Getting a Feel for Science

Adapting Existing Non-Formal Education Techniques to Conform to Universal Design

Sponsored by Commonwealth Scientific and Industrial Research Organisation (CSIRO)

An Interactive Qualifying Project
submitted to CSIRO Education and the Faculty of
WORCESTER POLYTECHNIC INSTITUTE
in partial fulfilment of the requirements for the
Degree of Bachelor of Science

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Spring 2009

Keywords
1. Education
2. CSIRO
3. Disability

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Abstract

This project implemented and tested methods to adapt Commonwealth Scientific and Industrial Research Organisation (CSIRO) science programs to accommodate Australian students with disabilities. Universal Design principles were applied to the Tyre Track activity in the Forensic Frenzy program to improve the science experience for visually impaired students. The team gathered survey and observational data, evaluated activity effectiveness, and delivered recommendations and guidelines. Statistical analysis demonstrated that non-formal education programs modified to contain multi-sensory components increase student knowledge and understanding.

Acknowledgements

Throughout the project many individuals have helped and inspired us. We would first like to thank WPI and the IGSD for supporting the Melbourne project centre, for without them, we would be still be in Worcester.

Our thanks to the WPI ATC for providing us with a video camera to document all our processes and some de-stressing dancing moments as well, to Laura Hanlan for her help jumpstarting our research and introducing us to Refworks, to Jon Baldiga for his outstanding construction skills in the face of impending deadlines, and to Jodie for making our experience at the Milano fun and always interesting. Without her Jillian would not have enjoyed the city nearly as much.

To all the schools we visited for their permission to survey the students – a big thanks. Without them we would have a statistically insignificant amount of data.

Our biggest thanks to the presenters of Forensic Frenzy we observed – Michelle, Rosemary, Carly, Gemma, and Cathleena – for allowing us to observe their sessions, providing us time to administer our surveys, and being helpful and an invaluable part of our project.

We would like to express our sincerest gratitude to Garry Stinchcombe for his insight regarding the accessibility of our stations to the visually impaired. We would like to thank him for his support of our project and the invaluable feedback provided from our visit. Learning 'Swish' was one of the highlights of our trip and we are greatly saddened future WPI project groups will not have the opportunity to experience this incredible opportunity.

And to our mothers, Sally Cohen, Ann Mondor, and Deborah Child Trabucco, for not only worrying about while still supporting our travels 10,000 miles away, but also for editing our paper, especially since they probably didn't know what they were getting themselves into when they agreed.

We would like to thank professors Kinicki and Weininger for their insight and continuous advice on this project. Without their suggestions, we would be knee deep in plaster. We would also like to thank Mrs. Kinicki and Mrs. Weininger for tea with the girls and allowing us a chance to take a break, except for Chad, who still wishes he was a girl to partake in the activities.

We are grateful to CSIRO for sponsoring our project and for all the people we have come into contact with for being friendly to us crazy Americans! Our sincere thanks to Ava for letting us in the building the first few weeks with a friendly face every morning, Lyn for listening to our constant discussion of the intricacies of our paper and still liking us, and Simon for allowing us to use his spare tyre over and over and over to create our moulds and making us the new suspects in the Forensic Frenzy case. And thank you to Nicola, Elke, Sean, Mick, and David for all your advice and patience. We will never forget icy poles or snibs unless we have a brain fart.

We would like to give a big hug to Caitlin. We really enjoyed the tea, coffee, and lollies she offered. The first day discussion of her husband's free samples set the stage for our comfort in the office. Without her enthusiasm and excitement we would not have had nearly as much fun with this project.

Finally, we would like to thank Chris KP. Without the endless hours of discussion in your office, ranging from the proper lubricating substance for our tyres, to how awfully great the Richmond Tigers are, to effective ways to deter strange strangers on the train, we would certainly not have learned nearly as much about Australian culture. We could not imagine our Australian experience without his genius ideas, guidance, support and comic relief.

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Nomenclature

Assessment: “a test of individual performance” (MacKendrick, Osgood, & Teske, 2008, p 64)

AT: Assessment Type

CSIRO: Commonwealth Scientific and Industrial Research Organisation

CSIRO-SEC: Commonwealth Scientific and Industrial Research Organisation- Science Education Centre

ddH_2O: Distilled and De-ionized Water

DNA Profile: The pattern of bands created after performing biological techniques to isolate and cut DNA. A DNA profile is unique for each individual, providing a means of identification

Evaluation: “a means of gathering a more broad range of data concerning effectiveness of programs and exhibits.” (MacKendrick, Osgood, & Teske, 2008, p 64)

FF: Forensic Frenzy

Forensic Frenzy: a CSIRO science education program in which students learn about forensic science through investigation of evidence

Formal Education: “hierarchically structured, chronologically graded ‘education system’, running from primary school through the university and including, in addition to general academic studies, a variety of specialised programmes and institutions for full-time technical and professional training” (Smith, 2001).

Informal Education: “the truly lifelong process whereby every individual acquires attitudes, values, skills, and knowledge from daily experiences and the educative influences and resources in his or her environment” (Smith, 2001)

IQP: Interactive Qualifying Project

Legally blind: A person having less than 6/60 vision or the field of vision is less than 20 degrees.

Mainstream School: A school, whether governmental or independent, which does not cater to a specific type of student.

MSDS: Material Safety Data Sheet

New: An abbreviation for “Modified”

Non-formal Education: “any organised educational activity outside the established formal system - whether operating separately or as an important feature of some broader activity - that is intended to serve identifiable learning clienteles and learning objectives” (Smith, 2001)

Old: An abbreviation for “Original”

Polar Question: A type of question that results in only a “yes” or “no” answer

Rating Scale: A question that seeks a response that must fall within a continuous range of numbers

SAM: Student Accessibility Matrix

TP: Tyre Positive

TT: Tyre Track

TTN: Tyre Track Negative

Tyre Track activity: a station that is part of the Forensic Frenzy program in which students compare tyre tracks found at the crime scene to suspects tyres

Tyre Track Negative: the image or mould that represents the track the tyre makes when rolled through a malleable material

Tyre Positive: the image or mould that represents the tyre itself

Universal Design: “framework for designing educational environments that enable all learners to gain knowledge, skills, and enthusiasm for learning. This is accomplished by simultaneously reducing barriers to the curriculum and providing rich supports for learning” (National Universal Design for Learning Task Force, 2008)

Vision impairment: a limitation of one or more functions of the eye (RIDBC, 2008)

WPI: Worcester Polytechnic Institute

Statistics Nomenclature

2-Prop-Z-Test: Determines if the difference between two proportions is significant

2-Samp-T-Test: Determines if the means from two separate samples from a population are each significantly different from the population mean

Alternative Hypothesis: A hypothesis that opposes the null hypothesis. It is accepted if the P Value is found to be below the significance level

Arithmetic Mean: An average of the quantitative values collected from the sample

Binary Responses: A response that results in one of two predefined responses. Examples include “yes” or “no” and “Male” or “Female.”

Central Tendency: A measurement that refers to the middle, average, or expected value of an entire data set.

Confidence: In terms of this report, the project team can state a fact in confidence if a P Value is found to be less than 0.05 or a 95% confidence interval is performed. Stating a fact with confidence means that the project team is at least 95% confident that the fact is true based on collected statistically significant data.

Confidence Interval: Is used to judge the accuracy with which a value has been calculated. Yield a deviation from the sample mean that the population mean is expected to fall within.

Continuous Rating Scale: A set of continuous values of a particular range. In most cases in this report, integers ranging from 1 through 5

Correlated: A strong relationship that is found between two variables or sets of data

Descriptive Statistics Testing: Describes the features of collected data from a sample as a unit

Hypothesis Testing: The process of making statistical decisions or conclusions using sets of data.

Independent: Meaning that the probability of two or more events occurring is unaffected by the outcome of another event

Null Hypothesis: A hypothesis that opposes the alternative hypothesis. It is assumed to be true unless the P Value is found to be below the significance level, in which case it is rejected.

One-sided testing: A term that describes how to calculate the P Value in a hypothesis test when the null hypothesis is that the man of one population is assumed to either be greater or less than the mean of another population

Open-Ended Question: A form of a question to which the responder is not presented with pre-determined responses to select from. The responder is allowed to answer the question using any interpretation and they chose.

P Value: The probability of obtaining a result that is at least as far away from the expected value as the one that was observed assuming that the null hypothesis is true

Percent Difference: A means to determine how different two measures are from each other

Percentage: Mathematically a fraction of the sample the project team is interested in over the total sample

Pooled Data: A term that is used if the variance or standard deviation of one sample of the population is assumed to be equal to the variance of standard deviation of the population as a whole

Population: The population from which the project team is sampling data. In most cases the population can be assumed to be the students of Australia or the students of Victoria.

Refute: Rejecting a hypothesis or a statement based on statistically significant data

Sample: A randomly selected group of people taken from the population

Sample Population: a synonym for “sample”

Sampling Size: The number of people, trials, or other distinct units in the sample taken from the population

Significance Level: The level which the P Value must fall below to reject the null hypothesis

Standard Deviation: A measure of variability of a set of data collected from a sample. Numerically equal to the square root of the sum of the variances of each datum from the arithmetic mean.

Statistical Inference Testing: Uses statistics to make assumptions and estimations about the total population from analysing sample data

Statistical Variability: The spread of a particular data set. Usually this measurement takes the form of including the sum of the distances of each data point from the mean.

Statistically Significant: A statement, hypothesis or fact can be stated with confidence if the data is statistically significant. In terms of this project, a statistically significant result is reached if the P Value falls below the significance level of 0.05.

Two-sided testing: A term that describes how to calculate the P Value in a hypothesis test when the null hypothesis is that the mean of one population is assumed to be unequal to the mean of another population

Variances: A measure of statistical distribution or spread which averages the squared distance every data point is from the mean

Executive Summary

The Commonwealth Scientific and Industrial Research Organisation (CSIRO) is the National Science Agency within Australia. CSIRO conducts a variety of scientific experiments and research with the goal of benefiting Australian industry and society. Within CSIRO is its Science Education Centre (CSIRO-SEC) whose focus is to educate students about science through a variety of exciting, hands-on educational programs. CSIRO-SEC hopes to inspire these students to become more involved with science in their futures.

Modelling after previous CSIRO IQP projects, CSIRO-SEC desires to implement Universal Design into their educational programs so that all students have equal opportunities to gain knowledge and understanding about science. The process of implementing Universal Design entails the development of a program so a student who has any type of disability or impairment will have the same learning opportunities as a student without any disability or impairment. It is also important that the modifications to the program do not interfere with the delivery of the program's objective, to help students understand science and introduce students to the world of science. The project team was asked to materialise the principles of Universal Design by adapting one of the CSIRO programs for students, specifically those with visual impairments.

An existing CSIRO program that would benefit from implementing Universal Design principles is titled Forensic Frenzy. Within this program are a variety of activities for students to learn the fundamentals of forensic science by participating in a mock crime scene. The specific activity that the project team modified was the Tyre Track activity (Figure 1). This activity requires the students to look at a picture taken of a tyre track that had been found at the scene of the crime. A picture has been taken of the tyres from each of the four suspect's cars. The students must match the tyre track to the corresponding tyre to determine which suspect's car was at the scene of the crime. For a student without any disabilities or impairments, the task is straightforward. However, if the student has a visual impairment, the task becomes more difficult and may even be impossible to complete.

Figure 1: Original Tyre Track Activity

The project team began by conducting background research on a variety of subjects. It was important to understand the different types of education, types of visual impairments, and methods of assessment. The project team came to the decision that the most effective means of adapting this activity to accommodate students with visual impairments would be to explore methods of moulding tyres and tyre tracks. With this design, the Modified activity would accommodate both the senses of sight and touch. Plaster of Paris, play dough, hardening clay, non-hardening clay, and silicone rubber were all investigated as options for creating moulds.

The most tangible deliverable of this project was the Modified Tyre Track activity (Figure 2). This consisted of four Tyre Positive moulds of the suspects' tyres and one Tyre Track Negative mould of the imprint found at the scene of the crime. All moulds were made of silicone rubber because of its durability and quality.

Figure 2: Modified Tyre Track Activity

In order to gain insight about the usefulness and effectiveness of the Modified Tyre Track activity, it was brought to both mainstream schools and a school for the visually impaired in the state of Victoria, Australia. The project team wanted to ensure that students with visual impairments would gain a better understanding of the program and excitement for science, while ensuring that the purpose of the activity would not be lost to students with normal vision.

Over 170 students were assessed as they progressed through the program. Within the mainstream schools, three formal assessments were conducted: a Pre-Program Survey, an Observational Checklist, and a Post-Program Survey. The Pre-Program Survey was distributed before the start of the program to establish a baseline of the knowledge and understanding that the students had about science and forensics. While the students were participating in the Tyre Track activity, the project team members observed student behaviours which provided information regarding the effectiveness of the activity. The Post-Program Survey was distributed to the students upon finishing the Forensic Frenzy program, but prior to discussing the evidence from the crime. The students were assessed on their understanding of the program and their opinions regarding the Tyre Track activity.

The project team compiled the data from the assessments and found the following statistically significant results:

- There is an increase in the students' perceived knowledge of science after progressing through the Modified Tyre Track activity.
- There is an increase in the students' perceived knowledge of forensic science after progressing through the Modified Tyre Track activity.
- There is an increase in the students' perceived knowledge of tyre forensics after progressing through either the Modified or Original Tyre Track activity.
- There is an increase in the proportion of students that used their sense of touch to help them identify the tyre in the Modified Tyre Track activity as compared to the Original Tyre Track activity.
- The students' perceived usefulness of the Original Tyre Track activity was greater than the student's perceived usefulness of the Modified Tyre Track activity.

In addition, potential negative side effects of the Modified Tyre Track activity were investigated and the following results were found to hold true:

- There was no difference in the percentage of students able to correctly progress through the station between the Modified and Original activity.
- There was no difference in the amount of confusion between the Modified and Original activity.
- There was an equal level of understanding between the Modified and Original activity.
- Variables such as gender or presenter did not influence student responses to other questions on the surveys.

The data collected by the project team in mainstream schools resulted in two broad conclusions:

1. **Multi-sensory activities stimulate an increase in excitement, knowledge and understanding.**

   The major purpose of implementing Universal Design is to make existing programs and activities accessible to all students of all abilities. Introducing multi-sensory activities should enable the program to reach a larger population of students and ideally increase learning by providing multiple methods of gathering information. There was not a significant difference in the proportion of students that utilized sight to match a tyre to its tyre track between the Original and Modified activity. However, there is statistically significant evidence supporting the result that a larger proportion of mainstream students utilized the sense of touch to match a tyre to its tyre track in the Modified activity. In addition to improving the activity for visually impaired students, the results of this study have also shown that there is a significant increase in learning, understanding, and knowledge in students in mainstream schools when a multi-sensory

program replaces a single-sensory program. Students who have normal vision are benefiting from an activity modified for students with vision impairments.

2. Simplicity increases effectiveness

The project team modified a single activity, made very simple, cost-effective, and straightforward modifications, and reintroduced the equipment into school systems producing a significant effect. Complex and expensive modifications to existing activities are not necessary to adapt programs to Universal Design principles. Interviews and surveys collected from students revealed that simple and straightforward activities are the easiest to understand.

The project team visited a school for the visually impaired to present a modified version of Forensic Frenzy. A version with six stations was presented, four of which were modified by the project team. Eleven visually impaired students were split into three groups which proceeded through all six stations with a project team member as a guide.

Two techniques were employed to gather information from the students and teachers at the school for the visually impaired. First, the project team recorded basic observations of the student's interactions with each station. Second, following the presentation, the project team engaged in discussion with the students. Feedback was gathered from the students and teachers from this discussion. These findings were then used to develop a number of conclusions which contributed to the development of recommendations.

The students expressed general enjoyment regarding the program and felt that they better understood forensics. Part of this enjoyment came from having the opportunity to discover things on their own. Students with visual impairments do not normally have the opportunity to participate in science education activities because the majority of these activities involve primarily visual methods of learning. By implementing Universal Design into the Forensic Frenzy program, visually impaired students were able to actively participate in science.

After analysing the collected data and making conclusions based upon that data, the project team developed the following recommendations:

Tyre Track Activity

- Implement the silicone rubber moulds into the Tyre Track activity of Forensic Frenzy

CSIRO-SEC Programs

- Provide alternative formats of the worksheets: in large font, in Braille, or as a voice recording
- Implement multi-sensory activities into the programs wherever possible: scent, sight, touch, auditory
- Follow Universal Design principles for any new programs developed
- Modify existing programs to comply with Universal Design principles. With more educational programs complying with Universal Design, more students will be able to participate and gain a positive educational experience.
- For activities that cannot be modified, ensure all students are encouraged to participate to the extent of their individual abilities.
- When a student with disabilities is present, ensure his or her partners have the skills to help compensate but still allow the student to participate.

Universal Design Principles - When adapting a program to be accessible to students with particular disabilities, it is important to be aware of the abilities and limitations of all students. To best adapt programming, the project team recommends that the principles of Universal Design be met.

- Provide material in advance if the student needs it
- Determine which activities are essential to learning
- Integrate multi-sensory activities
- Simplify instructions while keeping them as descriptive as possible
- Encourage group work
- Focus on individual strengths
- Presentation style and environment
- Lighting conditions of the room and where the presenter is standing
- Equipment is easily accessible
- Maintain organization and consistency
- Ensure safety
- Allow additional time if needed

Report Distribution

- Distribute this report to non-formal educators as proof of the usefulness Universal Design principles have in non-formal education and to other CSIRO Science Education Centre managers to implement across the CSIRO-SEC curriculum

Future Projects

- Explore the usefulness of implemented Universal Design principles for students with other disabilities
- Investigate and recommend further adaptations based on Universal Design for other CSIRO-SEC programs
- Expand Universal Design principles to other non-formal education settings

By implementing Universal Design into the Forensic Frenzy program, the project team was able to take the first steps in providing equal learning opportunities to students with disabilities while supplying all students with multiple avenues to learn. With the given recommendations, CSIRO-SEC will be able to further model their programs to conform to the Universal Design standards and will enable more students of all abilities to partake in the exciting journey science has to offer.

1 Introduction

Non-formal education is valuable to the overall learning experience of students. Unfortunately, many non-formal education techniques are unable to communicate the desired objective to students with disabilities. Universal Design is a method of adapting these programs to influence all students regardless of impairments. It reduces barriers present in educational settings so that all students have equal opportunities to learn.

The Commonwealth Scientific and Industrial Research Organisation (CSIRO), in Victoria Australia, strives to educate students about science through a variety of exciting educational programs. CSIRO is working to implement Universal Design into their educational programs to provide all students with equal opportunities to gain knowledge and understanding about science. The process of implementing Universal Design entails the development of a program whereby a student who has any type of disability or impairment will have the same learning opportunities as a student without any disability or impairment. It is also important that the modifications to the program do not interfere with the delivery of the program's objective, to introduce students to science.

One of the programs that CSIRO offers to educators is titled Forensic Frenzy. CSIRO reaches out to students in grades five through ten and teaches them the fundamentals of forensic science in hopes that they will acquire an interest in the subject. Students take on the role of forensic investigators and examine evidence using scientific techniques to solve a crime. The activities included in the Forensic Frenzy program are based on evidence left behind at the scene of the crime. The activities include fingerprint analysis, footprint analysis through soil testing, fabric and fibre analysis, and tyre track identification among others. The activity that the WPI project team has been asked to modify is the Tyre Track identification activity.

The current method for identification of tyres in the Forensic Frenzy program focuses on the use of photographs. A photograph of the tyre track left behind at the crime scene is compared to photographs of the tyres that belong to the cars of the four suspects. To a student without any disability, this task would seem relatively easy. However, for a student who is visually impaired, the comparison of the photographs is extremely difficult and may even be impossible. It would be beneficial to students with visual impairments to have a tactile aid for the Tyre Track identification activity.

In order to address the problem, the project team set out to create a mould of the tyre to represent the inverse print that the tyre track would exhibit. The team developed Tyre Positive prototypes and Tyre Track Negative prototypes which culminated in a final design for each. By using silicone rubber, the team was able to create the inverse print of the tyre in order to produce a tactile aid for the use of all students. The final design was implemented into the Forensic Frenzy program so that students participating in the program could to feel the comparisons of the tyre track left at the scene of a crime to the moulds of the suspects' tyres.

After implementing the new approach to the Tyre Track identification activity, the team assessed the effectiveness that the piece of equipment had on the Forensic Frenzy program and compared the

assessment to the Original method of tyre identification. Students either participated in the Tyre Track activity as the Original method or as the Modified activity. Throughout the activity, they were assessed. The assessment is composed of three parts: the Pre-Program Survey, the Observational Checklist, and the Post-Program Survey. The Pre-Program Survey defines the level of knowledge that the students had before going through the program. During the activity, the team observed the students' interactions and behaviours. After the completion of the activity, the student participated in the Post-Program Survey that assessed the amount of knowledge and interest gained from the activity. The set of data that was gathered from the Original activity was compared to the set of data from the Modified activity. Additionally the project team hoped to compare data between mainstream students without disabilities and those students with visual impairments. In order to accomplish this, the project team sought out specialized schools for visually impaired students. The desired outcome of implementing Universal Design was that students would gain the same amount of educational learning and stimuli regardless of disability. Additionally, it provided enhanced learning by stimulating multiple senses and making activities as interactive as possible. Because these two outcomes were achieved, the team reached the primary step in implementing Universal Design into CSIRO's educational programming. Additionally, the team was able to make recommendations to CSIRO based upon the completion of these goals.

2 Background

To best understand the CSIRO objectives, a variety of subjects were analysed by the project team. Within the non-formal education setting there are many types of students. Some have disabilities and impairments and others do not. Implementing Universal Design into the educational setting allows all students to gain the same opportunities regardless of impairments.

To be able to implement Universal Design into CSIRO's science programs, the project team researched an assortment of methods that are suggested for students with visual impairments in an educational setting. The project team also needed to research assessments that can accommodate all types of students. The team found that assessments vary widely between formal and non-formal education.

The project team goal was to convert a primarily vision based activity, the Tyre Track identification activity, to a tactile learning opportunity. Different moulding techniques were researched to determine the most effective means of tactile learning.

2.1 Non-formal Education

Non-formal education, occasionally referred to as informal education in the literature, is an integral part to learning in most educational systems. Non-formal education gives students a chance to learn and explore at their own pace, following their individual motivations.

2.1.1 Definition and Comparison to Formal Education

To define and clarify the term non-formal education, formal and informal education must first be clearly defined. According to Mark K. Smith, formal education is the

> "hierarchically structured, chronologically graded 'education system', running from primary school through the university and including, in addition to general academic studies, a variety of specialised programmes and institutions for full-time technical and professional training" (2001).

Formal education is typically what students experience in schools as part of a larger educational system, public or otherwise. In contrast, informal education is "the truly lifelong process whereby every individual acquires attitudes, values, skills, and knowledge from daily experiences and the educative influences and resources in his or her environment" (Smith, 2001). Informal education is simply the knowledge that one gains through interaction with his or her environment and the other individuals in it.

In contrast to these types of education is non-formal education, which falls between both of these extremes. Non-formal education is "any organised educational activity outside the established formal system - whether operating separately or as an important feature of some broader activity - that is intended to serve identifiable learning clienteles and learning objectives" (Smith, 2001). Common examples of non-formal education are field trips, museum or national park visits, and hands on projects provided by outside vendors. Non-formal education increases interest and curiosity for learning by providing students an opportunity to explore things which they find interesting and enables them to

learn guided by their own motivations. Non-formal education is sometimes referred to as informal education. In this proposal, *non-formal* and *informal education* will be used as defined above.

2.1.2 Evaluation and Assessment

Assessment is an essential element of both formal and non-formal education. Particularly in non-formal education, the issue of assessing both individual progress and the effectiveness of the program as a whole is not well established. Assessment of these two aspects is clarified by the following distinction:

> "Assessment is a test of individual performance, whereas evaluation is a means of gathering a more broad range of data concerning effectiveness of programs and exhibits." (MacKendrick, Osgood, & Teske, 2008, p 64).

In this sense, most non-formal educators are concerned with evaluation rather than assessment of individual student progress. Evaluation is preferred because non-formal education is designed to be fun, low-stress, and self-motivated. If the students are asked to participate in an assessment tool, they may experience anxiety and decreased levels of enjoyment of the activity (MacKendrick, p 63). For this reason, when evaluating a program or assessing students in a non-formal environment, care must be taken to use tools that are not stressful to students. The most common types of assessments used in non-formal settings include questionnaires, interviews, observation, focus groups, surveys, question and answer sessions, and minute papers (MacKendrick, p 62). Of these the most practical for projects such as the ones presented by CSIRO are observation, minute papers, and questionnaires.

Observations made by outside evaluators are considered to be the best form of assessment. Students often will not recognize they are being observed by outside parties and, therefore, stress to students is minimized. Additionally, structured observation using a checklist of clear behaviour associated with the learning objectives of the project can provide clear data to analyse (MacKendrick, p 74).

Minute papers have been recommended as the second most effective type of assessment. It is essential to first explain to students that the minute paper is not a test (as long as no grade will be given on an individual basis for the paper). The minute paper gives students an opportunity to show their enthusiasm for particular parts of the project and point out areas that may be unclear. This is accomplished by asking two open ended questions, one regarding what the student enjoyed and the other about things the students struggled with or did not understand (MacKendrick, p 74). These minute papers would take a significant amount of time to analyse. It may be difficult to draw strong comparable data from the minute papers because they do not provide standardized results. However, minute papers work well and provide clear feedback from the students as long as there is adequate time for performance and analysis.

The third recommendation for assessment of non-formal education is a questionnaire. Questionnaires are least desirable because of the close resemblance to a test. Many students, particularly younger ones, may not understand the difference between a test and a questionnaire, which may result in unneeded stress. With this stress the data may not be accurate; however the data will be easier to compare than other methods. To make it more accurate, the data are collected using a series of questions of various styles, including multiple choice and short answer (MacKendrick, p 74).

In order to have standardized data, a baseline of understanding must be established before the program is implemented. This baseline gives a comparison to the post-program data gathered. Two types of pre-program tools are recommended for use in creating this baseline. The first would be to provide students with pre-program information packets. These packets would be provided by the non-formal educators to the formal teachers in order to give background information on the subject, including any terms that may be unfamiliar to the students (MacKendrick, p 69). The main problem with this method, assuming the formal teacher presents the information to the students, is one of understanding and retention. Understanding new material may be difficult for students, particularly those with disabilities. Even if the material is understood, students may forget the new material before the start of the program. Additionally, this method does not account for students who may already have advanced knowledge of the subject (MacKendrick, p 70).

The second method would be to perform background knowledge probes prior to the start of the program, which provides data on the students' level of understanding (MacKendrick, p 69). These background knowledge probes could include a simple set of rating scales for each area of knowledge that asks the student's perceived skill or comfort level. For example, the student would be asked to rate his or her knowledge of science from 1-5, 1 indicating no knowledge and 5 indicating advanced knowledge. The background probe could also ask open ended questions for which students provide answers, such as asking the student to explain his or her past experience with forensic studies. Rating scales are more likely to be used by a formal teacher as they are quick to complete and therefore would not detract from instruction time (MacKendrick, p 70). The background knowledge probes are a good choice because they give a clear baseline to compare post-program data. However, it is important to consider filling gaps in background knowledge essential to the program. Hence, the best pre-program system would be to provide information packets and subsequently perform background knowledge probes (MacKendrick, p 70). Coupled with this type of pre-program system, the post-program assessment could provide the non-formal educators with feedback regarding the effectiveness of the program. Additionally, if the data were to be shared with the formal educators, it would provide an opportunity for them to assess the usefulness to the class as a whole and any gaps in knowledge still to be filled (MacKendrick, p 77).

2.1.3 CSIRO Science Education Centre Programs

The Commonwealth Scientific and Industrial Research Organisation (CSIRO) is a governmental scientific agency in Australia. CSIRO has a non-formal science education centre program which "operates a range of science education projects to alert school students, their families and teachers to the contribution of scientific research to our community" (Science for Schools, 2008). CSIRO currently has nine centres including at least one in each state and territory (Science for Schools, 2008). The Victorian Centre, located just outside Melbourne in Highett, is the focus of this section, as that was the operating base for the project team. CSIRO projects are divided into two broad categories, one tailored toward primary school students (grades pre-6) and the other toward secondary school students, which includes years 7-VCE (Victorian Certificate of Education, obtained by completing years 11 and 12) (CSIRO, School Programs, 2008). Each program also specifically targets defined age groups. The Victorian Centre offers sixteen primary school programs covering topics such as small animals, robotics, physics, chemistry,

energy, scientific method, natural disasters, weather, and astronomy (CSIRO, School Programs, 2008). Additionally, fifteen secondary school programs are offered, including topics such as chemistry, forensics, DNA manipulation, photonics, robotics, energy, and health (CSIRO, School Programs, 2008). These programs meet certain learning standards that are specific in the online descriptions and often parallel formal learning objectives (CSIRO, School Programs, 2008).

2.2 Visual Impairment

The visually impaired have a disadvantage in the educational setting. Many programs have not been updated to support Universal Design, so students with any type of impairment will not gain the same degree of learning and excitement as students without a visual impairment. It is important to understand the classifications of vision impairment and the definition of being legally blind in Australia. It is also crucial to be aware of the barriers that are present to students with visual impairments and potential strategies to improve their quality of learning.

2.2.1 Definition

Vision impairment is defined as a limitation of one or more functions of the eye (RIDBC, 2008). The most common impairments affect the sharpness or clarity of vision, normal range of vision, or colour perception. The government of Australia defines a person as "legally blind" if his or her "degree of sight loss entitles them to special benefits." An Australian person is legally blind if he or she has 6/60 vision, meaning he or she cannot see at six meters what a person with normal vision can see at 60 meters (Vision Australia, 2007). If a person's field of vision is reduced to less than 20 degrees, he or she is also considered legally blind.

Approximately one percent of Australia's population suffers from a significant visual impairment, which is equivalent to more than 400,000 people (University of New Castle, 2005). Eighty percent of these impairments are found to be caused by one of five main eye conditions: cataracts, glaucoma, under-corrected refractive error, diabetic retinopathy, and age-related macular degeneration (CERA, 2008). With the exception of macular degeneration, all these conditions can be evident in children. Some of them are congenital while others may develop later in childhood. Fortunately, the majority of vision loss is correctable. According to the Centre for Education and Research on Ageing (CERA) at least 50% of vision loss is correctable and 25% is preventable (CERA, 2008). This correction is accomplished through various treatments and the use of visual aids such as glasses or contact lenses.

While there are many opportunities for correction, a number of children still remain visually impaired to the extent that special adaptations are needed for them to learn properly. One study found that only three to five percent of printed material is available in an accessible format for the visually impaired (Vision Australia, 2007). For students whose visual impairments cannot be corrected, there are a variety of means that can help them in the classroom, all depending on the severity of their disability. Repeating important phrases, speaking clearly and audibly, using a microphone, and verbalizing all points that are written out will allow the student to use his or her sense of hearing to take in information. Supplying lecture notes in a variety of formats, including in large print and in Braille, ensuring there is proper lighting in the classroom, verbally describing all motions and demonstrations, and using simple language are also helpful to these students (University of New Castle, 2005).

2.2.2 Barriers Present for Students

In a non-formal educational setting, the barriers to students with visual impairments are significant. In CSIRO's Forensic Frenzy program, students rely on their ability to see evidence that is left behind at a crime scene. There is a considerable amount of observation that must be done that is inaccessible to students with visual impairments.

The size and font of the text is crucial for students that have low vision in any situation where printed material is provided to the students. If the text is not enlarged properly, the student may not be able to read instructions or worksheets and would have a disadvantage compared to the students with normal vision. Additionally, if material is in colour, the contrast may be a barrier to these students. Therefore, it is important for any material used in the classroom to be accessible to all students (University of New Castle, 2005). Due to the fact that CSIRO uses photographs in their educational programming, students with visual impairments may be unable to distinguish one photograph from another.

It is important for appropriate dialogues to be used in the vicinity of students with visual impairments. The students may not have the ability to watch interactions between people or even know if a question is directed towards them. Descriptors such as "up here" or "over there" are often accompanied by hand gestures that a student with a visual impairment will not be able to properly observe (University of New Castle, 2005).

2.2.3 Adaptations for Students

To make learning more accessible for students with visual impairments, adaptations can be made to both materials that are used for learning and to the students' environment. When adapting materials, it is important to consider the purpose of the lesson and define what the material is intended to teach. The material should serve that purpose. When adapting material, it is important to be aware of whether the student's best learning channel is auditory or tactile. The visually impaired student should be able to gain the same amount of information from the adapted material as the sighted students do from the original material. This learning should be measurable. Examples of modifications and adaptations in materials include enlarging text, adding texture, minimizing glare, eliminating unnecessary detail, shifting from two-dimensional to three-dimensional figures and images, allotting extra time, and changing the media from written to oral or taped (Bishop, 2004, pp 107-108).

Adapting the learning environment can also be particularly helpful to a student with visual impairments. The student should be allowed preferential seating for best use of available vision and be allowed enough time to complete their best work on assignments. The student's best work should be expected. The same quality of work should be expected from the student with a visual impairment as a student with normal vision. Lighting conditions should be monitored to minimize glare and maximize sight potential. Also, maintaining organisation is important so the students are familiar and comfortable in their learning space (Bishop, 2004, 109).

2.2.4 Universal Design

Universal design, according to the National Universal Design for Learning Task Force, is a "framework for designing educational environments that enable all learners to gain knowledge, skills, and enthusiasm

for learning. This is accomplished by simultaneously reducing barriers to the curriculum and providing rich supports for learning" (2008). Accommodations are often made for students that have disabilities or impairments so that assignments and activities are accessible to them. Many of the accommodations made by educators for students with disabilities are incorporated into the classroom to enhance the level of understanding for all of the students. A variety of techniques have been shown to make educational material more accessible and easier to understand for all students, whether or not they have a disability (Simone, Vozzola, & Worobey, 2007).

The Universal Design principles are as follows:

1. Provide material to students to prepare them in advance
2. Determine which specific activities are essential to achieve learning goals
3. Integrate multi-sensory activities
4. Simplify instructions
5. Encourage group work
6. Focus on the individual strengths of students
7. Recognise the presentation style
8. Ensure that all equipment is easily accessible to students
9. Ensure safety when using any equipment
10. Allow students additional time if needed

A detailed description of each principle can be found in Appendix A: Universal Design Principles.

Past studies have been completed assessing the extent to which Universal Design has been implemented into existing CSIRO-SEC non-formal education programs (Simone, Vozzola & Worobey, 2007). This report presents the Student Accessibility Matrix, SAM, which illustrates the barriers that students with disabilities encounter in educational settings. The vision impairment section of this matrix is given in Appendix B: Student Accessibility Matrix (SAM).

2.3 CSIRO Programs

CSIRO, the Commonwealth Scientific and Industrial Research Organisation, is the national science agency of Australia, consisting of over 15 business divisions involved in over 740 research activities. The mission of CSIRO is to serve the people of Australia by fostering an interest in science and research by exploring problems and developing solutions for industrial, environmental, and consumer markets (CSIRO, 2009).

The Science Education Centres division of CSIRO are "the base for CSIRO Education outreach programs around Australia" (CSIRO, 2009). The programs that CSIRO-SEC offers strive to bring interactive activities to schools throughout the country not only for the students, but for professional educators as well. The three goals of the CSIRO-SEC program are to alert students, teachers, and parents to contributions society makes to scientific research, to engage students in scientific learning so that they may choose to pursue a career in research, engineering, or scientific theory, and to elucidate the applications of scientific practices to students and teachers in real-world scenarios.

CSIRO-SEC in Victoria offers over 30 programs to primary and secondary schools in the Melbourne area covering a broad range of biological, chemical, and physics problems applied to solutions used in industry and nature (CSIRO, School Programs, 2009)

The Forensic Frenzy program, an interactive forensic analysis activity offered by CSIRO-SEC to grade levels 5-10, is a primary example of an interactive non-formal education program that may be better adapted to coincide with Universal Design principles. The objective of this project is to better adjust the Forensic Frenzy program to reach a broader range of students, regardless of whether or not they have visual, auditory or other disabilities or impairments. The goal is to use this adapted Forensic Frenzy program to collect data to determine if adapting non-formal education techniques to Universal Design positively influences education using the assessment tools such as SAM.

2.3.1 Forensic Studies

This project addresses the implementation of Universal Design into science education programs. An established non-formal education program must be selected to test and compare improvements that could be made to the program in order to determine the effectiveness of modifications in favour of Universal Design.

CSIRO Science Education Centre of Australia provides a plethora of non-formal science education programs to age groups ranging from primary education to secondary education. Forensic studies, by their nature as an observational science, require acute use of the senses. This gives students the opportunity to analyse physical evidence and examine events that have transpired to gather information present at the scene of a crime. The Forensic Frenzy program offered by CSIRO allows students to analyse the details of a mock crime scene and, by using various observational skills, gather information to determine the series of events involved in the crime and the role of the characters involved (Forensic Frenzy Teacher Booklet, 2006).

The Forensic Frenzy program is divided into a multitude of stations where the students gather the evidence for the crime. The stations are as follows:

1. Fabric on the Fence
2. Fibres on the Body
3. Ballistics – Type of Firearm
4. Ballistics – Griess Test
5. Envelope Ink – Chromatography
6. Dental X-rays
7. Facial Identification
8. Facial Reconstruction
9. Fingerprints
10. Oil Stains
11. Blood Identification and DNA Profiling
12. "PAID" Stamp Impressions
13. Soil Testing
14. Tyre Tracks

The instructions sheets for each activity can be viewed in Appendix C: Forensic Frenzy .

Many of the observational techniques used in the Forensic Frenzy program rely on visual methods. Therefore, they may be significantly improved in accordance with adapting a Universal Design method so that the activities are not lost to those students with visual impairments. One aspect of the mock study is to use visual observation to identify patterns of tyre tracks that have been left at the scene of the crime and compare them to the original tyre to determine a match between a suspect's car and the tyre tracks at the crime scene.

The purpose of this activity may be inaccessible to those students who have visual disabilities. They are unable to visually compare the tyre track to the respective tyre. Forensic related investigations require acute observation using all senses. The Forensic Frenzy program supports the three goals of the CSIRO-SEC department; mainly to reach out to students about the importance of science and its applications. Adapting Universal Design to forensic studies is crucial for students with visual disabilities so that this goal is achieved. CSIRO-SEC would be better equipped to spark interest in science and engineering to those with sensory impairments if their programs were adapted to Universal Design.

2.3.2 Tyre Forensics

Common practices in modern forensics include the casting of tyre tracks at crime scenes to prepare data that is utilized in a court of law (Bodziak, 2008). Tracks left by tyres are the indentations in road materials, marks on pavement, or other detailing remnants that a tyre leaves while moving backward or forward when a load is applied. Track evidence involves the collection of those tyre track indentations and includes, but is not limited to, measurements such as the track width, tread width, pattern, wheelbase, turning diameter, and rolling circumference (Bodziak, 2008).

Tyre tracks may be left on a number of materials such as concrete, pavement, snow, dirt, mud, sand or other driving surfaces. The techniques to analyse tyre tracks depend on many environmental conditions at the time of driving.

Casting these tracks is common practice in forensics for those tyres leaving indentations in dirt, snow, sand or other malleable surfaces. Common casting materials include epoxies, resins, rubbers, waxes and other adhesive materials to mould to the contours of the track. Casting tyres or tracks provides a method for people with visual impairments to practice the activity of tyre forensics by converting a visual observation into a tactile feedback mechanism.

2.3.3 Use in Forensic Frenzy

To implement Universal Design in this non-formal education program, tyre tread and tyre track evidence must be made more accessible to students with visual impairments. Casting moulds of tyres may be implemented in this activity of the Forensic Frenzy education program so that students can compare the imprint of a tyre to that of the original using tactile methods of examination.

The method of Universal Design accomplishes much beyond the scope of making this activity accessible to students with visual disabilities. Both students with and without visual impairments will be able to compare the tyre to its inverse, since the imprint of tyre tracks yields the negative pattern of the tyre. This will stimulate the thought processes of students to visually and geometrically compare an original three dimensional mould to its negative to identify matches. In addition, this side effect will allow students with visual disabilities to better understand inverse images, patterns and designs. This is a powerful tool in understanding how tyre forensic studies are actually practiced in crime scenes.

Most importantly, this improvement would allow students with visual impairments to participate in a non-formal education program that would otherwise be inaccessible to them in purpose and understanding.

2.3.4 Castings and Moulds

Several commercial products are available to properly mould rubber tyres, capturing all the contours and details necessary for forensic analysis. Great-Stuff™ manufactures insulating foam that hardens and may be used in addition to a silicone spray to yield an accurate physical mould of tyres. Plaster of Paris is another commercially available product that may be used to create a hard but brittle mould of tyres for use in observation. Epoxy resins are available which harden to fit the shape of a mould and remain strong and durable. Clay is a commonly available product that is frequently used to create moulds in arts and crafts. Lastly, silicone rubber is a viable option for flexible moulding purposes.

Plaster of Paris is a commercially available powder that hardens similar to cement but remains slightly malleable after drying. It is comprised primarily of calcium sulphate hemihydrate ($CaSO_4 \cdot ½H_2O$) and is created by heating gypsum to temperatures above 150°C with water. This mixture releases heat, has a consistency of paste, and hardens after minutes of setting. Plaster of Paris creates accurate moulds, is inexpensive, and relatively simple to use. It has a quick cure time and poses no health concerns according to publicly available Material Safety Data Sheet (MSDS) reports (www.sciencestuff.com, 2006). Plaster of Paris is slightly brittle, which is to be expected from such a moulding substance.

Clay is a common substance used for many different moulding applications. Two types of clay are typically used, one that hardens with air exposure, and another that remains malleable. Specifically the air hardening clay will harden within 24 hours without any additions or adaptations. This makes it quick to use and allows for a permanent mould structure. According to Dixon Ticonderoga Company, a leading manufacturer of air hardening clay, the product is safe for use by children (Falke, Partners, 2007). The company also mentions the material is flexible before hardening, which "prevents crumbling when removing it from molds." (Falke, Partners, 2007). This is convenient for creating a mould of a tyre. However the clay, once hardened, is brittle and susceptible to breaking.

The non-hardening clay has moulding properties similar to the hardening clay, with the main difference being that the clay stays soft and malleable. This makes the non-hardening clay less likely to be used as a final mould; however it is possible to use in conjunction with other materials. Non-hardening clay is safe for use by children, according to Jovi, the manufacturer of Plastilina, a vegetable based non-hardening clay (Jovi Corp., 2009).

Silicone rubber is a polymer that may be injected into a mould or poured over a surface to create a highly durable, flexible and strong product. The mould resulting from silicone rubber polymerization is resistant to high temperatures and has high tear strength. It is resistant to reacting with many different chemicals, prolonging its longevity (www.azom.com, 2009).

The chemical qualities of silicone rubber are derived from its molecular structure, mainly a backbone of silicon-oxygen linkages. The bond lengths and angles between silicon and oxygen atoms in this molecule are large and therefore allow the product to be flexible on a macromolecular scale. In contrast, backbones consisting of carbon have much shorter bond lengths and angles which yield a more rigid material (Zumdahl, 2007). These qualities of silicone rubber moulding products allow moulds to be highly durable over time and also produce a substance which resembles the tactile qualities of tyre rubber for more accurate comparison.

Silicone rubber is commercially available from retail stores (Solid Solutions, 2009). It is typically sold in combination with a "catalyst" which speeds up the cure time of the rubber. Solid Mould 500, produced by Solid Solutions, is representative of a typical product that can be purchased, and has a working time of 40 minutes. Over three to four hours, the rubber will demould, which means that the shape can no longer be altered. Solid Mould 500 will be completely set within one to two days (Solid Solutions, 2009). These processing times are long enough for an accurate mould to be created and short enough for moulds to be produced in high quantity in a timely fashion. Material properties can be found in the technical data sheets which are publically available (Solid Solutions, 2009) and the MSDS of these products show low health risk to adults and children once the product has cured.

These options are all viable methods of moulding and will be further explored by the project team, in collaboration with CSIRO, to create the most realistic product.

3 Methodology

The broad purpose for working with CSIRO was to adapt non-formal educational programs towards Universal Design standards. The majority of non-formal education programs do not meet Universal Design standards in their individual activities, causing students with visual, hearing, or sensory disabilities to take away less from the overall experience.

To better accomplish this goal within a specific program, two objectives were set for the scope of this project.

A piece of equipment needed to be improved upon or built to adapt a non-formal education program for students with visual impairments. For the purposes of working with CSIRO's existing non-formal education programs, the Forensic Frenzy program was selected to adapt the activities to assist students with visual impairments in understanding the purpose of the demonstrations.

To determine if the changes to the piece of equipment had an effect on the level of understanding to all students involved, a method of data collection and analysis was implemented. Therefore, the second objective was to assess the effectiveness that the piece of equipment had on the understanding of the students progressing through Forensic Frenzy program.

Extensive research on the topics of Universal Design, assessment techniques, students with disabilities, and forensics was completed and allowed three specific methods to be formulated. A tyre track mould was created and tested as a piece of equipment designed using Universal Design standards. This mould allowed the students to actively participate in the activity using multiple senses. Specific types of assessment techniques were chosen to gather data: a Pre-Program Survey, Observational Checklist, and Post-Program Survey were selected to collect data from students by non-intrusive means. Six activities were adapted by the project team to be more accessible to students with visual impairments. This Modified Forensic Frenzy program was presented to a school for the blind and data was collected. Statistical tests were used to analyse, compare, and make conclusions from the data.

Using these methods, this project offered three deliverables. A piece of Universal Design equipment was created, implemented and used within the Forensic Frenzy program. A quantitative assessment was provided of all the data collected including statistical correlations found within bins of data. Finally, recommendations were provided on how to adapt CSIRO and other non-formal education programs to comply with Universal Design. The overall breakdown of the project can be seen in Figure 3.

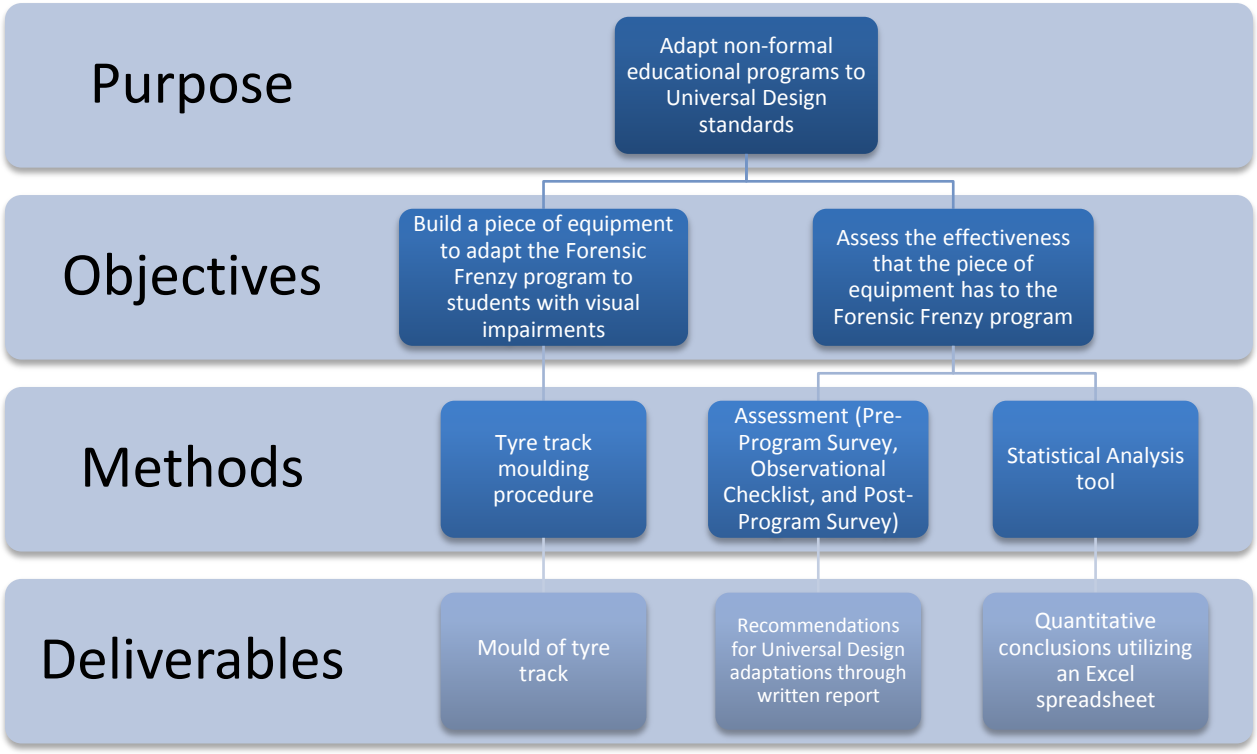

Figure 3: Flow chart describing breakdown of purpose of project

In short, a course of action was taken to design a means of moulding tyres for the Forensic Frenzy program, test the Modified Forensic Frenzy program in local schools to students of all abilities, and observe and assess the Modified program, comparing the existing curriculum to the new approach. Recommendations and guidelines were provided for non-formal educational programs.

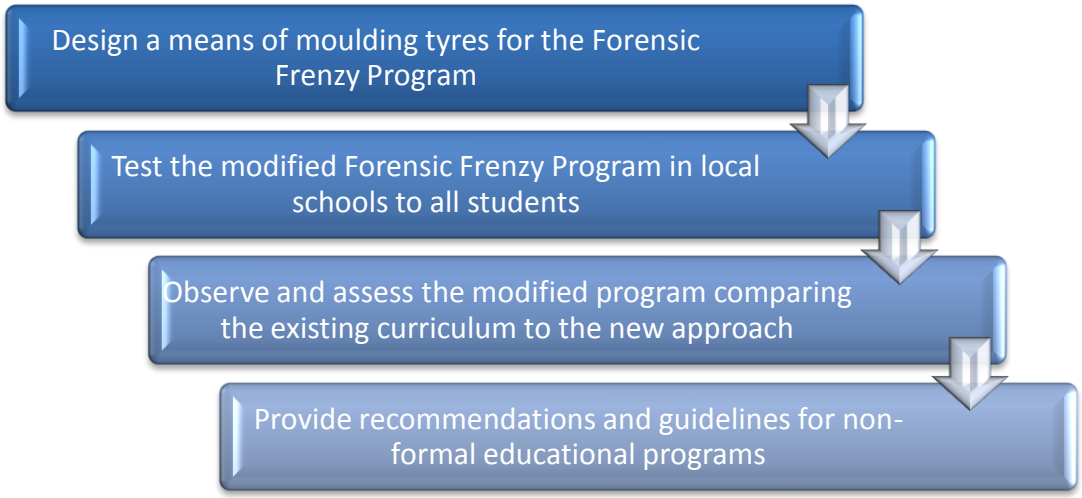

Figure 4: Project Design

3.1 Universal Design Equipment

In modifying a non-formal education program to better adapt to Universal Design standards, the Tyre Tracks activity of the Forensic Frenzy program was selected as the model case study. As stated in Section 2.2.4, students who have visual impairments may not benefit from this activity.

3.1.1 Mould Versions

The use of moulding materials to conform to a rubber tyre and cure to hardness was found to be the most effective method to recreate a realistic representation of a tyre track. After extensive research, a testing phase ensued which resulted in six consecutive versions of a Tyre Track Negative (TTN), an overview of which is found in Figure 5, and five consecutive versions of a Tyre Positive (TP), an overview which is found in Figure 9. These are the deliverable pieces of equipment for use in the Forensic Frenzy program.

Tyre Track Negative Versions

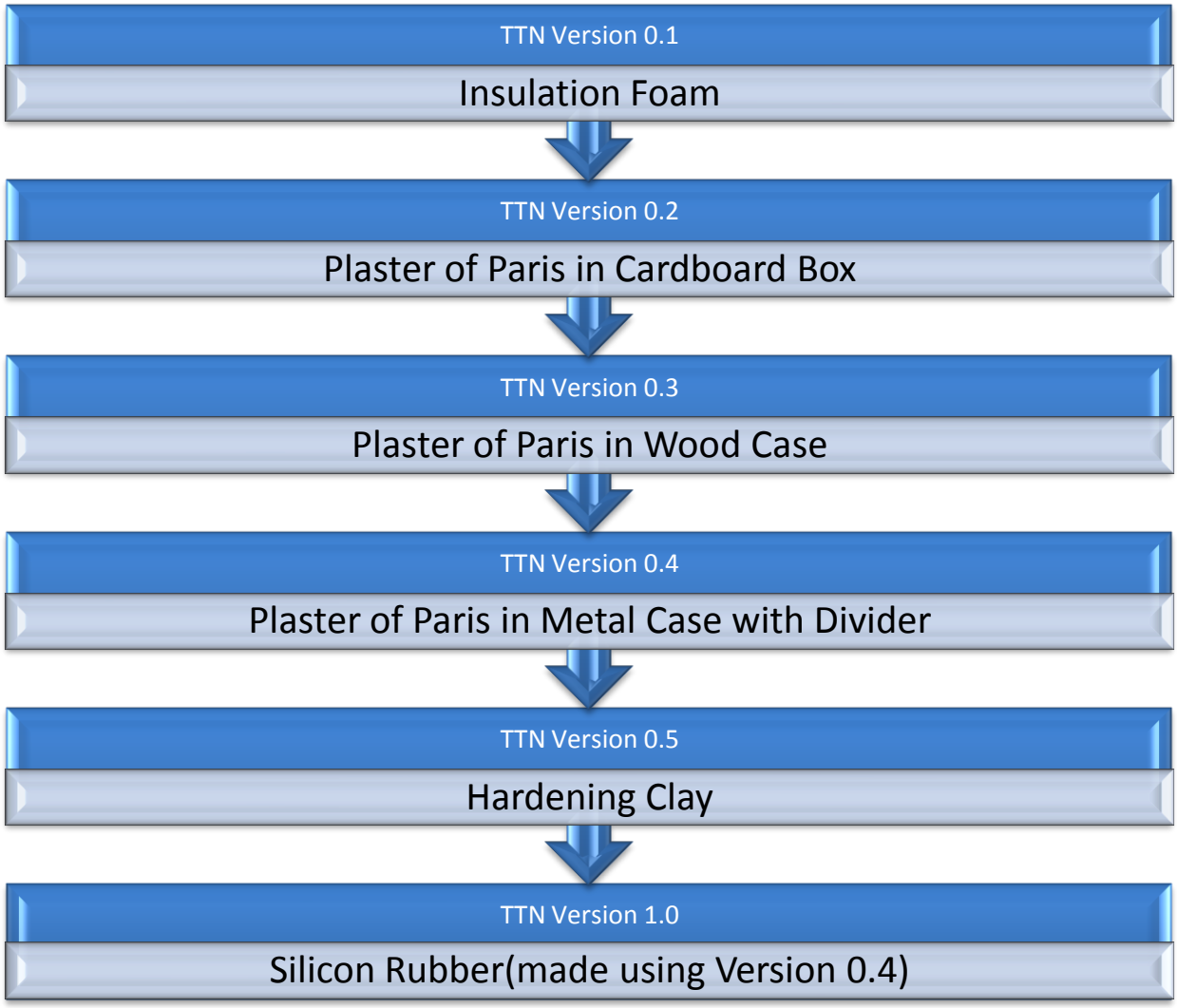

Figure 5: TTN (Tyre Track Negative) Versions

TTN Version 0.1, created in the United States, utilized Great-Stuff™ insulation foam. The intention was to use a pressurized canister to spray Great-Stuff™ insulation foam into the grooves of the rubber tyre. Great-Stuff™ is commercially used to seal cracks on doors. Great-Stuff™ is highly flexible due to its nature as a conforming insulation material and is therefore highly durable. Unfortunately, there are major safety concerns with Great-Stuff™ as it easily irritates the skin after prolonged exposure and is extremely harmful if it gets into the eyes. In addition, Great-Stuff™ did not successfully adhere to rubber surfaces and had to be dismissed as a possible means to mould tyres. The procedure for creating TTN Version 0.1 can be seen in Appendix D: Modified Tyre Track Worksheet.

TTN Version 0.2, created in the United States, utilized Plaster of Paris as a moulding material. Much cheaper than commercially available resin materials, Plaster of Paris is just as effective at creating accurate moulds of materials and is a much easier and safer substance to work with when compared to epoxy resins. MSDS listings reveal that Plaster of Paris is an inert and innocuous material safe to the touch after curing (DAP, 2002). Twenty-five lb bags (11.84 kg) produced by DAP™ are available at local hardware stores for approximately US$15 and cover over 10,000 cubic centimetres of surface per bag, making it a relatively inexpensive option. The working time is between 15—20 minutes from time of reaction to setting and the solid product continues to harden over the next three days (DAP, 2005).

TTN Version 0.2 was created using a cardboard box with an open cover as a casing. Cracks in the casing were sealed with masking tape. The plaster mould was a defined tyre track with high resolution directly comparable to the original tyre. The tracks remained relatively durable to the touch, but after prolonged exposure to touch and investigation, the tracks would wear and become brittle. The stability of the cardboard container was subpar and the equipment was prone to snapping if not carried with an equal pressure applied to the entire bottom surface.

The third version of the Tyre Track Negative, TTN Version 0.3, was built following the same procedure as the previous version but utilized a wooden chamber made of wood blocks and particle board to house the plaster. This provided the needed stability in the casing that the previous version lacked. TTN Version 0.3, also created in the United States, was difficult for one-person transport. Weighing nearly 50 pounds (110 kg), the design team realised TTN Version 0.3 had to be scaled down. The procedure for creating TTN Version 0.3 can be seen in Appendix F: TTN Version 0.3 Plaster of Paris in Wood Case.

TTN Version 0.4 was the first version created in Australia. It utilized the same procedure as TTN Versions 0.2 and 0.3, however it was placed in a metal casing lined with plastic and a divider was inserted before the plaster had cured completely (Figure 6). Adding the divider allowed the larger plaster mould to be split into two parts which were separated upon hardening. These two moulds were lighter in weight than previous versions and smaller for easier transport. The procedure for creating TTN Version 0.4 can be seen in Appendix G: TTN Version 0.4 Procedure.

While TTN Version 0.4 delivered a clear imprint of the tyre and was a more realistic tool than the previous versions, plaster is still a brittle material that may not withstand many uses. Since many children would be picking up and observing it, and it would be transported around the state, the likelihood of the plaster remaining intact for a long period of time is extremely low.

Figure 6: TTN Version 0.4, Showing the Divider

With this in mind, the project team researched other materials. TTN Version 0.5 utilized hardening clay. The clay was pressed into the grooves and markings of the tyre, removed, and allowed to dry with exposure to air until completely hardened (Figure 7). The procedure for creating TTN Version 0.5 can be seen in Appendix H: TTN Version 0.5 Hardening Clay. The resulting version was similar in quality and resolution to the plaster versions of TTN, but weighed a great deal less and was slightly less brittle. However, the design team was still concerned about the long term durability of TTN Version 0.5.

Figure 7: TTN Version 0.5

The final version of the Tyre Track Negative, TTN Version 1.0, was created using the plaster TTN Version 0.4, non-hardening clay, and silicone rubber. The non-hardening clay was pressed into the plaster mould of the tyre track. It was then placed into a cardboard box lined with tape (see Figure 8). The project team then added extra clay to the side to create a closed seal. Silicone rubber was poured over the clay tyre mould and was allowed to cure completely over a few days. The complete procedure for creating TTN Version 1.0 can be seen in Appendix I: TTN Version 1.0 Non-Hardening Clay. The finished product was a silicone rubber tyre track negative that was highly durable and lightweight.

Figure 8: Making TTN Version 1.0

Tyre Positive Versions

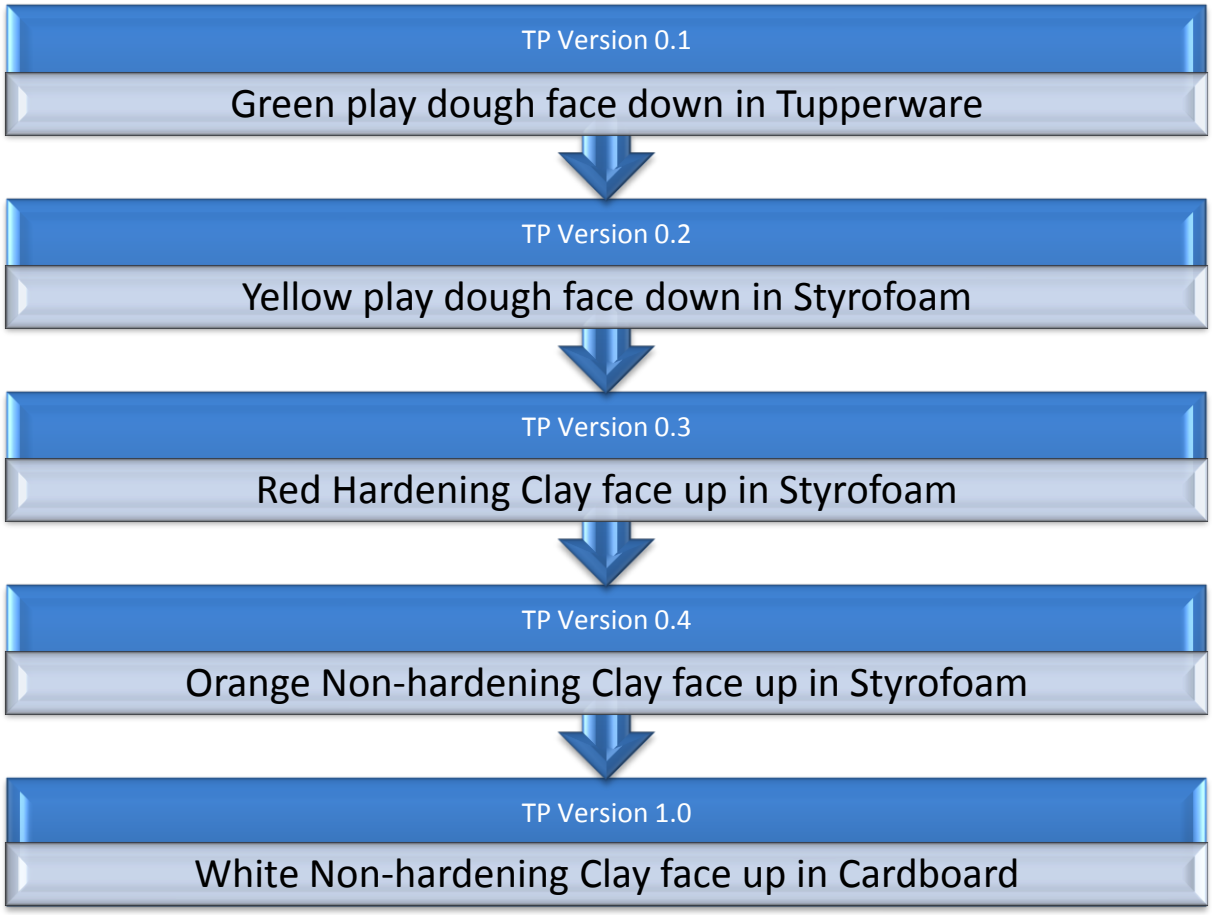

Figure 9: TP (Tyre Positive) Versions

TP Version 0.1 was created using a play dough tyre track negative and silicone rubber in a plastic container. The procedure for creating TP Version 0.1 can be seen in Appendix J: TP Version 0.1 Play dough in Tupperware. The project team poured the silicon rubber into the plastic container and then placed the play dough track negative down into it. After the rubber cured, the play dough was sticky and difficult to completely extract from the mould. There were many air bubbles in the mould due to the play dough being on top of the rubber, and upon removal, the mould became stuck in the container. After additional days, the mould hardened significantly, resulting in deformations.

TP Version 0.2 was also created using play dough tyre track negative and silicone rubber; however it was moulded in a Styrofoam container. Air bubbles were significantly reduced by better mixing and allowing it to set for approximately 10 minutes before inserting the play dough. Styrofoam was used for easier removal. The complete procedure for creating TP Version 0.2 can be seen in Appendix K: TP Version 0.2 Play dough in Styrofoam. The project team investigated other materials because the play dough was sticky and difficult to extract from the silicone rubber.

TP Version 0.3 was created by placing a tyre track negative made of red hardening clay face up in a Styrofoam container with the silicone rubber poured over it. The procedure for creating TP Version 0.3 can be seen in Appendix L: TP Version 0.3 Hardening Clay. The clay hardened over time and was fairly easy to remove from the rubber (Figure 10). No air bubbles remained and the resolution of the treads was very clear. The rubber was stained a reddish colour because of the colour of the clay. The overall quality of the mould was the same as TP Version 0.4.

Figure 10: Making TP Version 0.3

TP Version 0.4 utilized a tyre track negative made of orange non-hardening clay that was placed face up in a Styrofoam container with the silicone rubber poured over it. The procedure was the same as the hardening clay and can be seen in Appendix M: TP Version 0.4 Non-Hardening Clay. A disposable container and stirring rod was used to mix the rubber solution so that cleanup was easier. Tape was used on the inside of the container to prevent leakage. No air bubbles remained in the final mould, but the rubber did not harden evenly and leaked a small amount. This could have been due to the moisture

held within the non-hardening clay (Figure 11). The clay was easy to remove but stained the rubber an orange colour.

Figure 11: Making TP Version 0.4

The final version of the Tyre Positive, TP Version 1.0 utilized a tyre track negative made of white non-hardening clay placed face up in a cardboard container (Figure 12) with the silicone rubber poured over it. Additional time was allowed for the rubber to cure so that it would harden completely before removal. The procedure for creating TP Version 1.0 can be seen in Appendix N: TP Version 1.0 Non-Hardening Clay.

Because the clay was nearly the same colour as the silicone rubber moulding, the mould was not dyed any colour. The cardboard allowed the mould to be removed easily. Additionally, the silicone rubber is extremely durable and lightweight.

Figure 12: Making TP Version 1.0

The criteria considered when choosing materials are listed in Figure 13 in tabular form.

Figure 13: Design Criteria

3.2 Methods of Assessment

To compare the accessibility of the Original and the Modified programs to both students with and without visual impairments, certain data were collected. The data was collected from students in the form of three assessments. Each assessment contains statements and questions that are categorized by type or purpose. These categorizations are designated “Assessment Types” or “AT.” A full list of statements and questions corresponding to each Assessment Type is listed in Figure 14.

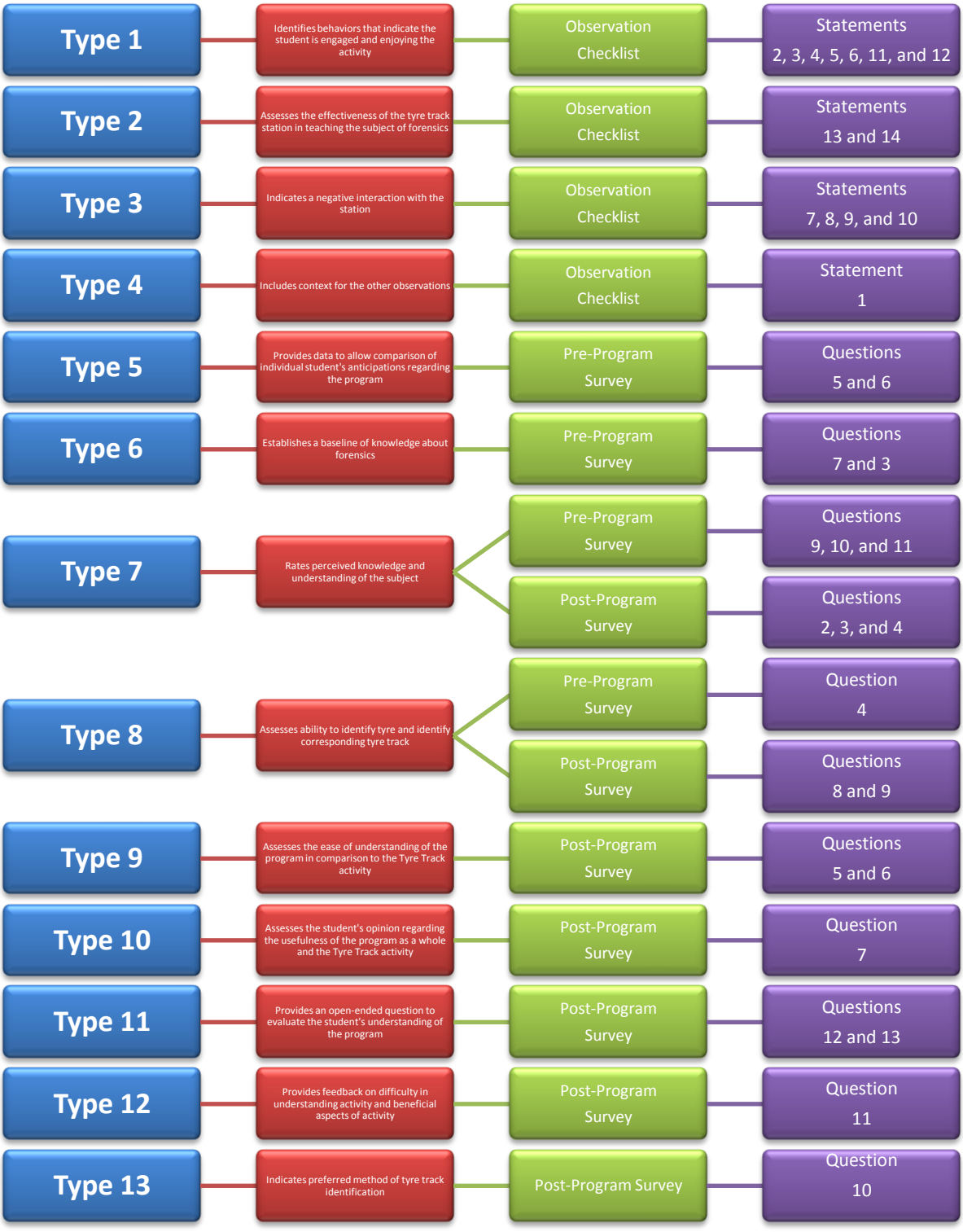

Figure 14: Assessment Types and corresponding survey statements

One type of assessment is an observational checklist that lists behaviours indicating levels of understanding. The Observational Checklist was chosen as one type of assessment for this project because it is effective in the non-formal education setting (Section 2.1.2), including the Forensic Frenzy program. It is important that the assessment is non-intrusive in order to minimize stress for the participants. The checklist was completed by each project team member.

The Observational Checklist has four Assessment Types (Appendix O: Final Version of Observational Checklist). AT1 was designed to identify the behaviours that indicate the student is engaged and enjoying the activity. To assess the Tyre Track activity's effectiveness at teaching the subject of forensics, statement AT2 was created. AT2 gave quantitative data that is comparable among different subgroups of the sample population. Although it was the intention for all students to enjoy the Tyre Track activity, it was still essential to include a group of behaviours that would indicate the contrary. AT3 indicates a negative interaction with the activity. This implies that the student did not enjoy the activity, and was either confused or not engaged. This data was essential when comparing the Original Tyre Track activity with the Modified activity which includes the tactile component. AT4, the final assessment type present in the Observational Checklist, was important to ask to provide context for the other observations. AT4 asks if there are any students with a visual impairment.

The format of the original Observational Checklist (Appendix P: Original Version of Observational Checklist) was modified by the project team upon arriving in Melbourne. After observing the Forensic Frenzy program, the project team concluded that recording observational data for each student was impractical. This eliminated the need for numbered labels and allowed the project team to simplify the format. The format that was used (Appendix O: Final Version of Observational Checklist) counts the total number of students who display the particular behaviour, allowing multiple sets of observations to be gathered simultaneously. Observations were made by each project team member. Averages for each observation were calculated to provide accurate results for each session.

Upon observing students, the project team removed some of the behaviours that were determined to be unessential or ambiguous. For example, due to the visual nature of the Tyre Track activity, the students did not make eye contact with their peers, rather looking at the moulds or pictures, even when explaining or engaging in discussion. Therefore, this observation would not provide useful data when making comparisons between other variables. Additionally, the statement which asked if the student correctly identified the tyre was removed due to an inability to differentiate whether that individual or his or her group partner made the correct identification. Based upon preliminary observations, four behaviours were added to the checklist. Statements 5, 11, 12 correspond to AT1 and statement 13 corresponds to AT2. The project team hypothesised that these statements would provide useful data in comparing variables.

The other two forms of assessment provide pre- and post- program comparisons as a pair. Both are framed as a survey, and the students were informed the surveys were not going to be graded. This alleviates stress associated with the assessment. The Pre-Program Survey, given prior to the start of the activity, included questions regarding the background knowledge of the students. The Pre-Program Survey (Appendix Q: Final Version of Pre-Program Survey) includes four assessment types, and gathers

demographic information. Assessment Type 5 gathers information about the students' expectations from the program. AT5 provides data to allow the project team to compare individual students' anticipations regarding the program. In a question requesting similar information, AT6 in the Pre-Program Survey uses Pre-Program questions 7 and 3 to establish a baseline of knowledge about forensics and tyre tracks and evaluate any prior interaction with the topic. If the student has had an experience with forensics, he or she may already know the information presented or may already have formed opinions about forensics.

Similar questions were used in the Post-Program Survey to evaluate the change in comfort level and knowledge of the students. These questions include those in Assessment Types 7 and 8. AT7 gives scales for the student to rate his or her perceived knowledge and understanding of the subject. AT7 and AT8 provide a comparison between the Pre-Program and Post-Program responses, and any trends can be correlated to the Forensic Frenzy program or the Tyre Track activity. AT8, present in both the Pre-Program and Post-Program Surveys, gathers data similar to the rating scales. The student was given the opportunity to assess his or her perceived ability to identify a tyre based upon its track in AT8 on both the Pre- and Post-Surveys. This allowed the project team to correlate the instructive nature of the Tyre Track activity to any change in the student's ability.

Additionally, the Post-Program Survey (Appendix R: Final Version of Post-Program Survey) includes questions directly relating to the student's experience in the Forensic Frenzy program and specifically the Tyre Track activity. Five other assessment types exist in the Post-Program Survey. AT9 was used to assess the ease of understanding of the program as a whole and in comparison to the Tyre Track activity. The student was given the opportunity to rate his or her understanding, based on the same scale as past questions. A scale was used to give a wider range of responses in comparison to a polar (yes or no) question. This same scale was used to gather similar data in AT10, which assesses the student's opinion regarding the usefulness of the Tyre Track activity. AT11 provides open-ended questions to evaluate the student's understanding of the program. These questions allowed the student to express his or her understanding of the Tyre Track activity in his or her own words.

It was important for the project team to receive feedback regarding any areas of the program that may have been confusing or difficult to understand and any areas that were particularly enjoyable or beneficial. The feedback provided recommendations for improvement of the program. AT12 gives the student an opportunity to provide this type of feedback.

AT11 and AT12 are designed to emulate the purpose of minute papers.

One of the most important aspects for the project team to consider was the student's preferred method of tyre track identification. This was accomplished with AT13. This question allowed the project team to evaluate the accessibility of the Modified Tyre Track activity compared to the Original activity.

Both the Pre-Program Survey and the Post-Program Survey underwent changes after the project team observed the Forensic Frenzy program (for original surveys see Appendix S: Original Version of Pre-Program Survey and Appendix T: Original Version of Post-Program Survey). Both surveys added a space for name in order to allow data correlation between the two surveys. Additionally, some of the

demographic questions were removed due to the project team already possessing the information. The Pre-Program Survey had one additional question, as part of AT6, in order to further assess the prior knowledge of the student. Many questions in the Post-Program Survey were removed due to the time constraints of the program. Data was still collected for all assessment types. Additionally, one question (11 on the final version) was changed from open ended to polar in order to conserve time. Due to the changes made to the Observational Checklist, question 9 was added to collect data regarding the ability of the student to correctly identify the tyre.

Varying formats of the assessments were provided to the students based upon their individual needs or disability. These formats included paper copies, enlarged text versions, electronic versions, and Braille.

3.4 Sample Size

The assessments described in Section 3.3 were presented to the sample group, comprised of every student who had the opportunity to experience the Forensic Frenzy program. CSIRO organised sessions for the project team to attend and collect data. The Forensic Frenzy program was brought to five schools. At these five schools a total of nine sessions were held. Six sessions were conducted using the Modified activity with moulds and three were conducted using the Original activity with pictures. Each session had a varying number of students. The session information regarding date, school, number of students, station type, school year, and gender can be found in Table 1. The number of students in each session ranged from 13 to 25 students. The total sample size gathered from the sessions is 164. Of these 164 students, 133 interacted with the Tyre Track activity. Of those students, 45 experienced the Original activity and 88 encountered the Modified activity. In addition to the five mainstream schools, one subgroup of visually impaired students experienced a modified version of Forensic Frenzy. This subgroup of 11 students was not given assessments; however, the information gathered from these students is presented in the findings section. For more information on the material presented to this subgroup please see Section 3.5.

With the large sample size, certain conclusions can be made regarding the effectiveness of the Universal Design adaptations to the Forensic Frenzy program, as discussed in Section 5.2. The number of students in each tier of the sample size can be seen in Figure 15.

Table 1: Session Information

Session	Station Type	Date	School	Gender	Year	Number of students
Alpha	Old	24/3/2009	Haileybury	Girls	8	25
Beta	New	24/3/2009	Haileybury	Boys	8	19
Gamma	New & Clay	24/3/2009	Haileybury	Boys	8	16
Delta	New & Clay	25/3/2009	St. James	Boys	9	16
Epsilon	New	1/4/2009	Elwood	Both	8	19
Zeta	New	1/4/2009	Elwood	Both	8	15
Eta	New	1/4/2009	Elwood	Both	8	13
Theta	Old	2/4/2009	Mill Park	Both	9	18
Iota	Old	2/4/2009	Noble Park	Both	9	23

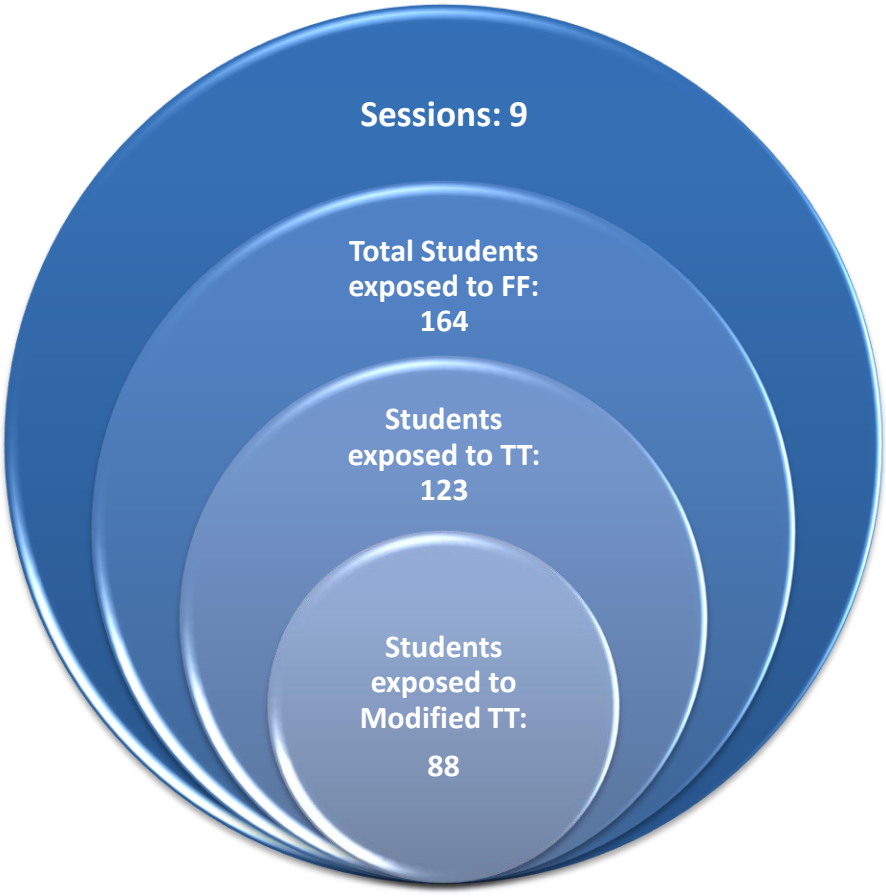

Figure 15: Sample Size, FF=Forensic Frenzy, TT=Tyre Track Activity

3.5 Adapting Forensic Frenzy for a School for the Blind

The project team had the opportunity to visit a local school for the blind in Australia. The school that was chosen has a program where blind and low vision students, who have been integrated into the mainstream school systems, go to the school for the blind each month to interact with each other and utilize the technology that is available. The project team wanted to bring the Forensic Frenzy program to the students to see how the changes that were made to the Tyre Track activity were perceived by the students. The Forensic Frenzy program had to be further adapted so that the students could actively participate. Six of the fourteen activities were brought to the students at the school for the blind, of which, four were modified including the Tyre Track activity.

The Original Tyre Track activity, as seen in Figure 16, utilizes pictures to match a tyre track found at the scene of the crime to one of the suspects' tyres. To a student with limited or no vision, matching a set of pictures can be extremely difficult. The project team brought the silicone rubber moulds to the school for the blind to allow the students to feel the tyre track left at the scene of the crime and compare the

negative print to the positive markings on the tyres (Figure 17). The adapted instruction sheet for the Tyre Track activity can be seen in Appendix U: Adapted Tyre Track Worksheet.

Figure 16: Original Tyre Track Activity

Figure 17: Modified Tyre Track Activity

The second adapted activity was DNA profiling. The Original activity displayed DNA bands from the victim's blood as black lines and compared it to the DNA profiles of a missing person as well as all of the suspects. The purpose of the activity is to identify the victim. To a student with limited or no vision, matching a set of lines on a piece of paper may be difficult. The project team created a three dimensional display of the black lines using foam board. Black foam board was cut into strips and organised to match the DNA profiles of the Original activity. With this modification, the students could both feel and see the DNA bands, creating multi-sensory learning. The Modified activity can be seen in Figure 18, and the instruction sheet can be seen in Appendix V: Adapted DNA Profiling Worksheet.

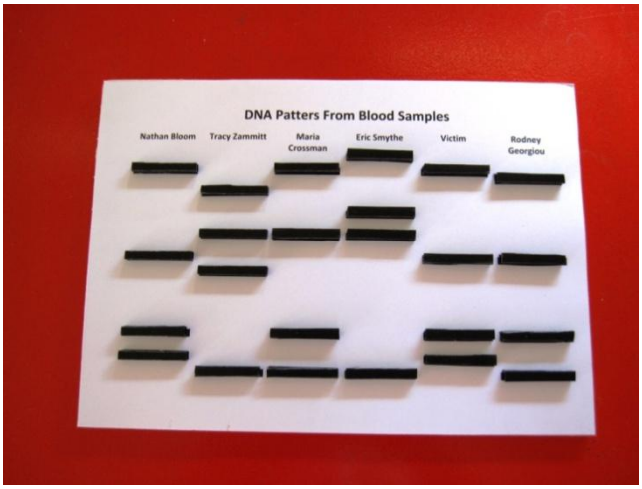

Figure 18: Modified DNA Profiling Activity

The third activity modified by the project team was the soil testing activity. A footprint was found in the mud at the scene of the crime. The Original activity involved testing soil found on the bottom of each suspects' shoes for pH. The student is responsible for matching the soils on the suspects to the soil from the crime scene based on the colour change when the pH indicator is applied. With limited or no vision, the student may not be able to identify the colour change. The project team modified the activity so it would be more tactile. Soils with different textures were chosen and put in a container with dividers. One section contains the soil from the crime scene and the other four sections have samples of the soil from each of the suspects' shoes. The types of soils chosen varied from rough-grained dirt, to fine-grained dirt, to sand. The Modified activity can be seen in Figure 19, and the instruction sheet can be seen in Appendix W: Adapted Soil Testing Worksheet.

Figure 19: Modified Soil Testing Activity

The final activity modified by the project team was the Fabric Identification activity. A piece of torn fabric was found on the fence outside the factory where the body of the victim was found. The Original activity involved a visual comparison of the fabric fibres and a comparison using colour change when a dye was applied. A student with visual impairments may find it difficult to identify these differences. In modifying the activity, the project team chose fabrics with tactile fibre differences. The student was able to feel the fabric found at the scene of the crime and compare it to the textures of the fabrics from each of the suspects' shirts. The Modified activity can be seen in Figure 20, and the instruction sheet can be seen in Appendix X: Adapted Fabric Identification Worksheet.

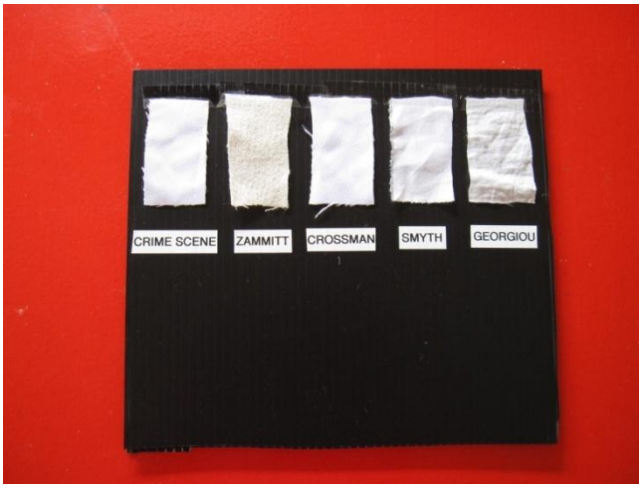

Figure 20: Modified Fabric Identification Activity

The Chromatography activity (Figure 21) and the Facial Reconstruction activity (Figure 22) were also brought to the school for the blind. These two activities were not modified. The chromatography activity involves black ink on the ransom note. The chromatography profile of that ink is given and the students are to perform chromatography tests for black pens that were found in possession by each suspect. When a chromatography test is performed, the black ink is separated into the different coloured dyes it contains. The project team realised that this activity may be difficult to the students with limited or no vision, but wanted to present a challenging activity that would encourage communication within the group. The project team hypothesised that students with low vision would be able to explain the colour separation of the inks to the students with no vision. The instruction sheet for the Chromatography activity can be seen in Appendix X: Adapted Fabric Identification Worksheet.

The Facial Reconstruction activity was already a tactile activity. It involved moulding play dough to a replica of a decomposed skull to be able to recreate what the victim looked like. Pegs were placed on the skull representing the thickness of the skin over different parts of the face (Figure 22). The instruction sheet for the Facial Reconstruction activity can be seen in Appendix Z: Adapted Facial Reconstruction Worksheet.

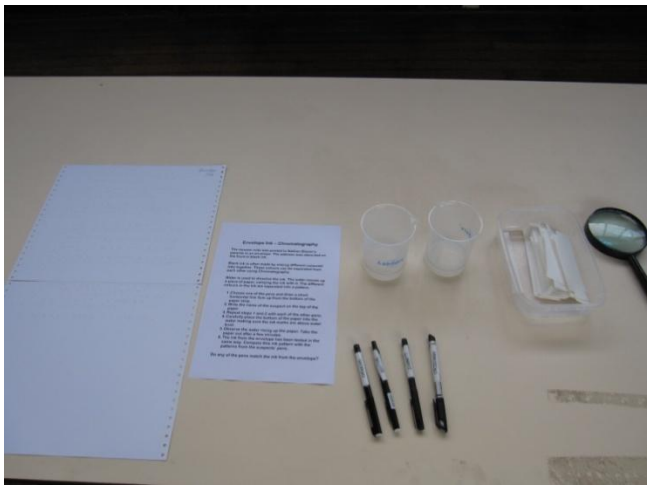

Figure 21: Chromatography Activity

Figure 22: Facial Reconstruction Activity

The instruction sheets and the labels for all activities were increased to bold, 18 point font to be accessible for students with low vision. The sheets and labels were also provided in Braille for the students with no vision. A magnifying glass was provided at each activity.

3.6 Data Analysis

The Observational Checklist, Pre-Program Survey and Post-Program Survey contain both qualitative and quantitative data that may be used to provide results and draw conclusions. The data collected serves as evidence to either support or refute the effectiveness of adapting non-formal education programs for those with visual impairments. Data analysis provided evidence in the following three focus areas:

1. Differences in students understanding, confusion, gained knowledge, engagement and enjoyment between the Original Tyre Track activity and the Modified Tyre Track activity
2. Changes in students behaviours and actions based upon the level of interaction in the Tyre Track activity
3. Differences in responses given by students based upon such variables as gender, presenter, time of day, and preconceived opinions on how much they would benefit from the Forensic Frenzy program

The results that were drawn from these three major focus areas allowed the project team to make verifiable conclusions on factors that increase the effectiveness of non-formal education programs for all students. These conclusions allow the team to propose future recommendations for research and implementation.

The root of all results, conclusions, and recommendations are dependent on the validity of the data collected and the sample populations surveyed.

3.6.1 Assessment Sample Sizes

The sample size of the sample population exposed to the Forensic Frenzy program is described in detail in Section 3.4. The sampled survey size must be significantly large enough to allow for statistical tests of confidence.

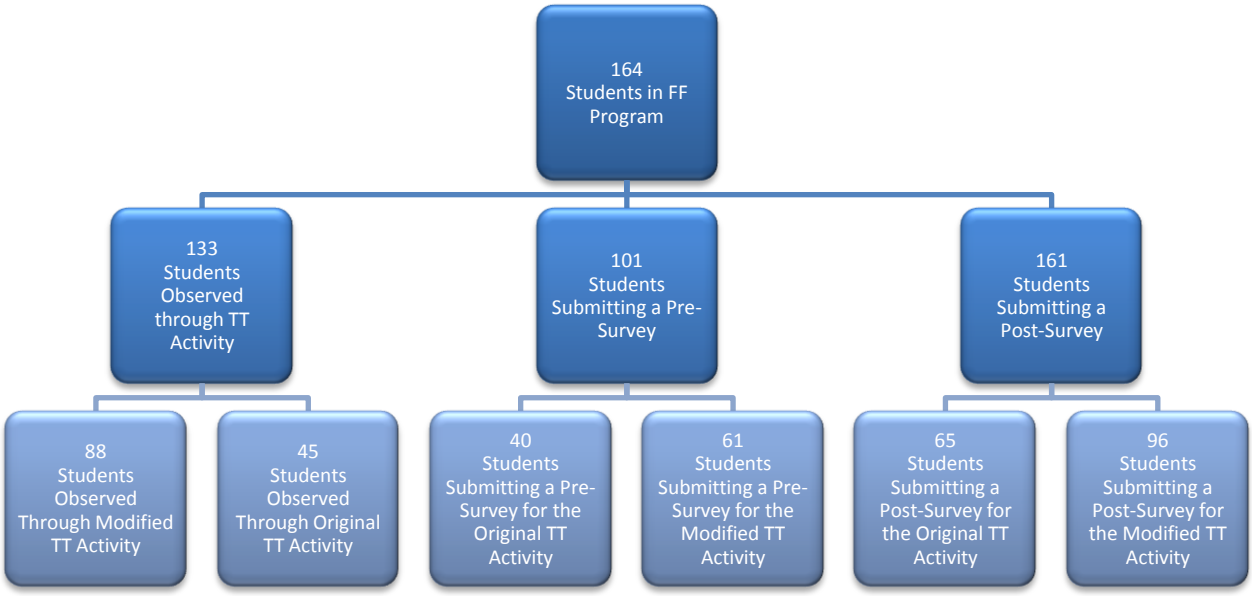

Figure 23: Surveyed Sample Size

Observation

There were 164 students in the Forensic Frenzy programs attended by the project team. Of those students, 133 were observed progressing through the Tyre Track activity. Eighty-eight proceeded through the Modified Tyre Track activity while 45 proceeded through the Original Tyre Track activity. A sample size of at least 45 students is large enough to make observations that can be relatively accurately compared to the entire population of students.

Pre- Program Survey and Post- Program Survey

The project team distributed and collected 101 Pre-Program Surveys, 40 of which were distributed to students progressing through the Original Tyre Track activity and 61 of which were distributed to students progressing through the Modified Tyre Track activity. The amount of Pre-Program Surveys distributed is less than the amount of students in the attended Forensic Frenzy programs due to time constraints of the program, students arriving at the program after the Pre-Program Surveys had already been collected, the amount of time needed to complete the survey, and explicit permission to collect survey data granted from the attended schools.

The project team distributed and collected 161 Post-Program Surveys, 65 of which were distributed to students progressing through the Original Tyre Track activity and 96 of which were distributed to students progressing through the Modified Tyre Track activity. The amount of Post-Program Surveys distributed is less than the number of students in the attended Forensic Frenzy programs due to students leaving the program early or not completing the survey in the allotted amount of time.

Almost all of the Pre- Program data can be matched with the Post- Program data due to the fact that the students were asked to put their names on the surveys they responded to. This provides pooled data which can be tested using statistical methods of correlation explained in Section 3.6.2.

The assessment sample size for students who provided both a Pre- and Post-Program Survey is 40 unique responses for the Original activity and 101 unique responses for the Modified activity. This provided a large enough sample size to make correlations between sets of data that are statistically significant and can be applied to the entire student population.

3.6.2 Statistical Analysis Techniques

Statistical analysis techniques were employed by the project team to quantitatively assess the significance of the data collected from the Observational Checklist, Pre-Program Survey and Post-Program Survey.

The specific techniques selected to quantify the significance of each question in the written assessments and each observation were chosen based upon the purpose of each test and the requirements of each test for the results to be considered valid.

The statistical analysis techniques used are described in greater detail below.

Descriptive Statistics Testing

Descriptive statistics testing describes the features of collected data from a sample as a unit. The two types of descriptive statistics testing used by the project team to assess the effectiveness of Universal Design programming include measures of central tendency and measures of statistical variability.

Measures of central tendency include arithmetic mean of data taken from the sample population. Measures of statistical tendency include the standard deviation of the sample population.

Arithmetic Mean

The arithmetic mean, an average of the quantitative values collected from the sample, is used in all tests by the project team for use in directly comparing question responses. This is used extensively in questions on the Pre-Program and Post-Program Surveys to establish a measurement of central tendency on the rating scales ranging from one to five.

The arithmetic mean was used by the project team to determine a baseline for comparison. The arithmetic mean will be depicted by the symbol “μ” in this report.

Standard Deviation

The standard deviation is a measure of variability of a set of data collected from a sample. It is numerically equal to the square root of the sum of the variances of each datum from the arithmetic mean. The standard deviation is used by the project team in all questions on the Pre-Program Survey and Post-Program Survey using a rating scale and in the tyre track identification times to determine the spread of the range of values.

A smaller standard deviation means that the sample statistics are precise and located close to the arithmetic mean of the entire sample. A larger standard deviation means that the sample statistics have a large range of values that may be drastically different from the sample mean.

Small standard deviations collected by the project team allowed more confidence in determining whether or not differences in responses were significant in hypothesis testing. The standard deviation will be depicted by the symbol "σ" in this report.

Percentage

Percentage is mathematically a fraction of the sample the project team is interested in over the total sample.

Percentage is used by the project team extensively in binary responses given by the sampled population such as in "Yes" or "No" related questions or "Male" or "Female" related questions in the Pre-Program and Post-Program Surveys. Percentage is also used in the binary counts of data in the Observational Checklist such as tallies in the "Reads the Instruction Sheet" category.

Percent Difference

Percent Difference is numerically:

$$Percent\ Difference = \frac{|x_1 - x_2|}{\frac{x_1 + x_2}{2}} \times 100$$

Percent Difference gives the project team a means to determine how different two measures are from each other.

The project team employed this technique in determining differences in percentages and arithmetic means in the Observational Checklist, Pre-Program Survey, and Post- Program Survey.

Statistical Inference and Hypothesis Testing

Statistical inference testing uses statistics to make assumptions and estimations about the total population from analysing sample data. Typically a sample of the total population is tested and those statistics are used to determine the tendencies of the entire population.

The project team made hypotheses for the comparison between responses for each question in the Pre-Program Survey and Post-Program Survey. Tests of statistical inference were used to determine if there was enough supporting evidence either in favour or against the hypothesis. These tests yield a specific value that quantitatively assesses the confidence that the findings of the sample can be applied to the greater population.

Sampling

The sampling size of the Forensic Frenzy program is detailed in Sections 3.4 and 3.6.1 of this report.

Ideal sampling includes sizes as large as possible with complete random selection from within the population. Maximizing these two values will ensure greater accuracy that the sample statistics more accurately reflect the population traits.

It proved impossible for the project team to obtain a large simple random sample from the entire Australian student population. Instead our data reflects students between years 8 and 9 at schools that had already booked Forensic Frenzy programs with CSIRO within the months of March through April within the State of Victoria. Therefore our sample statistics can accurately reflect this particular subsection of the population but caution must be applied to making generalizations for all students in the Victoria area.

P Value

The P Value is the probability of obtaining a result that is at least as far away from the expected value as the one that was observed assuming that the null hypothesis is true.

If the P Value falls above the significance level, the result is ascribed to chance and the null hypothesis is not rejected. The result is determined to not be statistically significantly different from the expected value.

The P Value can only be used to accept an alternative hypothesis and may not be used to determine that the null hypothesis is true.

The P Value is used by the project team to detail observations and calculations that varied significantly from the null hypothesis and is a means of interpreting precisely what the data suggests about the overall population.

For example, if the null hypothesis is that students gain equal understanding of science from both the Modified and Original Tyre Track activity, and the P Value is greater than 0.05, we retain that hypothesis. However, if the P Value is less than 0.05, we reject that hypothesis in favour of the alternative hypothesis which would be that there is a difference in the understanding of science that students gain between the modified and original activity.

One-Sided or One-Tailed Testing

One-sided testing is a term that describes how to calculate the P Value in a hypothesis test. If the null hypothesis is that the mean of one population is assumed to either be greater or less than the mean of another population, a one-sided test is used.

An example of a one-sided test is if the alternative hypothesis is $\mu > 1$, rejecting the null hypothesis of $\mu <= 1$ for large values of the mean of the sample.

Two-Sided or Two-Tailed Testing

Two-sided testing is a term that describes how to calculate the P Value in a hypothesis test. If the null hypothesis is that the mean of one population is assumed to be unequal to the mean of another population, a two-sided test is used.

An example of a two-sided test is if the alternative hypothesis is μ not equal to 1, rejecting the null hypothesis of μ = 1 for large values of the mean of the sample.

Pooled Data

Pooled Data is a term used if the variance or standard deviation of one sample of the population is assumed to be equal to the variance or standard deviation of the population as a whole. Samples that are taken from the same population can be assumed to have equivalent standard deviations and variances.

The project team employed pooled data in cases when two similar questions are being compared in the Pre-Program Survey and Post-Program Survey by similar students. For example, if a particular subset of students was asked to answer the same question in both the Pre-Program Survey and Post-Program Survey, the standard deviation was pooled because the population is identical between the assessment types.

Confidence Interval

A confidence interval is used to judge the accuracy with which a value has been calculated. Confidence intervals give a deviation from the sample mean that the population mean is expected to fall within.

For the purpose of this report, a 95% confidence interval is always chosen which means that the project team is 95% certain that the population mean falls within the given values. Confidence intervals were used exclusively in determining the population mean of the tyre track identification times.

Significance Level

The significance level (α) is the level which the P Value must fall below to reject the null hypothesis.

The project team selected a significance level of 0.05 for all tests detailed in this report. If the P Value falls below this value, the alternate hypothesis is accepted.

2-Prop-Z-Test

A Two Proportion Z Test determines if the difference between two proportions is significant.

The test returns a P Value which can be tested against the established significance level of α = 0.05.

For the purposes of testing the validity of the collected data, the project team ensured that the following conditions were met when conducting a 2-Prop-Z-Test:

- Sampling is as random and varied as possible
- The responses given in each sample are independent from each other
- Each sample includes at least five successes and five failures
- The population is at least 10 times as large as the sample.

These requirements ensure that the returned P Value is an accurate representation of the difference between data.

The project team utilized a Texas Instruments TI-83+ graphing calculator to conduct this test. The project team used this test on all comparisons made between two samples that involved percentages.

2-Samp-T-Test

A Two Sample T Test determines if the means from two separate samples from a population are each significantly different from the population mean.

The test returns a P Value which can be tested against the established significance level of $\alpha = 0.05$.

For the purposes of testing the validity of the collected data, the project team ensured that the following conditions were met when conducting a 2-Samp-T-Test:

- Sampling is as random and varied as possible
- The responses given in each sample are independent from each other
- Normal distribution
- The population is at least 10 times as large as the sample.

These requirements ensure that the returned P Value is an accurate representation of the difference between data.

The project team utilized a Texas Instruments TI-83+ graphing calculator to conduct this test. The project team used this test on all comparisons made between two samples that involved sample statistics that could yield a mean.

Standard deviations were pooled in 2-Samp-T-Tests if the populations surveyed were assumed to be equal.

Validity

The validity of the statistical hypothesis tests is more reliable if the following conditions are followed:

- Random sampling
- Large sample size
- Small standard deviation

For this reason, the project team maximized these conditions on all tests performed. If any of these conditions were not met, the test was not performed.

3.6.3 Controls and Variables

In conducting tests of significance on the data collected in the Observational Checklist, Pre-Program Survey, and Post-Program Survey, the project team identified the variables that may have had a significant impact on the results of the data. Similarly, variables were identified that may have had an influence on responses given by students at the school for the blind.

These bins of data were kept as equal and constant as possible when making comparisons between samples of data. To determine if a bin of data had a significant influence on the outcome of a statistical

test, that bin of data was identified, data was separated within the bin, and the statistical test was performed on the unique populations falling under that particular bin.

School for the Blind

A bin for students with visual impairments was further subdivided into specific types of impairments. Students who disclose other disabilities are separated into a third bin. The separation allows for comparison of the effectiveness of the program and the Tyre Track activity as a whole for the different target populations.

Figure 24 identifies the bins of data identified by the project team that may have had influence on the responses collected from the students at the school for the blind:

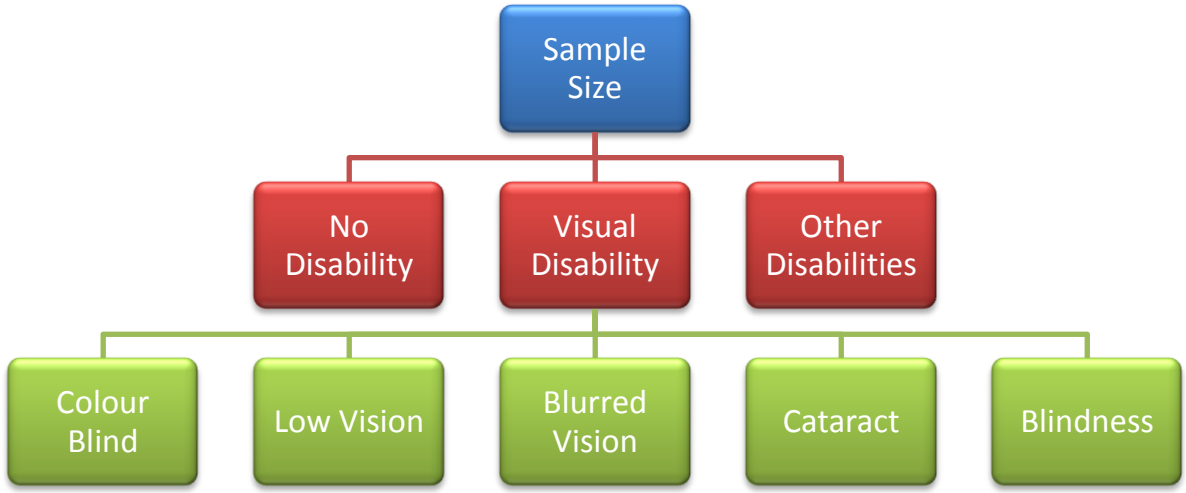

Figure 24: Bins for Students with Disabilities

Bins Applying to all Students within Mainstream Schools

The data collected by the quantitative assessment tools can be separated into the following bins. Each of these bins was recognized by the project team as a variable that could influence responses by students on the Pre-Program Survey and Post-Program Survey. The project team attempted to keep the proportion of students in each of these bins equal between the two samples that were being analysed by a statistical test. Further tests were performed to determine if responses to questions from each bin varied significantly.

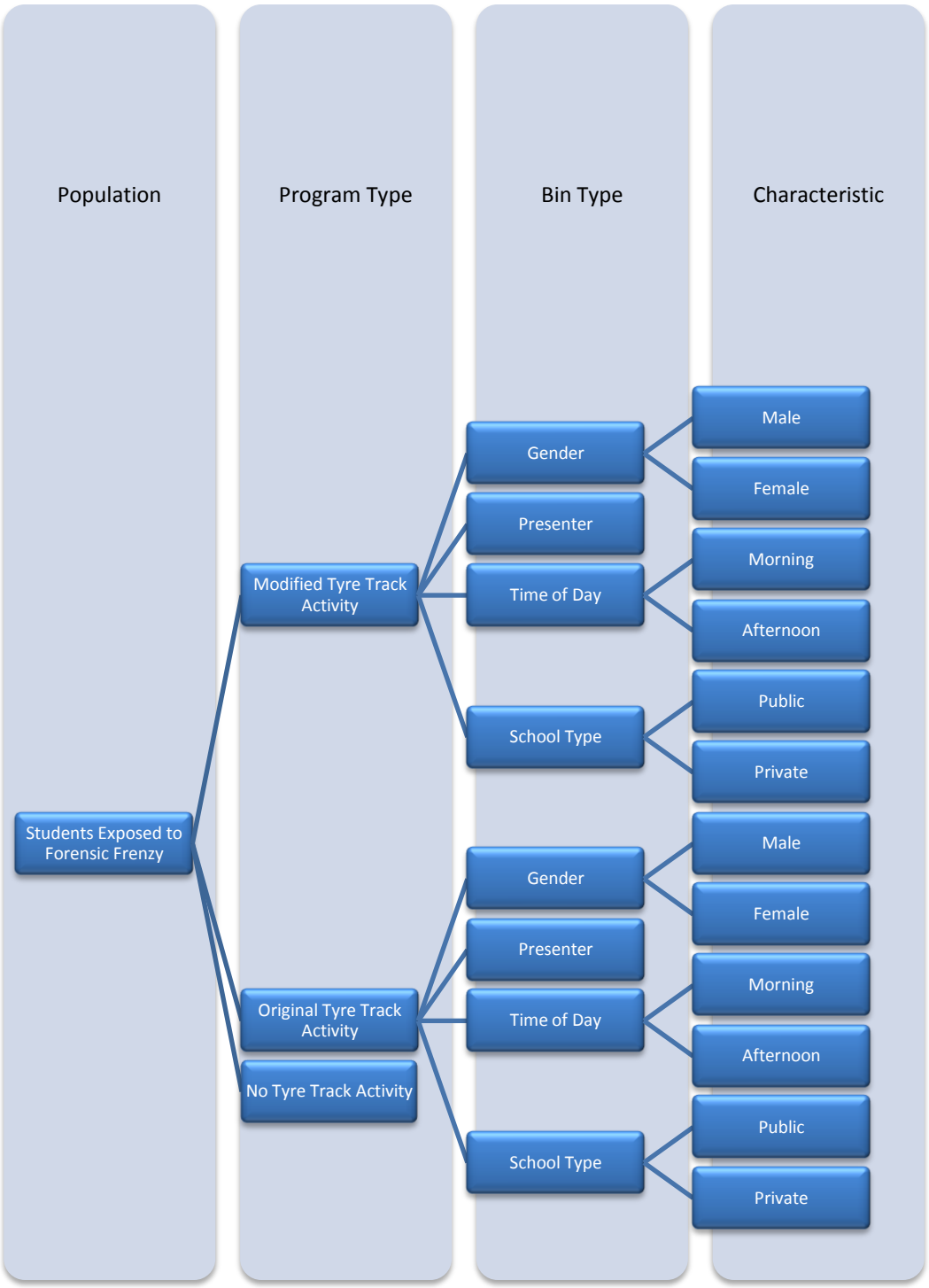

Figure 25: Binned Data

The group that experienced the Tyre Track activity were separated into two bins to be analysed; one that experienced the Original Tyre Track activity, and the other which interacted with the Modified activity. With these two bins, correlations can be made between the version of the Tyre Track activity and the overall excitement and learning the student acquired from the. As was explained in Section 3.4,

there is a subset that was from a specialised school for students with visual impairments. This allowed the formation of a bin for comparison purposes, in which one bin includes the students from the specialised school, and the other comprises of the students from mainstream schools (Figure 26). Additional correlations are made based upon the student's answers to individual questions and displayed behaviours on the observational checklist. These correlations were explored once the data was obtained.

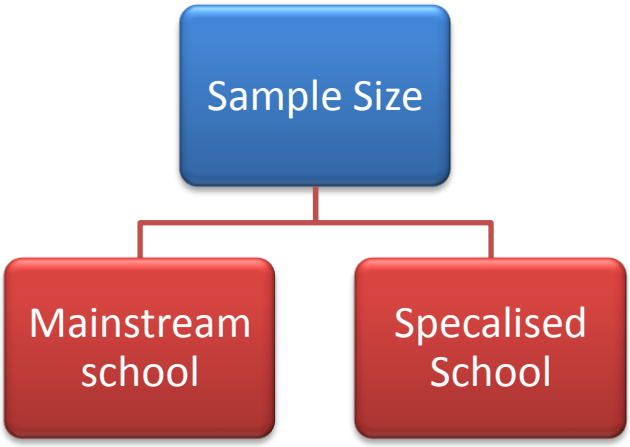

Figure 26: Bins for Type of School Attended

An example of data analysis using bins is the change that students experienced in their perceived knowledge of science from the beginning of the program to the end of the program depending on whether or not they experienced the Modified Tyre Track activity or the Original Tyre Track activity. This analysis can be further broken down to determine whether or not gender played a role in their responses to this question.

The project team used these selected bins to minimize the variance in responses due to controllable variable bias such as gender in order to make more accurate conclusions about the entire population.

3.6.4 Observational Data Collection

Quantitative observational data was collected by the three project group members when possible. The values returned by each member were averaged into a single value for each item on the Observational Checklist.

For example, if Chad witnessed 12 students participating in discussion over the course of the session, Jillian witnessed 17 and Sally witnessed 14, the average amount of students witnessed participating in discussion would be 14.33 and this value would become the amount of students that were witnessed participating in discussion by the project team. This method reduces bias from each individual group member.

Data was compiled from the paper Observational Checklist for each session into a Microsoft Excel Document which was used for all calculations.

3.6.5 Written Survey Data Collection

Quantitative Pre-Program Survey and Post-Program Survey data was collected from the students by the group members and data from each session and each student was entered into a Microsoft Excel Document which was used for all calculations.

Data was then further subdivided into bins and question numbers as necessary in additional tabs of the Excel Document (attached to this report).

3.6.6 Calculation and Correlation Methods

Microsoft Excel Spreadsheets and a Texas Instrument TI-83+ were used for all calculations and correlations made between data.

Different calculation methods were used based upon the type of data returned. The methods of calculating and correlating data are described below.

Observational Checklist

Quantitative data taken from the Observational Checklist was compiled and percentages were determined for both the Modified Tyre Track activity and the Original Tyre Track activity for each item on the checklist. In addition, percent differences and differences between percents were calculated between the corresponding responses from students progressing through the Modified and Original Tyre Track activities.

Tyre track identification times were compiled for both the Modified and Original Tyre Track activities. A mean, standard deviation and confidence interval was calculated for each of these bins.

This data is compiled in Appendix CC: Observation Data: Comparison.

Pre-Program Survey and Post-Program Survey

Questions were quantitatively compared between the Pre-Program Survey and Post-Program Survey.

Means, standard deviations, and sample sizes were calculated for all of the questions and bins outlined in Section 3.6.3. Percent differences were also calculated when valid and necessary.

At least one 2-Prop-Z-Test or 2-Samp-T-Test was conducted for each comparison between questions yielding a P Value which is also compiled in Appendix FF: Mainstream Schools Results.

4 Tyre Track Activity Deliverable

The Tyre Track activity is one of three deliverable products designed to assist CSIRO in adapting their existing non-formal education programs to comply with the Universal Design principles. The most tangible product of the deliverables, the Modified Tyre Track activity, directly implements the Universal Design principles found both in SAM and in the project team's conclusions and recommendations. The Tyre Track activity deliverable is presented as a prime example of successfully altering an existing program. This is proven with verifiable statistical data (Appendix GG: Pre- and Post-Survey Test Results). It may be used as a prototype to generate subsequent modifications to better adapt non-formal education techniques to support all students.

4.1 Original Tyre Track Activity

The Original Tyre Track activity (Figure 27) utilizes purely visual methods of identification, inference and stimulation. No other senses could be used to correctly progress through the activity or gain knowledge and understanding of forensics.

Figure 27: Original Tyre Track Activity

The Original Tyre Track activity consisted of the following components:

- A laminated instruction sheet detailing all procedures and information required to correctly match a tyre track to its associated tyre
- Four laminated photographs of four different vehicle tyres
- One laminated photograph of a tyre track pressed in dirt corresponding to one of the four tyres

4.2 Modified Tyre Track Activity Deliverable

The Modified Tyre Track activity utilizes visual and tactile methods of identification, inference and stimulation. Studies show that students are able to correctly progress through the activity using either one of the senses or a combination of both. Data suggests that students have a better understanding of the activity as a result of the increase in interactivity and appeal to the senses.

Figure 28: Modified Tyre Track Activity

The Modified Tyre Track activity consists of the following components:

- A laminated instruction sheet detailing all procedures and information required to correctly match a tyre track to its associated tyre (Appendix D: Modified Tyre Track Worksheet)
- Four silicone rubber moulds of four different vehicle tyres (TP's)
- One silicone rubber mould of a tyre track (TTN) corresponding to one of the four tyres
- One magnifying glass for the purpose of increased visibility of the tyre and tyre track treads

5 Mainstream Schools

The project team visited a variety of mainstream schools in order to present the Forensic Frenzy program with the Modified Tyre Track activity. The program was presented with a CSIRO staff member to five schools, with a total of nine individual sessions. Using information from these experiences, findings were gathered based upon both observations made by the project team and feedback received from the students on their Pre-Program and Post-Program Surveys. We then used these findings to develop a number of conclusions which contributed to the development of recommendations found in Section 7.

5.1 Findings

The project team collected data through a variety of assessments. Before the beginning of the Forensic Frenzy program, the students were given a Pre-Program Survey that asked for demographics and the rating of their knowledge and understanding in certain areas. While the students participated in the Tyre Track activity, the project team members observed them using Observational Checklists. Once the students finished the activities, they filled out Post-Program Surveys. The data collected from these surveys allowed us to make observations and draw conclusions.

5.1.1 Observations

The data collected by the project team through Observational Checklists can be found in Appendix AA: Observation Data: Original and Appendix BB: Observation Data: Modified Station. Furthermore, the project members took notes on other observations that they made while the Forensic Frenzy program was running. These observations are as follows:

- If a magnifying glass is present, the student often picks it up, even if they are not going to use it.
- When the car oils activity is placed next to the Tyre Track activity, the students are often confused why the suspects do not match between the two activities.
- Asking the students whether or not there are unique markings on the tyres confuses them.
- Students often make prior assumptions on the suspect based on the stations they have already completed.
- When labelled sheets are laid down under the moulds, the student is more likely to put the moulds back in place instead of leaving them scattered.
- The presenter should not stand in front of an open window because the lighting makes it difficult to focus.
- Many students attempted to superimpose the tyre track to the tyres to see which would match.
- Many students smelled the moulds.

5.1.2 Pre-Surveys and Post-Surveys

The data collected by the project team through distributing Pre-Program and Post-Program Surveys to the students can be found in Appendix DD: Survey Data: Original Activity and Appendix EE: Survey Data: Modified Activity

5.2 Results and Conclusions

The results and conclusions that were developed by the project team were drawn from the raw data collected in the Observational Checklist and the Pre-Program and Post-Program Surveys.

5.2.1 Observational Checklist

The checklist items observed by the project team were tallied and compiled. Comparisons were made among the data collected.

Table 2: Observational Checklist Results

Checklist Item Number	Checklist Item	Percentage of Students in Original Activity	Percentage of Students in Modified Activity	Percent Difference	Difference in Percent
1	Eye Contact	7.018	0.000	200.000	-7.018
2	Discussion	79.524	71.591	10.499	-7.933
3	Looks at Pictures	90.370			
4	Picks up the Pictures	62.500			
5	Feels the Tyre Track		62.500		
6	Feels the Tyre		70.076		
7	Reads the Instruction Sheet	33.333	32.197	3.468	-1.136
8	Smiles	9.524	13.636	35.514	4.113
9	Frowns	0.000	0.758	200.000	0.758
10	Frustration or Confusion	2.857	8.712	101.216	5.855
11	Appears Bored	6.667	6.061	9.524	-0.606
12	Negative Behaviour	0.000	0.758	200.000	0.758
13	Magnifying Glass	25.287	33.333	27.451	8.046
14	Takes Notes	87.778	73.106	18.239	-14.672
15	Mention of mirror image/inverse	0.000	19.209	200.000	19.209

The statistical tests performed on the data collected from the Observational checklist are summarized in Table 2.

Of the 15 Items in the Observational Checklist Results, the project team is most confident in their tallies for items 2, 3, 4, 5, 6, 7, 13, 14, and 15 because there is little to no ambiguity in whether or not the student actually performed those actions. The remaining items are subject to the interpretation of the observer and are therefore less reliable.

Of the nine reliable items in the checklist, “Percent Difference” and “Difference in Percent” can be calculated for items 13, 14, and 15.

Students experiencing the Modified Tyre Track activity were, on average, more likely to discuss with fellow students, feel the tyre track mould, feel the tyre moulds, use the magnifying glass, and mention mirror images or inverses.

Students experiencing the Original Tyre Track activity were, on average, more likely to look at the pictures, pick up the pictures, and take notes.

These results yield a number of interpretations in correlation with other collected data. From the quantitative data the project team can make conclusions.

The most significant conclusions are the following:

- Eye contact with other students had no bearing on their experience with the activity.
- Discussion with other students was more frequent in the Modified Tyre Track activity.
- Students were more apt to look at the pictures in the Original activity (expected).
- Students were more apt to pick up the pictures in the Original activity (expected); however this shows that students are subconsciously prone to use their sense of touch, even if an activity is purely visual.
- Students were more apt to feel the tyre track in the Modified activity (expected).
- Students were more apt to feel the tyre in the Modified activity (expected).
- The percentage of students that read the instruction sheet was not significantly different between the two activities.
- The project team was not able to accurately measure the amount of smiling, frowning, frustration, confusion, boredom, and negative behaviour of the students.
- The magnifying glass was used more often in the Modified activity. The magnifying glass provided students with normal vision little additional help in the activity and was used often in both activities. This shows that students wish to use props and tools that may not necessarily help them in identifying a tyre.
- Students take notes less often when progressing through the Modified activity as compared to the Original.
- The students mentioned a mirror image or inverse much more often in the Modified activity. This suggests complex thought process and understanding.

Tyre Track Identification Times

Tyre Track identification time was measured for each student observed passing through either the Modified or Original Tyre Track activity. The results are tabulated in Table 3.

Table 3: Tyre Track Activity Time Trials

TT Activity	N (Count)	μ (Average)	σ (Deviation)	Confidence
Modified	90 students	68.98 seconds	60.02	+/- 12.57
Original	44 students	43.36 seconds	28.62	+/- 8.70

A 95% confidence T interval was performed on this data, and it was found that the population mean for a student progressing through the Modified Tyre Track activity is between 56.41 and 81.55 seconds. The population mean for a student progressing through the Original Tyre Track activity is between 34.66 seconds and 52.07 seconds. These confidence intervals do not overlap, and the project team can be fairly confident that students are able to identify the suspect's tyre more quickly in the Original Tyre Track activity (Figure 29)

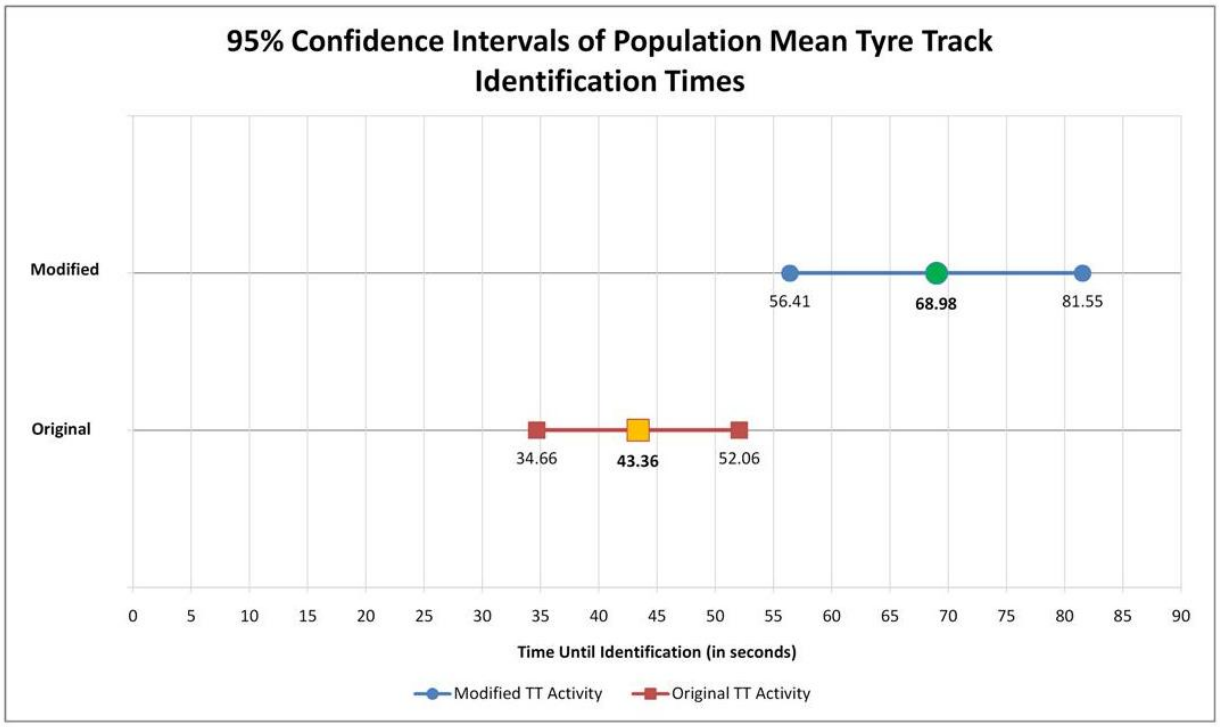

Figure 29: Confidence Interval of Population Mean Tyre Track Identification Times

The normal curve of the population using the sample data is shown in Figure 30.

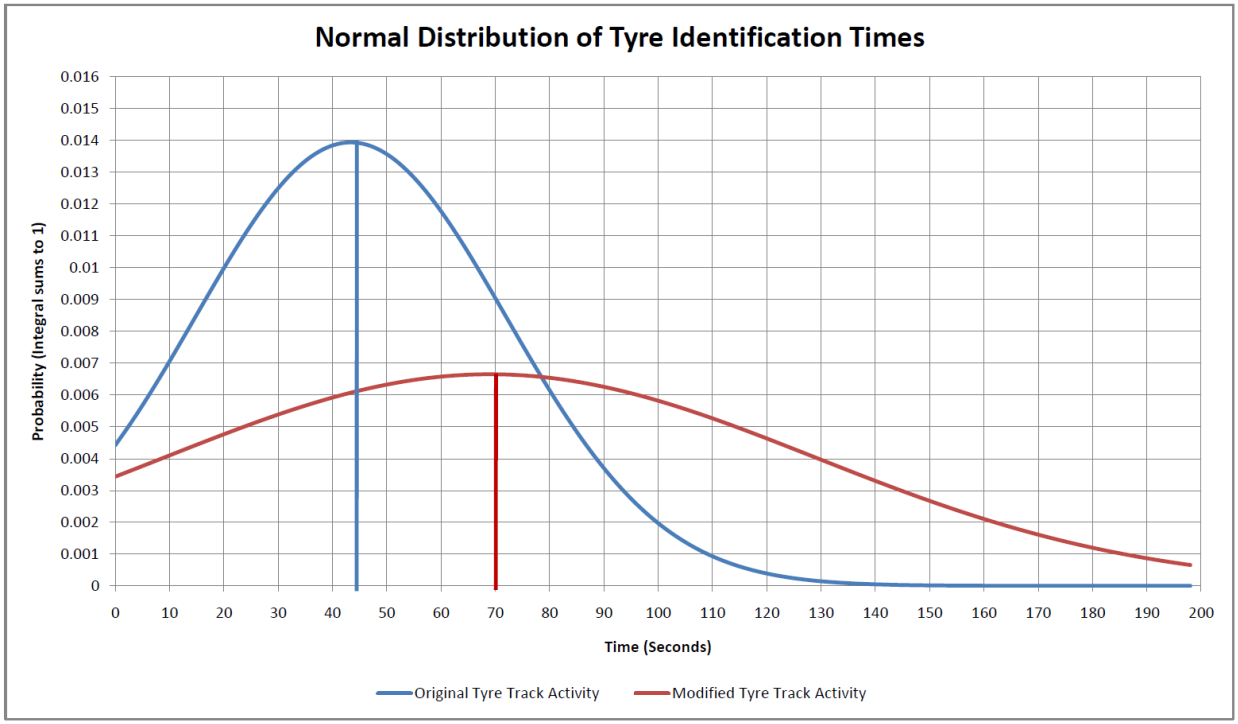

Figure 30: Normal Distribution of Tyre Identification Times

5.2.2 Pre-Program and Post-Program Surveys

The responses to the surveys given to each student allowed the project team to make many comparisons and perform statistical tests to analyse the data.

A full list detailing all 34 statistical tests conducted on quantitative data can be found in Appendix FF: Mainstream Schools Results. Detailed interpretation and precise wording of the results for each test can be found in Appendix GG: Pre- and Post-Survey Test Results.

Quantitative conclusions for the Pre-Program and Post-Program Surveys can be compiled into two distinct bins. The project team accepts the alternative hypothesis in the tests that result in a statistically significant difference in responses between two compared questions in the Modified and Original activities. The project team retains the null hypothesis for tests that result in no statistically significant difference between two compared questions in the Modified and Original activities. These findings are summarized in Table 4 and Table 5.

Table 4: Statistically Significant Differences in Responses

Test Number	Finding (Alternative Hypothesis)
3	There is an increase in the student's perceived knowledge of science after progressing through the Modified Tyre Track activity.
5	There is an increase in the student's perceived knowledge of forensic science after progressing through the Modified Tyre Track activity.
7 & 8	There is an increase in the student's perceived knowledge of tyre forensics after progressing through either the Modified or Original Tyre Track activity.
14	There is an increase in the proportion of students that used their sense of touch to help them identify the tyre in the Modified Tyre Track activity as compared to the Original Tyre Track activity.
16	The student's perceived usefulness of the Original Tyre Track activity was greater than the student's perceived usefulness of the Modified Tyre Track activity.
18	There is a significant difference in the proportion of students of a particular gender that progressed through the Original Tyre Track activity compared to the Modified Tyre Track activity (A significantly greater proportion of males passed through the Original activity).
27, 28, 29 & 30	Students who believe that Forensic Frenzy will positively impact their understanding of science will experience a greater increase in perceived knowledge of science if they progress through the Modified activity as compared to the Original activity.
31, 32, 33, & 34	Students who believe that Forensic Frenzy will positively impact their understanding of science will experience a greater increase in perceived knowledge of forensic science if they progress through the Modified activity as compared to the Original activity.

Table 5: No Statistically Significant Difference in Responses

Test Number	Finding (Null Hypothesis)
1	There is no difference between the Original and the Modified activity in students gaining the ability to match tyre tracks to their respective tyres.
2	The Modified Tyre Track activity is no more confusing than the Original Tyre Track activity.
4	There is no change in the student's perceived knowledge of science after progressing through the Original Tyre Track activity.
6	There is no change in the student's perceived knowledge of forensic science after progressing through the Original Tyre Track activity.
9	There is no difference in the magnitude of the increase in the student's perceived knowledge of tyre forensics after progressing through the Modified or Original Tyre Track activity.
10	The student's perceived change in knowledge of science does not depend on whether Gemma or Rosemary was the presenter.
11 & 12	Students have the same ability to identify the suspect correctly in both the Original and Modified Tyre Track activities.
13	There is no difference in level of understanding between the Original and Modified Tyre Track activities.
15	There is no difference in the proportion of students that used their sense of sight to help them identify the tyre in the Modified Tyre Track activity compared to the Original activity.
17	There is no difference in the student's level of understanding of the Forensic Frenzy program whether they experienced the Original or Modified Tyre Track activity.
19, 20, 21 & 22	Gender does not influence the change in perceived knowledge of science regardless of whether the student passes through the Original or Modified Tyre Track activity.
23, 24, 25, & 26	There is no difference in the change in the student's perceived knowledge of tyre forensics at crime scenes in either the Modified or Original Tyre Track activity regardless of whether or not the student has heard of using tyre tracks at crime scenes to collect evidence.

The Pre- and Post-Program Surveys have returned a number of quantifiably significant data. The purpose in collecting this data was to determine the effectiveness of the Modified Tyre Track activity in respect to Universal Design principles. Ideally, the Modified activity should show increased learning and understanding of the purpose of the activity. The results show that the Modified program is more effective in achieving the goals of Universal Design when compared to the Original activity.

The data shows that there is an increase in the student's perceived knowledge of science, forensic science, and tyre forensics when progressing through the Modified activity. In contrast, there is only a statistically significant increase in the student's perceived knowledge of tyre forensics when progressing through the Original activity. Although the team would expect an increased knowledge in tyre forensics when progressing through either activity, this data is astounding to the team. The fact that a simple change to a single activity could influence a student's perceived knowledge of a much larger topic such as forensics or science is of paramount importance and interest.

Quantitative analysis has also shown that students who believe that Forensic Frenzy will positively impact their understanding of science will experience a greater increase in perceived knowledge of both forensics and science if they progress through the Modified activity as compared to the Original activity. This shows that a student's opinion of the value of a non-formal education program before it begins is crucial to how much they learn and take away from the activities.

The project team wanted to ensure that no degree of learning or understanding was sacrificed in introducing a Modified activity with Universal Design substituting for the Original activity. The tests show little to no side effects from introducing the Modified activity. There is no statistically significant evidence to state that there is a difference in the proportion of students that believe they are able to correctly match tyre track to their respective tyres when comparing the Modified activity to the Original. There is no evidence to support that the Modified Tyre Track activity is more confusing than the Original. Student's have the same ability to identify the correct suspect's tyre in both the Modified and Original activity. There is no difference in the level of understanding the student's had of Tyre Track activity and Forensic Frenzy in both the Modified and Original activity. In short, the introduction of the Modified activity seems to have had no impact on the effectiveness of the program or the knowledge the student's have gained from the activity. This represents an ideal implementation of Universal Design.

To ensure that there were no underlying factors or variables skewing the data in favour of the Modified activity, bins were tested as outlined in Section 3.6.3. Gender and presenter were both statistically shown to not have a significant influence on student's responses to selected questions. This was important to verify as the proportion of students of a particular gender and presenter varied between each trial. In addition, the time of day the surveys was administered between the Modified and Original activities was varied enough to not be a significant factor.

The underlying purpose of implementing Universal Design is to make existing programs and activities accessible to all students of all abilities. In brief, introducing multi-sensory activities should reach a larger population of students and ideally increase learning by providing multiple methods of gathering

information. In our studies, it is shown that there was not a significant difference in the proportion of students that utilized sight to match a tyre to its tyre track between the Original and Modified activity. However, there is statistically significant evidence supporting that a larger proportion of mainstream students utilized the sense of touch to match a tyre to its tyre track in the Modified activity. This data is astounding when taken in context. The Pre- and Post-Program Surveys reached only those students in mainstream schools and did not include the students in the school for the blind. The impact of this observation is imperative. In addition to improving the activity for visually impaired students, the results of this study have also shown that there is a significant increase in learning, understanding, and knowledge in students in mainstream schools when a multi-sensory program replaces a single-sensory program. Simply, students who have normal vision are benefiting from an activity modified for students with vision impairments.

This result supplies irrefutable, quantifiable support that Universal Design principles are necessary to maximize learning in non-formal education programs. Data suggests that an increase in the amount of multi-sensory activities correlates to an increase in learning, knowledge, and understanding of the topic with no negative side effects if designed properly.

Perhaps the most interesting result in light of viewing all statistical conclusions made from this study is that there was statistically significant evidence that the students believed that the Original activity was more useful than the Modified activity.

Shown in Figure 31 is the normal curve for the population fit to the statistical data collected for the student's perceived usefulness of the Tyre Track activity. This is plotted in contrast to the student's change in understanding of matching tyre tracks at a crime scene in Figure 32. These figures visually represent the data presented in Table 22 and Table 15.

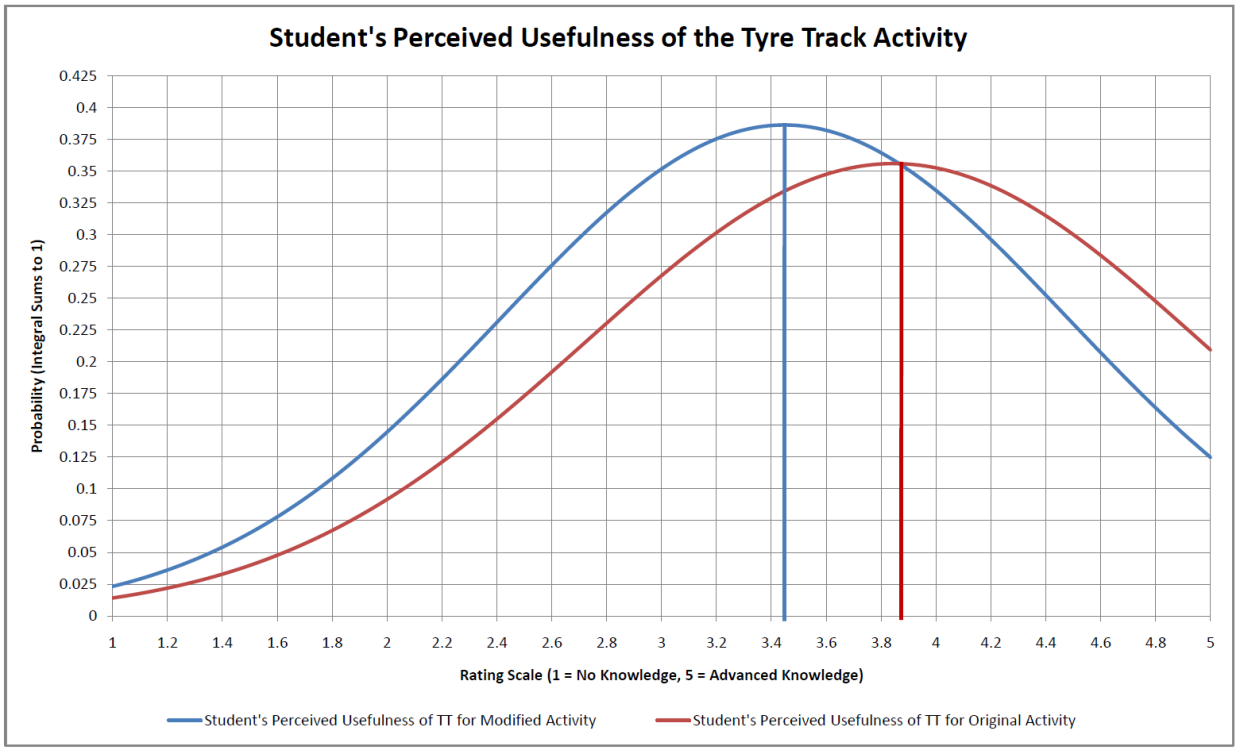

Figure 31: Student's Perceived Usefulness of the Tyre Track Activity

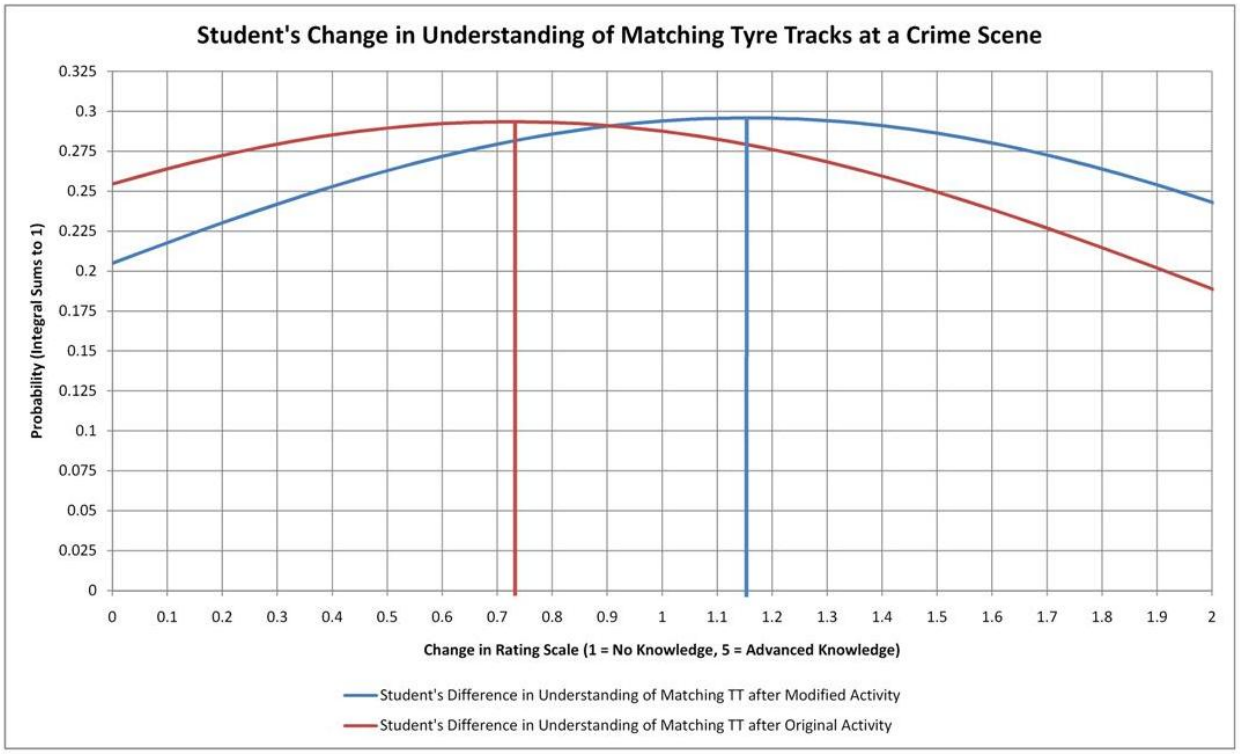

Figure 32: Student's Change in Understanding of Matching Tyre Tracks at a Crime Scene

The project team recognizes that although the mean for the perceived usefulness of the Tyre Track activity is visually higher for the Original activity than the Modified activity, this does not necessarily imply that the level of understanding a student gains from the Original activity is greater than the level of understanding gained from the Modified activity. This is shown in Figure 32 with the mean for the Modified activity greater than the mean for the Original activity.

In short, the amount learned by a student in an activity does not necessarily correlate to how useful the student believes the activity is. Although this may be the case in some activities, there proved to be the opposite correlation in the Modified Tyre Track activity. Therefore, asking students how useful they find an activity is not a measure of how much the students have learned from the activity.

Therefore, the project team has been cautious in not predetermining implications of survey results and making assumptions about other related survey questions. The data presented in this section is completely supported by quantifiable evidence as factual. Inferences and interpretations of this data in light of the project team observations are made in Section 7.

6 School for the Blind

The project team visited a school for the blind to present a modified version of Forensic Frenzy. A version with six stations was presented, four of which were modified, as seen in Section 3.5. Eleven students were split into three groups which proceeded through all six stations with a project team member as a guide. Using information from these experiences, findings were gathered based upon both observations made by the project team and feedback received from the students and teachers present. These findings were then used by the project team to develop a number of conclusions which contributed to the development of recommendations found in Section 7.

6.1 Findings

The project team gathered information from the students and teachers at the school for the blind in two ways. First, the project team recorded basic observations of the student's interactions with each activity. Second, following the presentation, the project team engaged in discussion with the students. This allowed the project team to record feedback from the students and teachers.

6.1.1 Observations

The project team observed the three groups in each of the six stations and made the following notes of interest:

- Braille takes longer to read than text and is only accessible to one student at a time.
- The raised DNA profiles of each person were located too close together, and therefore it was difficult to differentiate which bands were in which column.
- The bordering edges of the tyre moulds misled the students identifying via touch because they believed the border to be part of the tyre treads.
- The loose threads at the bottom of the fabric squares were confusing and misleading.
- Students who were completely blind did not actively participate in the chromatography activity until encouraged.
- Students with low vision could not describe the tyre track photos to the completely blind students.
- When a totally blind student was presented with the tyre track photos, he found the moulds on the table and felt those instead.
- The students try to superimpose the tyre track and tyre moulds together as inverses.
- One student spent extra time during lunch playing with the facial reconstruction activity.

6.1.2 Feedback

The students were asked to provide feedback to the project team in a discussion format once they completed the activities. Some of the feedback was specific to a particular activity, as follows:

Chromatography:

> "For a totally blind person, just to clarify, that station basically was the hardest one there, not only because of the colour, but uhm I've been thinking trying to figure out how you guys could show that but I don't really know." – Student with no vision
>
> Additionally, one of the teachers present suggested giving visually impaired students specific indication of how far up the water in the beaker is and where on the blotting paper to draw the ink line. The teacher suggested this would enable the visually impaired students to participate by allowing them to prepare the samples.

Soil samples:

> "I found it actually quite easy because once you ran your fingers through the container a couple of times for each one; you sort of got a feeling for it." – Student with limited vision
>
> "It was interesting." – Student with limited vision

Fabric Samples:

> "It was so hard, but you know you kind of have to get your sense going, and you have to find which one is the soft one, which one is…, which is confusing as well, so it was a really good one." – Student with limited vision

Tyre Track:

> "I reckon I could've sat there all day, looking at them and still wouldn't have known the damn answer."- Student with no vision
>
> "Yeah I liked it because it was difficult to solve." – Student with limited vision
>
> "Tyres were weird, they just smell funny." – Student with limited vision
>
> "It was REALLY confusing and even though they were real tyres it was very hard to discern which was which." – Student with no vision
>
> The students suggested that the moulds be made wider and deeper without edges. The suggestion was also made that if the moulds were a uniform size and orientation it would be easier to understand how the tyre track and the tyre mould were related spatially.

The students expressed general enjoyment regarding the program and felt that they better understood forensics. Part of this enjoyment came from having the opportunity to discover things on their own. Some students expressed what they enjoyed specifically:

> "Being able to actually feel things in science" – Student with no vision
> "You didn't like the forensic stuff before did you? Did this make it a little better for you?" –Jillian
> "Yeah" – Student with no vision
> "So it was easier to understand because you could feel things?"- Jillian
> "Yeah, it was a lot easier." – Student with no vision
>
> "No board notes" – Student with limited vision
>
> "Well first of all I think there wasn't much of a panic, because if we're in a real science class, we've got sighted people around us, we've got a time limit, we want to do it, we can't do it, but you know, so it's kind of everywhere. There wasn't much of a fuss, there was order so that was good, uhm, and I think just the fact that we were kind of put in a situation where, you know, there's a crime and you have to solve it. So it kind of got your mind thinking, because if you're doing a normal experiment your just reading and doing it and you know what's going to end up, you know what's going to happen. So that was good." – Student with limited vision
>
> "The variousness and the fact that we don't have to write a thousand word essay." – Student with no vision

One student gave general feedback on the program, explaining a feature at a museum exhibit:

> "They've got this thing, where you push a button and it plays a recording, maybe, but it doesn't need to work like that, you could always have groups doing the reading for the visually impaired." – Student with no vision

The discussion ended with an inquiry from the project group if there were any questions. The answer from one student was an enthusiastic "Yeah, what's the answer?!"

6.2 Conclusions

Based upon the findings for the school for the blind, the project team was able to make a variety of conclusions.

The project team concluded that, in addition to providing the instruction sheets in Braille, each group should include at least one person who can read the instructions out loud or the instructions should be provided in a recorded audio format. All labels should be provided in both large print and Braille formats.

For the DNA identification activity, the project team deduced that the modifications should be implemented, ensuring that there is ample space between each DNA column.

In order to make the Tyre Track activity accessible, the project team concluded the moulds should be used. Efforts should be made to ensure uniformity throughout the five moulds to minimize confusion. This could be accomplished by removing the edges and cutting the moulds to the same size.

When cutting squares of fabric for the fabric identification activity, the project team concluded that care should be taken to ensure each edge is straight and uniform to prevent loose fibres.

The project team judged that providing soil samples of varying particle size allows students to compare the samples using tactile means and to easily identify the soils that match.

Regarding the chromatography activity, the project team concluded that encouraging blind students to participate to the extent of their ability helps to increase the level of learning the students experience. The project team also recognizes the need for a group with blind students to have at least one student who is capable of interpreting the results visually in this activity.

The project team deduced, based upon the positive feedback provided by the students, that the adapted forensic frenzy program instilled curiosity and an interest in learning in the students. Of particular note is that the students did not want the project team to leave without an explanation of who committed the crime – the students were interested and excited to learn the answer.

The data collected from the school for the blind empowers the project team to make two broad conclusions on increasing the effectiveness of non-formal education activities for those students with impairments.

Simplicity is essential. Existing non-formal education programs do not have to be modified to include complex pieces of equipment to make activities accessible for students of all abilities. Simple, straightforward, and inexpensive means of adapting pieces of equipment are usually the most effective. The simplest of the adjustments made by the project team in the modified stations appeared the most effective in communicating objectives to the visually impaired students. Any modification that made an activity more complex and did not yield any additional purpose, such as the edges on the Modified Tyre Track activity or the close DNA profiles on the DNA Identification activity, increased confusion in understanding the activity. For this reason, the project team concludes that modifications made to implement Universal Design should be simple and straightforward. Any element to an activity that does not have an obvious purpose in conveying a lesson to students should be removed to prevent students from misunderstanding or misinterpreting instructions.

Finally, multi-sensory activities correlate directly to increased learning as well as excitement in the classroom. Mainstream school data strongly supports the fact that a student's level of understanding of an activity increases if an activity is altered to use Universal Design. Observing and collecting data from students in this specialised school not only further supported that data, but undeniably made the activity exciting for students. The project team firmly suggests that the excitement shown by students

progressing through the Modified Tyre Track activity was a result of multi-sensory learning. Providing a greater number of methods to complete a task allows students to choose a means of learning that is most simple and effective for them. In all studies conducted by the project team, there is strong evidence of students using their senses of sight, touch, and smell to learn, even if some of these senses cannot be used in the activity to draw a useful conclusion. This data indicates that students employ all of their senses to learn, and any activity not utilizing all senses to their fullest extent will not fully convey its purpose to the entire population of students.

7 Recommendations

After analysing the collected data and making conclusions based upon that data, the project team developed a number of recommendations. These recommendations are based primarily upon the conclusions drawn in Section 5.2 and Section 6.2. Additionally casual recommendations have been made based upon the project team's observations.

7.1 Tyre Track Activity

The project team recommends CSIRO-SEC implement the silicone rubber moulds into the Tyre Track activity of Forensic Frenzy. This recommendation is based upon conclusions drawn indicating that adding the tactile component to this activity increases the understanding of students without disabilities and increases the accessibility to students with visual impairments.

7.2 Forensic Frenzy Activities

The project team recommends adapting three additional activities as part of the Forensic Frenzy program. The soil sample activity should use soils that not only provide a different pH, but also have different grain sizes. This will enable students to feel a difference between soils while also giving them the opportunity to use the colour changing dye if they choose. This option should be explained to the students by the presenter. The fabric identification activity should include large enough swatches of fabric to be felt by the students. The fabric chosen should have differing textures, so that the students have the option to identify the fabric using the dye provided or by tactile means. The presenter should explain this option to the class. The DNA profiling activity should be adapted to have raised bands corresponding to the black bands in the Original activity. This will allow students to compare the DNA profiles of the various people using both sense of touch and sight. This adaptation should include adequate space between each individual's DNA profile to provide clear distinctions among them.

The project team makes the following casual recommendations based upon observation. The presenters for Forensic Frenzy should permit students to explore different stations based upon the student's interests and learning abilities. Specifically the project team recommends that presenters refrain from discouraging students from using the facial reconstruction activity. Presenters should be clear regarding the time limit for gathering evidence in order to provide students with a sense of structure if they desire. To reduce student anxiety, the project team additionally recommends the presenter ensure the students understand they are not expected to collect every piece of evidence. By informing the students that they will share evidence after the specified amount of time, it encourages each student to explore at his or her own pace without concern for missing something essential due to time constraints.

7.3 CSIRO-SEC Programs

There are a variety of recommendations that the project team suggests CSIRO-SEC implement throughout their educational programs. One suggestion is to provide alternative formats of the worksheets in all of the programs. Worksheets should be provided in large font, in Braille, or as voice recordings to any student who may need them. Implementing multi-sensory activities into the programs wherever possible will foster students participation based on their abilities and preferred learning styles. Senses of sight, scent, touch, and hearing should be integrated into the programs.

CSIRO-SEC should follow the Universal Design principles for any new programs that are developed as well as modify the existing programs to comply with these standards. With more educational programs complying with Universal Design, more students will be able to participate and gain a positive educational experience.

For activities that cannot be modified, it is important to ensure all students are encouraged to participate to the extent of their individual abilities. When a student with disabilities is present, ensure that his or her partners have the skills to help compensate but still allow the student to participate. Students should not feel as though they have to step back and observe their peers.

It is important to emphasize that confusion is not necessarily a bad thing. The data shows that although students may have to spend more time understanding an activity, the students make the same conclusions and may even learn more through their struggles. Additionally, the student's perceived usefulness of an activity does not necessarily correlate to how much they actually learn.

7.4 Universal Design Principles

When adapting a program to be accessible to students with particular disabilities, it is important to be aware of the abilities and limitations of all students. To best adapt programming, the project team recommends that the principles of Universal Design be met. The Universal Design principles are as follows (Simone, Vozzola, & Worobey, 2007):

1. Provide material to students to prepare them in advance
2. Determine which specific activities are essential to achieve learning goals
3. Integrate multi-sensory activities
4. Simplify instructions
5. Encourage group work
6. Focus on the individual strengths of students
7. Recognise the presentation style
8. Ensure that all equipment is easily accessible to students
9. Ensure safety when using any equipment
10. Allow students additional time if needed

If needed, the student should be able to retrieve the materials for the activities in advance. This enables him or her to prepare for the program and gain an understanding through repetition.

The educator or program presenter should determine which activities are essential to the learning goals of the activity. If a student has a disability or impairment that prevents him or her from being able to compete all of the activities, there should be a preset list of activities which will encourage the student to get the most out of the program.

The project team stresses the importance of incorporating multi-sensory activities. Integrating multi-sensory activities into the non-formal education setting allows a majority of students to participate, regardless of any disability or impairment. Multi-sensory activities enable students to explore multiple avenues to learn.

Simplifying instructions will allow the students to understand the purpose of the activity without adding confusion. However, the instructions should still be as descriptive as possible. The student should be able to glance at the instruction sheet and quickly grasp the objectives of the activity.

Group work should be encouraged. This way, students are able to focus on their individual strengths and make contributions to their group. If there is something that one of the students does not understand, another group member will likely be able to help. The student will get more out of the activity if able to focus on his or her strengths, and will be more likely to enjoy participating.

The project team also stresses the importance of presentation. Both the presentation style and the environment are important when adapting a program to accommodate all students. The presenter should speak audibly and directly to the students. The presenter's voice should be projected out towards the students. It is important to be aware of the lighting conditions in the room and outside. The lights should be adjusted so it is comfortable to see the material. If the sun is shining through the window, the presenter should not stand in front of it. This lighting condition can make it difficult for the students to focus on the presenter.

The equipment necessary for the program should be easily accessible to the students. The program should be well organised and consistent. This will also make it easier for the presenters to find the materials they need for each activity. It is important that proper safety techniques are always used so the students and educators are not in any danger.

If a student with a disability or impairment needs additional time to complete the activities, permit him or her to do so if possible. It may take a little longer for the student to grasp the material.

By implementing the Universal Design principles into non-formal education, more students will be able to gain a positive educational experience.

7.5 Report Distribution

In order to ensure CSIRO Science Education Centres across Australia provide equal learning opportunities, it is recommended that this paper be distributed to managers of all CSIRO Science Education Centres. This will permit the recommendations provided to be implemented across the entire CSIRO-SEC curriculum.

Additionally, it is recommended that the report be distributed to non-formal educators throughout Australia and internationally. This will provide evidence in favour of the usefulness of Universal Design principals in non-formal education and will encourage educators to implement various recommendations made by the project team.

7.6 Future Projects

The project team recommends a number of future projects based upon the conclusions of this paper. Future project groups could focus on investigating the usefulness of the implemented Universal Design standards for students with other types of disabilities. This project could focus on the activities that have already been adapted and explore if these adaptations improve learning outcomes for students with

other sensory, mobility, or learning disabilities. Additionally, the project group could explore if the implemented Universal Design principles conform to the Student Accessibility Matrix for mobility and auditory disabilities.

If CSIRO-SEC expresses interest in continuing adaptations to other science education programs, future project teams could investigate and recommend modifications based upon Universal Design. The programs adapted may focus on science in primary schools to provide young children with disabilities an opportunity to develop an interest in science.

The project team found that students indicated increased understanding of topics after participating in the Modified Tyre Track activity within the Forensic Frenzy program. In the future, a project could be conducted that would investigate the long term effects and impact any CSIRO program has on students. This could be conducted by evaluating the perceived understanding of the specific topic months before the program is presented, immediately prior to presentation, immediately following presentation, and months after presentation. This would give comparable data to explore the longevity of the impact of the program. CSIRO would be able to evaluate the effectiveness their programs have in achieving the goal of instilling an interest in and understanding of science.

Future projects could be conducted at other non-formal education sites to implement Universal Design broadly across many areas. Some examples of non-formal education locations that could potentially sponsor a project include Zoos Victoria, the Immigration Museum, the Melbourne Aquarium, or other similar sites across the world.

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Appendix A: Universal Design Principles

1. Providing preparatory material to students is important because it introduces them to the concepts before an activity and allows them to familiarize themselves with the material before seeing it in the classroom. Educators should make sure that materials, such as worksheets, are converted to formats and fonts that are suitable for all students. The alternate formats depend on the student's actual need and can include Braille or an enlarged font. By providing the information in advance, students also are given repetition. Repetition allows information to be introduced through different mechanisms multiple times and allows the students to gain a greater understanding of the subject.
2. By recognizing the primary and secondary objectives of an activity, educators are able to identify which areas must be modified to accommodate all students. For example, if the goal of the activity is to observe a chemical reaction that results from the mixture of two chemicals, the measurement of the chemicals themselves is not an important concept to the activity. The students could be given preset volumes to mix to remove the barrier that is associated with the task and focus the students' attention on the most important objective.
3. Integrating multi-sensory activities are essential to learning in the classroom. It helps reinforce concepts and allows the student to access material through multiple mediums. Students are able to take advantage of their abilities and utilize their strongest senses. Additionally, multi-sensory activities allow students to access material through different mechanisms which keep them more engaged in the activity. For example, if an activity requires the students to observe photographs and compare them, it would be beneficial to also include a tactile mould so that students would be able to see and feel the comparison.
4. Simplifying instructions gives the students clear and concise directions. By doing this, students are more likely to understand the procedure and even complete the activity independently. Also, by breaking the instructions into smaller steps and appending images makes the instructions easier to follow. Students with language and vocabulary barriers will benefit especially well from these modified instructions because they will gain a better understanding of the simpler language and images.
5. Group work should be encouraged in the learning environment because students can focus on their strengths and contribute to the understanding of the entire group. If a student doesn't understand the procedure of a certain part of the activity, another group member will be able to complete it and aid the whole group in better understanding. Allowing students to take advantage of their own strengths and share them with the group makes group work much more effective, productive, and satisfying for all students.
6. Focusing on the individual strengths of the students allows the educator to incorporate activities into the curriculum that the students are capable of completing. If programs and activities are created with a broad range of student abilities in mind, fewer adaptations will have to be made in the future. Additionally, focusing on the strengths of the students will make the curriculum more accessible and more enjoyable for all students.
7. It is important for the educator to be aware of the presentation style they are using. This style should be accessible to all students. The presenter should avoid pacing back and forth or turning

their back to the students. The presenter should always face the students directly so that their voice is projected forward and so their expressions are always visible.

8. All equipment used in a program or activity should be in reach of the student. The activities should be based at a level that can be easily and safely assessed by the students. By using adjustable tables and workstations, and keeping necessary equipment in reach and organized, more students will be able to gain knowledge and experiences. These changes will also make the program or activity accessible to students with disabilities.
9. Safety is a primary consideration that should be taken into account when conducting an activity. Suitable materials should be used that will not break and are less likely to harm a student. Proper storage and properly labelling any hazardous or sharp material will familiarize the students with the dangers. It is important to create a safe environment for students.
10. Students in the classroom have a wide range of abilities. If needed, it is necessary to allow students more time to complete tasks. It is important students do not feel rushed because they may not be able to do their best or fully understand the objectives of the activity. Providing more time is particularly important for students with disabilities or impairments. It may take them longer to read and comprehend the material.

Appendix B: Student Accessibility Matrix (SAM)

(Extracted from Simone, Vozzola &Worobey, 2007)

Tasks that have been identified as barriers for student with visual impairments are listed in the left hand column. The spectrum of the disability is found in the top row of the matrix. The second row of the matrix includes accommodations that can be made for all tasks to make them more accessible for students with visual impairments; these solutions should be considered before the rest of the matrix is consulted. The middle cells of the matrix contain solution codes which correspond to adaptations that can be made to accommodate students with visual impairments. The coded list of solutions is found below the matrix. It should be noted that the vision specific accommodations are meant to supplement the Universal Design section; they assume that the general strategies in the Universal Design section have been implemented.

VISION SAM

Task	Colour-blind	Limited Visual Field	Low Vision	Blind
ALL TASKS	**V7, V16**	**V9, V16**	**V7, V8, V12, V16**	**V16**
Targeting (Moving, Pouring, Assembling)			V5	V5
Measuring Using an Analogue Scale			V3	V3
Reading Instruments with a Digital Output			V3	V3
Reading Text			V4, V13, V15	V4, V6, V14, V15
Writing			V4, V17	V4, V6, V17
Viewing Two Dimensional Images	V11	V11	V1, V11	V1, V11
Observing Motion			V1, V2, V10	V1, V2, V10
Observing Changes (Physical, Chemical, Colour)			V1, V2	V1, V2

Vision Solution Key

V1 - Access through Touch

V2 - Access through Sound/Smell

V3- Technology with Verbal Output

V4- Audio Recording

V5- Aids for Targeting

V6- Braille

V7- Increase Colour Contrast

V8- Enlarged Text

V9- Ensure Task or Demonstration is in Visual Field

V10- First Person Experience

V11- Good Keys and Legends

V12- Magnify/Enlarge

V13- Use Screen Magnifier

V14- Use Screen Reader

V15- Simplify

V16- Team Approach

V17 - Using Computers as a Writing Alternative

V1

Access through touch:

- Incorporate activities which have tactile elements in them
- Allow the student to touch/feel what is happening in different activities when it is safe to do so
- Make a three dimensional (tactile) diagram of the concept being taught

Students who are blind or visually impaired often have a more developed sense of touch as they have learned to use it more effectively. Different textures can be used to explain concepts and the differences between them. Students should be allowed feel different types of materials that are being talked about when it is safe to do so. Providing actual objects, as opposed to photos of the objects, will be a valuable addition for all students, especially students with visual impairments. During different reactions, allow

students to feel what is happening. If an experiment involves dissolving a substance, let the student feel the mixture at the beginning, middle, and end of the process. This way the student has a connection with the material by touching it. If it is safe for a student to touch part of an experiment only while wearing protective gloves, the loss of tactility is tolerable.

Three dimensional diagrams or models can be made to illustrate many different concepts including how the solar system is arranged, the components of a cell, or the structure of a plant. Craft supplies, such as Plaster of Paris, Popsicle sticks, and clay can all be used to make tactile diagrams.

There are also different types of paper which will become raised to make diagrams and graphs on paper more tactile. Piaf paper and thermoform paper are both used for this purpose. Thermoform paper can be placed over a raised surface and heated to conform to the surface. The thermoform paper can then be removed and used on its own. Piaf paper uses heat sensitivity to raise different areas based on greyscale shading, making the dark outlines of different diagrams three dimensional.

V2

Access through sound/smell:

- Incorporate activities which contain changes in sound
- Incorporate activities which contain changes in smell when it is safe to do so
- Incorporate sounds into the activities to give students feedback

It is important to incorporate activities which have changes in sound and smell to make the activities more multi-sensory. Changes in sound and smell can be used during reactions, allowing students with visual impairment to detect changes through their stronger senses. Sounds can also accompany visual changes to reinforce them when a complete substitute cannot be made. For example, if a noise like a click is used to signal that something has happened, the student will know when the visual change has occurred. Including nonverbal sounds and smells ensures that students with visual impairments can gain an understanding of what is happening during the reaction.

V3

Technology with verbal output:

- Talking tape measures, scales, rulers, and colour readers

For students that have severe vision impairments, there are devices such as talking tape measures and other tools which utilize a verbal output. These can allow students to participate in measuring activities that they otherwise would not be able to perform.

V4

Audio Recording:

- Record instructions on audio tape or in mp3 format

- Allow the students to submit audio tapes detailing their ideas and observations

For activities with complicated instructions, it can be hard to remember all of the instructions through memory. As an alternative to converting instructions to large text or Braille, they can be converted to audio format, utilizing a much stronger sensory input channel. In audio format, students can play instructions step by step, pausing in between and allowing time to complete the activity. The students can also review steps if they miss something the first time around. Mp3 formats are very accessible as they can be used on computers, which make it possible to read the labels on recordings using a screen reader or magnifier.

In addition to using audio recordings as an alternative format for delivering information to students, students can also record their own ideas and observations. This way, time is saved and students do not have write or type their answers, a task which may be difficult for some students.

V5

Aids for Targeting:

- Use containers with large openings
- Use a funnel
- A guide system can be helpful

If substances are being moved from one container to another, ensure that the openings are large enough for the student to move the material to the right place easily. If the opening is too small, the student may not be able to see it and will have difficulty targeting. Using a funnel is an easy way to widen the opening and make it easier for students with all different types of visual impairments to target small openings. For students with severe vision impairments, a device or person to guide the student to the area to pour is often very helpful.

V6

Braille:

- Convert text-based documents into Braille
- Allow students to use a Braille typewriter to record their answers

Although Braille is not the most widely used written communication method for students with visual impairments, for those who do use the medium it is important to supply them with access to Braille material. Many different places will transcribe information into Braille. In Australia, the Vision Australia Information Library Service (VAILS) will convert various materials into Braille form, but it usually takes about two weeks. Braille can also be applied to measuring devices like rulers so blind students can read the increments on the tool.

Students can also use Braille typewriters to record their answers.

V7

Increase Colour Contrast:

- Utilize contrasting colours in measurement devices, PowerPoint, worksheets and visual aids
- Minimize use of colours which cannot be seen by students

It is difficult for students with visual impairments to see objects or text that have very little colour contrast; these students need maximum colour contrast to see well. To account for this, it is best to use a light background with dark text or vice versa. Specifically, a light yellow or white background with black text works best. This applies to devices such as rulers, text on computer screens, and PowerPoint slides. In addition, adding colour to a clear liquid can make the liquid easier to see when measuring volumes.

Avoid non-contrasting colour combinations, such as red and green, because students who are colour-blind may not be able to distinguish the difference between such colours. If an experiment is being done where the colour change goes from red to green, it is suggested to use materials which will produce other colours or completely report the results in a drawing or illustration in which alternate colours can be used.

V8

Enlarged Text:

- Use a larger font size (18 is usually sufficient)
- Use a copier to enlarge a textual document

For students with visual impairments, text is not accessible if it is not transcribed into the right format. It is important to find a font size that ensures students with low vision are able to comfortably read the material. When material is in an electronic format the font size can be altered before being printed out and if material from a book is being used or worksheets are being copied, a copier can be used to enlarge the print of the text. Eighteen point font is usually sufficient for most users, but it depends greatly on the level of impairment. Some students may be able to read smaller text, but visual fatigue will set in much quicker. Text on measuring devices can also be enlarged as well as number keys on tools like calculators.

V9

Ensure Task or Demonstration is in Visual Field

- Place objects in student's visual field
- Encourage student to scan entire area

For students with a limited visual field, it is important that objects are located within the student's visual field. The visual field can be different for each student, so it is important to first identify where the student's visual range lies. An activity may need to be relocated in a vertical or horizontal direction. Additionally, activities may need to be positioned closer to students. Also, for students with a limited

visual field, a task which is normally spread out may need to be consolidated so all the tools and materials can be seen at once. While students may have a limited visual field, it is still important to encourage them to scan the entire area so they are aware of their surroundings.

V10

First Person Experience:

- Show the student what is happening by having them experience it

First person experience allows a student to better understand certain phenomena such as force. For example, to show the effect of force on movement, push the student on a skateboard, rather than just showing a demonstration to the class. The student will be able to experience movement and gain a better understanding of force and the resultant motion.

V11

Good Keys and Legends

- Use good keys and legends when using diagrams or grasp
- Ensure that keys and legends are simple
- Incorporate textures into the keys and legends if tactile diagrams are being used

It is easier for a student to understand diagrams, whether they be tactile or enlarged two-dimensional, if there is a good key which is not overly complex. The simpler and more self-explanatory a diagram or graph is, the easier it is to understand. This is especially important for visually impaired students because if a student is accessing a diagram in a tactile manner there is only a very limited area that can be accessed at one time. Also, for students with low vision if the diagram is not labelled well it will be difficult to understand.

V12

Magnify/Enlarge:

- Enlarge images from microscopes or demonstrations using a camera
- Supply magnifying glasses to students with visual impairments
- Enlarge the size of pictures and diagrams
- Enlarge the size of objects and buttons

Using cameras connected to projectors or televisions to enlarge small demonstrations can allow students to see what is happening better. Similarly, connecting a microscope to a projector or television can give the student access to phenomena that occur on a scale that is normally too small for them to see. Magnifying glasses can be used to enlarge objects that are too small for students to see. In addition to using optics to enlarge objects in real time, enlarging the physical size of buttons or objects will make it easier for students to see or use them.

V13

Use Screen Magnifier:

- Put things in an electronic format and use computer software to magnify information displayed on computer screen

Screen magnifier software can be used to enlarge text or pictorial images to the desired level. It should be noted that for internet use, not all websites are compatible with screen magnifiers.

V14

Use Screen Reader

- Put things in an electronic format and use computer software to read written material to students

Screen readers are accessed through a computer. The software translates the electronic text into a verbal output. It should be noted not all websites and PDF files are compliant with screen readers.

V15

Simplify:

- Simplify instructions and explanations, be concise
- Use less text
- Simplify visual displays to ensure they are easy to comprehend

Too much text can become overwhelming and confusing for all students, particularly students with visual impairments. To account for this, it is important to make sure that written instructions and textual documents are as concise as possible. Also, pictures can be used in place of text in instances where students have low vision but are able to see the pictures.

For students with visual impairments, it can become very confusing if there are too many lines on a graph or if there are too many different figures on one diagram. By simplifying the graphs and diagrams, they are easier to understand for everyone and can be seen better on worksheets and posters. It should also be noted that different colour lines on graphs should be used with caution. Coloured lines are good when material is printed in colour but may be difficult to distinguish and if the graph is copied in black and white at any point, the colours will be changed to gray shades, which can be very hard to read.

V16

Team Approach:

- Put students in teams so that the students can help each other

Students with visual impairments may require peer helpers during classroom activities. Using a team approach to learning can optimize each student's strengths within activities. This way, every student can contribute in his or her own way and complete all the activities. For students with visual impairments, peer helpers may need to read off the numbers on a scale or stop watch, verbally explain visual changes, and aid the student in any other areas where vision is required. It is important to note that in some cases, a trained observer may be needed to describe visual changes because a student observer may not know what to look for. It is important to ensure that every member of the group contributes; therefore, while one member of the group may read the digital outputs from a scale, the student who is blind or visually impaired could record data or hold/position other objects.

V17

Use Computers as a Writing Alternative

- Allow students to type answers

Students with visual impairments, especially blind students, will have difficulty writing manually. As an alternative to manual writing, these students may use computers to input their answers. With the support of technologies like screen readers and screen magnifiers, it is easier for students to record their answers and observations.

Appendix C: Forensic Frenzy Teacher Booklet

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CSIRO Education, Victoria

Innovative and Creative Science Programs

Forensic Frenzy

(Years 7-10)

Teacher Booklet

CSIRO's DOUBLE HELIX SCIENCE CLUB

State Government Victoria Department of Education & Training

Catholic Education Office Archdiocese of Melbourne

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Bloomsdale Police Department
Investigation Report

The body of a young man has been found in the abandoned paint factory in Bloomsdale. The victim has died from a gunshot wound, and is yet to be positively identified from dental records. Crime scene detectives found the following physical evidence:

1. The shirt worn by the victim at the time of death.
2. Oil sample extracted from the victim's clothing.
3. Cloth fibres found on the victim's clothing.
4. A piece of torn fabric entangled in a barbed wire fence outside the factory.
5. Fingerprints on a bench top in the factory where the victim was found.
6. A footprint found in mud outside the factory.
7. A stained cloth found in an office at the Bloomsdale Research Laboratory.
8. Tyre tracks outside the crime scene.

The body is believed to be that of Nathan Bloom. He and his family are known to police for possession and sale of stolen goods, and for gambling fraud at The Lucky Country Club, a local casino. Their criminal activities have made them local identities in Bloomsdale.

Nathan was abducted for ransom while returning home from a local bar between 12:40 am and 1:00 am ten days ago. A type written note was posted to Mr. & Mrs. Bloom demanding $50,000 in used currency. The ransom note was in an envelope with the address stencilled on the front with black ink.

Bloomsdale Police Department
Investigation Report

Four suspects have been interviewed. They all deny any knowledge of and involvement with the kidnapping and murder.

Name: Rodney Georgiou
Sex: Male
Age: 28 years
Occupation: Landscape gardener
Comments: Currently unemployed. Single and lives alone in Bloomsdale. Actively involved in fitness programs. Known to police for break and enter, burglary and possession of stolen goods.

Name: Maria Crossman
Sex: Female
Age: 29 years
Occupation: Cleaner
Comments: Married and lives with her partner in Bloomsdale. Suspected criminal associate of the Bloom family. Employed as a part time cleaner at the Bloomsdale Research Laboratory.

Name: Eric Smythe
Sex: Male
Age: 41 years
Occupation: Manager
Comments: Married with two children. Employed at the Lucky Country Club and lives in an apartment at the club. Licensed owner of 2 guns kept at the club for security personnel. No police record.

Name: Tracy Zammitt
Sex: Female
Age: 23 years
Occupation: Laboratory technician
Comments: Employed at the Bloomsdale Research Laboratory. Experiencing financial difficulties, due to gambling debts. Licensed gun owner and belongs to a sport shooting club.

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Bloomsdale Police Department
Investigation Findings

Evidence	Conclusions
Ballistics - Greiss Test	
Ballistics – type of firearm used	
Dental X-rays	
Envelope ink	
Fabric on the fence	
Fibres on the body	
Fingerprints at the factory	
Fingerprints on the gun	
Fingerprints on the ransom note	
Is it blood? Whose blood?	
Oil stains	
PAID stamp	
Soil testing	
Tyre tracks	

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Bloomsdale Police Department
Investigation Summary

Crossman	Georgiou	Smythe	Zammitt	Victim
				Ballistics

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Summary of Evidence

Body identification

- Dental X-rays and DNA patterns on the blood sample indicate that the victim is Nathan Bloom.

FACES computer program

- Georgiou was identified by a witness as the person seen loitering around the Bloom's neighbourhood.

The ransom note

- The stamp impression found on the ransom note was traced to the office of Tracy Zammitt.
- The ink on the ransom note envelope matches ink found at Crossman's house.

Soil testing

- The soil test shows that both Georgiou and Smythe had walked near the crime scene.

Fingerprints

- Crossman's fingerprints were found on a bench top in the factory.
- Both Crossman's and Zammitt's fingerprints were found on the ransom note.

Fabrics and fibres

- Fibres on Nathan's body match those from Crossman's jumper.
- Fabric found on the fence at the factory matched Georgiou's cotton shirt.

Other physical evidence

- Oil stains on Nathan's body matched the oil used in both Crossman's and Smythe's cars.
- The "Hemastix" test confirmed the fabric in the bin in Zammitt's office was stained with blood. DNA analysis showed the blood was from Nathan Bloom.
- The tyre tracks showed that Crossman's car had been at the crime scene.

Ballistics

- Absence of discharge residue suggests gun was fired too far from the victim to be suicide.
- The size of the bullet hole in the victim's shirt suggests that 0.38 ammunition was used.
- Greiss tests show that Smythe and Zammit have all fired guns recently.
- Guns owned by Smythe and Zammitt have the fingerprints of the owner on them, and no-one elses.

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Case brought before Court by the Crown Prosecutor

Nathan Bloom and his family have been moderately successful in their criminal activities over the last ten years. They have in the process made enemies and earned the jealousy of like-minded people.

Maria Crossman was guilty of the kidnapping and murder of Nathan Bloom. She did it for her own personal financial gain, and shot Nathan dead in cold blood. It is uncertain whether she ever intended to hand Nathan over in return for the ransom.

Crossman abducted Nathan while he was walking home from a local bar. Nathan knew Crossman and accepted her offer of a lift home. He was held at gunpoint, against his will until his death.

Nathan was shot in the belly at a distance of more than 80 cm with a .38 Smith and Wesson handgun, and the bullet passed through the body. The shooting occurred at an unknown location, and no gun or bullet has been found. Crossman wore gloves during the shooting, so no discharge residue was found on her fingers.

After the shooting, the body was moved to the abandoned factory. A cloth was stained with blood, and this was planted in the office of Tracy Zammitt as part of an attempt to make Tracy a prime suspect in the case. Crossman mistakenly left behind some of her own fingerprints in the factory, and cloth fibres from her clothing were found on the victim's clothing.

Crossman typed the ransom note on Zammitt's typewriter using scrap paper found in her office. The scrap paper carried several clues, including an impression of a paid stamp, which was traced to Zammitt's office, and fingerprints from both Zammitt and Crossman.

Crossman sent the ransom note to the parents of the deceased in an envelope which she addressed using black ink and a stencil. The ink was analysed by police using chromatography, and was matched to a black ink pen found by police at Crossman's home. Crossman hoped to claim the ransom and leave the country before the body was discovered

Georgiou was seen by a witness on the morning of the kidnapping as he was casing the Bloom's neighbourhood. He is a known felon, but it is believed he had no involvement in this case. He had been in the factory, tearing his T-shirt on the barbed wire fence and leaving footprints in the mud. This was unrelated to the crime.

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Fabric on the Fence
Fibres on the Body

Is the fibre from an animal, a plant or is it synthetic?
Where did it come from?
How did it get at the crime scene?
Does it help us find more about what happened at the crime scene?

What to do:

1. Use tweezers to take a small piece of each of the 4 fabrics from our suspects and place it into a square of the yellow box.
2. Wet the fabrics (see fig.1).
3. Put 1-2 drops of Shirlastain onto the wet fabric (see fig. 2).
4. Wait 2 minutes.
5. Rinse the fabrics with water, remove with tweezers and put them onto the blotting paper.
6. Compare the colours of the fabrics with that of the fabric found on the fence, and the fibres found on the victim's clothes. These have already been treated with Shirlastain, and have been laminated.

Did the fibres on the victim's clothing come from any of our suspects?

Did the fabric on the fence come from any of our suspects?

Fig. 1

Fig. 2

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Ballistics – Type of Firearm

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A ballistics expert will try to answer the following questions:

1. *What make of weapon was used in the shooting?*
2. *If the police have found a weapon, was the weapon used in the shooting?*
3. *How far away was the gun from the target when the gun was fired?*
4. *Where were the assailant and the victim when the shot was fired?*

What to do:

No bullets or cartridges were found at the crime scene. One bullet entered the victim through the abdomen, and exited through the back.

1. **Look at the entry and exit holes in the t-shirt.**
   Compare these with the ballistics tests conducted using the Smith and Wesson 0.38 calibre and 0.22 calibre handguns owned by Smythe, and the 12 gauge Winchester shotgun owned by Zammitt.

2. **What weapon may have produced the marks in the t-shirt?**
   Pay particular attention to the size of the bullet hole.

3. **How far away from the victim was the gun fired?**
   Look closely for evidence of discharge residue, which is the result of burning gunpowder.

4. **Can you suggest a reason why the bullet was not found?**

5. **Was it murder? Could it have been suicide?**

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Envelope Ink

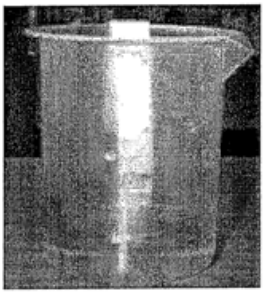
Chromatography

The ransom note was posted to Nathan Bloom's parents in an envelope. The address was stencilled on the front in black ink.

Black ink is often made by mixing different coloured inks together. These colours can be separated from each other using ***Chromatography****.*

Water is used to dissolve the ink. The water moves up a piece of paper, carrying the ink with it. Some ink colours are carried faster and further than others. In this way the different colours in the ink are separated into a pattern.

What to do:



1. Choose one of the pens, and draw a short horizontal line 3cm up from the bottom of the paper strip.
2. Write the name of the suspect on the top of the paper.
3. Repeat steps 2 and 3. with each of the other pens.
4. Carefully place the bottom of the paper into the water. **Make sure the ink marks are above the water level.**
5. Watch the water rise up the paper. Take the paper out after a few minutes.
6. The ink from the envelope has been tested in the same way. This ink pattern is covered in plastic. Compare this ink pattern with the patterns from the suspects' pens.

Do any of the pens make a pattern like the one from the envelope of the ransom note?

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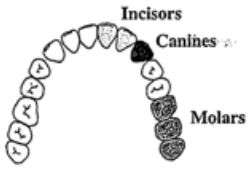
Dental X-rays

Using dental details to identify people

If you have had a tooth filled or removed, or if you have braces or a mouthguard, then your dentist has a record of what your teeth look like. Most people in Australia have a record of their teeth, and this record can be useful to identify a dead body or a skeleton.

You need to compare the teeth of the victim with the missing persons, using the X-rays.

What to do:



1. Hold the victim's X-ray up to the light. This lets you see it more clearly.
2. Look for similarities between the X-ray from the victim and those from the missing persons.

Is it likely that the victim is one of the missing people? If so, who is it?

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Facial Identification

Using computer technology

Police appealed to residents of Bloomsdale to come forward if they had noticed anything suspicious on the morning of the kidnapping. A neighbour reported seeing a man loitering in the Blooms' street. Police called the witness to the local station to make a computer picture (photofit) of the man's face. The picture was released and distributed around the neighbourhood to see if anyone recognised it. This led to the identification of Rodney Georgiou.

In the past, such a picture would have been made with the aid of a police artist. Today police use computer technology. You will use the computer to create your own picture of Georgiou.

What to do:

1. Look at the picture of Rodney Georgiou for 30 seconds and then turn it face down.
2. To start a new face choose **NEW** in the **FILE** Menu. If prompted, do not save any faces you have created.
3. Choose a facial feature (**EYE, NOSE, JAW, HAIR, EYEBROWS, MOUTH,** etc)
4. You can increase the size and position of many features.
5. You can make a person look older by adding mouth lines, forehead lines and smile lines.
6. When you are finished, compare your picture with the photograph of Georgiou. How close were you?

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Fingerprints

Looking for patterns

Fingerprints are caused by the sweat and oil on our fingers. To see the fingerprints, scientists use chemicals that react with the sweat left on objects. For a forensic scientist our fingers act like a stamp pad!
There are three main types of fingerprints; arch, loop or whorl.

ARCH

LOOP

WHORL

A fingerprint that is made up of a combination of an arch, loop or whorl is called a composite. However composites are not very common.

What to do:

The fingerprints found by the detectives in the factory have been copied on to the laminated sheet. They were found on a bench by dusting with manganese dioxide (a black powder).

1. Compare the prints with the fingerprints of the four suspects. Which suspect is likely to have left the prints.

Fingerprints at the factory belong to:

A fingerprint was found on the ransom note by exposing the paper to iodine vapour.

2. Which suspect is likely to have left the print on the ransom note?

Fingerprints on the ransom note belong to:

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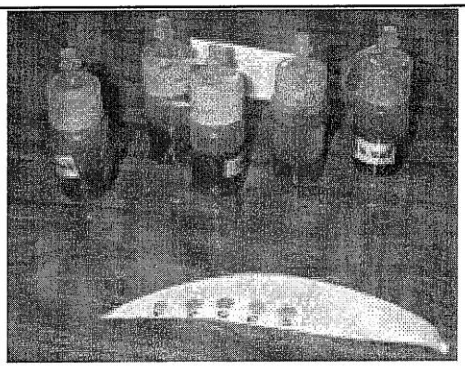
Oil Stains
Looking for clues

*Oils contain chemicals that make them **fluoresce**. This means that when placed under ultraviolet (UV) light, such as from the sun, they emit light that we can see. Different oils emit slightly different colours of light when they fluoresce. You will be using an ultraviolet light in this activity.*

What to do:

1. Locate the bottles of oil.
2. Place a small smear of oil from the victim's clothing (evidence) onto a piece of filter paper. Write "victim" near the smear.
3. Place a drop of each of the other oil samples on the same piece of filter paper.
4. Place the filter paper in the light box, under the UV light.
5. Compare the 'evidence' with oils obtained from the suspects.

Do any of the oils closely match the oil stains found on the victim's clothing?



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Is It Blood? Whose Blood?

Police found some cloth in a bin in Zammitt's office at the Bloomsdale Research Laboratory. The Laboratory is next door to the abandoned paint factory where the body was found. The cloth is stained, and the police need to know whether the stains are blood, or something else.

What to do:

1. There is only one test per group.
2. Take a "Hemastix" from the container.
3. Using tweezers take a piece of the fabric and put it in the centre of the bowl. Stir the fabric in the water for 15 seconds.
4. Place the yellow end of the "Hemastix" on the damp cloth for 5-10 seconds, and check the colour. If any of it turns green, the fabric was stained with blood.
6. If the stain is blood, what other tests could you do to find out whether it is the blood of the victim?

DNA Tests

DNA tests were done on blood samples from Nathan Bloom, the 4 suspects, the victim, and also the bloodstain found on the cloth. DNA tests produce a pattern known as a profile.

If blood from 2 different samples gives the same profile, then they are from the same person.

Look at the DNA patterns. Whose blood is on the cloth?

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Looking Complete

Facial reconstruction

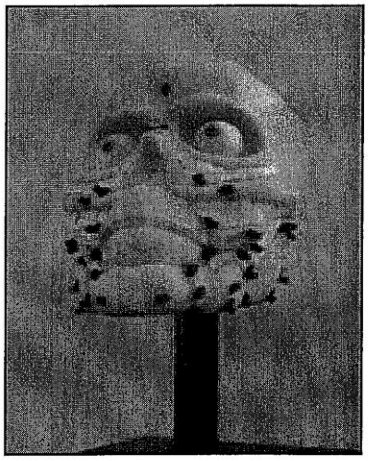
When skeletal remains are discovered, it can be difficult to identify the body, since much of the flesh will decompose if the body has been left for a long period of time. Forensic scientists use the skull and make very accurate measurements of the bones to try and reconstruct the person's face. The model that they make will often help a relative or friend of the deceased to recognise the body.

What to do:

1. Mould the plasticine onto the front of the skull. Use the blue pegs as a guide for the depth of the skin layer.

   Can you reconstruct the face?

2. More information on these techniques can be found on the laminated sheets at this workstation.



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PAID Stamp

Looking for impressions

The impression of a PAID stamp appeared on the back of the ransom note. Similar stamps have been collected from some of the suspects.

1. Stamp each of the PAID stamps on a blank page in your workbook.

2. Compare these with the PAID stamp found by detectives on the back of the ransom note. Look for scratches, dents or other flaws.

Could the stamp belonging to one of the suspects have been used to make the impression on the back of the ransom note?

If so, which one?

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Smooth Surfaces

Looking for finger prints

If forensic scientists are looking for fingerprints on smooth surfaces, they use a fine powder to enhance any latent prints a process called ***dusting****. Different coloured powders are used for different coloured surfaces. Police forensic experts use manganese dioxide powder (black) and titanium dioxide powder (white) to dust for fingerprints.*

What to do:

1. Wipe the mug with a tissue to remove any fingerprints.
2. Make a thumbprint on the mug.
3. Dip the brush into the **fingerprint powder**.
4. Tap off the excess powder.
5. Lightly brush the area where your fingers touched the mug.
6. Examine the fingerprints with a magnifying glass.
7. When finished, clean the mug with a tissue.

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Soil Testing

Crime scene detectives found a footprint in soil, outside the factory in which the body was found. The police confiscated pairs of shoes from each of the 4 suspects and scrapings of soil were taken from the soles of the shoes.

The chemical make up of the soil from the crime scene needs to be compared to that of the soil taken from the suspects' shoes.

What to do:

1. Place a quarter of a spoon of the crime scene soil sample onto the clean white tile.
2. Add <u>one</u> drop of the liquid and mix it with the soil with an icy-pole stick.
3. Puff the white powder onto the soil so that the soil is just covered with powder. <u>Do not</u> stir powder in. Two puffs should be plenty.
4. Match the soil colour with one on the chart. Each colour has a number near it. This number tells you the amount of acid in the soil. It is called the pH of the soil.
5. Repeat steps 1-4 for each of the other samples taken from the suspects' shoes.
6. Which of the suspects' samples matches the sample taken from near the crime scene?
7. Wipe the soil into the bin and wash the white tile.

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Tyre Tracks

A set of tyre tracks was left at the crime scene. Crime scene detectives have taken a photo of the tyre tracks and photos of our 4 suspects' car tyres. Forensic scientist would normally examine the entire track of the suspect's car tyres rather than a small part as in this example. Often it is not just the tread marks that the manufacturer puts on the tyre but the wear patterns on the tyres that become important.

1. Look at the photo of the tyre tracks taken from the crime scene. Are there any unusual marks or patterns of wear in the tyre?

2. Next, look at the photos of the 4 suspects' tyres. Make sure that you look for strange marks or bald patches.

3. Compare the crime scene photo to the suspects' tyre photos. Do you notice any similarities?

Do any of the suspects' tyres match the photo taken from the crime scene?

If so, which one matches?

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Fingerprints on the gun
Ballistics – Griess Test

When a person fires a gun, their hands are sprayed with discharge residue from the burning gunpowder. A Greiss test is used to search for nitrite residue on a suspect's hands. A positive result indicates the person has fired a gun recently.

Greiss tests have been performed on each of the suspects, and the guns seized by police have been dusted for fingerprints.

What to do:

1. Analyse the fingerprints found on Zammitt's Winchester, and the Smith and Wesson .38 owned by Smythe. No prints were found on the .22 Smith and Wesson.

.38 Smith and Wesson

12 gauge Winchester

2. Greiss tests results

Crossman	- negative
Smythe	- positive
Georgiou	- negative
Zammitt	- positive

Do you know who fired the fatal shot?

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FORENSIC FRENZY
WEB SITES

Interesting websites that may relate to Forensic Frenzy, and to those interested in Forensic Science in general:

TEACHER RESOURCES

- Cybersleuth. An international school forensics program with a number of Victorian schools involved.
  http://www.kilvington.vic.edu.au/cyber/forensic/index.html

- Yahoo's Forensic Science Index
  Quite a good index for more forensic science sites
  http://www.yahoo.com/science/forensics

- Zeno's Forensics Page
  Older kids might be interested
  http://forensic.to/forensic.html

- Crime and Clues
  In particular, try clicking on Fingerprint Evidence
  http://crimeandclues.com/

ACTIVITY SITES FOR KIDS

- MysteryNet kids section
  Excellent see-and-solve site for kids
  http://www.MysteryNet.com/thecase/

- FACES website
  Download a free demo version of the photofit software used in the Forensic Frenzy
  http://www.iqbiometrix.com

September 2006
(with thanks to the Rick Daley in Adelaide who put most of the list together)

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FF Websitelist.doc

Appendix D: Modified Tyre Track Worksheet

Tyre Tracks

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A set of tyre tracks was left at the crime scene. Crime scene detectives have created a silicone rubber mould of the tyre tracks and have also created moulds of the 4 suspects' car tyres. Forensic scientists would normally examine the entire track of the suspect's car tyres rather than a small part as in this example. Often it is not just the tread marks that the manufacturer puts on the tyre but the wear patterns on the tyres that become important.

1. Examine the mould of the tyre tracks taken from the crime scene. Are there any unusual marks or patterns of wear in the tyre?

2. Examine the moulds of the 4 suspects' tyre. Make sure you look for strange marks or bald patches.

3. Compare the crime scene mould to the suspects' tyre moulds. Do you notice any similarities?

Do any of the suspects' tyres match the track found at the crime scene? If so, which one matches?

Appendix E: TTN Version 0.1 Insulation Foam

Materials:

- Gloves
- Newspaper
- Spray lubricant
- Spray Insulation foam
- Car tyre

1. Lay newspapers on the ground to allow for easy clean-up
2. Spray the entire tyre with lubricant
3. Spray the tyre with the insulation foam making sure to cover all grooves and tread marks.
4. Let dry

Appendix F: TTN Version 0.3 Plaster of Paris in Wood Case

Materials

- Two 30 inch 2x4 wooden planks cut to size
- Two 18 inch 2x4 wooden planks cut to size
- Flat 15x30 inch sheet of at least ½ inch Particle Board
- Screws

Tools

- Table or hand saw and bench
- Protective eye and hand equipment
- Electric hand drill
- Drill bits
- Sandpaper

Procedure

1. After obtaining all materials and tools necessary to create the casing, secure a safe location, preferably a workshop that provides the necessary safety standards to proceed with woodworking. Ensure to follow all safety guidelines as outlined in the safety manuals provided while using the table or hand saw and the electric drill. Observe standard safety guidelines throughout the entire procedure. Wear protection gear at all times.
2. Cut all 2x4 planks and particle board to the specified sizes using a standard table or hand saw. Ensure that all pieces are smooth using sandpaper.
3. Place the particle board on a flat surface and align two 30 inch 2x4's on each long side and the two 18 inch 2x4's on the short side of the plaster board to ensure that all pieces are flush to form a rectangular box as outlined by Figure 33.

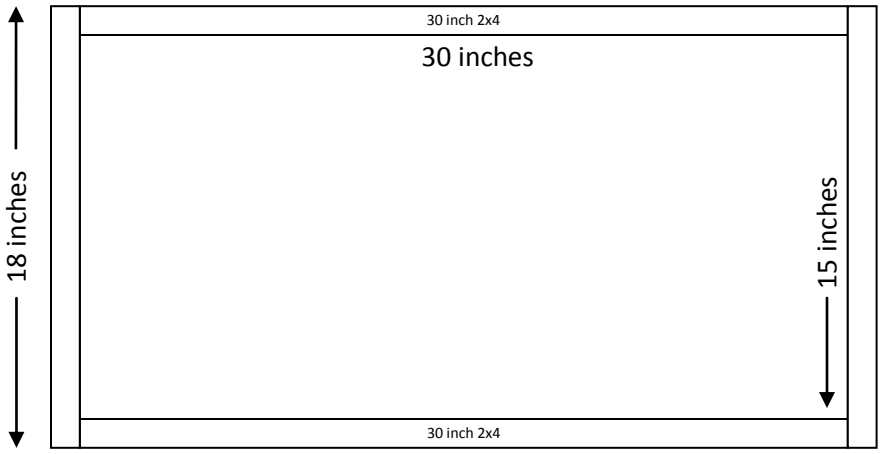


Figure 33: Diagram of TTN Version 0.3 Casing

4. The 2x4 wooden planks should be flush and touching the bottom of the flat surface so that the particle board overlaps with the sides of the wooden planks, not the bottom of the wooden planks.

5. Obtain the necessary drill bit for the standardized screws to be used, and drill three evenly spaced holes piercing each 18 inch 2x4 into the particle board. Drill in screws.
6. Drill four even spaced holes piercing each 30 inch 2x4 into the particle board. Drill in screws.
7. Drill 2 holes on both the left and the right side of each 18 inch 2x4 so that the holes piece into the 30 inch 2x4s located on each end of the 18 inch particle board. Drill in screws.
8. Ensure that the entire casing is snug, stable, and level. Drill in additional screws if necessary to ensure stability.
9. Clean up properly and sand down TIPOPIC container once more for safe handling.

Plaster Mixing and Pouring

After building the necessary compartment for this step, this procedure must the followed to ensure proper casting of the tyre. Ensure that all materials and tools are procured and ready to be used for both this step and the steps in the Tyre Moulding Procedure before proceeding. This is a time-dependent step that will require strict adherence to the time protocols described.

Materials

- Tyre
- Household cleaner
- Paper Towels
- Empty 5 gallon bucket
- Paint stirrer
- Silicone spray
- 25 lb (11.84 kg) bag Plaster of Paris (DAP™)
- Duct Tape
- ddH_2O
- gloves and safety goggles
- Wooden casing

Tools

- Stop Watch

Procedure

1. Ensure that safety equipment is worn at all times, as reacting Plaster of Paris may be harmful if handled inappropriately according to MSDS.
2. Ensure that the tyre is completely dirt-free by cleaning with household cleaner beforehand.
3. Spray down the entire tyre with silicone spray ensuring that all surfaces and crevices are covered as shown in Figure 34.
4. Rest the tyre on ground or on a flat surface for later use.

Figure 34: Lubricated Tyre

Figure 35: TTN Version 0.3 Casing

5. Duct tape inside angles of TIPOPIC casing as a means for sealing gaps between pieces of wood as shown in Figure 35. This will ensure that Plaster of Paris does not leak outside of the casing.
6. Fill 5-gallon bucket with ddH2O equivalent to half the volume of the amount of Plaster of Paris being used.
7. Slowly add Plaster of Paris to ddH_2O while mixing vigorously with paint stirrer.
8. Continue mixing until all of the Plaster of Paris is added. The mixture should be a thick, homogeneous consistency.
9. Carefully pour Plaster of Paris into casing ensuring that solution is level and evenly spread. Spread evenly with paint stirrer if necessary.

Figure 36: Spreading Plaster of Paris

10. Typical cure time for Plaster of Paris to the consistency of a malleable solid is approximately 7-9 minutes. Test Plaster of Paris for consistency every minute.
11. Proceed to the Tyre Moulding Procedure when Plaster of Paris no longer adheres to a stick or rod being pulled out of solution after being dipped in.

Tyre Moulding Procedure

Materials

- Casing and materials from previous step
- Lubricated tyre

Procedure

1. Once the Plaster of Paris has cured to the recommended consistency, place the tyre on the long end of casing so that the tyre is parallel to the 30 inch 2x4 planks.
2. Using one person to guide the tyre from one end of the casing to the other and a second person to apply pressure to the top of the tyre, roll the tyre through the Plaster of Paris from one side of the casing to the other providing the necessary amount of force to allow the solution to indent to form a visible tyre track.
3. When the tyre has been rolled to the opposite side of the casing, remove tyre from the Plaster, clean and dispose of properly.
4. Allow Plaster of Paris to cure and harden for at least 24 hours in a cool, dry location.
5. Allow to dry overnight.

Figure 37: TTN Version 0.3

Appendix G: TTN Version 0.4 Procedure

Materials

- Tyre
- Household cleaner
- Paper Towels
- Empty 5 gallon bucket
- Paint stirrer
- Silicone spray
- 25 lb (11.84 kg) bag Plaster of Paris (DAP™)
- Plastic Sheeting
- ddH_2O
- gloves and safety goggles
- Metal casing
- Divider

Procedure

1. Ensure that safety equipment is worn at all times, as reacting Plaster of Paris may be harmful if handled inappropriately according to MSDS.
2. Ensure that the tyre is completely dirt-free by cleaning with household cleaner beforehand.
3. Spray down the entire tyre with silicone spray ensuring that all surfaces and crevices are covered.
4. Rest the tyre on ground or on a flat surface for later use.
5. Place plastic sheeting inside the metal casing as a means for sealing gaps and easy removal. This will ensure that Plaster of Paris does not leak outside of the casing.
6. Fill 5-gallon bucket with ddH2O equivalent to half the volume of the amount of Plaster of Paris being used.
7. Slowly add Plaster of Paris to ddH_2O while mixing vigorously with paint stirrer.
8. Continue mixing until all of the Plaster of Paris is added. The mixture should be a thick, homogeneous consistency.
9. Carefully pour Plaster of Paris into casing ensuring that solution is level and evenly spread. Spread evenly with paint stirrer if necessary.
10. Typical cure time for Plaster of Paris to the consistency of a malleable solid is approximately 7-9 minutes. Test Plaster of Paris for consistency every minute.
11. Proceed to the Tyre Moulding Procedure when Plaster of Paris no longer adheres to a stick or rod being pulled out of solution after being dipped in.
12. Once the Plaster of Paris has cured to the recommended consistency, place the tyre on the end of casing so that the tyre is parallel to the longer side.
13. Using one person to guide the tyre from one end of the casing to the other and a second person to apply pressure to the top of the tyre, roll the tyre through the Plaster of Paris from one side of the casing to the other providing the necessary amount of force to allow the solution to indent to form a visible tyre track.

14. When the tyre has been rolled to the opposite side of the casing, remove tyre from the Plaster, clean and dispose of properly.
15. Place the divider in the middle of the track and apply pressure so it will completely divide the plaster mould in half.
16. Allow Plaster of Paris to cure and harden for at least 24 hours in a cool, dry location.
17. After Plaster of Paris has completely cured, removed the divider from the mould and remove the plater mould from the metal casing.

Appendix H: TTN Version 0.5 Hardening Clay

Materials:

Car Tyre
Hardening Clay
Spray lubricant

1. Work out the clay so it is malleable.
2. Flatten it out so it is approximately 1cm in thickness.
3. Spray tyre with lubricant, ensuring to cover entire area to be used.
4. Press the hardening clay up to the tyre and apply pressure making sure extra pressure is given to grooved areas and tread marks.
5. Carefully remove the clay from the tyre and bring it inside.
6. Allow the clay to harden with exposure to air.
7. This will create a negative image that can be used as a tyre track found at the scene of the crime.

Appendix I: TTN Version 1.0 Non-Hardening Clay

Materials:

- Non-Hardening Clay
- TTN Version 0.4
- Gloves
- Safety Goggles
- Disposable Container
- Stirring Rod
- Cardboard Box (sized to fit clay)
- Masking tape

1. Work out the clay so it is malleable.
2. Flatten it out so it is approximately 1cm in thickness.
3. Press the non-hardening clay up to TTN Version 0.4 and apply pressure making sure extra pressure is given to grooved areas and tread marks.
4. Carefully remove the clay from TTN Version 0.4. This will create a positive image.
5. Line the cardboard box with duct tape to prevent leakage.
6. Place the clay face up in the container and seal the edges with extra clay.
7. In a disposable container, mix 500mL of silicone rubber with 15mL of catalyst until well blended.
8. Pour the mixture over the clay carefully.
9. Carefully run the stirring rod over the mixture to remove any air bubbles.
10. Allow hardening for 1-2 days.
11. After the rubber has completely set, remover the mould from the cardboard box and peel away the clay. The silicone rubber will be a negative image.

Appendix J: TP Version 0.1 Play dough in Tupperware

Materials:

- Gloves
- Play dough
- Car tyre
- Container (sized to fit to negative of tyre)
- Silicone Rubber
- Catalyst
- Beaker
- Stirring Rod
- Spray lubricant

1. Work out the Play dough so that it is malleable. Flatten it out so that it is approximately 1cm in thickness.
2. Spray tyre with lubricant, ensuring to cover entire area to be used.
3. Press the Play dough up to the tyre and apply pressure making sure extra pressure is given to grooved areas and tread marks. This will create a negative image.
4. Carefully remove the Play dough from the tyre and bring it inside. Trim the mould so that the negative has clean edges.
5. In a 1L container, mix 500mL of Silicone Rubber with 15mL of catalyst until well blended.
6. Pour the mixture into the Tupperware container.
7. Carefully place the play dough mould facedown into the mixture.
8. Allow to set for 1-2 days
9. After the silicone rubber has completely set, carefully remove.

Appendix K: TP Version 0.2 Play dough in Styrofoam

Materials:

- Gloves
- Play dough
- Car tyre
- Container (sized to fit to negative of tyre)
- Silicone Rubber
- Catalyst
- Beaker
- Stirring Rod
- Spray lubricant

1. Work out the Play dough so that it is malleable. Flatten it out so that it is approximately 1cm in thickness.
2. Spray tyre with lubricant, ensuring to cover entire area to be used.
3. Press the Play dough up to the tyre and apply pressure making sure extra pressure is given to grooved areas and tread marks. This will create a negative image.
4. Carefully remove the Play dough from the tyre and bring it inside. Trim the mould so that the negative has clean edges.
5. In a 1L container, mix 500mL of Silicone Rubber with 15mL of catalyst until well blended.
6. Pour the mixture into the Styrofoam container.
7. Carefully place the play dough mould facedown into the mixture.
8. Allow to set for 1-2 days
9. After the silicone rubber has completely set, carefully remove.

Appendix L: TP Version 0.3 Hardening Clay

Materials:

- Hardening Clay
- Car Tyre
- Gloves
- Safety Goggles
- Disposable Container
- Stirring Rod
- Cardboard Box (sized to fit clay)
- Masking tape

1. Work out the clay so it is malleable.
2. Flatten it out so it is approximately 1cm in thickness.
3. Press the hardening clay up to the tyre and apply pressure making sure extra pressure is given to grooved areas and tread marks.
4. Carefully remove the clay from the tyre and bring it inside. This will create a negative image.
5. Line the cardboard box with duct tape to prevent leakage.
6. Place the clay face up in the container and seal the edges with extra clay.
7. In a disposable container, mix 500mL of silicone rubber with 15mL of catalyst until well blended.
8. Pour the mixture over the clay carefully.
9. Carefully run the stirring rod over the mixture to remove any air bubbles.
10. Allow hardening for 1-2 days.
11. After the rubber has completely set, remover the mould from the cardboard box and peel away the clay. The silicone rubber will be a positive image.

Appendix M: TP Version 0.4 Non-Hardening Clay

Materials:

- Non-Hardening Clay
- Car Tyre
- Gloves
- Safety Goggles
- Disposable Container
- Stirring Rod
- Styrofoam container (sized to fit clay)
- Masking tape

1. Work out the clay so it is malleable.
2. Flatten it out so it is approximately 1cm in thickness.
3. Press the non-hardening clay up to the tyre and apply pressure making sure extra pressure is given to grooved areas and tread marks.
4. Carefully remove the clay from the tyre and bring it inside. This will create a negative image.
5. Place the clay face up in the container and seal the edges with extra clay.
6. In a disposable container, mix 500mL of silicone rubber with 15mL of catalyst until well blended.
7. Pour the mixture over the clay carefully.
8. Carefully run the stirring rod over the mixture to remove any air bubbles.
9. Allow hardening for 1-2 days.
10. After the rubber has completely set, remover the mould from the Styrofoam container and peel away the clay (Figure 38). The silicone rubber will be a positive image.

Figure 38: Peeling Clay away from rubber mould in TP Version 0.4

Appendix N: TP Version 1.0 Non-Hardening Clay

Materials:

- Non-Hardening Clay
- Car Tyre
- Gloves
- Safety Goggles
- Disposable Container
- Stirring Rod
- Cardboard Box (sized to fit clay)
- Masking tape

1. Work out the clay so it is malleable.
2. Flatten it out so it is approximately 1cm in thickness.
3. Press the non-hardening clay up to the tyre and apply pressure making sure extra pressure is given to grooved areas and tread marks.
4. Carefully remove the clay from the tyre and bring it inside. This will create a negative image.
5. Line the cardboard box with duct tape to prevent leakage.
6. Place the clay face up in the container and seal the edges with extra clay.
7. In a disposable container, mix 500mL of silicone rubber with 15mL of catalyst until well blended.
8. Pour the mixture over the clay carefully.
9. Carefully run the stirring rod over the mixture to remove any air bubbles.
10. Allow hardening for 1-2 days. (Figure 39)
11. After the rubber has completely set, remover the mould from the cardboard box and peel away the clay. The silicone rubber will be a positive image.

Figure 39: TP Version 1.0 Hardening

Appendix O: Final Version of Observational Checklist

Number of visually impaired students _____

Discussion with other students

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

Feels the mould

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

Feels the tyre

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

Reads the instruction sheet

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

Smiles

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

Frowns

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

Frustration or confusion

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

Appears bored

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

Negative behaviour

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

Magnifying glass

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

Take notes

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

Mention of mirror image/inverse

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

How long does the student take to identify the tyre

_____ seconds

Number of Students Total: **Number of Students in Tyre Track:**

Recorder: School:
Year Level: Session:
Station type:

Notes

Appendix P: Original Version of Observational Checklist

Name:

- ○ Chad
- ○ Jillian
- ○ Sally

Subject's ID Number:

1. Does the student make eye contact with other students?

- ○ Yes
- ○ No

2. Is there at least one visually impaired student in the group?

- ○ Yes
- ○ No

3. Does the student discuss with other students?

- ○ Yes
- ○ No

4. Does the student feel the mould?

- ○ Yes
- ○ No

5. Does the student feel the tyre?

- ○ Yes
- ○ No

6. Does the student correctly identify the tyre?

- Yes
- No

7. Does the student smile?

- Yes
- No

8. Does the student frown?

- Yes
- No

9. Does the student display frustration or confusion?

a. "I don't understand this."

b. "How can you tell it is the same?"

c. "How are we supposed to be able to tell which one matches?"

d. "This doesn't make sense."

e. "What's the purpose of this station?"

f. Student sighs in frustration.

g. Student scowls.

h. Student wrinkles forehead.

- Yes
- No

10. Does the student appear bored?

a. Student yawns.

b. Student's eyes wander around the room.

c. Student leaves the station early.

- Yes
- No

11. Does the student display negative behaviour toward other students?

o Aggression

o Raised voice

o Argumentative

- Yes
- No

12. How long does the student take to identify the tyre in seconds?

Enter any other observations or notes.

Appendix Q: Final Version of Pre-Program Survey

1. What is your name?

_____

2. What is your gender?

MALE FEMALE

3. Have you heard of using tyre tracks at a crime scene to collect evidence?

YES NO

4. Do you think you are capable of identifying tyre tracks and matching them to their respective tyres?

YES NO

5. Do you think that the Forensic Frenzy program will help you better understand science?

YES NO

6. Do you think that the Forensic Frenzy program will help you better understand forensics?

YES NO

7. Have you ever been exposed to the study of forensics before?

YES NO

8. If you are comfortable answering, please list any visual, hearing, mobility, or any other impairments you have. This information will help our study to assist in better adapting science programs such as Forensic Frenzy to all students.

COLOR BLIND	LOW VISION	BLURRED VISION	CATARACT
BLINDNESS	HEARING LOSS	ARTHRITIS	CEREBRAL PALSY
MULTIPLE SCLEROSIS	MUSCULAR DYSTROPHY	PARALYSIS	PARKINSON'S DISEASE
	STROKE	OTHER	

If you answered "OTHER," please explain:

On a scale of 1 (no knowledge) to 5 (advanced knowledge), please answer the following questions:

	1	2	3	4	5
9. How would you rate your knowledge of science?	○	○	○	○	○
10. How would you rate your knowledge of forensics?	○	○	○	○	○
11. How would you rate your knowledge of tyre forensics at crime scenes?	○	○	○	○	○

Appendix R: Final Version of Post-Program Survey

1. What is your name?

On a scale of 1 (no knowledge) to 5 (advanced knowledge), please answer the following questions:

	1	2	3	4	5
2. How would you rate your knowledge of science?	○	○	○	○	○
3. How would you rate your knowledge of forensics?	○	○	○	○	○
4. How would you rate your knowledge of tyre forensics at crime scenes?	○	○	○	○	○
5. How well did you understand the Forensic Frenzy program?	○	○	○	○	○
6. How well did you understand the tyre identification activity?	○	○	○	○	○
7. How useful did you find the tyre identification activity?	○	○	○	○	○

8. Do you think you are capable of identifying tyre tracks and matching them to their respective tyres? (please circle)

YES NO

If you participated in the Tyre Track activity, please respond to questions 10 through 13.

9. Which suspect's tyre matched the tyre track at the crime scene? (please circle)

GEORGIOU CROSSMAN SMYTHE ZAMMITT

10. How did you identify the tyre? (please circle)

BY TOUCH BY SIGHT BOTH

11. Did you find the activity confusing? (please circle)

YES NO

If you answered "Yes" to the previous question, please explain.

12. Please explain the purpose of the Tyre Track identification activity.

13. Please explain what you learned from the Tyre Track activity.

Appendix S: Original Version of Pre-Program Survey

Please enter the number on the sticker you were given.

What is your gender?

- Male
- Female

What is your age?

What is your grade level?

On a scale of 1-5, how would you rate the following?

	None 1	2	Average 3	4	Advanced 5
1. How would you rate your knowledge of science?					
2. How would you rate your knowledge of forensics?					
3. How would you rate your knowledge of tyre forensics at crime scenes?					

4. Do you think you are capable of identifying tyre tracks and matching them to their respective tyres?

- Yes
- No

5. Do you think that the Forensic Frenzy program will help you better understand science?

- Yes
- No

6. Do you think that the Forensic Frenzy program will help you better understand forensics?

- Yes
- No

7. Have you ever been exposed to the study of forensics before?

- Yes
- No

If you answered "Yes" to the previous question, please explain.

8. If you are comfortable answering, please list any visual, hearing, mobility, or any other impairments you have. This information will help our study to assist in better adapting science programs such as Forensic Frenzy to all students.

- Colour Blind
- Low Vision
- Blurred Vision
- Cataract
- Blindness
- Hearing Loss
- Arthritis
- Cerebral Palsy
- Multiple Sclerosis
- Muscular Dystrophy
- Paralysis
- Parkinson's Disease
- Stroke
- Other

If you answered "Other," please explain.

Appendix T: Original Version of Post-Program Survey

Please enter the number on the sticker you were given.

On a scale of 1 to 5, please answer the following questions:

	None 1	2	Average 3	4	Advanced 5
1. How would you rate your knowledge of science?	○	○	○	○	○
2. How would you rate your knowledge of forensics?	○	○	○	○	○
3. How would you rate your knowledge of tyre forensics at crime scenes?	○	○	○	○	○
4. How well did you understand the Forensic Frenzy program?	○	○	○	○	○
5. How well did you understand the tyre identification activity?	○	○	○	○	○
6. How useful did you find the Forensic Frenzy program?	○	○	○	○	○
7. How useful did you find the tyre identification activity?	○	○	○	○	○

8. Please explain the purpose of the Tyre Track identification activity.

9. Do you think you are capable of identifying tyre tracks and matching them to their respective tyres?

- ○ Yes
- ○ No

10. Did you have any difficulty identifying the correct tyre?

- Yes
- No

If you answered "Yes" to the previous question, please explain.

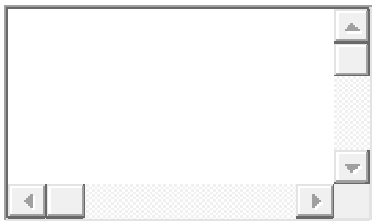
11. How did you identify the correct tyre?

- By Touch
- By Sight
- Both

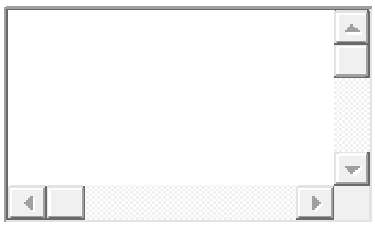
12. Was it easy to identify the correct tyre using this method?

- Yes
- No

If you had difficulty identifying the correct tyre using this method, please explain.

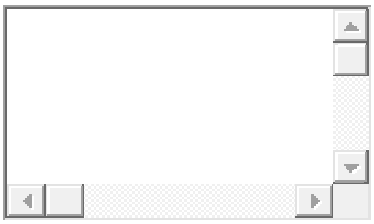


13. Please explain what you learned from the Tyre Track activity.



14. What did you enjoy or find interesting about this Tyre Track activity?

15. What was unclear or confusing about the Tyre Track activity?



Appendix U: Adapted Tyre Track Worksheet

Tyre Tracks

A set of tyre tracks was left at the crime scene. Crime scene detectives have created a silicone rubber mould of the tyre tracks and have also created moulds of the 4 suspects' car tyres. Forensic scientists would normally examine the entire track of the suspect's car tyres rather than a small part as in this example.

1. **Examine the mould of the tyre tracks taken from the crime scene.**
2. **Examine the moulds of the 4 suspects' tyres.**
3. **Compare the crime scene mould to the suspects' tyre moulds. Do you notice any similarities?**

Do any of the suspects' tyres match the track found at the crime scene? If so, which one matches?

Is It Blood?

Whose Blood?

Police found some cloth in a bin in Zammitt's office at the Bloomsdale Research Laboratory. The Laboratory is next door to the abandoned paint factory where the body was found. The cloth is stained, and the police need to know whether the stains are blood, or something else. A Hemastix test was performed and the fabric was found to contain blood.

DNA tests were done on blood samples from Nathan Bloom, the 4 suspects, the victim and also the bloodstain found on the cloth. DNA tests produce a pattern known as a profile in which bands of DNA are separated by distances unique to each person.

If blood from 2 different samples gives the same profile, then they are from the same person.

Examine the DNA patterns. Whose blood is on the cloth?

Soil Testing

Crime scene detectives found a footprint in soil, outside the factory in which the body was found. The police confiscated pairs of shoes from each of the 4 suspects and scrapings of soil were taken from the soles of the shoes.

The make up of the soil from the crime scene needs to be compared to that of the soil taken from the suspects' shoes.

What to do:

1. **Compare the soil from each of the suspects shoes to the soil found at the crime scene.**

2. **Which of the suspects' soil samples matches the sample taken from the crime scene? Is it more than one?**

Fabric on the Fence

When a piece of fabric is found near a crime scene, forensic scientists can examine the fabric and compare it to fabric worn by suspects. Crime scene detectives found a piece of torn fabric entangled in a barbed wire fence outside the factory where the body was found.

What to do:

1. **Compare the torn fabric found at the crime scene to the fabric samples taken from each suspect.**

2. **Did the fabric on the fence come from any of our suspects?**

Envelope Ink – Chromatography

The ransom note was posted to Nathan Bloom's parents in an envelope. The address was stencilled on the front in black ink.

Black ink is often made by mixing different coloured inks together. These colours can be separated from each other using Chromatography.

Water is used to dissolve the ink. The water moves up a piece of paper, carrying the ink with it. The different colours in the ink are separated into a pattern.

1. **Choose one of the pens and draw a short horizontal line 3cm up from the bottom of the paper strip.**
2. **Write the name of the suspect on the top of the paper**
3. **Repeat steps 1 and 2 with each of the other pens.**
4. **Carefully place the bottom of the paper into the water making sure the ink marks are above water level.**

5. **Observe the water rising up the paper. Take the paper out after a few minutes.**
6. **The ink from the envelope has been tested in the same way. Compare this ink pattern with the patterns from the suspects' pens.**

Do any of the pens match the ink from the envelope?

Looking Complete - Facial Reconstruction

When skeletal remains are discovered, it can be difficult to identify the body, since much of the flesh will decompose if the body has been left for a long period of time. Forensic scientists use the skull and make very accurate measurements of the bones to try and reconstruct the person's face. The model that they make will often help a relative or friend of the deceased to recognize the body.

What to do:

1. **Mould the plasticine onto the front of the skull. Use the blue pegs as a guide for the depth of the skin layer.**

Can you reconstruct the face?

Appendix AA: Observation Data: Original Activity

Observation Checklist

Observation Checklist
Original Tyre Track Activity

Session	Chad Observed	Jillian Observed	Sally Observed	Average Observed	Total	Percent Observed	Tested?	Number Surveyers
Alpha	19	19	19	19	25	**76**	Yes	3
Theta	16		16	16	18	**88.88888889**	Yes	2
Iota		10		10	23	**43.47826087**	Yes	1

Question Type	Session	Chad	Jillian	Sally	Average	Percent Average		Tested?	Number Surveyers
Appears Bored	Alpha	7	0	0	2.333333333	12.28070175		Yes	3
Appears Bored	Theta	0		0	0	0		Yes	2
Appears Bored	Iota							No	
Discussion	Alpha	12	17	14	14.33333333	75.43859649		Yes	3
Discussion	Theta	13		14	13.5	71.05263158		Yes	2
Discussion	Iota							No	
Eye Contact	Alpha	2	0	2	1.333333333	7.01754386		Yes	3
Eye Contact	Theta							No	
Eye Contact	Iota							No	
Feels the Tyre	Alpha							No	
Feels the Tyre	Theta							No	
Feels the Tyre	Iota							No	
Feels the Tyre Track	Alpha							No	
Feels the Tyre Track	Theta							No	
Feels the Tyre Track	Iota							No	
Frowns	Alpha	0	0	0	0	0		Yes	3
Frowns	Theta	0		0	0	0		Yes	2
Frowns	Iota							No	
Frustration or Confusion	Alpha	0	0	0	0	0		Yes	3
Frustration or Confusion	Theta	1		1	1	5.263157895		Yes	2
Frustration or Confusion	Iota							No	
Looks at Pictures	Alpha	17	19	17	17.66666667	92.98245614		Yes	3
Looks at Pictures	Theta	16		14	15	78.94736842		Yes	2
Looks at Pictures	Iota		8		8	42.10526316		Yes	1
Magniying Glass	Alpha	5	3	5	4.333333333	22.80701754		Yes	3
Magniying Glass	Theta							No	
Magniying Glass	Iota		3		3	15.78947368		Yes	1
Mention of mirror image/inverse	Alpha							No	
Mention of mirror image/inverse	Theta	0		0	0	0		Yes	2
Mention of mirror image/inverse	Iota							No	
Negative Behavior	Alpha	0	0	0	0	0		Yes	3
Negative Behavior	Theta	0		0	0	0		Yes	2
Negative Behavior	Iota							No	
Picks up the Pictures	Alpha							No	
Picks up the Pictures	Theta	7		13	10	52.63157895		Yes	2
Picks up the Pictures	Iota							No	
Reads the Instruction Sheet	Alpha	7	10	9	8.666666667	45.61403509		Yes	3
Reads the Instruction Sheet	Theta	3		3	3	15.78947368		Yes	2
Reads the Instruction Sheet	Iota							No	
Smiles	Alpha	3	5	2	3.333333333	17.54385965		Yes	3
Smiles	Theta	0		0	0	0		Yes	2
Smiles	Iota							No	
Takes Notes	Alpha	19	17	18	18	94.73684211		Yes	3
Takes Notes	Theta	14		15	14.5	76.31578947		Yes	2
Takes Notes	Iota		7		7	36.84210526		Yes	1

Question Type		Total Average	Total Observed	Total in all Classes		Averaged Perce
Eye Contact		1.333333333	19	66		7.01754386
Discussion		27.83333333	35	66		79.52380952
Looks at Pictures		40.66666667	45	66		90.37037037
Picks up the Pictures		10	16	66		62.5
Feels the Tyre Track		0	0	66		
Feels the Tyre		0	0	66		
Reads the Instruction Sheet		11.66666667	35	66		33.33333333
Smiles		3.333333333	35	66		9.523809524
Frowns		0	35	66		0
Frustration or Confusion		1	35	66		2.857142857
Appears Bored		2.333333333	35	66		6.666666667
Negative Behavior		0	35	66		0
Magniying Glass		7.333333333	29	66		25.28735632
Takes Notes		39.5	45	66		87.77777778
Mention of mirror image/inverse		0	16	66		0

Tyre Track Identification Times

Session	Time (seconds)	Students	Students x Time
Alpha	117	2	234
Alpha	56	2	112
Alpha	98	3	294
Alpha	34	2	68
Alpha	28	2	56
Alpha	27	3	81
Alpha	72	3	216
Alpha	39	2	78
Theta	16	2	32
Theta	50	3	150
Theta	10	2	20
Theta	38	3	114
Theta	11	3	33
Theta	24	2	48
Theta	12	1	12
Iota	44	3	132
Iota	57	3	171
Iota	19	3	57
		44	

Session	Average Time (seconds)
Alpha	**59.94736842**
Theta	**25.5625**
Iota	**40**

Column1	Column2
Total	**43.36363636**
Deviation	28.62190648
Confidence	8.7

95% Confidence that the Population Mean Tyre Track Identification Time Takes 43.36 seconds +/- 8.70 seconds

Appendix BB: Observation Data: Modified Station

Observation Checklist

Observation Checklist
Modified Tyre Track Activity

Session	Chad Observed	Jillian Observed	Sally Observed	Average Observed	Total	Percent Observed	Tested?	Number Surveyers
Beta	19		19	19	19	100	Yes	2
Gamma	10	10	10	10	16	62.5	Yes	3
Delta	16	16	16	16	16	100	Yes	3
Epsilon	19	19		19	19	100	Yes	2
Zeta	11	11		11	15	73.33333333	Yes	2
Eta	13	13	13	13	13	100	Yes	3

Question Type	Session	Chad	Jillian	Sally	Average	Percent Averag		Tested?	Number Surveyers
Appears Bored	Beta	0		0	0	0		Yes	2
Appears Bored	Gamma	0	0	0	0	0		Yes	3
Appears Bored	Delta	2	0	0	0.666666667	5.128205128		Yes	3
Appears Bored	Epsilon	1	0	2	1	7.692307692		Yes	3
Appears Bored	Zeta	2	3	3	2.666666667	20.51282051		Yes	3
Appears Bored	Eta	0	1	2	1	7.692307692		Yes	3
Discussion	Beta	18		14	16	123.0769231		Yes	2
Discussion	Gamma	10	10	9	9.666666667	74.35897436		Yes	3
Discussion	Delta	12	13	15	13.33333333	102.5641026		Yes	3
Discussion	Epsilon	10	13	10	11	84.61538462		Yes	3
Discussion	Zeta	4	9	7	6.666666667	51.28205128		Yes	3
Discussion	Eta	7	2	10	6.333333333	48.71794872		Yes	3
Eye Contact	Beta	0		0	0	0		Yes	2
Eye Contact	Gamma	0	0	0	0	0		Yes	3
Eye Contact	Delta							No	
Eye Contact	Epsilon							No	
Eye Contact	Zeta							No	
Eye Contact	Eta							No	
Feels the Tyre	Beta	18		14	16	123.0769231		Yes	2
Feels the Tyre	Gamma	10	9	9	9.333333333	71.79487179		Yes	3
Feels the Tyre	Delta	8	9	8	8.333333333	64.1025641		Yes	3
Feels the Tyre	Epsilon	16	12	13	13.66666667	105.1282051		Yes	3
Feels the Tyre	Zeta	7	7	7	7	53.84615385		Yes	3
Feels the Tyre	Eta	8	8	6	7.333333333	56.41025641		Yes	3
Feels the Tyre Track	Beta	19		13	16	123.0769231		Yes	2
Feels the Tyre Track	Gamma	10	8	9	9	69.23076923		Yes	3
Feels the Tyre Track	Delta	10	5	7	7.333333333	56.41025641		Yes	3
Feels the Tyre Track	Epsilon	15	11	9	11.66666667	89.74358974		Yes	3
Feels the Tyre Track	Zeta	7	5	6	6	46.15384615		Yes	3
Feels the Tyre Track	Eta	6	4	5	5	38.46153846		Yes	3
Frowns	Beta	0		0	0	0		Yes	2
Frowns	Gamma	0	0	0	0	0		Yes	3
Frowns	Delta	0	0	0	0	0		Yes	3
Frowns	Epsilon	2	0	0	0.666666667	5.128205128		Yes	3
Frowns	Zeta	0	0	0	0	0		Yes	3
Frowns	Eta	0	0	0	0	0		Yes	3
Frustration or Confusion	Beta	0		4	2	15.38461538		Yes	2
Frustration or Confusion	Gamma	0	0	0	0	0		Yes	3
Frustration or Confusion	Delta	2	2	0	1.333333333	10.25641026		Yes	3
Frustration or Confusion	Epsilon	2	2	1	1.666666667	12.82051282		Yes	3
Frustration or Confusion	Zeta	0	0	0	0	0		Yes	3
Frustration or Confusion	Eta	4	1	3	2.666666667	20.51282051		Yes	3
Looks at Pictures	Beta							No	
Looks at Pictures	Gamma							No	
Looks at Pictures	Delta							No	
Looks at Pictures	Epsilon							No	
Looks at Pictures	Zeta							No	
Looks at Pictures	Eta							No	
Magniying Glass	Beta	1		3	2	15.38461538		Yes	2
Magniying Glass	Gamma	3	4	2	3	23.07692308		Yes	3
Magniying Glass	Delta	8	8	10	8.666666667	66.66666667		Yes	3
Magniying Glass	Epsilon	7	3	7	5.666666667	43.58974359		Yes	3
Magniying Glass	Zeta	4	3	4	3.666666667	28.20512821		Yes	3
Magniying Glass	Eta	7	5	7	6.333333333	48.71794872		Yes	3
Mention of mirror image/inverse	Beta							No	
Mention of mirror image/inverse	Gamma							No	
Mention of mirror image/inverse	Delta	2	5	2	3	23.07692308		Yes	3
Mention of mirror image/inverse	Epsilon	5	5	5	5	38.46153846		Yes	3

Mention of mirror image/inverse	Zeta	0	3	3	2	15.38461538		Yes	3
Mention of mirror image/inverse	Eta	0	2	2	1.333333333	10.25641026		Yes	3
Negative Behavior	Beta	0		0	0	0		Yes	2
Negative Behavior	Gamma	0	1	0	0.333333333	2.564102564		Yes	3
Negative Behavior	Delta	0	0	0	0	0		Yes	3
Negative Behavior	Epsilon	0	0	1	0.333333333	2.564102564		Yes	3
Negative Behavior	Zeta	0	0	0	0	0		Yes	3
Negative Behavior	Eta	0	0	0	0	0		Yes	3
Picks up the Pictures	Beta							No	
Picks up the Pictures	Gamma							No	
Picks up the Pictures	Delta							No	
Picks up the Pictures	Epsilon							No	
Picks up the Pictures	Zeta							No	
Picks up the Pictures	Eta							No	
Reads the Instruction Sheet	Beta	10		6	8	61.53846154		Yes	2
Reads the Instruction Sheet	Gamma	1	1	1	1	7.692307692		Yes	3
Reads the Instruction Sheet	Delta	2	1	2	1.666666667	12.82051282		Yes	3
Reads the Instruction Sheet	Epsilon	5	2	5	4	30.76923077		Yes	3
Reads the Instruction Sheet	Zeta	4	3	4	3.666666667	28.20512821		Yes	3
Reads the Instruction Sheet	Eta	9	11	10	10	76.92307692		Yes	3
Smiles	Beta	6		0	3	23.07692308		Yes	2
Smiles	Gamma	2	2	2	2	15.38461538		Yes	3
Smiles	Delta	4	0	0	1.333333333	10.25641026		Yes	3
Smiles	Epsilon	9	0	0	3	23.07692308		Yes	3
Smiles	Zeta	3	0	0	1	7.692307692		Yes	3
Smiles	Eta	2	2	1	1.666666667	12.82051282		Yes	3
Takes Notes	Beta	19		13	16	123.0769231		Yes	2
Takes Notes	Gamma	10	10	10	10	76.92307692		Yes	3
Takes Notes	Delta	16	16	16	16	123.0769231		Yes	3
Takes Notes	Epsilon	9	7	14	10	76.92307692		Yes	3
Takes Notes	Zeta	7	7	3	5.666666667	43.58974359		Yes	3
Takes Notes	Eta	7	4	9	6.666666667	51.28205128		Yes	3

Question Type		Total Average	Total Observed	Total in all Classes		Averaged Perc
Eye Contact		0	29	98		0
Discussion		63	88	98		71.59090909
Looks at Pictures		0	0	98		
Picks up the Pictures		0	0	98		
Feels the Tyre Track		55	88	98		62.5
Feels the Tyre		61.66666667	88	98		70.07575758
Reads the Instruction Sheet		28.33333333	88	98		32.1969697
Smiles		12	88	98		13.63636364
Frowns		0.666666667	88	98		0.757575758
Frustration or Confusion		7.666666667	88	98		8.712121212
Appears Bored		5.333333333	88	98		6.060606061
Negative Behavior		0.666666667	88	98		0.757575758
Magniying Glass		29.33333333	88	98		33.33333333
Takes Notes		64.33333333	88	98		73.10606061
Mention of mirror image/inverse		11.33333333	59	98		19.20903955

Tyre Track Identification Times

Session	Time (seconds)	Students	Total Time (seconds)
Beta	248	2	496
Beta	119	2	238
Beta	137	2	274
Beta	82	2	164
Beta	50	2	100
Beta	10	2	20
Beta	78	1	78
Beta	81	2	162
Beta	144	4	576
Gamma	64	2	128
Gamma	60	2	120
Gamma	25	2	50
Gamma	33	2	66
Gamma	63	2	126
Gamma	35	2	70
Delta	28	2	56
Delta	19	2	38
Delta	14	2	28
Delta	65	3	195
Delta	120	3	360
Delta	57	2	114
Delta	15	2	30
Epsilon	12	4	48
Epsilon	143	2	286
Epsilon	21	3	63
Epsilon	66	3	198
Epsilon	43	2	86
Epsilon	51	2	102
Epsilon	14	3	42
Zeta	39	2	78
Zeta	36	2	72
Zeta	29	2	58
Zeta	233	3	699
Zeta	16	2	32
Eta	30	3	90
Eta	37	3	111
Eta	166	3	498
Eta	89	2	178
Eta	39	2	78
		90	

Session	Average Time (seconds)
Beta	**110.9473684**
Gamma	**46.66666667**
Delta	**51.3125**
Epsilon	**43.42105263**

Column1	Column2
Total	**68.97777778**

Deviation	60.01609855
Confidence	12.57

95% Confidence that the Population Mean Tyre Track Identification Time Takes 68.98 seconds +/- 12.57 seconds

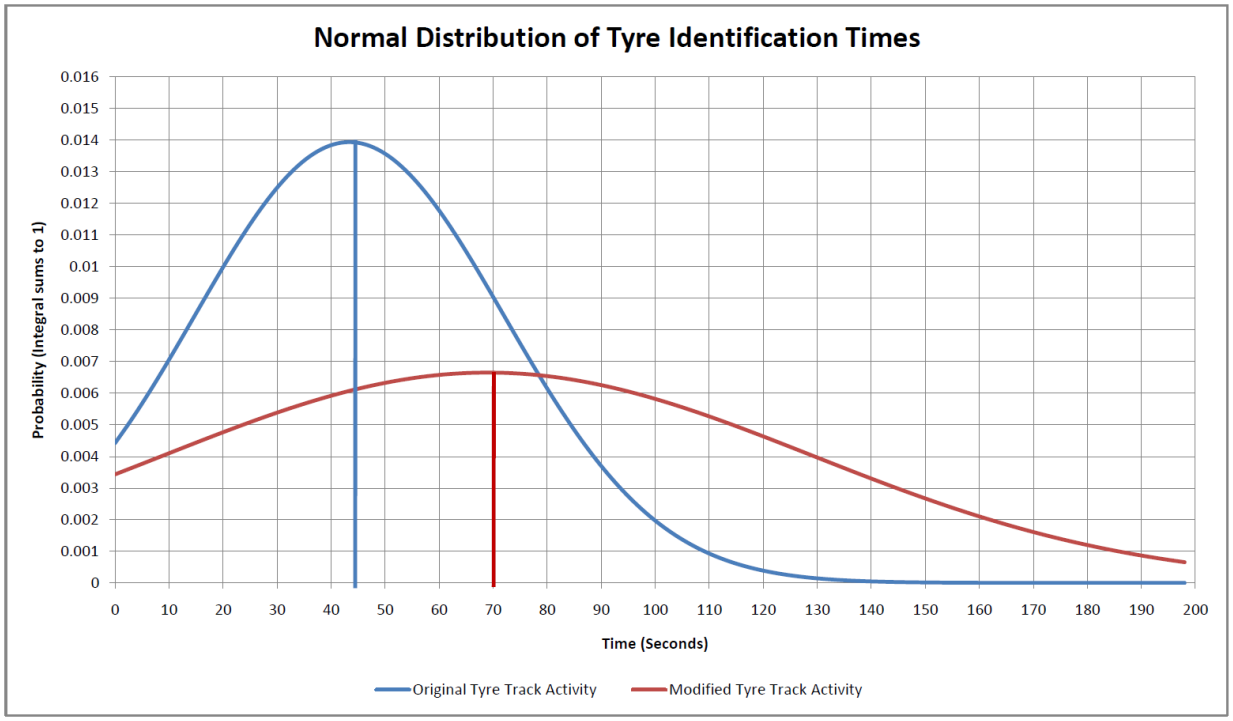
Appendix CC: Observation Data: Comparison

Comparison of Checklist Items between Modified and Original

Checklist Item	Old	New	% Difference	Difference in %
Eye Contact	7.018	0.000	200.000	-7.018
Discussion	79.524	71.591	10.499	-7.933
Looks at Pictures	90.370			
Picks up the Pictures	62.500			
Feels the Tyre Track		62.500		
Feels the Tyre		70.076		
Reads the Instruction Sheet	33.333	32.197	3.468	-1.136
Smiles	9.524	13.636	35.514	4.113
Frowns	0.000	0.758	200.000	0.758
Frustration or Confusion	2.857	8.712	101.216	5.855
Appears Bored	6.667	6.061	9.524	-0.606
Negative Behavior	0.000	0.758	200.000	0.758
Magniying Glass	25.287	33.333	27.451	8.046
Takes Notes	87.778	73.106	18.239	-14.672
Mention of mirror image/inverse	0.000	19.209	200.000	19.209

Checklist Item	Old Average	Old Integer	Old Observed	New Average	New Integer	New Observed	P Value
Eye Contact	1.333333333	**1**	**19**	0	**0**	**29**	**0.2118425**
Discussion	27.83333333	**28**	**35**	63	**63**	**88**	**0.337489**
Looks at Pictures	40.66666667	**41**	**45**	0	**0**	**0**	
Picks up the Pictures	10	**10**	**16**	0	**0**	**0**	
Feels the Tyre Track	0	**0**	**0**	55	**55**	**88**	
Feels the Tyre	0	**0**	**0**	61.66666667	**62**	**88**	
Reads the Instruction Sheet	11.66666667	**12**	**35**	28.33333333	**28**	**88**	**0.7920993**
Smiles	3.333333333	**3**	**35**	12	**12**	**88**	**0.4386109**
Frowns	0	**0**	**35**	0.666666667	**1**	**88**	**0.5265797**
Frustration or Confusion	1	**1**	**35**	7.666666667	**8**	**88**	**0.2309731**
Appears Bored	2.333333333	**2**	**35**	5.333333333	**5**	**88**	**0.9944045**
Negative Behavior	0	**0**	**35**	0.666666667	**1**	**88**	**0.5265797**
Magniying Glass	7.333333333	**7**	**29**	29.33333333	**29**	**88**	**0.3723086**
Takes Notes	39.5	**40**	**45**	64.33333333	**64**	**88**	**0.0327028**
Mention of mirror image/inverse	0	**0**	**16**	11.33333333	**11**	**59**	**0.0615259**

Normal Distribution of Tyre Identification Times



Appendix DD: Survey Data: Original Activity

Raw Data

Old or New?	Session	Student Number	Pre or Post	Gender	Question Number	Response	Pre and Post?	Gender of Group	Time of Day	Presenter
Old	Theta	1	Pre	Male	2	Male	Yes	Mixed	11:00AM	Carly
Old	Theta	1	Pre	Male	3	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	1	Pre	Male	4	No	Yes	Mixed	11:00AM	Carly
Old	Theta	1	Pre	Male	5	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	1	Pre	Male	6	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	1	Pre	Male	7	No	Yes	Mixed	11:00AM	Carly
Old	Theta	1	Pre	Male	8		Yes	Mixed	11:00AM	Carly
Old	Theta	1	Pre	Male	9	3	Yes	Mixed	11:00AM	Carly
Old	Theta	1	Pre	Male	10	3	Yes	Mixed	11:00AM	Carly
Old	Theta	1	Pre	Male	11	2	Yes	Mixed	11:00AM	Carly
Old	Theta	2	Pre	Female	2	Female	Yes	Mixed	11:00AM	Carly
Old	Theta	2	Pre	Female	3	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	2	Pre	Female	4	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	2	Pre	Female	5	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	2	Pre	Female	6	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	2	Pre	Female	7	No	Yes	Mixed	11:00AM	Carly
Old	Theta	2	Pre	Female	8		Yes	Mixed	11:00AM	Carly
Old	Theta	2	Pre	Female	9	2	Yes	Mixed	11:00AM	Carly
Old	Theta	2	Pre	Female	10	3	Yes	Mixed	11:00AM	Carly
Old	Theta	2	Pre	Female	11	3	Yes	Mixed	11:00AM	Carly
Old	Theta	3	Pre	Male	2	Male	Yes	Mixed	11:00AM	Carly
Old	Theta	3	Pre	Male	3	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	3	Pre	Male	4	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	3	Pre	Male	5	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	3	Pre	Male	6	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	3	Pre	Male	7	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	3	Pre	Male	8		Yes	Mixed	11:00AM	Carly
Old	Theta	3	Pre	Male	9	5	Yes	Mixed	11:00AM	Carly
Old	Theta	3	Pre	Male	10	5	Yes	Mixed	11:00AM	Carly
Old	Theta	3	Pre	Male	11	4	Yes	Mixed	11:00AM	Carly
Old	Theta	4	Pre	Female	2	Female	Yes	Mixed	11:00AM	Carly
Old	Theta	4	Pre	Female	3	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	4	Pre	Female	4	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	4	Pre	Female	5	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	4	Pre	Female	6	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	4	Pre	Female	7	No	Yes	Mixed	11:00AM	Carly
Old	Theta	4	Pre	Female	8		Yes	Mixed	11:00AM	Carly
Old	Theta	4	Pre	Female	9	4	Yes	Mixed	11:00AM	Carly
Old	Theta	4	Pre	Female	10	4	Yes	Mixed	11:00AM	Carly
Old	Theta	4	Pre	Female	11	2	Yes	Mixed	11:00AM	Carly
Old	Theta	5	Pre	Male	2	Male	Yes	Mixed	11:00AM	Carly
Old	Theta	5	Pre	Male	3	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	5	Pre	Male	4	No	Yes	Mixed	11:00AM	Carly
Old	Theta	5	Pre	Male	5	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	5	Pre	Male	6	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	5	Pre	Male	7	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	5	Pre	Male	8		Yes	Mixed	11:00AM	Carly
Old	Theta	5	Pre	Male	9	3	Yes	Mixed	11:00AM	Carly
Old	Theta	5	Pre	Male	10	4	Yes	Mixed	11:00AM	Carly
Old	Theta	5	Pre	Male	11	3	Yes	Mixed	11:00AM	Carly
Old	Theta	6	Pre	Female	2	Female	Yes	Mixed	11:00AM	Carly
Old	Theta	6	Pre	Female	3	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	6	Pre	Female	4	No	Yes	Mixed	11:00AM	Carly
Old	Theta	6	Pre	Female	5	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	6	Pre	Female	6	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	6	Pre	Female	7	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	6	Pre	Female	8		Yes	Mixed	11:00AM	Carly
Old	Theta	6	Pre	Female	9	4	Yes	Mixed	11:00AM	Carly
Old	Theta	6	Pre	Female	10	4	Yes	Mixed	11:00AM	Carly
Old	Theta	6	Pre	Female	11	3	Yes	Mixed	11:00AM	Carly
Old	Theta	7	Pre	Female	2	Female	Yes	Mixed	11:00AM	Carly
Old	Theta	7	Pre	Female	3	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	7	Pre	Female	4	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	7	Pre	Female	5	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	7	Pre	Female	6	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	7	Pre	Female	7	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	7	Pre	Female	8		Yes	Mixed	11:00AM	Carly
Old	Theta	7	Pre	Female	9	3	Yes	Mixed	11:00AM	Carly
Old	Theta	7	Pre	Female	10	4	Yes	Mixed	11:00AM	Carly
Old	Theta	7	Pre	Female	11	3	Yes	Mixed	11:00AM	Carly
Old	Theta	8	Pre	Female	2	Female	Yes	Mixed	11:00AM	Carly
Old	Theta	8	Pre	Female	3	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	8	Pre	Female	4	No	Yes	Mixed	11:00AM	Carly
Old	Theta	8	Pre	Female	5	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	8	Pre	Female	6	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	8	Pre	Female	7	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	8	Pre	Female	8		Yes	Mixed	11:00AM	Carly
Old	Theta	8	Pre	Female	9	4	Yes	Mixed	11:00AM	Carly
Old	Theta	8	Pre	Female	10	4	Yes	Mixed	11:00AM	Carly
Old	Theta	8	Pre	Female	11	2	Yes	Mixed	11:00AM	Carly
Old	Theta	9	Pre	Female	2	Female	Yes	Mixed	11:00AM	Carly
Old	Theta	9	Pre	Female	3	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	9	Pre	Female	4	No	Yes	Mixed	11:00AM	Carly
Old	Theta	9	Pre	Female	5	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	9	Pre	Female	6	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	9	Pre	Female	7	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	9	Pre	Female	8		Yes	Mixed	11:00AM	Carly
Old	Theta	9	Pre	Female	9	4	Yes	Mixed	11:00AM	Carly
Old	Theta	9	Pre	Female	10	3	Yes	Mixed	11:00AM	Carly
Old	Theta	9	Pre	Female	11	3	Yes	Mixed	11:00AM	Carly
Old	Theta	10	Pre	Female	2	Female	Yes	Mixed	11:00AM	Carly
Old	Theta	10	Pre	Female	3	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	10	Pre	Female	4	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	10	Pre	Female	5	No	Yes	Mixed	11:00AM	Carly
Old	Theta	10	Pre	Female	6	Yes	Yes	Mixed	11:00AM	Carly

Old	Theta	10	Pre	Female	7	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	10	Pre	Female	8		Yes	Mixed	11:00AM	Carly
Old	Theta	10	Pre	Female	9	4	Yes	Mixed	11:00AM	Carly
Old	Theta	10	Pre	Female	10	4	Yes	Mixed	11:00AM	Carly
Old	Theta	10	Pre	Female	11	2	Yes	Mixed	11:00AM	Carly
Old	Theta	11	Pre	Male	2	Male	Yes	Mixed	11:00AM	Carly
Old	Theta	11	Pre	Male	3	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	11	Pre	Male	4	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	11	Pre	Male	5	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	11	Pre	Male	6	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	11	Pre	Male	7	No	Yes	Mixed	11:00AM	Carly
Old	Theta	11	Pre	Male	8		Yes	Mixed	11:00AM	Carly
Old	Theta	11	Pre	Male	9	2	Yes	Mixed	11:00AM	Carly
Old	Theta	11	Pre	Male	10	3	Yes	Mixed	11:00AM	Carly
Old	Theta	11	Pre	Male	11	3	Yes	Mixed	11:00AM	Carly
Old	Theta	12	Pre	Female	2	Female	Yes	Mixed	11:00AM	Carly
Old	Theta	12	Pre	Female	3	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	12	Pre	Female	4	No	Yes	Mixed	11:00AM	Carly
Old	Theta	12	Pre	Female	5	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	12	Pre	Female	6	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	12	Pre	Female	7	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	12	Pre	Female	8		Yes	Mixed	11:00AM	Carly
Old	Theta	12	Pre	Female	9	4	Yes	Mixed	11:00AM	Carly
Old	Theta	12	Pre	Female	10	5	Yes	Mixed	11:00AM	Carly
Old	Theta	12	Pre	Female	11	3	Yes	Mixed	11:00AM	Carly
Old	Theta	13	Pre	Male	2	Male	Yes	Mixed	11:00AM	Carly
Old	Theta	13	Pre	Male	3	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	13	Pre	Male	4	No	Yes	Mixed	11:00AM	Carly
Old	Theta	13	Pre	Male	5	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	13	Pre	Male	6	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	13	Pre	Male	7	No	Yes	Mixed	11:00AM	Carly
Old	Theta	13	Pre	Male	8		Yes	Mixed	11:00AM	Carly
Old	Theta	13	Pre	Male	9	3	Yes	Mixed	11:00AM	Carly
Old	Theta	13	Pre	Male	10	4	Yes	Mixed	11:00AM	Carly
Old	Theta	13	Pre	Male	11	1	Yes	Mixed	11:00AM	Carly
Old	Theta	14	Pre	Female	2	Female	Yes	Mixed	11:00AM	Carly
Old	Theta	14	Pre	Female	3	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	14	Pre	Female	4	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	14	Pre	Female	5	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	14	Pre	Female	6	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	14	Pre	Female	7	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	14	Pre	Female	8		Yes	Mixed	11:00AM	Carly
Old	Theta	14	Pre	Female	9	4	Yes	Mixed	11:00AM	Carly
Old	Theta	14	Pre	Female	10	3	Yes	Mixed	11:00AM	Carly
Old	Theta	14	Pre	Female	11	3	Yes	Mixed	11:00AM	Carly
Old	Theta	15	Pre	Male	2	Male	Yes	Mixed	11:00AM	Carly
Old	Theta	15	Pre	Male	3	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	15	Pre	Male	4	No	Yes	Mixed	11:00AM	Carly
Old	Theta	15	Pre	Male	5	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	15	Pre	Male	6	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	15	Pre	Male	7	No	Yes	Mixed	11:00AM	Carly
Old	Theta	15	Pre	Male	8		Yes	Mixed	11:00AM	Carly
Old	Theta	15	Pre	Male	9	3	Yes	Mixed	11:00AM	Carly
Old	Theta	15	Pre	Male	10	4	Yes	Mixed	11:00AM	Carly
Old	Theta	15	Pre	Male	11	1	Yes	Mixed	11:00AM	Carly
Old	Theta	16	Pre	Female	2	Female	Yes	Mixed	11:00AM	Carly
Old	Theta	16	Pre	Female	3	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	16	Pre	Female	4	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	16	Pre	Female	5	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	16	Pre	Female	6	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	16	Pre	Female	7	No	Yes	Mixed	11:00AM	Carly
Old	Theta	16	Pre	Female	8		Yes	Mixed	11:00AM	Carly
Old	Theta	16	Pre	Female	9	3	Yes	Mixed	11:00AM	Carly
Old	Theta	16	Pre	Female	10	4	Yes	Mixed	11:00AM	Carly
Old	Theta	16	Pre	Female	11	3	Yes	Mixed	11:00AM	Carly
Old	Theta	17	Pre	Male	2	Male	Yes	Mixed	11:00AM	Carly
Old	Theta	17	Pre	Male	3	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	17	Pre	Male	4	No	Yes	Mixed	11:00AM	Carly
Old	Theta	17	Pre	Male	5	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	17	Pre	Male	6	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	17	Pre	Male	7	No	Yes	Mixed	11:00AM	Carly
Old	Theta	17	Pre	Male	8	Low Vision	Yes	Mixed	11:00AM	Carly
Old	Theta	17	Pre	Male	9	3	Yes	Mixed	11:00AM	Carly
Old	Theta	17	Pre	Male	10	4	Yes	Mixed	11:00AM	Carly
Old	Theta	17	Pre	Male	11	4	Yes	Mixed	11:00AM	Carly
Old	Theta	1	Post		2	3	Yes	Mixed	11:00AM	Carly
Old	Theta	1	Post		3	3	Yes	Mixed	11:00AM	Carly
Old	Theta	1	Post		4	3	Yes	Mixed	11:00AM	Carly
Old	Theta	1	Post		5	4	Yes	Mixed	11:00AM	Carly
Old	Theta	1	Post		6	4	Yes	Mixed	11:00AM	Carly
Old	Theta	1	Post		7	2	Yes	Mixed	11:00AM	Carly
Old	Theta	1	Post		8	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	1	Post		9	Crossman	Yes	Mixed	11:00AM	Carly
Old	Theta	1	Post		10	Sight	Yes	Mixed	11:00AM	Carly
Old	Theta	1	Post		11	No	Yes	Mixed	11:00AM	Carly
Old	Theta	2	Post		2	2	Yes	Mixed	11:00AM	Carly
Old	Theta	2	Post		3	3	Yes	Mixed	11:00AM	Carly
Old	Theta	2	Post		4	2	Yes	Mixed	11:00AM	Carly
Old	Theta	2	Post		5	3	Yes	Mixed	11:00AM	Carly
Old	Theta	2	Post		6	3	Yes	Mixed	11:00AM	Carly
Old	Theta	2	Post		7	4	Yes	Mixed	11:00AM	Carly
Old	Theta	2	Post		8	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	2	Post		9	Crossman	Yes	Mixed	11:00AM	Carly
Old	Theta	2	Post		10	Sight	Yes	Mixed	11:00AM	Carly
Old	Theta	2	Post		11	No	Yes	Mixed	11:00AM	Carly
Old	Theta	3	Post		2	5	Yes	Mixed	11:00AM	Carly

Old	Theta	3	Post		3	5	Yes	Mixed	11:00AM	Carly
Old	Theta	3	Post		4	4	Yes	Mixed	11:00AM	Carly
Old	Theta	3	Post		5	5	Yes	Mixed	11:00AM	Carly
Old	Theta	3	Post		6	4	Yes	Mixed	11:00AM	Carly
Old	Theta	3	Post		7	5	Yes	Mixed	11:00AM	Carly
Old	Theta	3	Post		8	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	3	Post		9	Crossman	Yes	Mixed	11:00AM	Carly
Old	Theta	3	Post		10	Sight	Yes	Mixed	11:00AM	Carly
Old	Theta	3	Post		11	No	Yes	Mixed	11:00AM	Carly
Old	Theta	4	Post		2	4	Yes	Mixed	11:00AM	Carly
Old	Theta	4	Post		3	4	Yes	Mixed	11:00AM	Carly
Old	Theta	4	Post		4	3	Yes	Mixed	11:00AM	Carly
Old	Theta	4	Post		5	5	Yes	Mixed	11:00AM	Carly
Old	Theta	4	Post		6	5	Yes	Mixed	11:00AM	Carly
Old	Theta	4	Post		7	5	Yes	Mixed	11:00AM	Carly
Old	Theta	4	Post		8	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	4	Post		9	Crossman	Yes	Mixed	11:00AM	Carly
Old	Theta	4	Post		10	Sight	Yes	Mixed	11:00AM	Carly
Old	Theta	4	Post		11	No	Yes	Mixed	11:00AM	Carly
Old	Theta	5	Post		2	3	Yes	Mixed	11:00AM	Carly
Old	Theta	5	Post		3	4	Yes	Mixed	11:00AM	Carly
Old	Theta	5	Post		4	3	Yes	Mixed	11:00AM	Carly
Old	Theta	5	Post		5	4	Yes	Mixed	11:00AM	Carly
Old	Theta	5	Post		6	4	Yes	Mixed	11:00AM	Carly
Old	Theta	5	Post		7	5	Yes	Mixed	11:00AM	Carly
Old	Theta	5	Post		8	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	5	Post		9	Crossman	Yes	Mixed	11:00AM	Carly
Old	Theta	5	Post		10	Both	Yes	Mixed	11:00AM	Carly
Old	Theta	5	Post		11	No	Yes	Mixed	11:00AM	Carly
Old	Theta	6	Post		2	4	Yes	Mixed	11:00AM	Carly
Old	Theta	6	Post		3	4	Yes	Mixed	11:00AM	Carly
Old	Theta	6	Post		4	5	Yes	Mixed	11:00AM	Carly
Old	Theta	6	Post		5	4	Yes	Mixed	11:00AM	Carly
Old	Theta	6	Post		6	5	Yes	Mixed	11:00AM	Carly
Old	Theta	6	Post		7	5	Yes	Mixed	11:00AM	Carly
Old	Theta	6	Post		8	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	6	Post		9	Crossman	Yes	Mixed	11:00AM	Carly
Old	Theta	6	Post		10	Sight	Yes	Mixed	11:00AM	Carly
Old	Theta	6	Post		11	No	Yes	Mixed	11:00AM	Carly
Old	Theta	7	Post		2	3	Yes	Mixed	11:00AM	Carly
Old	Theta	7	Post		3	5	Yes	Mixed	11:00AM	Carly
Old	Theta	7	Post		4	5	Yes	Mixed	11:00AM	Carly
Old	Theta	7	Post		5	5	Yes	Mixed	11:00AM	Carly
Old	Theta	7	Post		6	5	Yes	Mixed	11:00AM	Carly
Old	Theta	7	Post		7	5	Yes	Mixed	11:00AM	Carly
Old	Theta	7	Post		8	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	7	Post		9	Crossman	Yes	Mixed	11:00AM	Carly
Old	Theta	7	Post		10	Sight	Yes	Mixed	11:00AM	Carly
Old	Theta	7	Post		11	No	Yes	Mixed	11:00AM	Carly
Old	Theta	8	Post		2	4	Yes	Mixed	11:00AM	Carly
Old	Theta	8	Post		3	4	Yes	Mixed	11:00AM	Carly
Old	Theta	8	Post		4	4	Yes	Mixed	11:00AM	Carly
Old	Theta	8	Post		5	5	Yes	Mixed	11:00AM	Carly
Old	Theta	8	Post		6	5	Yes	Mixed	11:00AM	Carly
Old	Theta	8	Post		7	4	Yes	Mixed	11:00AM	Carly
Old	Theta	8	Post		8	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	8	Post		9	Crossman	Yes	Mixed	11:00AM	Carly
Old	Theta	8	Post		10	Sight	Yes	Mixed	11:00AM	Carly
Old	Theta	8	Post		11	No	Yes	Mixed	11:00AM	Carly
Old	Theta	9	Post		2	4	Yes	Mixed	11:00AM	Carly
Old	Theta	9	Post		3	4	Yes	Mixed	11:00AM	Carly
Old	Theta	9	Post		4	4	Yes	Mixed	11:00AM	Carly
Old	Theta	9	Post		5	5	Yes	Mixed	11:00AM	Carly
Old	Theta	9	Post		6	5	Yes	Mixed	11:00AM	Carly
Old	Theta	9	Post		7	4	Yes	Mixed	11:00AM	Carly
Old	Theta	9	Post		8	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	9	Post		9	Crossman	Yes	Mixed	11:00AM	Carly
Old	Theta	9	Post		10	Sight	Yes	Mixed	11:00AM	Carly
Old	Theta	9	Post		11	No	Yes	Mixed	11:00AM	Carly
Old	Theta	10	Post		2	4	Yes	Mixed	11:00AM	Carly
Old	Theta	10	Post		3	4	Yes	Mixed	11:00AM	Carly
Old	Theta	10	Post		4	4	Yes	Mixed	11:00AM	Carly
Old	Theta	10	Post		5	5	Yes	Mixed	11:00AM	Carly
Old	Theta	10	Post		6	5	Yes	Mixed	11:00AM	Carly
Old	Theta	10	Post		7	3	Yes	Mixed	11:00AM	Carly
Old	Theta	10	Post		8	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	10	Post		9	Crossman	Yes	Mixed	11:00AM	Carly
Old	Theta	10	Post		10	Sight	Yes	Mixed	11:00AM	Carly
Old	Theta	10	Post		11	No	Yes	Mixed	11:00AM	Carly
Old	Theta	11	Post		2	2	Yes	Mixed	11:00AM	Carly
Old	Theta	11	Post		3	3	Yes	Mixed	11:00AM	Carly
Old	Theta	11	Post		4	3	Yes	Mixed	11:00AM	Carly
Old	Theta	11	Post		5	4	Yes	Mixed	11:00AM	Carly
Old	Theta	11	Post		6	4	Yes	Mixed	11:00AM	Carly
Old	Theta	11	Post		7	3	Yes	Mixed	11:00AM	Carly
Old	Theta	11	Post		8	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	11	Post		9	Crossman	Yes	Mixed	11:00AM	Carly
Old	Theta	11	Post		10	Sight	Yes	Mixed	11:00AM	Carly
Old	Theta	11	Post		11	No	Yes	Mixed	11:00AM	Carly
Old	Theta	12	Post		2	5	Yes	Mixed	11:00AM	Carly
Old	Theta	12	Post		3	5	Yes	Mixed	11:00AM	Carly
Old	Theta	12	Post		4	3	Yes	Mixed	11:00AM	Carly
Old	Theta	12	Post		5	5	Yes	Mixed	11:00AM	Carly
Old	Theta	12	Post		6	4	Yes	Mixed	11:00AM	Carly
Old	Theta	12	Post		7	4	Yes	Mixed	11:00AM	Carly
Old	Theta	12	Post		8	Yes	Yes	Mixed	11:00AM	Carly

Old	Theta	12	Post		9	Crossman	Yes	Mixed	11:00AM	Carly
Old	Theta	12	Post		10	Sight	Yes	Mixed	11:00AM	Carly
Old	Theta	12	Post		11	No	Yes	Mixed	11:00AM	Carly
Old	Theta	13	Post		2	4	Yes	Mixed	11:00AM	Carly
Old	Theta	13	Post		3	4	Yes	Mixed	11:00AM	Carly
Old	Theta	13	Post		4	3	Yes	Mixed	11:00AM	Carly
Old	Theta	13	Post		5	4	Yes	Mixed	11:00AM	Carly
Old	Theta	13	Post		6	4	Yes	Mixed	11:00AM	Carly
Old	Theta	13	Post		7	5	Yes	Mixed	11:00AM	Carly
Old	Theta	13	Post		8	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	13	Post		9	Crossman	Yes	Mixed	11:00AM	Carly
Old	Theta	13	Post		10	Sight	Yes	Mixed	11:00AM	Carly
Old	Theta	13	Post		11	No	Yes	Mixed	11:00AM	Carly
Old	Theta	14	Post		2	4	Yes	Mixed	11:00AM	Carly
Old	Theta	14	Post		3	3	Yes	Mixed	11:00AM	Carly
Old	Theta	14	Post		4	3	Yes	Mixed	11:00AM	Carly
Old	Theta	14	Post		5	5	Yes	Mixed	11:00AM	Carly
Old	Theta	14	Post		6	4	Yes	Mixed	11:00AM	Carly
Old	Theta	14	Post		7	4	Yes	Mixed	11:00AM	Carly
Old	Theta	14	Post		8	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	14	Post		9	Crossman	Yes	Mixed	11:00AM	Carly
Old	Theta	14	Post		10	Sight	Yes	Mixed	11:00AM	Carly
Old	Theta	14	Post		11	No	Yes	Mixed	11:00AM	Carly
Old	Theta	15	Post		2	2	Yes	Mixed	11:00AM	Carly
Old	Theta	15	Post		3	3	Yes	Mixed	11:00AM	Carly
Old	Theta	15	Post		4	1	Yes	Mixed	11:00AM	Carly
Old	Theta	15	Post		5	2	Yes	Mixed	11:00AM	Carly
Old	Theta	15	Post		6	1	Yes	Mixed	11:00AM	Carly
Old	Theta	15	Post		7	2	Yes	Mixed	11:00AM	Carly
Old	Theta	15	Post		8	No	Yes	Mixed	11:00AM	Carly
Old	Theta	15	Post		9	Crossman	Yes	Mixed	11:00AM	Carly
Old	Theta	15	Post		10	Sight	Yes	Mixed	11:00AM	Carly
Old	Theta	15	Post		11	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	16	Post		2	3	Yes	Mixed	11:00AM	Carly
Old	Theta	16	Post		3	4	Yes	Mixed	11:00AM	Carly
Old	Theta	16	Post		4	4	Yes	Mixed	11:00AM	Carly
Old	Theta	16	Post		5	4	Yes	Mixed	11:00AM	Carly
Old	Theta	16	Post		6	4	Yes	Mixed	11:00AM	Carly
Old	Theta	16	Post		7	5	Yes	Mixed	11:00AM	Carly
Old	Theta	16	Post		8	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	16	Post		9	Crossman	Yes	Mixed	11:00AM	Carly
Old	Theta	16	Post		10	Both	Yes	Mixed	11:00AM	Carly
Old	Theta	16	Post		11	No	Yes	Mixed	11:00AM	Carly
Old	Theta	17	Post		2	3	Yes	Mixed	11:00AM	Carly
Old	Theta	17	Post		3	5	Yes	Mixed	11:00AM	Carly
Old	Theta	17	Post		4	4	Yes	Mixed	11:00AM	Carly
Old	Theta	17	Post		5	5	Yes	Mixed	11:00AM	Carly
Old	Theta	17	Post		6	4	Yes	Mixed	11:00AM	Carly
Old	Theta	17	Post		7	5	Yes	Mixed	11:00AM	Carly
Old	Theta	17	Post		8	Yes	Yes	Mixed	11:00AM	Carly
Old	Theta	17	Post		9	Crossman	Yes	Mixed	11:00AM	Carly
Old	Theta	17	Post		10	Sight	Yes	Mixed	11:00AM	Carly
Old	Theta	17	Post		11	No	Yes	Mixed	11:00AM	Carly
Old	Theta	18	Post		2	3	No	Mixed	11:00AM	Carly
Old	Theta	18	Post		3	4	No	Mixed	11:00AM	Carly
Old	Theta	18	Post		4	3	No	Mixed	11:00AM	Carly
Old	Theta	18	Post		5	4	No	Mixed	11:00AM	Carly
Old	Theta	18	Post		6	5	No	Mixed	11:00AM	Carly
Old	Theta	18	Post		7	4	No	Mixed	11:00AM	Carly
Old	Theta	18	Post		8	Yes	No	Mixed	11:00AM	Carly
Old	Theta	18	Post		9	Crossman	No	Mixed	11:00AM	Carly
Old	Theta	18	Post		10	Sight	No	Mixed	11:00AM	Carly
Old	Theta	18	Post		11	No	No	Mixed	11:00AM	Carly
Old	Iota	1	Pre	Female	2	Female	Yes	Mixed	9:30AM	Caitlin
Old	Iota	1	Pre	Female	3	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	1	Pre	Female	4	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	1	Pre	Female	5	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	1	Pre	Female	6	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	1	Pre	Female	7	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	1	Pre	Female	8		Yes	Mixed	9:30AM	Caitlin
Old	Iota	1	Pre	Female	9	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	1	Pre	Female	10	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	1	Pre	Female	11	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	2	Pre	Male	2	Male	Yes	Mixed	9:30AM	Caitlin
Old	Iota	2	Pre	Male	3	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	2	Pre	Male	4	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	2	Pre	Male	5	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	2	Pre	Male	6	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	2	Pre	Male	7	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	2	Pre	Male	8		Yes	Mixed	9:30AM	Caitlin
Old	Iota	2	Pre	Male	9	2	Yes	Mixed	9:30AM	Caitlin
Old	Iota	2	Pre	Male	10	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	2	Pre	Male	11	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	3	Pre	Male	2	Male	Yes	Mixed	9:30AM	Caitlin
Old	Iota	3	Pre	Male	3	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	3	Pre	Male	4	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	3	Pre	Male	5	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	3	Pre	Male	6	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	3	Pre	Male	7	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	3	Pre	Male	8		Yes	Mixed	9:30AM	Caitlin
Old	Iota	3	Pre	Male	9	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	3	Pre	Male	10	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	3	Pre	Male	11	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	4	Pre	Male	2	Male	Yes	Mixed	9:30AM	Caitlin
Old	Iota	4	Pre	Male	3	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	4	Pre	Male	4	Yes	Yes	Mixed	9:30AM	Caitlin

Old	Iota	4	Pre	Male	5	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	4	Pre	Male	6	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	4	Pre	Male	7	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	4	Pre	Male	8		Yes	Mixed	9:30AM	Caitlin
Old	Iota	4	Pre	Male	9	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	4	Pre	Male	10	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	4	Pre	Male	11	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	5	Pre	Female	2	Female	Yes	Mixed	9:30AM	Caitlin
Old	Iota	5	Pre	Female	3	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	5	Pre	Female	4	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	5	Pre	Female	5	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	5	Pre	Female	6	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	5	Pre	Female	7	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	5	Pre	Female	8		Yes	Mixed	9:30AM	Caitlin
Old	Iota	5	Pre	Female	9	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	5	Pre	Female	10	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	5	Pre	Female	11	1	Yes	Mixed	9:30AM	Caitlin
Old	Iota	6	Pre	Male	2	Male	Yes	Mixed	9:30AM	Caitlin
Old	Iota	6	Pre	Male	3	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	6	Pre	Male	4	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	6	Pre	Male	5	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	6	Pre	Male	6	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	6	Pre	Male	7	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	6	Pre	Male	8		Yes	Mixed	9:30AM	Caitlin
Old	Iota	6	Pre	Male	9	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	6	Pre	Male	10	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	6	Pre	Male	11	2	Yes	Mixed	9:30AM	Caitlin
Old	Iota	7	Pre	Male	2	Male	Yes	Mixed	9:30AM	Caitlin
Old	Iota	7	Pre	Male	3	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	7	Pre	Male	4	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	7	Pre	Male	5	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	7	Pre	Male	6	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	7	Pre	Male	7	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	7	Pre	Male	8		Yes	Mixed	9:30AM	Caitlin
Old	Iota	7	Pre	Male	9	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	7	Pre	Male	10	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	7	Pre	Male	11	5	Yes	Mixed	9:30AM	Caitlin
Old	Iota	8	Pre	Female	2	Female	Yes	Mixed	9:30AM	Caitlin
Old	Iota	8	Pre	Female	3	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	8	Pre	Female	4	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	8	Pre	Female	5	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	8	Pre	Female	6	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	8	Pre	Female	7	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	8	Pre	Female	8		Yes	Mixed	9:30AM	Caitlin
Old	Iota	8	Pre	Female	9	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	8	Pre	Female	10	2	Yes	Mixed	9:30AM	Caitlin
Old	Iota	8	Pre	Female	11	2	Yes	Mixed	9:30AM	Caitlin
Old	Iota	9	Pre	Female	2	Female	Yes	Mixed	9:30AM	Caitlin
Old	Iota	9	Pre	Female	3	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	9	Pre	Female	4	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	9	Pre	Female	5	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	9	Pre	Female	6	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	9	Pre	Female	7	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	9	Pre	Female	8		Yes	Mixed	9:30AM	Caitlin
Old	Iota	9	Pre	Female	9	5	Yes	Mixed	9:30AM	Caitlin
Old	Iota	9	Pre	Female	10	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	9	Pre	Female	11	1	Yes	Mixed	9:30AM	Caitlin
Old	Iota	10	Pre	Female	2	Female	Yes	Mixed	9:30AM	Caitlin
Old	Iota	10	Pre	Female	3	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	10	Pre	Female	4	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	10	Pre	Female	5	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	10	Pre	Female	6	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	10	Pre	Female	7	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	10	Pre	Female	8		Yes	Mixed	9:30AM	Caitlin
Old	Iota	10	Pre	Female	9	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	10	Pre	Female	10	5	Yes	Mixed	9:30AM	Caitlin
Old	Iota	10	Pre	Female	11	2	Yes	Mixed	9:30AM	Caitlin
Old	Iota	11	Pre	Female	2	Female	Yes	Mixed	9:30AM	Caitlin
Old	Iota	11	Pre	Female	3	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	11	Pre	Female	4	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	11	Pre	Female	5	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	11	Pre	Female	6	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	11	Pre	Female	7	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	11	Pre	Female	8		Yes	Mixed	9:30AM	Caitlin
Old	Iota	11	Pre	Female	9	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	11	Pre	Female	10	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	11	Pre	Female	11	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	12	Pre	Male	2	Male	Yes	Mixed	9:30AM	Caitlin
Old	Iota	12	Pre	Male	3	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	12	Pre	Male	4	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	12	Pre	Male	5	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	12	Pre	Male	6	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	12	Pre	Male	7	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	12	Pre	Male	8		Yes	Mixed	9:30AM	Caitlin
Old	Iota	12	Pre	Male	9	1	Yes	Mixed	9:30AM	Caitlin
Old	Iota	12	Pre	Male	10	1	Yes	Mixed	9:30AM	Caitlin
Old	Iota	12	Pre	Male	11	1	Yes	Mixed	9:30AM	Caitlin
Old	Iota	13	Pre	Female	2	Female	Yes	Mixed	9:30AM	Caitlin
Old	Iota	13	Pre	Female	3	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	13	Pre	Female	4	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	13	Pre	Female	5	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	13	Pre	Female	6	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	13	Pre	Female	7	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	13	Pre	Female	8		Yes	Mixed	9:30AM	Caitlin
Old	Iota	13	Pre	Female	9	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	13	Pre	Female	10	4	Yes	Mixed	9:30AM	Caitlin

Old	Iota	13	Pre	Female	11	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	14	Pre	Female	2	Female	Yes	Mixed	9:30AM	Caitlin
Old	Iota	14	Pre	Female	3	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	14	Pre	Female	4	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	14	Pre	Female	5	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	14	Pre	Female	6	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	14	Pre	Female	7	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	14	Pre	Female	8		Yes	Mixed	9:30AM	Caitlin
Old	Iota	14	Pre	Female	9	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	14	Pre	Female	10	2	Yes	Mixed	9:30AM	Caitlin
Old	Iota	14	Pre	Female	11	2	Yes	Mixed	9:30AM	Caitlin
Old	Iota	15	Pre	Female	2	Female	Yes	Mixed	9:30AM	Caitlin
Old	Iota	15	Pre	Female	3	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	15	Pre	Female	4	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	15	Pre	Female	5	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	15	Pre	Female	6	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	15	Pre	Female	7	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	15	Pre	Female	8		Yes	Mixed	9:30AM	Caitlin
Old	Iota	15	Pre	Female	9	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	15	Pre	Female	10	2	Yes	Mixed	9:30AM	Caitlin
Old	Iota	15	Pre	Female	11	2	Yes	Mixed	9:30AM	Caitlin
Old	Iota	16	Pre	Female	2	Female	Yes	Mixed	9:30AM	Caitlin
Old	Iota	16	Pre	Female	3	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	16	Pre	Female	4	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	16	Pre	Female	5	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	16	Pre	Female	6	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	16	Pre	Female	7	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	16	Pre	Female	8		Yes	Mixed	9:30AM	Caitlin
Old	Iota	16	Pre	Female	9	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	16	Pre	Female	10	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	16	Pre	Female	11	2	Yes	Mixed	9:30AM	Caitlin
Old	Iota	17	Pre	Female	2	Female	Yes	Mixed	9:30AM	Caitlin
Old	Iota	17	Pre	Female	3	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	17	Pre	Female	4	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	17	Pre	Female	5	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	17	Pre	Female	6	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	17	Pre	Female	7	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	17	Pre	Female	8		Yes	Mixed	9:30AM	Caitlin
Old	Iota	17	Pre	Female	9	1	Yes	Mixed	9:30AM	Caitlin
Old	Iota	17	Pre	Female	10	1	Yes	Mixed	9:30AM	Caitlin
Old	Iota	17	Pre	Female	11	1	Yes	Mixed	9:30AM	Caitlin
Old	Iota	18	Pre	Male	2	Male	Yes	Mixed	9:30AM	Caitlin
Old	Iota	18	Pre	Male	3	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	18	Pre	Male	4	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	18	Pre	Male	5	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	18	Pre	Male	6	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	18	Pre	Male	7	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	18	Pre	Male	8		Yes	Mixed	9:30AM	Caitlin
Old	Iota	18	Pre	Male	9	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	18	Pre	Male	10	5	Yes	Mixed	9:30AM	Caitlin
Old	Iota	18	Pre	Male	11	5	Yes	Mixed	9:30AM	Caitlin
Old	Iota	19	Pre	Female	2	Female	Yes	Mixed	9:30AM	Caitlin
Old	Iota	19	Pre	Female	3	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	19	Pre	Female	4	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	19	Pre	Female	5	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	19	Pre	Female	6	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	19	Pre	Female	7	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	19	Pre	Female	8		Yes	Mixed	9:30AM	Caitlin
Old	Iota	19	Pre	Female	9	2	Yes	Mixed	9:30AM	Caitlin
Old	Iota	19	Pre	Female	10	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	19	Pre	Female	11	5	Yes	Mixed	9:30AM	Caitlin
Old	Iota	20	Pre	Female	2	Female	Yes	Mixed	9:30AM	Caitlin
Old	Iota	20	Pre	Female	3	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	20	Pre	Female	4	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	20	Pre	Female	5	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	20	Pre	Female	6	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	20	Pre	Female	7	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	20	Pre	Female	8		Yes	Mixed	9:30AM	Caitlin
Old	Iota	20	Pre	Female	9	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	20	Pre	Female	10	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	20	Pre	Female	11	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	21	Pre	Female	2	Female	Yes	Mixed	9:30AM	Caitlin
Old	Iota	21	Pre	Female	3	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	21	Pre	Female	4	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	21	Pre	Female	5	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	21	Pre	Female	6	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	21	Pre	Female	7	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	21	Pre	Female	8		Yes	Mixed	9:30AM	Caitlin
Old	Iota	21	Pre	Female	9	1	Yes	Mixed	9:30AM	Caitlin
Old	Iota	21	Pre	Female	10	1	Yes	Mixed	9:30AM	Caitlin
Old	Iota	21	Pre	Female	11	1	Yes	Mixed	9:30AM	Caitlin
Old	Iota	22	Pre	Male	2	Male	Yes	Mixed	9:30AM	Caitlin
Old	Iota	22	Pre	Male	3	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	22	Pre	Male	4	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	22	Pre	Male	5	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	22	Pre	Male	6	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	22	Pre	Male	7	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	22	Pre	Male	8		Yes	Mixed	9:30AM	Caitlin
Old	Iota	22	Pre	Male	9	2	Yes	Mixed	9:30AM	Caitlin
Old	Iota	22	Pre	Male	10	5	Yes	Mixed	9:30AM	Caitlin
Old	Iota	22	Pre	Male	11	1	Yes	Mixed	9:30AM	Caitlin
Old	Iota	23	Pre	Female	2	Female	Yes	Mixed	9:30AM	Caitlin
Old	Iota	23	Pre	Female	3	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	23	Pre	Female	4	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	23	Pre	Female	5	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	23	Pre	Female	6	Yes	Yes	Mixed	9:30AM	Caitlin

Old	Iota	23	Pre	Female	7	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	23	Pre	Female	8		Yes	Mixed	9:30AM	Caitlin
Old	Iota	23	Pre	Female	9	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	23	Pre	Female	10	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	23	Pre	Female	11	2	Yes	Mixed	9:30AM	Caitlin
Old	Iota	1	Post		2	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	1	Post		3	5	Yes	Mixed	9:30AM	Caitlin
Old	Iota	1	Post		4	2	Yes	Mixed	9:30AM	Caitlin
Old	Iota	1	Post		5	5	Yes	Mixed	9:30AM	Caitlin
Old	Iota	1	Post		6	1	Yes	Mixed	9:30AM	Caitlin
Old	Iota	1	Post		7	5	Yes	Mixed	9:30AM	Caitlin
Old	Iota	1	Post		8	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	1	Post		9	Crossman	Yes	Mixed	9:30AM	Caitlin
Old	Iota	1	Post		10	Both	Yes	Mixed	9:30AM	Caitlin
Old	Iota	1	Post		11	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	2	Post		2	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	2	Post		3	2	Yes	Mixed	9:30AM	Caitlin
Old	Iota	2	Post		4	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	2	Post		5		Yes	Mixed	9:30AM	Caitlin
Old	Iota	2	Post		6	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	2	Post		7	2	Yes	Mixed	9:30AM	Caitlin
Old	Iota	2	Post		8	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	2	Post		9	Crossman	Yes	Mixed	9:30AM	Caitlin
Old	Iota	2	Post		10	Both	Yes	Mixed	9:30AM	Caitlin
Old	Iota	2	Post		11	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	3	Post		2	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	3	Post		3	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	3	Post		4	2	Yes	Mixed	9:30AM	Caitlin
Old	Iota	3	Post		5	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	3	Post		6	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	3	Post		7	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	3	Post		8	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	3	Post		9	Crossman	Yes	Mixed	9:30AM	Caitlin
Old	Iota	3	Post		10	Both	Yes	Mixed	9:30AM	Caitlin
Old	Iota	3	Post		11	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	4	Post		2	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	4	Post		3	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	4	Post		4	5	Yes	Mixed	9:30AM	Caitlin
Old	Iota	4	Post		5	5	Yes	Mixed	9:30AM	Caitlin
Old	Iota	4	Post		6	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	4	Post		7	5	Yes	Mixed	9:30AM	Caitlin
Old	Iota	4	Post		8	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	4	Post		9	Crossman	Yes	Mixed	9:30AM	Caitlin
Old	Iota	4	Post		10	Sight	Yes	Mixed	9:30AM	Caitlin
Old	Iota	4	Post		11	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	5	Post		2	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	5	Post		3	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	5	Post		4	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	5	Post		5	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	5	Post		6	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	5	Post		7	5	Yes	Mixed	9:30AM	Caitlin
Old	Iota	5	Post		8	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	5	Post		9	Crossman	Yes	Mixed	9:30AM	Caitlin
Old	Iota	5	Post		10	Sight	Yes	Mixed	9:30AM	Caitlin
Old	Iota	5	Post		11	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	6	Post		2	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	6	Post		3	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	6	Post		4	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	6	Post		5	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	6	Post		6	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	6	Post		7	2	Yes	Mixed	9:30AM	Caitlin
Old	Iota	6	Post		8	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	6	Post		9	Georgiou	Yes	Mixed	9:30AM	Caitlin
Old	Iota	6	Post		10	Sight	Yes	Mixed	9:30AM	Caitlin
Old	Iota	6	Post		11	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	7	Post		2	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	7	Post		3	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	7	Post		4	5	Yes	Mixed	9:30AM	Caitlin
Old	Iota	7	Post		5	5	Yes	Mixed	9:30AM	Caitlin
Old	Iota	7	Post		6	5	Yes	Mixed	9:30AM	Caitlin
Old	Iota	7	Post		7	5	Yes	Mixed	9:30AM	Caitlin
Old	Iota	7	Post		8	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	7	Post		9	Georgiou	Yes	Mixed	9:30AM	Caitlin
Old	Iota	7	Post		10	Both	Yes	Mixed	9:30AM	Caitlin
Old	Iota	7	Post		11	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	8	Post		2	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	8	Post		3	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	8	Post		4	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	8	Post		5	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	8	Post		6	5	Yes	Mixed	9:30AM	Caitlin
Old	Iota	8	Post		7		Yes	Mixed	9:30AM	Caitlin
Old	Iota	8	Post		8	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	8	Post		9	Crossman	Yes	Mixed	9:30AM	Caitlin
Old	Iota	8	Post		10	Sight	Yes	Mixed	9:30AM	Caitlin
Old	Iota	8	Post		11	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	9	Post		2	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	9	Post		3	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	9	Post		4	5	Yes	Mixed	9:30AM	Caitlin
Old	Iota	9	Post		5	5	Yes	Mixed	9:30AM	Caitlin
Old	Iota	9	Post		6	5	Yes	Mixed	9:30AM	Caitlin
Old	Iota	9	Post		7	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	9	Post		8	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	9	Post		9	Crossman	Yes	Mixed	9:30AM	Caitlin
Old	Iota	9	Post		10	Sight	Yes	Mixed	9:30AM	Caitlin
Old	Iota	9	Post		11	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	10	Post		2	2	Yes	Mixed	9:30AM	Caitlin

Old	Iota	10	Post		3	5	Yes	Mixed	9:30AM	Caitlin
Old	Iota	10	Post		4	1	Yes	Mixed	9:30AM	Caitlin
Old	Iota	10	Post		5	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	10	Post		6	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	10	Post		7	1	Yes	Mixed	9:30AM	Caitlin
Old	Iota	10	Post		8	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	10	Post		9	Crossman	Yes	Mixed	9:30AM	Caitlin
Old	Iota	10	Post		10		Yes	Mixed	9:30AM	Caitlin
Old	Iota	10	Post		11	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	11	Post		2	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	11	Post		3	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	11	Post		4	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	11	Post		5	5	Yes	Mixed	9:30AM	Caitlin
Old	Iota	11	Post		6	5	Yes	Mixed	9:30AM	Caitlin
Old	Iota	11	Post		7	5	Yes	Mixed	9:30AM	Caitlin
Old	Iota	11	Post		8	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	11	Post		9	Crossman	Yes	Mixed	9:30AM	Caitlin
Old	Iota	11	Post		10	Sight	Yes	Mixed	9:30AM	Caitlin
Old	Iota	11	Post		11	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	12	Post		2	1	Yes	Mixed	9:30AM	Caitlin
Old	Iota	12	Post		3	1	Yes	Mixed	9:30AM	Caitlin
Old	Iota	12	Post		4	1	Yes	Mixed	9:30AM	Caitlin
Old	Iota	12	Post		5	1	Yes	Mixed	9:30AM	Caitlin
Old	Iota	12	Post		6	1	Yes	Mixed	9:30AM	Caitlin
Old	Iota	12	Post		7	1	Yes	Mixed	9:30AM	Caitlin
Old	Iota	12	Post		8	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	12	Post		9	Crossman	Yes	Mixed	9:30AM	Caitlin
Old	Iota	12	Post		10	Sight	Yes	Mixed	9:30AM	Caitlin
Old	Iota	12	Post		11	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	13	Post		2	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	13	Post		3	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	13	Post		4	5	Yes	Mixed	9:30AM	Caitlin
Old	Iota	13	Post		5	5	Yes	Mixed	9:30AM	Caitlin
Old	Iota	13	Post		6	5	Yes	Mixed	9:30AM	Caitlin
Old	Iota	13	Post		7	5	Yes	Mixed	9:30AM	Caitlin
Old	Iota	13	Post		8	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	13	Post		9	Crossman	Yes	Mixed	9:30AM	Caitlin
Old	Iota	13	Post		10	Sight	Yes	Mixed	9:30AM	Caitlin
Old	Iota	13	Post		11	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	14	Post		2	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	14	Post		3	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	14	Post		4	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	14	Post		5	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	14	Post		6	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	14	Post		7	2	Yes	Mixed	9:30AM	Caitlin
Old	Iota	14	Post		8		Yes	Mixed	9:30AM	Caitlin
Old	Iota	14	Post		9	Crossman	Yes	Mixed	9:30AM	Caitlin
Old	Iota	14	Post		10		Yes	Mixed	9:30AM	Caitlin
Old	Iota	14	Post		11	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	15	Post		2	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	15	Post		3	2	Yes	Mixed	9:30AM	Caitlin
Old	Iota	15	Post		4	2	Yes	Mixed	9:30AM	Caitlin
Old	Iota	15	Post		5	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	15	Post		6	2	Yes	Mixed	9:30AM	Caitlin
Old	Iota	15	Post		7	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	15	Post		8	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	15	Post		9	Crossman	Yes	Mixed	9:30AM	Caitlin
Old	Iota	15	Post		10	Sight	Yes	Mixed	9:30AM	Caitlin
Old	Iota	15	Post		11	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	16	Post		2	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	16	Post		3	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	16	Post		4	5	Yes	Mixed	9:30AM	Caitlin
Old	Iota	16	Post		5	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	16	Post		6	5	Yes	Mixed	9:30AM	Caitlin
Old	Iota	16	Post		7	5	Yes	Mixed	9:30AM	Caitlin
Old	Iota	16	Post		8	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	16	Post		9	Crossman	Yes	Mixed	9:30AM	Caitlin
Old	Iota	16	Post		10	Sight	Yes	Mixed	9:30AM	Caitlin
Old	Iota	16	Post		11	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	17	Post		2	1	Yes	Mixed	9:30AM	Caitlin
Old	Iota	17	Post		3	1	Yes	Mixed	9:30AM	Caitlin
Old	Iota	17	Post		4	1	Yes	Mixed	9:30AM	Caitlin
Old	Iota	17	Post		5		Yes	Mixed	9:30AM	Caitlin
Old	Iota	17	Post		6	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	17	Post		7	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	17	Post		8	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	17	Post		9	Crossman	Yes	Mixed	9:30AM	Caitlin
Old	Iota	17	Post		10	Sight	Yes	Mixed	9:30AM	Caitlin
Old	Iota	17	Post		11	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	18	Post		2	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	18	Post		3	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	18	Post		4	5	Yes	Mixed	9:30AM	Caitlin
Old	Iota	18	Post		5	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	18	Post		6	5	Yes	Mixed	9:30AM	Caitlin
Old	Iota	18	Post		7	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	18	Post		8	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	18	Post		9	Crossman	Yes	Mixed	9:30AM	Caitlin
Old	Iota	18	Post		10	Sight	Yes	Mixed	9:30AM	Caitlin
Old	Iota	18	Post		11	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	19	Post		2	2	Yes	Mixed	9:30AM	Caitlin
Old	Iota	19	Post		3	2	Yes	Mixed	9:30AM	Caitlin
Old	Iota	19	Post		4	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	19	Post		5	5	Yes	Mixed	9:30AM	Caitlin
Old	Iota	19	Post		6	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	19	Post		7	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	19	Post		8	Yes	Yes	Mixed	9:30AM	Caitlin

Old	Iota	19	Post		9	Crossman	Yes	Mixed	9:30AM	Caitlin
Old	Iota	19	Post		10	Both	Yes	Mixed	9:30AM	Caitlin
Old	Iota	19	Post		11	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	20	Post		2	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	20	Post		3	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	20	Post		4	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	20	Post		5	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	20	Post		6	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	20	Post		7	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	20	Post		8	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	20	Post		9	Crossman	Yes	Mixed	9:30AM	Caitlin
Old	Iota	20	Post		10	Sight	Yes	Mixed	9:30AM	Caitlin
Old	Iota	20	Post		11	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	21	Post		2	2	Yes	Mixed	9:30AM	Caitlin
Old	Iota	21	Post		3	1	Yes	Mixed	9:30AM	Caitlin
Old	Iota	21	Post		4	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	21	Post		5	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	21	Post		6	2	Yes	Mixed	9:30AM	Caitlin
Old	Iota	21	Post		7	5	Yes	Mixed	9:30AM	Caitlin
Old	Iota	21	Post		8	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	21	Post		9	Crossman	Yes	Mixed	9:30AM	Caitlin
Old	Iota	21	Post		10	Sight	Yes	Mixed	9:30AM	Caitlin
Old	Iota	21	Post		11	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	22	Post		2	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	22	Post		3	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	22	Post		4	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	22	Post		5	5	Yes	Mixed	9:30AM	Caitlin
Old	Iota	22	Post		6	5	Yes	Mixed	9:30AM	Caitlin
Old	Iota	22	Post		7	5	Yes	Mixed	9:30AM	Caitlin
Old	Iota	22	Post		8	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	22	Post		9	Crossman	Yes	Mixed	9:30AM	Caitlin
Old	Iota	22	Post		10	Sight	Yes	Mixed	9:30AM	Caitlin
Old	Iota	22	Post		11	No	Yes	Mixed	9:30AM	Caitlin
Old	Iota	23	Post		2	1	Yes	Mixed	9:30AM	Caitlin
Old	Iota	23	Post		3	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	23	Post		4	5	Yes	Mixed	9:30AM	Caitlin
Old	Iota	23	Post		5	3	Yes	Mixed	9:30AM	Caitlin
Old	Iota	23	Post		6	2	Yes	Mixed	9:30AM	Caitlin
Old	Iota	23	Post		7	4	Yes	Mixed	9:30AM	Caitlin
Old	Iota	23	Post		8	Yes	Yes	Mixed	9:30AM	Caitlin
Old	Iota	23	Post		9		Yes	Mixed	9:30AM	Caitlin
Old	Iota	23	Post		10		Yes	Mixed	9:30AM	Caitlin
Old	Iota	23	Post		11		Yes	Mixed	9:30AM	Caitlin
Old	Alpha	1	Post		2	3	No	Girls	9:30AM	Cathleena
Old	Alpha	1	Post		3	3	No	Girls	9:30AM	Cathleena
Old	Alpha	1	Post		4	5	No	Girls	9:30AM	Cathleena
Old	Alpha	1	Post		12	2	No	Girls	9:30AM	Cathleena
Old	Alpha	1	Post		13	4	No	Girls	9:30AM	Cathleena
Old	Alpha	1	Post		5		No	Girls	9:30AM	Cathleena
Old	Alpha	1	Post		6		No	Girls	9:30AM	Cathleena
Old	Alpha	1	Post		15		No	Girls	9:30AM	Cathleena
Old	Alpha	1	Post		14		No	Girls	9:30AM	Cathleena
Old	Alpha	1	Post		7		No	Girls	9:30AM	Cathleena
Old	Alpha	1	Post		16		No	Girls	9:30AM	Cathleena
Old	Alpha	1	Post		17		No	Girls	9:30AM	Cathleena
Old	Alpha	1	Post		8		No	Girls	9:30AM	Cathleena
Old	Alpha	1	Post		9		No	Girls	9:30AM	Cathleena
Old	Alpha	1	Post		10		No	Girls	9:30AM	Cathleena
Old	Alpha	2	Post		2	3	No	Girls	9:30AM	Cathleena
Old	Alpha	2	Post		3	3	No	Girls	9:30AM	Cathleena
Old	Alpha	2	Post		4	4	No	Girls	9:30AM	Cathleena
Old	Alpha	2	Post		12	2	No	Girls	9:30AM	Cathleena
Old	Alpha	2	Post		13	3	No	Girls	9:30AM	Cathleena
Old	Alpha	2	Post		5	4	No	Girls	9:30AM	Cathleena
Old	Alpha	2	Post		6	3	No	Girls	9:30AM	Cathleena
Old	Alpha	2	Post		15	2	No	Girls	9:30AM	Cathleena
Old	Alpha	2	Post		14	2	No	Girls	9:30AM	Cathleena
Old	Alpha	2	Post		7	3	No	Girls	9:30AM	Cathleena
Old	Alpha	2	Post		16	2	No	Girls	9:30AM	Cathleena
Old	Alpha	2	Post		17	3	No	Girls	9:30AM	Cathleena
Old	Alpha	2	Post		8	Yes	No	Girls	9:30AM	Cathleena
Old	Alpha	2	Post		9	Crossman	No	Girls	9:30AM	Cathleena
Old	Alpha	2	Post		10	Sight	No	Girls	9:30AM	Cathleena
Old	Alpha	3	Post		2	3	No	Girls	9:30AM	Cathleena
Old	Alpha	3	Post		3	2	No	Girls	9:30AM	Cathleena
Old	Alpha	3	Post		4	3	No	Girls	9:30AM	Cathleena
Old	Alpha	3	Post		12	1	No	Girls	9:30AM	Cathleena
Old	Alpha	3	Post		13	3	No	Girls	9:30AM	Cathleena
Old	Alpha	3	Post		5	3	No	Girls	9:30AM	Cathleena
Old	Alpha	3	Post		6	3	No	Girls	9:30AM	Cathleena
Old	Alpha	3	Post		15	2	No	Girls	9:30AM	Cathleena
Old	Alpha	3	Post		14	3	No	Girls	9:30AM	Cathleena
Old	Alpha	3	Post		7	4	No	Girls	9:30AM	Cathleena
Old	Alpha	3	Post		16	1	No	Girls	9:30AM	Cathleena
Old	Alpha	3	Post		17	3	No	Girls	9:30AM	Cathleena
Old	Alpha	3	Post		8	Yes	No	Girls	9:30AM	Cathleena
Old	Alpha	3	Post		9	Crossman	No	Girls	9:30AM	Cathleena
Old	Alpha	3	Post		10	Sight	No	Girls	9:30AM	Cathleena
Old	Alpha	4	Post		2	3	No	Girls	9:30AM	Cathleena
Old	Alpha	4	Post		3	3	No	Girls	9:30AM	Cathleena
Old	Alpha	4	Post		4	3	No	Girls	9:30AM	Cathleena
Old	Alpha	4	Post		12	1	No	Girls	9:30AM	Cathleena
Old	Alpha	4	Post		13	3	No	Girls	9:30AM	Cathleena
Old	Alpha	4	Post		5	3	No	Girls	9:30AM	Cathleena
Old	Alpha	4	Post		6	4	No	Girls	9:30AM	Cathleena
Old	Alpha	4	Post		15	3	No	Girls	9:30AM	Cathleena

Old	Alpha	4	Post		14	5	No	Girls	9:30AM	Cathleena
Old	Alpha	4	Post		7	4	No	Girls	9:30AM	Cathleena
Old	Alpha	4	Post		16		No	Girls	9:30AM	Cathleena
Old	Alpha	4	Post		17	5	No	Girls	9:30AM	Cathleena
Old	Alpha	4	Post		8		No	Girls	9:30AM	Cathleena
Old	Alpha	4	Post		9		No	Girls	9:30AM	Cathleena
Old	Alpha	4	Post		10		No	Girls	9:30AM	Cathleena
Old	Alpha	5	Post		2	3	No	Girls	9:30AM	Cathleena
Old	Alpha	5	Post		3	3	No	Girls	9:30AM	Cathleena
Old	Alpha	5	Post		4	4	No	Girls	9:30AM	Cathleena
Old	Alpha	5	Post		12	4	No	Girls	9:30AM	Cathleena
Old	Alpha	5	Post		13	3	No	Girls	9:30AM	Cathleena
Old	Alpha	5	Post		5	4	No	Girls	9:30AM	Cathleena
Old	Alpha	5	Post		6	4	No	Girls	9:30AM	Cathleena
Old	Alpha	5	Post		15		No	Girls	9:30AM	Cathleena
Old	Alpha	5	Post		14	4	No	Girls	9:30AM	Cathleena
Old	Alpha	5	Post		7	3	No	Girls	9:30AM	Cathleena
Old	Alpha	5	Post		16		No	Girls	9:30AM	Cathleena
Old	Alpha	5	Post		17	5	No	Girls	9:30AM	Cathleena
Old	Alpha	5	Post		8	Yes	No	Girls	9:30AM	Cathleena
Old	Alpha	5	Post		9	Crossman	No	Girls	9:30AM	Cathleena
Old	Alpha	5	Post		10		No	Girls	9:30AM	Cathleena
Old	Alpha	6	Post		2	3	No	Girls	9:30AM	Cathleena
Old	Alpha	6	Post		3	3	No	Girls	9:30AM	Cathleena
Old	Alpha	6	Post		4	4	No	Girls	9:30AM	Cathleena
Old	Alpha	6	Post		12	1	No	Girls	9:30AM	Cathleena
Old	Alpha	6	Post		13	3	No	Girls	9:30AM	Cathleena
Old	Alpha	6	Post		5	5	No	Girls	9:30AM	Cathleena
Old	Alpha	6	Post		6	5	No	Girls	9:30AM	Cathleena
Old	Alpha	6	Post		15	2	No	Girls	9:30AM	Cathleena
Old	Alpha	6	Post		14	4	No	Girls	9:30AM	Cathleena
Old	Alpha	6	Post		7	5	No	Girls	9:30AM	Cathleena
Old	Alpha	6	Post		16	3	No	Girls	9:30AM	Cathleena
Old	Alpha	6	Post		17	5	No	Girls	9:30AM	Cathleena
Old	Alpha	6	Post		8	Yes	No	Girls	9:30AM	Cathleena
Old	Alpha	6	Post		9	Crossman	No	Girls	9:30AM	Cathleena
Old	Alpha	6	Post		10	Sight	No	Girls	9:30AM	Cathleena
Old	Alpha	7	Post		2	3	No	Girls	9:30AM	Cathleena
Old	Alpha	7	Post		3	4	No	Girls	9:30AM	Cathleena
Old	Alpha	7	Post		4	4	No	Girls	9:30AM	Cathleena
Old	Alpha	7	Post		12	2	No	Girls	9:30AM	Cathleena
Old	Alpha	7	Post		13	4	No	Girls	9:30AM	Cathleena
Old	Alpha	7	Post		5	3	No	Girls	9:30AM	Cathleena
Old	Alpha	7	Post		6	4	No	Girls	9:30AM	Cathleena
Old	Alpha	7	Post		15	2	No	Girls	9:30AM	Cathleena
Old	Alpha	7	Post		14	5	No	Girls	9:30AM	Cathleena
Old	Alpha	7	Post		7	3	No	Girls	9:30AM	Cathleena
Old	Alpha	7	Post		16	2	No	Girls	9:30AM	Cathleena
Old	Alpha	7	Post		17	5	No	Girls	9:30AM	Cathleena
Old	Alpha	7	Post		8		No	Girls	9:30AM	Cathleena
Old	Alpha	7	Post		9		No	Girls	9:30AM	Cathleena
Old	Alpha	7	Post		10		No	Girls	9:30AM	Cathleena
Old	Alpha	8	Post		2	3	No	Girls	9:30AM	Cathleena
Old	Alpha	8	Post		3	4	No	Girls	9:30AM	Cathleena
Old	Alpha	8	Post		4	4	No	Girls	9:30AM	Cathleena
Old	Alpha	8	Post		12		No	Girls	9:30AM	Cathleena
Old	Alpha	8	Post		13		No	Girls	9:30AM	Cathleena
Old	Alpha	8	Post		5	4	No	Girls	9:30AM	Cathleena
Old	Alpha	8	Post		6	4	No	Girls	9:30AM	Cathleena
Old	Alpha	8	Post		15		No	Girls	9:30AM	Cathleena
Old	Alpha	8	Post		14	5	No	Girls	9:30AM	Cathleena
Old	Alpha	8	Post		7	4	No	Girls	9:30AM	Cathleena
Old	Alpha	8	Post		16	3	No	Girls	9:30AM	Cathleena
Old	Alpha	8	Post		17	5	No	Girls	9:30AM	Cathleena
Old	Alpha	8	Post		8		No	Girls	9:30AM	Cathleena
Old	Alpha	8	Post		9		No	Girls	9:30AM	Cathleena
Old	Alpha	8	Post		10		No	Girls	9:30AM	Cathleena
Old	Alpha	9	Post		2	4	No	Girls	9:30AM	Cathleena
Old	Alpha	9	Post		3	3	No	Girls	9:30AM	Cathleena
Old	Alpha	9	Post		4	4	No	Girls	9:30AM	Cathleena
Old	Alpha	9	Post		12	2	No	Girls	9:30AM	Cathleena
Old	Alpha	9	Post		13	4	No	Girls	9:30AM	Cathleena
Old	Alpha	9	Post		5	4	No	Girls	9:30AM	Cathleena
Old	Alpha	9	Post		6	4	No	Girls	9:30AM	Cathleena
Old	Alpha	9	Post		15	4	No	Girls	9:30AM	Cathleena
Old	Alpha	9	Post		14	5	No	Girls	9:30AM	Cathleena
Old	Alpha	9	Post		7	4	No	Girls	9:30AM	Cathleena
Old	Alpha	9	Post		16	2	No	Girls	9:30AM	Cathleena
Old	Alpha	9	Post		17	3	No	Girls	9:30AM	Cathleena
Old	Alpha	9	Post		8		No	Girls	9:30AM	Cathleena
Old	Alpha	9	Post		9		No	Girls	9:30AM	Cathleena
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Old	Alpha	10	Post		7	3	No	Girls	9:30AM	Cathleena
Old	Alpha	10	Post		16		No	Girls	9:30AM	Cathleena
Old	Alpha	10	Post		17	4	No	Girls	9:30AM	Cathleena
Old	Alpha	10	Post		8		No	Girls	9:30AM	Cathleena
Old	Alpha	10	Post		9		No	Girls	9:30AM	Cathleena

Old	Alpha	10	Post		10		No	Girls	9:30AM	Cathleena
Old	Alpha	11	Post		2	4	No	Girls	9:30AM	Cathleena
Old	Alpha	11	Post		3	4	No	Girls	9:30AM	Cathleena
Old	Alpha	11	Post		4	4	No	Girls	9:30AM	Cathleena
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Old	Alpha	14	Post		16	3	No	Girls	9:30AM	Cathleena
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Old	Alpha	15	Post		16	2.5	No	Girls	9:30AM	Cathleena
Old	Alpha	15	Post		17	5	No	Girls	9:30AM	Cathleena
Old	Alpha	15	Post		8	Yes	No	Girls	9:30AM	Cathleena
Old	Alpha	15	Post		9	Crossman	No	Girls	9:30AM	Cathleena
Old	Alpha	15	Post		10	Sight	No	Girls	9:30AM	Cathleena
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Old	Alpha	16	Post		17	5	No	Girls	9:30AM	Cathleena
Old	Alpha	16	Post		8	Yes	No	Girls	9:30AM	Cathleena
Old	Alpha	16	Post		9	Crossman	No	Girls	9:30AM	Cathleena
Old	Alpha	16	Post		10	Sight	No	Girls	9:30AM	Cathleena
Old	Alpha	17	Post		2	3	No	Girls	9:30AM	Cathleena
Old	Alpha	17	Post		3	4	No	Girls	9:30AM	Cathleena
Old	Alpha	17	Post		4	1	No	Girls	9:30AM	Cathleena
Old	Alpha	17	Post		12		No	Girls	9:30AM	Cathleena
Old	Alpha	17	Post		13	4	No	Girls	9:30AM	Cathleena

Old	Alpha	17	Post		5	5	No	Girls	9:30AM	Cathleena
Old	Alpha	17	Post		6		No	Girls	9:30AM	Cathleena
Old	Alpha	17	Post		15		No	Girls	9:30AM	Cathleena
Old	Alpha	17	Post		14	5	No	Girls	9:30AM	Cathleena
Old	Alpha	17	Post		7		No	Girls	9:30AM	Cathleena
Old	Alpha	17	Post		16		No	Girls	9:30AM	Cathleena
Old	Alpha	17	Post		17	4	No	Girls	9:30AM	Cathleena
Old	Alpha	17	Post		8		No	Girls	9:30AM	Cathleena
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Old	Alpha	18	Post		12	1	No	Girls	9:30AM	Cathleena
Old	Alpha	18	Post		13	4	No	Girls	9:30AM	Cathleena
Old	Alpha	18	Post		5	4	No	Girls	9:30AM	Cathleena
Old	Alpha	18	Post		6	4	No	Girls	9:30AM	Cathleena
Old	Alpha	18	Post		15	2	No	Girls	9:30AM	Cathleena
Old	Alpha	18	Post		14	3	No	Girls	9:30AM	Cathleena
Old	Alpha	18	Post		7	2	No	Girls	9:30AM	Cathleena
Old	Alpha	18	Post		16	2	No	Girls	9:30AM	Cathleena
Old	Alpha	18	Post		17	3	No	Girls	9:30AM	Cathleena
Old	Alpha	18	Post		8		No	Girls	9:30AM	Cathleena
Old	Alpha	18	Post		9		No	Girls	9:30AM	Cathleena
Old	Alpha	18	Post		10		No	Girls	9:30AM	Cathleena
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Old	Alpha	19	Post		3	4	No	Girls	9:30AM	Cathleena
Old	Alpha	19	Post		4	3	No	Girls	9:30AM	Cathleena
Old	Alpha	19	Post		12	2	No	Girls	9:30AM	Cathleena
Old	Alpha	19	Post		13	4	No	Girls	9:30AM	Cathleena
Old	Alpha	19	Post		5	4	No	Girls	9:30AM	Cathleena
Old	Alpha	19	Post		6	2	No	Girls	9:30AM	Cathleena
Old	Alpha	19	Post		15	3	No	Girls	9:30AM	Cathleena
Old	Alpha	19	Post		14	2	No	Girls	9:30AM	Cathleena
Old	Alpha	19	Post		7	3	No	Girls	9:30AM	Cathleena
Old	Alpha	19	Post		16	3	No	Girls	9:30AM	Cathleena
Old	Alpha	19	Post		17	4	No	Girls	9:30AM	Cathleena
Old	Alpha	19	Post		8	Yes	No	Girls	9:30AM	Cathleena
Old	Alpha	19	Post		9	Crossman	No	Girls	9:30AM	Cathleena
Old	Alpha	19	Post		10		No	Girls	9:30AM	Cathleena
Old	Alpha	20	Post		2	4	No	Girls	9:30AM	Cathleena
Old	Alpha	20	Post		3	4	No	Girls	9:30AM	Cathleena
Old	Alpha	20	Post		4	2	No	Girls	9:30AM	Cathleena
Old	Alpha	20	Post		12	3	No	Girls	9:30AM	Cathleena
Old	Alpha	20	Post		13	4	No	Girls	9:30AM	Cathleena
Old	Alpha	20	Post		5	3	No	Girls	9:30AM	Cathleena
Old	Alpha	20	Post		6	4	No	Girls	9:30AM	Cathleena
Old	Alpha	20	Post		15	3	No	Girls	9:30AM	Cathleena
Old	Alpha	20	Post		14	5	No	Girls	9:30AM	Cathleena
Old	Alpha	20	Post		7	4	No	Girls	9:30AM	Cathleena
Old	Alpha	20	Post		16	1	No	Girls	9:30AM	Cathleena
Old	Alpha	20	Post		17	5	No	Girls	9:30AM	Cathleena
Old	Alpha	20	Post		8		No	Girls	9:30AM	Cathleena
Old	Alpha	20	Post		9		No	Girls	9:30AM	Cathleena
Old	Alpha	20	Post		10		No	Girls	9:30AM	Cathleena
Old	Alpha	21	Post		2	4	No	Girls	9:30AM	Cathleena
Old	Alpha	21	Post		3	3	No	Girls	9:30AM	Cathleena
Old	Alpha	21	Post		4	1	No	Girls	9:30AM	Cathleena
Old	Alpha	21	Post		12	1	No	Girls	9:30AM	Cathleena
Old	Alpha	21	Post		13	5	No	Girls	9:30AM	Cathleena
Old	Alpha	21	Post		5	4	No	Girls	9:30AM	Cathleena
Old	Alpha	21	Post		6	5	No	Girls	9:30AM	Cathleena
Old	Alpha	21	Post		15	3	No	Girls	9:30AM	Cathleena
Old	Alpha	21	Post		14		No	Girls	9:30AM	Cathleena
Old	Alpha	21	Post		7	5	No	Girls	9:30AM	Cathleena
Old	Alpha	21	Post		16	1	No	Girls	9:30AM	Cathleena
Old	Alpha	21	Post		17		No	Girls	9:30AM	Cathleena
Old	Alpha	21	Post		8		No	Girls	9:30AM	Cathleena
Old	Alpha	21	Post		9		No	Girls	9:30AM	Cathleena
Old	Alpha	21	Post		10		No	Girls	9:30AM	Cathleena
Old	Alpha	22	Post		2	4	No	Girls	9:30AM	Cathleena
Old	Alpha	22	Post		3	3	No	Girls	9:30AM	Cathleena
Old	Alpha	22	Post		4	1	No	Girls	9:30AM	Cathleena
Old	Alpha	22	Post		12	1	No	Girls	9:30AM	Cathleena
Old	Alpha	22	Post		13	5	No	Girls	9:30AM	Cathleena
Old	Alpha	22	Post		5	4	No	Girls	9:30AM	Cathleena
Old	Alpha	22	Post		6	5	No	Girls	9:30AM	Cathleena
Old	Alpha	22	Post		15	3	No	Girls	9:30AM	Cathleena
Old	Alpha	22	Post		14		No	Girls	9:30AM	Cathleena
Old	Alpha	22	Post		7	5	No	Girls	9:30AM	Cathleena
Old	Alpha	22	Post		16	1	No	Girls	9:30AM	Cathleena
Old	Alpha	22	Post		17		No	Girls	9:30AM	Cathleena
Old	Alpha	22	Post		8	Yes	No	Girls	9:30AM	Cathleena
Old	Alpha	22	Post		9	Crossman	No	Girls	9:30AM	Cathleena
Old	Alpha	22	Post		10		No	Girls	9:30AM	Cathleena
Old	Alpha	23	Post		2	4	No	Girls	9:30AM	Cathleena
Old	Alpha	23	Post		3	3	No	Girls	9:30AM	Cathleena
Old	Alpha	23	Post		4	1	No	Girls	9:30AM	Cathleena
Old	Alpha	23	Post		12	1	No	Girls	9:30AM	Cathleena
Old	Alpha	23	Post		13	5	No	Girls	9:30AM	Cathleena
Old	Alpha	23	Post		5	4	No	Girls	9:30AM	Cathleena
Old	Alpha	23	Post		6	5	No	Girls	9:30AM	Cathleena
Old	Alpha	23	Post		15	3	No	Girls	9:30AM	Cathleena
Old	Alpha	23	Post		14		No	Girls	9:30AM	Cathleena
Old	Alpha	23	Post		7	5	No	Girls	9:30AM	Cathleena
Old	Alpha	23	Post		16	1	No	Girls	9:30AM	Cathleena

Old	Alpha	23	Post		17		No	Girls	9:30AM	Cathleena
Old	Alpha	23	Post		8		No	Girls	9:30AM	Cathleena
Old	Alpha	23	Post		9		No	Girls	9:30AM	Cathleena
Old	Alpha	23	Post		10		No	Girls	9:30AM	Cathleena
Old	Alpha	24	Post		2	3	No	Girls	9:30AM	Cathleena
Old	Alpha	24	Post		3	4	No	Girls	9:30AM	Cathleena
Old	Alpha	24	Post		4	3	No	Girls	9:30AM	Cathleena
Old	Alpha	24	Post		12	4	No	Girls	9:30AM	Cathleena
Old	Alpha	24	Post		13	4	No	Girls	9:30AM	Cathleena
Old	Alpha	24	Post		5	4	No	Girls	9:30AM	Cathleena
Old	Alpha	24	Post		6	4	No	Girls	9:30AM	Cathleena
Old	Alpha	24	Post		15		No	Girls	9:30AM	Cathleena
Old	Alpha	24	Post		14		No	Girls	9:30AM	Cathleena
Old	Alpha	24	Post		7	4	No	Girls	9:30AM	Cathleena
Old	Alpha	24	Post		16		No	Girls	9:30AM	Cathleena
Old	Alpha	24	Post		17		No	Girls	9:30AM	Cathleena
Old	Alpha	24	Post		8		No	Girls	9:30AM	Cathleena
Old	Alpha	24	Post		9		No	Girls	9:30AM	Cathleena
Old	Alpha	24	Post		10		No	Girls	9:30AM	Cathleena

Appendix EE: Survey Data: Modified Activity

Raw Data

Old or New?	Session	Student Number	Pre or Post	Gender	Question Number	Response	Pre and Post?	Gender of Group	Time of Day	Presenter
New	Delta	1	Pre	Male	2	Male	Yes	Boys	9:30AM	Gemma
New	Delta	1	Pre	Male	3	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	1	Pre	Male	4	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	1	Pre	Male	5	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	1	Pre	Male	6	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	1	Pre	Male	7	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	1	Pre	Male	8		Yes	Boys	9:30AM	Gemma
New	Delta	1	Pre	Male	9	3	Yes	Boys	9:30AM	Gemma
New	Delta	1	Pre	Male	10	4	Yes	Boys	9:30AM	Gemma
New	Delta	1	Pre	Male	11	2	Yes	Boys	9:30AM	Gemma
New	Delta	2	Pre	Male	2	Male	Yes	Boys	9:30AM	Gemma
New	Delta	2	Pre	Male	3	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	2	Pre	Male	4	No	Yes	Boys	9:30AM	Gemma
New	Delta	2	Pre	Male	5	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	2	Pre	Male	6	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	2	Pre	Male	7	No	Yes	Boys	9:30AM	Gemma
New	Delta	2	Pre	Male	8		Yes	Boys	9:30AM	Gemma
New	Delta	2	Pre	Male	9	1	Yes	Boys	9:30AM	Gemma
New	Delta	2	Pre	Male	10	1	Yes	Boys	9:30AM	Gemma
New	Delta	2	Pre	Male	11	1	Yes	Boys	9:30AM	Gemma
New	Delta	3	Pre	Male	2	Male	Yes	Boys	9:30AM	Gemma
New	Delta	3	Pre	Male	3	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	3	Pre	Male	4	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	3	Pre	Male	5	No	Yes	Boys	9:30AM	Gemma
New	Delta	3	Pre	Male	6	No	Yes	Boys	9:30AM	Gemma
New	Delta	3	Pre	Male	7	No	Yes	Boys	9:30AM	Gemma
New	Delta	3	Pre	Male	8		Yes	Boys	9:30AM	Gemma
New	Delta	3	Pre	Male	9	2	Yes	Boys	9:30AM	Gemma
New	Delta	3	Pre	Male	10	3	Yes	Boys	9:30AM	Gemma
New	Delta	3	Pre	Male	11	3	Yes	Boys	9:30AM	Gemma
New	Delta	4	Pre	Male	2	Male	Yes	Boys	9:30AM	Gemma
New	Delta	4	Pre	Male	3	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	4	Pre	Male	4	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	4	Pre	Male	5	No	Yes	Boys	9:30AM	Gemma
New	Delta	4	Pre	Male	6	No	Yes	Boys	9:30AM	Gemma
New	Delta	4	Pre	Male	7	No	Yes	Boys	9:30AM	Gemma
New	Delta	4	Pre	Male	8		Yes	Boys	9:30AM	Gemma
New	Delta	4	Pre	Male	9	3	Yes	Boys	9:30AM	Gemma
New	Delta	4	Pre	Male	10	2	Yes	Boys	9:30AM	Gemma
New	Delta	4	Pre	Male	11	2	Yes	Boys	9:30AM	Gemma
New	Delta	5	Pre	Male	2	Male	Yes	Boys	9:30AM	Gemma
New	Delta	5	Pre	Male	3	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	5	Pre	Male	4	No	Yes	Boys	9:30AM	Gemma
New	Delta	5	Pre	Male	5	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	5	Pre	Male	6	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	5	Pre	Male	7	No	Yes	Boys	9:30AM	Gemma
New	Delta	5	Pre	Male	8		Yes	Boys	9:30AM	Gemma
New	Delta	5	Pre	Male	9	2	Yes	Boys	9:30AM	Gemma
New	Delta	5	Pre	Male	10	1	Yes	Boys	9:30AM	Gemma
New	Delta	5	Pre	Male	11	1	Yes	Boys	9:30AM	Gemma
New	Delta	6	Pre	Male	2	Male	Yes	Boys	9:30AM	Gemma
New	Delta	6	Pre	Male	3	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	6	Pre	Male	4	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	6	Pre	Male	5	No	Yes	Boys	9:30AM	Gemma
New	Delta	6	Pre	Male	6	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	6	Pre	Male	7	No	Yes	Boys	9:30AM	Gemma
New	Delta	6	Pre	Male	8		Yes	Boys	9:30AM	Gemma
New	Delta	6	Pre	Male	9	4	Yes	Boys	9:30AM	Gemma
New	Delta	6	Pre	Male	10	3	Yes	Boys	9:30AM	Gemma
New	Delta	6	Pre	Male	11	2	Yes	Boys	9:30AM	Gemma
New	Delta	7	Pre	Male	2	Male	Yes	Boys	9:30AM	Gemma
New	Delta	7	Pre	Male	3	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	7	Pre	Male	4	No	Yes	Boys	9:30AM	Gemma
New	Delta	7	Pre	Male	5	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	7	Pre	Male	6	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	7	Pre	Male	7	No	Yes	Boys	9:30AM	Gemma
New	Delta	7	Pre	Male	8		Yes	Boys	9:30AM	Gemma
New	Delta	7	Pre	Male	9	1	Yes	Boys	9:30AM	Gemma
New	Delta	7	Pre	Male	10	1	Yes	Boys	9:30AM	Gemma
New	Delta	7	Pre	Male	11	1	Yes	Boys	9:30AM	Gemma
New	Delta	8	Pre	Male	2	Male	Yes	Boys	9:30AM	Gemma
New	Delta	8	Pre	Male	3	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	8	Pre	Male	4	No	Yes	Boys	9:30AM	Gemma
New	Delta	8	Pre	Male	5	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	8	Pre	Male	6	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	8	Pre	Male	7	No	Yes	Boys	9:30AM	Gemma
New	Delta	8	Pre	Male	8		Yes	Boys	9:30AM	Gemma
New	Delta	8	Pre	Male	9	3	Yes	Boys	9:30AM	Gemma
New	Delta	8	Pre	Male	10	3	Yes	Boys	9:30AM	Gemma
New	Delta	8	Pre	Male	11	2	Yes	Boys	9:30AM	Gemma
New	Delta	9	Pre	Male	2	Male	Yes	Boys	9:30AM	Gemma
New	Delta	9	Pre	Male	3	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	9	Pre	Male	4	No	Yes	Boys	9:30AM	Gemma
New	Delta	9	Pre	Male	5	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	9	Pre	Male	6	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	9	Pre	Male	7	No	Yes	Boys	9:30AM	Gemma
New	Delta	9	Pre	Male	8		Yes	Boys	9:30AM	Gemma
New	Delta	9	Pre	Male	9	3	Yes	Boys	9:30AM	Gemma
New	Delta	9	Pre	Male	10	3	Yes	Boys	9:30AM	Gemma
New	Delta	9	Pre	Male	11	2	Yes	Boys	9:30AM	Gemma
New	Delta	10	Pre	Male	2	Male	Yes	Boys	9:30AM	Gemma
New	Delta	10	Pre	Male	3	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	10	Pre	Male	4	No	Yes	Boys	9:30AM	Gemma

New	Delta	10	Pre	Male	5	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	10	Pre	Male	6	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	10	Pre	Male	7	No	Yes	Boys	9:30AM	Gemma
New	Delta	10	Pre	Male	8		Yes	Boys	9:30AM	Gemma
New	Delta	10	Pre	Male	9	3	Yes	Boys	9:30AM	Gemma
New	Delta	10	Pre	Male	10	2	Yes	Boys	9:30AM	Gemma
New	Delta	10	Pre	Male	11	1	Yes	Boys	9:30AM	Gemma
New	Delta	11	Pre	Male	2	Male	Yes	Boys	9:30AM	Gemma
New	Delta	11	Pre	Male	3	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	11	Pre	Male	4	No	Yes	Boys	9:30AM	Gemma
New	Delta	11	Pre	Male	5	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	11	Pre	Male	6	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	11	Pre	Male	7	No	Yes	Boys	9:30AM	Gemma
New	Delta	11	Pre	Male	8		Yes	Boys	9:30AM	Gemma
New	Delta	11	Pre	Male	9	4	Yes	Boys	9:30AM	Gemma
New	Delta	11	Pre	Male	10	2	Yes	Boys	9:30AM	Gemma
New	Delta	11	Pre	Male	11	2	Yes	Boys	9:30AM	Gemma
New	Delta	12	Pre	Male	2	Male	Yes	Boys	9:30AM	Gemma
New	Delta	12	Pre	Male	3	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	12	Pre	Male	4	No	Yes	Boys	9:30AM	Gemma
New	Delta	12	Pre	Male	5	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	12	Pre	Male	6	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	12	Pre	Male	7	No	Yes	Boys	9:30AM	Gemma
New	Delta	12	Pre	Male	8		Yes	Boys	9:30AM	Gemma
New	Delta	12	Pre	Male	9	3	Yes	Boys	9:30AM	Gemma
New	Delta	12	Pre	Male	10	2	Yes	Boys	9:30AM	Gemma
New	Delta	12	Pre	Male	11	3	Yes	Boys	9:30AM	Gemma
New	Delta	13	Pre	Male	2	Male	Yes	Boys	9:30AM	Gemma
New	Delta	13	Pre	Male	3	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	13	Pre	Male	4	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	13	Pre	Male	5	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	13	Pre	Male	6	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	13	Pre	Male	7	No	Yes	Boys	9:30AM	Gemma
New	Delta	13	Pre	Male	8		Yes	Boys	9:30AM	Gemma
New	Delta	13	Pre	Male	9	3	Yes	Boys	9:30AM	Gemma
New	Delta	13	Pre	Male	10	2	Yes	Boys	9:30AM	Gemma
New	Delta	13	Pre	Male	11	4	Yes	Boys	9:30AM	Gemma
New	Delta	14	Pre	Male	2	Male	Yes	Boys	9:30AM	Gemma
New	Delta	14	Pre	Male	3	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	14	Pre	Male	4	No	Yes	Boys	9:30AM	Gemma
New	Delta	14	Pre	Male	5	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	14	Pre	Male	6	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	14	Pre	Male	7	No	Yes	Boys	9:30AM	Gemma
New	Delta	14	Pre	Male	8		Yes	Boys	9:30AM	Gemma
New	Delta	14	Pre	Male	9	2	Yes	Boys	9:30AM	Gemma
New	Delta	14	Pre	Male	10	1	Yes	Boys	9:30AM	Gemma
New	Delta	14	Pre	Male	11	1	Yes	Boys	9:30AM	Gemma
New	Delta	15	Pre	Male	2	Male	Yes	Boys	9:30AM	Gemma
New	Delta	15	Pre	Male	3	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	15	Pre	Male	4	No	Yes	Boys	9:30AM	Gemma
New	Delta	15	Pre	Male	5	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	15	Pre	Male	6	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	15	Pre	Male	7	No	Yes	Boys	9:30AM	Gemma
New	Delta	15	Pre	Male	8		Yes	Boys	9:30AM	Gemma
New	Delta	15	Pre	Male	9	4	Yes	Boys	9:30AM	Gemma
New	Delta	15	Pre	Male	10	2	Yes	Boys	9:30AM	Gemma
New	Delta	15	Pre	Male	11	1	Yes	Boys	9:30AM	Gemma
New	Delta	16	Pre	Male	2	Male	Yes	Boys	9:30AM	Gemma
New	Delta	16	Pre	Male	3	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	16	Pre	Male	4	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	16	Pre	Male	5	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	16	Pre	Male	6	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	16	Pre	Male	7	No	Yes	Boys	9:30AM	Gemma
New	Delta	16	Pre	Male	8		Yes	Boys	9:30AM	Gemma
New	Delta	16	Pre	Male	9	3	Yes	Boys	9:30AM	Gemma
New	Delta	16	Pre	Male	10	2	Yes	Boys	9:30AM	Gemma
New	Delta	16	Pre	Male	11	2	Yes	Boys	9:30AM	Gemma
New	Delta	1	Post		2	2	Yes	Boys	9:30AM	Gemma
New	Delta	1	Post		3	4	Yes	Boys	9:30AM	Gemma
New	Delta	1	Post		4	3	Yes	Boys	9:30AM	Gemma
New	Delta	1	Post		5	4	Yes	Boys	9:30AM	Gemma
New	Delta	1	Post		6	3	Yes	Boys	9:30AM	Gemma
New	Delta	1	Post		7	4	Yes	Boys	9:30AM	Gemma
New	Delta	1	Post		8	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	1	Post		9	Crossman	Yes	Boys	9:30AM	Gemma
New	Delta	1	Post		10	Sight	Yes	Boys	9:30AM	Gemma
New	Delta	1	Post		11	No	Yes	Boys	9:30AM	Gemma
New	Delta	2	Post		2	1	Yes	Boys	9:30AM	Gemma
New	Delta	2	Post		3	1	Yes	Boys	9:30AM	Gemma
New	Delta	2	Post		4	1	Yes	Boys	9:30AM	Gemma
New	Delta	2	Post		5	1	Yes	Boys	9:30AM	Gemma
New	Delta	2	Post		6	5	Yes	Boys	9:30AM	Gemma
New	Delta	2	Post		7	1	Yes	Boys	9:30AM	Gemma
New	Delta	2	Post		8	No	Yes	Boys	9:30AM	Gemma
New	Delta	2	Post		9	Crossman	Yes	Boys	9:30AM	Gemma
New	Delta	2	Post		10	Sight	Yes	Boys	9:30AM	Gemma
New	Delta	2	Post		11	No	Yes	Boys	9:30AM	Gemma
New	Delta	3	Post		2	3	Yes	Boys	9:30AM	Gemma
New	Delta	3	Post		3	3	Yes	Boys	9:30AM	Gemma
New	Delta	3	Post		4	3	Yes	Boys	9:30AM	Gemma
New	Delta	3	Post		5	3	Yes	Boys	9:30AM	Gemma
New	Delta	3	Post		6	5	Yes	Boys	9:30AM	Gemma
New	Delta	3	Post		7	4	Yes	Boys	9:30AM	Gemma
New	Delta	3	Post		8	Yes	Yes	Boys	9:30AM	Gemma

New	Delta	3	Post		9	Crossman	Yes	Boys	9:30AM	Gemma
New	Delta	3	Post		10	Sight	Yes	Boys	9:30AM	Gemma
New	Delta	3	Post		11	No	Yes	Boys	9:30AM	Gemma
New	Delta	4	Post		2	3	Yes	Boys	9:30AM	Gemma
New	Delta	4	Post		3	4	Yes	Boys	9:30AM	Gemma
New	Delta	4	Post		4	3	Yes	Boys	9:30AM	Gemma
New	Delta	4	Post		5	4	Yes	Boys	9:30AM	Gemma
New	Delta	4	Post		6	5	Yes	Boys	9:30AM	Gemma
New	Delta	4	Post		7	5	Yes	Boys	9:30AM	Gemma
New	Delta	4	Post		8	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	4	Post		9	Crossman	Yes	Boys	9:30AM	Gemma
New	Delta	4	Post		10	Sight	Yes	Boys	9:30AM	Gemma
New	Delta	4	Post		11	No	Yes	Boys	9:30AM	Gemma
New	Delta	5	Post		2	4	Yes	Boys	9:30AM	Gemma
New	Delta	5	Post		3	3	Yes	Boys	9:30AM	Gemma
New	Delta	5	Post		4	4	Yes	Boys	9:30AM	Gemma
New	Delta	5	Post		5	5	Yes	Boys	9:30AM	Gemma
New	Delta	5	Post		6	4	Yes	Boys	9:30AM	Gemma
New	Delta	5	Post		7	4	Yes	Boys	9:30AM	Gemma
New	Delta	5	Post		8	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	5	Post		9	Crossman	Yes	Boys	9:30AM	Gemma
New	Delta	5	Post		10	Sight	Yes	Boys	9:30AM	Gemma
New	Delta	5	Post		11	No	Yes	Boys	9:30AM	Gemma
New	Delta	6	Post		2	4	Yes	Boys	9:30AM	Gemma
New	Delta	6	Post		3	3	Yes	Boys	9:30AM	Gemma
New	Delta	6	Post		4	3	Yes	Boys	9:30AM	Gemma
New	Delta	6	Post		5	4	Yes	Boys	9:30AM	Gemma
New	Delta	6	Post		6	4	Yes	Boys	9:30AM	Gemma
New	Delta	6	Post		7	3	Yes	Boys	9:30AM	Gemma
New	Delta	6	Post		8	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	6	Post		9	Crossman	Yes	Boys	9:30AM	Gemma
New	Delta	6	Post		10	Sight	Yes	Boys	9:30AM	Gemma
New	Delta	6	Post		11	No	Yes	Boys	9:30AM	Gemma
New	Delta	7	Post		2	1	Yes	Boys	9:30AM	Gemma
New	Delta	7	Post		3	1	Yes	Boys	9:30AM	Gemma
New	Delta	7	Post		4	1	Yes	Boys	9:30AM	Gemma
New	Delta	7	Post		5	3	Yes	Boys	9:30AM	Gemma
New	Delta	7	Post		6	4	Yes	Boys	9:30AM	Gemma
New	Delta	7	Post		7	3	Yes	Boys	9:30AM	Gemma
New	Delta	7	Post		8	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	7	Post		9	Crossman	Yes	Boys	9:30AM	Gemma
New	Delta	7	Post		10	Sight	Yes	Boys	9:30AM	Gemma
New	Delta	7	Post		11	No	Yes	Boys	9:30AM	Gemma
New	Delta	8	Post		2	3	Yes	Boys	9:30AM	Gemma
New	Delta	8	Post		3	3	Yes	Boys	9:30AM	Gemma
New	Delta	8	Post		4	3	Yes	Boys	9:30AM	Gemma
New	Delta	8	Post		5	3	Yes	Boys	9:30AM	Gemma
New	Delta	8	Post		6	3	Yes	Boys	9:30AM	Gemma
New	Delta	8	Post		7	3	Yes	Boys	9:30AM	Gemma
New	Delta	8	Post		8	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	8	Post		9	Crossman	Yes	Boys	9:30AM	Gemma
New	Delta	8	Post		10	Sight	Yes	Boys	9:30AM	Gemma
New	Delta	8	Post		11	No	Yes	Boys	9:30AM	Gemma
New	Delta	9	Post		2	3	Yes	Boys	9:30AM	Gemma
New	Delta	9	Post		3	3	Yes	Boys	9:30AM	Gemma
New	Delta	9	Post		4	3	Yes	Boys	9:30AM	Gemma
New	Delta	9	Post		5	3	Yes	Boys	9:30AM	Gemma
New	Delta	9	Post		6	3	Yes	Boys	9:30AM	Gemma
New	Delta	9	Post		7	2	Yes	Boys	9:30AM	Gemma
New	Delta	9	Post		8	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	9	Post		9	Crossman	Yes	Boys	9:30AM	Gemma
New	Delta	9	Post		10	Sight	Yes	Boys	9:30AM	Gemma
New	Delta	9	Post		11	No	Yes	Boys	9:30AM	Gemma
New	Delta	10	Post		2	4	Yes	Boys	9:30AM	Gemma
New	Delta	10	Post		3	3	Yes	Boys	9:30AM	Gemma
New	Delta	10	Post		4	5	Yes	Boys	9:30AM	Gemma
New	Delta	10	Post		5	5	Yes	Boys	9:30AM	Gemma
New	Delta	10	Post		6	5	Yes	Boys	9:30AM	Gemma
New	Delta	10	Post		7	4	Yes	Boys	9:30AM	Gemma
New	Delta	10	Post		8	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	10	Post		9	Crossman	Yes	Boys	9:30AM	Gemma
New	Delta	10	Post		10	Sight	Yes	Boys	9:30AM	Gemma
New	Delta	10	Post		11	No	Yes	Boys	9:30AM	Gemma
New	Delta	11	Post		2	4	Yes	Boys	9:30AM	Gemma
New	Delta	11	Post		3	3	Yes	Boys	9:30AM	Gemma
New	Delta	11	Post		4	5	Yes	Boys	9:30AM	Gemma
New	Delta	11	Post		5	3	Yes	Boys	9:30AM	Gemma
New	Delta	11	Post		6	5	Yes	Boys	9:30AM	Gemma
New	Delta	11	Post		7	4	Yes	Boys	9:30AM	Gemma
New	Delta	11	Post		8	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	11	Post		9	Crossman	Yes	Boys	9:30AM	Gemma
New	Delta	11	Post		10	Sight	Yes	Boys	9:30AM	Gemma
New	Delta	11	Post		11	No	Yes	Boys	9:30AM	Gemma
New	Delta	12	Post		2	3	Yes	Boys	9:30AM	Gemma
New	Delta	12	Post		3	3	Yes	Boys	9:30AM	Gemma
New	Delta	12	Post		4	5	Yes	Boys	9:30AM	Gemma
New	Delta	12	Post		5	3	Yes	Boys	9:30AM	Gemma
New	Delta	12	Post		6	5	Yes	Boys	9:30AM	Gemma
New	Delta	12	Post		7	4	Yes	Boys	9:30AM	Gemma
New	Delta	12	Post		8		Yes	Boys	9:30AM	Gemma
New	Delta	12	Post		9	Crossman	Yes	Boys	9:30AM	Gemma
New	Delta	12	Post		10	Sight	Yes	Boys	9:30AM	Gemma
New	Delta	12	Post		11	No	Yes	Boys	9:30AM	Gemma
New	Delta	13	Post		2	3	Yes	Boys	9:30AM	Gemma

New	Delta	13	Post		3	2	Yes	Boys	9:30AM	Gemma
New	Delta	13	Post		4	4	Yes	Boys	9:30AM	Gemma
New	Delta	13	Post		5	4	Yes	Boys	9:30AM	Gemma
New	Delta	13	Post		6	5	Yes	Boys	9:30AM	Gemma
New	Delta	13	Post		7	3	Yes	Boys	9:30AM	Gemma
New	Delta	13	Post		8	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	13	Post		9	Crossman	Yes	Boys	9:30AM	Gemma
New	Delta	13	Post		10	Sight	Yes	Boys	9:30AM	Gemma
New	Delta	13	Post		11	No	Yes	Boys	9:30AM	Gemma
New	Delta	14	Post		2	3	Yes	Boys	9:30AM	Gemma
New	Delta	14	Post		3	4	Yes	Boys	9:30AM	Gemma
New	Delta	14	Post		4	3	Yes	Boys	9:30AM	Gemma
New	Delta	14	Post		5	4	Yes	Boys	9:30AM	Gemma
New	Delta	14	Post		6	4	Yes	Boys	9:30AM	Gemma
New	Delta	14	Post		7	4	Yes	Boys	9:30AM	Gemma
New	Delta	14	Post		8	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	14	Post		9	Crossman	Yes	Boys	9:30AM	Gemma
New	Delta	14	Post		10	Both	Yes	Boys	9:30AM	Gemma
New	Delta	14	Post		11	No	Yes	Boys	9:30AM	Gemma
New	Delta	15	Post		2	4	Yes	Boys	9:30AM	Gemma
New	Delta	15	Post		3	3	Yes	Boys	9:30AM	Gemma
New	Delta	15	Post		4	5	Yes	Boys	9:30AM	Gemma
New	Delta	15	Post		5	5	Yes	Boys	9:30AM	Gemma
New	Delta	15	Post		6	5	Yes	Boys	9:30AM	Gemma
New	Delta	15	Post		7	4	Yes	Boys	9:30AM	Gemma
New	Delta	15	Post		8	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	15	Post		9	Crossman	Yes	Boys	9:30AM	Gemma
New	Delta	15	Post		10	Sight	Yes	Boys	9:30AM	Gemma
New	Delta	15	Post		11	No	Yes	Boys	9:30AM	Gemma
New	Delta	16	Post		2	3	Yes	Boys	9:30AM	Gemma
New	Delta	16	Post		3	3	Yes	Boys	9:30AM	Gemma
New	Delta	16	Post		4	3	Yes	Boys	9:30AM	Gemma
New	Delta	16	Post		5	4	Yes	Boys	9:30AM	Gemma
New	Delta	16	Post		6	3	Yes	Boys	9:30AM	Gemma
New	Delta	16	Post		7	3	Yes	Boys	9:30AM	Gemma
New	Delta	16	Post		8	Yes	Yes	Boys	9:30AM	Gemma
New	Delta	16	Post		9	Crossman	Yes	Boys	9:30AM	Gemma
New	Delta	16	Post		10	Sight	Yes	Boys	9:30AM	Gemma
New	Delta	16	Post		11	No	Yes	Boys	9:30AM	Gemma
New	Epsilon	1	Pre	Male	2	Male	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	1	Pre	Male	3	Yes	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	1	Pre	Male	4	No	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	1	Pre	Male	5	Yes	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	1	Pre	Male	6	Yes	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	1	Pre	Male	7	No	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	1	Pre	Male	8		Yes	Mixed	9:00AM	Rosemary
New	Epsilon	1	Pre	Male	9	3	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	1	Pre	Male	10	4	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	1	Pre	Male	11	2	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	2	Pre	Male	2	Male	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	2	Pre	Male	3	Yes	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	2	Pre	Male	4	No	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	2	Pre	Male	5	Yes	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	2	Pre	Male	6	Yes	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	2	Pre	Male	7	Yes	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	2	Pre	Male	8		Yes	Mixed	9:00AM	Rosemary
New	Epsilon	2	Pre	Male	9	3	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	2	Pre	Male	10	2	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	2	Pre	Male	11	1	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	3	Pre	Female	2	Female	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	3	Pre	Female	3	Yes	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	3	Pre	Female	4	Yes	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	3	Pre	Female	5	Yes	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	3	Pre	Female	6	Yes	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	3	Pre	Female	7	Yes	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	3	Pre	Female	8		Yes	Mixed	9:00AM	Rosemary
New	Epsilon	3	Pre	Female	9	3	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	3	Pre	Female	10	3	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	3	Pre	Female	11	4	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	4	Pre	Male	2	Male	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	4	Pre	Male	3	No	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	4	Pre	Male	4	Yes	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	4	Pre	Male	5	Yes	Yes	Mixed	9:00AM	Rosemary
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New	Epsilon	4	Pre	Male	8		Yes	Mixed	9:00AM	Rosemary
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New	Epsilon	4	Pre	Male	10	2	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	4	Pre	Male	11	1	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	5	Pre	Male	2	Male	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	5	Pre	Male	3	No	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	5	Pre	Male	4	Yes	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	5	Pre	Male	5	Yes	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	5	Pre	Male	6	Yes	Yes	Mixed	9:00AM	Rosemary
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New	Epsilon	5	Pre	Male	8		Yes	Mixed	9:00AM	Rosemary
New	Epsilon	5	Pre	Male	9	3	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	5	Pre	Male	10	2	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	5	Pre	Male	11	1	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	6	Pre	Female	2	Female	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	6	Pre	Female	3	Yes	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	6	Pre	Female	4	No	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	6	Pre	Female	5	Yes	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	6	Pre	Female	6	Yes	Yes	Mixed	9:00AM	Rosemary

New	Epsilon	6	Pre	Female	7	No	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	6	Pre	Female	8		Yes	Mixed	9:00AM	Rosemary
New	Epsilon	6	Pre	Female	9	3	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	6	Pre	Female	10	4	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	6	Pre	Female	11	2	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	7	Pre	Male	2	Male	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	7	Pre	Male	3	Yes	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	7	Pre	Male	4	No	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	7	Pre	Male	5	Yes	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	7	Pre	Male	6	Yes	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	7	Pre	Male	7	Yes	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	7	Pre	Male	8		Yes	Mixed	9:00AM	Rosemary
New	Epsilon	7	Pre	Male	9	3	Yes	Mixed	9:00AM	Rosemary
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New	Epsilon	8	Pre	Male	11	2	Yes	Mixed	9:00AM	Rosemary
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New	Epsilon	9	Pre	Female	4	Yes	Yes	Mixed	9:00AM	Rosemary
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New	Epsilon	9	Pre	Female	6	Yes	Yes	Mixed	9:00AM	Rosemary
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New	Epsilon	9	Pre	Female	8		Yes	Mixed	9:00AM	Rosemary
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New	Epsilon	9	Pre	Female	11	1	Yes	Mixed	9:00AM	Rosemary
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New	Epsilon	10	Pre	Female	4	No	Yes	Mixed	9:00AM	Rosemary
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New	Epsilon	10	Pre	Female	6	Yes	Yes	Mixed	9:00AM	Rosemary
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New	Epsilon	10	Pre	Female	10	1	Yes	Mixed	9:00AM	Rosemary
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New	Epsilon	12	Pre	Female	5	Yes	Yes	Mixed	9:00AM	Rosemary
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New	Epsilon	12	Pre	Female	10	4	Yes	Mixed	9:00AM	Rosemary
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New	Epsilon	14	Pre	Male	6	Yes	Yes	Mixed	9:00AM	Rosemary
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New	Epsilon	14	Pre	Male	8		Yes	Mixed	9:00AM	Rosemary
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New	Epsilon	14	Pre	Male	11	3	Yes	Mixed	9:00AM	Rosemary
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New	Epsilon	15	Pre	Male	4	No	No	Mixed	9:00AM	Rosemary
New	Epsilon	15	Pre	Male	5	Yes	No	Mixed	9:00AM	Rosemary
New	Epsilon	15	Pre	Male	6	Yes	No	Mixed	9:00AM	Rosemary
New	Epsilon	15	Pre	Male	7	Yes	No	Mixed	9:00AM	Rosemary
New	Epsilon	15	Pre	Male	8		No	Mixed	9:00AM	Rosemary
New	Epsilon	15	Pre	Male	9	4	No	Mixed	9:00AM	Rosemary
New	Epsilon	15	Pre	Male	10	2	No	Mixed	9:00AM	Rosemary

New	Epsilon	15	Pre	Male	11	1	No	Mixed	9:00AM	Rosemary
New	Epsilon	16	Pre	Female	2	Female	No	Mixed	9:00AM	Rosemary
New	Epsilon	16	Pre	Female	3	Yes	No	Mixed	9:00AM	Rosemary
New	Epsilon	16	Pre	Female	4	Yes	No	Mixed	9:00AM	Rosemary
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New	Epsilon	16	Pre	Female	10	4	No	Mixed	9:00AM	Rosemary
New	Epsilon	16	Pre	Female	11	4	No	Mixed	9:00AM	Rosemary
New	Epsilon	17	Pre	Male	2	Male	No	Mixed	9:00AM	Rosemary
New	Epsilon	17	Pre	Male	3	Yes	No	Mixed	9:00AM	Rosemary
New	Epsilon	17	Pre	Male	4		No	Mixed	9:00AM	Rosemary
New	Epsilon	17	Pre	Male	5	Yes	No	Mixed	9:00AM	Rosemary
New	Epsilon	17	Pre	Male	6	Yes	No	Mixed	9:00AM	Rosemary
New	Epsilon	17	Pre	Male	7	Yes	No	Mixed	9:00AM	Rosemary
New	Epsilon	17	Pre	Male	8		No	Mixed	9:00AM	Rosemary
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New	Epsilon	1	Post		6	4	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	1	Post		7	3	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	1	Post		8	Yes	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	1	Post		9	Crossman	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	1	Post		10	Sight	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	1	Post		11	No	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	2	Post		2	3	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	2	Post		3	4	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	2	Post		4	3	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	2	Post		5	4	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	2	Post		6	3	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	2	Post		7	2	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	2	Post		8	Yes	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	2	Post		9	Crossman	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	2	Post		10	Sight	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	2	Post		11	No	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	3	Post		2	3	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	3	Post		3	3	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	3	Post		4	4	Yes	Mixed	9:00AM	Rosemary
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New	Epsilon	3	Post		6	4	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	3	Post		7	5	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	3	Post		8	Yes	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	3	Post		9	Crossman	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	3	Post		10	Both	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	3	Post		11	No	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	4	Post		2	3	Yes	Mixed	9:00AM	Rosemary
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New	Epsilon	4	Post		7	3	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	4	Post		8	Yes	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	4	Post		9	Crossman	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	4	Post		10	Sight	Yes	Mixed	9:00AM	Rosemary
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New	Epsilon	5	Post		7	4	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	5	Post		8	Yes	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	5	Post		9	Crossman	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	5	Post		10	Both	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	5	Post		11	No	Yes	Mixed	9:00AM	Rosemary
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New	Epsilon	6	Post		7	5	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	6	Post		8	Yes	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	6	Post		9	Crossman	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	6	Post		10	Sight	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	6	Post		11	No	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	7	Post		2	4	Yes	Mixed	9:00AM	Rosemary
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New	Epsilon	7	Post		4	4	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	7	Post		5	4	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	7	Post		6	3	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	7	Post		7	3	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	7	Post		8	Yes	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	7	Post		9	Crossman	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	7	Post		10	Sight	Yes	Mixed	9:00AM	Rosemary
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New	Epsilon	8	Post		2	3	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	8	Post		3	3	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	8	Post		4	4	Yes	Mixed	9:00AM	Rosemary

New	Epsilon	8	Post		5	4	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	8	Post		6	4	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	8	Post		7	4	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	8	Post		8	Yes	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	8	Post		9	Crossman	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	8	Post		10	Both	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	8	Post		11	No	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	9	Post		2	3	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	9	Post		3	3	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	9	Post		4	5	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	9	Post		5	4	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	9	Post		6	5	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	9	Post		7	4	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	9	Post		8	Yes	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	9	Post		9	Crossman	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	9	Post		10	Both	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	9	Post		11		Yes	Mixed	9:00AM	Rosemary
New	Epsilon	10	Post		2	2	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	10	Post		3	3	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	10	Post		4	3	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	10	Post		5	3	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	10	Post		6		Yes	Mixed	9:00AM	Rosemary
New	Epsilon	10	Post		7	3	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	10	Post		8	No	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	10	Post		9	Crossman	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	10	Post		10	Both	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	10	Post		11	No	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	11	Post		2	4	Yes	Mixed	9:00AM	Rosemary
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New	Epsilon	11	Post		9		Yes	Mixed	9:00AM	Rosemary
New	Epsilon	11	Post		10		Yes	Mixed	9:00AM	Rosemary
New	Epsilon	11	Post		11		Yes	Mixed	9:00AM	Rosemary
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New	Epsilon	12	Post		4	4	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	12	Post		5	5	Yes	Mixed	9:00AM	Rosemary
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New	Epsilon	12	Post		8	Yes	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	12	Post		9	Crossman	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	12	Post		10	Both	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	12	Post		11	No	Yes	Mixed	9:00AM	Rosemary
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New	Epsilon	13	Post		6	3	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	13	Post		7	3	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	13	Post		8	Yes	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	13	Post		9	Crossman	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	13	Post		10	Both	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	13	Post		11	No	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	14	Post		2	3	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	14	Post		3	4	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	14	Post		4	3	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	14	Post		5	3	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	14	Post		6	4	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	14	Post		7	3	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	14	Post		8	Yes	Yes	Mixed	9:00AM	Rosemary
New	Epsilon	14	Post		9		Yes	Mixed	9:00AM	Rosemary
New	Epsilon	14	Post		10		Yes	Mixed	9:00AM	Rosemary
New	Epsilon	14	Post		11		Yes	Mixed	9:00AM	Rosemary
New	Epsilon	18	Post		2	3	No	Mixed	9:00AM	Rosemary
New	Epsilon	18	Post		3	3	No	Mixed	9:00AM	Rosemary
New	Epsilon	18	Post		4	2	No	Mixed	9:00AM	Rosemary
New	Epsilon	18	Post		5	3	No	Mixed	9:00AM	Rosemary
New	Epsilon	18	Post		6	2	No	Mixed	9:00AM	Rosemary
New	Epsilon	18	Post		7	2	No	Mixed	9:00AM	Rosemary
New	Epsilon	18	Post		8	Yes	No	Mixed	9:00AM	Rosemary
New	Epsilon	18	Post		9		No	Mixed	9:00AM	Rosemary
New	Epsilon	18	Post		10		No	Mixed	9:00AM	Rosemary
New	Epsilon	18	Post		11		No	Mixed	9:00AM	Rosemary
New	Epsilon	19	Post		2	3	No	Mixed	9:00AM	Rosemary
New	Epsilon	19	Post		3	3	No	Mixed	9:00AM	Rosemary
New	Epsilon	19	Post		4	3	No	Mixed	9:00AM	Rosemary
New	Epsilon	19	Post		5	4	No	Mixed	9:00AM	Rosemary
New	Epsilon	19	Post		6	5	No	Mixed	9:00AM	Rosemary
New	Epsilon	19	Post		7	5	No	Mixed	9:00AM	Rosemary
New	Epsilon	19	Post		8	Yes	No	Mixed	9:00AM	Rosemary
New	Epsilon	19	Post		9	Crossman	No	Mixed	9:00AM	Rosemary
New	Epsilon	19	Post		10	Both	No	Mixed	9:00AM	Rosemary
New	Epsilon	19	Post		11	No	No	Mixed	9:00AM	Rosemary
New	Epsilon	20	Post		2	3	No	Mixed	9:00AM	Rosemary
New	Epsilon	20	Post		3	4	No	Mixed	9:00AM	Rosemary
New	Epsilon	20	Post		4	3	No	Mixed	9:00AM	Rosemary
New	Epsilon	20	Post		5	2	No	Mixed	9:00AM	Rosemary
New	Epsilon	20	Post		6	3	No	Mixed	9:00AM	Rosemary
New	Epsilon	20	Post		7	4	No	Mixed	9:00AM	Rosemary
New	Epsilon	20	Post		8	Yes	No	Mixed	9:00AM	Rosemary

New	Epsilon	20	Post		9	Crossman	No	Mixed	9:00AM	Rosemary
New	Epsilon	20	Post		10	Both	No	Mixed	9:00AM	Rosemary
New	Epsilon	20	Post		11	No	No	Mixed	9:00AM	Rosemary
New	Epsilon	21	Post		2	2	No	Mixed	9:00AM	Rosemary
New	Epsilon	21	Post		3	2	No	Mixed	9:00AM	Rosemary
New	Epsilon	21	Post		4	1	No	Mixed	9:00AM	Rosemary
New	Epsilon	21	Post		5	2	No	Mixed	9:00AM	Rosemary
New	Epsilon	21	Post		6	1	No	Mixed	9:00AM	Rosemary
New	Epsilon	21	Post		7	1	No	Mixed	9:00AM	Rosemary
New	Epsilon	21	Post		8	No	No	Mixed	9:00AM	Rosemary
New	Epsilon	21	Post		9		No	Mixed	9:00AM	Rosemary
New	Epsilon	21	Post		10		No	Mixed	9:00AM	Rosemary
New	Epsilon	21	Post		11	Yes	No	Mixed	9:00AM	Rosemary
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New	Zeta	1	Pre	Female	3	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	1	Pre	Female	4	No	Yes	Mixed	11:00AM	Rosemary
New	Zeta	1	Pre	Female	5	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	1	Pre	Female	6	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	1	Pre	Female	7	No	Yes	Mixed	11:00AM	Rosemary
New	Zeta	1	Pre	Female	8		Yes	Mixed	11:00AM	Rosemary
New	Zeta	1	Pre	Female	9	3	Yes	Mixed	11:00AM	Rosemary
New	Zeta	1	Pre	Female	10	2	Yes	Mixed	11:00AM	Rosemary
New	Zeta	1	Pre	Female	11	3	Yes	Mixed	11:00AM	Rosemary
New	Zeta	2	Pre	Female	2	Female	Yes	Mixed	11:00AM	Rosemary
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New	Zeta	2	Pre	Female	4	No	Yes	Mixed	11:00AM	Rosemary
New	Zeta	2	Pre	Female	5	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	2	Pre	Female	6	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	2	Pre	Female	7	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	2	Pre	Female	8		Yes	Mixed	11:00AM	Rosemary
New	Zeta	2	Pre	Female	9	3	Yes	Mixed	11:00AM	Rosemary
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New	Zeta	2	Pre	Female	11	1	Yes	Mixed	11:00AM	Rosemary
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New	Zeta	3	Pre	Female	5	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	3	Pre	Female	6	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	3	Pre	Female	7		Yes	Mixed	11:00AM	Rosemary
New	Zeta	3	Pre	Female	8		Yes	Mixed	11:00AM	Rosemary
New	Zeta	3	Pre	Female	9	3	Yes	Mixed	11:00AM	Rosemary
New	Zeta	3	Pre	Female	10	2	Yes	Mixed	11:00AM	Rosemary
New	Zeta	3	Pre	Female	11	2	Yes	Mixed	11:00AM	Rosemary
New	Zeta	4	Pre	Female	2	Female	Yes	Mixed	11:00AM	Rosemary
New	Zeta	4	Pre	Female	3	No	Yes	Mixed	11:00AM	Rosemary
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New	Zeta	4	Pre	Female	5	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	4	Pre	Female	6	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	4	Pre	Female	7	No	Yes	Mixed	11:00AM	Rosemary
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New	Zeta	4	Pre	Female	9	3	Yes	Mixed	11:00AM	Rosemary
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New	Zeta	4	Pre	Female	11	2	Yes	Mixed	11:00AM	Rosemary
New	Zeta	5	Pre	Male	2	Male	Yes	Mixed	11:00AM	Rosemary
New	Zeta	5	Pre	Male	3	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	5	Pre	Male	4	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	5	Pre	Male	5	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	5	Pre	Male	6	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	5	Pre	Male	7	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	5	Pre	Male	8		Yes	Mixed	11:00AM	Rosemary
New	Zeta	5	Pre	Male	9	3	Yes	Mixed	11:00AM	Rosemary
New	Zeta	5	Pre	Male	10	3	Yes	Mixed	11:00AM	Rosemary
New	Zeta	5	Pre	Male	11	2	Yes	Mixed	11:00AM	Rosemary
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New	Zeta	6	Pre	Female	3	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	6	Pre	Female	4	No	Yes	Mixed	11:00AM	Rosemary
New	Zeta	6	Pre	Female	5	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	6	Pre	Female	6	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	6	Pre	Female	7	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	6	Pre	Female	8		Yes	Mixed	11:00AM	Rosemary
New	Zeta	6	Pre	Female	9	3	Yes	Mixed	11:00AM	Rosemary
New	Zeta	6	Pre	Female	10	3.5	Yes	Mixed	11:00AM	Rosemary
New	Zeta	6	Pre	Female	11	1	Yes	Mixed	11:00AM	Rosemary
New	Zeta	7	Pre	Male	2	Male	Yes	Mixed	11:00AM	Rosemary
New	Zeta	7	Pre	Male	3	No	Yes	Mixed	11:00AM	Rosemary
New	Zeta	7	Pre	Male	4	No	Yes	Mixed	11:00AM	Rosemary
New	Zeta	7	Pre	Male	5	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	7	Pre	Male	6	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	7	Pre	Male	7	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	7	Pre	Male	8		Yes	Mixed	11:00AM	Rosemary
New	Zeta	7	Pre	Male	9	3	Yes	Mixed	11:00AM	Rosemary
New	Zeta	7	Pre	Male	10	3	Yes	Mixed	11:00AM	Rosemary
New	Zeta	7	Pre	Male	11	2	Yes	Mixed	11:00AM	Rosemary
New	Zeta	8	Pre	Male	2	Male	Yes	Mixed	11:00AM	Rosemary
New	Zeta	8	Pre	Male	3	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	8	Pre	Male	4	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	8	Pre	Male	5	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	8	Pre	Male	6	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	8	Pre	Male	7	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	8	Pre	Male	8		Yes	Mixed	11:00AM	Rosemary
New	Zeta	8	Pre	Male	9	4	Yes	Mixed	11:00AM	Rosemary
New	Zeta	8	Pre	Male	10	2	Yes	Mixed	11:00AM	Rosemary
New	Zeta	8	Pre	Male	11	1	Yes	Mixed	11:00AM	Rosemary
New	Zeta	9	Pre	Male	2	Male	Yes	Mixed	11:00AM	Rosemary

New	Zeta	9	Pre	Male	3	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	9	Pre	Male	4	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	9	Pre	Male	5	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	9	Pre	Male	6	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	9	Pre	Male	7	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	9	Pre	Male	8		Yes	Mixed	11:00AM	Rosemary
New	Zeta	9	Pre	Male	9	4	Yes	Mixed	11:00AM	Rosemary
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New	Zeta	10	Pre	Male	3	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	10	Pre	Male	4	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	10	Pre	Male	5	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	10	Pre	Male	6	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	10	Pre	Male	7	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	10	Pre	Male	8		Yes	Mixed	11:00AM	Rosemary
New	Zeta	10	Pre	Male	9	4	Yes	Mixed	11:00AM	Rosemary
New	Zeta	10	Pre	Male	10	4	Yes	Mixed	11:00AM	Rosemary
New	Zeta	10	Pre	Male	11	3	Yes	Mixed	11:00AM	Rosemary
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New	Zeta	11	Pre	Female	3	No	Yes	Mixed	11:00AM	Rosemary
New	Zeta	11	Pre	Female	4	No	Yes	Mixed	11:00AM	Rosemary
New	Zeta	11	Pre	Female	5	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	11	Pre	Female	6	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	11	Pre	Female	7	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	11	Pre	Female	8		Yes	Mixed	11:00AM	Rosemary
New	Zeta	11	Pre	Female	9	3	Yes	Mixed	11:00AM	Rosemary
New	Zeta	11	Pre	Female	10	3	Yes	Mixed	11:00AM	Rosemary
New	Zeta	11	Pre	Female	11	2	Yes	Mixed	11:00AM	Rosemary
New	Zeta	12	Pre	Female	2	m	Yes	Mixed	11:00AM	Rosemary
New	Zeta	12	Pre	Female	3	No	Yes	Mixed	11:00AM	Rosemary
New	Zeta	12	Pre	Female	4	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	12	Pre	Female	5	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	12	Pre	Female	6	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	12	Pre	Female	7	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	12	Pre	Female	8		Yes	Mixed	11:00AM	Rosemary
New	Zeta	12	Pre	Female	9	3	Yes	Mixed	11:00AM	Rosemary
New	Zeta	12	Pre	Female	10	2	Yes	Mixed	11:00AM	Rosemary
New	Zeta	12	Pre	Female	11	1	Yes	Mixed	11:00AM	Rosemary
New	Zeta	13	Pre	Female	2	Female	Yes	Mixed	11:00AM	Rosemary
New	Zeta	13	Pre	Female	3	No	Yes	Mixed	11:00AM	Rosemary
New	Zeta	13	Pre	Female	4	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	13	Pre	Female	5	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	13	Pre	Female	6	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	13	Pre	Female	7	No	Yes	Mixed	11:00AM	Rosemary
New	Zeta	13	Pre	Female	8		Yes	Mixed	11:00AM	Rosemary
New	Zeta	13	Pre	Female	9	3	Yes	Mixed	11:00AM	Rosemary
New	Zeta	13	Pre	Female	10	3	Yes	Mixed	11:00AM	Rosemary
New	Zeta	13	Pre	Female	11	1	Yes	Mixed	11:00AM	Rosemary
New	Zeta	14	Pre	Female	2	Female	Yes	Mixed	11:00AM	Rosemary
New	Zeta	14	Pre	Female	3	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	14	Pre	Female	4	No	Yes	Mixed	11:00AM	Rosemary
New	Zeta	14	Pre	Female	5	No	Yes	Mixed	11:00AM	Rosemary
New	Zeta	14	Pre	Female	6	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	14	Pre	Female	7	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	14	Pre	Female	8		Yes	Mixed	11:00AM	Rosemary
New	Zeta	14	Pre	Female	9	4	Yes	Mixed	11:00AM	Rosemary
New	Zeta	14	Pre	Female	10	3	Yes	Mixed	11:00AM	Rosemary
New	Zeta	14	Pre	Female	11	2	Yes	Mixed	11:00AM	Rosemary
New	Zeta	15	Pre	Female	2	m	Yes	Mixed	11:00AM	Rosemary
New	Zeta	15	Pre	Female	3	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	15	Pre	Female	4	No	Yes	Mixed	11:00AM	Rosemary
New	Zeta	15	Pre	Female	5	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	15	Pre	Female	6	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	15	Pre	Female	7	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	15	Pre	Female	8		Yes	Mixed	11:00AM	Rosemary
New	Zeta	15	Pre	Female	9	3	Yes	Mixed	11:00AM	Rosemary
New	Zeta	15	Pre	Female	10	4	Yes	Mixed	11:00AM	Rosemary
New	Zeta	15	Pre	Female	11	3	Yes	Mixed	11:00AM	Rosemary
New	Zeta	1	Post		2	3	Yes	Mixed	11:00AM	Rosemary
New	Zeta	1	Post		3	2	Yes	Mixed	11:00AM	Rosemary
New	Zeta	1	Post		4	3	Yes	Mixed	11:00AM	Rosemary
New	Zeta	1	Post		5	4	Yes	Mixed	11:00AM	Rosemary
New	Zeta	1	Post		6	3	Yes	Mixed	11:00AM	Rosemary
New	Zeta	1	Post		7	4	Yes	Mixed	11:00AM	Rosemary
New	Zeta	1	Post		8	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	1	Post		9	Georgiou	Yes	Mixed	11:00AM	Rosemary
New	Zeta	1	Post		10	Both	Yes	Mixed	11:00AM	Rosemary
New	Zeta	1	Post		11	No	Yes	Mixed	11:00AM	Rosemary
New	Zeta	2	Post		2	2	Yes	Mixed	11:00AM	Rosemary
New	Zeta	2	Post		3	2	Yes	Mixed	11:00AM	Rosemary
New	Zeta	2	Post		4	1	Yes	Mixed	11:00AM	Rosemary
New	Zeta	2	Post		5	2	Yes	Mixed	11:00AM	Rosemary
New	Zeta	2	Post		6	1	Yes	Mixed	11:00AM	Rosemary
New	Zeta	2	Post		7	1	Yes	Mixed	11:00AM	Rosemary
New	Zeta	2	Post		8	No	Yes	Mixed	11:00AM	Rosemary
New	Zeta	2	Post		9	Zammitt	Yes	Mixed	11:00AM	Rosemary
New	Zeta	2	Post		10	Both	Yes	Mixed	11:00AM	Rosemary
New	Zeta	2	Post		11		Yes	Mixed	11:00AM	Rosemary
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New	Zeta	3	Post		3	2	Yes	Mixed	11:00AM	Rosemary
New	Zeta	3	Post		4	2	Yes	Mixed	11:00AM	Rosemary
New	Zeta	3	Post		5	2	Yes	Mixed	11:00AM	Rosemary
New	Zeta	3	Post		6	4	Yes	Mixed	11:00AM	Rosemary

New	Zeta	3	Post		7	5	Yes	Mixed	11:00AM	Rosemary
New	Zeta	3	Post		8	No	Yes	Mixed	11:00AM	Rosemary
New	Zeta	3	Post		9	Crossman	Yes	Mixed	11:00AM	Rosemary
New	Zeta	3	Post		10	Both	Yes	Mixed	11:00AM	Rosemary
New	Zeta	3	Post		11	No	Yes	Mixed	11:00AM	Rosemary
New	Zeta	4	Post		2	3	Yes	Mixed	11:00AM	Rosemary
New	Zeta	4	Post		3	3	Yes	Mixed	11:00AM	Rosemary
New	Zeta	4	Post		4	1	Yes	Mixed	11:00AM	Rosemary
New	Zeta	4	Post		5	4	Yes	Mixed	11:00AM	Rosemary
New	Zeta	4	Post		6	1	Yes	Mixed	11:00AM	Rosemary
New	Zeta	4	Post		7	1	Yes	Mixed	11:00AM	Rosemary
New	Zeta	4	Post		8	No	Yes	Mixed	11:00AM	Rosemary
New	Zeta	4	Post		9		Yes	Mixed	11:00AM	Rosemary
New	Zeta	4	Post		10		Yes	Mixed	11:00AM	Rosemary
New	Zeta	4	Post		11		Yes	Mixed	11:00AM	Rosemary
New	Zeta	5	Post		2	3	Yes	Mixed	11:00AM	Rosemary
New	Zeta	5	Post		3	3	Yes	Mixed	11:00AM	Rosemary
New	Zeta	5	Post		4	2	Yes	Mixed	11:00AM	Rosemary
New	Zeta	5	Post		5	4	Yes	Mixed	11:00AM	Rosemary
New	Zeta	5	Post		6	2	Yes	Mixed	11:00AM	Rosemary
New	Zeta	5	Post		7	2	Yes	Mixed	11:00AM	Rosemary
New	Zeta	5	Post		8	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	5	Post		9	Crossman	Yes	Mixed	11:00AM	Rosemary
New	Zeta	5	Post		10		Yes	Mixed	11:00AM	Rosemary
New	Zeta	5	Post		11	No	Yes	Mixed	11:00AM	Rosemary
New	Zeta	6	Post		2	3	Yes	Mixed	11:00AM	Rosemary
New	Zeta	6	Post		3	4	Yes	Mixed	11:00AM	Rosemary
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New	Zeta	6	Post		5	4	Yes	Mixed	11:00AM	Rosemary
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New	Zeta	6	Post		7	3	Yes	Mixed	11:00AM	Rosemary
New	Zeta	6	Post		8	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	6	Post		9	Crossman	Yes	Mixed	11:00AM	Rosemary
New	Zeta	6	Post		10	Both	Yes	Mixed	11:00AM	Rosemary
New	Zeta	6	Post		11	No	Yes	Mixed	11:00AM	Rosemary
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New	Zeta	7	Post		3	4	Yes	Mixed	11:00AM	Rosemary
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New	Zeta	7	Post		6	4	Yes	Mixed	11:00AM	Rosemary
New	Zeta	7	Post		7	4	Yes	Mixed	11:00AM	Rosemary
New	Zeta	7	Post		8	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	7	Post		9	Crossman	Yes	Mixed	11:00AM	Rosemary
New	Zeta	7	Post		10	Sight	Yes	Mixed	11:00AM	Rosemary
New	Zeta	7	Post		11	No	Yes	Mixed	11:00AM	Rosemary
New	Zeta	8	Post		2	5	Yes	Mixed	11:00AM	Rosemary
New	Zeta	8	Post		3	5	Yes	Mixed	11:00AM	Rosemary
New	Zeta	8	Post		4	5	Yes	Mixed	11:00AM	Rosemary
New	Zeta	8	Post		5	5	Yes	Mixed	11:00AM	Rosemary
New	Zeta	8	Post		6	1	Yes	Mixed	11:00AM	Rosemary
New	Zeta	8	Post		7	5	Yes	Mixed	11:00AM	Rosemary
New	Zeta	8	Post		8	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	8	Post		9	Crossman	Yes	Mixed	11:00AM	Rosemary
New	Zeta	8	Post		10	Both	Yes	Mixed	11:00AM	Rosemary
New	Zeta	8	Post		11	No	Yes	Mixed	11:00AM	Rosemary
New	Zeta	9	Post		2	4	Yes	Mixed	11:00AM	Rosemary
New	Zeta	9	Post		3	4	Yes	Mixed	11:00AM	Rosemary
New	Zeta	9	Post		4	3	Yes	Mixed	11:00AM	Rosemary
New	Zeta	9	Post		5	4	Yes	Mixed	11:00AM	Rosemary
New	Zeta	9	Post		6	3	Yes	Mixed	11:00AM	Rosemary
New	Zeta	9	Post		7	2	Yes	Mixed	11:00AM	Rosemary
New	Zeta	9	Post		8	Yes	Yes	Mixed	11:00AM	Rosemary
New	Zeta	9	Post		9	Crossman	Yes	Mixed	11:00AM	Rosemary
New	Zeta	9	Post		10	Both	Yes	Mixed	11:00AM	Rosemary
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New	Zeta	12	Post		8	Yes	Yes	Mixed	11:00AM	Rosemary
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New	Zeta	12	Post		11		Yes	Mixed	11:00AM	Rosemary
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New	Eta	7	Pre	Male	2	Male	Yes	Mixed	1:30PM	Rosemary
New	Eta	7	Pre	Male	3	Yes	Yes	Mixed	1:30PM	Rosemary
New	Eta	7	Pre	Male	4	No	Yes	Mixed	1:30PM	Rosemary

New	Eta	7	Pre	Male	5	Yes	Yes	Mixed	1:30PM	Rosemary
New	Eta	7	Pre	Male	6	Yes	Yes	Mixed	1:30PM	Rosemary
New	Eta	7	Pre	Male	7	No	Yes	Mixed	1:30PM	Rosemary
New	Eta	7	Pre	Male	8		Yes	Mixed	1:30PM	Rosemary
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New	Eta	1	Post		9	Crossman	Yes	Mixed	1:30PM	Rosemary
New	Eta	1	Post		10	Sight	Yes	Mixed	1:30PM	Rosemary
New	Eta	1	Post		11	No	Yes	Mixed	1:30PM	Rosemary
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New	Eta	3	Post		6	2	Yes	Mixed	1:30PM	Rosemary
New	Eta	3	Post		7	2	Yes	Mixed	1:30PM	Rosemary
New	Eta	3	Post		8	No	Yes	Mixed	1:30PM	Rosemary

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New	Eta	3	Post		11		Yes	Mixed	1:30PM	Rosemary
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New	Eta	5	Post		9	Crossman	Yes	Mixed	1:30PM	Rosemary
New	Eta	5	Post		10	Sight	Yes	Mixed	1:30PM	Rosemary
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New	Eta	6	Post		9	Crossman	Yes	Mixed	1:30PM	Rosemary
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New	Eta	7	Post		9	Crossman	Yes	Mixed	1:30PM	Rosemary
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New	Eta	8	Post		9	Crossman	Yes	Mixed	1:30PM	Rosemary
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New	Eta	9	Post		11		Yes	Mixed	1:30PM	Rosemary
New	Eta	10	Post		2	3	Yes	Mixed	1:30PM	Rosemary
New	Eta	10	Post		3	4	Yes	Mixed	1:30PM	Rosemary
New	Eta	10	Post		4	4	Yes	Mixed	1:30PM	Rosemary
New	Eta	10	Post		5	4	Yes	Mixed	1:30PM	Rosemary
New	Eta	10	Post		6	4	Yes	Mixed	1:30PM	Rosemary
New	Eta	10	Post		7	3	Yes	Mixed	1:30PM	Rosemary
New	Eta	10	Post		8		Yes	Mixed	1:30PM	Rosemary
New	Eta	10	Post		9	Crossman	Yes	Mixed	1:30PM	Rosemary
New	Eta	10	Post		10	Both	Yes	Mixed	1:30PM	Rosemary
New	Eta	10	Post		11	No	Yes	Mixed	1:30PM	Rosemary
New	Eta	11	Post		2	3	Yes	Mixed	1:30PM	Rosemary
New	Eta	11	Post		3	2	Yes	Mixed	1:30PM	Rosemary
New	Eta	11	Post		4	3	Yes	Mixed	1:30PM	Rosemary
New	Eta	11	Post		5	4	Yes	Mixed	1:30PM	Rosemary
New	Eta	11	Post		6	2	Yes	Mixed	1:30PM	Rosemary
New	Eta	11	Post		7	4	Yes	Mixed	1:30PM	Rosemary
New	Eta	11	Post		8	Yes	Yes	Mixed	1:30PM	Rosemary
New	Eta	11	Post		9	Crossman	Yes	Mixed	1:30PM	Rosemary
New	Eta	11	Post		10	Sight	Yes	Mixed	1:30PM	Rosemary
New	Eta	11	Post		11	No	Yes	Mixed	1:30PM	Rosemary
New	Eta	12	Post		2	3	Yes	Mixed	1:30PM	Rosemary
New	Eta	12	Post		3	3	Yes	Mixed	1:30PM	Rosemary
New	Eta	12	Post		4	2	Yes	Mixed	1:30PM	Rosemary
New	Eta	12	Post		5	3	Yes	Mixed	1:30PM	Rosemary
New	Eta	12	Post		6	2	Yes	Mixed	1:30PM	Rosemary
New	Eta	12	Post		7	2	Yes	Mixed	1:30PM	Rosemary
New	Eta	12	Post		8	No	Yes	Mixed	1:30PM	Rosemary
New	Eta	12	Post		9	Crossman	Yes	Mixed	1:30PM	Rosemary
New	Eta	12	Post		10	Touch	Yes	Mixed	1:30PM	Rosemary
New	Eta	12	Post		11	Yes	Yes	Mixed	1:30PM	Rosemary
New	Eta	13	Post		2	3.5	Yes	Mixed	1:30PM	Rosemary

New	Eta	13	Post		3	3.5	Yes	Mixed	1:30PM	Rosemary
New	Eta	13	Post		4	3	Yes	Mixed	1:30PM	Rosemary
New	Eta	13	Post		5	4	Yes	Mixed	1:30PM	Rosemary
New	Eta	13	Post		6	3	Yes	Mixed	1:30PM	Rosemary
New	Eta	13	Post		7	4	Yes	Mixed	1:30PM	Rosemary
New	Eta	13	Post		8	Yes	Yes	Mixed	1:30PM	Rosemary
New	Eta	13	Post		9	Crossman	Yes	Mixed	1:30PM	Rosemary
New	Eta	13	Post		10	Both	Yes	Mixed	1:30PM	Rosemary
New	Eta	13	Post		11		Yes	Mixed	1:30PM	Rosemary
New	Beta	1	Post		2	4	No	Boys	11:30AM	Cathleena
New	Beta	1	Post		3	3	No	Boys	11:30AM	Cathleena
New	Beta	1	Post		4	3	No	Boys	11:30AM	Cathleena
New	Beta	1	Post		12	2	No	Boys	11:30AM	Cathleena
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New	Beta	1	Post		5	4	No	Boys	11:30AM	Cathleena
New	Beta	1	Post		6	5	No	Boys	11:30AM	Cathleena
New	Beta	1	Post		15	4	No	Boys	11:30AM	Cathleena
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New	Beta	1	Post		7	3	No	Boys	11:30AM	Cathleena
New	Beta	1	Post		16	4	No	Boys	11:30AM	Cathleena
New	Beta	1	Post		17	5	No	Boys	11:30AM	Cathleena
New	Beta	1	Post		8	Yes	No	Boys	11:30AM	Cathleena
New	Beta	1	Post		9		No	Boys	11:30AM	Cathleena
New	Beta	1	Post		10	Sight	No	Boys	11:30AM	Cathleena
New	Beta	2	Post		2	4	No	Boys	11:30AM	Cathleena
New	Beta	2	Post		3	3	No	Boys	11:30AM	Cathleena
New	Beta	2	Post		4	4	No	Boys	11:30AM	Cathleena
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New	Beta	2	Post		13	4	No	Boys	11:30AM	Cathleena
New	Beta	2	Post		5	5	No	Boys	11:30AM	Cathleena
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New	Beta	2	Post		14	3	No	Boys	11:30AM	Cathleena
New	Beta	2	Post		7	4	No	Boys	11:30AM	Cathleena
New	Beta	2	Post		16	2	No	Boys	11:30AM	Cathleena
New	Beta	2	Post		17	5	No	Boys	11:30AM	Cathleena
New	Beta	2	Post		8	Yes	No	Boys	11:30AM	Cathleena
New	Beta	2	Post		9	Crossman	No	Boys	11:30AM	Cathleena
New	Beta	2	Post		10	Sight	No	Boys	11:30AM	Cathleena
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New	Beta	3	Post		8	Yes	No	Boys	11:30AM	Cathleena
New	Beta	3	Post		9	Crossman	No	Boys	11:30AM	Cathleena
New	Beta	3	Post		10	Sight	No	Boys	11:30AM	Cathleena
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New	Beta	4	Post		8	Yes	No	Boys	11:30AM	Cathleena
New	Beta	4	Post		9	Crossman	No	Boys	11:30AM	Cathleena
New	Beta	4	Post		10	Sight	No	Boys	11:30AM	Cathleena
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New	Beta	5	Post		16	3	No	Boys	11:30AM	Cathleena
New	Beta	5	Post		17	5	No	Boys	11:30AM	Cathleena
New	Beta	5	Post		8	Yes	No	Boys	11:30AM	Cathleena
New	Beta	5	Post		9	Crossman	No	Boys	11:30AM	Cathleena
New	Beta	5	Post		10		No	Boys	11:30AM	Cathleena
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New	Beta	6	Post		15	5	No	Boys	11:30AM	Cathleena
New	Beta	6	Post		14	5	No	Boys	11:30AM	Cathleena
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New	Beta	6	Post		16	5	No	Boys	11:30AM	Cathleena
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New	Beta	6	Post		8	Yes	No	Boys	11:30AM	Cathleena
New	Beta	6	Post		9	Crossman	No	Boys	11:30AM	Cathleena
New	Beta	6	Post		10	Sight	No	Boys	11:30AM	Cathleena
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New	Beta	8	Post		8	Yes	No	Boys	11:30AM	Cathleena
New	Beta	8	Post		9	Crossman	No	Boys	11:30AM	Cathleena
New	Beta	8	Post		10	Both	No	Boys	11:30AM	Cathleena
New	Beta	9	Post		2	4	No	Boys	11:30AM	Cathleena
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New	Beta	9	Post		8	Yes	No	Boys	11:30AM	Cathleena
New	Beta	9	Post		9	Crossman	No	Boys	11:30AM	Cathleena
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New	Beta	10	Post		17	3	No	Boys	11:30AM	Cathleena
New	Beta	10	Post		8	Yes	No	Boys	11:30AM	Cathleena
New	Beta	10	Post		9	Crossman	No	Boys	11:30AM	Cathleena
New	Beta	10	Post		10	Sight	No	Boys	11:30AM	Cathleena
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New	Beta	12	Post		17	5	No	Boys	11:30AM	Cathleena
New	Beta	12	Post		8	Yes	No	Boys	11:30AM	Cathleena
New	Beta	12	Post		9	Crossman	No	Boys	11:30AM	Cathleena

New	Beta	12	Post		10	Sight	No	Boys	11:30AM	Cathleena
New	Beta	13	Post		2	4	No	Boys	11:30AM	Cathleena
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New	Beta	14	Post		9	Crossman	No	Boys	11:30AM	Cathleena
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New	Beta	15	Post		8		No	Boys	11:30AM	Cathleena
New	Beta	15	Post		9	Crossman	No	Boys	11:30AM	Cathleena
New	Beta	15	Post		10	Both	No	Boys	11:30AM	Cathleena
New	Beta	16	Post		2	4	No	Boys	11:30AM	Cathleena
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New	Beta	16	Post		17	4	No	Boys	11:30AM	Cathleena
New	Beta	16	Post		8	Yes	No	Boys	11:30AM	Cathleena
New	Beta	16	Post		9	Crossman	No	Boys	11:30AM	Cathleena
New	Beta	16	Post		10	Both	No	Boys	11:30AM	Cathleena
New	Beta	17	Post		2	3	No	Boys	11:30AM	Cathleena
New	Beta	17	Post		3	4	No	Boys	11:30AM	Cathleena
New	Beta	17	Post		4	3	No	Boys	11:30AM	Cathleena
New	Beta	17	Post		12	2	No	Boys	11:30AM	Cathleena
New	Beta	17	Post		13	4	No	Boys	11:30AM	Cathleena
New	Beta	17	Post		5	4	No	Boys	11:30AM	Cathleena
New	Beta	17	Post		6	4	No	Boys	11:30AM	Cathleena
New	Beta	17	Post		15	2	No	Boys	11:30AM	Cathleena
New	Beta	17	Post		14	4	No	Boys	11:30AM	Cathleena
New	Beta	17	Post		7	4	No	Boys	11:30AM	Cathleena
New	Beta	17	Post		16	3	No	Boys	11:30AM	Cathleena
New	Beta	17	Post		17	4	No	Boys	11:30AM	Cathleena
New	Beta	17	Post		8	Yes	No	Boys	11:30AM	Cathleena
New	Beta	17	Post		9	Crossman	No	Boys	11:30AM	Cathleena
New	Beta	17	Post		10	Both	No	Boys	11:30AM	Cathleena
New	Beta	18	Post		2	3	No	Boys	11:30AM	Cathleena
New	Beta	18	Post		3	3	No	Boys	11:30AM	Cathleena
New	Beta	18	Post		4	2	No	Boys	11:30AM	Cathleena
New	Beta	18	Post		12	3	No	Boys	11:30AM	Cathleena
New	Beta	18	Post		13	3	No	Boys	11:30AM	Cathleena
New	Beta	18	Post		5	4	No	Boys	11:30AM	Cathleena
New	Beta	18	Post		6	3	No	Boys	11:30AM	Cathleena
New	Beta	18	Post		15	4	No	Boys	11:30AM	Cathleena
New	Beta	18	Post		14	4	No	Boys	11:30AM	Cathleena
New	Beta	18	Post		7	3	No	Boys	11:30AM	Cathleena
New	Beta	18	Post		16	3	No	Boys	11:30AM	Cathleena
New	Beta	18	Post		17	3	No	Boys	11:30AM	Cathleena
New	Beta	18	Post		8	Yes	No	Boys	11:30AM	Cathleena
New	Beta	18	Post		9	Crossman	No	Boys	11:30AM	Cathleena
New	Beta	18	Post		10	Sight	No	Boys	11:30AM	Cathleena
New	Beta	19	Post		2	3	No	Boys	11:30AM	Cathleena
New	Beta	19	Post		3	3	No	Boys	11:30AM	Cathleena
New	Beta	19	Post		4	2	No	Boys	11:30AM	Cathleena

New	Beta	19	Post		12		No	Boys	11:30AM	Cathleena
New	Beta	19	Post		13	3	No	Boys	11:30AM	Cathleena
New	Beta	19	Post		5	3	No	Boys	11:30AM	Cathleena
New	Beta	19	Post		6	3	No	Boys	11:30AM	Cathleena
New	Beta	19	Post		15	3	No	Boys	11:30AM	Cathleena
New	Beta	19	Post		14	3	No	Boys	11:30AM	Cathleena
New	Beta	19	Post		7	3	No	Boys	11:30AM	Cathleena
New	Beta	19	Post		16	3	No	Boys	11:30AM	Cathleena
New	Beta	19	Post		17	3	No	Boys	11:30AM	Cathleena
New	Beta	19	Post		8	Yes	No	Boys	11:30AM	Cathleena
New	Beta	19	Post		9	Crossman	No	Boys	11:30AM	Cathleena
New	Beta	19	Post		10	Sight	No	Boys	11:30AM	Cathleena
New	Gamma	1	Post		2	3	No	Boys	1:45PM	Cathleena
New	Gamma	1	Post		3	3	No	Boys	1:45PM	Cathleena
New	Gamma	1	Post		4	5	No	Boys	1:45PM	Cathleena
New	Gamma	1	Post		12	2	No	Boys	1:45PM	Cathleena
New	Gamma	1	Post		13	3	No	Boys	1:45PM	Cathleena
New	Gamma	1	Post		5	4	No	Boys	1:45PM	Cathleena
New	Gamma	1	Post		6	5	No	Boys	1:45PM	Cathleena
New	Gamma	1	Post		15	2	No	Boys	1:45PM	Cathleena
New	Gamma	1	Post		14	3	No	Boys	1:45PM	Cathleena
New	Gamma	1	Post		7	5	No	Boys	1:45PM	Cathleena
New	Gamma	1	Post		16	2	No	Boys	1:45PM	Cathleena
New	Gamma	1	Post		17	3	No	Boys	1:45PM	Cathleena
New	Gamma	1	Post		8	Yes	No	Boys	1:45PM	Cathleena
New	Gamma	1	Post		9	Crossman	No	Boys	1:45PM	Cathleena
New	Gamma	1	Post		10	Sight	No	Boys	1:45PM	Cathleena
New	Gamma	2	Post		2	3	No	Boys	1:45PM	Cathleena
New	Gamma	2	Post		3	3	No	Boys	1:45PM	Cathleena
New	Gamma	2	Post		4	2	No	Boys	1:45PM	Cathleena
New	Gamma	2	Post		12	1	No	Boys	1:45PM	Cathleena
New	Gamma	2	Post		13	2	No	Boys	1:45PM	Cathleena
New	Gamma	2	Post		5	2	No	Boys	1:45PM	Cathleena
New	Gamma	2	Post		6	5	No	Boys	1:45PM	Cathleena
New	Gamma	2	Post		15	2	No	Boys	1:45PM	Cathleena
New	Gamma	2	Post		14	5	No	Boys	1:45PM	Cathleena
New	Gamma	2	Post		7	5	No	Boys	1:45PM	Cathleena
New	Gamma	2	Post		16	3	No	Boys	1:45PM	Cathleena
New	Gamma	2	Post		17		No	Boys	1:45PM	Cathleena
New	Gamma	2	Post		8		No	Boys	1:45PM	Cathleena
New	Gamma	2	Post		9		No	Boys	1:45PM	Cathleena
New	Gamma	2	Post		10		No	Boys	1:45PM	Cathleena
New	Gamma	3	Post		2	4	No	Boys	1:45PM	Cathleena
New	Gamma	3	Post		3	3	No	Boys	1:45PM	Cathleena
New	Gamma	3	Post		4	4	No	Boys	1:45PM	Cathleena
New	Gamma	3	Post		12	4	No	Boys	1:45PM	Cathleena
New	Gamma	3	Post		13	4	No	Boys	1:45PM	Cathleena
New	Gamma	3	Post		5	4	No	Boys	1:45PM	Cathleena
New	Gamma	3	Post		6	4	No	Boys	1:45PM	Cathleena
New	Gamma	3	Post		15	3	No	Boys	1:45PM	Cathleena
New	Gamma	3	Post		14	3	No	Boys	1:45PM	Cathleena
New	Gamma	3	Post		7	3	No	Boys	1:45PM	Cathleena
New	Gamma	3	Post		16	3	No	Boys	1:45PM	Cathleena
New	Gamma	3	Post		17	3	No	Boys	1:45PM	Cathleena
New	Gamma	3	Post		8	Yes	No	Boys	1:45PM	Cathleena
New	Gamma	3	Post		9	Crossman	No	Boys	1:45PM	Cathleena
New	Gamma	3	Post		10		No	Boys	1:45PM	Cathleena
New	Gamma	4	Post		2	4	No	Boys	1:45PM	Cathleena
New	Gamma	4	Post		3	4	No	Boys	1:45PM	Cathleena
New	Gamma	4	Post		4	4	No	Boys	1:45PM	Cathleena
New	Gamma	4	Post		12	3	No	Boys	1:45PM	Cathleena
New	Gamma	4	Post		13	3	No	Boys	1:45PM	Cathleena
New	Gamma	4	Post		5	4	No	Boys	1:45PM	Cathleena
New	Gamma	4	Post		6	5	No	Boys	1:45PM	Cathleena
New	Gamma	4	Post		15	4	No	Boys	1:45PM	Cathleena
New	Gamma	4	Post		14	4	No	Boys	1:45PM	Cathleena
New	Gamma	4	Post		7	3	No	Boys	1:45PM	Cathleena
New	Gamma	4	Post		16	4	No	Boys	1:45PM	Cathleena
New	Gamma	4	Post		17	4	No	Boys	1:45PM	Cathleena
New	Gamma	4	Post		8	Yes	No	Boys	1:45PM	Cathleena
New	Gamma	4	Post		9	Crossman	No	Boys	1:45PM	Cathleena
New	Gamma	4	Post		10	Sight	No	Boys	1:45PM	Cathleena
New	Gamma	5	Post		2	3	No	Boys	1:45PM	Cathleena
New	Gamma	5	Post		3	3	No	Boys	1:45PM	Cathleena
New	Gamma	5	Post		4	5	No	Boys	1:45PM	Cathleena
New	Gamma	5	Post		12	3	No	Boys	1:45PM	Cathleena
New	Gamma	5	Post		13	4	No	Boys	1:45PM	Cathleena
New	Gamma	5	Post		5	4	No	Boys	1:45PM	Cathleena
New	Gamma	5	Post		6	3	No	Boys	1:45PM	Cathleena
New	Gamma	5	Post		15	5	No	Boys	1:45PM	Cathleena
New	Gamma	5	Post		14	4	No	Boys	1:45PM	Cathleena
New	Gamma	5	Post		7	3	No	Boys	1:45PM	Cathleena
New	Gamma	5	Post		16	5	No	Boys	1:45PM	Cathleena
New	Gamma	5	Post		17	4	No	Boys	1:45PM	Cathleena
New	Gamma	5	Post		8		No	Boys	1:45PM	Cathleena
New	Gamma	5	Post		9		No	Boys	1:45PM	Cathleena
New	Gamma	5	Post		10		No	Boys	1:45PM	Cathleena
New	Gamma	6	Post		2	4	No	Boys	1:45PM	Cathleena
New	Gamma	6	Post		3	3	No	Boys	1:45PM	Cathleena
New	Gamma	6	Post		4	3	No	Boys	1:45PM	Cathleena
New	Gamma	6	Post		12	3	No	Boys	1:45PM	Cathleena
New	Gamma	6	Post		13	3	No	Boys	1:45PM	Cathleena
New	Gamma	6	Post		5	3	No	Boys	1:45PM	Cathleena
New	Gamma	6	Post		6	4	No	Boys	1:45PM	Cathleena

New	Gamma	6	Post		15	3	No	Boys	1:45PM	Cathleena
New	Gamma	6	Post		14	4	No	Boys	1:45PM	Cathleena
New	Gamma	6	Post		7	2	No	Boys	1:45PM	Cathleena
New	Gamma	6	Post		16	3	No	Boys	1:45PM	Cathleena
New	Gamma	6	Post		17		No	Boys	1:45PM	Cathleena
New	Gamma	6	Post		8		No	Boys	1:45PM	Cathleena
New	Gamma	6	Post		9		No	Boys	1:45PM	Cathleena
New	Gamma	6	Post		10		No	Boys	1:45PM	Cathleena
New	Gamma	7	Post		2	3	No	Boys	1:45PM	Cathleena
New	Gamma	7	Post		3	5	No	Boys	1:45PM	Cathleena
New	Gamma	7	Post		4	5	No	Boys	1:45PM	Cathleena
New	Gamma	7	Post		12	4	No	Boys	1:45PM	Cathleena
New	Gamma	7	Post		13	5	No	Boys	1:45PM	Cathleena
New	Gamma	7	Post		5	5	No	Boys	1:45PM	Cathleena
New	Gamma	7	Post		6	5	No	Boys	1:45PM	Cathleena
New	Gamma	7	Post		15	4	No	Boys	1:45PM	Cathleena
New	Gamma	7	Post		14	5	No	Boys	1:45PM	Cathleena
New	Gamma	7	Post		7	5	No	Boys	1:45PM	Cathleena
New	Gamma	7	Post		16	3	No	Boys	1:45PM	Cathleena
New	Gamma	7	Post		17	5	No	Boys	1:45PM	Cathleena
New	Gamma	7	Post		8	Yes	No	Boys	1:45PM	Cathleena
New	Gamma	7	Post		9	Crossman	No	Boys	1:45PM	Cathleena
New	Gamma	7	Post		10	Both	No	Boys	1:45PM	Cathleena
New	Gamma	8	Post		2	4	No	Boys	1:45PM	Cathleena
New	Gamma	8	Post		3	4	No	Boys	1:45PM	Cathleena
New	Gamma	8	Post		4	5	No	Boys	1:45PM	Cathleena
New	Gamma	8	Post		12	4	No	Boys	1:45PM	Cathleena
New	Gamma	8	Post		13	3	No	Boys	1:45PM	Cathleena
New	Gamma	8	Post		5	5	No	Boys	1:45PM	Cathleena
New	Gamma	8	Post		6	4	No	Boys	1:45PM	Cathleena
New	Gamma	8	Post		15	3	No	Boys	1:45PM	Cathleena
New	Gamma	8	Post		14	4	No	Boys	1:45PM	Cathleena
New	Gamma	8	Post		7	3	No	Boys	1:45PM	Cathleena
New	Gamma	8	Post		16	2	No	Boys	1:45PM	Cathleena
New	Gamma	8	Post		17	4	No	Boys	1:45PM	Cathleena
New	Gamma	8	Post		8	Yes	No	Boys	1:45PM	Cathleena
New	Gamma	8	Post		9	Crossman	No	Boys	1:45PM	Cathleena
New	Gamma	8	Post		10	Sight	No	Boys	1:45PM	Cathleena
New	Gamma	9	Post		2	4	No	Boys	1:45PM	Cathleena
New	Gamma	9	Post		3	3	No	Boys	1:45PM	Cathleena
New	Gamma	9	Post		4	5	No	Boys	1:45PM	Cathleena
New	Gamma	9	Post		12	2	No	Boys	1:45PM	Cathleena
New	Gamma	9	Post		13	5	No	Boys	1:45PM	Cathleena
New	Gamma	9	Post		5	5	No	Boys	1:45PM	Cathleena
New	Gamma	9	Post		6	5	No	Boys	1:45PM	Cathleena
New	Gamma	9	Post		15	4	No	Boys	1:45PM	Cathleena
New	Gamma	9	Post		14	5	No	Boys	1:45PM	Cathleena
New	Gamma	9	Post		7	5	No	Boys	1:45PM	Cathleena
New	Gamma	9	Post		16	3	No	Boys	1:45PM	Cathleena
New	Gamma	9	Post		17	4	No	Boys	1:45PM	Cathleena
New	Gamma	9	Post		8	Yes	No	Boys	1:45PM	Cathleena
New	Gamma	9	Post		9	Crossman	No	Boys	1:45PM	Cathleena
New	Gamma	9	Post		10	Sight	No	Boys	1:45PM	Cathleena
New	Gamma	10	Post		2	5	No	Boys	1:45PM	Cathleena
New	Gamma	10	Post		3	3	No	Boys	1:45PM	Cathleena
New	Gamma	10	Post		4	3	No	Boys	1:45PM	Cathleena
New	Gamma	10	Post		12	2	No	Boys	1:45PM	Cathleena
New	Gamma	10	Post		13	5	No	Boys	1:45PM	Cathleena
New	Gamma	10	Post		5	5	No	Boys	1:45PM	Cathleena
New	Gamma	10	Post		6	5	No	Boys	1:45PM	Cathleena
New	Gamma	10	Post		15	3	No	Boys	1:45PM	Cathleena
New	Gamma	10	Post		14	5	No	Boys	1:45PM	Cathleena
New	Gamma	10	Post		7	3	No	Boys	1:45PM	Cathleena
New	Gamma	10	Post		16	1	No	Boys	1:45PM	Cathleena
New	Gamma	10	Post		17	5	No	Boys	1:45PM	Cathleena
New	Gamma	10	Post		8	Yes	No	Boys	1:45PM	Cathleena
New	Gamma	10	Post		9	Crossman	No	Boys	1:45PM	Cathleena
New	Gamma	10	Post		10	Both	No	Boys	1:45PM	Cathleena
New	Gamma	11	Post		2	4	No	Boys	1:45PM	Cathleena
New	Gamma	11	Post		3	4	No	Boys	1:45PM	Cathleena
New	Gamma	11	Post		4	4	No	Boys	1:45PM	Cathleena
New	Gamma	11	Post		12	3	No	Boys	1:45PM	Cathleena
New	Gamma	11	Post		13	5	No	Boys	1:45PM	Cathleena
New	Gamma	11	Post		5	4	No	Boys	1:45PM	Cathleena
New	Gamma	11	Post		6	4	No	Boys	1:45PM	Cathleena
New	Gamma	11	Post		15	4	No	Boys	1:45PM	Cathleena
New	Gamma	11	Post		14	4	No	Boys	1:45PM	Cathleena
New	Gamma	11	Post		7		No	Boys	1:45PM	Cathleena
New	Gamma	11	Post		16	4	No	Boys	1:45PM	Cathleena
New	Gamma	11	Post		17	4	No	Boys	1:45PM	Cathleena
New	Gamma	11	Post		8	Yes	No	Boys	1:45PM	Cathleena
New	Gamma	11	Post		9	Crossman	No	Boys	1:45PM	Cathleena
New	Gamma	11	Post		10	Sight	No	Boys	1:45PM	Cathleena
New	Gamma	12	Post		2	4	No	Boys	1:45PM	Cathleena
New	Gamma	12	Post		3	3	No	Boys	1:45PM	Cathleena
New	Gamma	12	Post		4	5	No	Boys	1:45PM	Cathleena
New	Gamma	12	Post		12	1	No	Boys	1:45PM	Cathleena
New	Gamma	12	Post		13	4	No	Boys	1:45PM	Cathleena
New	Gamma	12	Post		5	5	No	Boys	1:45PM	Cathleena
New	Gamma	12	Post		6	4	No	Boys	1:45PM	Cathleena
New	Gamma	12	Post		15		No	Boys	1:45PM	Cathleena
New	Gamma	12	Post		14	4	No	Boys	1:45PM	Cathleena
New	Gamma	12	Post		7	5	No	Boys	1:45PM	Cathleena
New	Gamma	12	Post		16		No	Boys	1:45PM	Cathleena

New	Gamma	12	Post		17	4	No	Boys	1:45PM	Cathleena
New	Gamma	12	Post		8	Yes	No	Boys	1:45PM	Cathleena
New	Gamma	12	Post		9	Crossman	No	Boys	1:45PM	Cathleena
New	Gamma	12	Post		10	Both	No	Boys	1:45PM	Cathleena
New	Gamma	13	Post		2	3	No	Boys	1:45PM	Cathleena
New	Gamma	13	Post		3	2	No	Boys	1:45PM	Cathleena
New	Gamma	13	Post		4	1	No	Boys	1:45PM	Cathleena
New	Gamma	13	Post		12	1	No	Boys	1:45PM	Cathleena
New	Gamma	13	Post		13	1	No	Boys	1:45PM	Cathleena
New	Gamma	13	Post		5	3	No	Boys	1:45PM	Cathleena
New	Gamma	13	Post		6	2	No	Boys	1:45PM	Cathleena
New	Gamma	13	Post		15		No	Boys	1:45PM	Cathleena
New	Gamma	13	Post		14	3	No	Boys	1:45PM	Cathleena
New	Gamma	13	Post		7		No	Boys	1:45PM	Cathleena
New	Gamma	13	Post		16		No	Boys	1:45PM	Cathleena
New	Gamma	13	Post		17	3	No	Boys	1:45PM	Cathleena
New	Gamma	13	Post		8	No	No	Boys	1:45PM	Cathleena
New	Gamma	13	Post		9	Smythe	No	Boys	1:45PM	Cathleena
New	Gamma	13	Post		10		No	Boys	1:45PM	Cathleena
New	Gamma	14	Post		2	5	No	Boys	1:45PM	Cathleena
New	Gamma	14	Post		3	4	No	Boys	1:45PM	Cathleena
New	Gamma	14	Post		4	3	No	Boys	1:45PM	Cathleena
New	Gamma	14	Post		12	3	No	Boys	1:45PM	Cathleena
New	Gamma	14	Post		13	4	No	Boys	1:45PM	Cathleena
New	Gamma	14	Post		5	5	No	Boys	1:45PM	Cathleena
New	Gamma	14	Post		6	3	No	Boys	1:45PM	Cathleena
New	Gamma	14	Post		15	3	No	Boys	1:45PM	Cathleena
New	Gamma	14	Post		14	5	No	Boys	1:45PM	Cathleena
New	Gamma	14	Post		7	3	No	Boys	1:45PM	Cathleena
New	Gamma	14	Post		16	5	No	Boys	1:45PM	Cathleena
New	Gamma	14	Post		17	5	No	Boys	1:45PM	Cathleena
New	Gamma	14	Post		8		No	Boys	1:45PM	Cathleena
New	Gamma	14	Post		9	Smythe	No	Boys	1:45PM	Cathleena
New	Gamma	14	Post		10	Sight	No	Boys	1:45PM	Cathleena
New	Gamma	15	Post		2	4	No	Boys	1:45PM	Cathleena
New	Gamma	15	Post		3	5	No	Boys	1:45PM	Cathleena
New	Gamma	15	Post		4	5	No	Boys	1:45PM	Cathleena
New	Gamma	15	Post		12	3	No	Boys	1:45PM	Cathleena
New	Gamma	15	Post		13	4	No	Boys	1:45PM	Cathleena
New	Gamma	15	Post		5	5	No	Boys	1:45PM	Cathleena
New	Gamma	15	Post		6	5	No	Boys	1:45PM	Cathleena
New	Gamma	15	Post		15	3	No	Boys	1:45PM	Cathleena
New	Gamma	15	Post		14		No	Boys	1:45PM	Cathleena
New	Gamma	15	Post		7	5	No	Boys	1:45PM	Cathleena
New	Gamma	15	Post		16	2	No	Boys	1:45PM	Cathleena
New	Gamma	15	Post		17	5	No	Boys	1:45PM	Cathleena
New	Gamma	15	Post		8	Yes	No	Boys	1:45PM	Cathleena
New	Gamma	15	Post		9	Crossman	No	Boys	1:45PM	Cathleena
New	Gamma	15	Post		10	Sight	No	Boys	1:45PM	Cathleena

Appendix FF: Mainstream Schools Results

Table 6: Mainstream Schools Results

Test	Questions	Compared	Test used	Sided	P-Value	Statistical Evidence?	Other notes
1	Pre4 & Post8	Old TT Vs. New TT	Two Proportion Z-Test	Two sided	0.484	No significant evidence to support a difference between change in students thinking they can match tyre tracks to tyre.	
2	Post 11	Old TT Vs. New TT	Two Proportion Z-Test	Two sided	0.500	No significant evidence to support that old or new is more confusing	
3	Pre 9 & Post 2	New TT	Two Sample Pooled T-Test	Two Sided	0.0341	Significant increase in student's perceived knowledge of science after FF using new TT	
4	Pre 9 & Post 2	Old TT	Two Sample Pooled T-Test	Two Sided	1.00	No significant evidence of a change in student's perceived knowledge of science after FF using old TT	
5	Pre 10 & Post 3	New TT	Two Sample Pooled T-	Two Sided	5.30E-5	Significant increase in student's	

			Test			perceived knowledge of forensics after FF using new TT	
6	Pre 10 & Post 3	Old TT	Two Sample Pooled T-Test	Two Sided	0.835	No significant evidence of a change in student's perceived knowledge of forensics after FF using old TT	
7	Pre 11 & Post 4	New TT	Two Sample Pooled T-Test	Two Sided	1.85E-8	Significant increase in student's perceived knowledge of tyre forensics after FF using new TT	
8	Pre 11 & Post 4	Old TT	Two Sample Pooled T-Test	Two sided	0.00966	Significant increase in student's perceived knowledge of tyre forensics after FF using old TT	
9	Pre 11 & Post 4	Old TT Vs. New TT	Two Sample Pooled T-Test	One sided	0.0630	No significant evidence to support the increase in student's perceived knowledge in tyre forensics after FF using new TT is greater than the increase using old TT	Students learn the same amount in the new and old TT, which is an increase from their basis of knowledge

10	Pre 9 & Post 2	Gemma Vs. Rosemary	Two Sample T-Test	Two sided	0.501	No significant evidence to support that student's perceived change in knowledge of science depends on which of two compared were presenting	
11	Post 9 (No Blanks)	Old TT Vs. New TT	Two Proportion Z-Test	Two sided	0.616	No significant evidence that there was a difference in proportion of students that correctly identified the tyre correctly between compared	Students have the same ability to identify the tyre correctly in both new and old TT
12	Post 9 (Blanks Included)	Old TT Vs. New TT	Two Proportion Z-Test	Two sided	0.289	No significant evidence that there was a difference in proportion of students that correctly identified the tyre correctly between compared	Students have the same ability to identify the tyre correctly in both new and old TT
13	Post 6	Old TT Vs. New TT	Two Sample T-Test	Two sided	0.405	No significant evidence to support a difference in the level of understanding of the tyre track activity between compared	The students understanding of the TT activity stays the same regardless of which version they experience

14	Post 10	Old TT Vs. New TT Touch	Two Proportion Z-Test	One sided	0.00562	Significant increase in proportion of students that use touch to identify in new TT compared to old	
15	Post 10	Old TT Vs. New TT Sight	Two Proportion Z-Test	Two sided	0.456	No significant evidence to support difference in proportion of students using sight to identify in new TT versus old TT	
16	Post 7	Old TT Vs. New TT	Two Sample T-Test	Two sided	0.0305	Significant evidence to support that student's perceived usefulness of the old TT activity was greater than of the new TT activity	
17	Post 5	Old TT Vs. New TT	Two Sample T-Test	Two sided	0.303	No significant evidence to support a difference in student's understanding of FF after proceeding through new TT versus old TT	
18	None	Old TT Vs. New TT Gender	Two Proportion Z-Test	Two sided	0.00362	Significant difference in the proportion of males and females that experience	This shows gender to be a potential variable in other

						old TT vs new TT	tests
19	Pre 9 & Post 2	New Males Vs. Old Males	Two Sample T-test	Two Sided	0.273	No significant difference in perceived understanding of science between old TT and new TT for males	
20	Pre 9 & Post 2	New Females Vs. Old Females	Two Sample T-Test	Two Sided	0.0448	Significant change in perceived knowledge of science when using new TT versus old TT for females	
21	Pre 9 & Post 2	New Males Vs. New Female	Two Sample T-Test	Two Sided	0.913	No significant difference in perceived understanding of science between females and males in the new TT activity	
22	Pre 9 & post 2	Old Males Vs. Old Females	Two Sample T-Test	Two Sided	0.326	No significant difference in perceived understanding of science between females and males in old TT activity	
23	Pre 3, Pre 11 & Post 4	Old TT Vs. New TT, Pre 3=yes	Two Sample T-Test	Two Sided	0.192	No significant difference in student's perceived knowledge of tyre forensics between old TT and new TT if have heard of	

						using tyre tracks at crime scene
24	Pre 3, Pre 11 & Post 4	Old TT Vs. New TT, Pre 3=no	Two Sample T-Test	Two Sided	Too small	No significant difference in student's perceived knowledge of tyre forensics between old TT and new TT if have not heard of using tyre tracks at crime scene
25	Pre 3, Pre 11 & Post 4	New TT Pre 3= yes Vs. Pre 3=no	Two Sample T-Test	Two Sided	0.916	No significant difference in student's perceived knowledge of tyre forensics in new TT if have heard of versus have not heard of using tyre tracks at crime scene
26	Pre 3, Pre 11 & Post 4	Old TT Pre 3= yes Vs. Pre 3=no	Two Sample T-Test	Two Sided	Too small	No significant difference in student's perceived knowledge of tyre forensics in old TT if have heard of versus have not heard of using tyre tracks at crime scene
27	Pre 5, Pre 9 & Post 2	New TT Vs. Old TT, Pre 5=yes	Two Sample T-Test	Two Sided	0.0259	Significant increase in perceived knowledge of

						science using new TT versus old TT if student believe that FF will help better understand science
28	Pre 5, Pre 9 & Post 2	New TT Vs. Old TT, Pre 5=no	Two Sample T-Test	Two Sided	Too Small	No significant increase in perceived knowledge of science using new TT versus old TT if student does not believe that FF will help better understand science
29	Pre 5, Pre 9 & Post 2	New TT, Pre 5=yes Vs. Pre 5=no	Two Sample T-Test	Two Sided	0.796	No significant increase in perceived knowledge of science using new TT if student believe versus do not believe that FF will help better understand science
30	Pre 5, Pre 9 & Post 2	Old TT, Pre 5=yes Vs. Pre 5=no	Two Sample T-Test	Two Sided	Too Small	No significant increase in perceived knowledge of science using new TT if student believe versus do not believe that FF will help better understand science

31	Pre 6, Pre 10 & Post 3	New TT Vs. Old TT, Pre 6=yes	Two Sample T-Test	Two Sided	1.75E-4	Significant increase in perceived knowledge of forensics using new TT versus old TT if student believe that FF will help better understand forensics
32	Pre 6, Pre 10 & Post 3	New TT Vs. Old TT, Pre 6=no	Two Sample T-Test	Two Sided	Too Small	No significant increase in perceived knowledge of forensics using new TT versus old TT if student do not believe that FF will help better understand forensics
33	Pre 6, Pre 10 & Post 3	New TT, Pre 6=no Vs. Pre 6=yes	Two Sample T-Test	Two Sided	Too Small	No significant increase in perceived knowledge of forensics using new TT if student do or do not believe that FF will help better understand forensics

34	**Pre 6, Pre 10 & Post 3**	**Old TT, Pre 6=no Vs. Pre 6=yes**	**Two Sample T-Test**	**Two Sided**	**Too Small**	**No significant increase in perceived knowledge of forensics using old TT if student do or do not believe that FF will help better understand forensics**

Appendix GG: Pre- and Post-Survey Test Results

Test 1

One of the questions investigated was whether or not the student feels capable of identifying tyre tracks and matching them to their respective tyres. This question can be found as number four on the Pre-Survey and number eight on the Post-Survey. The comparison made was if there was a significant difference in the proportion of responses that changed from "No" on the Pre-Survey to "Yes" on the Post-Survey between the Original Tyre Track activity and the Modified Tyre Track activity. A two-sided 2-Prop-Z-Test was conducted. This test yielded a P Value of 0.484. Because this value is greater than 0.05, it is not statistically significant and does not provide sufficient evidence to conclude there is a difference between the Original activity and the Modified activity in students gaining the ability to correctly match tyre tracks to their respective tyres.

Table 7: Test 1

Population	Size (N)	Count (X)
Modified	58	22
Original	40	18

Test 2

On question 11 on the Post-Survey, the student was asked if he or she found the Tyre Track activity to be confusing. A comparison was made between the proportion of students who responded "No" to the question after participating in the Original Tyre Track activity to the proportion of students who responded "No" to the question after participating in the Modified Tyre Track activity. A two-sided 2-Prop-Z-Test yielded a P Value of 0.50 which is greater than 0.05. This value showed that there is no statistically significant evidence to support the claim that the Original Tyre Track activity is more confusing than the Modified Tyre Track activity.

Table 8: Test 2

Population	Size (N)	Count (X)
Modified	49	45
Original	40	35

Tests 3 & 4

There were a series of questions on the surveys that asked the students to rate their knowledge in certain areas. The project team calculated the quantitative change in the response from Pre-Survey to Post-Survey and compared the responses from the Original Tyre Track activity to the Modified Tyre Track activity. The first of these questions, as seen in question nine on the Pre-Survey and question two on the Post-Survey, is the students' knowledge of science. A two-sided 2-Samp-T-Test was performed. The standard deviation data was pooled because the surveyed populations remained the same. After

progressing through the Forensic Frenzy program with the Original Tyre Track activity, there is no significant evidence to support a change in the student's perceived knowledge of science because the resulting P Value was 1.00. However, there is evidence to support a claim that there is a statistically significant increase in the student's perceived knowledge of science after progressing through the Forensic Frenzy program with the Modified Tyre Track activity. In this case the P Value was 0.0341.

Table 9: Test 3

Population	Size (N)	Average (X)	Deviation (σ)
Modified Pre	58	2.879	0.774
Modified Post	58	3.198	0.827

Table 10: Test 4

Population	Size (N)	Average (X)	Deviation (σ)
Original Pre	40	3.175	0.984
Original Post	40	3.175	1.010

Tests 5 and 6

The next question asked the students to rate their knowledge of forensics, in question ten on the Pre-Survey and question three on the Post-Survey. After running a two-sided 2-Samp-T-Test, the standard deviation data was pooled because the surveyed populations remained the same. After progressing through the Forensic Frenzy program with the Original Tyre Track activity, there is no significant evidence of a change in the student's perceived knowledge of forensics because the P Value came out to be 0.835. However, there is statistically significant evidence that there is an increase in the student's perceived knowledge of forensics after progressing through the Forensic Frenzy program with the Modified Tyre Track activity. The P Value was 5.30E-5.

Table 11: Test 5

Population	Size (N)	Average (X)	Deviation (σ)
Modified Pre	50	2.45	0.916
Modified Post	50	3.21	0.881

Table 12: Test 6

Population	Size (N)	Average (X)	Deviation (σ)
Original Pre	40	3.375	1.055
Original Post	40	3.425	1.083

Tests 7 and 8

The last comparison of the students' knowledge gain between the Original activity and the Modified activity was their perceived knowledge in tyre forensics. After a two-sided 2-Samp-T-Test with pooled standard deviation data, the Original Tyre Track activity resulted in a P Value of 0.00965 and the Modified Tyre Track activity resulted in a P Value of 1.85E-8. There is a statistically significant increase in the student's perceived knowledge of tyre forensics after progressing through the Forensic Frenzy program when being exposed to either the Original Tyre Track activity or the Modified Tyre Track activity.

Table 13: Test 7

Population	Size (N)	Average (X)	Deviation (σ)
Modified Pre	58	2.052	0.907
Modified Post	58	3.207	1.136

Table 14: Test 8

Population	Size (N)	Average (X)	Deviation (σ)
Original Pre	40	2.65	1.210
Original Post	40	3.375	1.234

Test 9

Because both of these tests showed statistical significance, another comparison was made to see if there was a significant increase in the change in perceived knowledge of tyre forensics between the Original and Modified Tyre Track activities. A one-sided test was performed with the null hypothesis that there was a larger increase in the Modified activity than the Original activity. Data was not pooled. This yielded a P Value of 0.063. Since this value is greater than 0.05, there is no statistical evidence to support that the increase in the student's knowledge of tyre forensics after passing through the Modified activity is significantly greater than the increase in the student's knowledge after passing through the Original activity.

Table 15: Test 9

Population	Size (N)	Average (X)	Deviation (σ)
Modified	58	1.155	1.348
Original	40	0.725	1.358

Test 10

The project team was curious as to whether the presenter made a difference to the student's rating of their knowledge of science. A comparison was made to see if there was a significant difference in the student's perceived change in knowledge of science as a result of the presenter, in this case Gemma versus Rosemary, while keeping everything else constant. The data for the Modified Tyre Track activity was used and a two-sided 2-Samp-T-Test was used. The data was not pooled and the test yielded a P Value of 0.5013. This number is greater than 0.05 and shows there is no evidence to support the statement that the student's perceived change in knowledge of science depends on whether Gemma or Rosemary were presenting. There is not a significantly large enough sample size to apply this test to other presenters.

Table 16: Test 10

Population	Size (N)	Average (X)	Deviation (σ)
Gemma	16	0.25	0.683
Rosemary	42	0.345	0.720

Tests 11 and 12

The students were asked in question nine on the Post-Program Survey, which suspect's tyre matched the tyre track at the crime scene? A comparison was made between the Original Tyre Track activity and the Modified Tyre Track activity to see if there was a significant difference in the proportion of students that identified the suspect correctly as Crossman. A two-sided 2-Prop-Z-Test was conducted. When blank answers were included, the P Value was 0.289. When blank answers were not included, the P Value was 0.616. Since the P Value is greater than 0.05 in both of these instances, there is no evidence to support the statement that there was a significant difference in the proportion of students that correctly identified that the tyre track came from the tyre of Crossman's car between the Original and Modified Tyre Track activities. We therefore keep the null hypothesis that students have the same ability to identify the suspect correctly in both the Original Tyre Track activity and the Modified Tyre Track activity.

Table 17: Test 11

Population	Size (N)	Count (X)
No Blanks New	80	75
No Blanks Old	48	46

Table 18: Test 12

Population	Size (N)	Count (X)
No Blanks New	96	75
No Blanks Old	65	46

Test 13

Post-Program Survey question six asked the students to rate their understanding of the tyre identification activity. A comparison was made to see if there was a significant difference in the level of understanding of the Tyre Track activity between the Original activity and the Modified activity. A two-sided 2-Samp-T-Test yielded a P Value of 0.405 which shows there is no significant difference in understanding. We accept the null hypothesis that the student's understanding is the same in either case.

Table 19: Test 13

Population	Size (N)	Average (X)	Deviation (σ)
Modified	95	3.758	1.118
Original	61	3.910	1.101

Tests 14 and 15

Question ten in the Post-Program Survey asked the students how they identified the tyre: by touch, by sight, or both. The project team made a comparison to see if there was a significant difference in the way the student identified the tyre between the Original Tyre Track activity and the Modified Tyre Track activity. A 2 Proportion Z-Test was used where all responses of "Both" were tallied in both the "Touch" and "Sight" columns. The "Touch" and "Sight" columns are therefore not mutually exclusive and these two parameters were compared using a one-sided test. The resulting P Value was 0.00562 which shows there is evidence that there is a significant increase in the proportion of students that used their sense of touch to help them identify the tyre in the Modified Tyre Track activity with the moulds than in the Original Tyre Track activity with the pictures. When the students are given something tactile, they are more likely to use their sense of touch than if they are only given photographs.

Table 20: Test 14

Population	Size (N)	Count (X)
Modified Touch	78	30
Original Touch	43	7

Secondly, a two-sided test was conducted to see if there was a significant difference in the proportion of students who used their sense of sight. The P Value was 0.456 which shows there is no evidence to support that there is a significant difference in the proportion of students that used their sense of sight to help them identify they tyre in the Modified Tyre Track activity compared to the Original activity.

Table 21: Test 15

Population	Size (N)	Count (X)
Modified Sight	78	77
Original Sight	43	43

Test 16

Question seven on the Post-Program Survey asked the student how useful they found the Tyre Track activity. A comparison was made on the responses by the students who went through the Original activity to the students who went through the Modified activity. A two-sided 2-Samp-T-Test determined the usefulness rating and yielded a P Value of 0.0305. There is evidence to support that the student's perceived usefulness of the Original Tyre Track activity was greater that the student's perceived usefulness of the Modified Tyre Track activity. The students' perception was that the Modified activity was less useful, but the rest of the data reflecting gained knowledge shows that the Modified activity was, in fact, useful.

Table 22: Test 16

Population	Size (N)	Average (X)	Deviation (σ)
Modified	94	3.447	1.033
Original	58	3.845	1.121

Test 17

Question five in the Post-Program Survey asked the student to rate how well they understood the Forensic Frenzy program. The comparison that was made was to see if there was a significant difference in the student's understanding of the Forensic Frenzy program between the Original Tyre Track activity and the Modified Tyre Track activity. A two-sided 2-Samp-T-Test was used to determine the level of difference in understanding and yielded a P Value of 0.303. There is no evidence to support a significant

difference in the student's understanding of the Forensic Frenzy program after proceeding through the Modified Tyre Track activity versus the Original Tyre Track activity.

Table 23: Test 17

Population	Size (N)	Average (X)	Deviation (σ)
Modified	96	3.948	0.887
Original	62	4.097	0.882

Test 18

A two-sided test was performed to determine if the proportion of students of either gender passing through the Modified activity and Original activity were significantly different. The P Value was 0.00362 which shows that there is a significant difference in the proportion of males and females that went through the Modified and Original Tyre Track activities. This does not necessarily mean that the gender affects the answers given, skewing the data, just that there is a significant difference in proportions of each gender experiencing each activity. Caution should be taken with this variable and an additional test was performed to determine if gender significantly affects responses. A possible reason for this disproportional gender distribution could be schools making science optional or subjecting more students of a specific gender to the Forensic Frenzy program. However, there is no data supporting this theory.

Table 24: Test 18

Population	Size (N)	Males (X)
Modified	40	15
Original	58	39

Tests 19 and 22

From this demographics test, the project team was interested in whether or not gender affected the response to the question "How would you rate your knowledge of science?" Four tests were completed in total to make this comparison: males in the Modified Tyre Track activity versus males in the Original Tyre Track activity (P Value of 0.273), females in the Modified Tyre Track activity versus females in the Original Tyre Track activity (P Value of 0.0448), males in the Modified Tyre Track activity versus females in the Modified Tyre Track activity (P Value of 0.913), and males in the Original Tyre Track activity versus females in the Original Tyre Track activity (P Value of 0.326). All of these tests were two sample 2-Prop-T-Tests without pooled data. The only test that revealed significance was that there is a change in perceived knowledge of science in females comparing the Modified Tyre Track activity to the Original Tyre Track activity. Females are more likely to have increased their knowledge of science after experiencing the Modified Tyre Track activity versus the Original Tyre Track activity. The remainder of these tests failed to produce a significant difference between males and females and therefore the

project team keeps the hypothesis that gender does not affect the answers to at least this particular question on the survey. The project team applies this generalization to the remainder of the questions on the survey although, further tests may be performed if a difference is suspected.

Table 25: Test 19

Population	Size (N)	Average (X)	Deviation (σ)
Modified Male	37	0.311	0.660
Original Male	13	0.077	0.641

Table 26: Test 20

Population	Size (N)	Average (X)	Deviation (σ)
Modified Female	21	0.333	0.796
Original Female	18	-0.167	0.707

Table 27: Test 21

Population	Size (N)	Average (X)	Deviation (σ)
Modified Male	37	0.311	0.660
Modified Female	21	0.333	0.796

Table 28: Test 22

Population	Size (N)	Average (X)	Deviation (σ)
Original Male	13	0.077	0.641
Original Female	18	-0.167	0.707

Tests 23 through 26

Another test was performed to determine if the change in the students perceived knowledge of tyre forensics at crime scenes between the Pre-Program Survey (question 11) and the Post-Program Survey (question four) increases significantly depending on whether or not they have heard of using Tyre Tracks at crime scenes to collect evidence (Pre-Program Survey question three). Four tests were completed in total to make this comparison: A “Yes” response to question three in the Modified activity versus a “Yes” response in the Original activity (P Value of 0.192), a “No” response to question three in the Modified activity versus a “No” response in the Original activity (sample size too small), a “Yes” response versus a “No” response in the Modified activity (P Value of 0.916), and a “Yes” response versus a “No” response in the Original activity (sample size too small). All of these tests were two sided 2-Samp-T-Tests without

pooled data. There is no evidence of a statistically significant difference in the student's perceived knowledge of tyre forensics at crime scenes between the surveys whether or not the student has heard of using tyre tracks at crime scenes to collect evidence.

Table 29: Test 23

Population	Size (N)	Average (X)	Deviation (σ)
Modified Yes	48	1.146	1.384
Original Yes	38	0.763	1.304

Table 30: Test 24

Population	Size (N)	Average (X)	Deviation (σ)
Modified No	10	1.1	1.197
Original No	2	0	2.828

Table 31: Test 25

Population	Size (N)	Average (X)	Deviation (σ)
Modified Yes	48	1.146	1.384
Modified No	10	1.1	1.197

Table 32: Test 26

Population	Size (N)	Average (X)	Deviation (σ)
Original Yes	38	0.763	1.304
Original No	2	0	2.828

Tests 27 through 30

A test was executed to determine if the students had a significant increase in their rating of "knowledge of science" (Pre-Program Survey question nine and Post-Program Survey two) based upon whether or not they think the Forensic Frenzy program will help them to better understand science (Pre-Program Survey question five). The four two-sample T-tests without pooled data performed are as follows: A "Yes" response to question five in the Modified activity versus a "Yes" response in the Original activity (P Value of 0.0259), a "No" response to question five in the Modified activity versus a "No" response in the Original activity (sample size too small), a "Yes" response versus a "No" response in the Modified activity (P Value of 0.796), and a "Yes" response versus a "No" response in the Original activity (sample size too small). There is a statistically significant amount of evidence that shows the correlation that students

who believe that Forensic Frenzy will positively impact their understanding of science will show an increase in their knowledge of science more in the Modified Tyre Track activity than in the Original Tyre Track activity. We keep the null hypothesis that the expectations of the student impact how much they think they get out of the program more for the Modified Tyre Track activity than the Original Tyre Track activity.

Table 33: Test 27

Population	Size (N)	Average (X)	Deviation (σ)
Modified Yes	54	0.324	0.721
Original Yes	39	0	0.649

Table 34: Test 28

Population	Size (N)	Average (X)	Deviation (σ)
Modified No	4	0.25	0.5
Original No	1	0	DIV/0

Table 35: Test 29

Population	Size (N)	Average (X)	Deviation (σ)
Modified Yes	54	0.324	0.721
Modified No	4	0.25	0.5

Table 36: Test 30

Population	Size (N)	Average (X)	Deviation (σ)
Original Yes	39	0	0.649
Original No	1	0	DIV/0

Tests 31 through 34

A test was executed to determine if the students had a significant increase in their rating of "knowledge of forensics" (Pre-Program Survey question ten and Post-Program Survey three) based upon whether or not they think the Forensic Frenzy program will help them to better understand science (Pre-Program Survey question six). Four two-sample T-tests without pooled data were performed. The only test that had a significant sample size was comparing a "Yes" response to question six in the Modified activity versus a "Yes" response in the Original activity, which yielded a P Value of 1.75E-4. Therefore the project team keeps the null hypothesis that If students believe that the Forensic Frenzy program will help them

better understand forensics, their perceived knowledge of forensics increases to a greater extent if they go through the Modified Tyre Track activity than the Original Tyre Track activity.

Table 37: Test 31

Population	Size (N)	Average (X)	Deviation (σ)
Modified Yes	55	0.973	1.384
Original Yes	39	0.0513	1.304

Table 38: Test 32

Population	Size (N)	Average (X)	Deviation (σ)
Modified No	2	2.5	1.197
Original No	1	0	2.828

Table 39: Test 33

Population	Size (N)	Average (X)	Deviation (σ)
Modified Yes	55	0.973	1.384
Modified No	2	2.5	1.197

Table 40: Test 34

Population	Size (N)	Average (X)	Deviation (σ)
Original Yes	39	0.051	1.304
Original No	1	0	2.828

Appendix HH: Survey Data: Comparisons

Test 1

Type	Pre or Post	Total Surveys	Total Answers	Yes	No	% Yes	% No
Old	Pre	40	40	19	21	47.5	52.5
New	Pre	61	60	31	29	51.66666667	48.33333333

Type	Pre or Post	Total Surveys	Total Answers	Yes	No	% Yes	% No
Old	Post	65	49	47	2	95.91836735	4.081632653
New	Post	96	88	73	15	82.95454545	17.04545455

Type	Changed to Yes	Changed to No	Pre and Post	% Total Changed to Yes	% Total Changed to No	Total Changed	Total % Changed	Of Changed, % Changed to Yes	Of Changed, % Changed to No
Old	18	0	40	45	0	18	45	100	0
New	22	7	58	37.93103448	12.06896552	29	50	75.86206897	24.13793103

2-PropZTest testing if P1 not equal to P2 for changed to yes responses over total Pre and Post responses
P1: N=40, x=18 P2: N=58, x=22 --> p = 0.484 which is > 0.05

Test 2

Pre or Post	Total Surveys	Total Answers	Yes	No	% Yes	% No
New	62	49	4	45	8.163265306	91.83673469
Old	41	40	5	35	12.5	87.5

2-PropZTest testing if New P1 > Old P2 for No over Total Answers
P1: N=49, x=45 P2: N=40, x=35 --> p = 0.250 which is > 0.05

Tests 3 and 4

Type	Pre or Post	Total Surveys	Total Answers	Sample Mean	Sample Standard Deviation	Sample Standard Deviation of Change
Old	Pre	40	40	3.175	0.984169571	0.640512615
New	Pre	61	61	2.901639344	0.76822128	0.705232796

Type	Pre or Post	Total Surveys	Total Answers	Sample Mean	Sample Standard Deviation	Sample Standard Deviation of Change
Old	Post	65	65	3.261538462	0.871007374	0.640512615
New	Post	96	96	3.348958333	0.830725085	0.705232796

Type	Pre and Post	Responded to Both Pre and Post	Increased by 1	Increased by 2	Increased by 3	Increased by 4	Decreased by 1	Decreased by 2	Decreased by 3	Decreased by 4	Number Increased	Number Decreased	No Change
Old	40	40	7	0	0	0	5	1	0	0	7	6	27
New	58	49	12	4	0	0	4	0	0	0	16	4	28

For Students Answering Both the Pre and Post Surveys

Type	Pre or Post	Total Surveys	Sample Standard Deviation of Change	Sample Mean	Sample Standard Deviation
Old	Pre	40	0.640512615	3.175	0.984169571
New	Pre	58	0.705232796	2.879310345	0.774088852

Type	Pre or Post	Total Surveys	Sample Standard Deviation of Change	Sample Mean	Sample Standard Deviation
Old	Post	40	0.640512615	3.175	1.009887021
New	Post	58	0.705232796	3.198275862	0.826850159

Difference betweeen New Pre and New Post

Column1	New Pre	New Post
N	58	58
Xbar	2.879310345	3.198275862
Sigma	0.774088852	0.826850159

2-SampTTest w/Pooled Data

p=0.0341014993

Difference between Old Pre and Old Post

Column1	Old Pre	Old Post
N	40	40
Xbar	3.175	3.175
Sigma	0.984169571	1.009887021

2-SampTTest w/Pooled Data

p = 1

Test 5 and 6

Type	Pre or Post	Total Surveys	Total Answers	Sample Mean	Sample Standard Deviation	Sample Standard Deviation of Change
Old	Pre	40	40	3.375	1.054599207	0.638507876
New	Pre	61	61	2.090163934	0.903477027	0.954260051

Type	Pre or Post	Total Surveys	Total Answers	Sample Mean	Sample Standard Deviation	Sample Standard Deviation of Change
Old	Post	65	65	3.415384615	0.93361374	0.638507876
New	Post	96	96	3.317708333	0.813003743	0.954260051

Type	Pre and Post	Responded to Both Pre and Post	Increased by 1	Increased by 2	Increased by 3	Increased by 4	Decreased by 1	Decreased by 2	Decreased by 3	Decreased by 4	Number Increased	Number Decreased	No Change
Old	40	40	8	0	0	0	4	1	0	0	8	5	27
New	58	50	16	9	2	0	3	0	0	0	27	3	18

For Students Answering Both the Pre and Post Surveys

Type	Pre or Post	Total Surveys	Sample Standard Deviation of Change	Sample Mean	Sample Standard Deviation
Old	Pre	40	0.638507876	3.375	1.054599207
New	Pre	50	0.954260051	2.45	0.916125381

Type	Pre or Post	Total Surveys	Sample Standard Deviation of Change	Sample Mean	Sample Standard Deviation
Old	Post	40	0.638507876	3.425	1.083382642
New	Post	50	0.954260051	3.21	0.881151844

Difference betweeen New Pre and New Post

Column1	New Pre	New Post
N	50	50
Xbar	2.45	3.21
Sigma	0.916125381	0.881151844

2-SampTTest w/Pooled Data

p = 5.3032254E-5

Difference between Old Pre and Old Post

Column1	Old Pre	Old Post
N	40	40
Xbar	3.375	3.425
Sigma	1.054599207	1.083382642

2-SampTTest w/Pooled Data

p = 0.8348712544

Tests 7, 8 and 9

Type	Pre or Post	Total Surveys	Total Answers	Sample Mean	Sample Standard Deviation	Sample Standard Deviation of Change
Old	Pre	40	40	2.65	1.21000106	1.358496529
New	Pre	61	61	2.131147541	0.953160015	1.348185579

Type	Pre or Post	Total Surveys	Total Answers	Sample Mean	Sample Standard Deviation	Sample Standard Deviation of Change
Old	Post	65	65	3.246153846	1.2123166	1.358496529
New	Post	96	96	3.302083333	1.152752237	1.348185579

Type	Pre and Post	Responded to Both Pre and Post	Increased by 1	Increased by 2	Increased by 3	Increased by 4	Decreased by 1	Decreased by 2	Decreased by 3	Decreased by 4	Number Increased	Number Decreased	No Change
Old	58	58	17	11	4	5	4	0	0	0	37	4	17
New	58	58	17	11	4	5	4	0	0	0	37	4	17

For Students Answering Both the Pre and Post Surveys

Type	Pre or Post	Total Surveys	Sample Standard Deviation of Change	Sample Mean	Sample Standard Deviation
Old	Pre	40	1.358496529	2.65	1.21000106
New	Pre	58	1.348185579	2.051724138	0.906553407

Type	Pre or Post	Total Surveys	Sample Standard Deviation of Change	Sample Mean	Sample Standard Deviation
Old	Post	40	1.358496529	3.375	1.233870292
New	Post	58	1.348185579	3.206896552	1.135683127

Difference betweeen New Pre and New Post

	New Pre	New Post
N	58	58
Xbar	2.051724138	3.206896552
Sigma	0.906553407	1.135683127

2-SampTTest w/Pooled Data

p = 1.8509209E-8

Difference between Old Pre and Old Post

	Old Pre	Old Post
N	40	40
Xbar	2.65	3.375
Sigma	1.21000106	1.233870292

2-SampTTest w/Pooled Data

p = 0.0096554667

Since p values are both < .05 calculate if there is statistically significant difference between the two samples using change data
One Tailed guessing that New > Old

	Old	New
Mean Change	0.725	1.155172414
Standard Deviation of Change	1.358496529	1.348185579
N	40	58

p = 0.06301

Since p>.05 we cannot say that the mean change in the new is statistically significantly different from the mean change in the old

Tests 11 and 12

Pre or Post	Total Surveys	Total Answers	Crossman	Other	% Crossman	% Other	% CM incl Blanks	% Other incl Blanks
New	96	80	75	5	93.75	6.25	78.125	21.875
Old	65	48	46	2	95.83333333	4.166666667	70.76923077	29.23076923

2 Prop Z Test Crossman New vs. Crossman Old
p = 0.61576

2 Prop Z Test Crossman New vs. Crossman Old w/ Blanks
p = 0.28925

Test 13

Pre or Post	Total Surveys	Total Answers	Sample Mean	Sample Standard Deviation
Post	161	156	3.817307692	1.110196929

Old or New	Total Surveys	Total Answers	Sample Mean	Sample Standard Deviation
New	96	95	3.757894737	1.117708422
Old	65	61	3.909836066	1.101166793

2 Sample T Test
p = 0.4046671694

Tests 14 and 15

Pre or Post	Total Surveys	Total Answers	Sight (w/Both)	Touch (w/Both)	% Sight w/ Both	% Touch w/ Both
New	96	78	77	30	98.71794872	38.46153846
Old	65	43	43	7	100	16.27906977

2 Prop Z Test Touch New vs Touch Old w/ Both (p1>p2) (Identifyed tyre using at least the sence of touch (could be other senses such as sight too))
p = 0.0056256092

2 Prop Z Test Sight New vs Sight Old w/ Both (p1not=p2) (Identifyed tyre using at least the sence of sight (could be other senses such as touch too))
p = 0.4559264793

Test 16

Pre or Post	Total Surveys	Total Answers	Sample Mean	Sample Standard Deviation
Post	160	152	3.598684211	1.08120529

Old or New	Total Surveys	Total Answers	Sample Mean	Sample Standard Deviation
New	96	94	3.446808511	1.032972756
Old	64	58	3.844827586	1.120803661

2 Sample T Test
p = 0.0305217098

Kids found the old tyre track activity more useful than the new tyre track activity

Test 17

Pre or Post	Total Surveys	Total Answers	Sample Mean	Sample Standard Deviation
Post	161	158	4.006329114	0.8850984

Old or New	Total Surveys	Total Answers	Sample Mean	Sample Standard Deviation
New	96	96	3.947916667	0.8869794
Old	65	62	4.096774194	0.881683885

2 Sample T Test
p = 0.303135837

Test 18

	# Males Pre and Post	# Females Pre and Post	Total
Old	15	25	40
New	39	19	58

2-Prop-Z-Test for Males
P = 0.0036220276

Tests 19, 20, 21, and 22

New or Old	Male or Female	Total Surveys	Total Answers	Sample Mean	Sample Standard Deviation
New	Male	39	37	0.310810811	0.659875318
New	Female	22	21	0.333333333	0.795822426
Old	Male	15	13	0.076923077	0.640512615
Old	Female	25	18	-0.166666667	0.707106781

2-Sample T Test (No Pooled)

New Male vs Old Male

New	Male	39	37	0.310810811	0.659875318
Old	Male	15	13	0.076923077	0.640512615

p = .2734873974

New Female vs Old Female

New	Female	22	21	0.333333333	0.795822426
Old	Female	25	18	-0.166666667	0.707106781

p = .0447842388

New Male vs New Female

New	Male	39	37	0.310810811	0.659875318
New	Female	22	21	0.333333333	0.795822426

p = .9130312263

Old Male vs Old Female

Old	Male	15	13	0.076923077	0.640512615
Old	Female	25	18	-0.166666667	0.707106781

p = .3260528751

Tests 23, 24, 25, and 26

New or Old	Pre3 Yes or No	Total Surveys	Total Answers	Sample Mean	Sample Standard Deviation
New	Yes	50	48	1.145833333	1.383636641
New	No	11	10	1.1	1.197219
Old	Yes	38	38	0.763157895	1.303513143
Old	No	2	2	0	2.828427125

2-Sample T Test (No Pooled)

New Yes vs. Old Yes

New	Yes	50	48	1.145833333	1.383636641
Old	Yes	38	38	0.763157895	1.303513143

p = 0.1919751129

New No vs. Old No

New	No	11	10	1.1	1.197219
Old	No	2	2	0	2.828427125

Not Valid Too Small Sample Size

New Yes vs. New No

New	Yes	50	48	1.145833333	1.383636641
New	No	11	10	1.1	1.197219

p = 0.9161959847

Old Yes vs. Old No

Old	Yes	38	38	0.763157895	1.303513143
Old	No	2	2	0	2.828427125

Not Valid Too Small Sample Size

Tests 27, 28, 29, and 30

New or Old	Pre5 Yes or No	Total Surveys	Total Answers	Sample Mean	Sample Standard Deviation
New	Yes	56	54	0.324074074	0.721354906
New	No	4	4	0.25	0.5
Old	Yes	39	39	0	0.648885685
Old	No	1	1	0	#DIV/0!

2-Sample T Test (No Pooled)

New Yes vs. Old Yes

New	Yes	56	54	0.324074074	0.721354906
Old	Yes	39	39	0	0.648885685

p = 0.0258689479

New No vs. Old No

New	No	4	4	0.25	0.5
Old	No	1	1	0	#DIV/0!

Not Valid Too Small Sample Size

New Yes vs. New No

New	Yes	56	54	0.324074074	0.721354906
New	No	4	4	0.25	0.5

p = 0.7963951099

Old Yes vs. Old No

Old	Yes	39	39	0	0.648885685
Old	No	1	1	0	#DIV/0!

Not Valid Too Small Sample Size

Tests 31, 32, 33, and 34

New or Old	Pre5 Yes or No	Total Surveys	Total Answers	Sample Mean	Sample Standard Deviation
New	Yes	59	55	0.972727273	1.552829502
New	No	2	2	2.5	0.707106781
Old	Yes	39	39	0.051282051	0.646802579
Old	No	1	1	0	#DIV/0!

2-Sample T Test (No Pooled)

New Yes vs. Old Yes

New	Yes	59	55	0.972727273	1.552829502
Old	Yes	39	39	0.051282051	0.646802579

p = 1.7491953E-4

New No vs. Old No

New	No	2	2	2.5	0.707106781
Old	No	1	1	0	#DIV/0!

Not Valid Too Small Sample Size

New Yes vs. New No

New	Yes	59	55	0.972727273	1.552829502
New	No	2	2	2.5	0.707106781

Not Valid Too Small Sample Size

Old Yes vs. Old No

Old	Yes	39	39	0.051282051	0.646802579
Old	No	1	1	0	#DIV/0!

Not Valid Too Small Sample Size