

## Needs Analysis

- TIMS scores show decreasing performance in mathematics throughout primary schooling.
- Algebra begins being taught in 3<sup>rd</sup> grade and is tested in 8<sup>th</sup> grade. 30% of test.
- Lack of interest and pace of learning large factors in score decrease.

## Needs Analysis

- Subject Matter Experts:
  - Math teachers
  - 3<sup>rd</sup> and 4<sup>th</sup> grade students
  - Parents
- Simulation of skill is equal to performance in math.

## Task Analysis

- Steps to solving an algebra problem:  $4 + X = 6$ 
  - Identify operation used
  - Use opposite operation to get variable alone
  - Keep equation equal to preceding equation
- Expectation Violations:
  - Improper order of operations
  - Equation not balanced properly

## Project Overview

- Thumbnail
  - Teaching children algebra through a narrative driven game. The player must escape the maze they have fallen into by learning and demonstrating their algebra skills in a series of puzzles.
- Target Users
  - Children 8-10
  - Have understanding of basic operations (addition, multiplication,...)
- Delivery Platform
  - Flash or HTML5

## Learning Goals

- Single Variable Algebra
- Balancing Equations
- Order of Operations

## Narrative

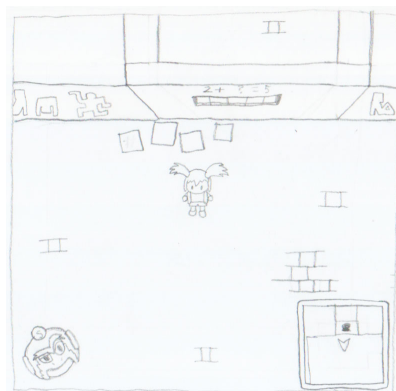
- Player's avatar is a child (male or female) stuck in a maze
- Stone statue is the player's guide
- Promises to help the player escape from the maze if they can find the missing pieces of the statues body.

## Instructional Design

- Shaping
  - Mini-game puzzles start easy and gain complexity
  - Difficulty resets when new type of puzzle starts.
- Scoring
  - Game provides assessment through final puzzle

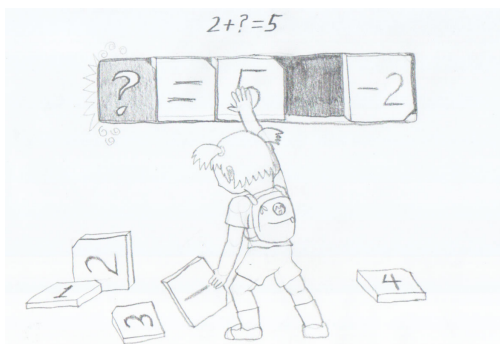
## GAMEPLAY

- Overhead exploration section
- WASD Keys
- Map in corner
- Identifies puzzles in room
- Click to interact
- Allows player to explore
- Leads to puzzles



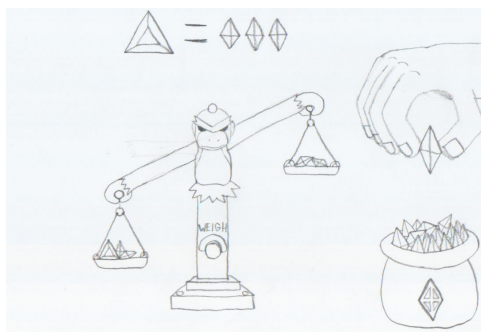
## GAMEPLAY: Tiles

- Wall with indent for tiles
- Player can slide and flip tiles
- Problem written above
- Teaches how to turn problems around to solve them.



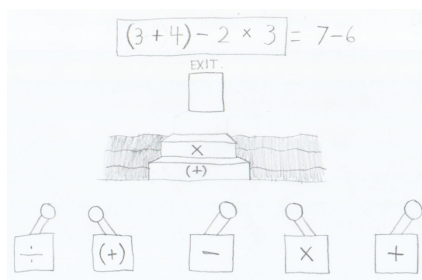
## GAMEPLAY: Jewels

- Scales with jewels on them
- Balance out jewels
- Big jewel shown on wall
- Similar to tiles
- Multiplication
- Division



## GAMEPLAY: Platforms

- Problem above, levers below
- Flip levers, raise steps
- Right order = leave room
- Incorrect = reset
- Order of Operations



## GAMEPLAY: Final

- Presents more complicated algebra problem
- Move dials to solve problem
- Parentheses locked until outside solved
- Reinforce knowledge learned

