**Overview**

Side scrolling game where the player is presented with a series of basic math problems and multiple solutions to pick from. Selection is done by flying through one of the options, incorrect answers cause the user to either (take damage?) or (lose?).

**Resources**

<https://www.tabletopaudio.com/> 10 minute free-to-use ambience and music tracks

<https://freesound.org> Free sound effects by professionals and amateurs

**Potential Variations**

* Vertical game. Player jumps through holes in the ground, incorrect solutions have either a bottom (trap or just a floor), correct solutions allow to fall through to the next area. Unlimited time per question? This could be making the game harder (ex: harder problems = slower pace) or easier (ex: younger children get more time per question).
* Storyline? Is there a reason for why you are doing this? Most childrens’ games have a basic storyline or explanation for game mechanics. Is there an end goal or a reward for completing the game?
* Top-down view of a 2D space. This could open up more for the themes, potentially switch between top-down and sideways view for different levels/themes.
* Speedrun / Increase speed and score for better players: implement a quick complete like in tetris, maybe once lined up with the answer, pressing in that direction speeds the player up dramatically through the opening. Perhaps some risk, increased speed for incorrect answers is more punishing.
* Infinite / Highscore mode: Pick a level and play it infinitely until you lose trying to get a highscore. Also could be called “Practice Mode” for the education aspect. May require looping rooms, once randomizing questions is solved that would be easy (see “Key Components” #5 and “Program Structure” Math Problems)

**Themes**

Potentially varies per level, could have selection system for level and theme combos

* Flying a spaceship through asteroids
* Plane through clouds, incorrect = lightning?
* Top-down view of a pirate ship on the ocean through rocks
* 80’s Arcade Style, think PONG or Asteroids, minimalist, simple

**Key Components, Potential Implementation Order**

1. Player
2. Scrolling
3. Obstacles
4. Collision: Wall vs Answer Detection
5. Random math problems
6. Something to block vision of correct path / better looking than just three gaps in an obstacle?

**Program Structure, Components**

* Levels
  + Selection
    - Is there a level select screen?
      * Is that even possible in GameMaker? Yes it is
    - Progressive game
      * Beat lvl 1, into lvl 2 immediately
    - Is it all one level?
    - Checkpoints?
      * By level?
      * By (10) questions?
  + Transitions
    - Transition screen?
    - Fade in using blank backgrounds at beginning and end of levels?
      * Can fade a layer on top of everything
  + Level Setup
    - Long rooms?
    - One question space and somehow loop back around for each problem?
      * Would save on space and work duplicating problem sections
      * Would require more work coding questions to change
    - When do you beat a level? #X questions?
* Player sprite
  + Movement
    - Constant motion in one direction
      * Speed varies with difficulty
        + Time in level
        + Questions correct
    - Answer Selection, either
      * Jumps
      * Smooth motion
  + Health/Lives
    - Decremented by incorrect answers
    - If health, continue game
    - If lives, start over from checkpoint / level start
  + Score
    - Incremented by correct answers
* Math Problems
  + Problem Location
    - Middle/Top of screen?
    - Moving with the obstacles?
      * Distance between problem and solutions?
  + Problem Selection
    - Random
    - Random List
    - Preset Questions
  + Making Choices
    - Solution Location
      * In obstacle gap
      * Distance before gap
    - Correct vs Incorrect
      * Collision detection
        + Correct detection

Increase score

Increase speed

* + - * + Incorrect

Reduce health?

Start over?

* GUI
  + Score
  + Lives
  + Menu
    - Back to main
    - Back to level select
  + Pause
    - Pause gameplay and bring up an pause screen that blocks view of game (no cheating!)
* List of Rooms so far
  + Main Menu
  + Level Select
  + Level 1 - ?
  + Game Over