

Function Force (ver 0.3a)

Function Force Legend:

- **Level:**
 - Refers to the larger set of *Sections* that focuses on either a mechanical theme or a core concept of functions
- **Section: (Board)**
 - The parts that make up the *level*. Each *level* has four *sections* that cumulatively build on each other.
 - **Note:** Specific levels and sections will be referenced as L1,S2 meaning Level 1, Section 2
- **HUD:**
 - The interface that we present to players to show the math behind their laser.
- **Static:**
 - *Sections* that stop the player's ship to focus on a specific obstacle in front of them
- **Puzzle:**
 - Exercises that make players use specific concepts of how functions work
- **Auto-scrolling:**
 - Refers to *sections* that involve more classic shmup gameplay that provides intermission between *static sections*
- **Collectible: (pickup)**
 - Objects that enemies, or spawners, drop that affect the player's laser
 - (+) and (-) refer to specific collectibles that directly change the slope of the laser
- **Spawner:**
 - A construct within the section that produces collectibles to help players solve certain puzzles.
- **Gate:**
 - Physical construct that prevents player progression until a puzzle is completed
- **Switch:**
 - Something that the player has to shoot to activate in order to open a gate
- **Deployable: (satellites)**
 - A satellite that player's have control over in order to solve puzzles and boost their firepower during auto-scrolling sections

General Terms Explained:

- **Cooldown:**
 - Time in between uses
 - Ex: the time in between firing lasers
- **Difficulty Curve:**
 - Progressively adding more enemies or complications to puzzle sections to create dynamic gameplay
- **Games Literacy:**
 - Understanding of rules and systems generally presented in games
- **Lock and Key:**
 - Puzzles that require players to activate a switch, or find a key, to unlock a gate in order to progress

Mechanical Breakdown (Cross-Level)

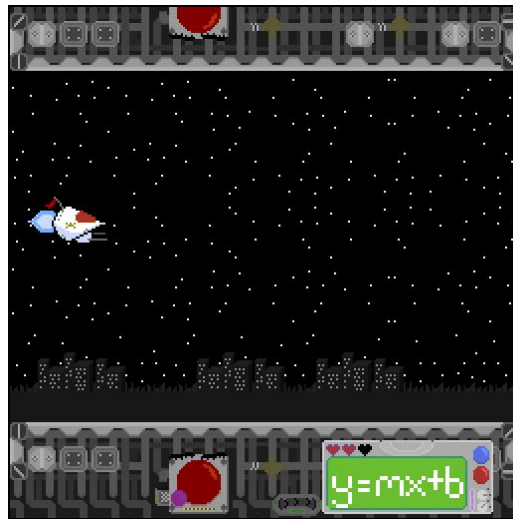
- HUD

- Pause button at the top right of the screen
- Equation of the current state of the laser at the bottom center of the screen
 - Buttons to the right and left of the equation to switch between satellites (Only in static sections)

Note:

(The rationale for having this HUD element represented at the bottom right of the screen as opposed to other locations is to have the player's eye be drawn to it as it changes. Normally in this genre, novice players tend to keep their eyes focused on what enters the screen, the right side, and if the equations change, player's eyes will more likely notice the change and see a correlation.)

- Score at the top right
- Life Gauge at the top right underneath the score



- Basic Player Movement and Interactions

- Only can move along the y-axis at a fixed momentum
 - ~~Colliding with terrain damaged the player~~

Note:

(This was a lengthy discussion that spanned over multiple weeks. We felt that the game would be more enjoyable with free range of motion, however, we felt that binding movement like this would immensely aid data collection in terms of assessment)

- Player can fire their laser outward on a fixed cooldown
 - Dotted silhouette of where the laser will fire is consistently present

Note:

(The intent of this feature is to streamline the understanding of how functions work. Rather than have the player conduct tedious trial and error, and risk them becoming frustrated and unreceptive we decided on this)

- **Deployables**

- Controllable satellites that help solve lock and key puzzles while also aiding in auto-scrolling sections
- L3, S2 for a detailed description along with annotation

- **Auto-Scrolling Sections**

- Player ship moves forward at a fixed pace
- 3-4 Enemy waves that display a specific pattern or function to the player during each auto-scrolling section
- Enemy units fly towards the player from the right side of the screen in fixed patterns depending on the level and will exit the screen on the left
 - Certain enemies can shoot at the player where others try to collide
 - Depending on the enemy type, players will need to fire at the enemies in different slopes in order to hit them and destroy (solve) them
 - Enemies will occasionally drop collectibles that slowly pan offscreen in a straight line to the left
 - (+) and (-) are the earliest introduced collectibles that change the slope of the laser
- When a player is hit by an enemy, they lose a section of their life gauge
- Expect that each auto-scrolling level progressively increases with difficulty with player progress

Note:

(This section of the game is aimed at increasing the overall enjoyment for the players. It helps separate the assessment and educational aspects of the game while also incorporating learning elements that pertain to the larger system of the game.)

- **Static Sections**

- Screen pans into a static board with some obstacle or puzzle that players need to overcome in order progress
- Enemies still enter the screen from the right side of the screen at a much lower rate and will always drop collectibles to help change the player's laser in order to solve the puzzle
 - Collectibles pan off the screen as they do in the auto-scrolling sections
- Alternatively, in areas where there needs to be a safe environment for clearer assessment and education, a spawner will be present that gives the player the tools to complete the puzzle

Note:

(These screens are intended to create a testing environment from both an assessment and game design perspective.)

Level Progression

- Level One

- L1 General Learning Objective

- The purpose of this level is to acclimate the players to a basic understanding of the game's system of having auto-scrolling sections that elicit twitch responses and static sections that require problem solving strategies.
- This Level also is intended to teach players that by adding a negative or positive integer to their function equation makes their laser elevate or decline accordingly
- Space Station Themed
 - Focuses on teaching players the basic game's literacy needed to engage with the game while also showing them the core concept of a negative and positive slope
- *Section 1* (Auto-scrolling)
 - Acclimates the player to firing their laser at enemy units without much difficulty
 - **New Enemy: Pterodactyl Pilots**
 - Enemies slowly pan onto the screen in set linear patterns that are easily dodged
 - The end of this section forces the player to pick up a (+) or a (-) (**See Image A-1**)
 - After the forced pickup, enemies will have the potential to randomly drop (+) and (-) to further alter the slope
 - There will be a limit to how far the slope can change
 - During this forced pickup, there will be a narrative prompt that implies that they will need one of them in order to make it past the security checkpoint ahead



(Image A-1)

- *Section 2* (Static)
 - Basic lock and key puzzle
 - Narrative prompt that tells the player they have to hit the switch in order to progress
 - The first level's puzzles will involve the player utilizing (+) and (-) that enemies entering the screen will drop when destroyed
 - Enemies and collectibles can pass through terrain

- Enemies and collectibles act the same as they do in auto-scrolling sections
 - Track how the player collects (+) and (-) collectibles behind the scenes

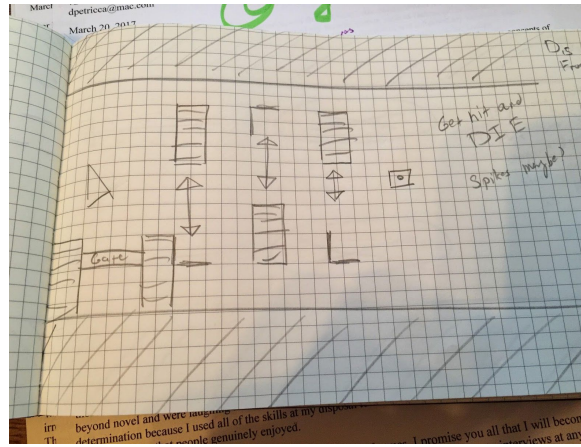


(Image A-2)

- *Section 3 (Auto-scrolling)*
 - This section will introduce new enemy patterns
 - General sin wave
 - Increases difficulty curve by having more enemies and having them be more aggressive
- *Section 4 (Static)*
 - This is the last section before the level's end and will be a more focused exercise
 - The level is vertically inverted from the earlier scene with a much narrower route to the switch and performs the same way as L1, S2.
 - Death Star flaw

- Level Two

- L2 General Learning objective
 - This level is intended to help further the player's understanding of linear function. Where L1 is intended to bring about a basic linear function understanding, L2 is intended to prove that they understand it. While the moving platforms serve as an obstacle that requires timing, they also serve as a higher knowledge cap for understanding the game system and basic linear functionality.
- Cave or Asteroid Themed
- *Section 1 (Auto-scrolling)*
 - **New feature:** There's now a HUD for the ship that shows the equation
 - **New Enemy:** Walker
 - Walks on the ground and shoots at player
 - Serves primarily as difficulty increase in auto-scrolling sections
 - Sin wave patterns of enemy movement in conjunction with linear waves of enemies
- *Section 2 (Static)*
 - Moving platforms that require timing and understanding of where the laser needs to be fired



(Image B-1)

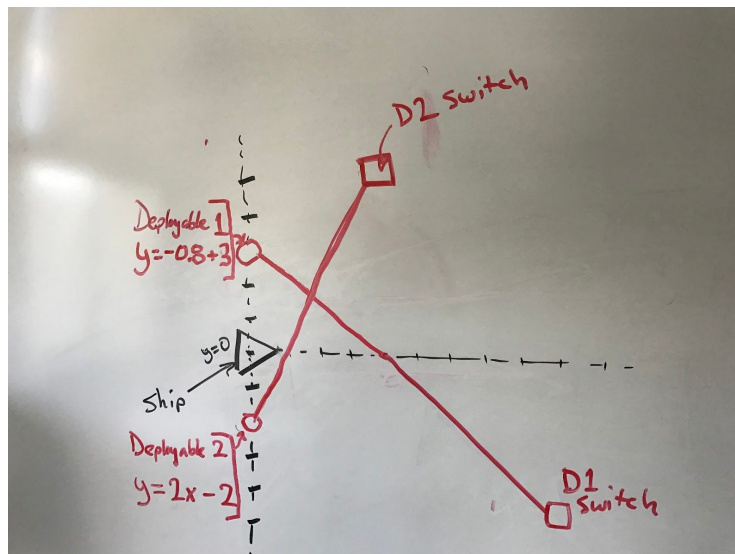
- Same style of lock and key puzzle but with a slightly higher difficulty
 - Less options for solving the puzzle
 - More precise firing needed for opening the door
- *Section 3* (Auto-scrolling)
 - Introduce terrain that can damage the player to constrict movement to a certain degree and have them think deeper about what kind of laser they want
- *Section 4* (Static)
 - Lock and Key
 - Moving platforms that hinder firing
 - Moving platforms that can also damage the player

- Level Three

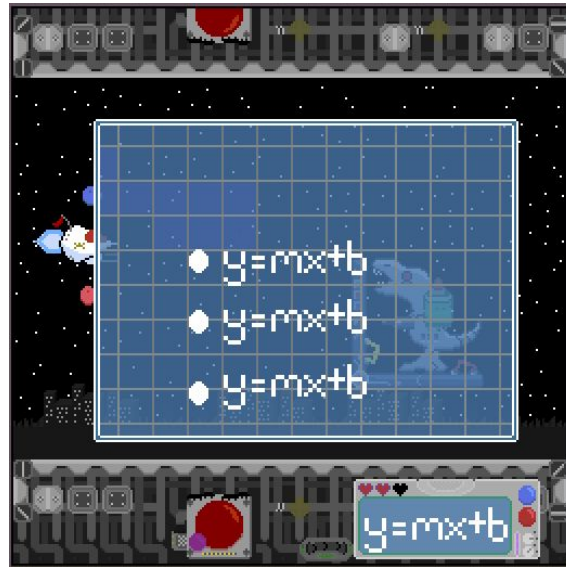
- L3 Learning Objective
 - Using deployable to show the player how functions look and interact through different coordinates. The new mechanic is meant to give the player a fuller understanding of how functions can work. L3 is also set up to dovetail new game mechanics, like using intercepts, in future iterations. The new enemy primarily serves as progressive difficulty and fun.
- Ocean Sky Theme
- *Section 1* (Auto Scrolling)
 - Normal enemy spawn at the beginning
 - Introduce new enemy unit that is the focus of the scrolling portion
 - Shield Dino
 - Rotating shield
 - Laser cannot pierce the shield



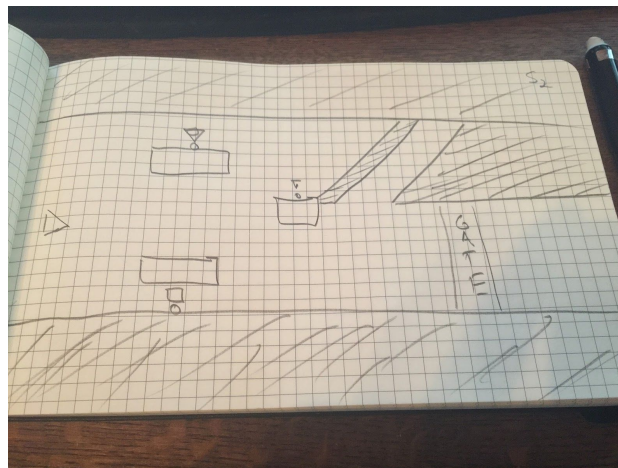
- Cannot progress the auto-scrolling until Shield Dino is destroyed (solved)
- Enemies spawn in waves until Shield Dino is defeated
- **Section 2 (Static)**
 - Introduces Deployables
 - Narrative: no agency yet because they forgot to pack them
 - **Mechanic Description:**
 - Satellites that the player has control over via pop-up UI at the press of the corresponding deployable colored button on the HUD
 - Fires smaller laser when the player fires their laser
 - Deployables have two uses:
 - *Scrolling Scenes*: extra firepower that can each individually collect collectibles to change their slope
 - *Static Scenes*: Player can open up the deployable to trigger a pop-up that explicitly shows the player ship as the origin point and depending on which button the player pressed, presents them with a set of four choices of linear equations of where the selected satellite will be positioned and how it will fire.
 - Alternatively there could be a button prompt with a predetermined set number of buttons that let players manually input the equation
 - **NOTE:** Satellites and player ship are bound to the y-axis



- to choose from a set of origin points and numbers to set up where they want their new laser to go:
 - This can affect how they're positioned on the y-axis
 - Pop-up pauses the moving sections of the board and limits vision. Also pauses and stops enemy movement behind the screen so they player will return to the section as the player left it



- Lock and key that has multiple switches to open a gate

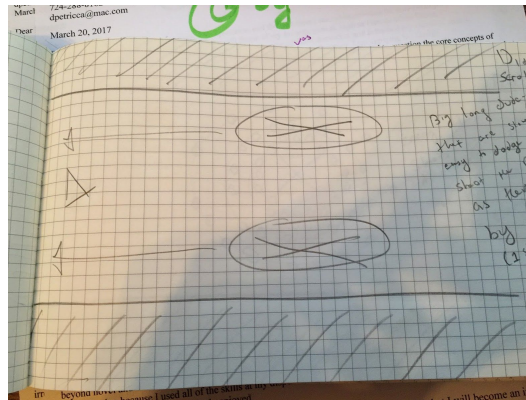


- Section 3 (Auto Scrolling)
 - Narrative: Explain how deployables work similarly to the main ship
- Section 4 (static)
 - Moving platforms
 - One switch attached to a moving platform similar to L2, S2
 - Requires timing shooting with deployables

- Level Four

- L4 Learning Objective

- Incorporates moving platforms and a new enemy to up the difficulty curve and test players to make sure they have an understanding of the game system and deployable functionality. L4 also tests players ability to use those systems in conjunction with the already established learning objectives.
- True Sky Theme
 - **New Collectible:** Sweep Shot
 - Flashing icon that causes the satellites to sweep the screen for a short duration
 - **New Enemy:** Raging Raptor
 - Can't pass the scrolling stages until both are destroyed
 - Swoops across the screen in a straight line and fires at the player's position when they enter the screen



- **Section 1 (Auto-scrolling)**
 - Basic enemy phase
 - New enemy
- **Section 2 (Static)**
 - Introduces the fact that the deployables have a wider range of motion than the main ship
 - Requires player to use popup to move deployable
 - Set choices
 - Switches all must be hit at the same time and will revert back to an inactive state if player tries to hit them all separately at different intervals
- **Section 3 (Auto-scrolling)**
 - Walkers and Raptors. No normal enemy spawns
- **Section 4 (Static)**
 - Modified L4,S2 puzzle that incorporates enemy spawn and deployable pop-up
 - **Note:** When deployed, deployables get a shield that blocks them from getting (+) or (-) collectibles that may try to interact with them

