

Overview of Kiwi: The Mathematical Mage

**Software Engineering COMP 4110
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Project Overview

- Game helps 4th graders learn and review basic arithmetic skills.
- Basic arithmetic is one of the most important fundamentals in mathematics. Practicing these skills can feel monotonous and tedious.
- Game's goal is to make practicing and mastering these skills entertaining, motivating students to learn math.

Overview of Features

- Predators
 - Predators travel along a path to reach and eat Kiwi's eggs.
- Spells
 - The player can select and cast spells to defeat predators at the cost of mana.
- Predator Waves
 - The player defeats waves of predators to earn berries, which are used to upgrade spells.
 - Waves become more difficult over time.

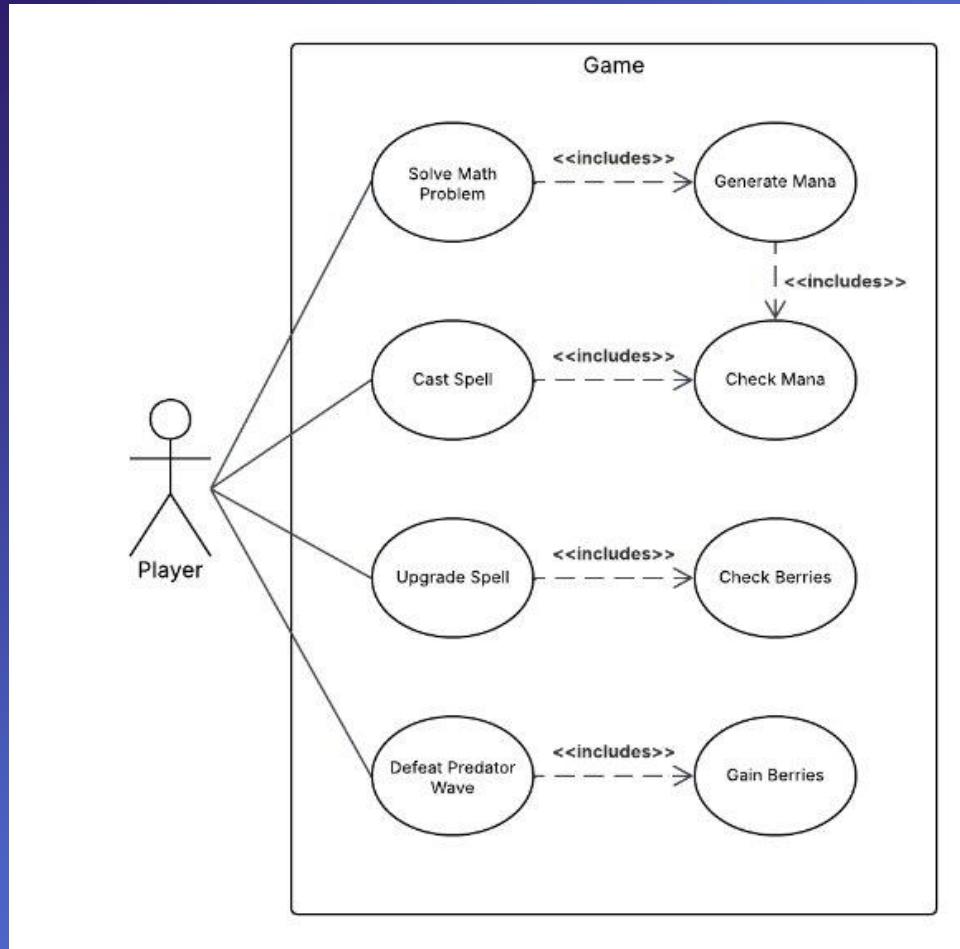
Domain Research p1

- Investigated area in basic 4th grade arithmetic.
- Needed to apply domain knowledge on topic: addition, subtraction, multiplication, and division.

Domain Research p2

- Project Constraints:
 - The game must abide by Common Core State Standards for 4th grade mathematics when generating math problems.
 - The game must not contain content that is considered inappropriate for a 4th grade audience by the Entertainment Software Rating Board.
 - The game must be able to run on lower end school computers without a dedicated GPU.
 - The game must be able to be played locally on the user's device without an internet connection.

Model-based View of System



Use Case Diagram p1

- Solve Math Problem
 - The player solves a math problem to generate mana.
- Cast Spell
 - The player spends mana to cast a spell at predators.
- Upgrade Spell
 - The player spends berries to upgrade a spell.
- Defeat Predator Wave
 - The player wipes out a predator wave and gains berries.

Use Case Diagram p2

- Generate Mana
 - The system provides mana to the player periodically.
 - The system rewards the player with mana for solving math problems.
- Check Mana
 - The system ensures that the player has enough mana to cast a spell.
 - The system ensures that the player does not generate more mana than they can hold.

Use Case Diagram p3

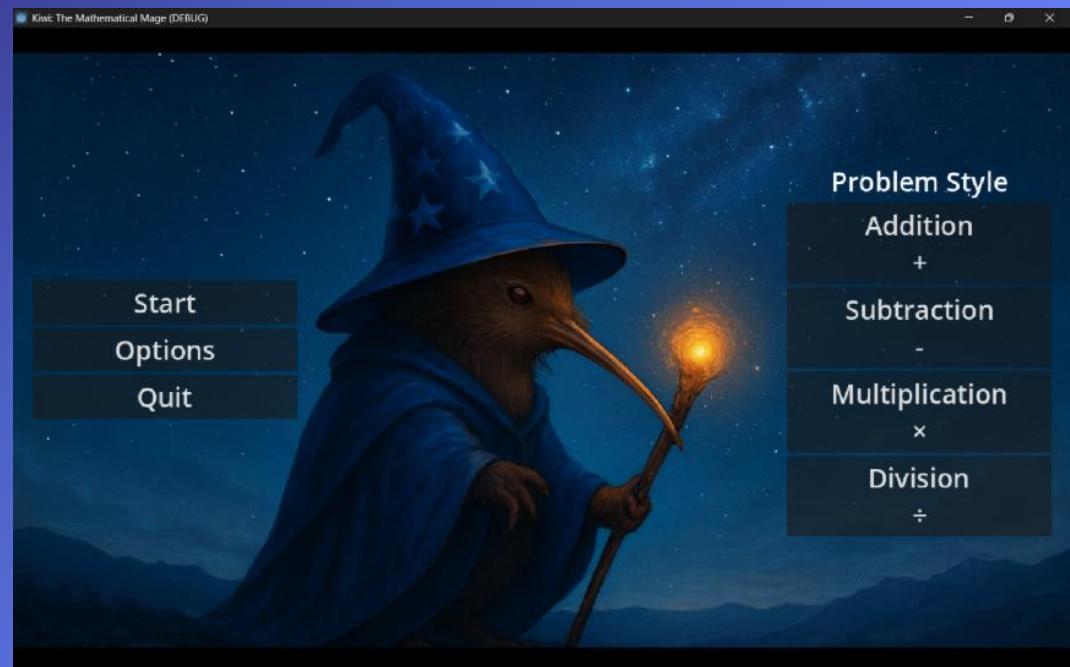
- Check Berries
 - The system ensures that the player has enough berries to upgrade a spell.
- Gain Berries
 - The system rewards the player with berries after defeating a predator wave.

Demonstration

- Game consists of multiple menus and a main game scene.
- Game opens in main menu, where the player can start the game.
- Main game scene requires use of keyboard to enter answers to problems and mouse to select and cast spells.

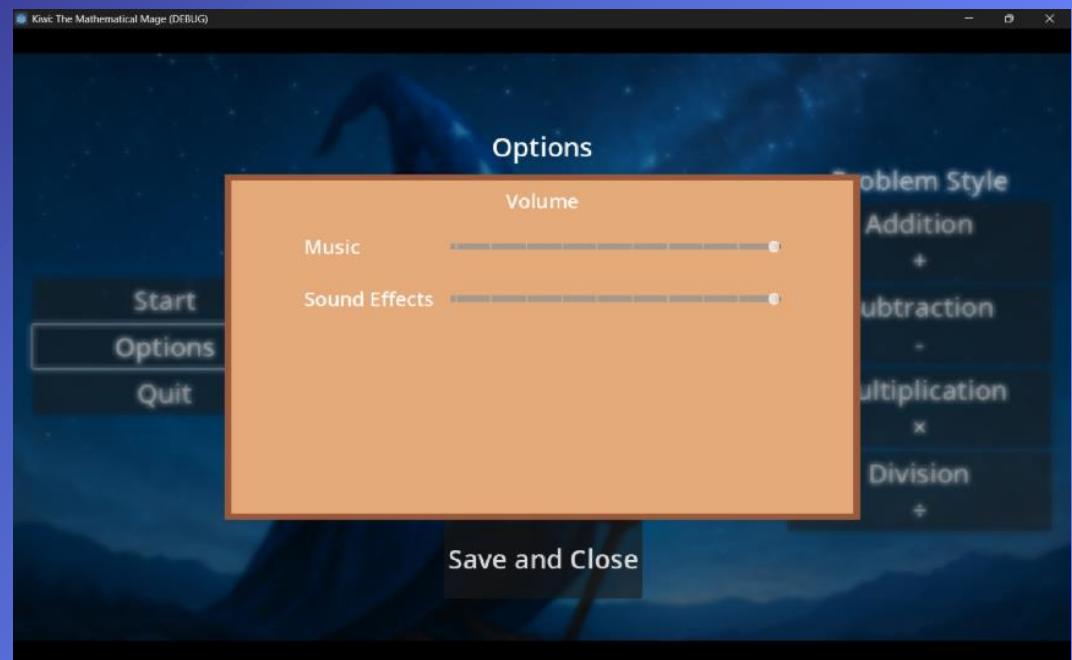
Main Menu

- Opens when game is launched.
- Players can:
 - Start the game
 - Open the options menu
 - Select the math problem type



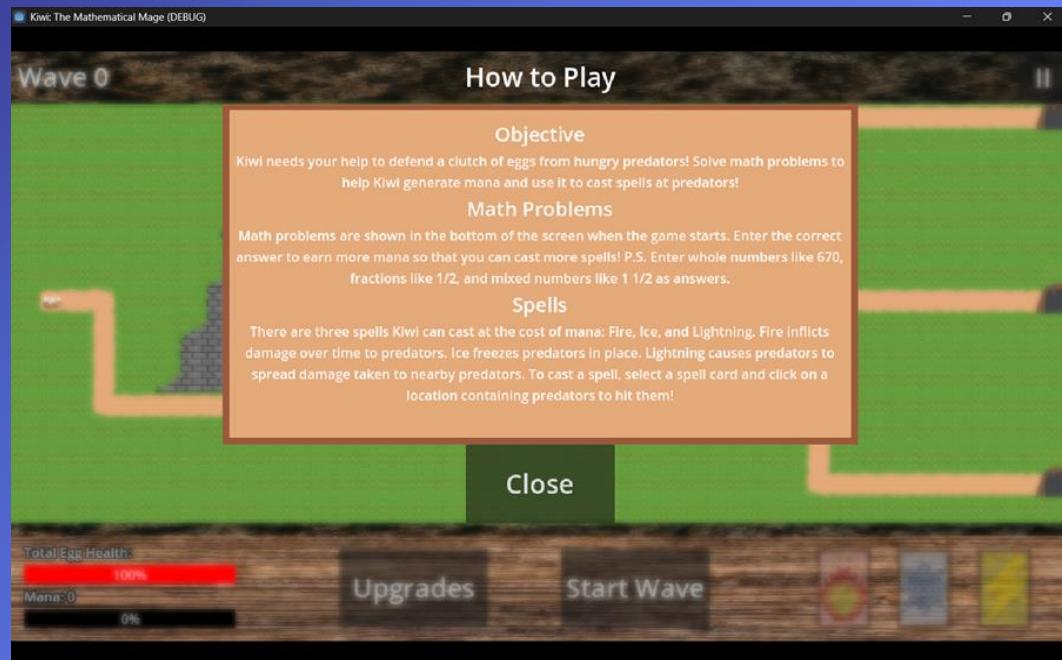
Options Menu

- Can be opened from main menu or pause menu.
- Contains sliders for music and sound effects volume.



How-to-Play Guide

- Shown when game is started from main menu.
- Tells the player:
 - The objective of the game
 - How to solve math problems for mana
 - What each spell is, what are their effects, and how to cast them



Game Scene (Intermission)

- Shown after closing how-to-play guide.
- Displays:
 - Wave count
 - Pause button
 - Total egg health
 - Mana count
 - Upgrades button
 - Start wave button
 - Spell buttons



Game Scene (Wave)

- Shown after wave start.
- Predators spawn from caverns.
- Spells can be cast onto predators.
- Passive mana generation begins.
- Math problems prompted for more mana.



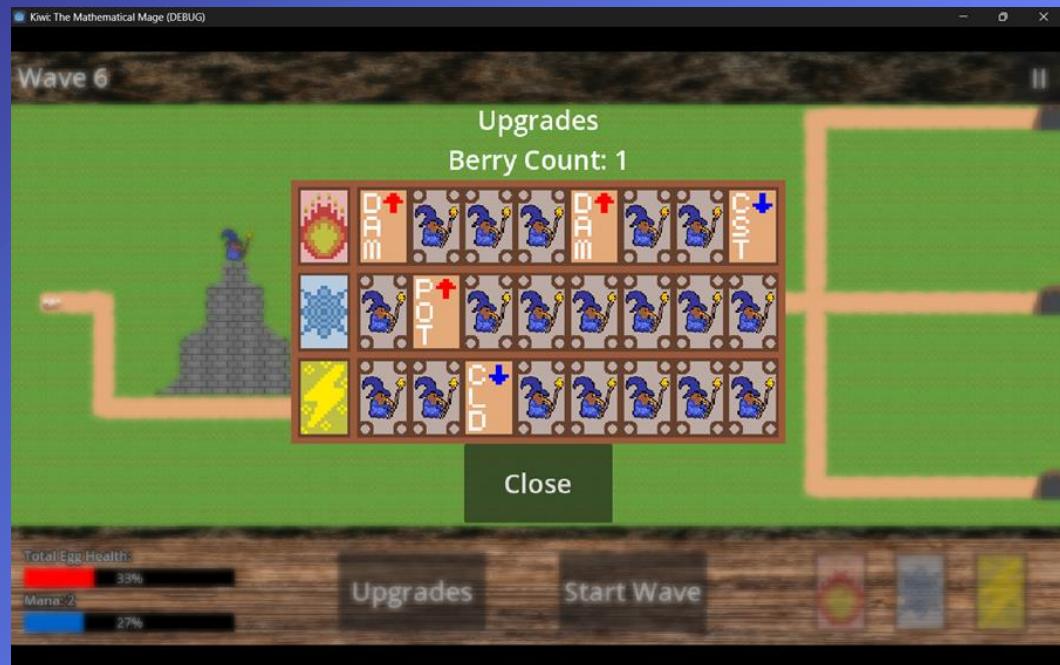
Pause Menu

- Shown when escape key or pause button pressed.
- Freezes game in place.
- Players can:
 - Resume the game
 - Open the options menu
 - Exit the game



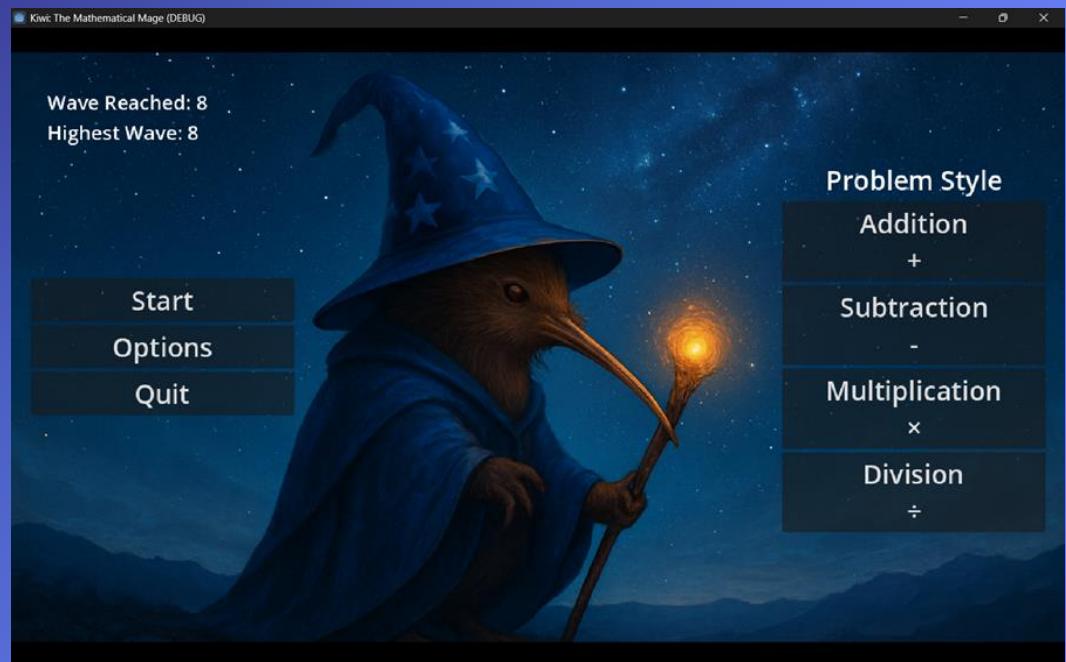
Upgrade Spell Menu

- Can be opened before and after waves.
- Players can:
 - View berry count
 - View active spell upgrades
 - Select spells to upgrade at the cost of berries
 - Close the menu



High Score Display

- Shown on main menu when player loses all eggs to predators.
- Displays:
 - Waves completed
 - Record waves completed
- Allows game to be replayed.



Future Work

- In the future we want to:
 - Tweak the difficult scaling to feel more realistic
 - Add more spells and make them interchangeable
 - Implement other maps
 - Include other types of enemies
 - Implement a high score system related to math problems

Acknowledgements

- We gratefully acknowledge and appreciate the participation of our customer, Name of Customer from Name of Company