

Essential:

1. The player's hardware must allow a Unity game to be played on it.
2. A main menu which will have options to select a level, see the help page, and see the about page.
 - 2.1. The level selection page which will have all the levels listed.
 - 2.2. The help page will have instructions on how to play the game, how each level is won, and how the score is calculated.
 - 2.3. The about page will list information about the game's developers and resources used.
 - 2.3.1. Has a list of the names of developers.
 - 2.3.2. Mentions it was made during the fall 2023 semester as part of Software Engineering I taught by Dr. James Daly at UMass Lowell.
 - 2.3.3. Has a list of external resources used.
 - 2.3.3.1. Unity and the template used
 - 2.3.3.2. kenney.nl and other sites from which assets are used
3. A grid will overlay every level, and it can be toggled on and off.
4. Each level will have a castle on either the left or right side of the screen and one or more cannons on the other side.
 - 4.1. The castle will be made up of lots of blocks.
 - 4.1.1. The center of each block is on a point on the Cartesian coordinate system, while the block itself takes up a square space bound by $(x-0.5, y-0.5)$ and $(x+0.5, y+0.5)$ with (x, y) being the block's coordinate.
 - 4.1.2. The shape of the castle will be randomly generated each time the level is started.
 - 4.1.3. One of these blocks near the middle of the castle is highlighted as containing the enemy leader. The amount of blocks surrounding it is predetermined for every level, increasing for higher levels.
 - 4.2. A number of cannons will be placed on the ground or on top of a hill either to the right or left of the castle.
 - 4.2.1. The number of cannons is predetermined for every level, with there being more in higher levels, but their locations are decided randomly.
 - 4.2.2. Cannons further away from the castle should be at higher y values than every cannon closer to the castle than it.
 - 4.2.3. Each cannon is on a point on the Cartesian coordinate system, with the center of the cannon being exactly on a point.
 - 4.2.4. If there are multiple cannons on a level, only one can fire at a time, in order of closest to the castle to farthest, and the cannon that will be fired next is highlighted.
5. On top of the screen there will be space to enter a linear equation in slope intercept form. Only the coefficients can be entered.

6. Once the player is satisfied with the equation there is a way to confirm it and fire a cannon.
 - 6.1. If the equation entered does not pass through the point the firing cannon is on, nothing happens and the user is asked to try again.
 - 6.2. If successful the cannonball travels until hitting the first castle block along its path and destroying it.
 - 6.2.1. If the cannonball hits at a non-integer value, e.g. (2, 2.3), it still counts as a hit on the block at that point.
 - 6.2.2. If it hits exactly between two blocks, e.g. landing at (2, 2.5), it counts as a hit on both blocks.
 - 6.2.3. If the cannonball hits the ground, another cannon, or flies off the screen without hitting any castle block, nothing else happens.
 - 6.2.4. Destroying one block will not affect any other blocks.
7. The level ends and is considered won when the highlighted block which contains the enemy leader is destroyed.
8. The number of cannonballs fired will be counted along with the time taken to finish the level, both of which will be shown at the end of the level.
 - 8.1. Both will be combined with information about the level (such as blocks surrounding the target block and the number of cannons) to generate a score. The lower the score the better.

Desirable:

1. A scratchpad exists on the right of the screen where the player can freely draw anything, meant to be a place to calculate the equations before entering them.
2. A way to pause a level, which then shows a menu from which the user can resume or quit without saving.
 - 2.1. The player cannot see the level when paused.
3. Hovering over a block or cannon will show its coordinate.
4. There are three difficulty levels which can be selected from the main menu. Level designs will be unaffected, but different stats will be displayed. The only difference between them is how equations will be entered.
 - 4.1. Easy: Several options for equations shown on top of the screen and only one will help the player, the player has to choose one of them.
 - 4.2. Medium: Equation must be entered in point slope form.
 - 4.3. Hard: Equation must be entered in slope intercept form.

Optional:

1. Another option on the main menu which displays the high scores for every level.
2. The level selection screen shows if a level has been played and what the highest score on the level is.

3. Another option on the pause menu where the player can save progress on the level and continue later.
 - 3.1. If selecting a saved level, the player has the option to either resume or start over from the beginning.
4. Animations are added for cannons and cannonballs.
 - 4.1. Cannons rotate after the equation is entered in the direction they are about to fire.
 - 4.2. The cannonball is shown flying along the screen.
 - 4.3. The cannonball explodes after hitting a block, which is then shown getting damaged before disappearing.
5. Different blocks are made of different materials and have different strengths, requiring several hits before being destroyed.
6. A direct hit on a wall, e.g. (2,2), will do more damage to it than an indirect hit like (2,2.3), and that will do more damage than hitting two blocks at once, e.g. landing at (2, 2.5).
7. Different cannons may shoot different types of cannonballs, which are better against different materials.
8. Multiple themes in addition to the default medieval theme.
 - 8.1. Industrial setting with tanks rather than cannons.
 - 8.2. A maritime setting with two ships and cannons mounted onto one of them.
9. Music and sound effects are added.
 - 9.1. A song or several songs are playing in the background.
 - 9.2. Sound effects are played for cannons firing and cannonballs exploding.
 - 9.3. Sound effects are played for clicking options.
 - 9.4. A victory sound is played after the game is won.
 - 9.5. Music is different for different themes.