Test 1: Launch the main interface

Implementation: Started the game webpage

Correct feedback:
1. The welcome image is loaded
2. The tutorials of the game are indicated
3. The HUD area below the canvas should be empty

Tested feedback:
1. The welcome image is loaded
2. The tutorials of the game are indicated
3. The HUD area below the canvas was empty

Result: Passed

Test 2: Enter the game interface

Implementation: Pressed the "enter" or "left shift" key

Correct feedback:
1. Enters the gameplay interface
2. The player's tank appears on the bottom side with health and 2 reloading bars under it.
3. There is one column of concrete bricks on the left side and one column of them on the right side.
4. For every three rows of tiles, there are some wood or concrete bricks appear on the screen.
5. For every three rows of tiles, there are some enemies that appear on the screen.
6. There are values that include scores, health, ammo type, ammo penetration and damage revealed under the canvas.

Tested feedback:
1. Entered the gameplay interface.
2. The player's tank appeared on the bottom side with health and 2 reloading bars under it.
3. There were one column of concrete bricks on the left side and one column of them on the right side.
4. For every three rows of tiles, there were some wood or concrete bricks appeared on the screen.
5. For every three rows of tiles, there were some enemies that appear on the screen.
6. There were values that include scores, health, ammo type, ammo penetration and damage revealed under the canvas.

Result: Passed

Test 3: Move up button

Implementation: Pressed 'w' or 'arrow up' key

Correct feedback:
1. The Player's tank rotates in the up direction and moves up, should not move up above 2/3 of the screen.
2. If the player's tank continues to move up above 2/3 of the screen, everything except the player's tank should move down.
3. If the player's tank hits any obstacles such as bricks or enemy tanks, it does not continue to move.

Tested feedback:
1. The Player's tank rotated in the up direction and moved up, and did not move up above 2/3 of the screen.
2. When the player's tank continued to move up above 2/3 of the screen, everything except the player's tank moved down.
3. When the player's tank hit any obstacles such as bricks or enemy tanks, it did not continue to move.

Result: Passed

Test 4: Move down buttons

Implementation: Pressed 's' pr 'arrow down' key

Correct feedback:
1. The Player's tank rotates in the bottom direction and moves down, should not move out at the bottom edge of the screen
2. If the player's tank hits any obstacles such as bricks or enemy tanks, it does not continue to move.

Tested feedback:
1. Player's tank rotated in the bottom direction and moved down, did not move out at the bottom edge of the screen.
2. When the player's tank hit any obstacles such as bricks or enemy tanks, it did not continue to move.

Result: Passed

Test 5: Move left buttons

Implementation: Pressed 'a' or 'arrow left' keys

Correct feedback:
1. The Player's tank rotates in the left direction and moves left.
2. If the player's tank hits any obstacles such as bricks or enemy tanks, it does not continue to move.

Tested feedback:
1. The Player's tank rotated in the left direction and moves left.
2. If the player's tank hits any obstacles such as bricks or enemy tanks, it did not continue to move.

Result: Passed

Test 6: Move right buttons

Implementation: Pressed 's' or 'arrow right' keys

Correct feedback:
1. The Player's tank rotates in the right direction and moves right.
2. If the player's tank hits any obstacles such as bricks or enemy tanks, it does not continue to move.

Tested feedback:
1. The Player's tank rotated in the right direction and moves right.
2. If the player's tank hits any obstacles such as bricks or enemy tanks, it did not continue to move.

Result: Passed

Test 7: Move the turret

Implementation: Moved mouse

Correct feedback:
The Player's turret rotates towards the direction of the current mouse position.

Tested feedback:
The Player's turret rotated towards the direction of the current mouse position.

Result: Passed

Test 8: Switch to piercer bullet

Implementation: Pressed '1' key

Correct feedback:
The HUD under the canvas updates information about the type, penetration, damage, critical rate and critical damage of the piercer bullet.

Tested feedback:
The HUD under the canvas updated information about the type, penetration, damage, critical rate and critical damage of the piercer bullet.

Result: Passed

Test 9: Switch to explosive bullet

Implementation: Pressed '2' key

Correct feedback:
The HUD under the canvas updates information about the type, penetration, damage and burning damage rates of the explosive bullet.

Tested feedback:
The HUD under the canvas updated information about the type, penetration and damage and burning damage rates of the explosive bullet.

Result: Passed

Test 10: Switch to machine gun

Implementation: Pressed '3' key

Correct feedback:
The HUD under the canvas updates information about the type, penetration, damage and numbers of ammos of the explosive bullet.

Tested feedback:
The HUD under the canvas updated information about the type, penetration and damage and numbers of ammos of the explosive bullet.

Result: Passed

Test 11: Shoot a bullet

Implementation: Pressed 'space' key when the loading bar is as long as the width of the tank

Correct feedback:
1. The Player's tank shoots out a bullet (blue bar for piercer, red bar for explosive bullet and yellow bar for machine gun's bullet) moving toward the direction in which the turret pointed.
2. The width of the reloading bar becomes 0 and it slowly becomes longer, if the player is shooting the machine gun, a chunk of the reloading bar should be decreased.
3. There is one flame that appears on the turret and expands for a period of time.
4. If an enemy is hit by the player's bullet, depending on the impact degree, some health points will be deducted, the health bar will be shorter and the red bar will be longer.
5. If an enemy's health points are not enough, then it should be killed, the body of the enemy will be disappeared and some explosion fire should appear on the canvas. The score should be added and get displayed under the canvas.
6. If the bullet hits a concrete brick, it will explode.
7. If the bullet hits a wood brick, it will explode and the brick will disappear, the machine gun's bullet should not destroy the wood brick until the machine gun is upgraded to a certain level.

Tested feedback:
1. The Player's tank shot out a bullet (blue bar for piercer, red bar for explosive bullet and yellow bar for machine gun's bullet) moving toward the direction in which the turret pointed.
2. The width of the reloading bar became 0 and it slowly became longer, when the player is shooting the machine gun, a chunk of the reloading bar was decreased.
3. There is one flame that appeared on the turret and expands for a period of time.
4. When an enemy is hit by the player's bullet, depending on the impact angle, some health points will be deducted, the health bar will be shorter and the red bar will be longer.
5. When an enemy's health points are not enough, then it should be killed, the body of the enemy will be disappeared and some explosion fire should appear on the canvas. The score was added and got displayed under the canvas.
6. When the bullet hits a concrete brick, it will explode.
7. When the bullet hits a wood brick, it will explode and the brick will disappear, the machine gun's bullet did not destroy the wood brick until the machine gun is upgraded to a certain level.

Result: Passed

Test 12: Pause the game

Implementation: Pressed an 'enter' key or 'left shift' key when the game is running.

Correct feedback:
The game should be paused and the upgrading interface should appear on the canvas.

Tested feedback:
The game paused and the upgrading interface appeared on the canvas.

Result: Passed

Test 13: Switching between two pause interfaces

Implementation: Use the mouse to click the 'key' or 'upgrade' keys.

Correct feedback:
Switch between tutorials and the upgrading interface.

Tested feedback:
Switched between tutorials and the upgrading interface.

Result: Passed

Test 14: Hover on an upgrade option

Implementation: Use the mouse to hover on any upgrade option button.

Correct feedback:
1. If the player's mouse cursor hovers on any button, the button should be zoomed in.
2. If the player's mouse cursor no longer hovers on any button, the button should be zoomed out.

Tested feedback:
1. When the player's mouse cursor hovered on any button, the button was zoomed in.
2. When the player's mouse cursor no longer hovers on any button, the button was zoomed out.

Result: Passed

Test 15: Select an upgrade option

Implementation: Use the mouse to click any upgrade option button.

Correct feedback:
1. The button's height should be decreased.
2. If the player does not have enough coins, the upgrade should not be applied.
3. If the player has enough coins, the upgrade should be applied, and the HUD information related to the upgrading should be updated.
4. After the mouse is released, the height of the button should be increased to the original height.

Tested feedback:
1. The button's height was decreased.
2. When the player does not have enough coins, the upgrade was not applied.
3. When the player has enough coins, the upgrade was applied, and the HUD information related to the upgrading was updated.
4. After the mouse is released, the height of the button increased to the original height.

Result: Passed

Test 16: Resume the game

Implementation: Pressed an 'enter' or 'left shift' key when the game is paused.

Correct feedback:
The game should be continued and the tutorial image should be removed from the canvas.

Tested feedback:
The game was continued and the tutorial image was removed from the canvas.

Result: Passed

Test 17: Enemies' random movements

Condition: There is at least one brick between the enemy and the player's tank.

Correct feedback:
The enemy may randomly move in a direction for a random period of time.

Tested feedback:
The enemy randomly moved in a direction for a random period of time.

Result: Passed

Test 18: Enemies' movements toward the player

Condition: There is no brick between the enemy and the player's tank

Correct feedback:
1. The enemy may randomly move in a direction toward the player for a random period of time.
2. If the enemy's turret approximately aims at the player's tank, it may shoot bullets toward the player, depending on the impact angle, deduct the player's health point. If the health point of the player is equal to or lower than 0, then the game is over.

Tested feedback:
1. The enemy may randomly move in a direction toward the player for a random period of time.
2. If the enemy's turret approximately aims at the player's tank, it may shoot bullets toward the player, depending on the impact angle, deduct the player's health point. If the health point of the player is equal to or lower than 0, then the game is over

Result: Passed.

Test 19: Pick the loot box

Condition: The player's tank collides with the loot box of the killed enemy.

Correct feedback:
1. The player will recover some health points if their health points are not full.
2. The player will be awarded some coins if the loot box is the enemy tank's turret.
3. The player will be upgraded if the loot box is an upgrading award.

Tested feedback:
1. The player recovered some health points if their health points are not full.
2. The player was awarded some coins if the loot box is the enemy tank's turret.
3. The player was upgraded if the loot box is an upgrading award.

Result: Passed

Test 20: Drone's movements

Condition: The player added a drone in the upgrading interface.

Correct feedback:
1. A drone will fly to the player's location.
2. The drone will fly towards an enemy once there is no brick between the player and the enemies.
3. The drone will shoot bullets when it is close enough to the enemy.
4. The drone will fly back to the player's location and reload its ammo.

Tested feedback:
1. A drone flew to the player's location.
2. The drone flew toward an enemy when there is no brick between the player and the enemies.
3. The drone shot bullets when it is close enough to the enemy.
4. The drone flew back to the player's location and reloaded its ammo.

Result: Passed

Test 21: Game over

Condition: The player is killed by the enemies

Correct feedback:
1. The game is stopped.
2. A summary image will be displayed on canvas, showing the score and the current difficulty level of this game.
3. The HUD area will be hidden.
4. The input box area will be displayed under the game canvas to allow the player to record the nickname.

Tested feedback

1. The game was stopped.
2. A summary image was displayed on canvas, showing the score and the current difficulty level of this game.
3. The HUD area was hidden.
4. The input box area was displayed under the game canvas to allow the player to record the nickname.

Result: Passed

Test 22: Replay the game

Implementation: Pressed 'enter' or 'left shift' key when the game is ended

Correct feedback:
1. The record table and "REPLAY" button will be removed.
2. The game canvas and HUD area reveal on the screen.
3. The game starts as same as the Test 1.

Test feedback:
1. The record table and "REPLAY" button were removed.
2. The game canvas and HUD area are revealed on the screen.
3. The game started as same as the Test 1.

Result: Passed

Test 23: Score records interface

Implementation: When the game is finished, the player typed the nickname and then uses the mouse to click the "SUBMIT" button.

Correct feedback:
1. The user's nickname, difficulty level and scores will be added to the database.
2. A new PHP webpage will be launched, so the game canvas and input box will be disappeared.
3. A records table will be revealed, it only shows the top 10 players with their difficulty level and scores.
4. A "REPLAY" button will be revealed under the record table.

Test feedback:

1. The user's nickname, difficulty level and scores were added to the database.
2. A new PHP webpage was launched, and the game canvas and input box disappeared.
3. A records table was revealed, it only showed the top 10 players with their difficulty level and scores.
4. A "REPLAY" button was revealed under the record table.

Result: Passed

Test 24: Replay the game on the PHP webpage

Implementation: The player clicks the "REPLAY" button.

Correct feedback:
1. All images of the previous game will be removed.
2. The game started as same as the Test 1.

Test feedback:
1. All images of the previous game were removed.
2. The game was started as same as the Test 1.

Result: Passed