Invaders - Blocks – Microsoft Arcade

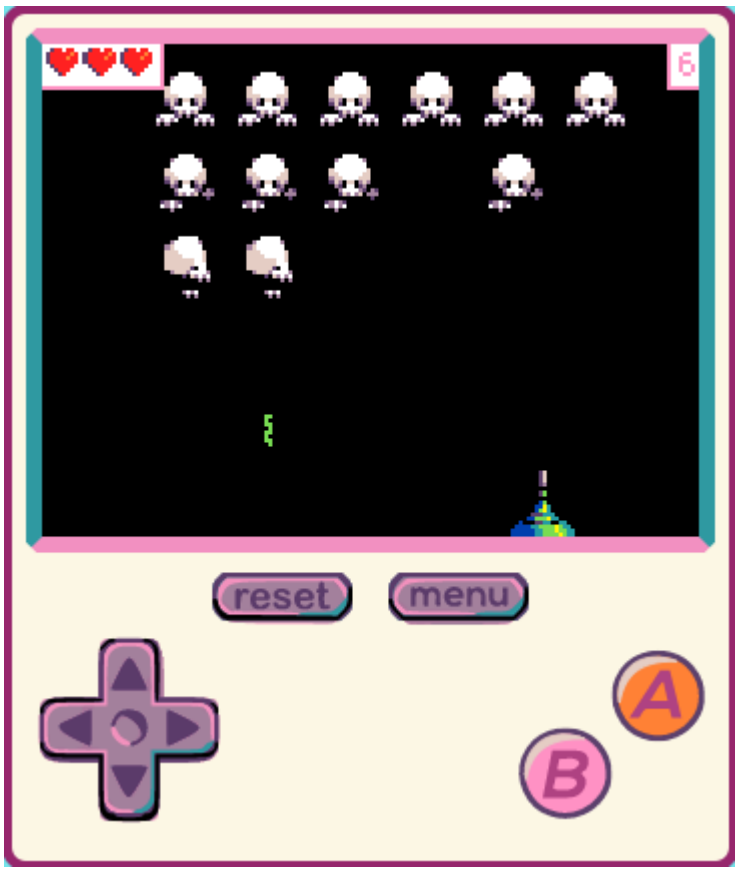
The following instructions will take you through the steps of creating a simple Space Invaders clone where the aim of the game is to destroy wave after wave of aliens before they can land. The player controls a tank that can be moved left and right along the bottom of the screen to “aim” at the aliens. The tanks cannon can be fired by pressing the A button.

A point is scored for each alien that is destroyed.

A life is lost each time the players tank is shot by an alien.

The game ends when all the player lives are lost or an alien touches the tank.

To start the game, serve the ball by pressing A.



Controls

To control the tank, use the left and right direction keys on the console. Alternatively, it may be easier to use the keyboard mappings for the keys as follows. Use the A button to serve the ball.

	Up (↑ or W)				
Left (← or A)		**Right** (→ or D)		**B** (E, X or Enter)	**A** (Q, Z or Space)
	Down (↓ or S)				

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Step 1 – Create the tank and move

The first step in creating Invaders is to setup the tank sprite that the user will control (called mySprite) and the variables that will be used to control the game. You will need to create the following new variables:

- topRow – This is an array that is used to keep track of the top row of aliens
- middleRow – This is an array that is used to keep track of the middle row of aliens
- bottomRow – This is an array that is used to keep track of the bottom row of aliens
- lasers – This is an array that is used to keep track of the lasers that are currently active
- directions – 0 is used to indicate left whilst 1 is used to indicate right
- speed – This is used to speed up the game as the players score increases

Experiment

Using your artistic skills, consider adding a backdrop to make the game more visually interesting.

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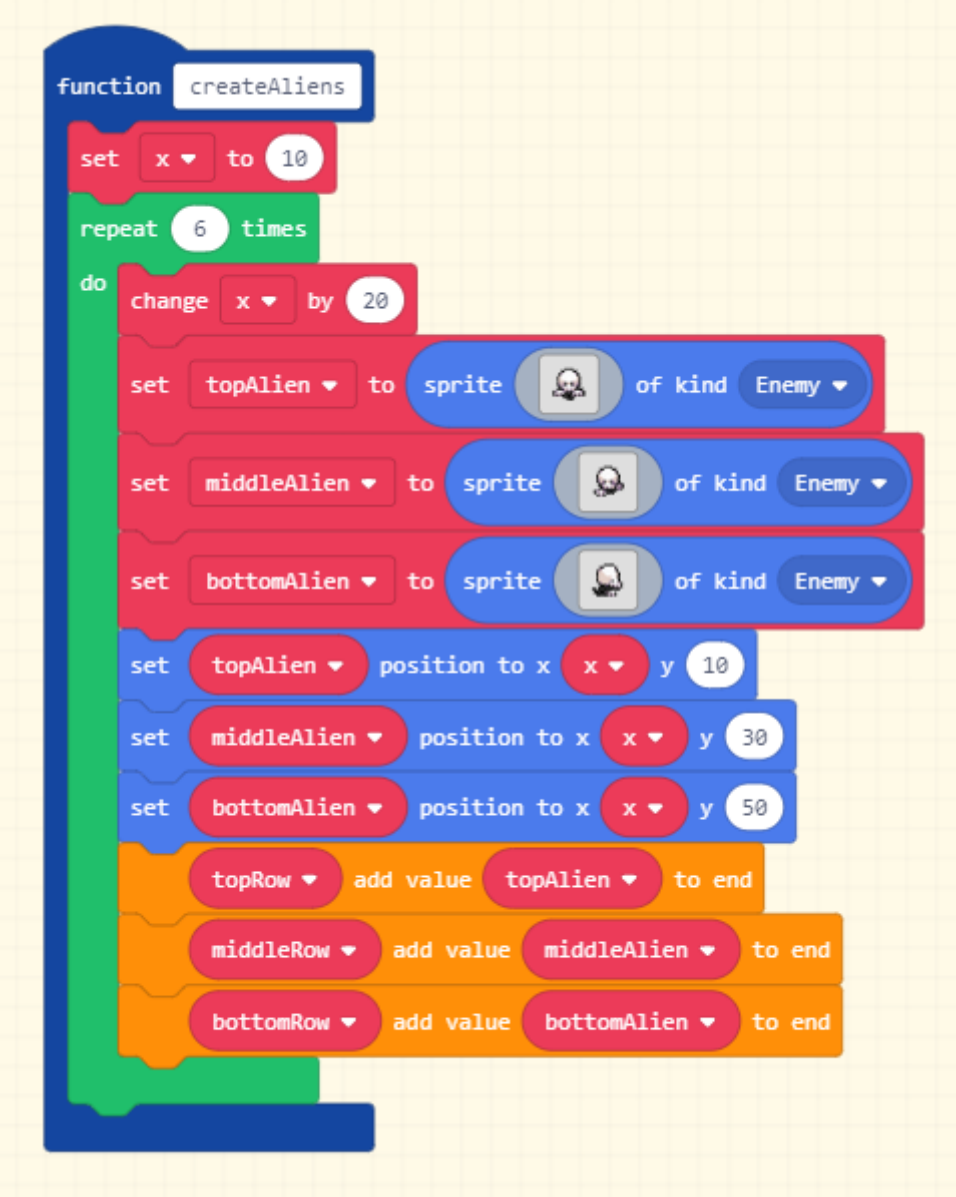
Step 2 – Create the aliens

We will create a new function (under Advanced -> Functions) called createAliens that is used to populate the three alien arrays (topAlien, middleAlien and bottomAlien) with 6 new aliens each.



The createAliens function will need to be called from the “On Start” loop that was created in step 1.

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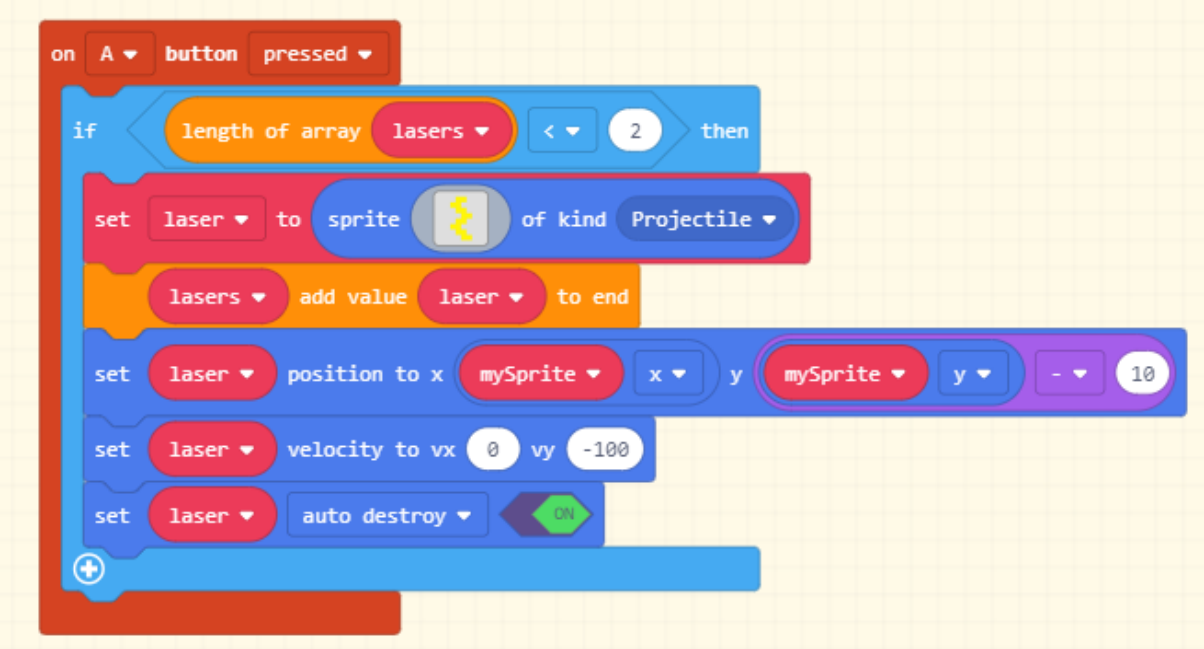
Step 3 – Shoot the aliens

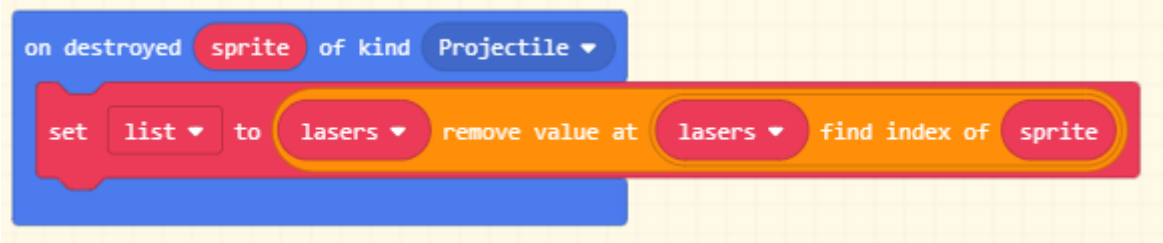
The A button will be used by the player to shoot the laser from their tank. This code will only allow the player to shoot if there are less than 2 lasers currently on the screen.



We need to destroy any aliens that the laser overlaps with (along with destroying the laser itself).

When a laser is destroyed, we also need to remove it from the lasers array to allow the player to shoot again. There are three nested blocks to perform this removal:

1. “set list to”
2. “lasers remove value at ?”
3. “lasers find index of sprite”



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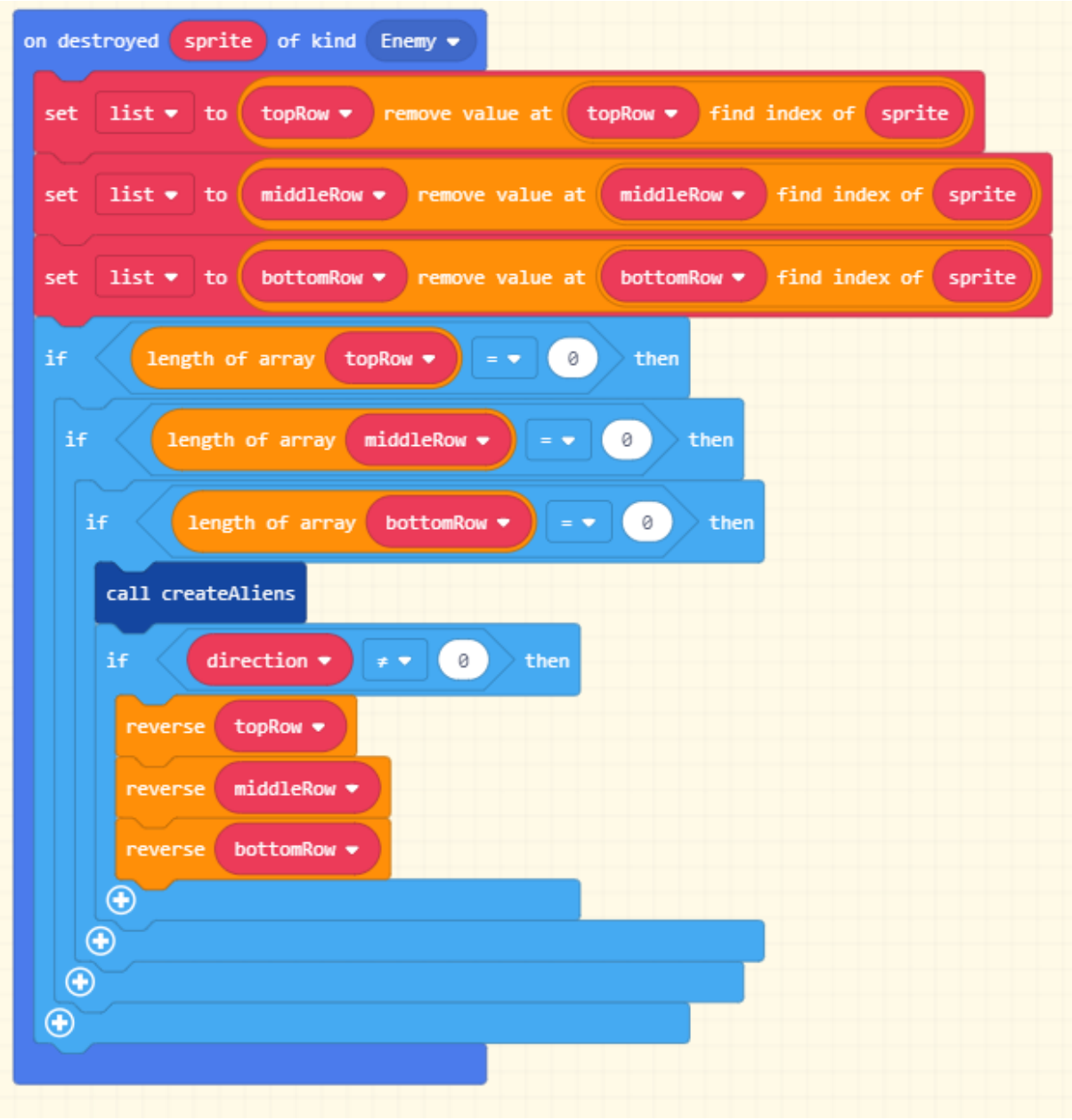
The following code is used to update the aliens arrays by removing the alien that has just been destroyed. Once the alien is removed, we make a check to see if all of the arrays are empty and if they are then we repopulate the arrays. We also make sure that the arrays are correctly ordered based on the direction (this is explained further in step 5- moving the aliens).



Experiment

Try your game out, you should now be able to shoot an infinite number of aliens.
Try different effects for destroying the lasers and aliens.
How would you change the maximum number of lasers that the player can shoot at any one time? Can you set this limit to 3?

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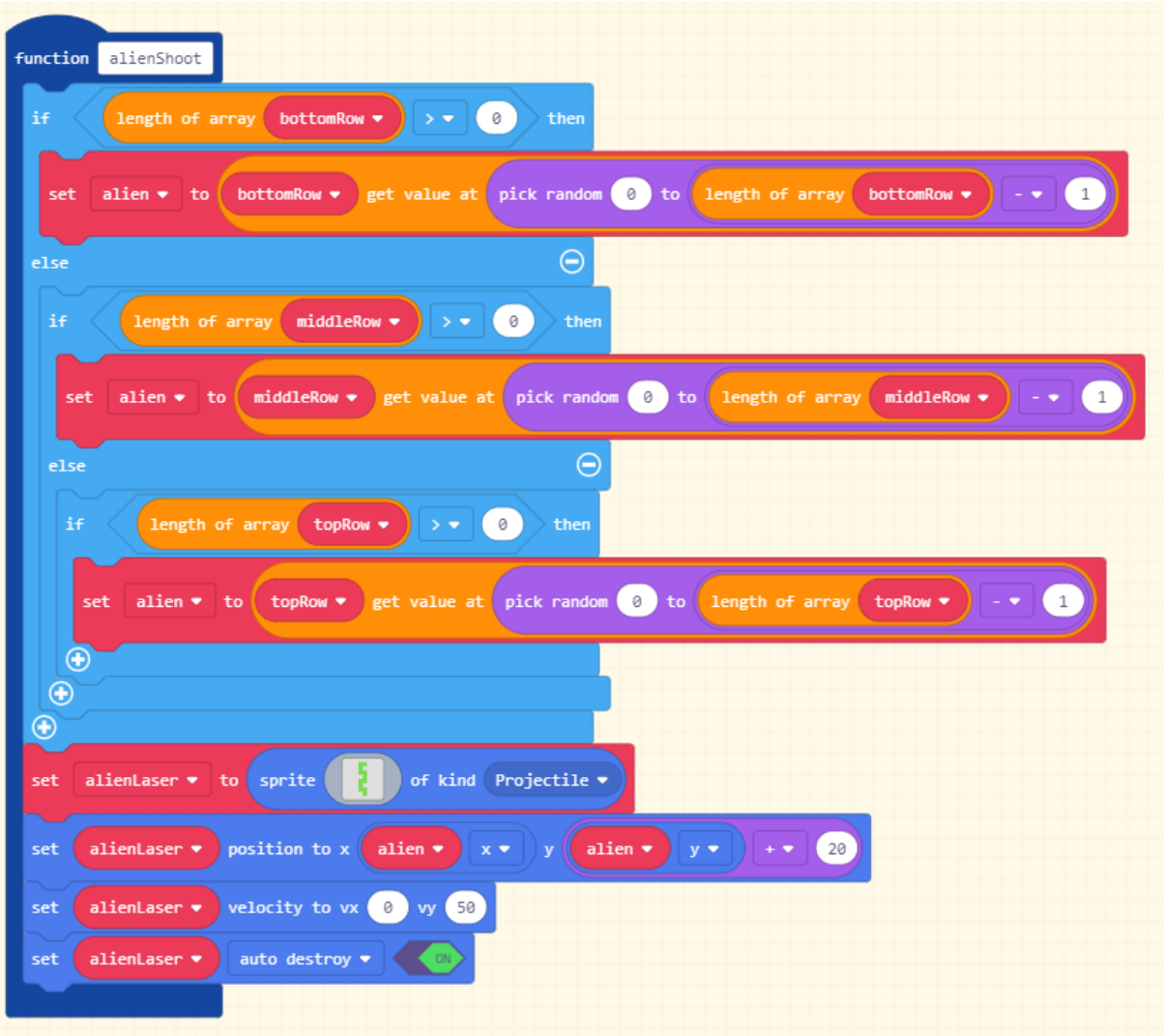
Step 4 – Aliens shoot back

The game is not very challenging as the aliens neither move nor shoot back. This step fixes that. We first start by adding the code to lose a life if the player is hit by a projectile.

Add another function called alienShoot. This will fire a laser from one of the aliens in the lowest row that still contains at least one.



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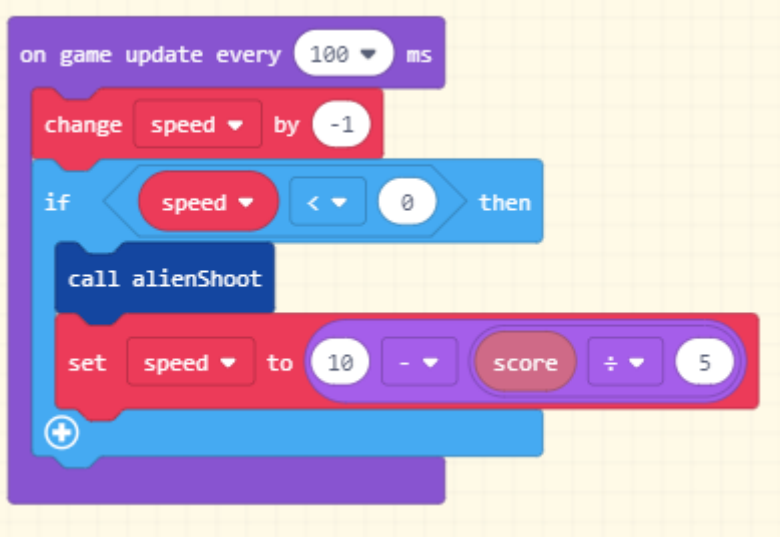
We now need to get the aliens to shoot back periodically. Add the following code to your game.



Experiment

Try adjusting the value that the speed variable starts with in "On Start". What does it do? Change the time in the game update loop. What does it do?

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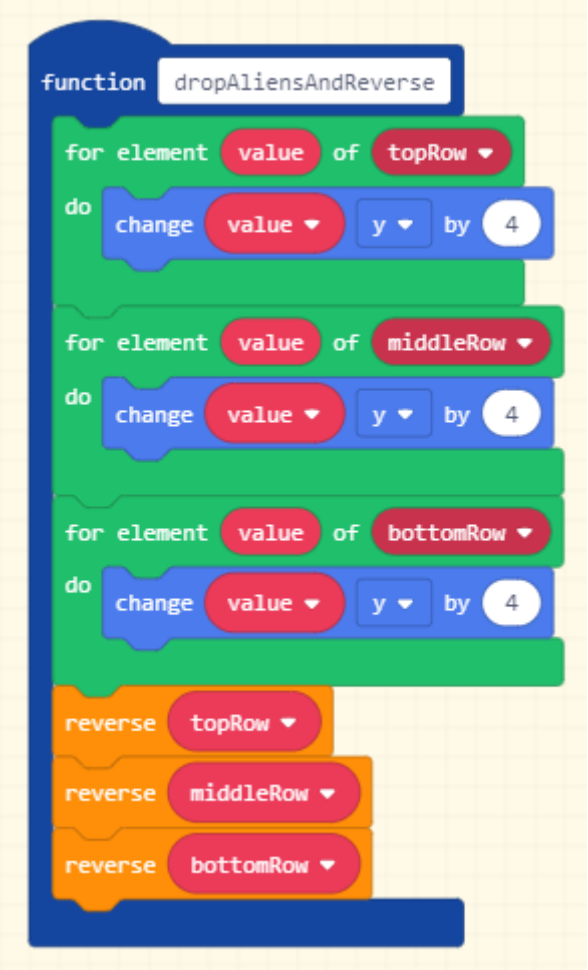
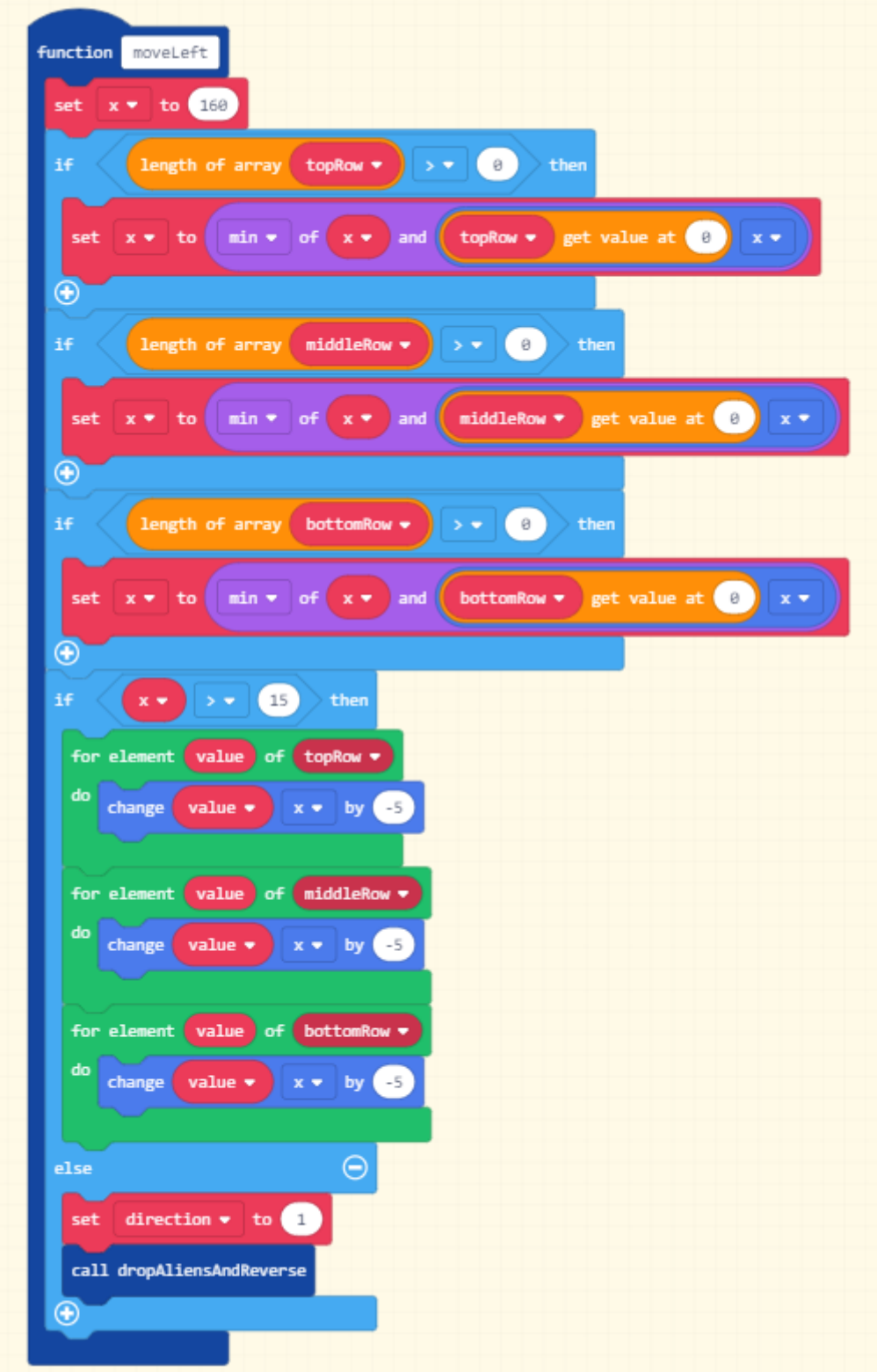
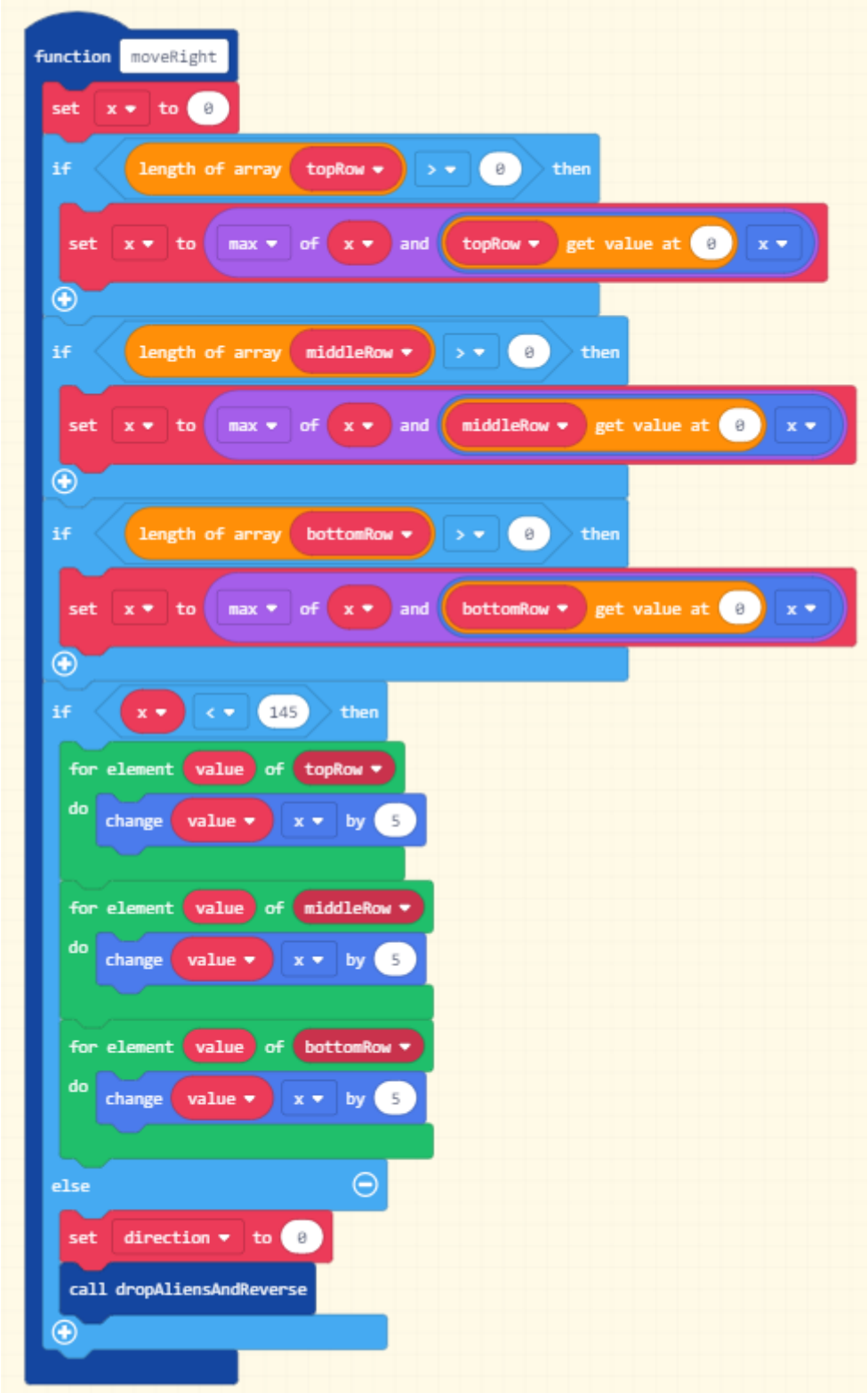
Step 5 – Moving the aliens

Moving the aliens is the most complex part of the program and requires three new functions to be created. The first function below (dropAliensAndReverse) is used to drop the height of all three rows of aliens. It also reverses the arrays so that the first alien to be moved is first in the list. If the aliens are moving left, the left-most alien is first in the list. If the aliens are moving right, the right-most alien is first in the list. This allows us to more easily check for collisions with the edges of the screen in the moveLeft and moveRight functions that will be created next.



The following two functions perform the move left and move right instructions. These are very similar so do the first one and then duplicate it and change the duplicated code as necessary.


function moveLeft
set x to 160
if length of array topRow > 0 then
set x to min of x and topRow get value at 0 x
if length of array middleRow > 0 then
set x to min of x and middleRow get value at 0 x
if length of array bottomRow > 0 then
set x to min of x and bottomRow get value at 0 x
if x > 15 then
for element value of topRow
do change value x by -5
for element value of middleRow
do change value x by -5
for element value of bottomRow
do change value x by -5
else
set direction to 1
call dropAliensAndReverse


function moveRight
set x to 0
if length of array topRow > 0 then
set x to max of x and topRow get value at 0 x
if length of array middleRow > 0 then
set x to max of x and middleRow get value at 0 x
if length of array bottomRow > 0 then
set x to max of x and bottomRow get value at 0 x
if x < 145 then
for element value of topRow
do change value x by 5
for element value of middleRow
do change value x by 5
for element value of bottomRow
do change value x by 5
else
set direction to 0
call dropAliensAndReverse

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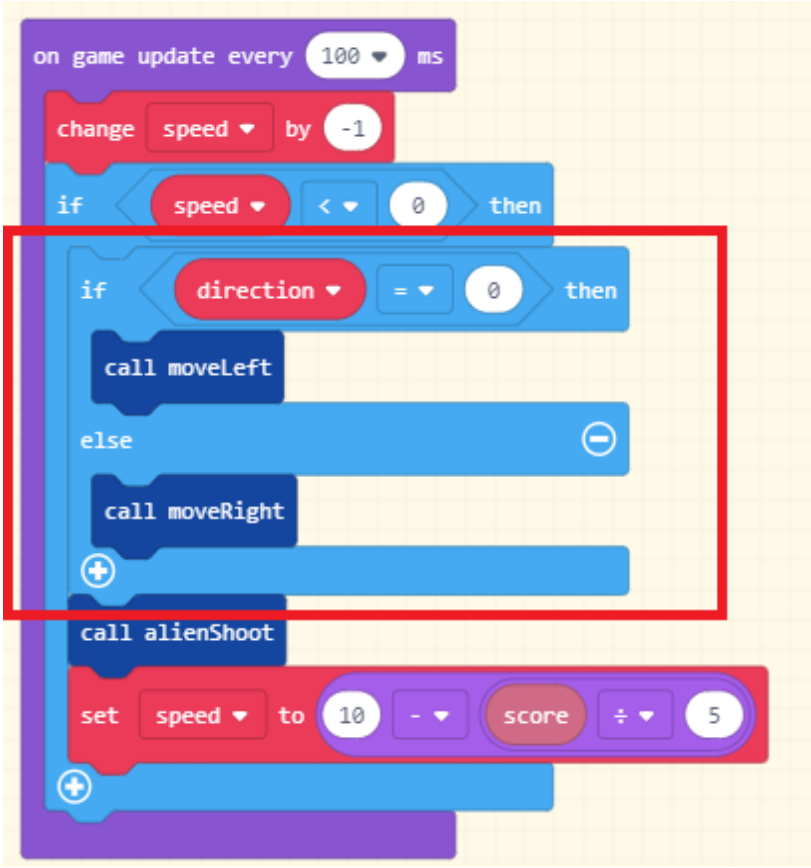
The final code change required is to adjust the game loop that was added in step 4 that allows the aliens to shoot back. As well as shooting, this loop will control the aliens movement to the left and right. Add the code highlighted in red.



Experiment

Try adjusting the value that the speed variable starts with in "On Start". What does it do? Change the time in the game update loop. What does it do?

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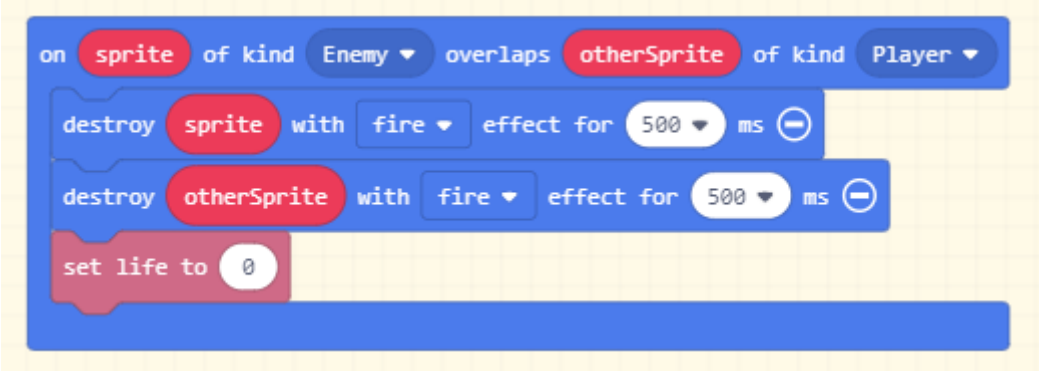
Step 6 – Aliens touchdown

The final step is to add the alien touchdown code. If an alien touches down, then the game ends. Add the following code to your game.



Extending the game

There are many ways that this game can be extended. Just a few ideas are given below.

- Put in a custom background rather than just the plain black one.
- Animate the players tank, aliens and lasers like you have in previous games.
- Award an extra life every time the player clears all of the aliens.