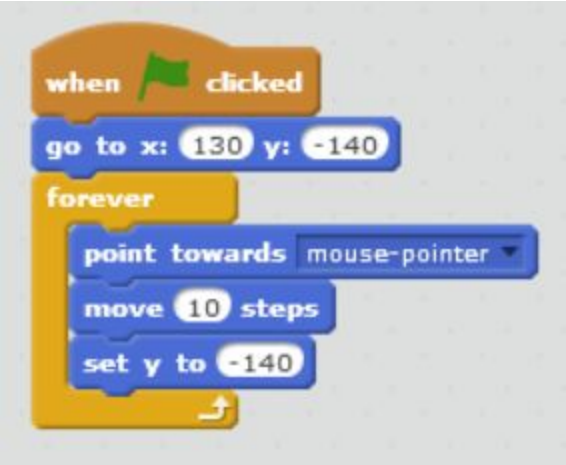
Lesson 4 - Brick Breaker

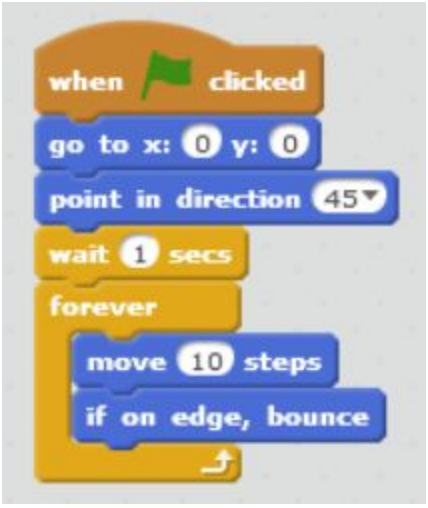
1. Create a moving paddle:
    a. Start a new Scratch program and delete the cat sprite (right click>delete or use the scissor button).
    b. Add a background:
        i. Click **Choose a backdrop from library** and select any backdrop.
    c. Add the paddle sprite:
        i. Click **Choose sprite from library**.
        ii. Find and select Paddle (look under Sports).
    d. Add the code:
        i. Make your paddle move with the following code:



        ii. Description:
            1. Start moving when the green flag is clicked.
            2. Move to the starting position at the bottom of the screen.
            3. Repeat forever:
                a. Head towards wherever the mouse is located.
                b. Move 10 spaces towards the position of the mouse.
                c. We only want the paddle to move side-to-side, so keep the y-coordinate set to -140.
    e. SAVE and RUN
2. Add a bouncing ball:
    a. Add a ball sprite:
        i. Click **Choose sprite from library**.
        ii. Find and select your favorite ball to add (look under Sports again).
    b. Resize the ball sprite:
        i. Click the **Shrink** tool (located on the banner at the top of the screen - looks like 4 arrows pointed towards each other).
        ii. Then click on the ball sprite in the stage area as many times as is needed until the ball looks like it is the right size.

iii. You want the ball to be no larger than about ½ the width of the paddle, but not too small (the smaller you make it, the harder the game will be).

c. Now add the following code to make the ball bounce around:



i. Description:
   1. Start the ball animation when the green flag is clicked.
   2. Go to the center of the screen.
   3. Start by aiming at the 45° direction (remember that in Scratch, up is 0°, right is 45°, down is 180° or -180°, left is -45°).
   4. Wait a second for the game and the player to get ready.
   5. Repeat forever:
      a. Move 10 spaces in the direction the ball is aiming.
      b. Bounce off an edge of the screen if touching an edge.

d. Next add the following code to broadcast a bounce if the ball hits the paddle:

i. Add the code inside the forever loop of the ball script we just added, right under the **if on edge, bounce** snippet.

ii. You'll have to create a new message called "Bounce" to broadcast by using the dropdown menu in the **broadcast** code snippet.

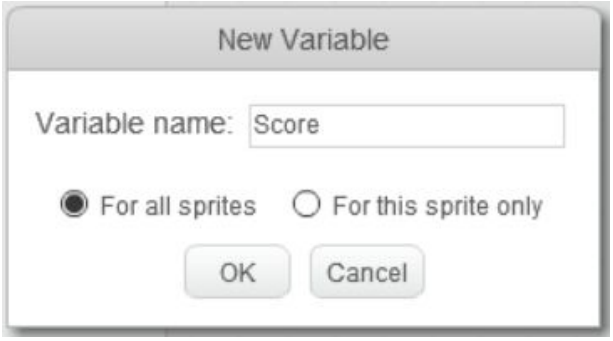
iii. Description:
   1. If the ball is touching the paddle, broadcast the Bounce message so it knows to bounce.

e. Now add the following code to get the ball to bounce:

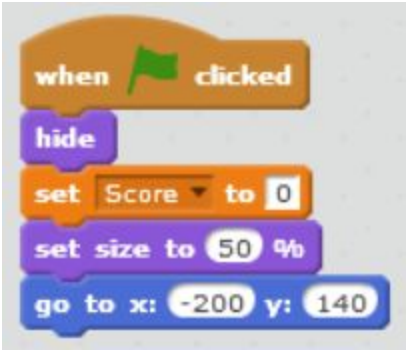
i. Description:
   1. If the ball hears the Bounce message being broadcast, we want it to bounce in a “reflected” direction to where the ball was pointing.
      a. If we subtract the current direction of the ball (say 135°) from 180°, then it will bounce the ball off the object it hit like a reflection in a mirror changes the angle of an image (180° - 135° = 45°).

f. SAVE and RUN

3. Add some bricks to break:
   a. Add a brick sprite:
      i. Click **Choose sprite from library**.
      ii. Find and select the Button2 sprite (look under Things).
   b. Create a Score variable to keep track of your score:
      i. Select the **Data** category under scripts.
      ii. Click **Make a Variable**.
      iii. Name the variable “Score” and make sure it is set **For all sprites**.



   c. Add the following code for the brick:



i. Description:
   1. Reset the brick when the green flag is clicked.

2. Hide the brick so we don't see it (we're going to make clones).
3. Reset the game score to 0.
4. Reduce the size of the brick to 50%.
5. Go to the starting position.

d. Let's clone the brick:
   i. Cloning a single brick saves you the headache of creating a separate brick sprite for each brick in the game (there's 28 - that would be a lot of sprites to create!).
   ii. Add the following code to the brick script space to tell it what to do when cloned:

1. Description: When a clone is created, make the cloned brick visible.

   iii. Now add the following code to clone the brick in a pattern:
1. Add the code at the bottom of the first brick script we just added, right under the **go to x: -200 y: 140** snippet.

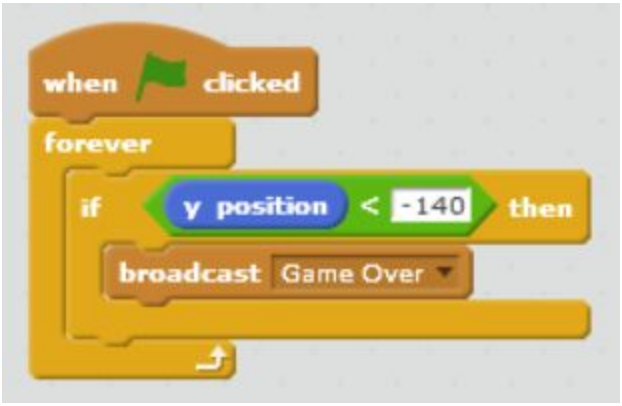
2. Description:
   a. We want 4 rows each with 7 bricks, so...
   b. Repeat 7 times: create a clone of the brick and increase the x-coordinate by 65 units. This is one row of bricks.
   c. Now we want to repeat creating a row 4 times, but we also have to reset the x-coordinate back to the starting value and move the new row down 30 units for each new row.

   iv. Now add the following code to the brick:
1. Add the code to the bottom of the **When I start as a clone** section.

2. Description:
    a. Always be checking for if the ball touches this brick clone and if it does:
        i. Broadcast a Bounce message so the ball will bounce.
        ii. Increase the game score.
        iii. Get rid of this brick clone.

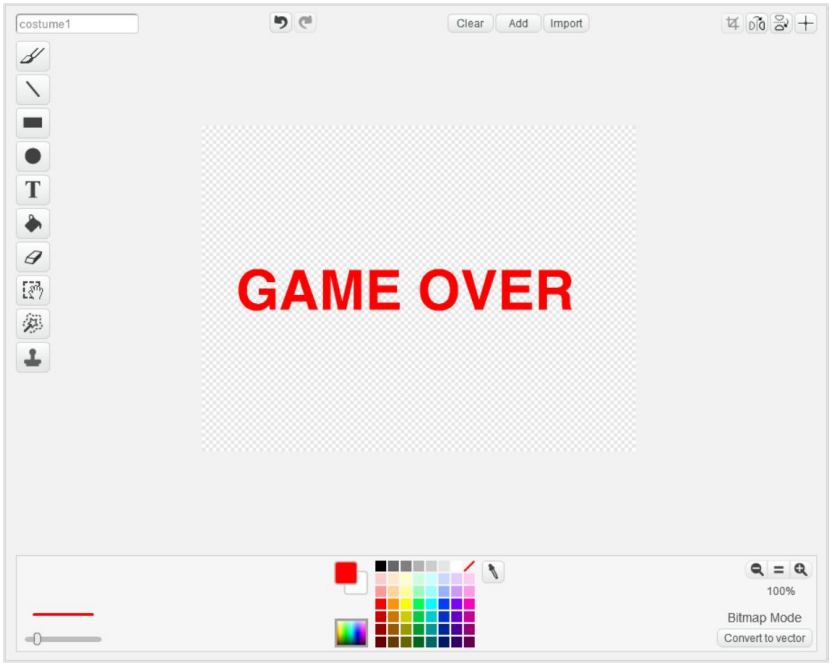
e. SAVE and RUN

4. Add the final touches:
    a. Our game is too easy without the ball being able to go out of bounds, so let's add that:
        i. Add the following code as a new block in the ball's script space:
            1. You'll have to create a new message called "Game Over" to broadcast by using the dropdown menu in the **broadcast** code snippet.

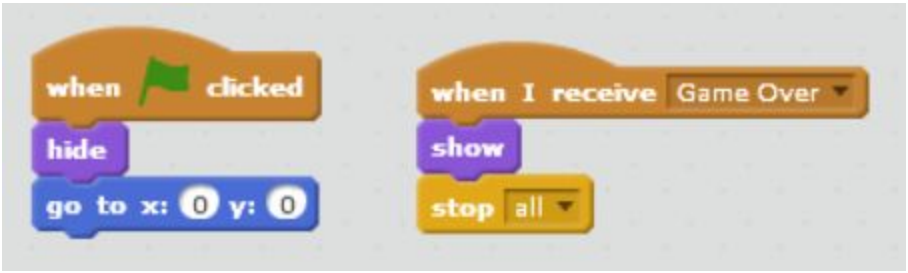


            2. Description:
                a. When the green flag is clicked, always be checking if the y-coordinate of the ball is less than -140.
                b. If the ball travels below -140, broadcast the Game Over message.
    b. Now create the game over screen:

i. Create the sprite:
    1. Click **Paint new sprite**.
    2. Select the **Text** tool in the costumes area.
    3. Change the color of the text with the color pallet at the bottom of the screen.
    4. Now click in the paint area and type “Game Over.”
    5. Center the text by selecting the **Set costume center** button (top right corner) and clicking in the center of the text.
    6. Increase the size of the text with the **Grow** tool (looks like 4 arrows pointed out).
    7. The sprite should look something like this:



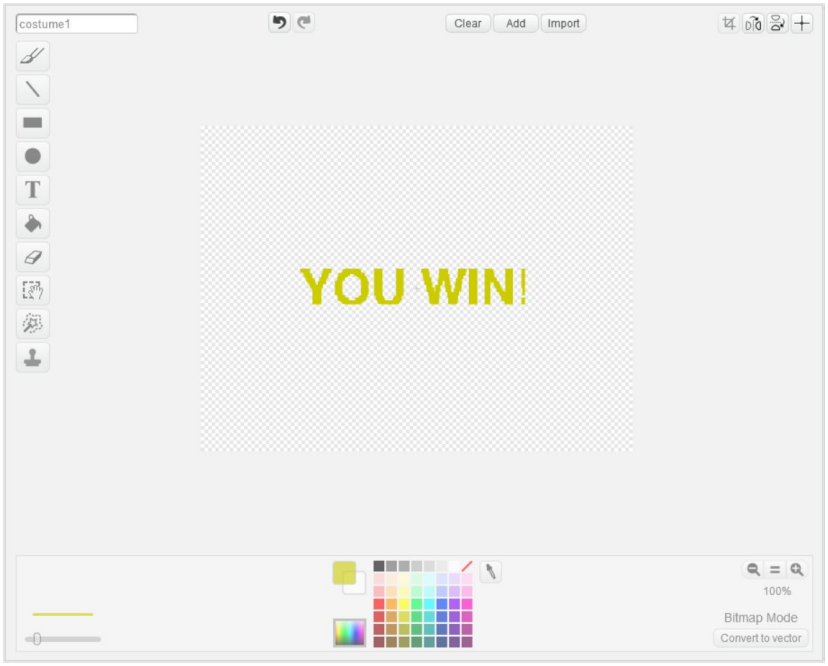
ii. Add the following code:



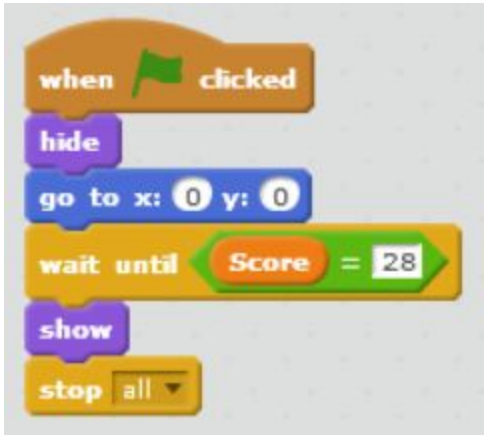
    1. Description:
        a. When the green flag is clicked, hide the game over sprite and center it in the screen.
        b. When the game over message is received, show the game over message and stop all other animation in the game.

c. But what if we win? Let’s make a game won screen:
    i. Create the sprite:

1. Click **Paint new sprite**.
2. Select the **Text** tool in the costumes area.
3. Change the color of the text with the color pallet at the bottom of the screen.
4. Now click in the paint area and type “You win!”
5. Center the text by selecting the **Set costume center** button (top right corner) and clicking in the center of the text.
6. Increase the size of the text with the **Grow** tool.
7. The sprite should look something like this:



ii. Now add the following code:



1. Description:
    a. When the green start flag is clicked, hide the win message, center it in the screen, and wait.

b. If the score reaches 28 (there are 28 total bricks, so all of them have been broken), show the win message and stop all other game animations.

5. SAVE and PLAY!!! We're done!
    a. Other ideas:
        i. Add sounds (game music, ball bounce sound effects, game over sound effects, game won sound effects, etc.).
        ii. Add visual effects (ghost effects and/or rotation to brick entrance/exits, make the paddle flash when the ball bounces off it, add a trail to the ball, add animated entrances to the game over and game win messages, etc.).