# Asteroids Lesson Plan

# Academy of Code

## Table of Contents

# 1 Asteroids Lesson Plan

Students are assumed to have covered basic course in Scratch and have used messages, clones, variables, random numbers , and if statements before. The use of movement keys and an understanding of the coordinates system in Scratch.

## 1.1 The purpose of the lesson

The purpose of the lesson plan is to allow students to develop, in Scratch, an existing Arcade Game produced when video games first started in the early 1980's. Example of the original game can be found online at:

http://www.classicgaming.cc/classics/asteroids/play-asteroids

## 1.2 Resources

The Scratch resources which exist on the Studio: Space Game under account "GrahamROI" are structured into:

- Asteroids Part 1: Movement
- Asteroids Part 2: Shooting
- Asteroids Part 3: Asteroids Artwork
- Asteroids Part 4: Asteroid Explosions
- Asteroids Part 5: Spaceship
- Asteroids Part 6: Complete Game
- Asteroids Part 7: Sounds

An Asteroids Resource Pack can be found on studio:
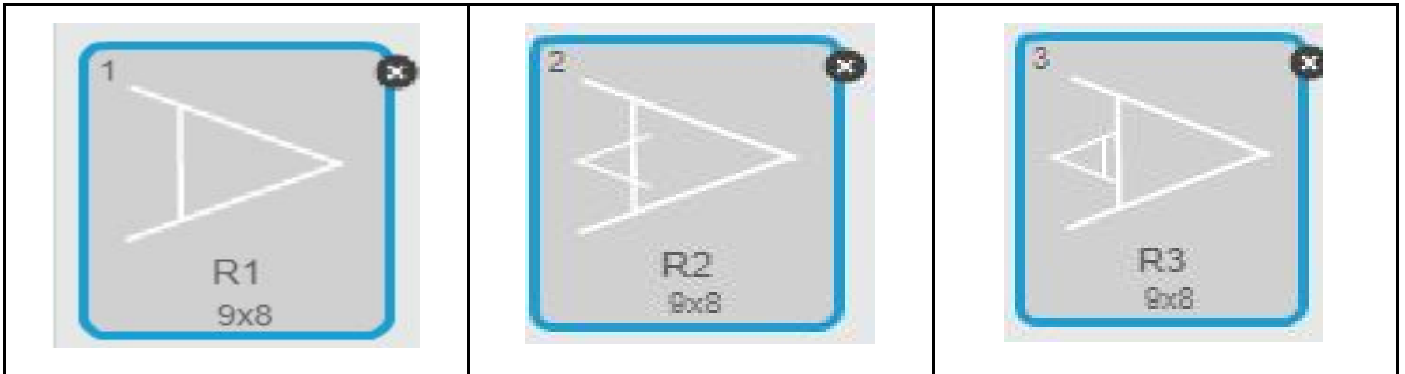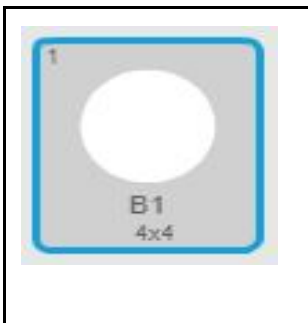
Asteroid: Resource Pack

Sound resources can be found online: http://www.classicgaming.cc/classics/asteroids/sounds
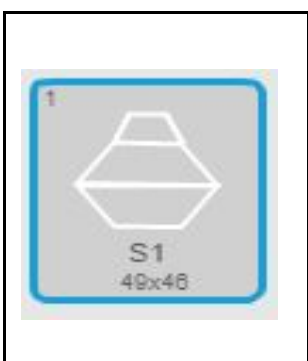
# 2 Asteroid Class Work - Artwork

## 2.1 Rocket



## 2.2 Bullet



## 2.3 Asteroids



## 2.4 Spaceship

# 3 Asteroid Class Work - Coding

## 3.1 Rocket Movement & Rotation

We need the rocket:

- to move forward key pressed 'Up Arrow'
- to turn left
- to turn right
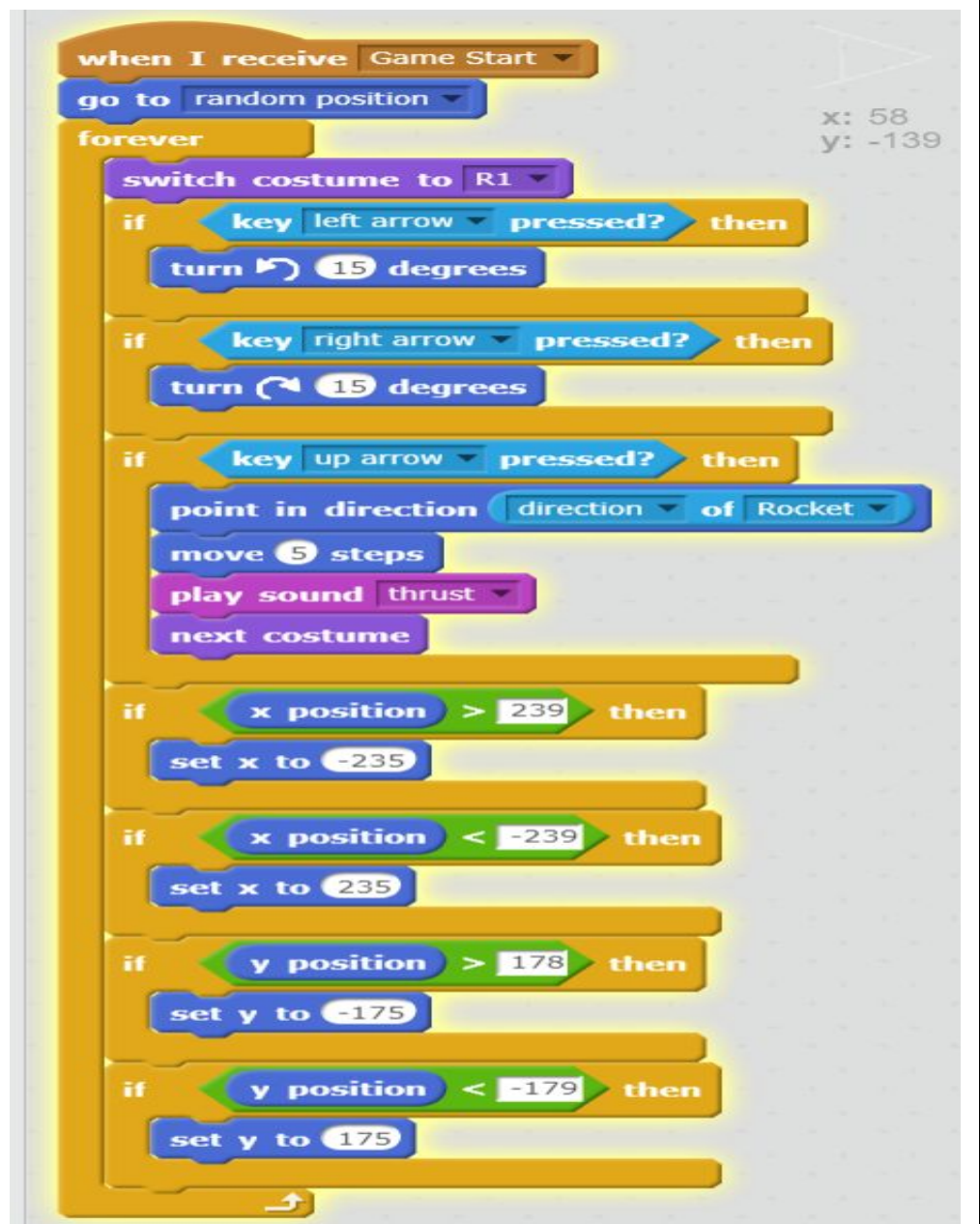- to  move across the Scratch stage

| Essentially | |
|---|---|
| [1] Game Start | |
| [2] Move to random position | |
| [3] Ensure main rocket costume is used. | |
| [4] Left and right arrows to rotate left and right. | |
| [5] "Up Arrow" move in direction with thruster sound and switch costume to show thrusting. | |
| [6] Move across boundary. | |

```
when I receive Game Start
go to random position
forever
    switch costume to R1
    if  key left arrow pressed? then
        turn ↰ 15 degrees
    if  key right arrow pressed? then
        turn ↱ 15 degrees
    if  key up arrow pressed? then
        point in direction  direction  of  Rocket
        move 5 steps
        play sound thrust
        next costume
    if  x position > 239  then
        set x to -235
    if  x position < -239  then
        set x to 235
    if  y position > 178  then
        set y to -175
    if  y position < -179  then
        set y to 175
```

x: 58
y: -139

## 3.2 Rocket Shooting

After creating the artwork for this, white circle as a sprite named Bullet:

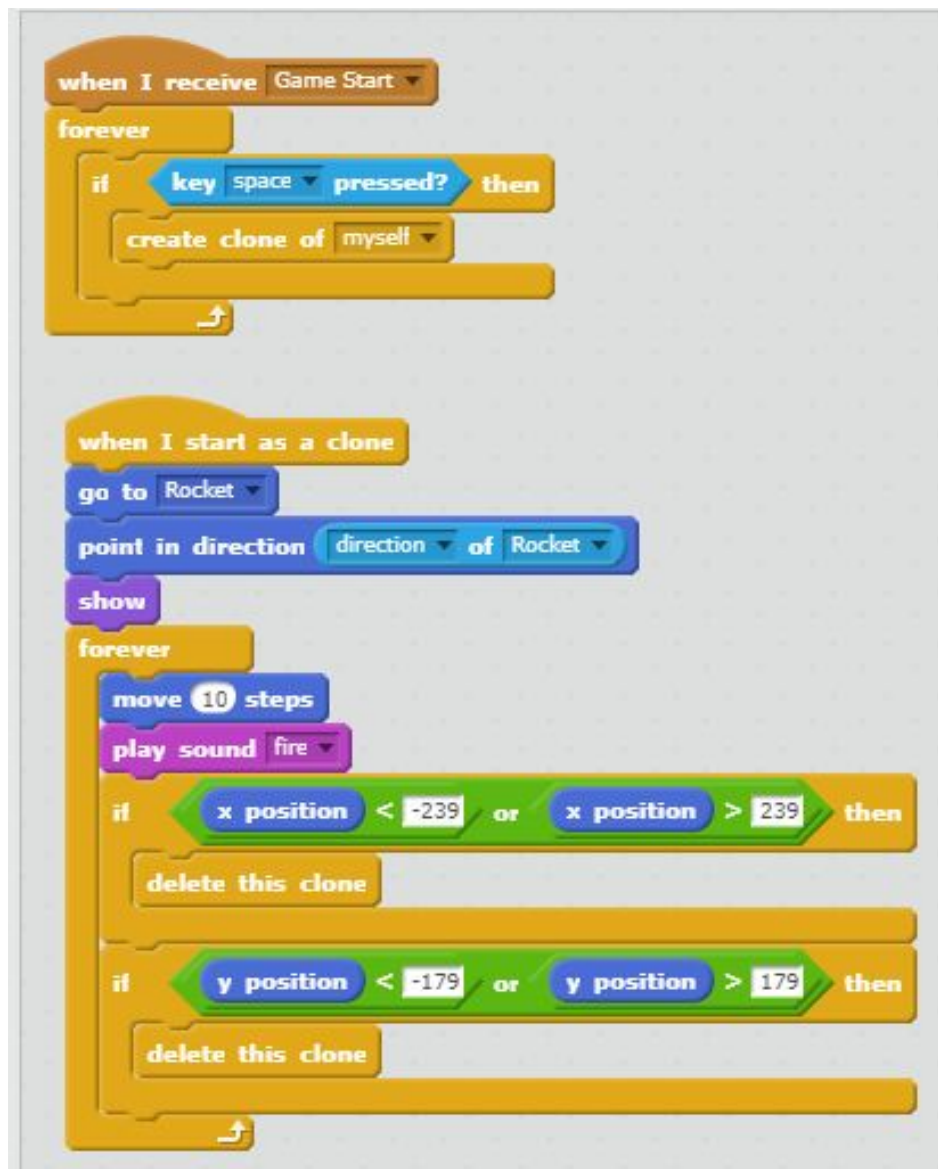We need to check when the Game is started whether the fire key 'spacebar' has been pressed.

Then we make a clone of the the Bullet.

When the Bullet starts as a clone, we must go to the position of the Rocket and fire in the direction of the Spaceship.

Move the bullet on 10 steps and use the sound of Fire associated with the key press.

If the bullet crosses the boundary we delete the clone. (You may wish to change this as you extend your Game)

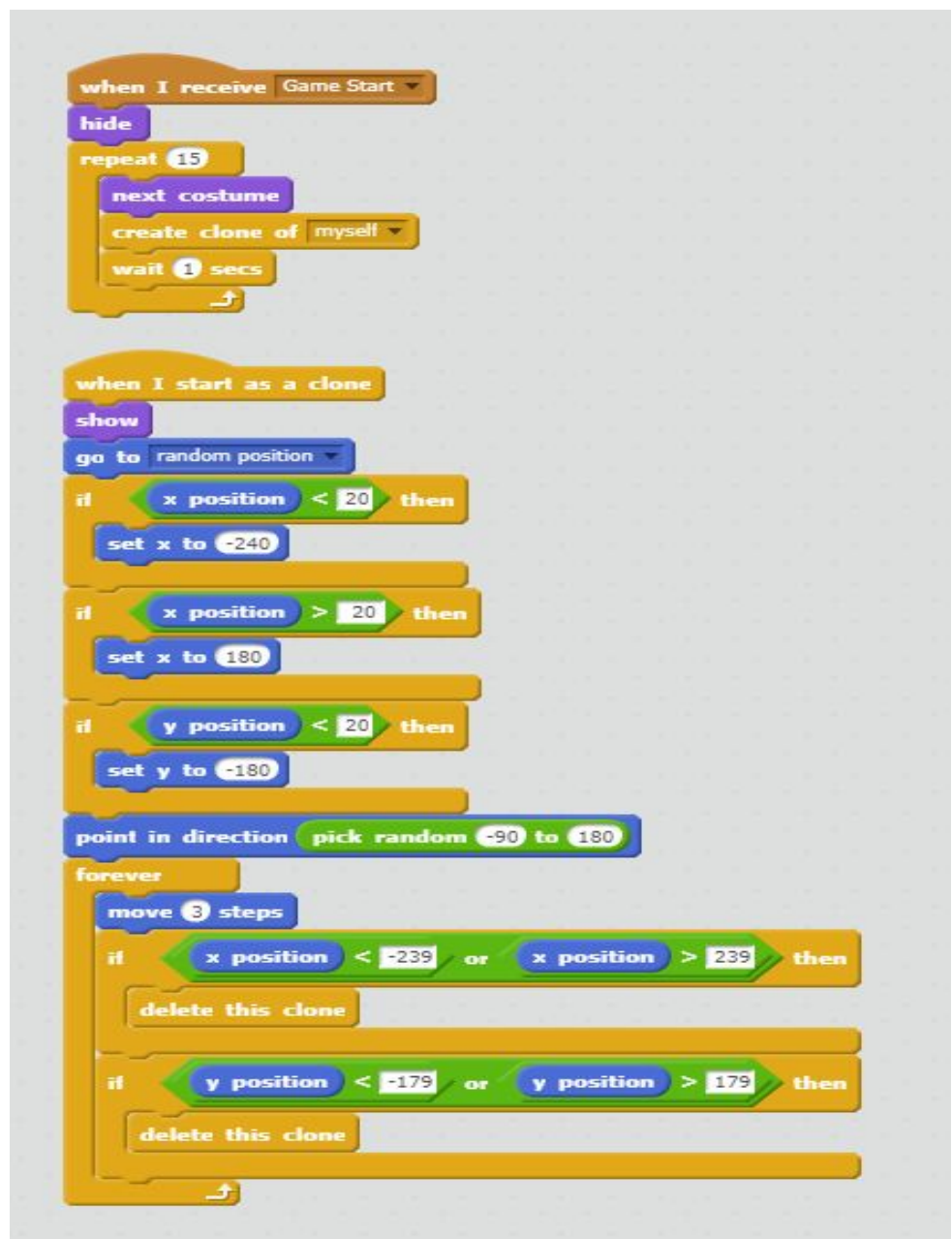Typically one key press will generate 4-5 cloned Bullets.

```
when I receive Game Start
forever
    if  key space pressed?  then
        create clone of myself
```

```
when I start as a clone
go to Rocket
point in direction  direction of Rocket
show
forever
    move 10 steps
    play sound fire
    if  x position < -239  or  x position > 239  then
        delete this clone
    if  y position < -179  or  y position > 179  then
        delete this clone
```

## 3.3 Asteroid Movement

When I receive 'Game Start', need to hide the original sprite and then create as many cloned asteroids as we need for the first round.

In the artwork for the Asteroids we have three costumes.

When each Asteroid starts as a clone we place in a random position, trying to make sure that the Rocket sprites is not landed on at the start.

We need to make sure that each Asteroid also moves with its own random position and then moves about the canvas until either shot or moves off the canvas.
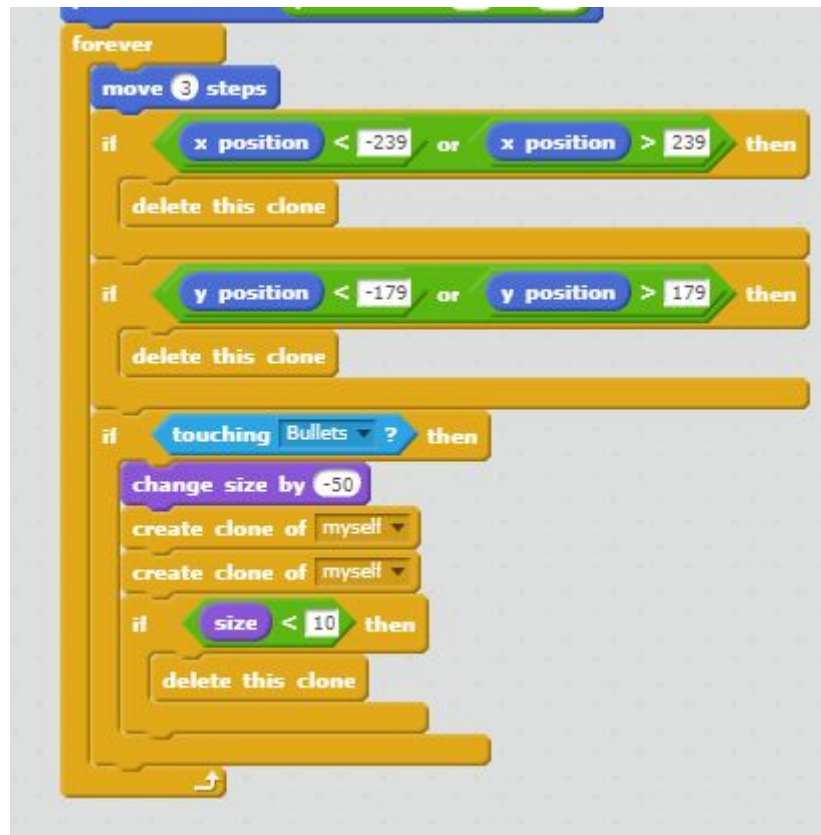
```
when I receive Game Start
hide
repeat 15
    next costume
    create clone of myself
    wait 1 secs


when I start as a clone
show
go to random position
if  x position < 20  then
    set x to -240
if  x position > 20  then
    set x to 180
if  y position < 20  then
    set y to -180
point in direction  pick random -90 to 180
forever
    move 3 steps
    if  x position < -239  or  x position > 239  then
        delete this clone
    if  y position < -179  or  y position > 179  then
        delete this clone
```

## 3.4 Asteroids Explosions

During the forever loop and the movement code of the Asteroids, we add a conditional statement if the Asteroid is touching a 'cloned' Bullet.

```
forever
    move 3 steps
    if  x position < -239  or  x position > 239  then
        delete this clone

    if  y position < -179  or  y position > 179  then
        delete this clone

    if  touching Bullets ?  then
        change size by -50
        create clone of myself
        create clone of myself
        if  size < 10  then
            delete this clone
```

## 3.5 Spaceship

We need to create a Spaceship to enter the game at a random time e.g. between 5 and 10 s

We also need the spaceship to start at a random position.

Also need to try to avoid touching the main Rocket.

This spaceship does not shoot at the Rocket, but if hits the Rocket then we need to remove one rocket life.

```
when I receive Game Start
hide
forever
    wait pick random 5 to 10 secs
    create clone of myself
```

```
when I start as a clone
go to random position
set y to 150
show
forever
    play sound saucerBig2
    move 10 steps
    if x position > 235 then
        delete this clone
    if touching Asteriod ? then
        play sound bangMedium
        delete this clone
    if touching Rocket ? then
        play sound bangSmall
        delete this clone
```

# 4 Studio Scratch Examples

[Asteroids Scratch Studio](#)

[Asteroids - Part 1: Movement](#)

[Asteroids - Part 2: Shooting](#)

[Asteroids - Part 3: Asteroid Artwork](#)

[Asteroids - Part 4: Asteroids Explosion](#)

[Asteroids - Part 5: Spaceship](#)

[Asteroids - Part 6: Completed Game](#)

[Asteroids - Part 7: Sounds](#)