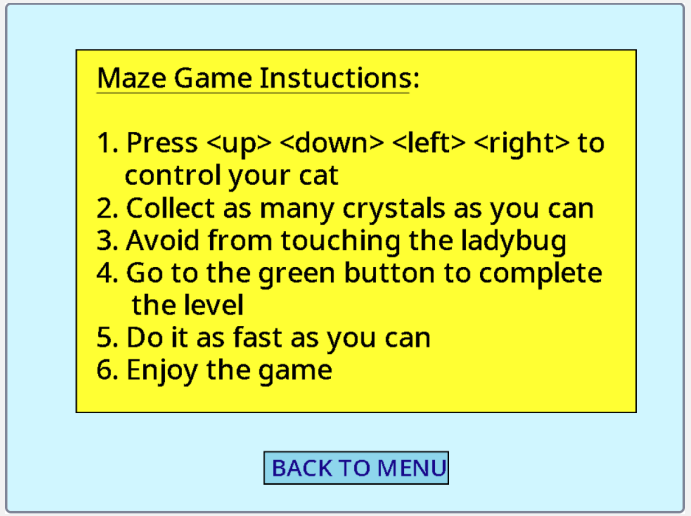
Scratch Programming

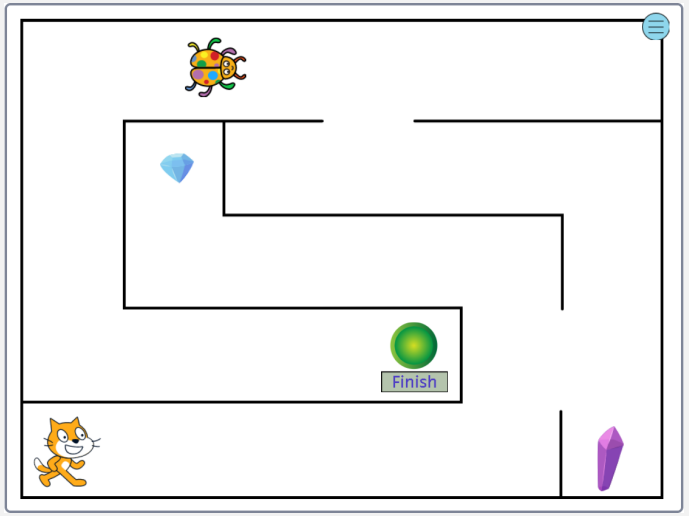
Lesson 11

Operators & Variable I

Presented by Advaspire Team

Review – Page Creation in Scratch





"Menu" Page

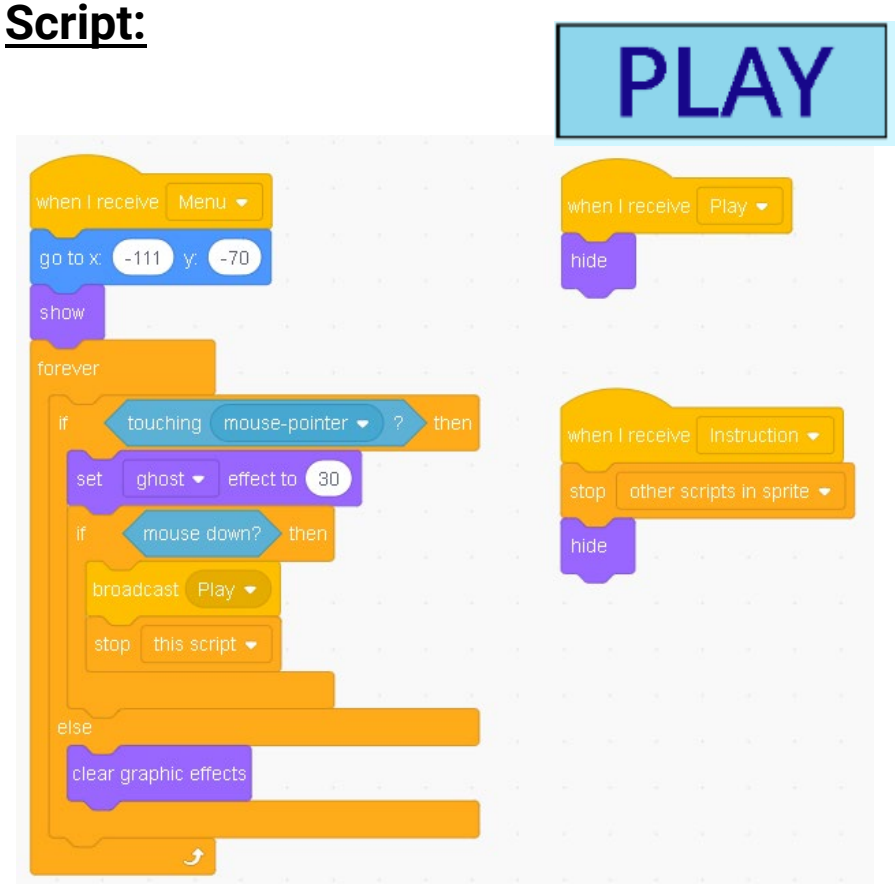
"Instruction" Page

"Play" Page

We use broadcast function to call out the pages set by us.

Review - Buttons Programming

Script:



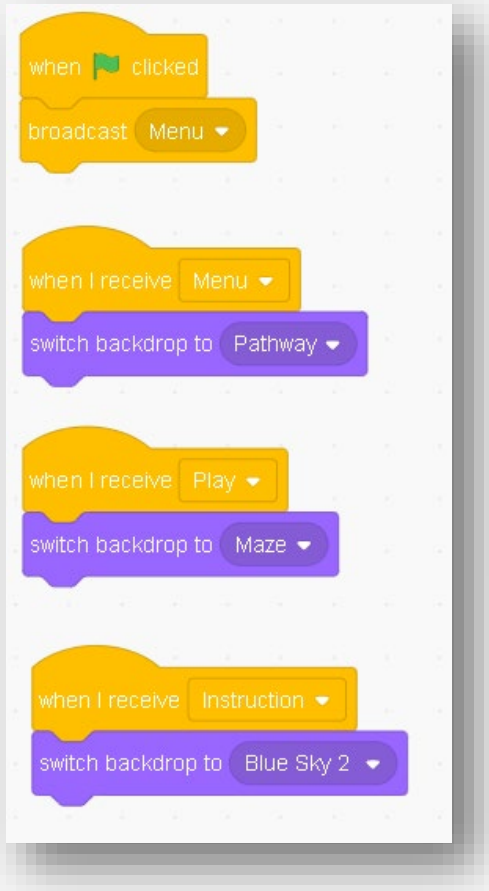
And remember that we don't want the button to show on the "Play" page and "Instruction" page, so I will call out a script to remain "Play" button hidden on other pages.

You notice that when received "Instruction", I have one "stop other scripts in sprite" but not in "Play" received. It's because when it broadcast "Play", it already stop the forever-loop itself.

If you did not stop the forever-loop in the Instruction page, even if your "Play" button is hidden, but you still can click on it and broadcast the "Play".

You can try it if you want.

Review – Broadcast the Menu page at Start



We add "Flag" clicked to the backdrop:

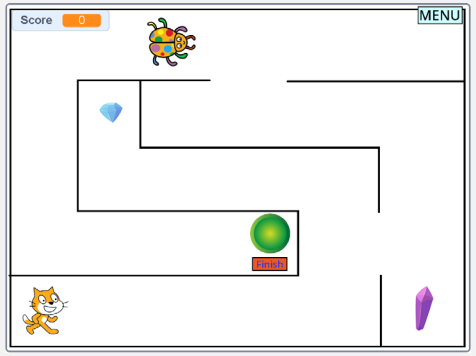
"Flag" clicked -> broadcast "Menu" message

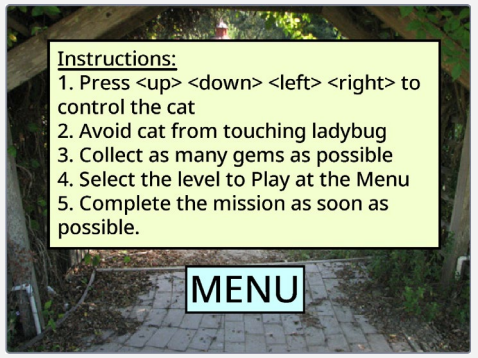
Menu -> Switch Pathway

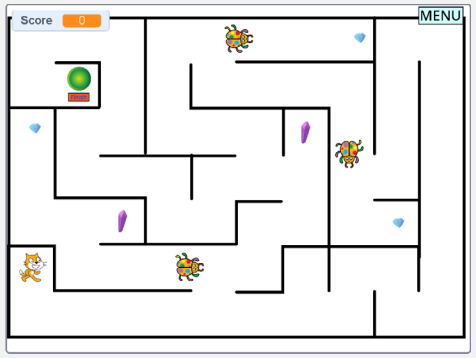
Instruction -> Switch Blue Sky 2

Play -> Switch Small Maze

Mission of Lesson 10 – Level Selection



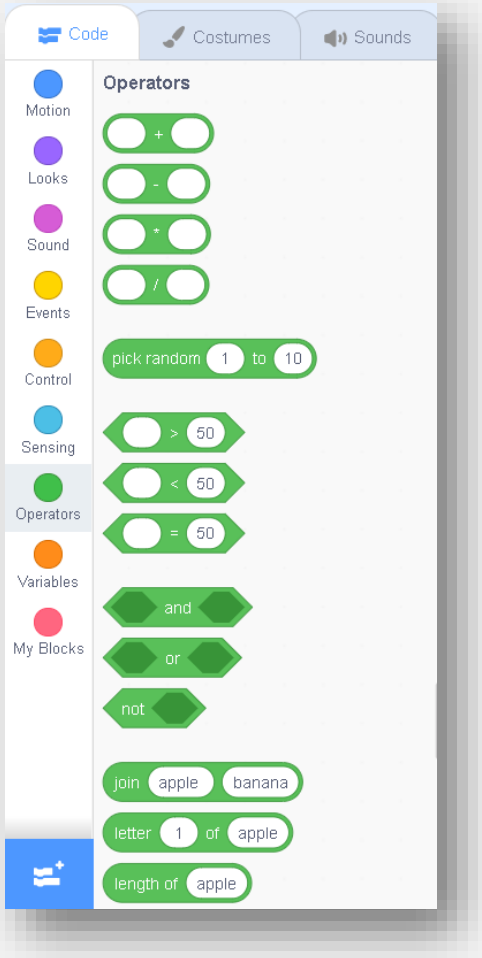




You will need to set up 5 pages in your mission of lesson 10:

1. **Menu Page**
2. **Level selection**
3. **Instruction page**
4. **Level 1 game**
5. **Level 2 game**

What is Operator for?



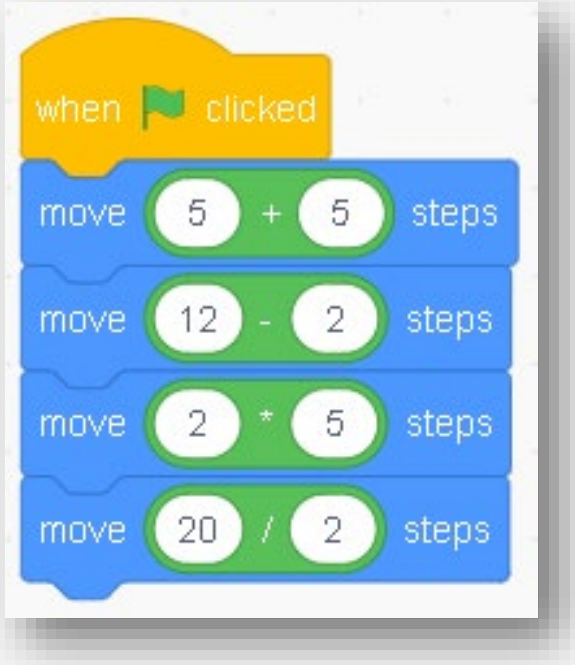
In green category, we have few operator blocks. These are for calculation and true-false statement.

Operator – The Addition

Actually we can use the operator to do the calculation for the value.

In this case, both will perform same movement since 5 + 5 = 10. Both will move for 10 steps after "Flag" is clicked.

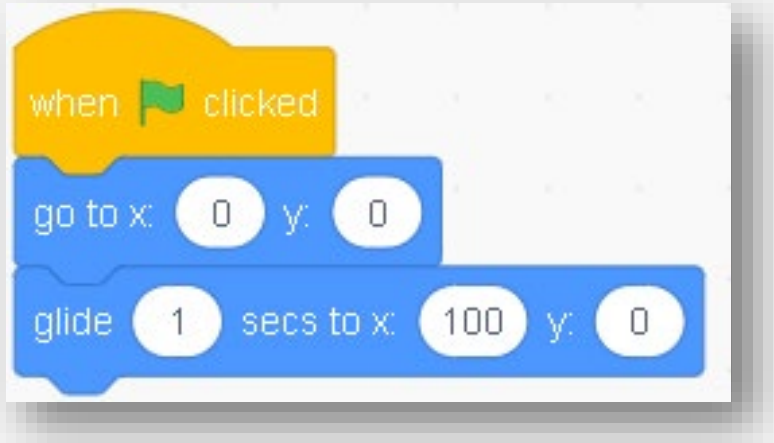
Operator – Let the computer do the calculation



If you lazy to do calculation by yourself, you can let the computer do it, but you must let it know how to calculation first.

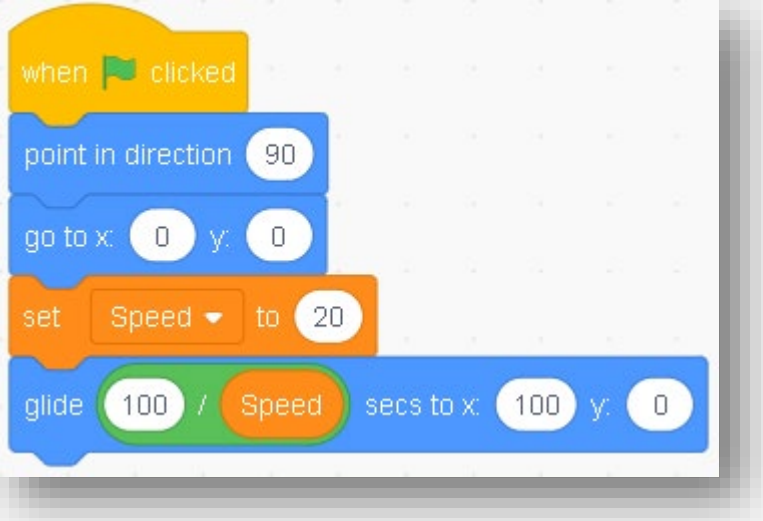
But in normal application, we don't do this, because we can calculate this simple equation faster than putting operator for computer.

Operator – with Variable Calculation



If we want to set the speed of the cat to move forward by using glide how many seconds to the point, we can use operator with variable to do the calculation.

Operator – Let the computer do the calculation



Formula of speed calculation is:
Speed = Distance ÷ Time
Time = Distance ÷ Speed
Distance = Speed ×Time

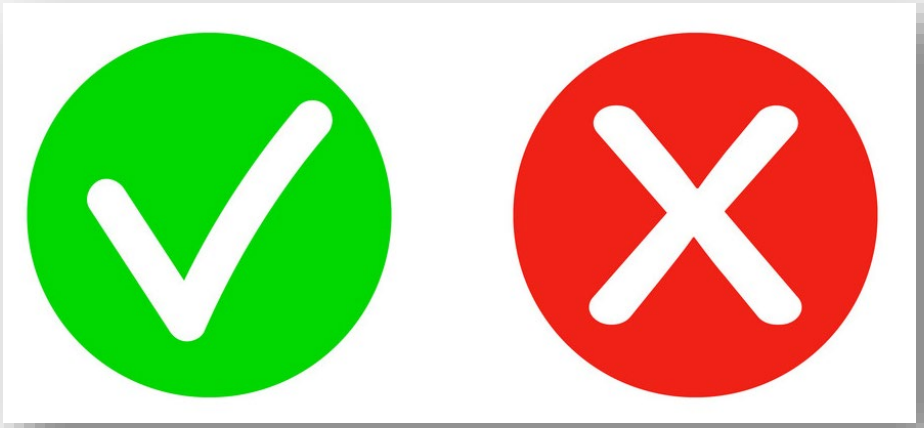
Now we know that it is going to travel 100 steps from (0,0) to (100,0) (which is the distance to be travelled), and we set that the speed (variable) to 20 steps per second.

Then we can drag out the operator to make Distance (100) ÷ Speed (20) = time (5).

Then it will result with 5 seconds to travel to the position.

You can try to change the speed and run the program again and observe the change.

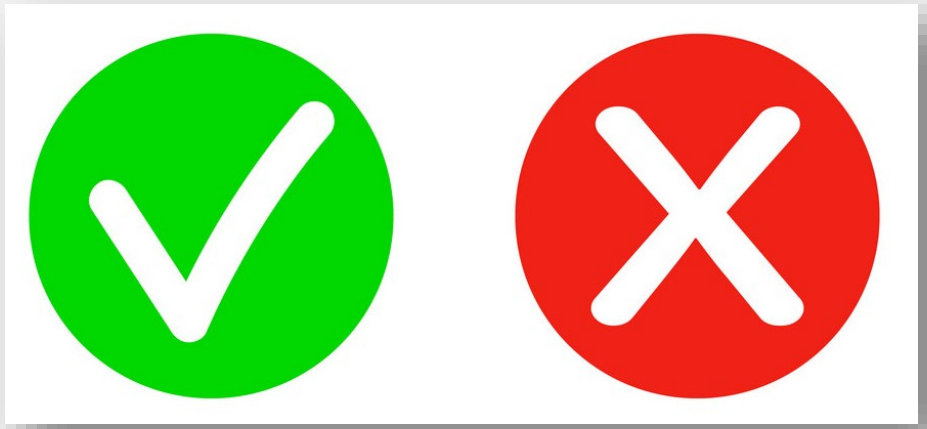
Operator – What is Boolean?



In computer science, the Boolean data type is a data type that has one of two possible values (usually denoted true and false) which is intended to represent the two truth values of logic and Boolean algebra.

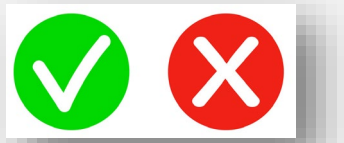
(*from Wikipedia)

Boolean – True & False



To make it simple to understand, we will start with True & False statement first.

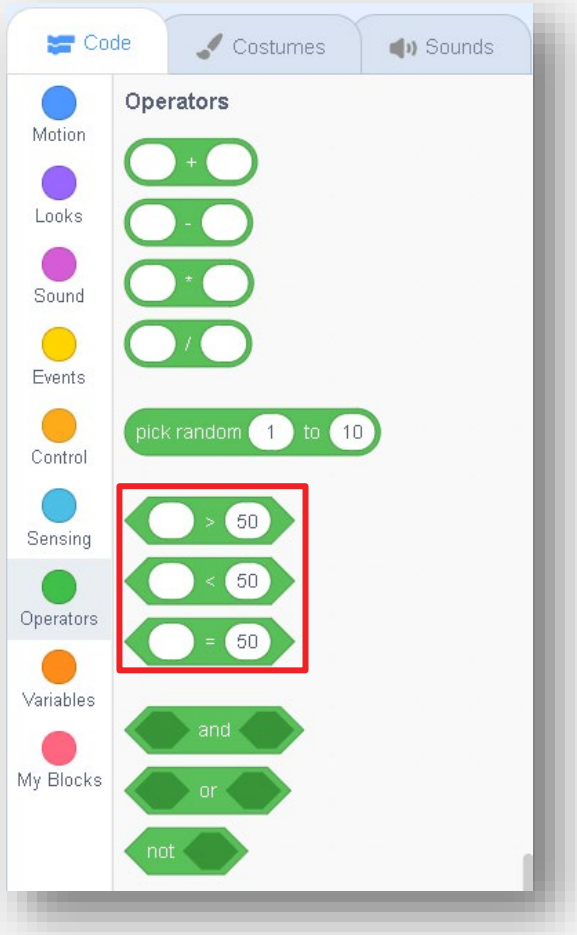
Boolean – True & False Statement



Let's try to answer following questions with True or False:

1. **24 is more than 6.** **(True / False)**
2. **18 is more than 19.** **(True / False)**
3. **A fish can fly.** **(True / False)**
4. **Metal can't be eaten.** **(True / False)**
5. **London is located in Malaysia.** **(True / False)**
6. **2 plus 5 equal to 7.** **(True / False)**

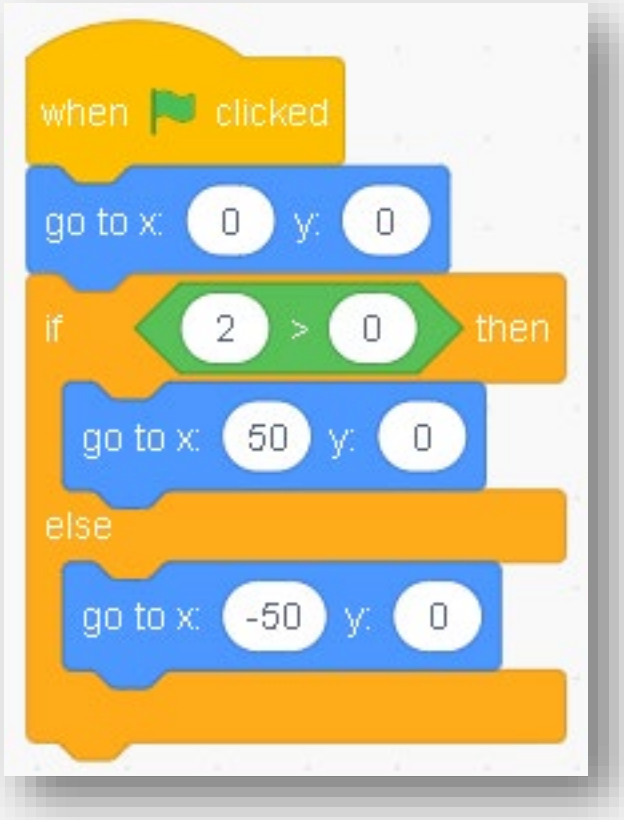
Boolean – True & False Statement



In Scratch programming, you will see some blocks in operators category are in hexagon shape.

These blocks are used for Boolean, it will analyze the true & false statement and result in either true or false input to the blocks.

Boolean – True & False with if-else Statement



Let's drag out an if-else statement and drag the "__ > __" operator into it.

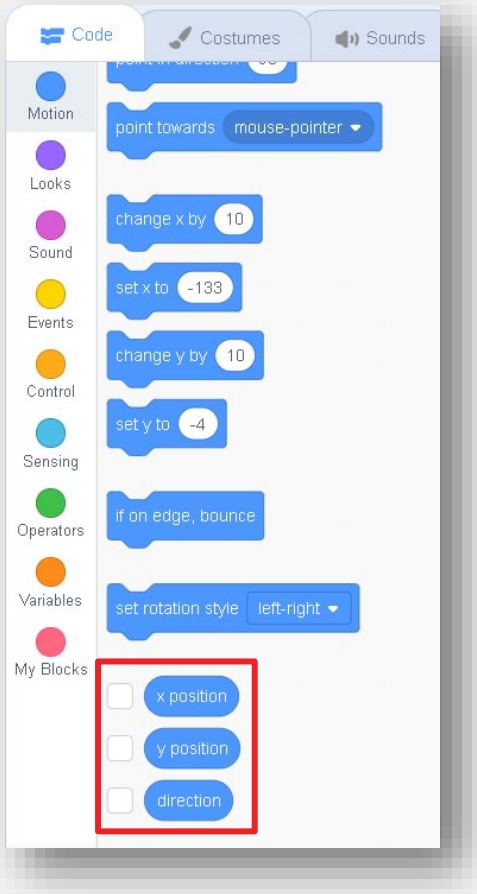
Now we set a statement over here:

If 2 > 0 is true, then the cat will move to the right (50, 0)

If 2 > 0 is not True, then the cat will move to the left (-50, 0).

What do you think will happen once we pressed start?

Boolean – True & False with if-else Statement

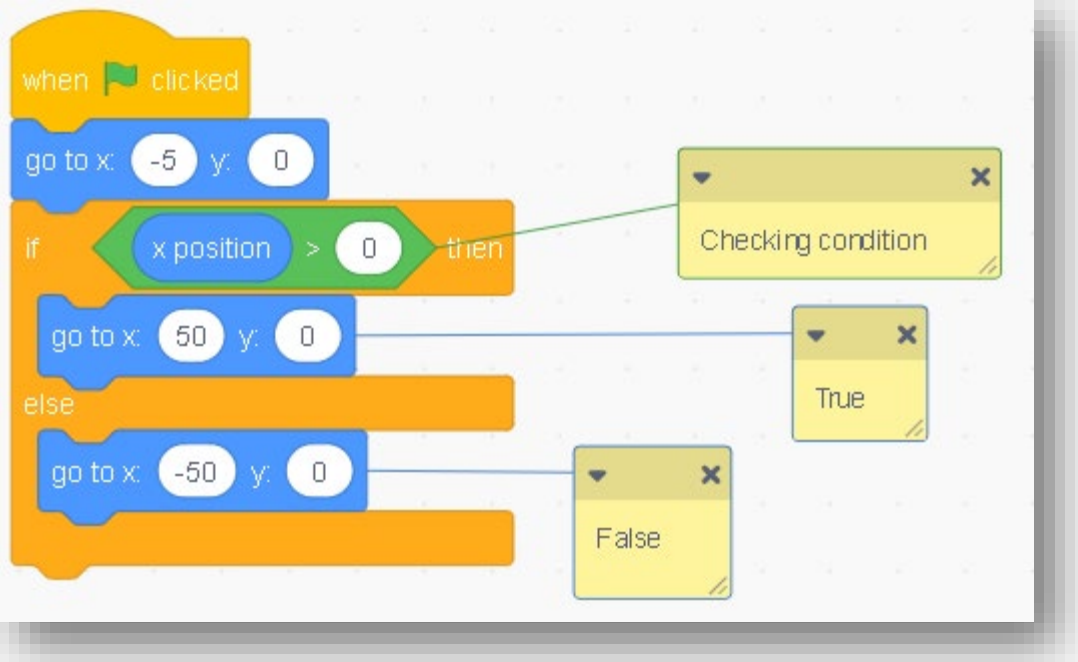


Now we change the starting position to (-5, 0), and drag out the x position (from the blue category) for the True-False statement.

What do you think will happen if I click on the "Flag" button?

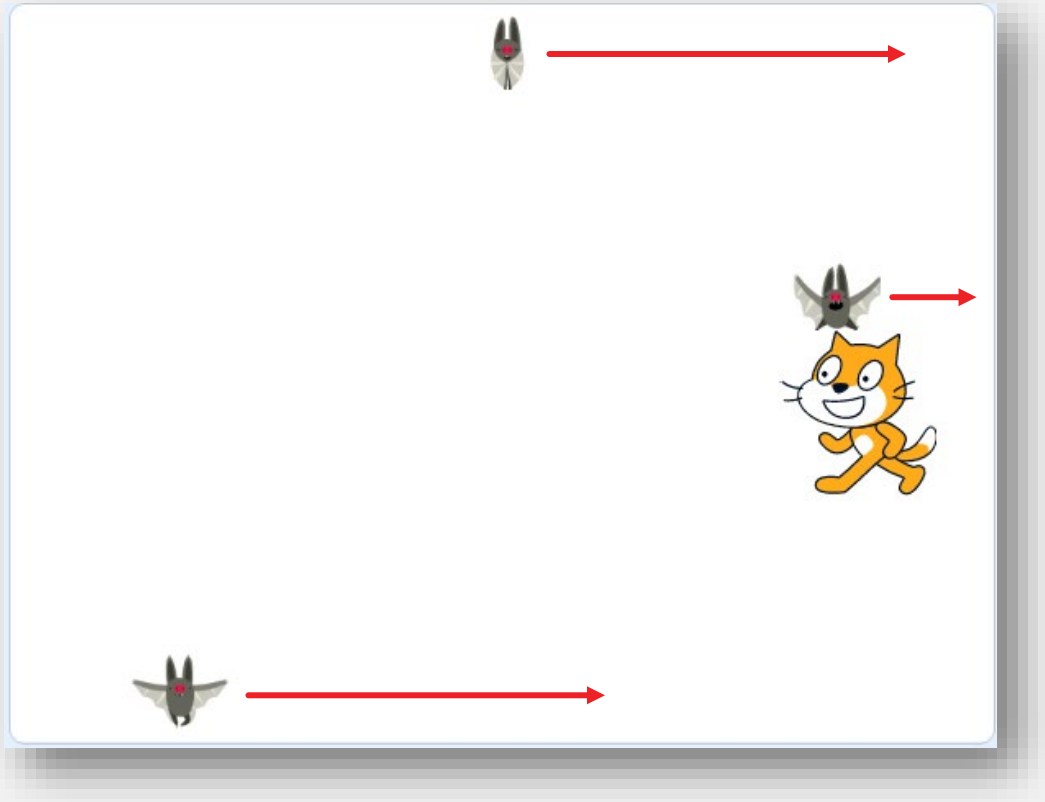
It will move to the left.

Boolean – True & False with if-else Statement



If the logic can be constructed in this way, then the computer will know how to make decision based on the conditions.

Now let's try to make Cat & Bat game again

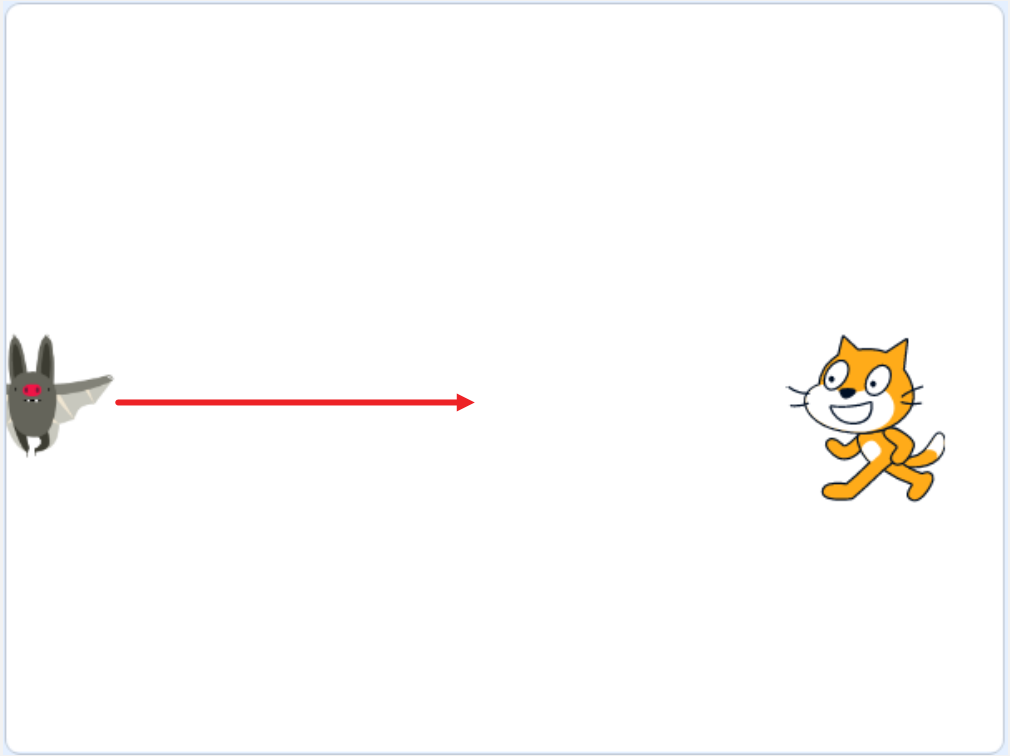


Now we want to make a bat game that it will spawn at the left and keep moving to the right, once it touches the edge of the right side, it will disappear.

And your cat will need to avoid from hitting the bat.

And the speed of the bat will keep increasing throughout the time.

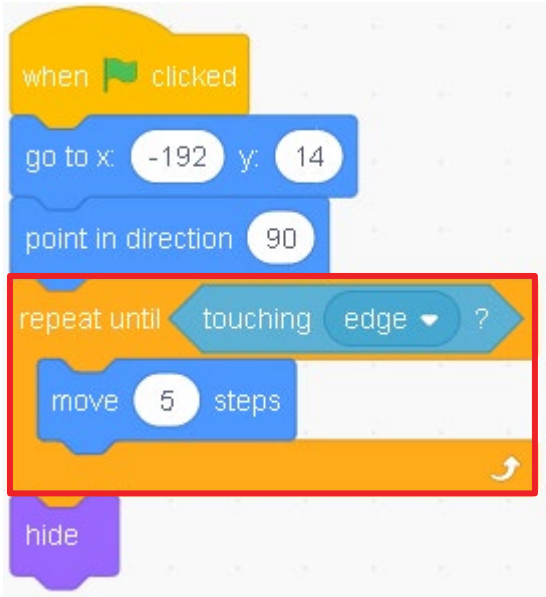
Code the bat



First thing we want to settle is to make the bat spawn at the left (any point) and make it keep moving forward until touching the edge.

Code the bat

Script:



At start, we set the starting position and direction for the bat, then we drag out a "repeat until" block from "control" category (orange).

Then we will make the bat keep moving forward for 5 steps until it touches the edge of the right side.

Then we will hide it.

This will make the bat look like appearing from the left and going to the right.

Code the bat

But I don't' want it to appear straight from the screen.

Same as the concept in lesson 3, which we make the cat to move in to the scene from the outside, we want our bat to be like this also.

But after you change the bat starting position to (-250,14) and re-run it, you will find it won't work.

Code the bat – Issue arises

What happened exactly after you changed the starting position to (-250,14)?

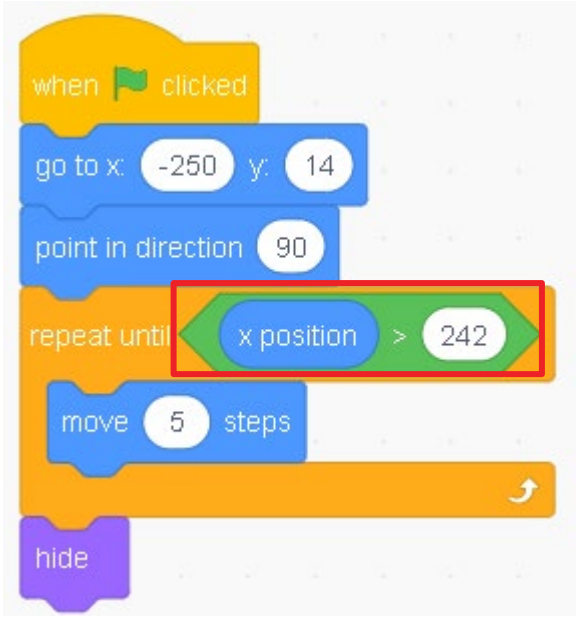
In slow motion, your computer will set the starting position for the bat at (-250,14) and point in direction to be 90°. Then check if the bat is touching the edge now.

At point (-250,14) the bat is touching the edge, therefore it won't execute the blocks inside (move 5 steps), it will straight jump to "hide".

That's why you won't see your bat after clicking the "flag".

Code the bat – Boolean Program

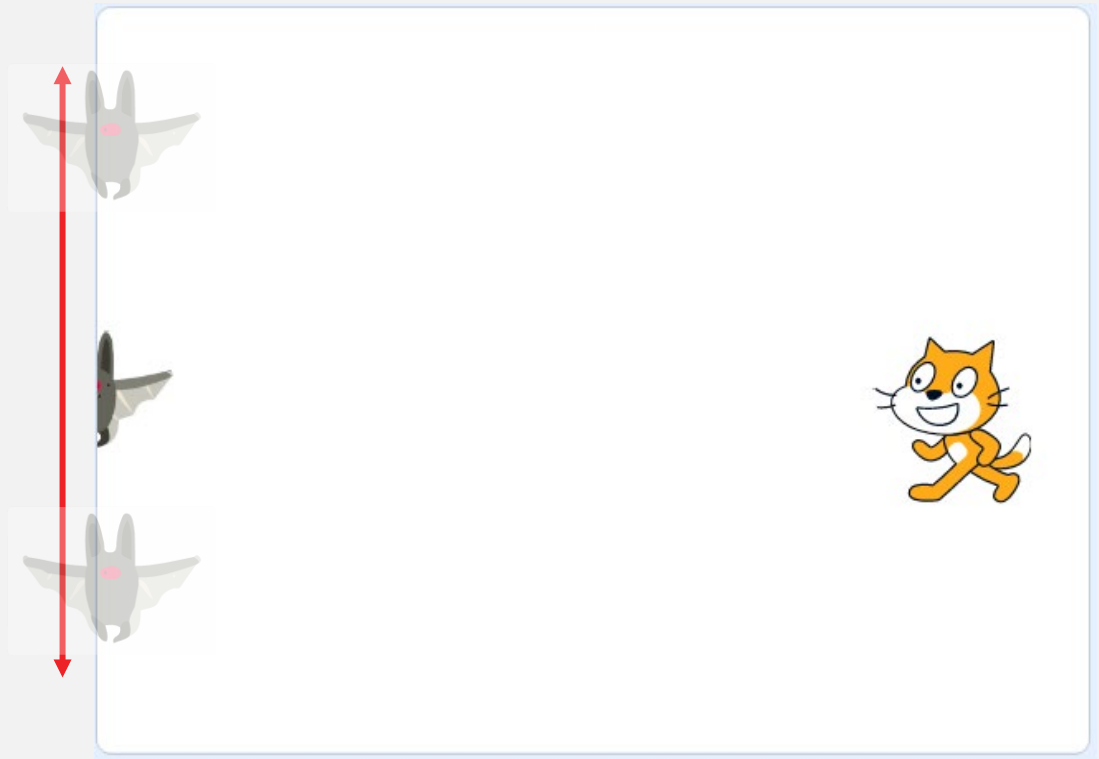
Script:



Therefore, we need to change our strategy in programming this.

Replace "x position > 242" with "touching edge", then run the script again, your bat should be able to move from the edge of left to edge of right now.

Code the bat – Random Spawn



Let's add random spawn to this bat.

We don't change the x position of the bat, we only make the y position (starting position) of the bat random from -160 to 160.

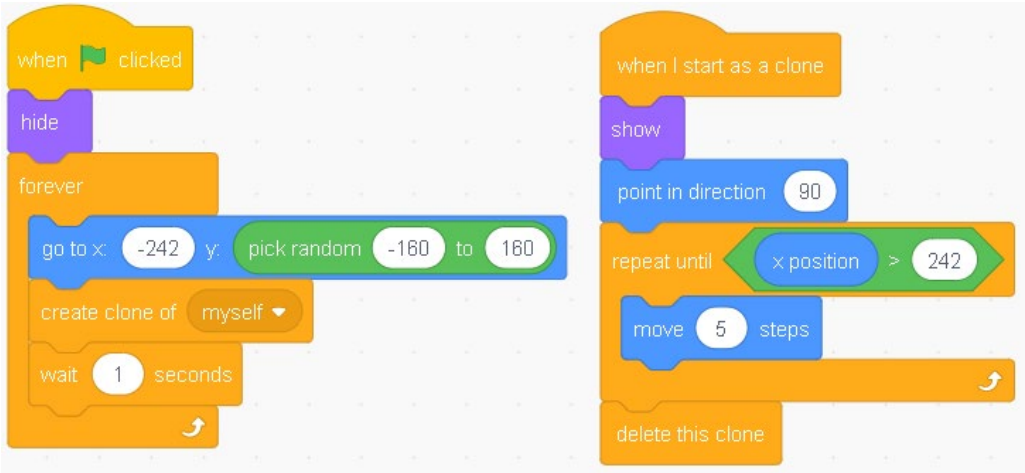
Code the bat – Random Spawn

Script:

Put a pick random from -160 to 160 into the starting position (y position only) of the bat.

Code the bat – Create Clone

Script:

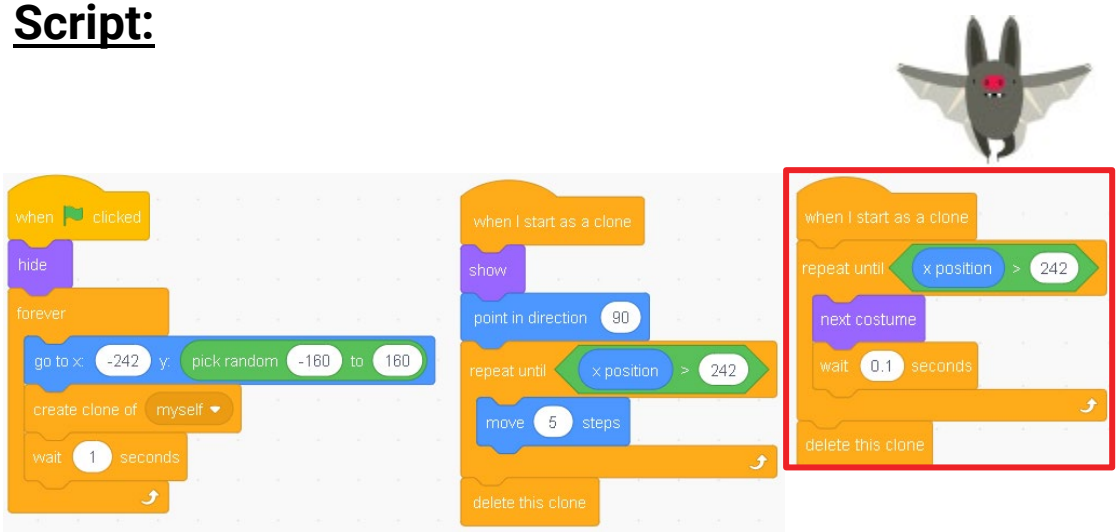


As we want to keep creating bat from left to move to the right, therefore we use create clone function in this case.

Let's do an arrangement for this.

Code the bat – Animation

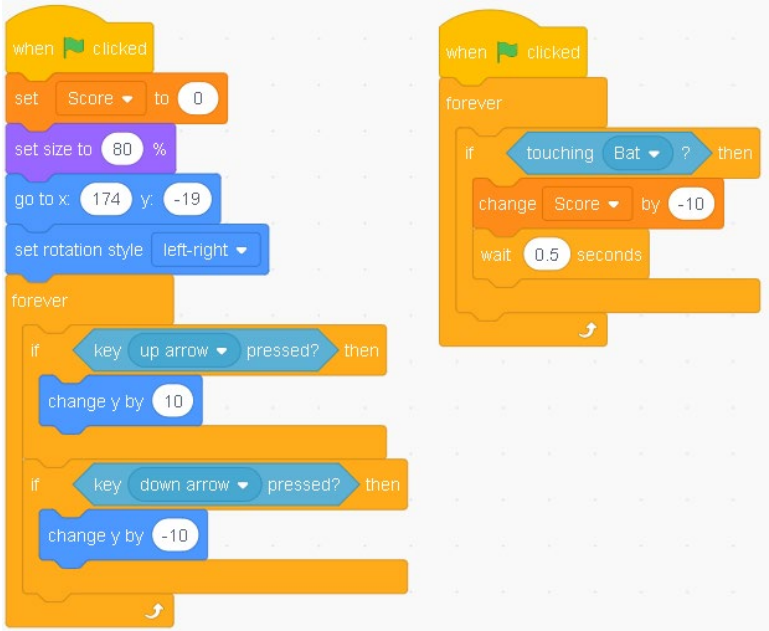
Script:



Of course we also want animation for bat, let's add a parallel script for bat.

Code the Cat - Control

Script:

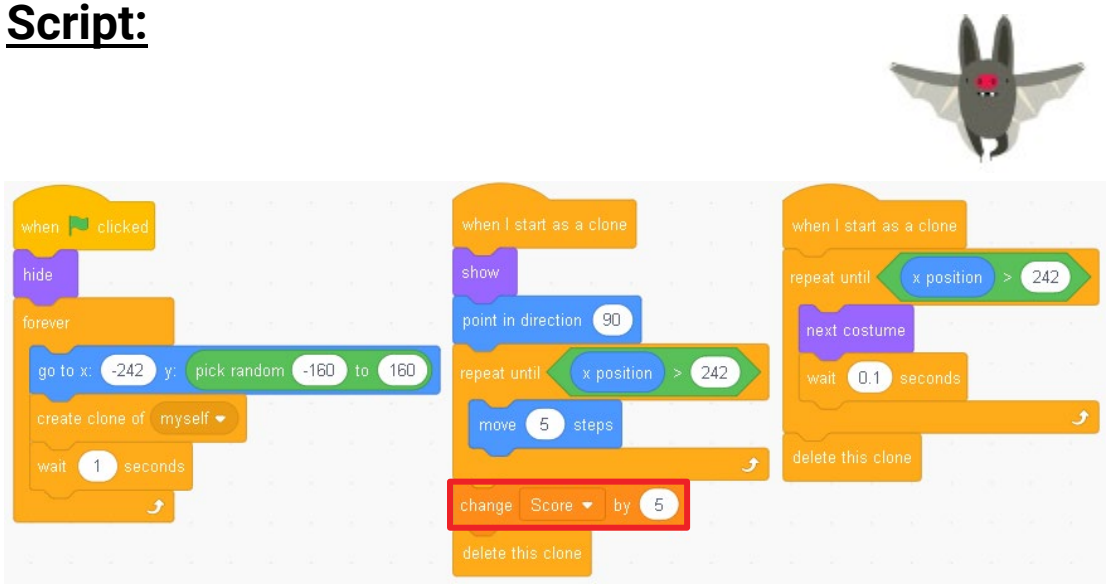


We will program the cat as usual.

If cat gets hit by bat, it will deduct the score by 10.

Code the bat – Increase score

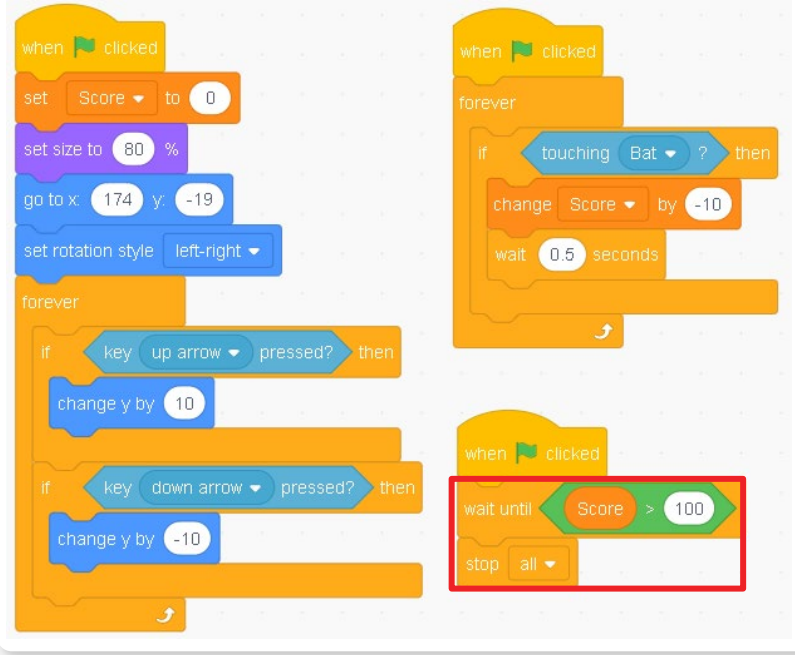
Script:



After the bat reaches the edge of the right side, it will add 5 to the score before clone is deleted.

Code the Cat – Target score to win

Script:



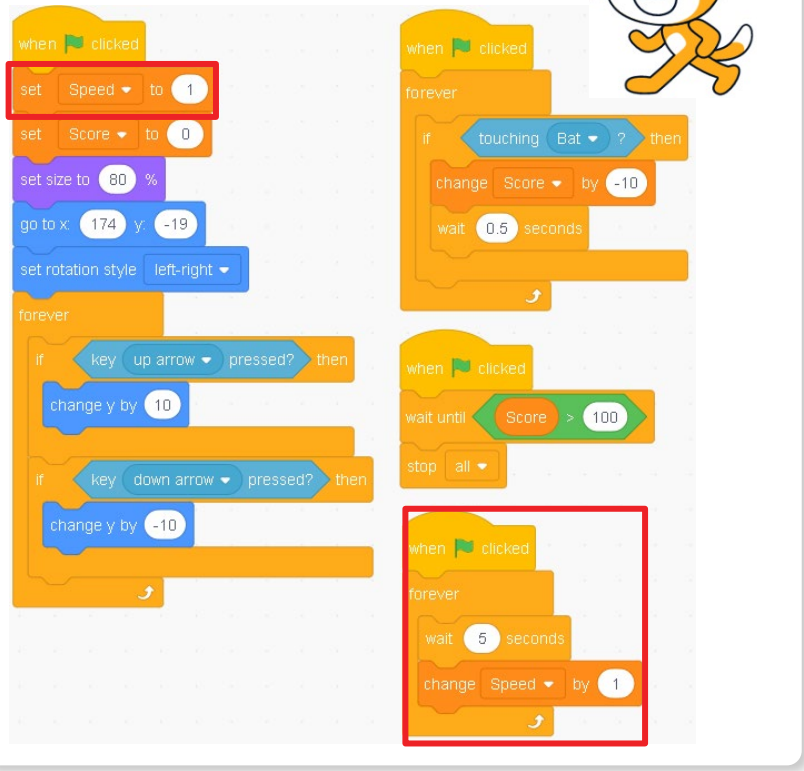
When will you win the game?

Let's code a script with "wait until" block (it's in orange category), and drag "Score > 100" into it, followed by a "stop all" block.

This it make the game stop (win) after the score is more than 100.

Increase in level of difficulty - Speed

Script:

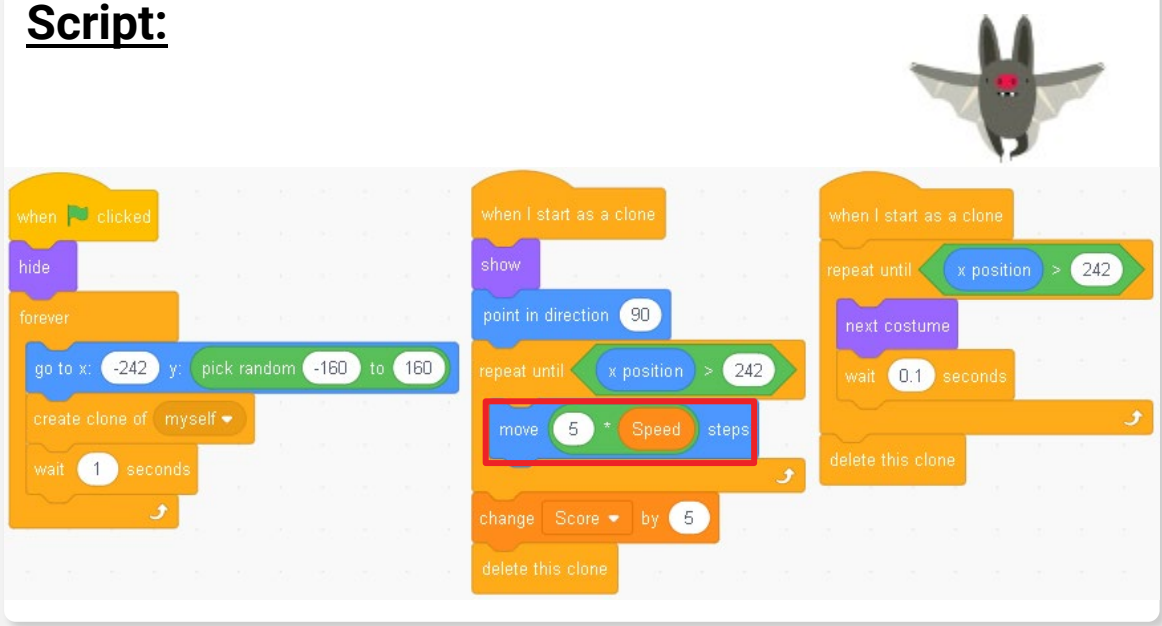


Let's add a new variable called "speed" (or you can call it "level").

And we will make the speed increase by 1 for every 5 seconds.

Increase in level of difficulty - Speed

Script:

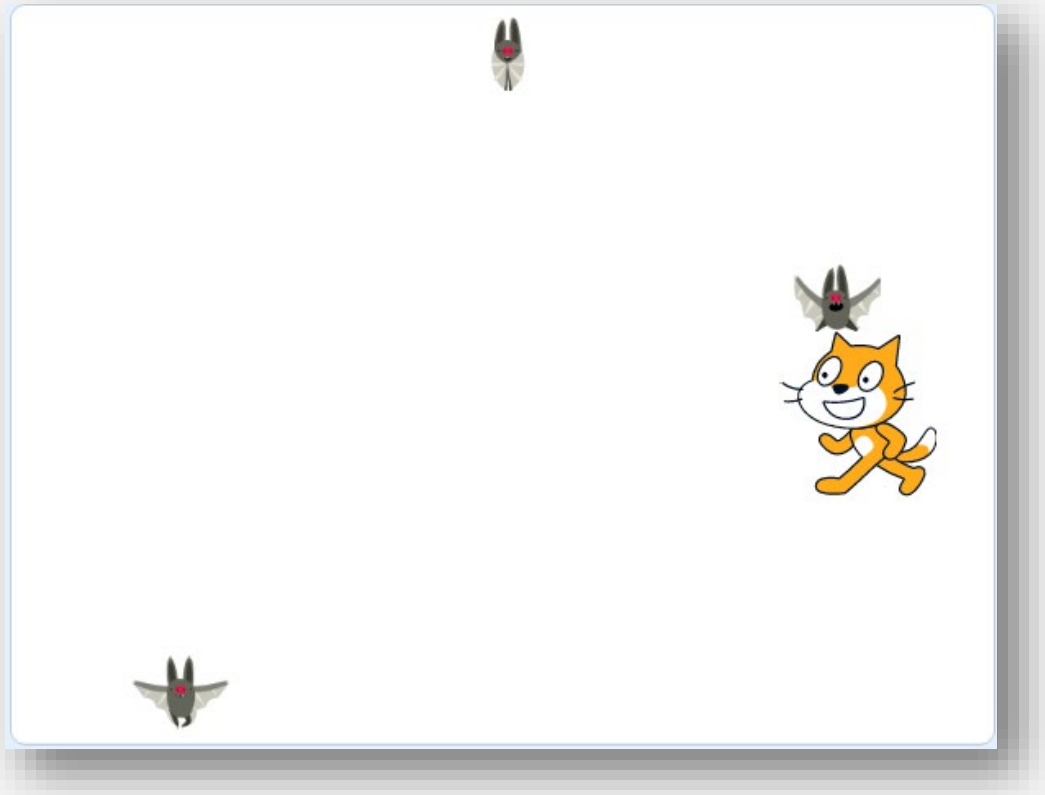


The speed will affect the movement speed of the bat.

In this case, the movement speed of the bat is 5 multiplied by "speed" variable.

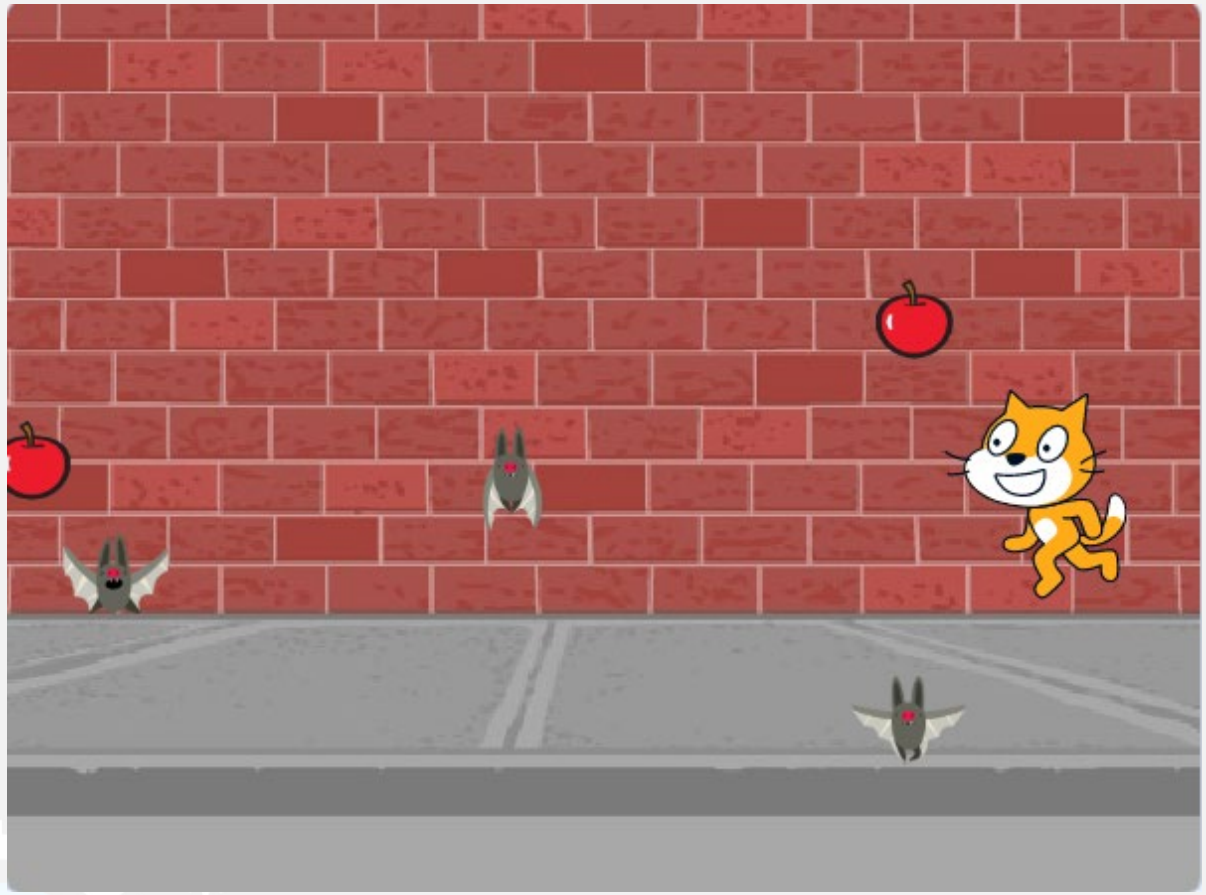
Which means the longer you play, the faster it goes.

Run and try your Cat & Bat Game



ASSIGNMENT *for*

Lesson 11



L11 – Mission

Code a game that you cat needs to collect apple to score points and to avoid bat (make it to 3 lives).

Set a target for the game to win, it can be when your score reaches how many then win.

And your cat only able to move up and down, remember to make animation for cat (change costume).

You can direct message your teacher and ask your question through Slack Robotene Community or arrange a One-to-One Consultation with your teacher.

Any Questions?

Thank you :)