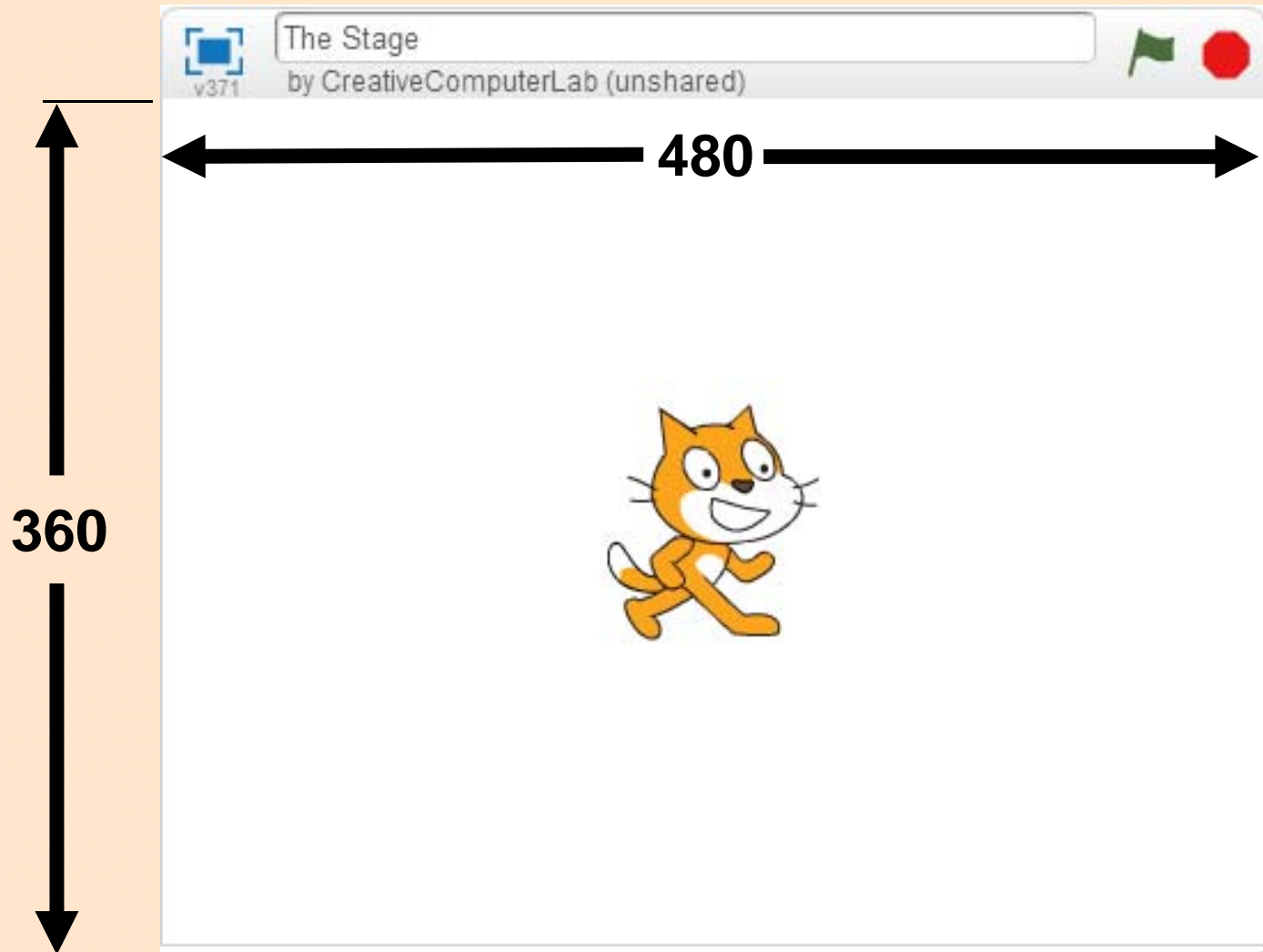


Scratch Primary Lesson 5

The XY Coordinate System

The Scratch Stage

- The scratch stage is 480 pixels wide and 360 pixels high:



The Pixel

- The pixel is the smallest single component of a digital image or a computer screen.
- Pixels form a grid across the screen. Each pixel can be given a color which makes up its part of an image.
- In Scratch, one unit of x or y, or one step is equal to one pixel:

change x by 1

change y by 1

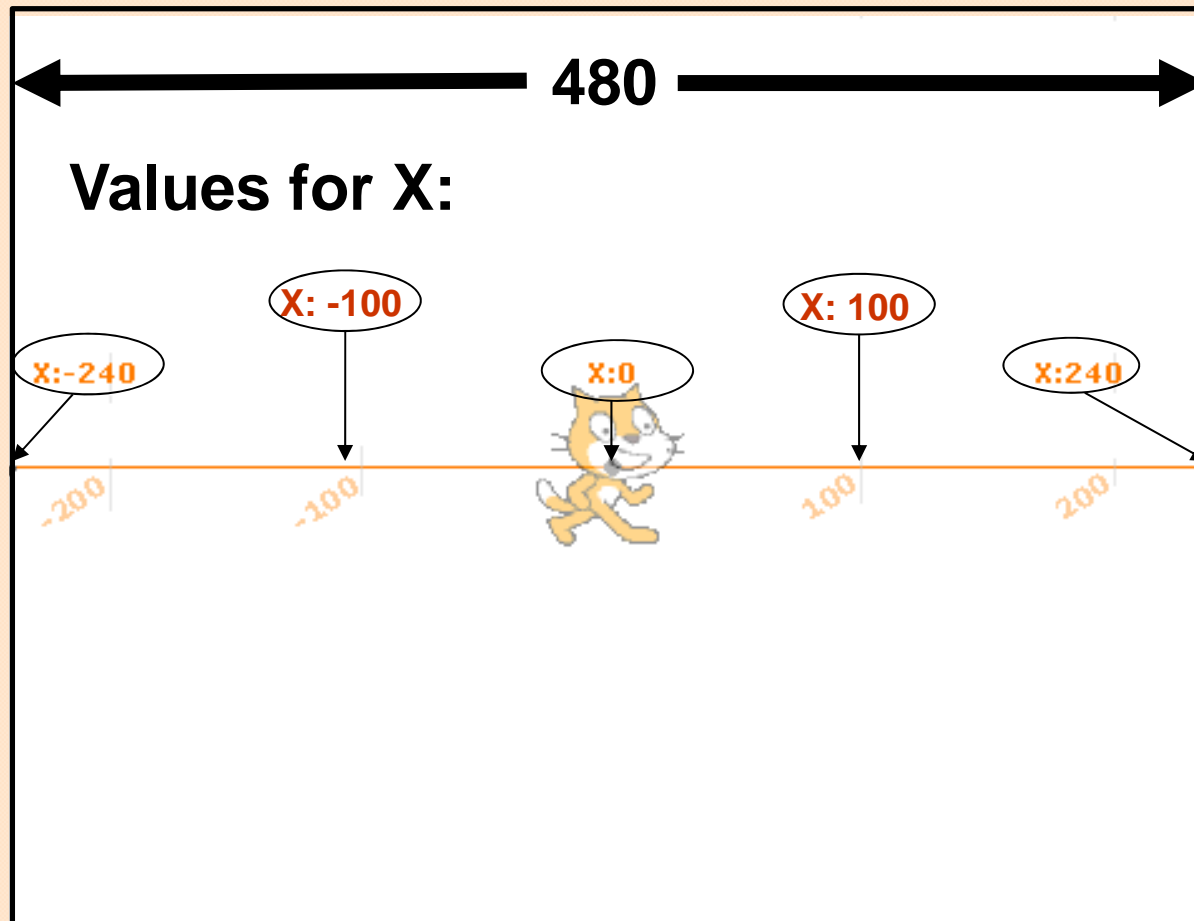
move 1 steps



Zoom in on the cat to see the individual pixels in the image

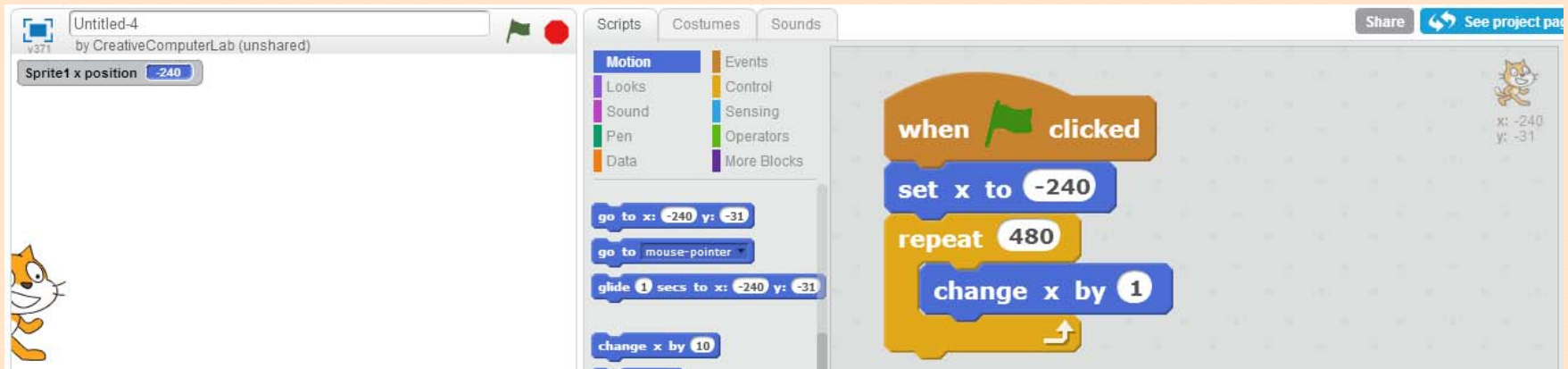
X Number Line

- These are the x values for the scratch stage
 - Where is 0? --Why are some x values negative?
 - What is half of 480?



Try This Experiment:

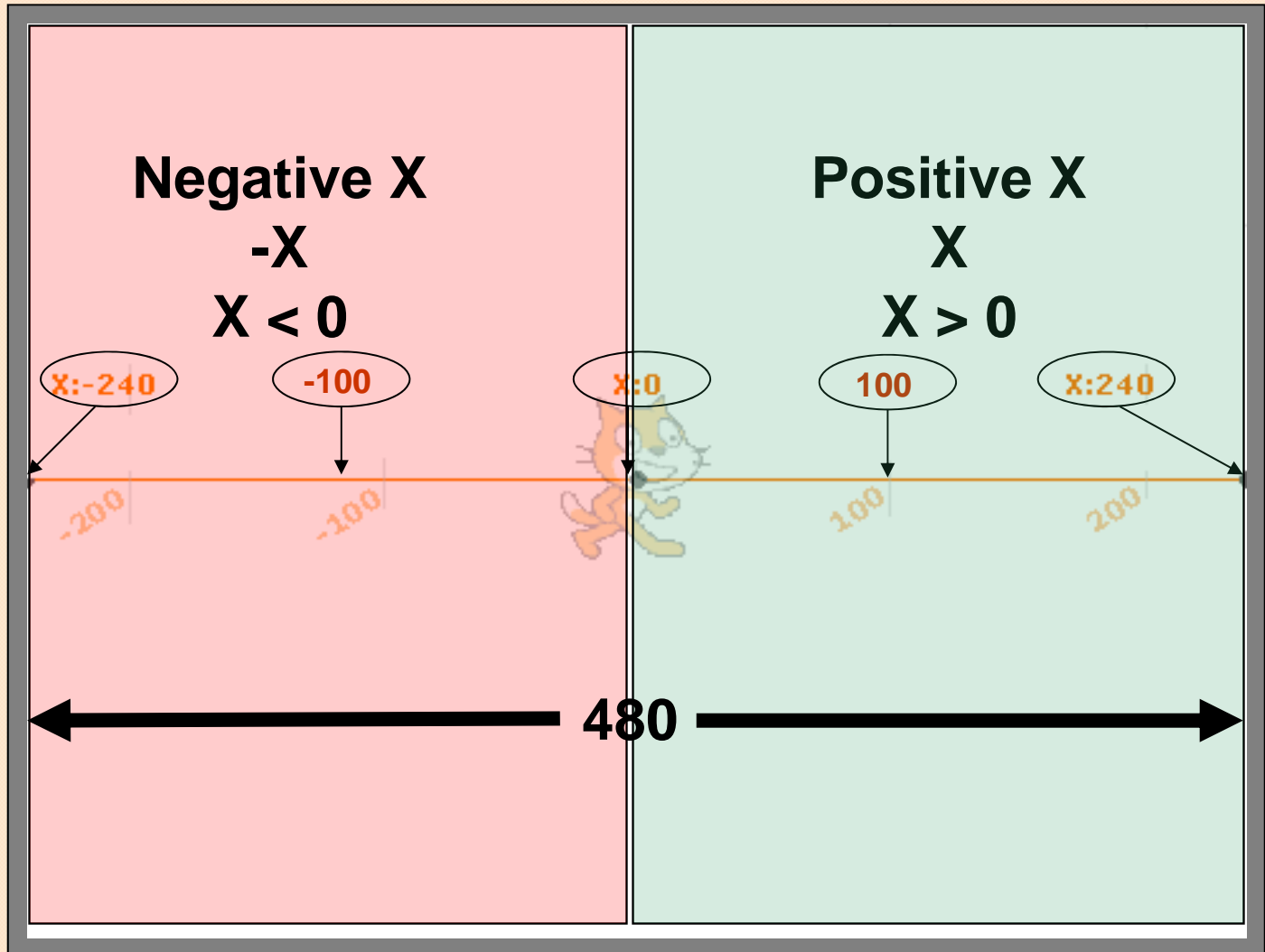
- Build the script shown below:
- Check the box to display the x position:
- Run the script and watch the sprite's x values change:



- What is the x position when the script ends?

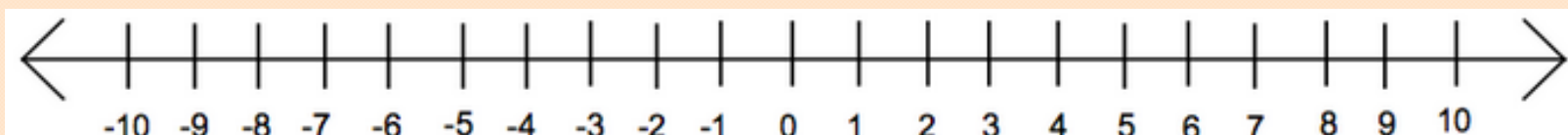
X Number Line

- The left half of the stage has negative (-X) values.
- The right half of the stage has positive (X) values



Move With The Arrow Keys

- A negative number moves in the opposite direction as a positive number.



- Positive numbers move x to the right ->

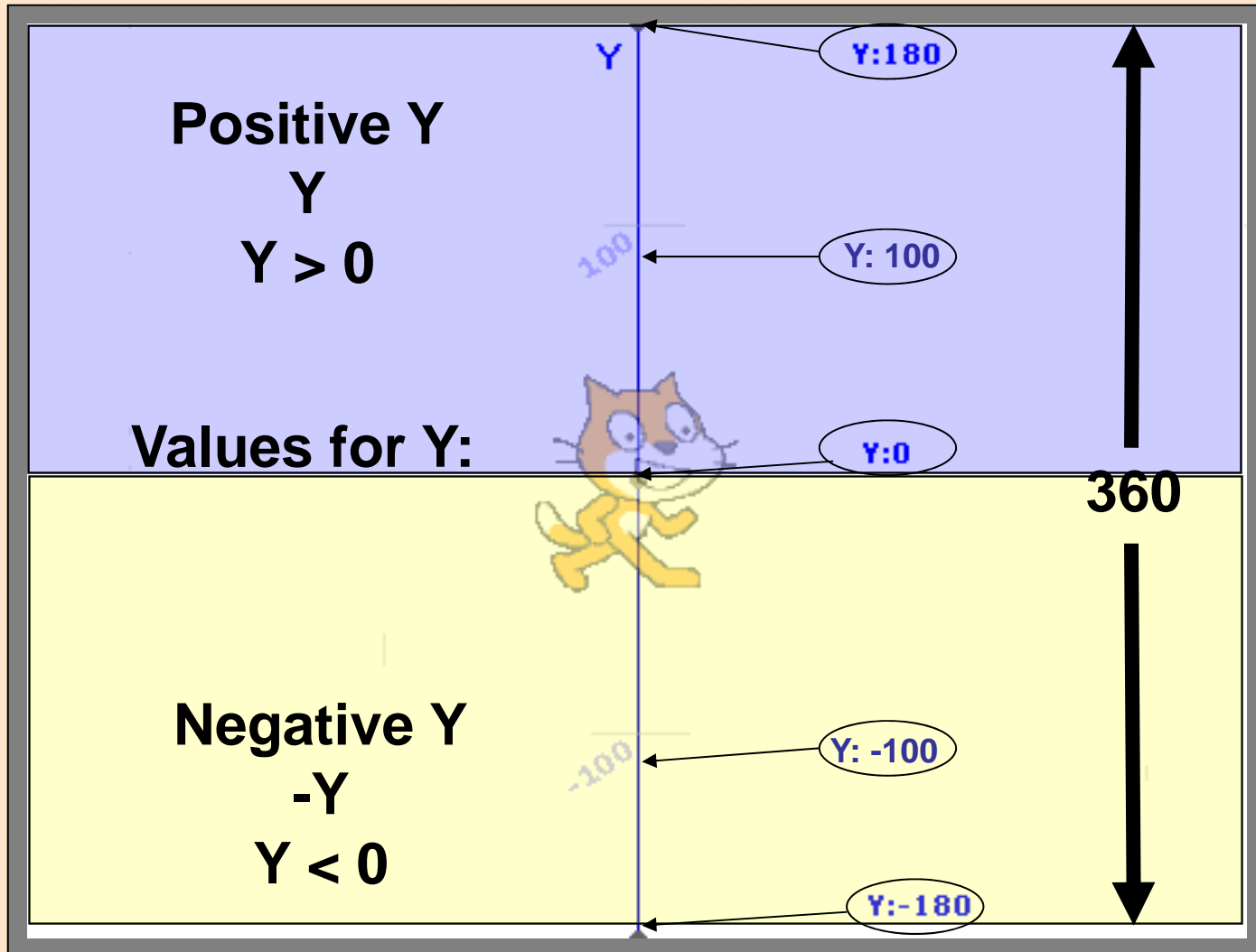


- Negative numbers move x to the left <-



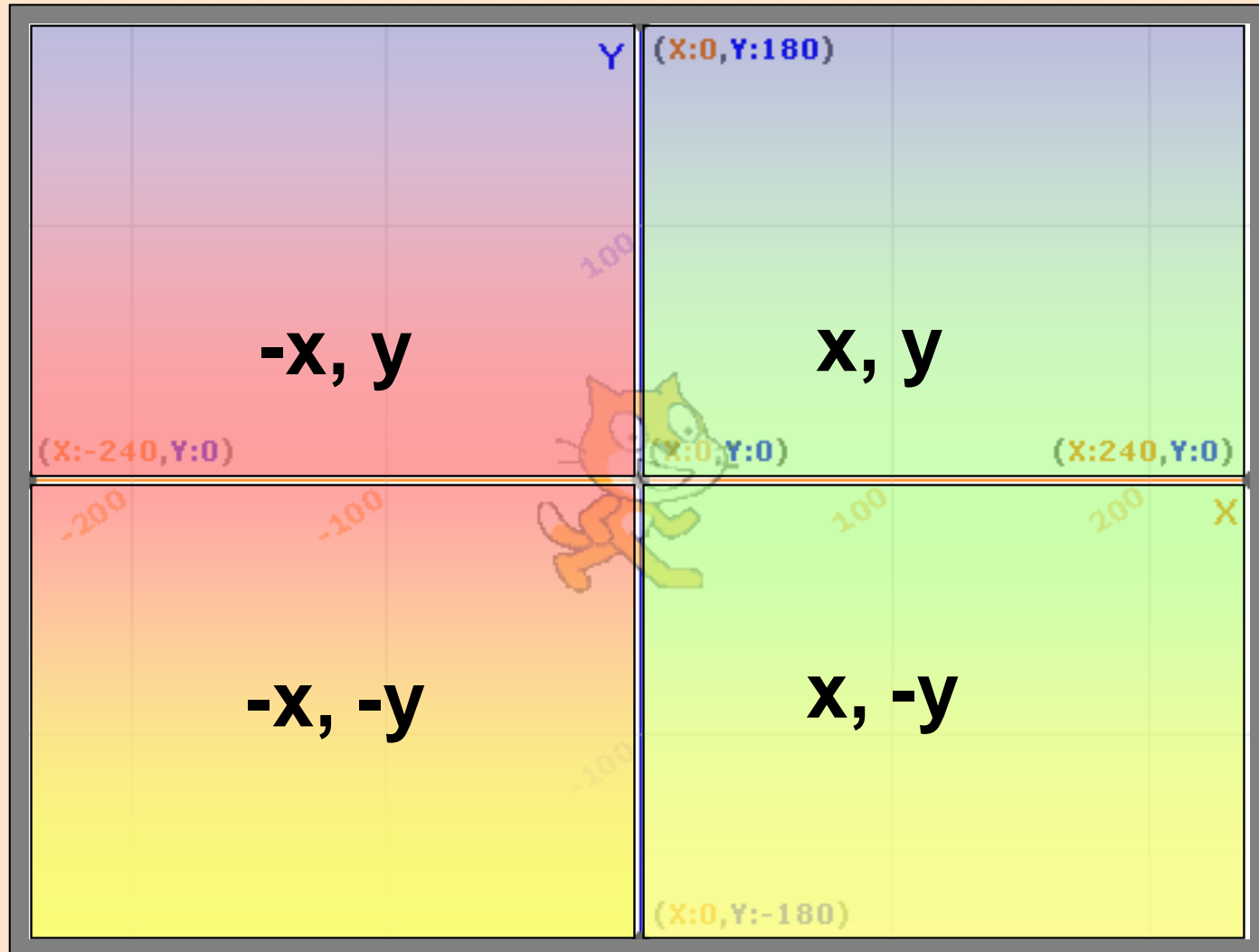
Y Number Line

- These are the y values for the scratch stage
 - Where is 0? --Why are some y values negative?
 - What is half of 360?



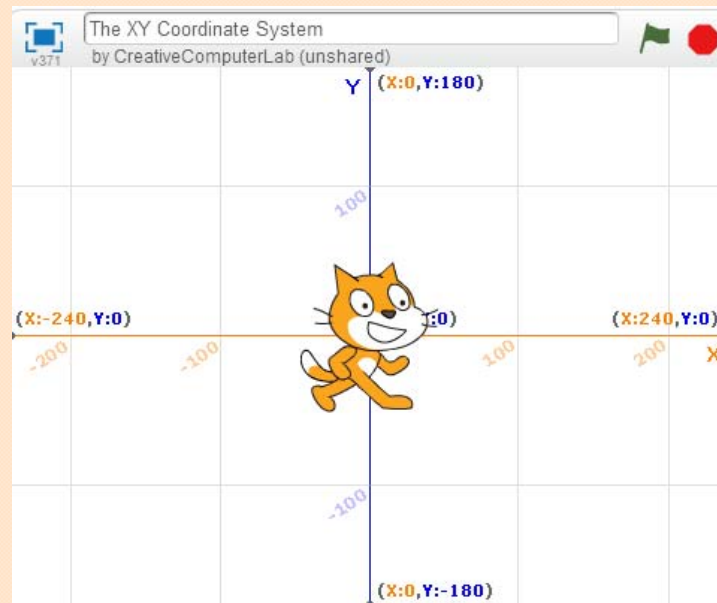
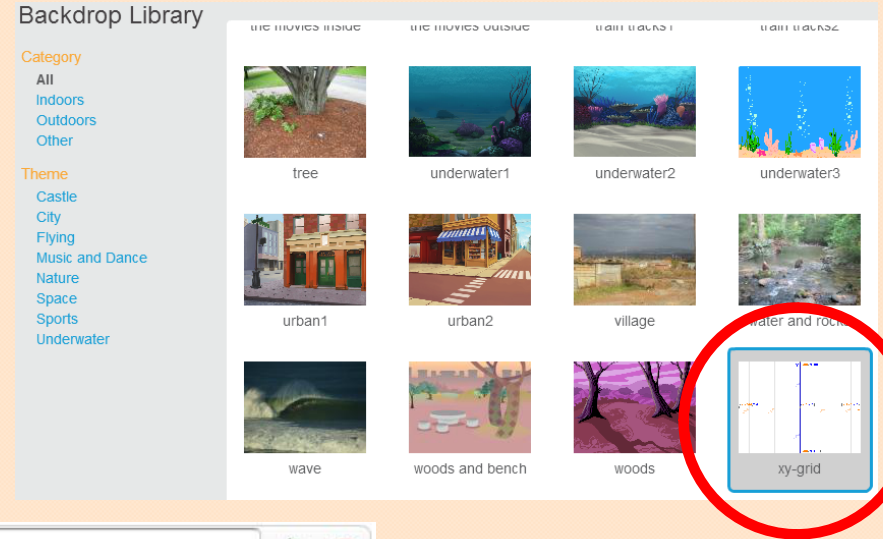
X and Y Values Combined

There are 4 'quadrants'. Each quadrant has a different combination of positive or negative x and y values:



The XY Coordinate System

- Start a new project.
- Select the “x-y grid backdrop for the stage:



Moving In the XY Coordinate System

- Hook the right arrow key up to “change x by 10”:



- How are we going to move left?
- What about moving up and down?
- Can you make the sprite move with all 4 of the arrow keys by changing x and y?

Fun With The Pen

pen down

- Starts drawing

pen up

- Stops drawing

clear

- Erases all drawings

set pen size to 1

- Sets the pen thickness

set pen color to 0

- Sets the pen's color

Make A Drawing Program

– Hook all four arrow keys to change x and y by 10



– Now double click on the 'pen down' block:



– Set the pen thickness:



– Set the pen color:



Now move around with the arrow keys and draw!

If you screen gets too messy you can click on 

Make Rainbow Tracks

- Program the scripts to change the pen color each time the sprite moves. See what happens.

when key pressed

change x by

change pen color by

when key pressed

change x by

change pen color by

when key pressed

change y by

change pen color by

when key pressed

change y by

change pen color by

Going Places

- Lets make the cat go to different XY locations on the stage.
- Make the cat go to the center of the stage:

go to x: 0 y: 0

- Make the cat go to the lower left of the stage:

go to x: -240 y: -180

- Make the cat glide to the upper right of the stage:

glide 1 secs to x: 240 y: 180

- See what happens when you make the glide for more than one second.

Explore the X and Y Space

- Go to the “xyPosition” project at :
<http://scratch.mit.edu/projects/12776565/>
- You can search for it by typing in “creativecomputerlab”, then click on the “xyPosition” project:

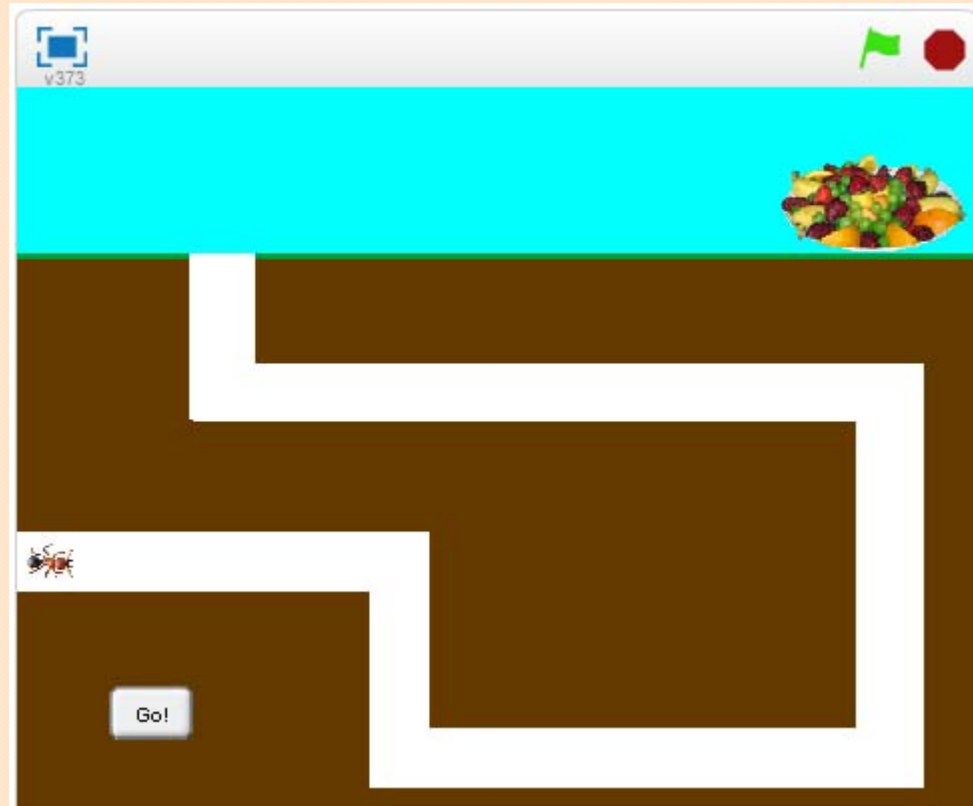


- Play with the project and see the values for x and y change.

The Ant Farm Game

This is a programming challenge. Program the ant to reach the food without touching the sides in 2 ways:

1. Move the ant by using the arrow keys.
2. You are NOT allowed to use the arrow keys. You have to write a script so that the ant will move by itself when you push the 'Go!' button.

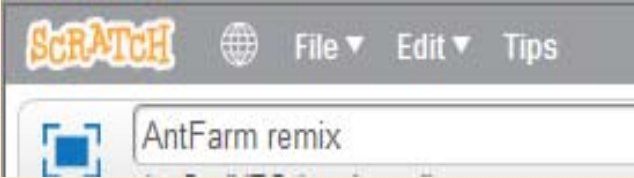


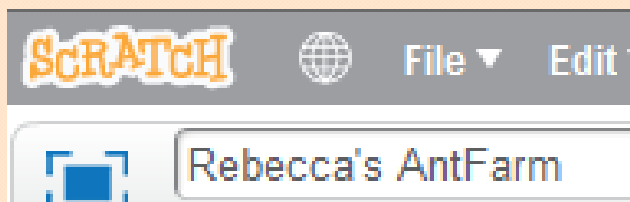
Make Your Own Copy Of The Ant Farm Game

- Go to the “Ant Farm” project at <http://scratch.mit.edu/projects/12778304/>
- Make your own copy of the game by:

1. Clicking on 

2. When you are in the project click on 

3. Change the name of the project from  to include your name:



Inside The Ant Farm Game

Challenge 1: Use arrow keys to move



The Ant: Make the ant move by adding scripts to move with the arrow keys:



Be careful that the ant doesn't touch the sides of the tunnel! See what the script does and play with it.

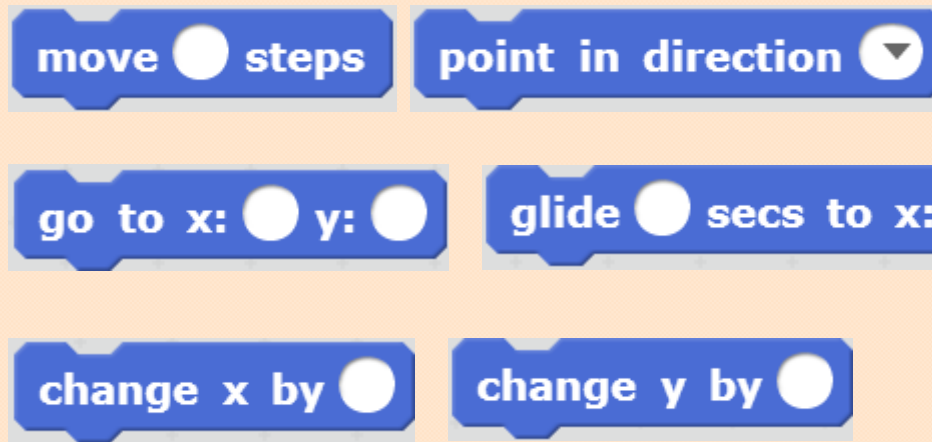
Inside The Ant Farm Game

Challenge 2: Move the ant using a script.



The Ant: Make a script which makes the ant move through the tunnel by itself **without** using the arrow keys.

Hint: You can use these blocks:



You win when the ant touches the food at the upper right.