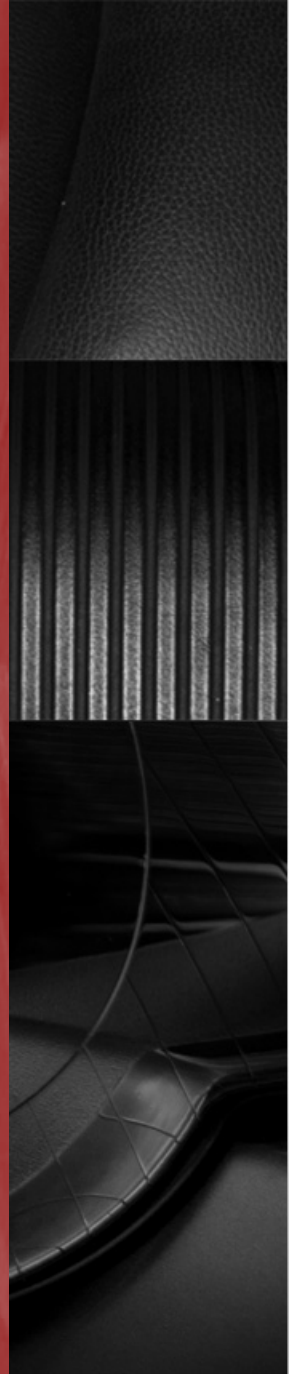


# Introduction to Scratch

Computer Programming I

Introduction to Aerospace





# What is Scratch?

- Scratch is a visual computer language used to create animations
- Visual computer languages use blocks to create a program. Non-visual languages use typewritten commands.
- Terminology
  - Sprites
  - Stages
  - Backgrounds
  - Scripts
  - Cartesian Coordinate System
  - Direction



# Sprites

- Characters in the animation that you can manipulate
  - Move
  - Glide
  - Shrink
  - Grow
  - Alter appearance
- The first Sprite that shows up is the Cat
- In the lower right hand part of the screen are where the Sprites are loaded or altered.



# Sprites

- Sprite Commands

- Paint a new Sprite

This brings up a Paint Editor screen

You can use the paint tools on the right (Paintbrush, Eraser, Fill tool, Rectangle tool, Ellips tool, Line tool, Text tool, Select tool, Stamp tool, and Eyedropper tool)

You can change the size of the Paintbrush, Eraser, and Line in the gray box below

You can also select different options for the Fill, Rectangle, Ellipse, and Text tools in that gray box.

Colors can be selected at the bottom, either from a fixed array of colors or from various spectrums of color

You can zoom, rotate, grow, shrink, and flip the drawings on the screen.

You can also import an existing Sprite to alter its appearance, or import in a file of your own.



# Sprites

- Sprite Commands

- Choose a new Sprite from file

Here you can bring up any of the pre-drawn Sprites that come with the program. They are in the costumes folder

You can also bring in other pictures on your computer

- Get surprise Sprite

Selects a random Sprite from the costumes folder

- Sprites have Scripts, Costumes, and Sounds

- Look in the central column: there is a tab for each
  - The scripts are the programs, the Costumes are different appearances for the Sprite, the Sounds are sounds



# Sprites

- Costumes

- When you click on the Cat sprite in the lower right hand area, you will see the cat appear in the central column.
- If you click on the Costumes tab, you will see two costumes for the cat that have already been drawn.
- How are they different? Click on each costume and see how they change in the Presentation area to the right.
- A Costume is just clothing for the Sprite, it is a different appearance of the Sprite.

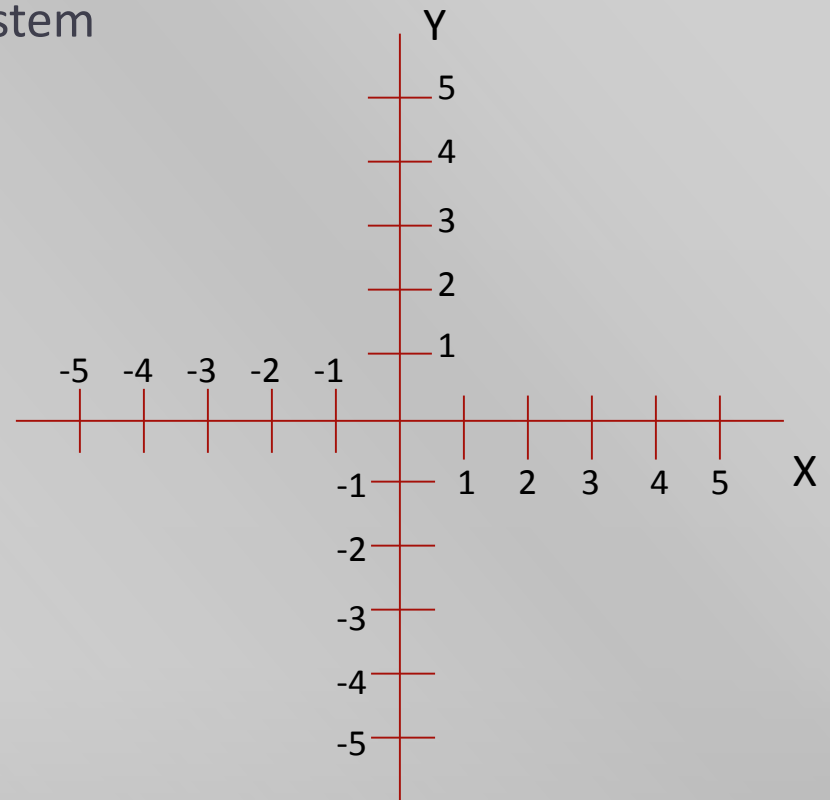


# Presentation Area

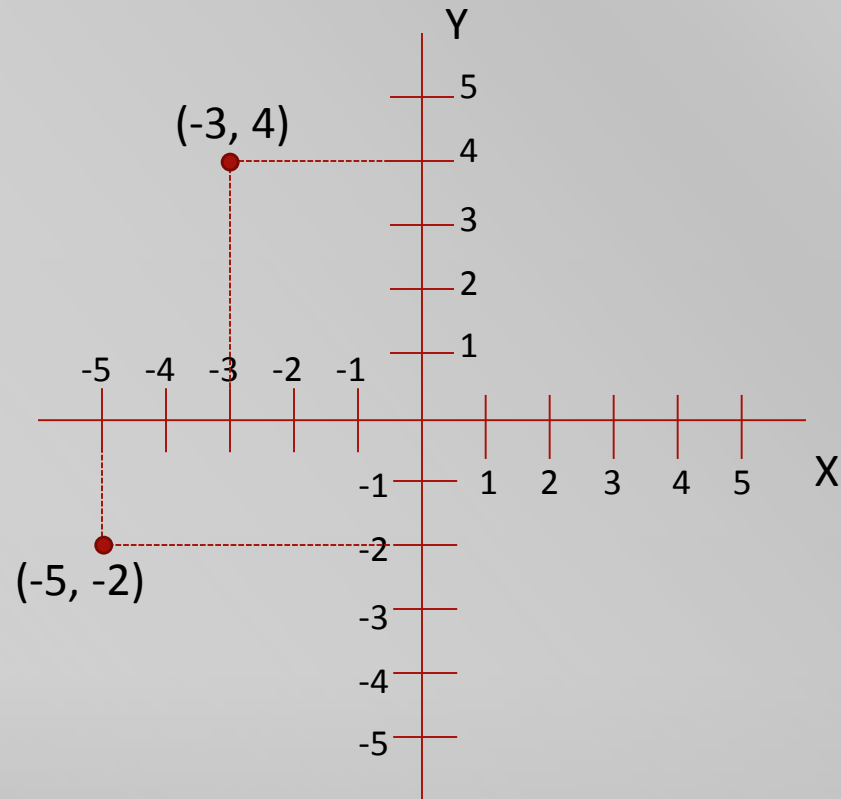
- This is the white area in the upper right corner of the screen
- Whatever your program tells the sprites to do will be shown here
- You can set the stage to have a particular background.
- If you select Stage down where the Sprites are located, you will see the central column area change
  - Now you have three tabs: Scripts, Backgrounds and Sounds
  - Only the Background is different compared with the Sprites
  - Under the Background tab, you can load in a picture that will serve as the background behind your Sprites.
  - You can paint a background, import a background that Scratch provides (in the Backgrounds folder), or import in your own background picture

# Cartesian Coordinate System

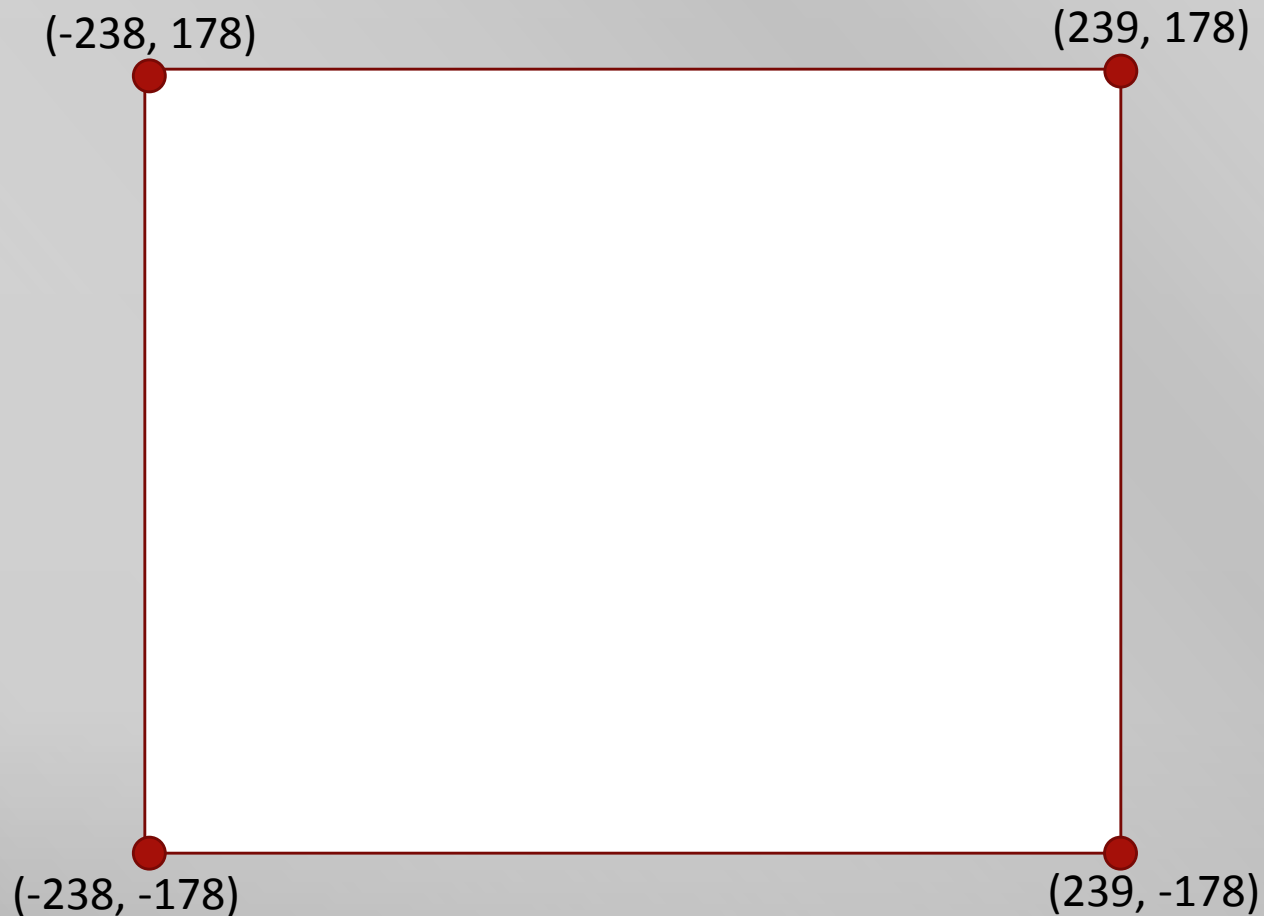
- Scratch uses a Cartesian Coordinate System



# Cartesian Coordinate System

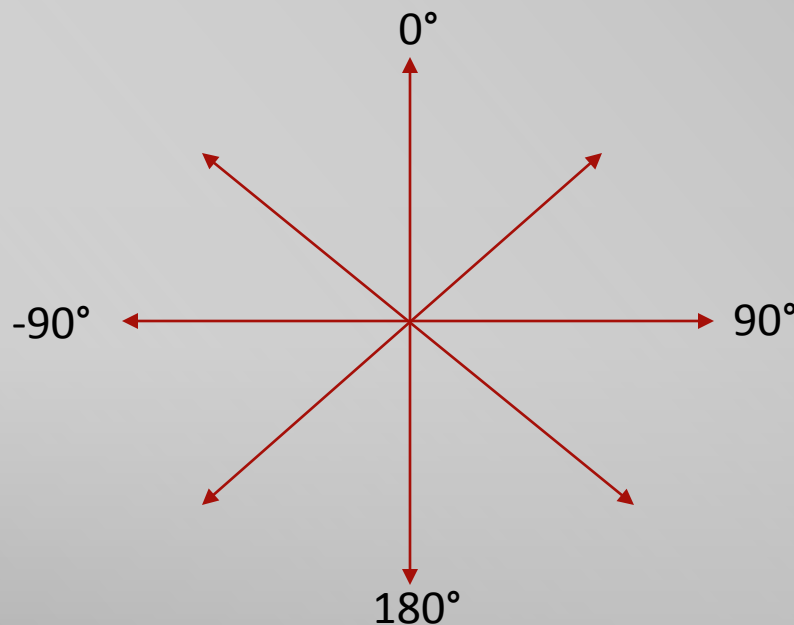


# Scratch Cartesian Coordinate system



# Direction

- In addition to the coordinate system to locate your Sprites, you can point the Sprite to move in a given direction. (This does not change the appearance of the Sprite)
- This is based on a 360 degree rotational notation.





# Presentation Area

- Click on the Cat Sprite and move it around the Presentation Area.
- You will see the Mouse x and Mouse y coordinates change as you move the cat
- Above the Presentation Area are some commands where you can select, stamp, cut, grow, and shrink items in the area.
- To the right is a Green flag that we'll discuss when we look at Scripts



# Scripts

- Scripts are the computer programs that govern the movement and appearance of each Sprite or Background
- They are created by dragging commands from the left column into the center column
- The Scripts are in the following categories:
  - Motion
  - Looks
  - Sound
  - Pen
  - Control
  - Sensing
  - Numbers
  - Variables



# Scripts

- Motion – Controls movement of the Sprite
  - Move – will move the sprite in the direction set
  - Turn – will turn the direction of the sprite by an number of degrees
  - Point – will point the direction of the sprite to a point or to another Sprite
  - Go to – will put the Sprite at a certain location
  - Glide – will move the Sprite at a certain rate to a location
  - Change by – will change the location by a certain amount in the x or y direction
  - Set to – will set the location to a specific x or y location
  - Bounce – will make the Sprite bounce if it hits the edge of the screen
  - X, y, direction boxes – Will place the x, y, or direction values for the Sprite on the screen



# Scripts

- Looks – Controls how the Sprite looks
  - Costume – will change the costume of the Sprite
  - Say – will put a box on the screen for a Sprite to say the Text entered
  - Think – will put a bubble on the screen for a Sprite to think the Text entered
  - Effects – will change the color or other effects for the Sprite
  - Glide – will move the Sprite at a certain rate to a location
  - Size – will change the size of the Sprite
  - Show/Hide – will either show or hide the Sprite from view
  - Go to – will set the Sprite to be in front of the other Sprites, or to move behind them
- Sound – controls sounds
- Pen – can draw on the screen
- Numbers and Variables – will be discussed later



# Scripts

- Control
  - Start – starts the script via flag, key, or clicking
  - Stop – stops the script or all of the scripts
  - We'll cover the rest later
    - Loops
    - Broadcast
    - When I receive
    - If statements
- Sensing
  - Will cover later



# Linear program

- Follow along in class, we'll build a simple linear program
- The Cat will walk in a square around the space
  - When flag clicked
  - Go to x: -150 y: 150
  - Glide 1 secs to x: 150 y:150
  - Glide 1 secs to x: 150 y:-150
  - Glide 1 secs to x: -150 y:-150



# Linear Program in Scratch – The Glider

- You will now make your first program in Scratch – everyone must have their own program
- Create a linear program that does the following:
  - Show a glider taking off from a hill, gliding, and then landing
  - Have an appropriate background
- Create an algorithm flow chart to illustrate your program
- Things to consider
  - The glider must be the right size to fit on the screen, take off and land
  - Include narration on the screen describing what happens
  - When you run the program multiple times, the glider should always start at the same position each time (called initial conditions)