

Scratch Geometry Explorations--2D shapes, lines and angles

regular polygon
cardinal direction

size by a percent
degrees/angles

coordinate pair
variable

quadrants
range

1. How can you use **move** and **turn** to draw regular polygons?

```

when green flag clicked
  set size to 20 %
  go to x: 0 y: -100
  clear
  pen down
  point in direction -90
  repeat 3
    move 100 steps
    turn 120 degrees
  repeat 4
    move 100 steps
    turn 90 degrees
  
```

3. How can a variable be used to create a script which draws polygons of **n** sides?
- Create a variable **# of sides**
 - Check the variable's box to show it on screen.
 - Set the variable's range by option/clicking on its screen readout.

```

when green flag clicked
  pen up
  clear
  set # of sides to # of sides
  set size to 30 %
  go to x: 0 y: -100
  pen down
  point in direction -90
  repeat # of sides
    move 100 steps
    turn 360 / # of sides degrees
  
```

2. What is the relationship between the number of sides in a regular polygon and the number of degrees the sprite has to turn to form each angle?

```

when green flag clicked
  pen up
  clear
  set size to 30 %
  go to x: 0 y: -100
  pen down
  point in direction -90
  repeat 3
    move 100 steps
    turn 360 / 3 degrees
  repeat 4
    move 100 steps
    turn 360 / 4 degrees
  
```

4. How can explorations of steps and turns create spirograph designs?

```

when green flag clicked
  set size to 20 %
  go to x: 50 y: -50
  point in direction 0
  clear
  pen down
  forever
    move 200 steps
    turn 179 degrees
    move 10 steps
    turn 15 degrees
    change pen shade by 10
  
```

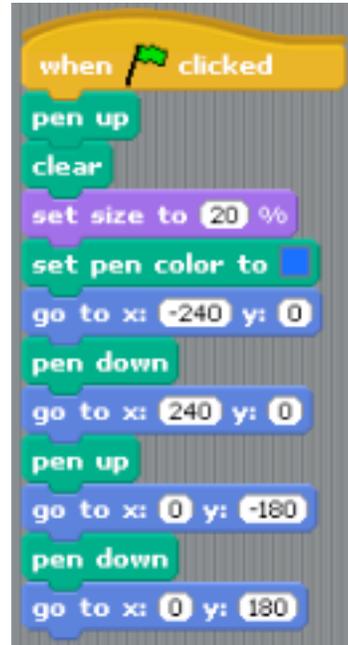
Scratch Geometry Explorations--Coordinate Geometry

Quadrant ordered pair x coordinate, y coordinate X-axis, Y-axis origin

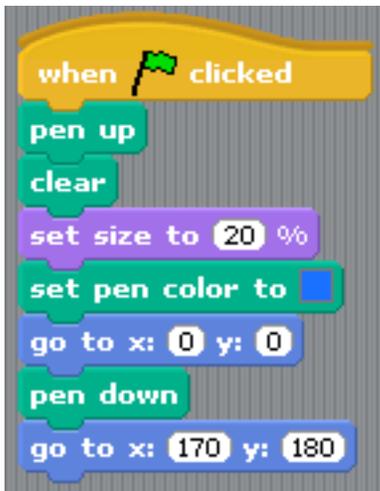
1. What is the default location of the cat when you open a project? How does that location change when you drag the cat to other places on the screen?



4. How can you draw the x and y axis of the coordinate grid by using coordinate pairs?

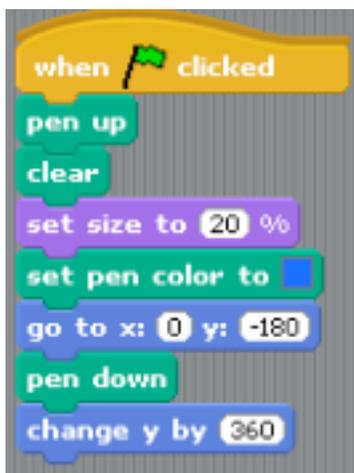


2. How can you draw lines by changing the x and/or y coordinate for the location of a sprite?



4. Here are directions to make a button that clears the screen and redraws the axis.
- Make a new sprite to be the button.
 - Draw a costume for it naming the function of the button, then position the button to the side.
 - Write a script for this sprite so that when it is clicked, it broadcasts to sprite1.

3. How can you draw a line by changing one coordinate?



- d. In Sprite1, copy the grid script and replace the flag block with **when I receive** the broadcast.



5. How can you use coordinate pairs to draw specific shapes, such as your initials?
- Start with a new script in Sprite1.
 - Make a Sprite3 to be the button that runs the script.

Scratch Math Explorations: Some Programming Concepts

Percentage	Positive and negative numbers	Coordinate geometry
Sequence (order of events)	Iteration (looping)	Random numbers
Threads (parallel events)	Synchronization (timing events using broadcast)	

1. How does changing the size % affect the size of the cat?

```

when clicked
  go to x: 0 y: 0
  set size to 100 %
  repeat 10
    change size by 10
  repeat 10
    change size by -10
  
```

4. How can you animate the cat while it dances?

```

when space key pressed
  forever
    switch to costume costume1
    wait 0.2 secs
    switch to costume costume2
    wait 0.2 secs
  
```

2. How can you use ordered pairs to change the location of the cat, to make it dance?



```

when space key pressed
  go to x: 45 y: 45
  wait 1 secs
  go to x: 45 y: -45
  wait 1 secs
  go to x: -45 y: -45
  wait 1 secs
  go to x: -45 y: 45
  wait 1 secs
  
```

5. How can you add music for the dance?



```

when clicked
  play sound GuitarChords2 until done
  
```

6. How can you combine different moves and music?

```

when clicked
  broadcast boxstep
  repeat 2
    play sound GuitarChords2 until done
  broadcast size
  forever
  
```

3. How can you use random numbers to change the dance to "jazz"?

```

when space key pressed
  forever
    go to x: pick random -45 to 45 y: pick random -45 to 45
    wait 5 secs
  
```

```

when I receive boxstep
  forever
    switch to costume costume1
    wait 0.2 secs
  
```

```

when I receive boxstep
  repeat 4
    go to x: 45 y: 45
  
```