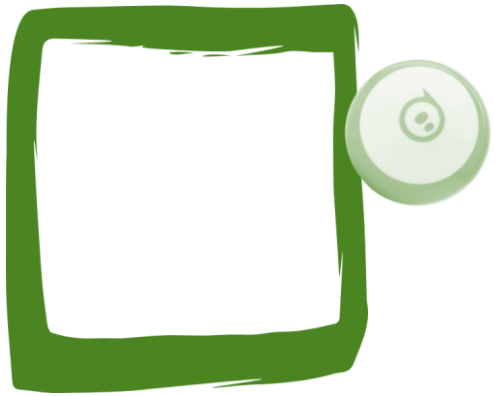
Spheros Making Shapes

Using the movement and angle option.

MTH1W – Day 2, Part D



MTH1W Curriculum Covered in This Lesson:

☑ C2.1a [Coding] Use coding to demonstrate understanding of **variables**
☑ C2.1b [Coding] Use coding to demonstrate understanding of **parameters**
☑ C2.1c [Coding] Use coding to demonstrate understanding of **equations**
☐ C2.1d [Coding] Use coding to demonstrate understanding of **inequalities**

☑ C2.2a [Coding] Create code by decomposing situations into computational steps in order to **represent mathematical concepts and relationships**
☑ C2.2b [Coding] Create code by decomposing situations into computational steps in order to **solve problems**

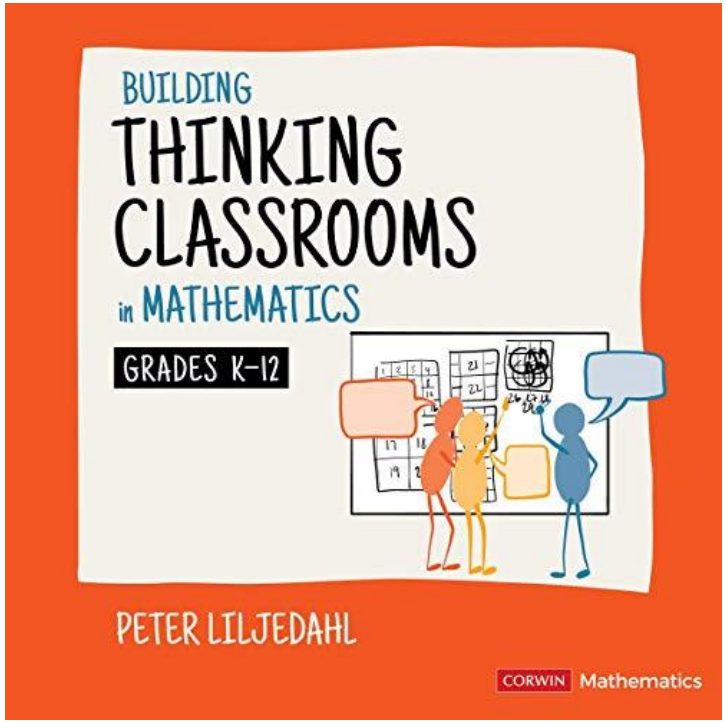
☑ C2.3a [Coding] **Read code to predict** its outcome
☑ C2.3b [Coding] **Alter code** to adjust **constraints, parameters** to represent a similar or new mathematical situation
☑ C2.3c [Coding] **Alter code** to adjust **outcomes** to represent a similar or new mathematical situation

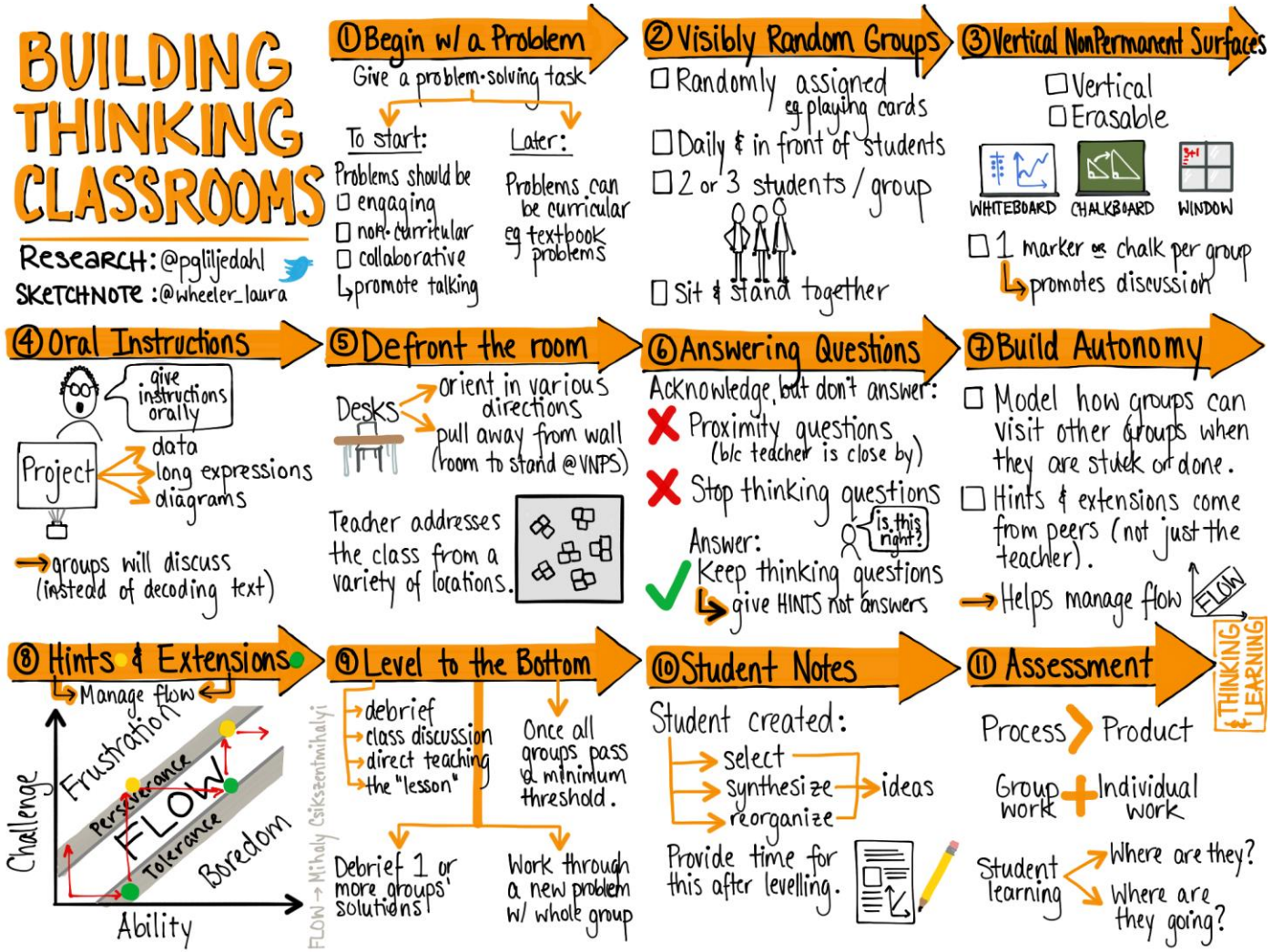
Sequencing and Timing:

- On Day 1, students will cover part A, Part B and some of Part C (this lesson).
- On Day 2, students finish Part C (this lesson) and cover Part D.

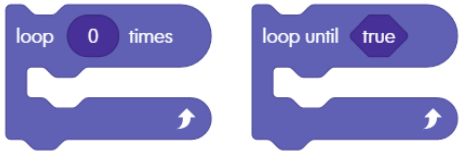
Original Curriculum Language:
C2.1 [Coding] use coding to demonstrate an understanding of algebraic concepts including variables, parameters, equations, and inequalities
C2.2 [Coding] create code by decomposing situations into computational steps in order to represent mathematical concepts and relationships, and to solve problems
C2.3 [Coding] read code to predict its outcome, and alter code to adjust constraints, parameters, and outcomes to represent a similar or new mathematical situation

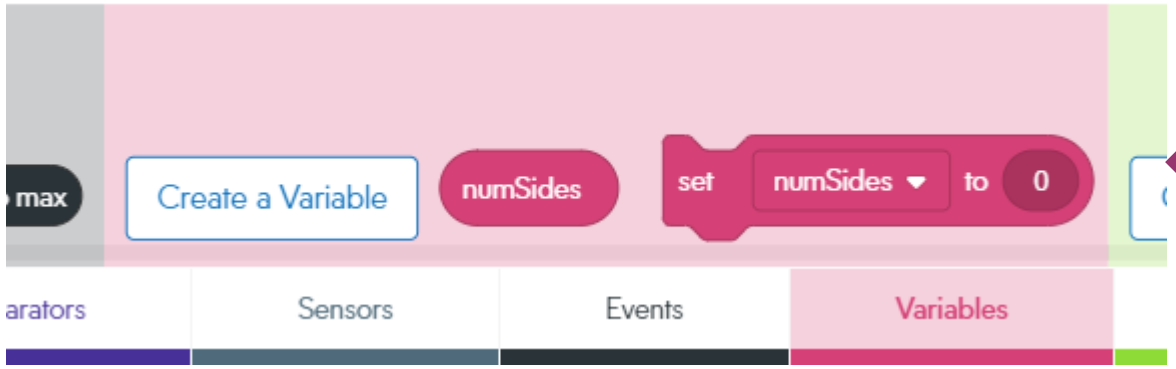
This lesson is set up to follow the format of Building Thinking Classrooms by Peter Liljedahl.

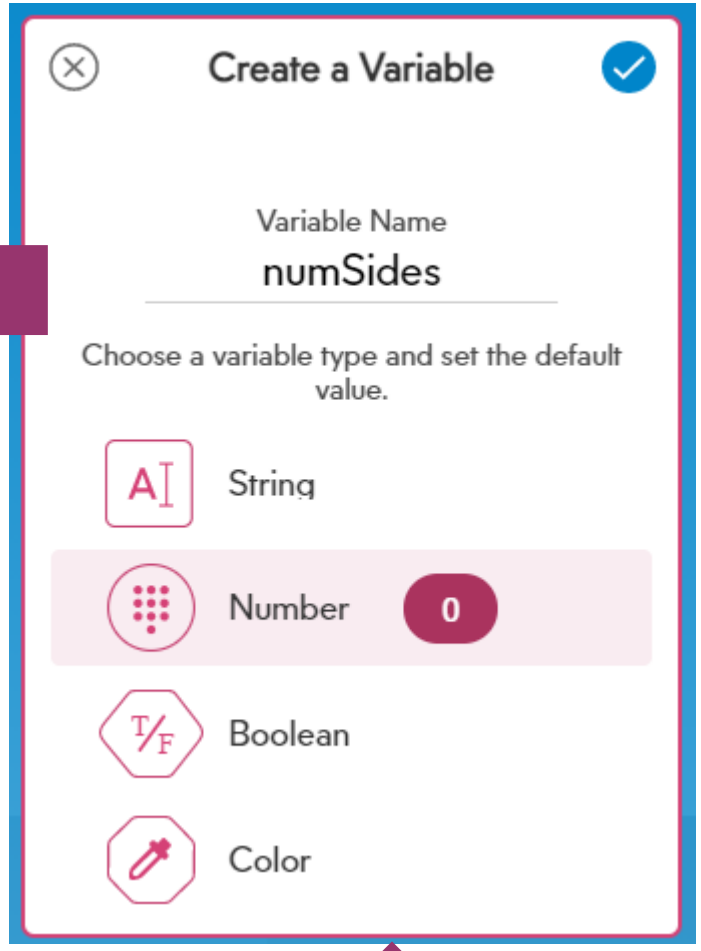




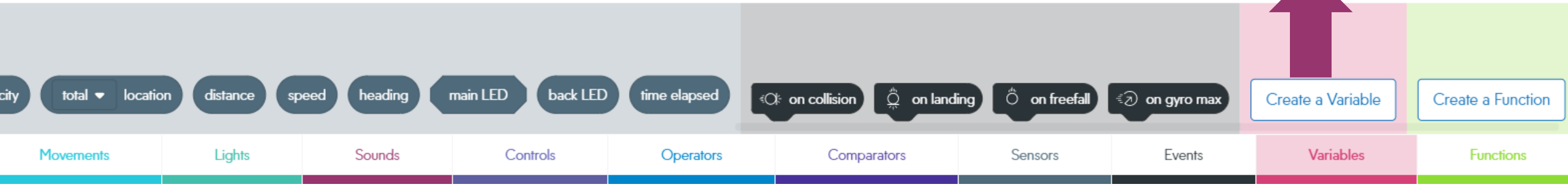
Basic Coding Components

Output	*Changes the robot:* Moves. Spins. Re-directs to a new angle. Makes sound. Speeds up. Lights up.	
Math	*Calculation that results in a number:* +, - , *, /, square root	
Boolean Expressions	*Calculation that results in **true or false**:* >, <, =, >=, <=, and, or, not	
Control	Ifs — ***Decides** which piece of code to run:* Uses a Boolean expression and output or math.	
	Loops — ***Repeats** code:* Uses a Boolean expression and output or math.	
Variables	Named pieces of memory where you can store things to use later OR to store calculation results.	
Functions	Named pieces of code where you can group code together to use it later.	



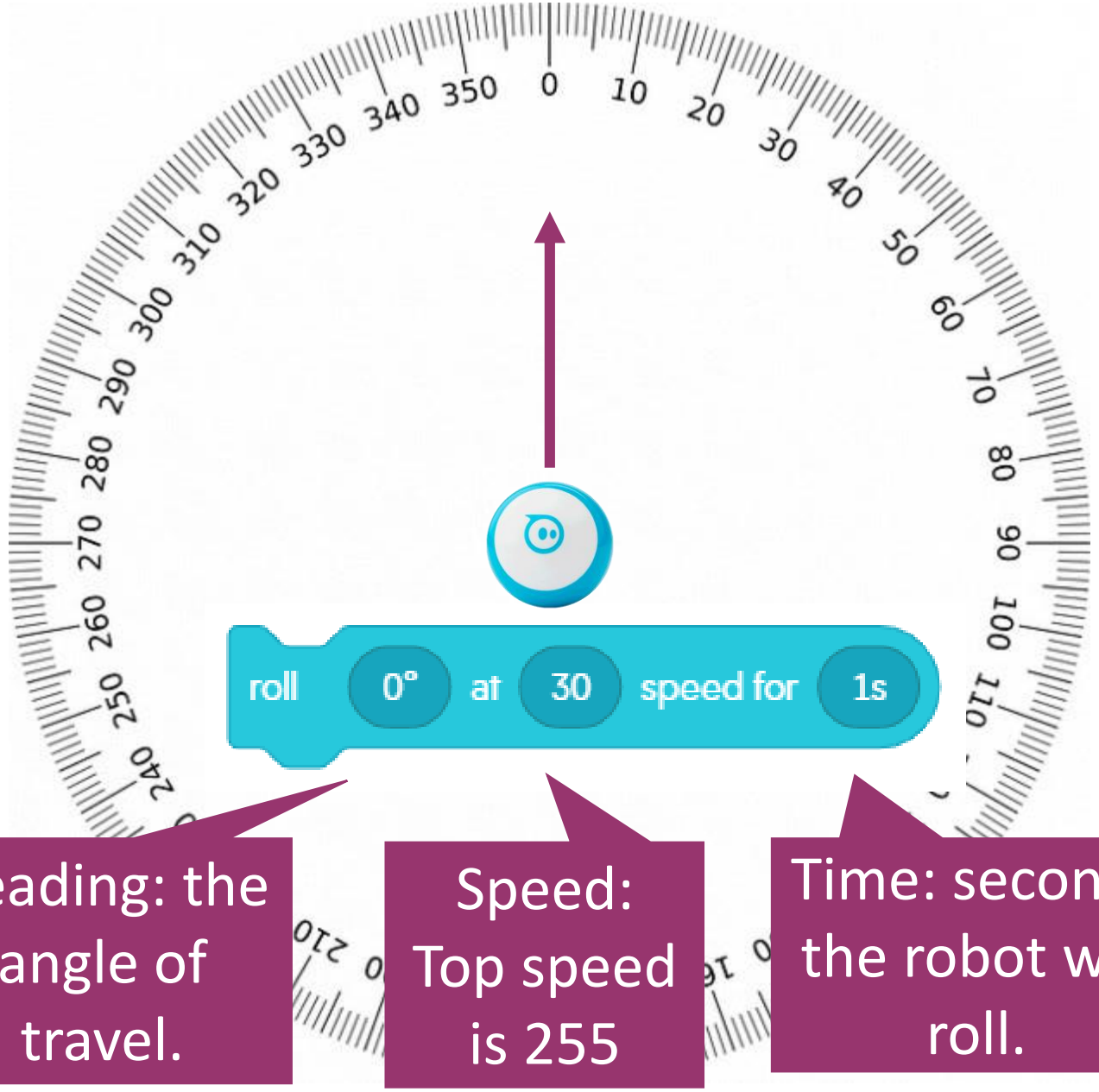


What is the name of this variable? What is it's initial value?



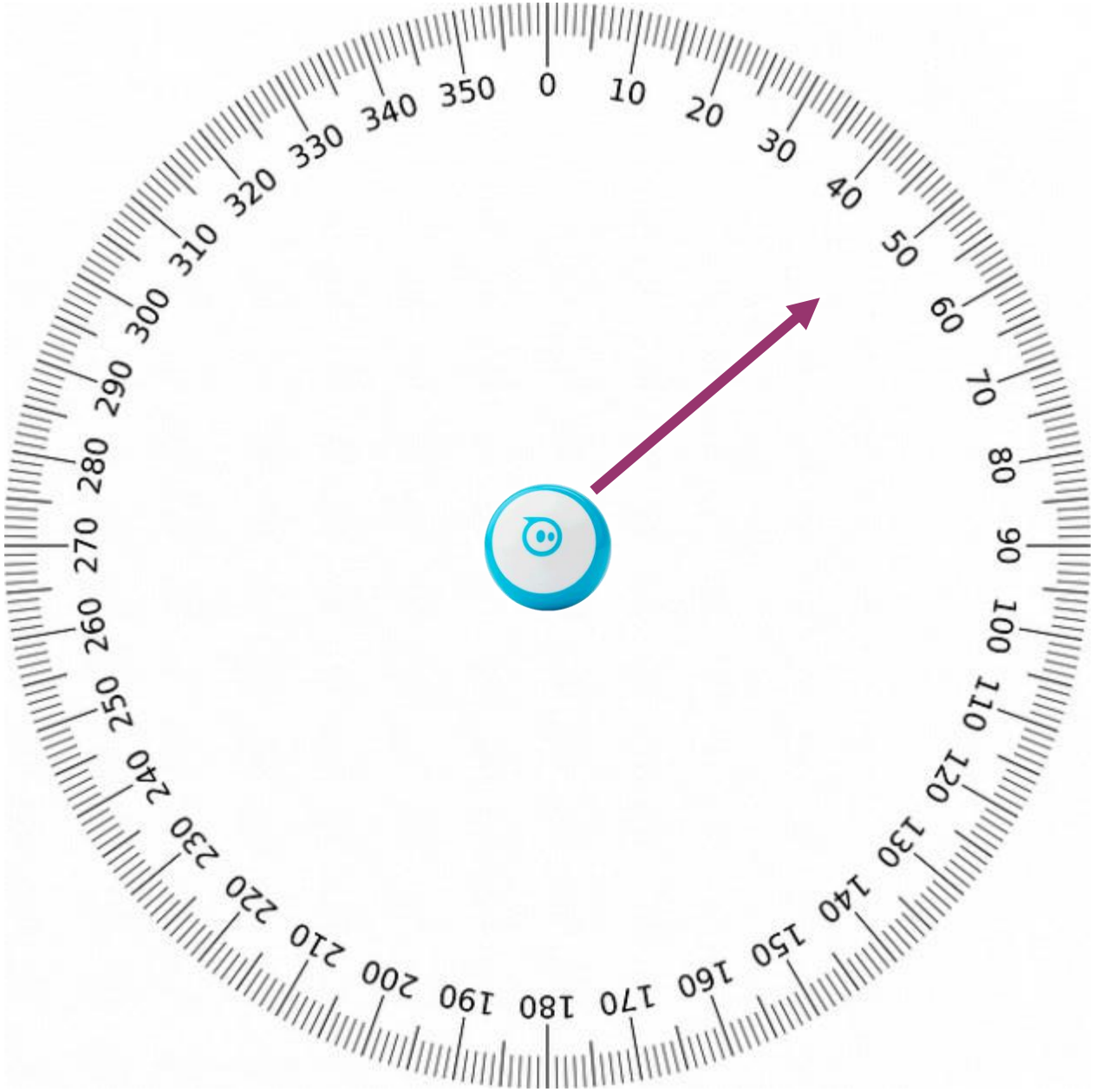
The Roll Block:

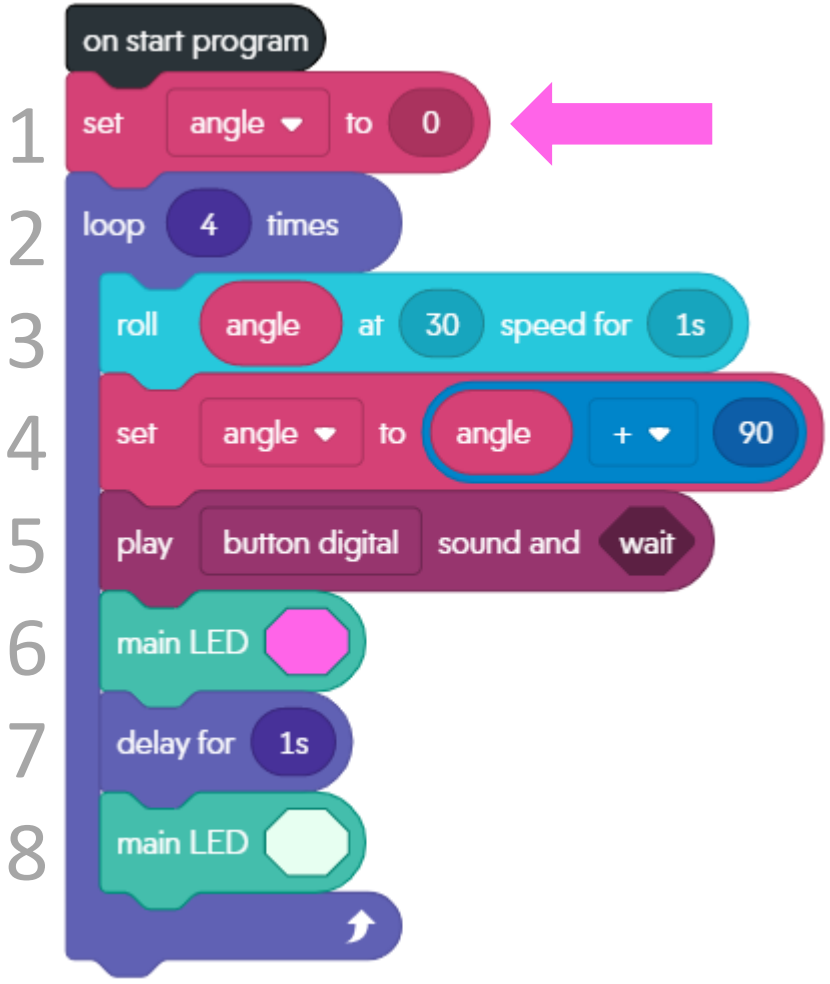
Parameters of the roll block:



The Roll Block:

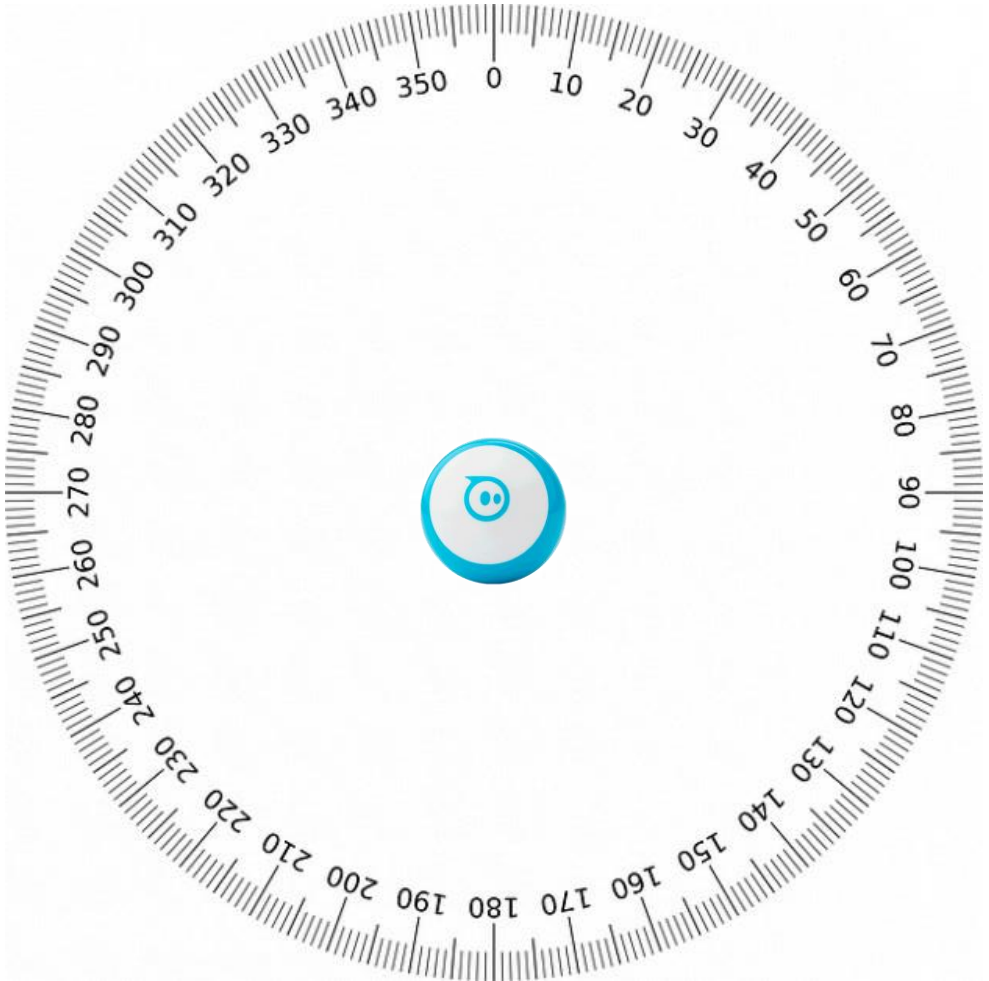
Another example of the roll block. What is the function name? What is the parameter name?





variables

Let's trace this program.
What does the first line do?

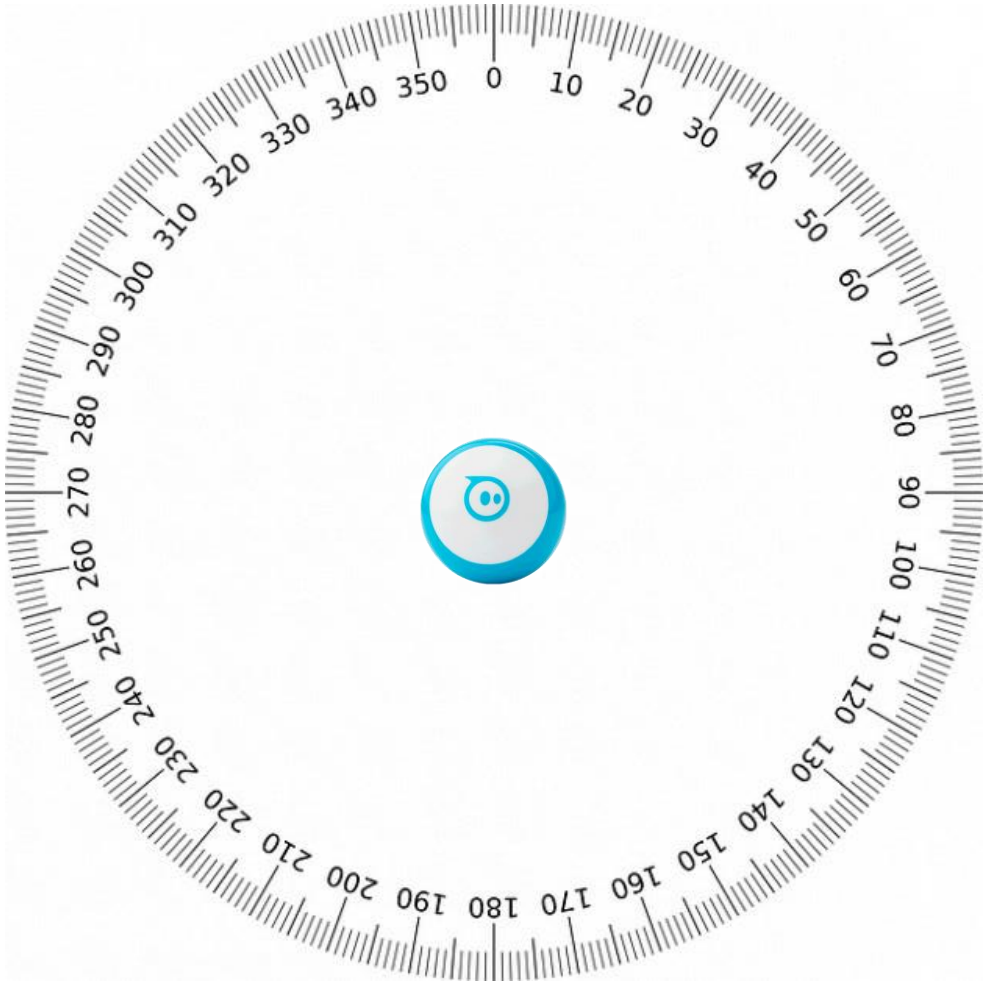


```
on start program
1 set angle to 0
2 loop 4 times
3     roll angle at 30 speed for 1s
4     set angle to angle + 90
5     play button digital sound and wait
6     main LED
7     delay for 1s
8     main LED
```

variables

angle	1

Where does the loop end? What lines of code are repeated 4 times?

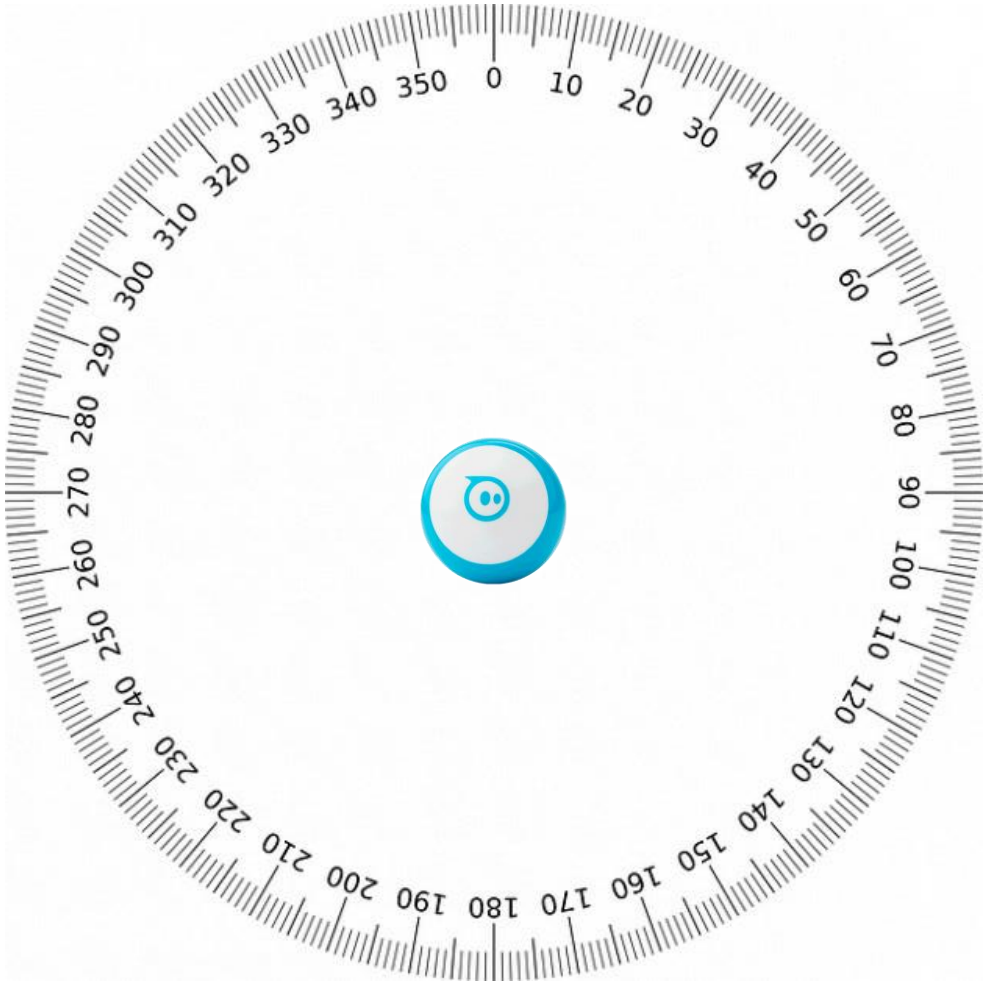


```
on start program
1 set angle to 0
2 loop 4 times
3     roll angle at 30 speed for 1s
4     set angle to angle + 90
5     play button digital sound and wait
6     main LED
7     delay for 1s
8     main LED
```

variables

angle	0

Does the Sphero head up, down, right or left?

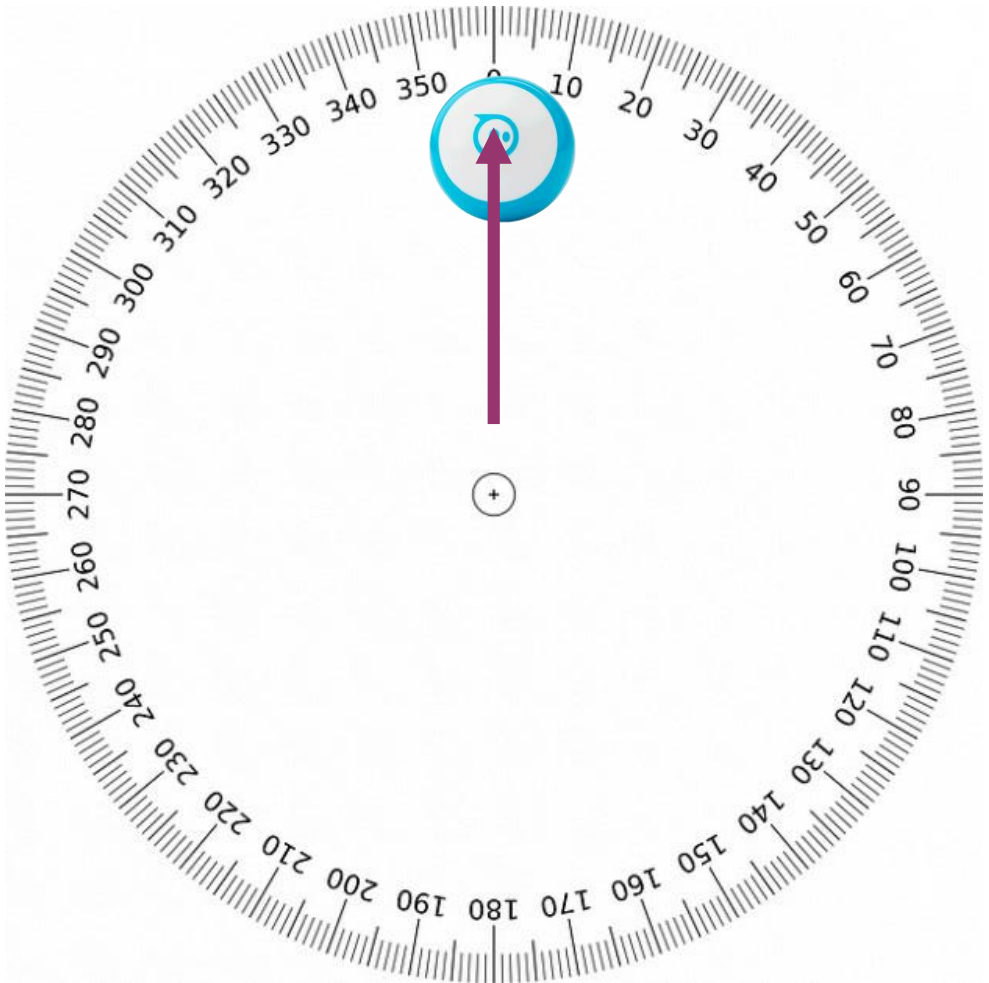


```
on start program
1 set angle to 0
2 loop 4 times
3     roll angle at 30 speed for 1s
4     set angle to angle + 90
5     play button digital sound and wait
6     main LED
7     delay for 1s
8     main LED
```

variables

angle	0

What changes after line 4 runs?

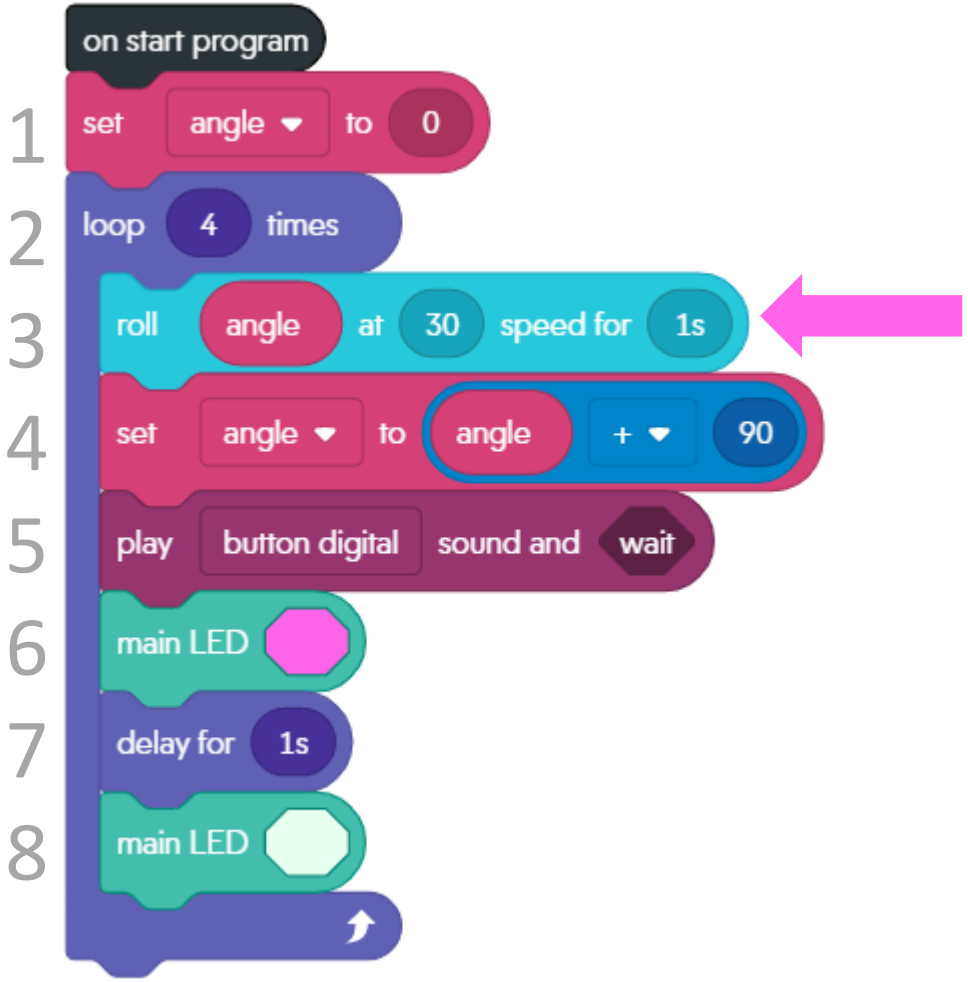


```
on start program
1 set angle to 0
2 loop 4 times
3     roll angle at 30 speed for 1s
4     set angle to angle + 90
5     play button digital sound and wait
6     main LED
7     delay for 1s
8     main LED
```

variables

angle	90

What do lines 5 to 8 do?



variables

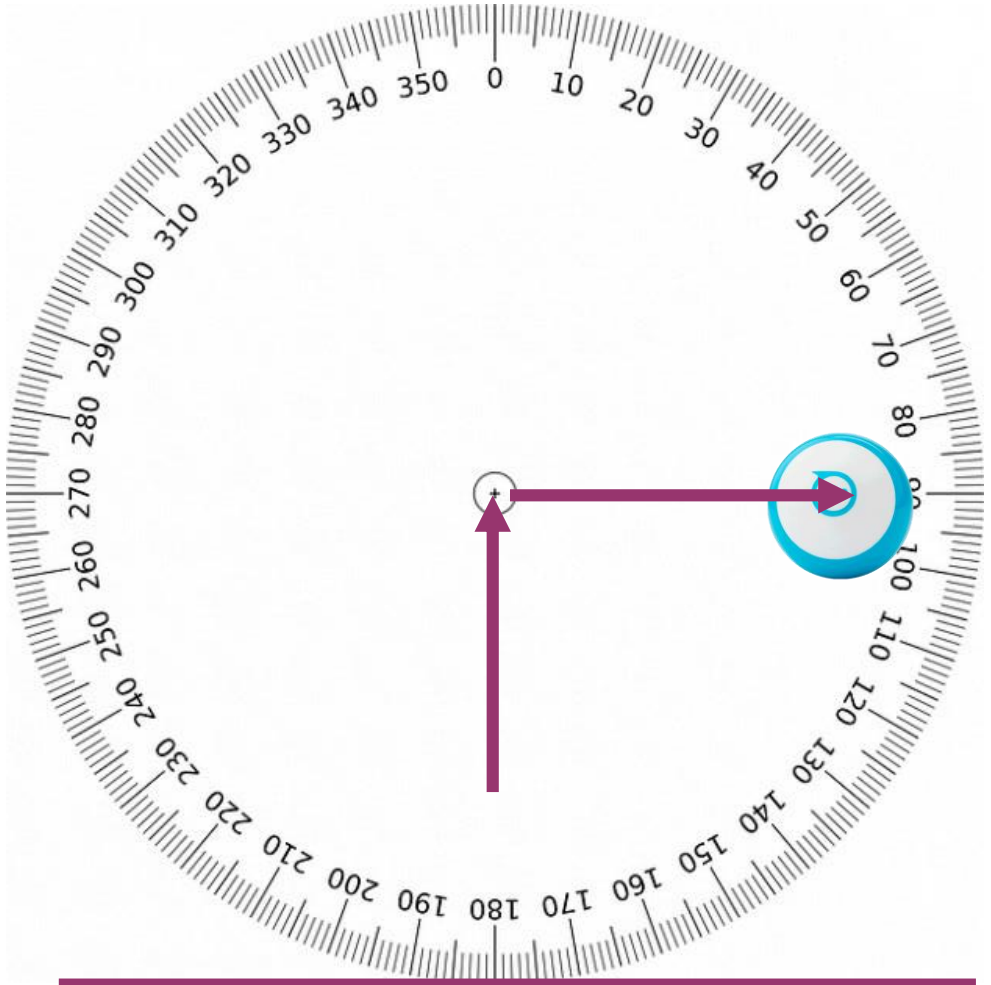
angle	90

The second time the loop runs, does the Sphero travel up, down, right or left?

```
on start program
1 set angle to 0
2 loop 4 times
3     roll angle at 30 speed for 1s
4     set angle to angle + 90
5     play button digital sound and wait
6     main LED
7     delay for 1s
8     main LED
```

variables

angle	90

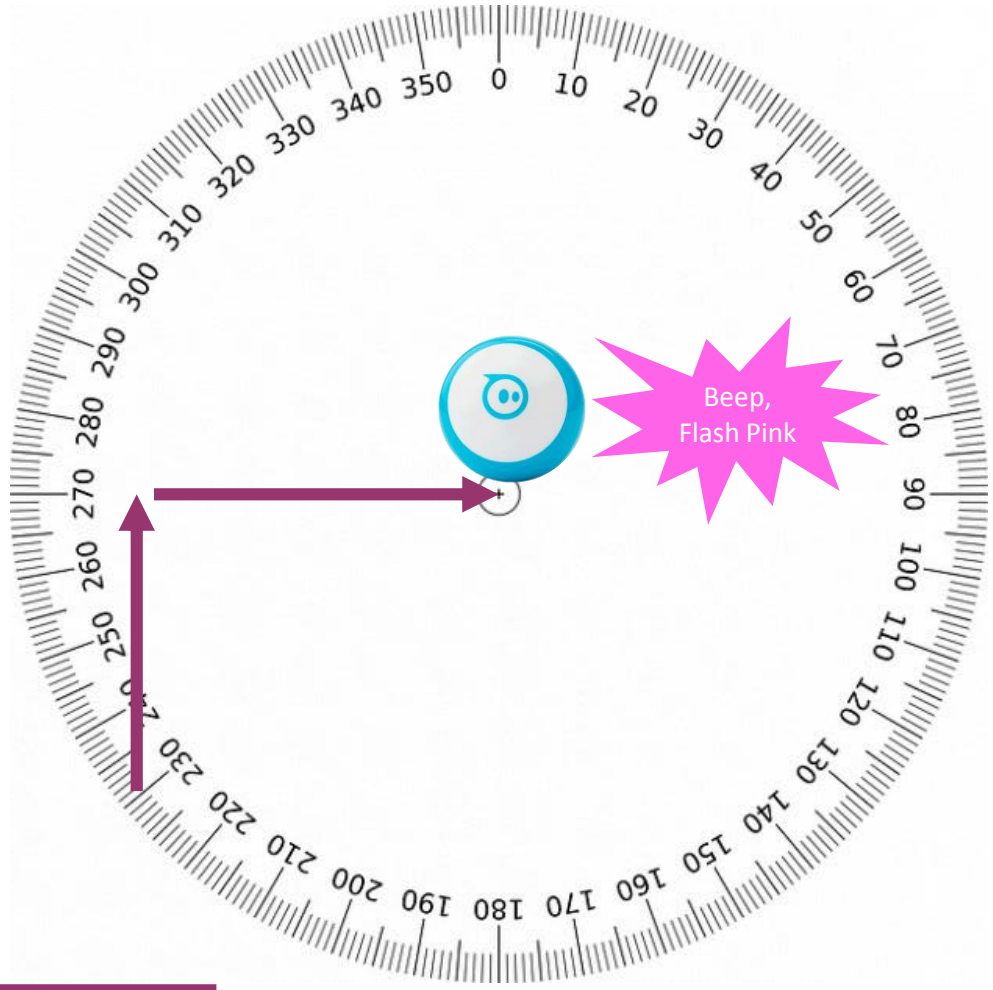


The second time the loop runs, what do lines 4 to 8 result in?

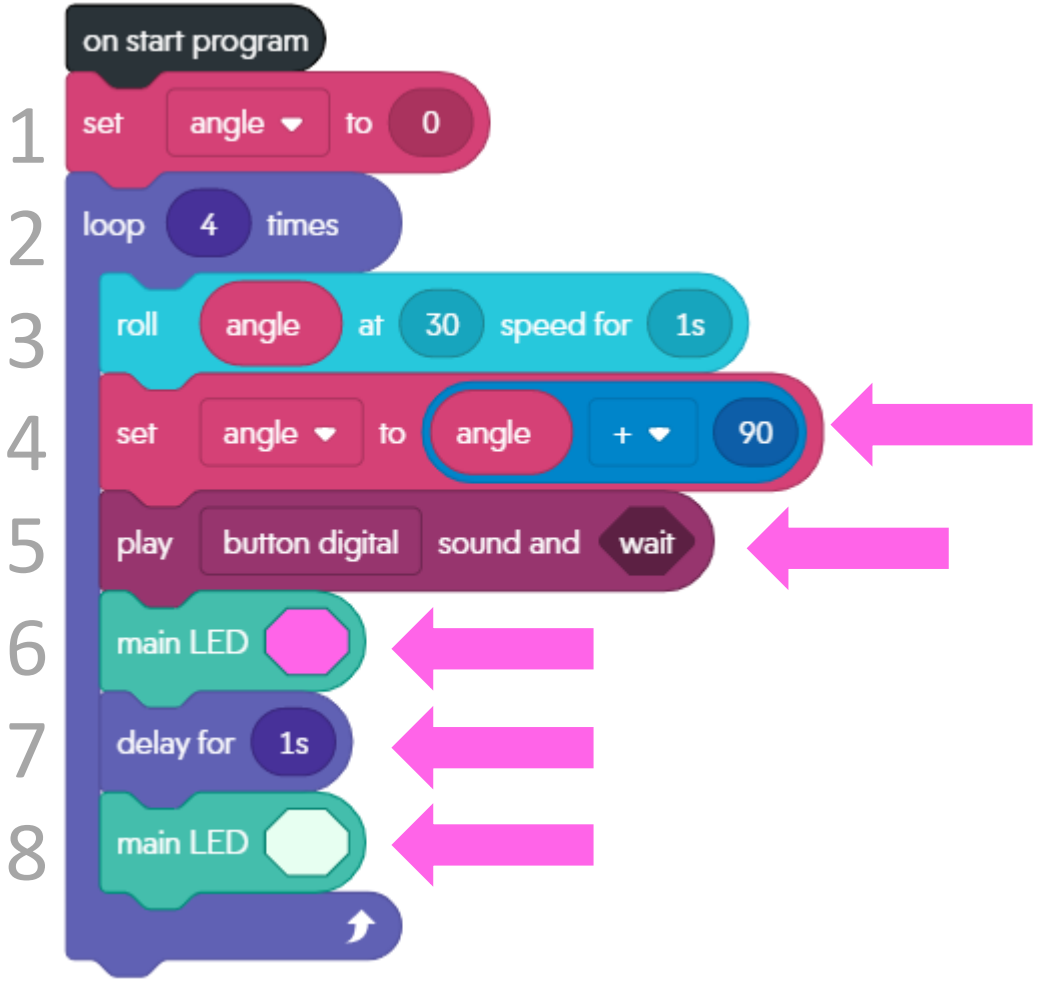
```
on start program
1 set angle to 0
2 loop 4 times
3     roll angle at 30 speed for 1s
4     set angle to angle + 90
5     play button digital sound and wait
6     main LED
7     delay for 1s
8     main LED
```

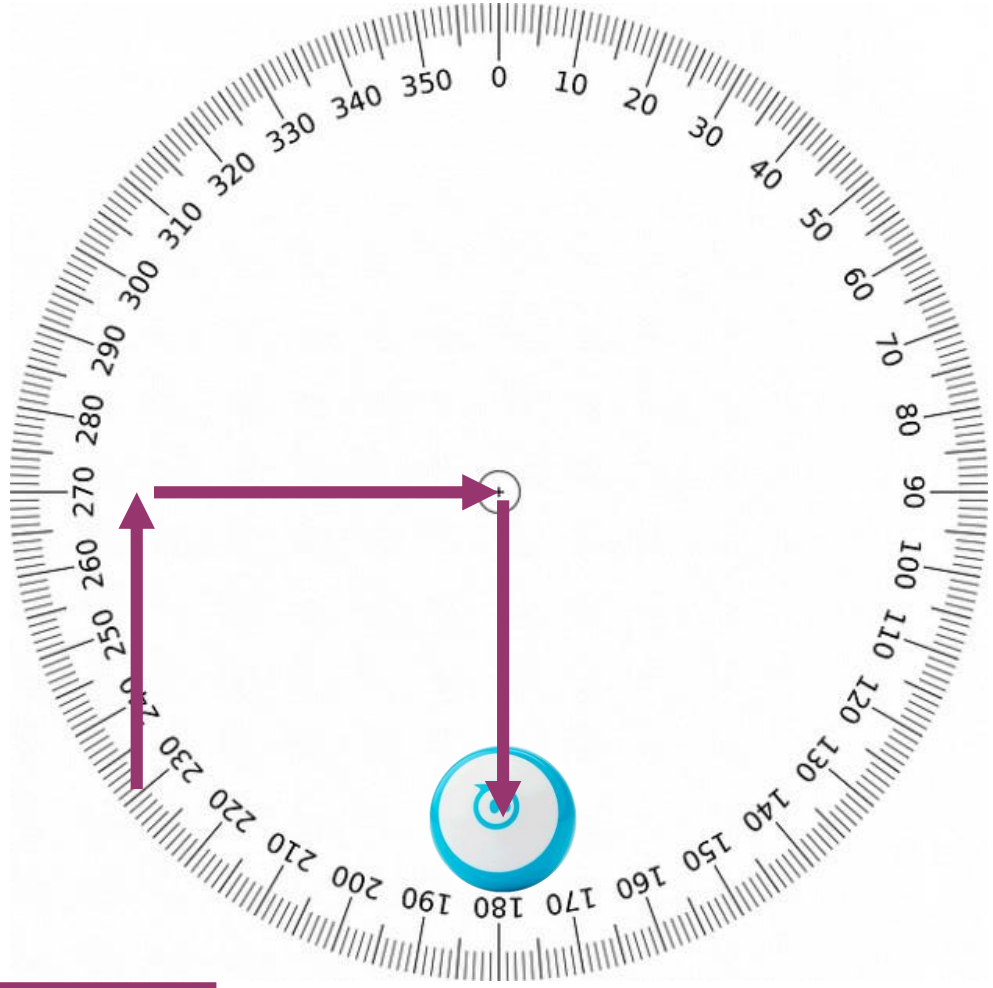
variables

angle	180



The third time the loop runs, does the Sphero travel up, down, right or left?





variables

angle	180

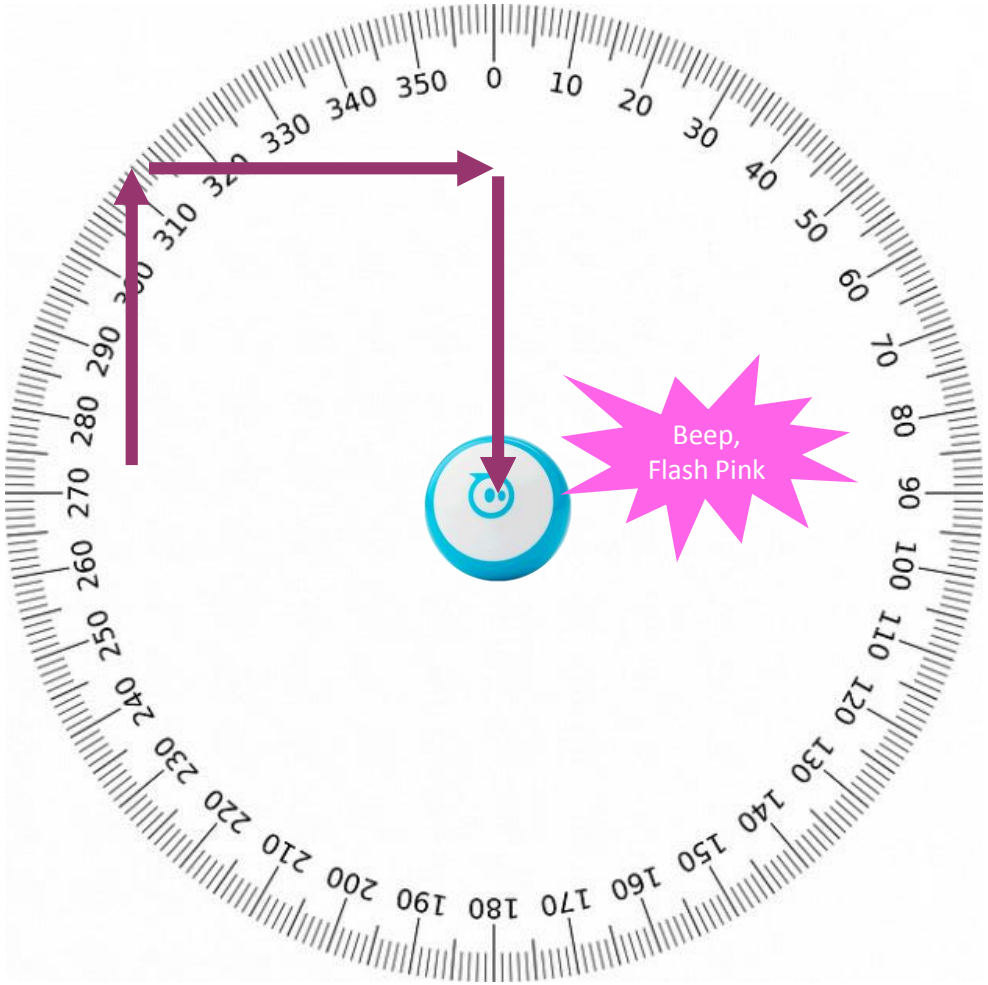
The third time the loop runs, what do lines 4-8 do?

```
on start program
1  set angle to 0
2  loop 4 times
3      roll angle at 30 speed for 1s
4      set angle to angle + 90
5      play button digital sound and wait
6      main LED
7      delay for 1s
8      main LED
```

variables

angle	270

The fourth time the loop runs, does the sphero travel up, down, right or left?

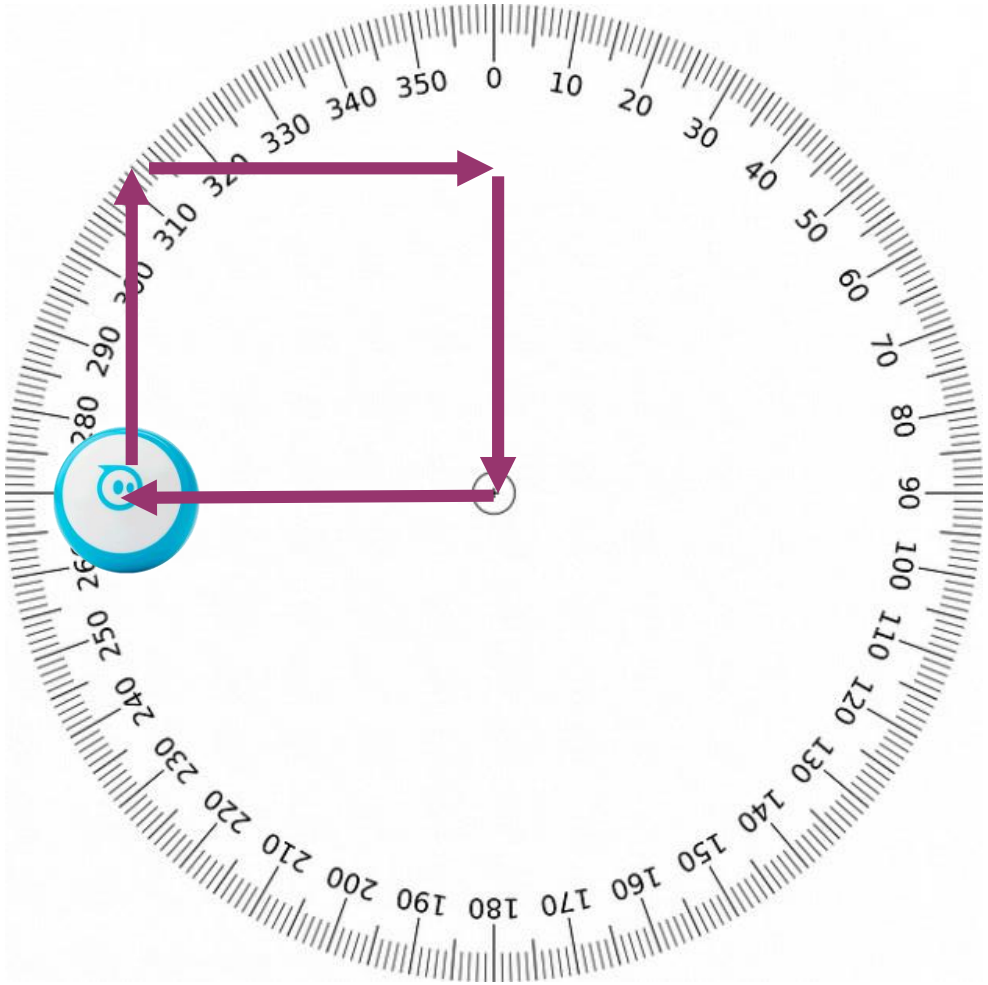


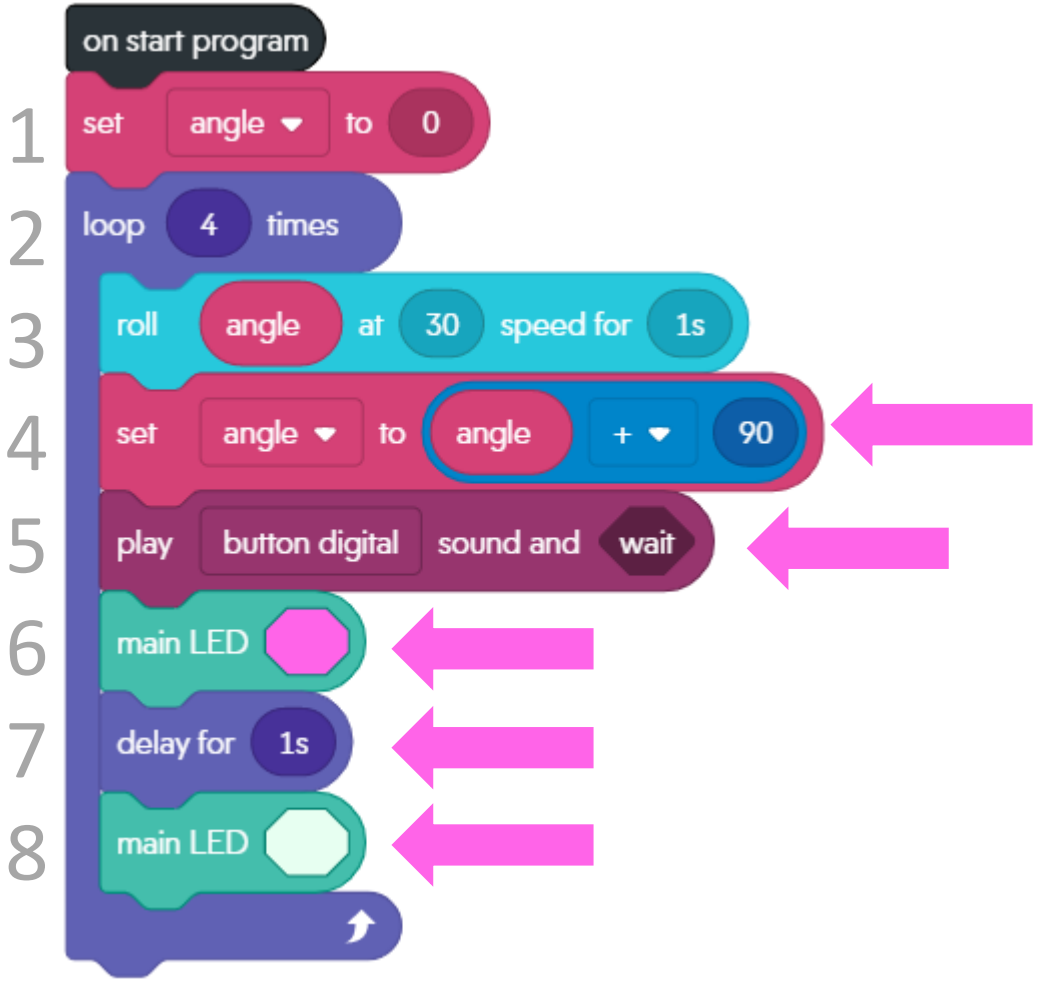
```
on start program
1  set angle to 0
2  loop 4 times
3      roll angle at 30 speed for 1s
4      set angle to angle + 90
5      play button digital sound and wait
6      main LED
7      delay for 1s
8      main LED
```

variables

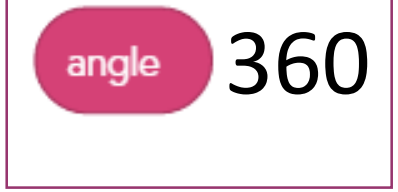
angle	270

The fourth time the loop runs, what do lines 4-8 do?

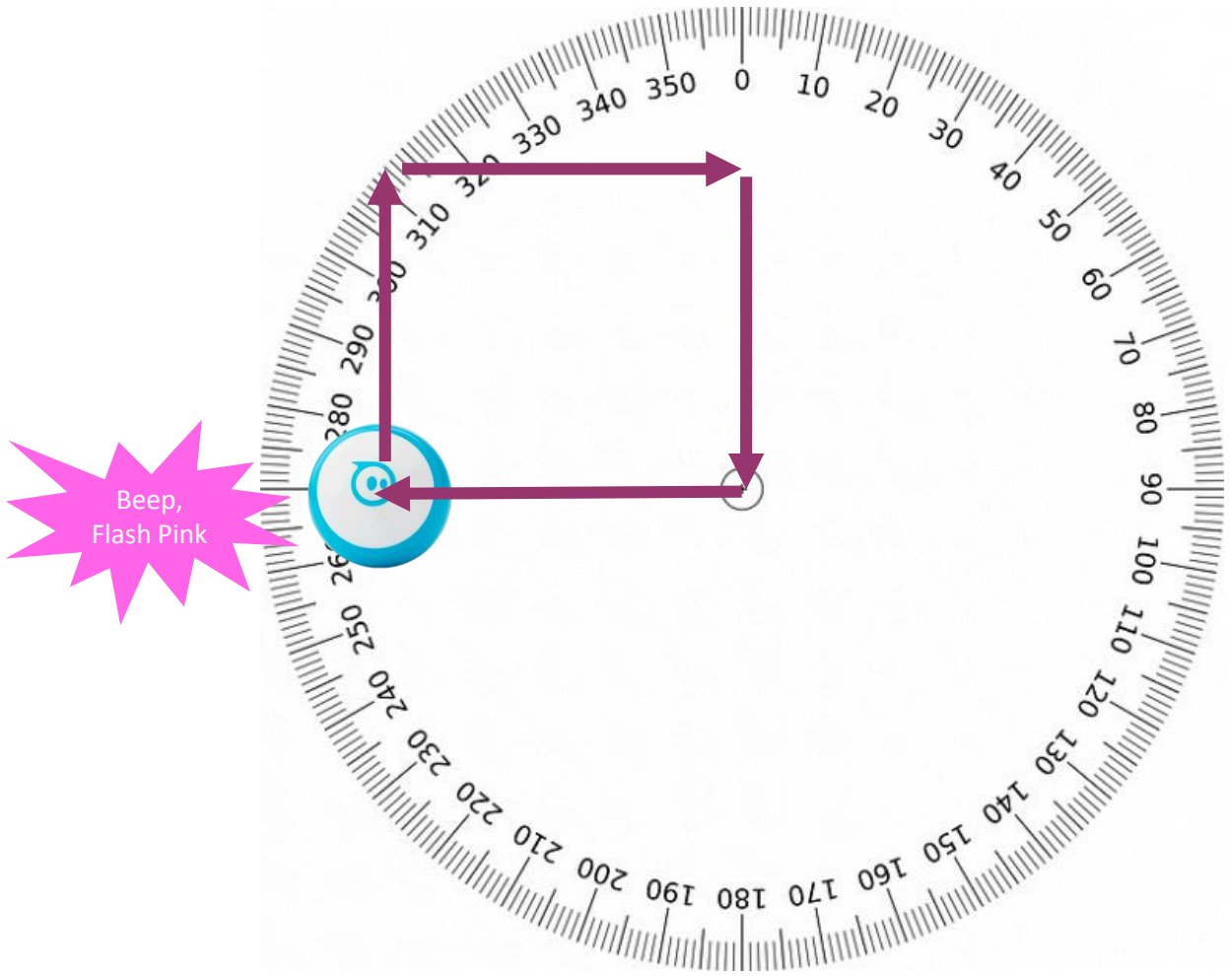




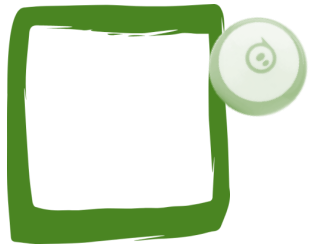
variables



Then, the square is complete. Beeps and flashes of light were used to signal changes of direction to the user.



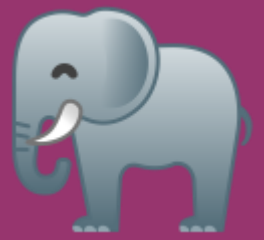
Spheros & Shapes Group Activities



We won't complete all of the following problems.

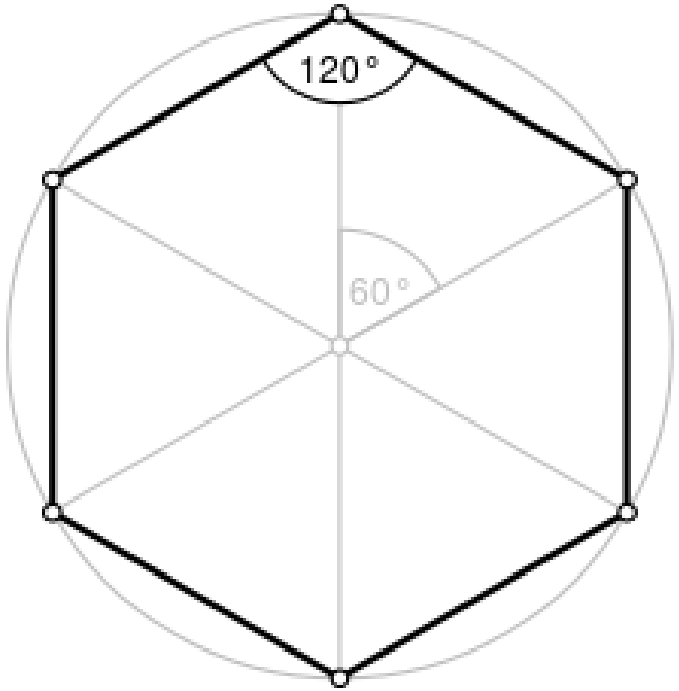
Your group will only complete one or two.

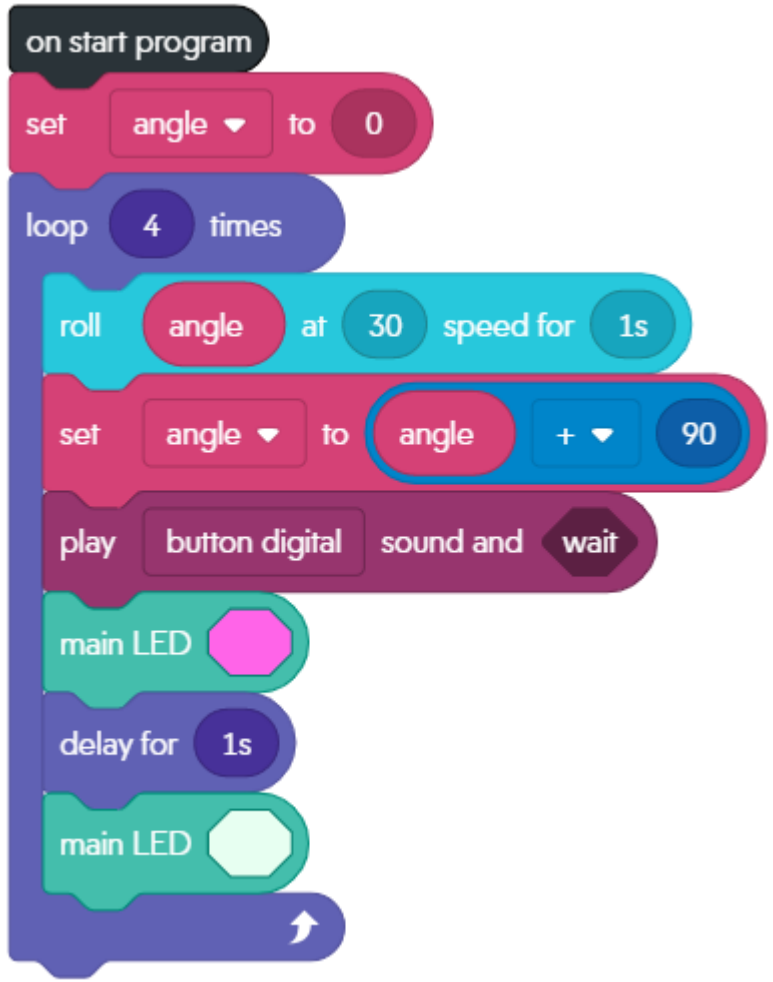
Start with Alligator. After you are done, we will discuss which one you should do next.

	Practice	More Practice
Problem 1	 A - Alligator	 B - Bat	 C - Cat
Problem 2	 D - Dog	 E - Elephant	 F - Fish
Problem 3	 G - Giraffe	 H - Horse	 I – Iguana
TIPS		J - Jaguar

Adapt this code to make a hexagon instead.

Test it on your Sphero.

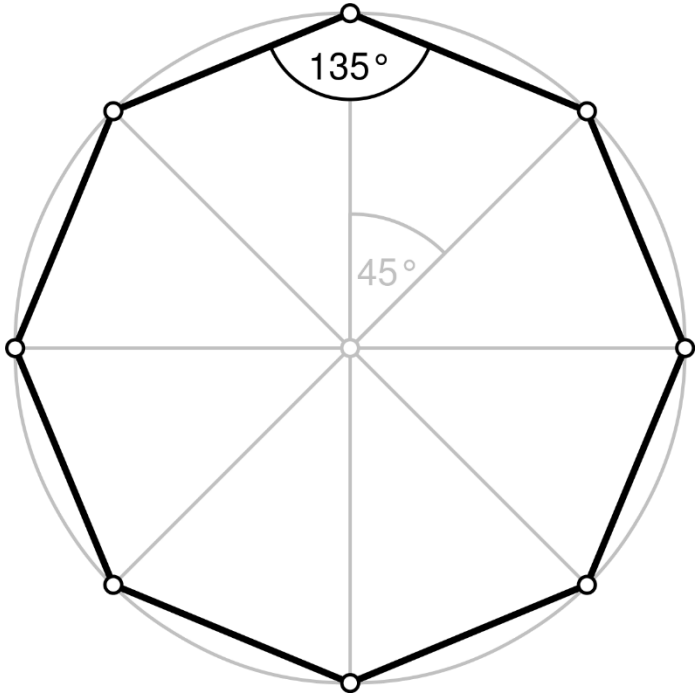


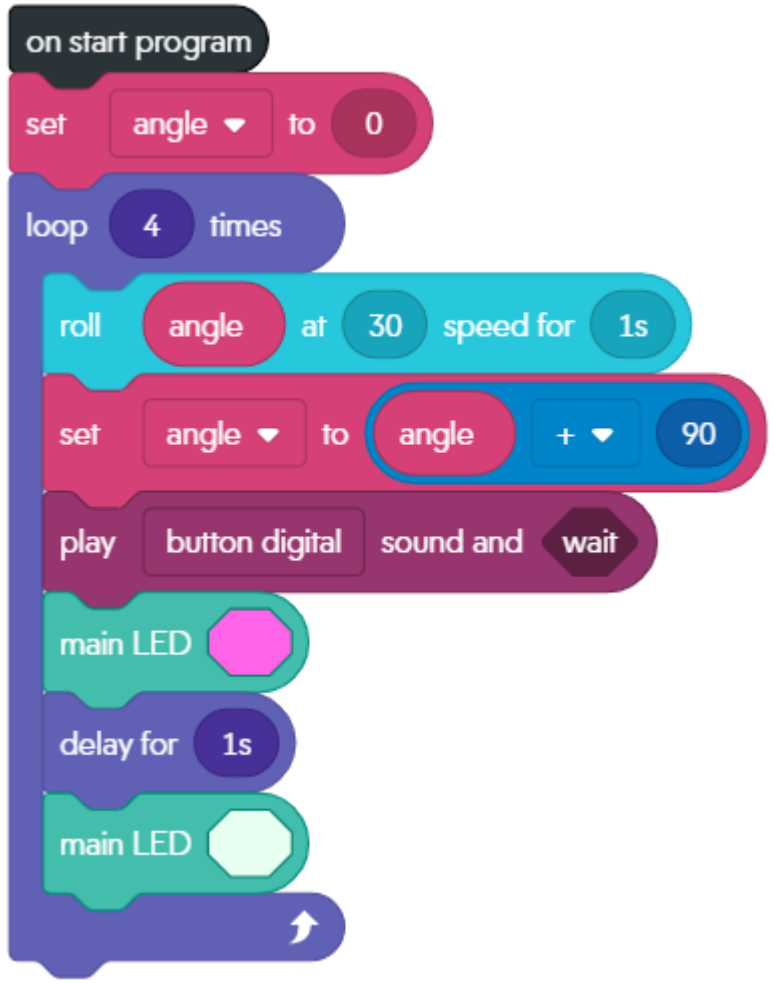


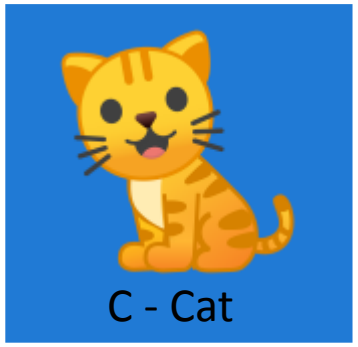
B - Bat

Adapt this code to make an octogon instead.

Test it on your Sphero.

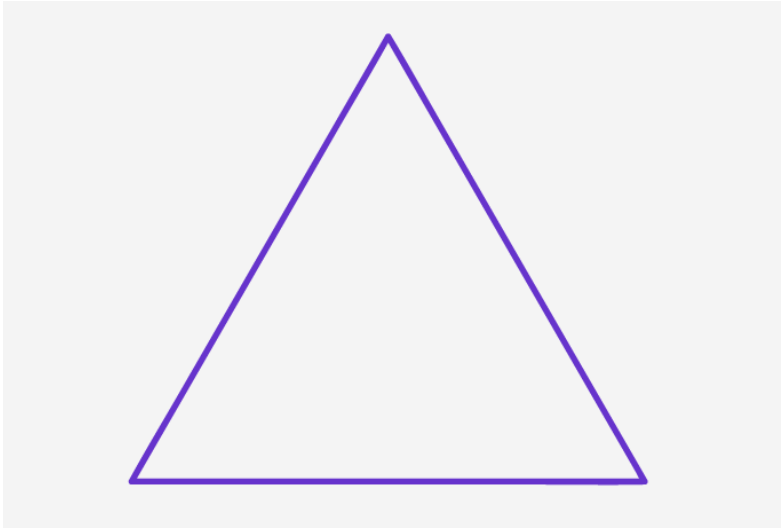


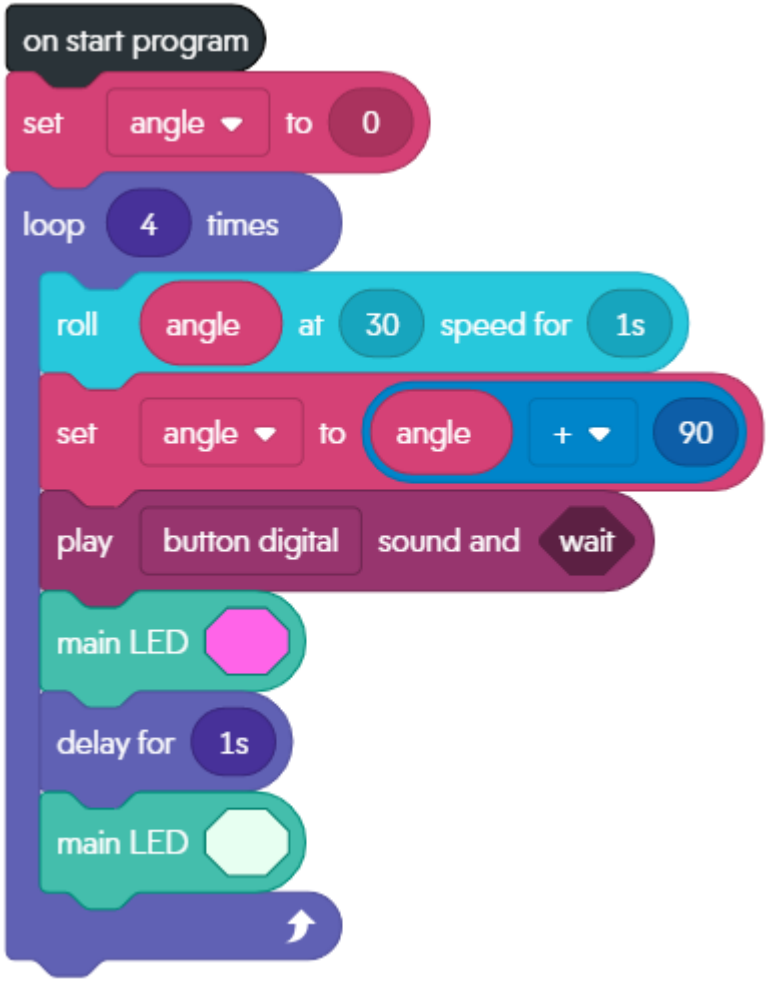


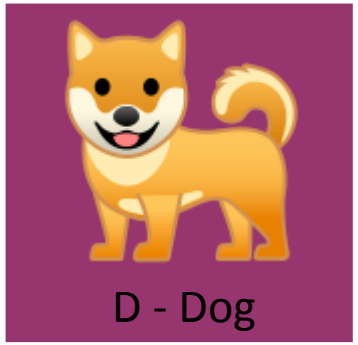


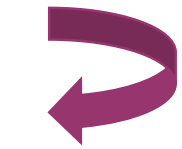
Adapt this code to make an equilateral triangle instead.

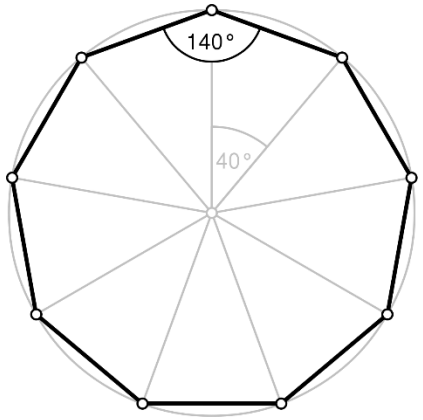
Test it on your Sphero.





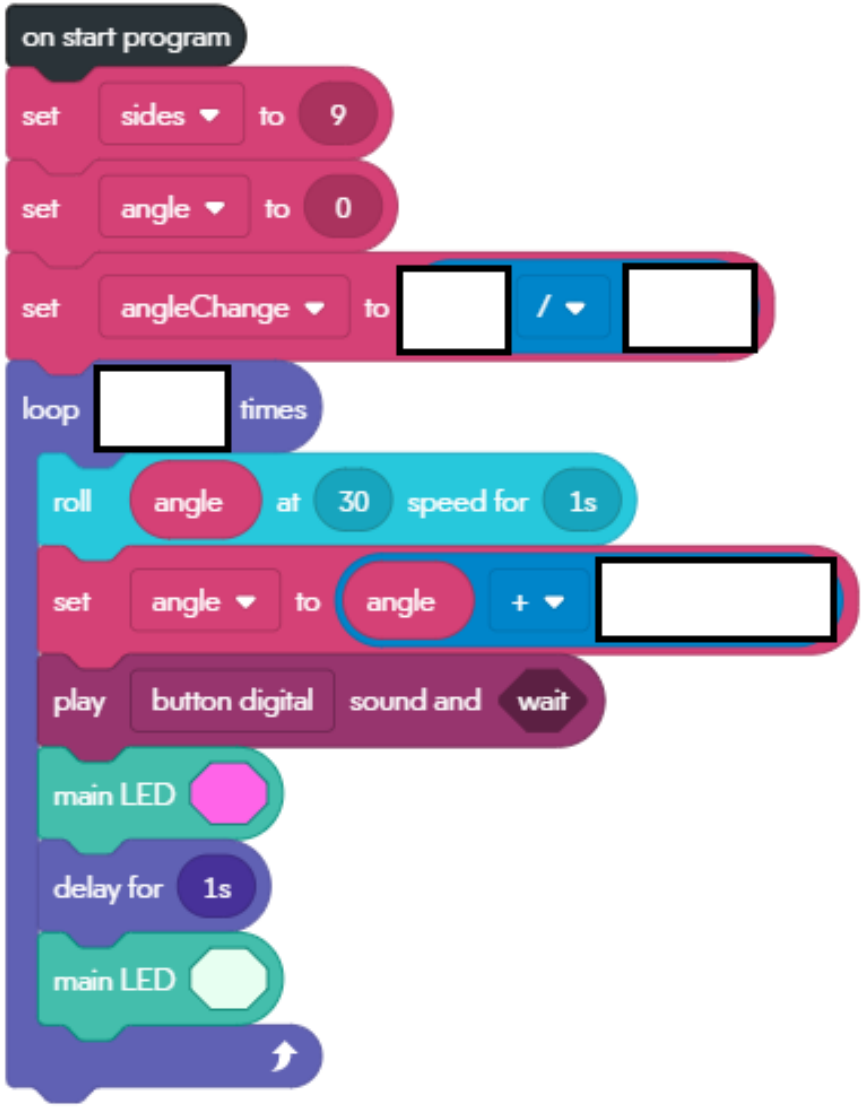


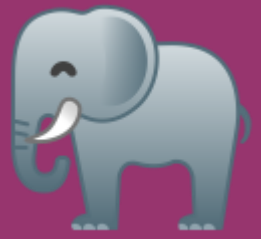




This program uses variables to make a nonogon (9 sided). If done correctly, once you have finished it, you will only need to change line 1 to be able to make any shape you would like.

Test it on your Sphero.

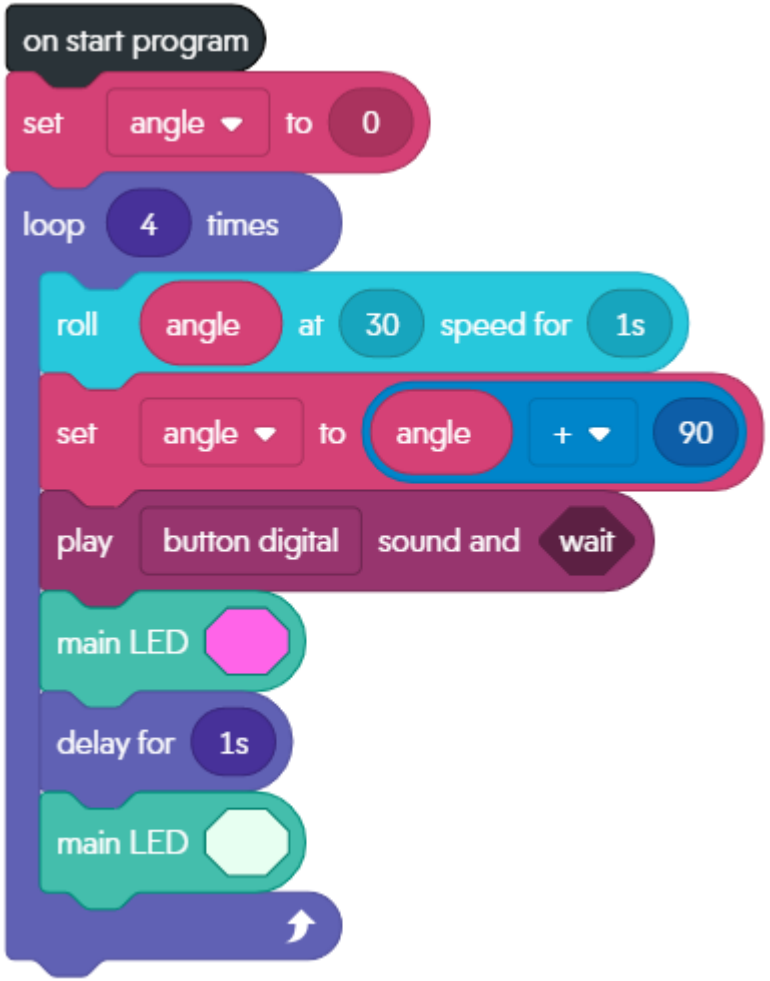




E - Elephant

Adapt this code to draw 3 squares.

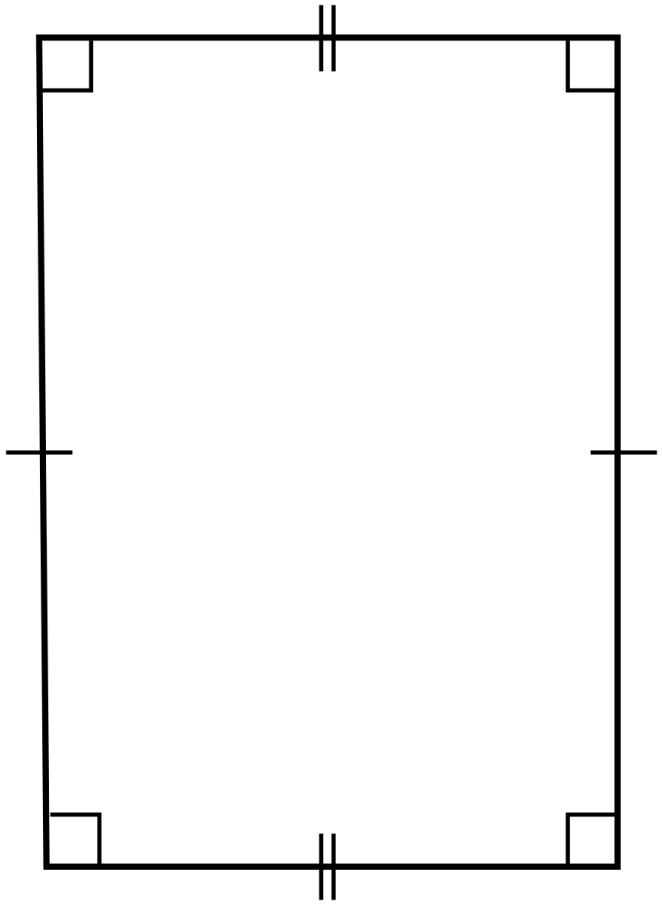
Test it on your Sphero.



F - Fish

Write code that uses a loop to make a rectangle. There should be two different side lengths.

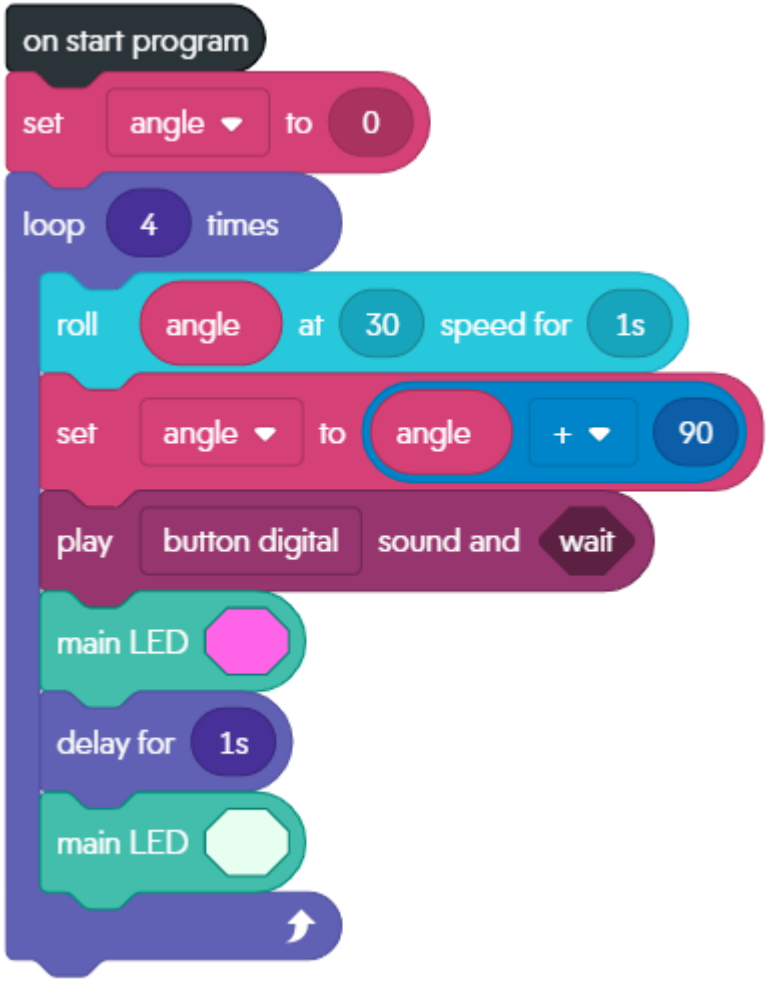
Test it on your Sphero.



G - Giraffe

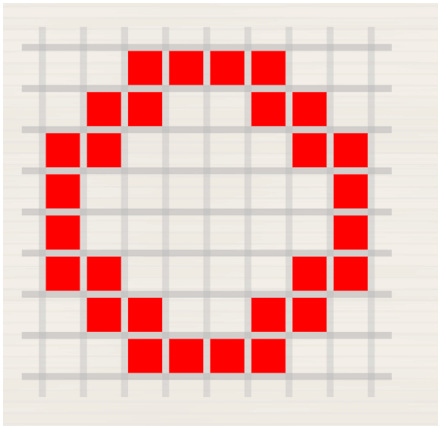
Write code that adds a variable to increase or decrease the size of the square.

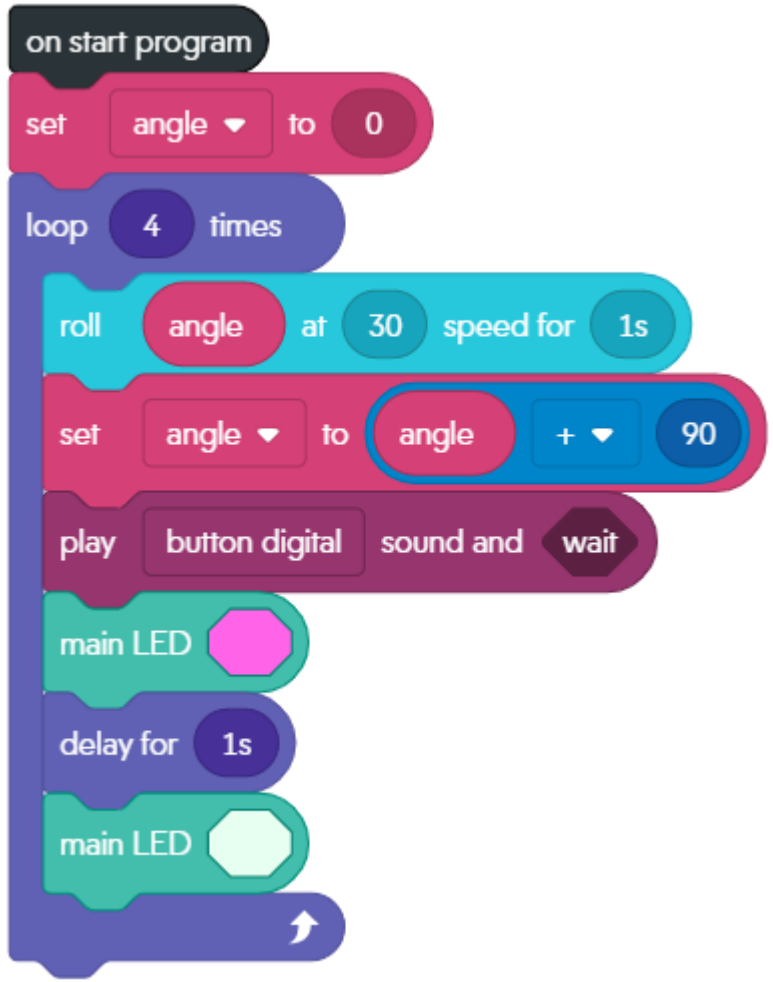
Test it on your Sphero.



H - Horse

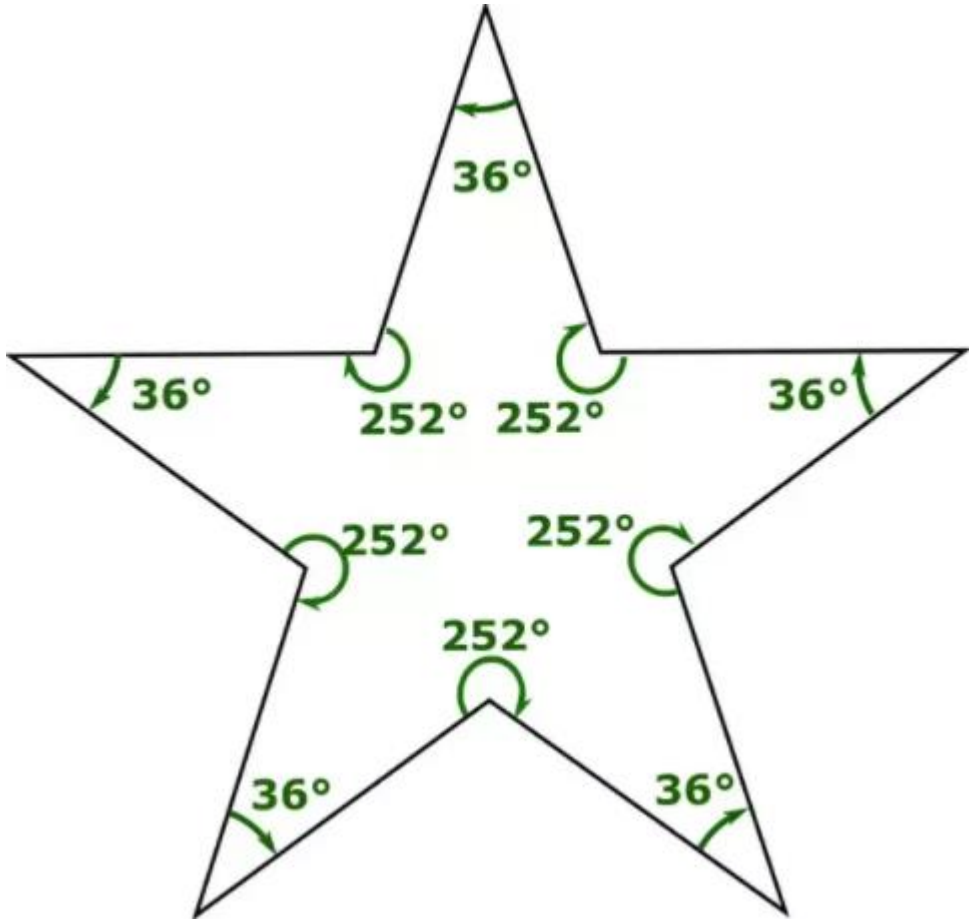
Adapt this code to draw something that looks like a circle (humans are easily fooled). Take out the sounds and lights.



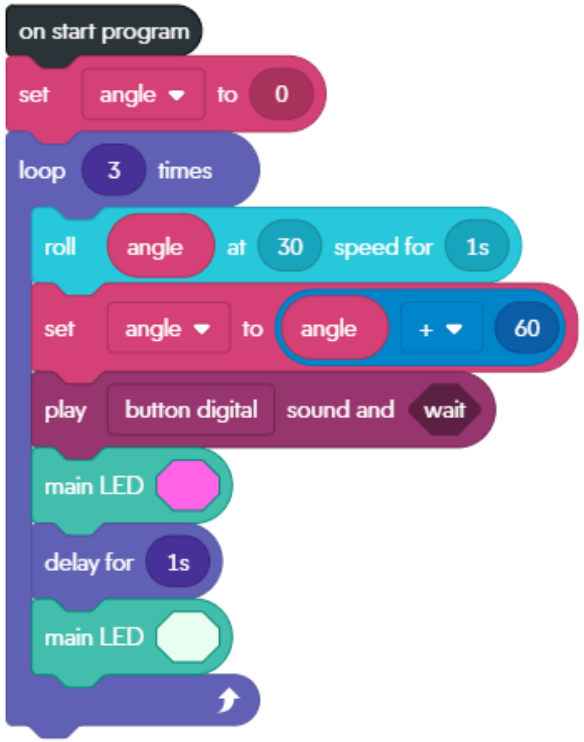


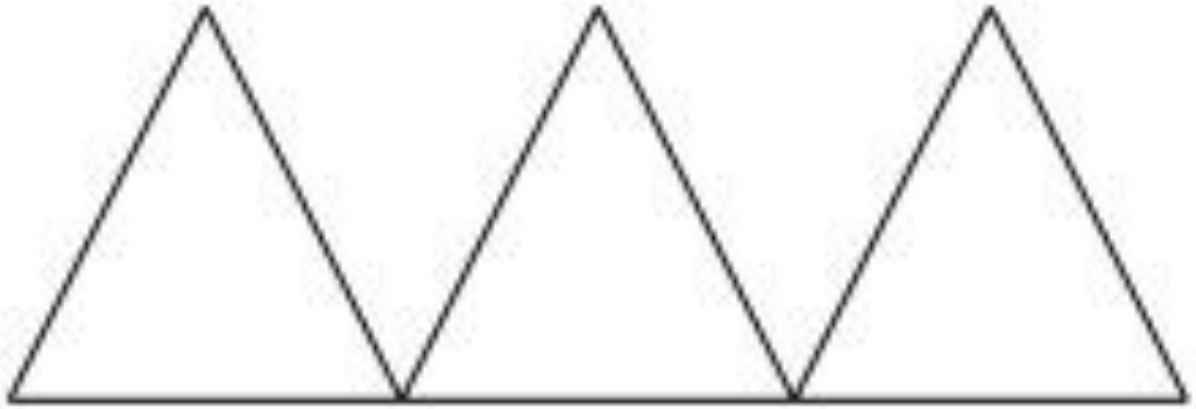
Write a program that would use a loop to draw a star.

Test it on your Sphero.

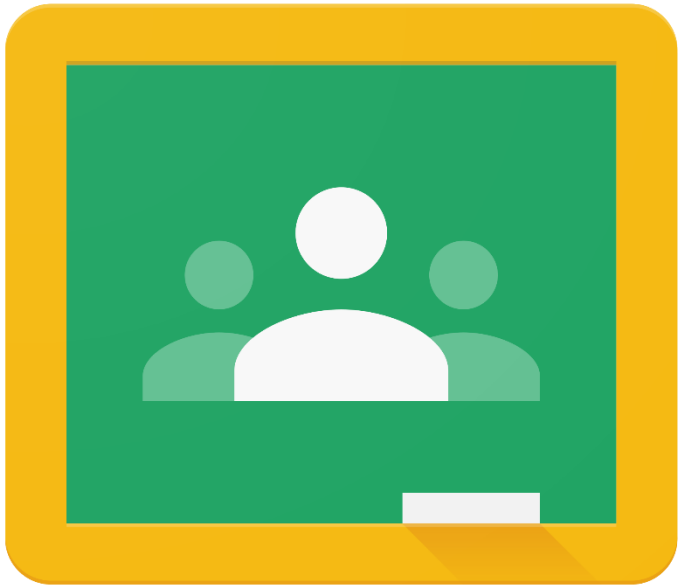


Write a program that draws three triangles in a row.





When you are done, there are check-your-understanding questions on Google Classroom.



Google Classroom