
















Programming Turtle Logo and Scratch: Regular Polygons in Scratch

<p>Aim: Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts.</p> <p>Use sequence, selection, and repetition in programs; work with variables and various forms of input and output.</p>	<p>Success Criteria: I can use commands in the correct order. I can use a variable value where required. I can correct any mistakes. I can create algorithms that draw regular polygons.</p>	<p>Resources: Lesson Pack</p> <p>Desktop computer /laptops Scratch v2 installed or use online application. Alternatively, use Pyonkee on iPads.</p>
<p>Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs.</p> <p>This unit continues the learning from the Year 2 Turtle Logo units and links well to shape and direction in Maths.</p> <p>I can create and debug algorithms that draw regular polygons.</p>	<p>Key/New Words: Sprite, block, command, background or backdrop, algorithm, move, turn, green flag, key press, pen, repeat.</p>	<p>Preparation: Ensure application is installed on the computers, or available online.</p> <p>It will help if teachers work through the unit prior to teaching the children to ensure familiarity.</p>

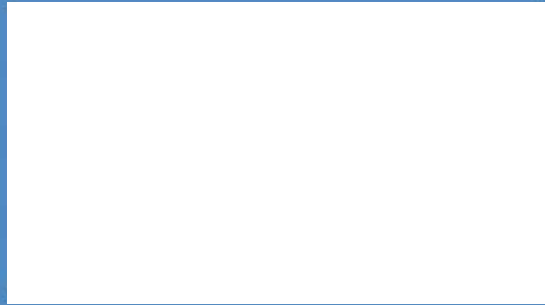
Prior Learning: It would be helpful if children are able to write simple algorithms with blocks in Scratch and save files.

Learning Sequence

	<p>What Can You Do? Children draw a regular hexagon using blocks, remembering how they did it with Turtle Logo and applying the same ideas to a different way of programming. Try other polygons and use the repeat command.</p>	
	<p>Using Repeat: Demonstrate how to use the repeat command to create algorithms for different regular polygons. How Could You Start? Show how to add the key press block to start the algorithm.</p>	
	<p>Algorithms for Regular Polygons: Children create algorithms for regular polygons, using the key press command to start each polygon with a different letter. Save the project.</p> <div style="display: flex; justify-content: space-around;"> <div> <p> Children are given the algorithms for a pentagon and hexagon, and given the sides and turns required for other regular polygons.</p> </div> <div> <p> Children are given the blocks needed to write an algorithm for a pentagon and hexagon, and given the sides and turns required for other regular polygons.</p> </div> <div> <p> Children need to work out the algorithm, including sides and angles, independently.</p> </div> </div>	
	<p>Share: Children share their algorithms, test and debug. They should be ready to share their ideas with the rest of the class.</p>	
	<p>Have Another Go! Children make any alterations or test ideas from their partner. <i>Can you make the pattern shown on the Lesson Presentation?</i></p>	
	<p>Which Algorithm? <i>Which algorithm will draw the pattern?</i> Ask the children to explain why the other one will not. Click options for answers and to see the algorithms running online.</p>	

Taskit

Polygonit: If the children have access to computers, laptops or tablets, the children could continue to create their own algorithms for regular polygons and patterns.



Computing

Programming Turtle Logo and Scratch

Regular Polygons in Scratch



Aim

- I can create and debug algorithms that draw regular polygons.

Success Criteria

- I can use commands in the correct order.
- I can use a variable value where required.
- I can correct any mistakes.
- I can create algorithms that draw regular polygons.

What Can You Do?



Create an algorithm that will draw a regular hexagon.

Think about the
algorithm that you used
in Turtle Logo.

What turn do you need?

Try other regular polygons using the repeat command.



Possible Algorithms

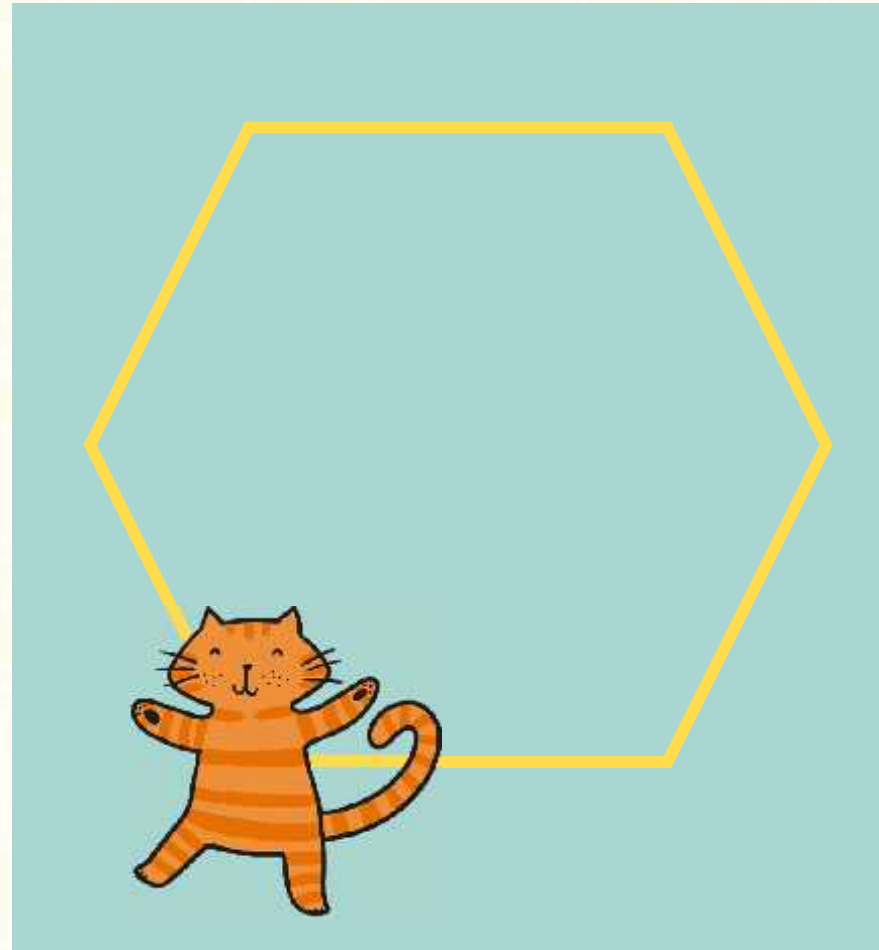
Compare the 2 algorithms with and without repeat.

```
pen down
move 100 steps
turn 60 degrees
move 100 steps
turn 60 degrees
move 100 steps
turn 60 degrees
move 10 steps
turn 60 degrees
move 100 steps
turn 60 degrees
move 100 steps
turn 60 degrees
move 100 steps
turn 60 degrees
```

```
pen down
repeat 6
  move 100 steps
  turn 60 degrees
```

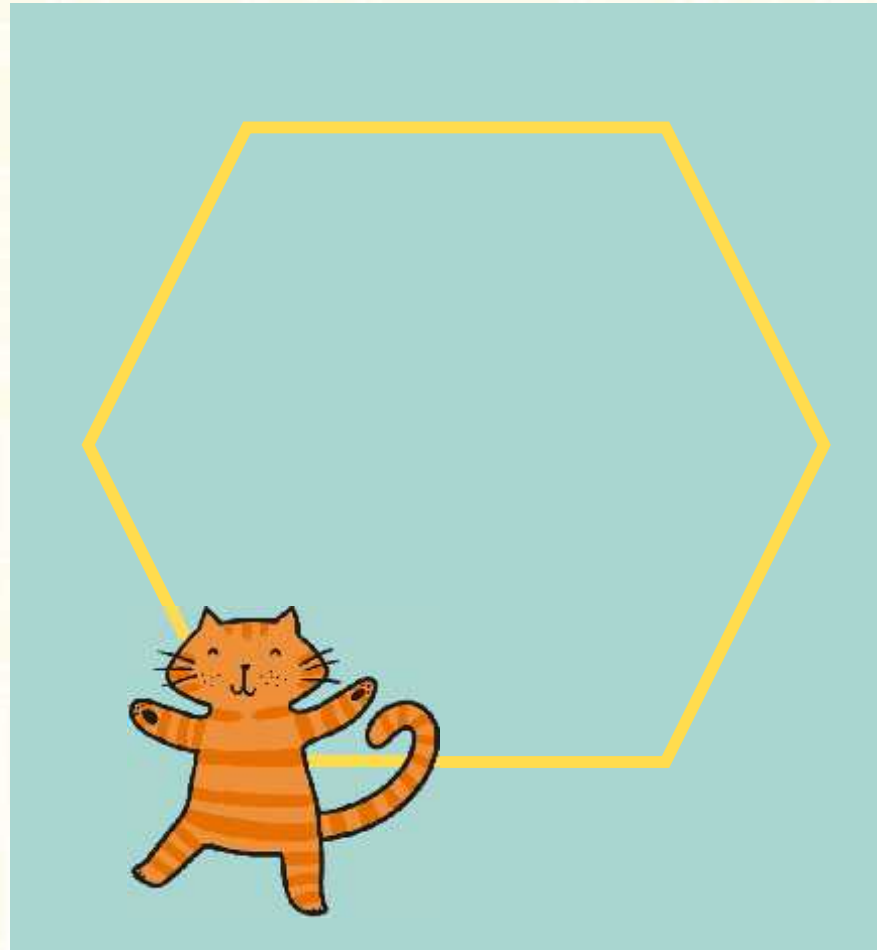
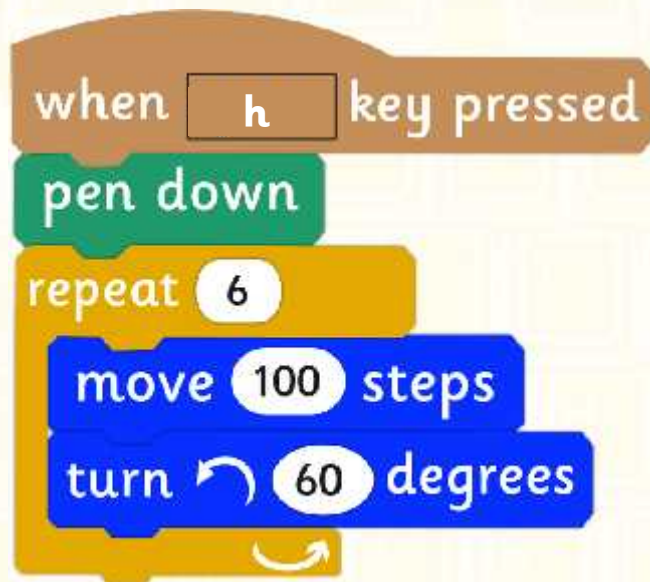
Using Repeat

The repeat block can be used to draw regular polygons by wrapping the move and turn.



How Could You Start?

Add a key press block to start the algorithm. Choose which letter or number you want to start with.

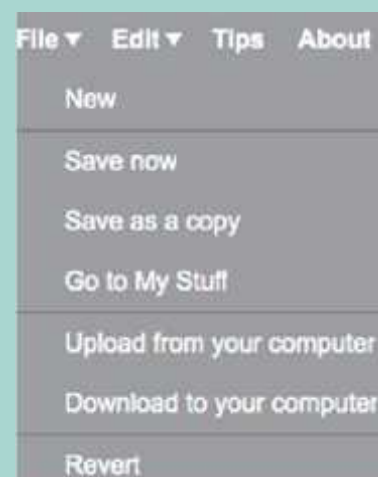


Saving Projects

Select file, then save.



If your working online, save if you have registered or download to your computer.



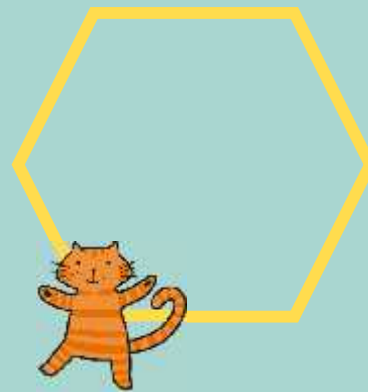
Algorithms for Regular Polygons



Create algorithms for regular polygons.

How many sides?

What angles will you turn?



Remember to use
pen down.

```
when space key pressed
clear
go to x: 0 y: 0
point in direction 90
```

And clear screen.

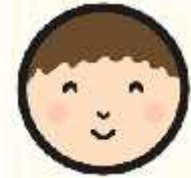
Share

Share your algorithm with your partner.



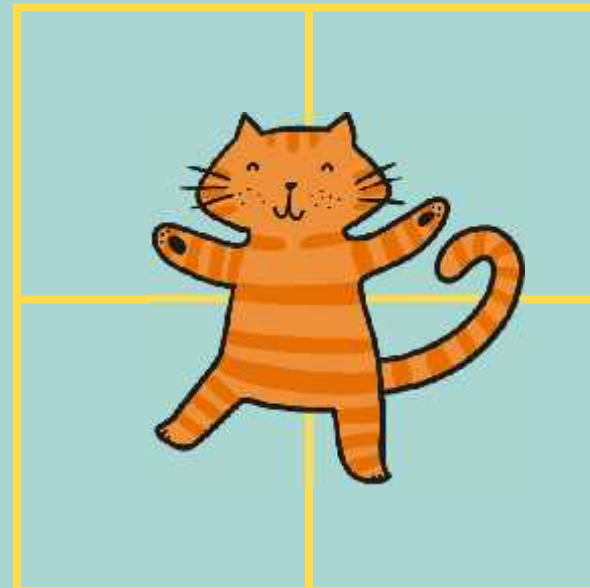
Test and debug it if you need to.

Have Another Go!



```
when 4 key pressed
  pen down
  repeat 4
    repeat 4
      move 100 steps
      turn 90 degrees
    turn 90 degrees
  pen up
```

Can you make an algorithm for this pattern?

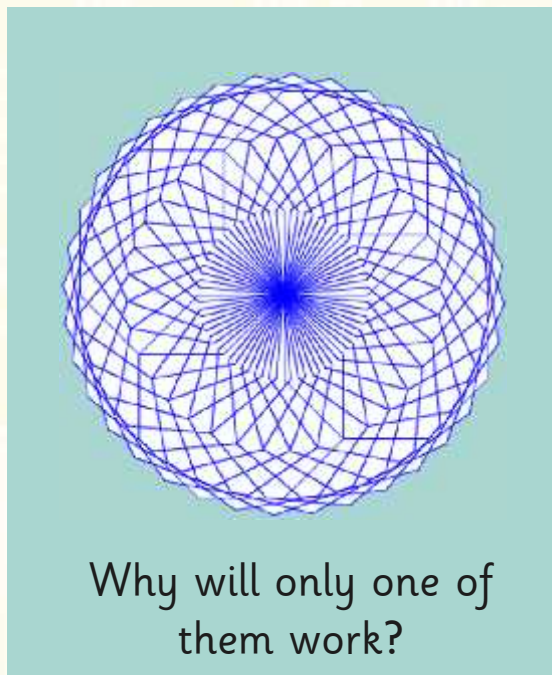


Click the cat to reveal the answer.



Which Algorithm?

Which algorithm will make this pattern?



Why will only one of them work?

```
when  key pressed
  pen down
  repeat 36
    repeat 8
      move 60 steps
      turn 45 degrees
    turn 10 degrees
  pen up
```

```
when  key pressed
  pen down
  repeat 10
    repeat 8
      move 60 steps
      turn 45 degrees
    turn 36 degrees
  pen up
```

Click on each algorithm to reveal the answer.

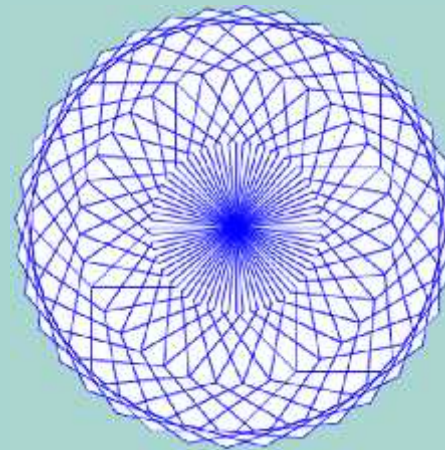
Correct

Click on the algorithm to run online.



```
when  key pressed
  pen down
  repeat 36
    repeat 8
      move 60 steps
      turn ↻ 45 degrees
    turn ↻ 10 degrees
  pen up
```

1. Start by pressing "o"
2. Pen down
3. Repeats the octagon 36 times
4. Turns 10° after each octagon
5. Pen up at the end



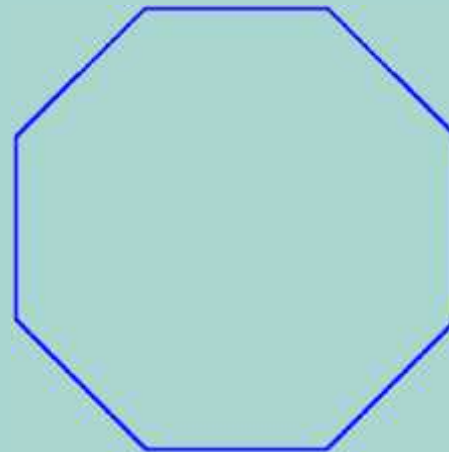
Incorrect

Click on the algorithm to run online.



```
when o key pressed
  pen down
  repeat 10
    repeat 8
      move 60 steps
      turn 45 degrees
    turn 36 degrees
  pen up
```

1. Start by pressing "o"
2. Pen down
3. Repeats the octagon **10 times**
4. **Turns 36° after all of the octagons**
5. Pen up at the end



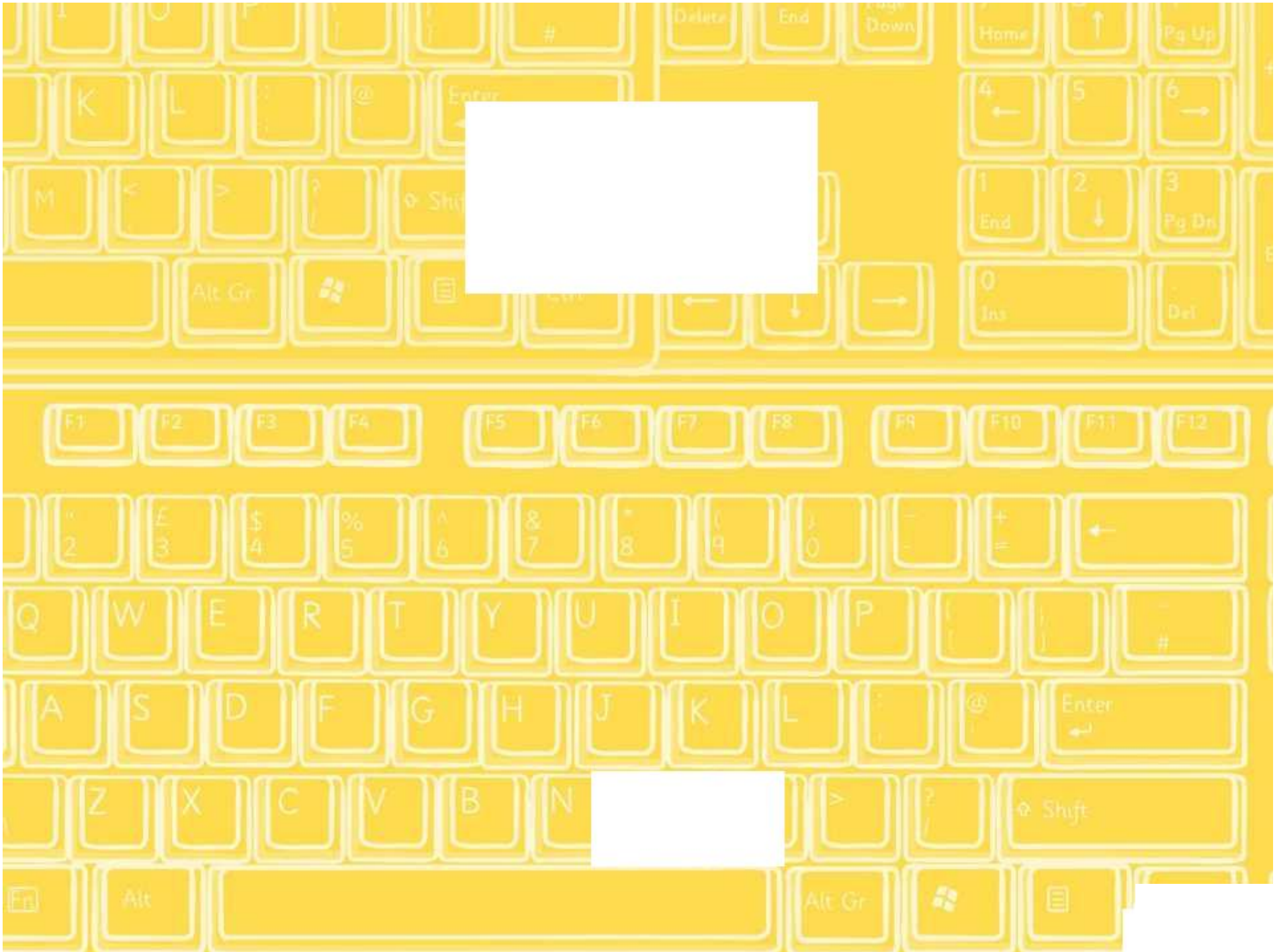
Aim



- I can create and debug algorithms that draw regular polygons

Success Criteria

- I can use commands in the correct order.
- I can use a variable value where required.
- I can correct any mistakes.
- I can create algorithms that draw regular polygons.



★ Regular Polygons in Scratch

Before you begin each algorithm remember to clear your screen.

Create the following algorithms in Scratch. Start each shape with the key press block, using the first letter from the name of the shape.

```
when space key pressed
clear
go to x: 0 y: 0
point in direction 90
```

1. Draw a regular hexagon using the following algorithm.

```
when h key pressed
pen down
repeat 6
  move 100 steps
  turn 60 degrees
pen up
```

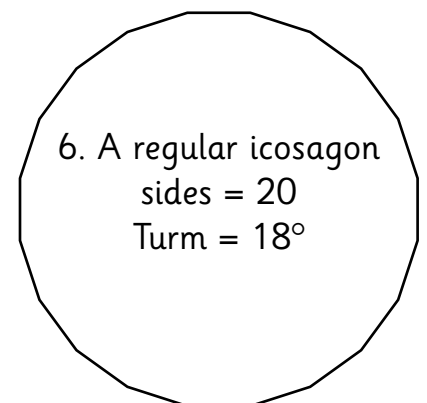
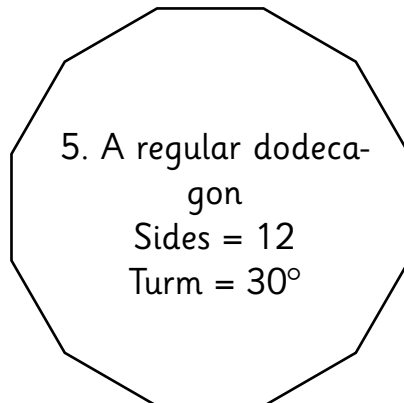
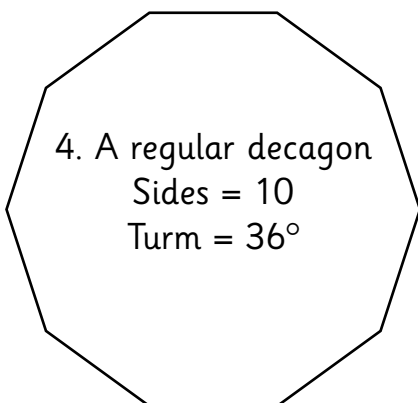
2. Draw a regular pentagon using the following algorithm.

```
when p key pressed
pen down
repeat 5
  move 100 steps
  turn 72 degrees
pen up
```

3. Draw a regular octagon using the following algorithm.

```
when o key pressed
pen down
repeat 8
  move 100 steps
  turn 45 degrees
pen up
```

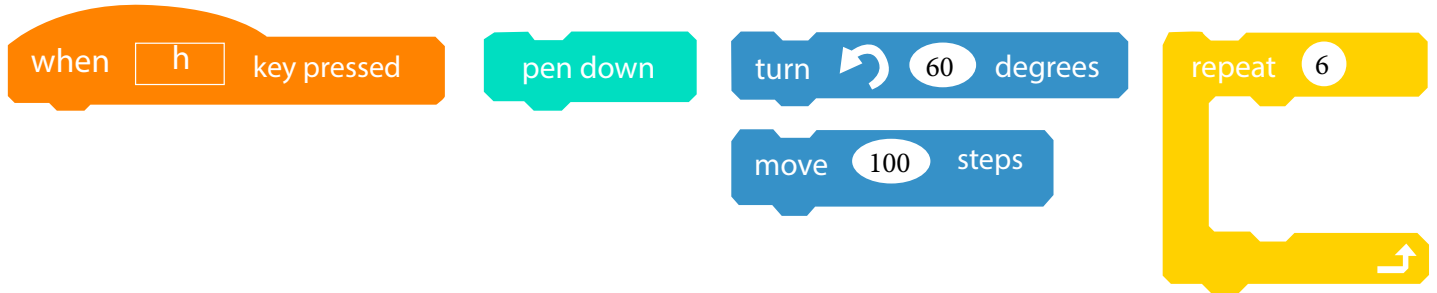
Don't forget to save your projects! Now draw the following shapes:



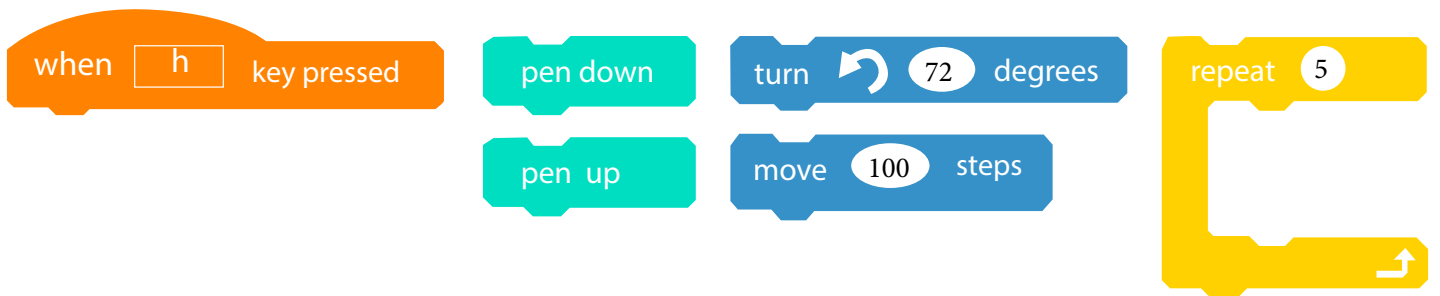
Regular Polygons in Scratch

Create the following algorithms in Scratch. Start each shape with the key press block, using the first letter from the name of the shape. Before you begin each algorithm remember to clear your screen.

1. Using the blocks below draw a regular hexagon. Save your project.

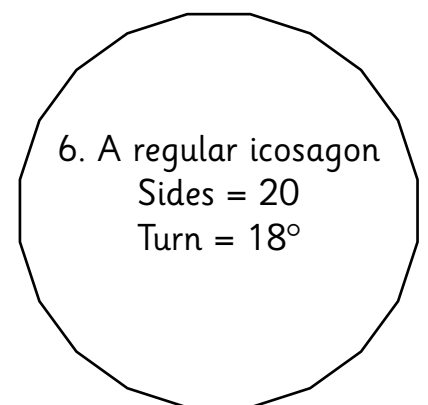
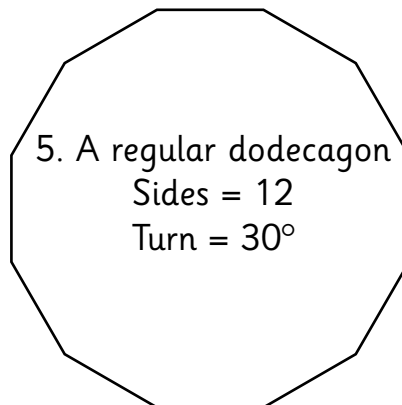
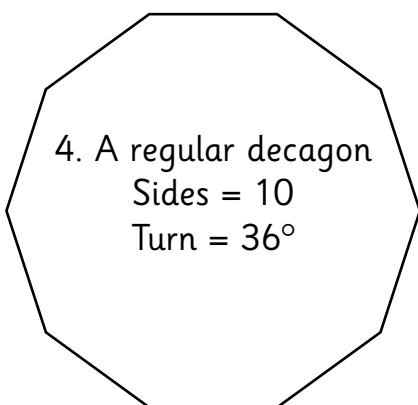


2. Using the blocks below draw a regular pentagon. Save your project.



3. Draw a regular octagon using the blocks above. The turn for the octagon is 45° , you will need to work out how many sides are needed. Don't forget to save your projects!

Now draw the following shapes:



Challenge

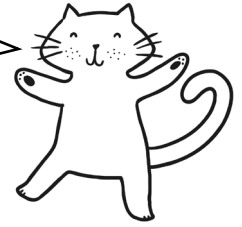
Try drawing different patterns by repeating regular polygons and turning after each one.



Regular Polygons in Scratch

Create the following algorithms in Scratch. Start each shape with the key press block, think about what the best letter to use for each shape would be. Before you begin each algorithm remember to clear your screen.

You can work out the angle that you need to turn by dividing 360 by the number of sides the shape has.



1. A regular hexagon.

2. A regular pentagon.

3. A regular octagon.

4. A regular decagon
Sides = 10

5. A regular dodecagon
Sides = 12

6. A regular icosagon
sides = 20

Challenge

Try drawing different patterns by repeating regular polygons and turning after each one. Now try creating the pattern using a single algorithm. Save your work.

Programming Turtle Logo and Scratch | Regular Polygons in Scratch

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I can use commands in the correct order.		
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