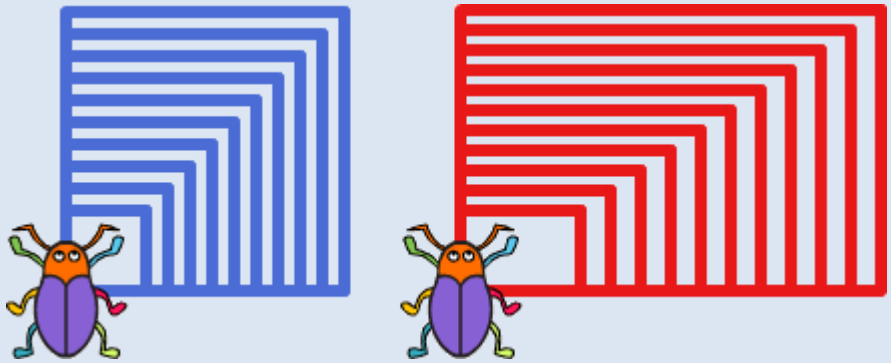
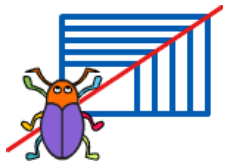
Mathematically Similar Rectangles



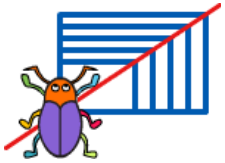


ACTIVITY 5.2.1

Sequence of Squares

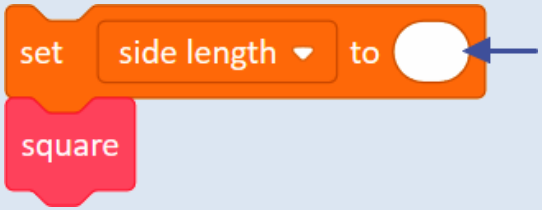
Module 5: Investigation 2

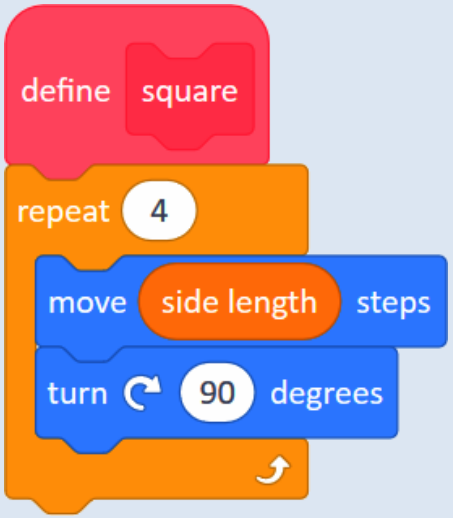
Activity 5.2.1 – Sequence of Squares



Open project **52-Altering Polygons**.

- Use the existing **square** block in a short script to draw a square of the **side length** of 20.





- Using the same script to draw squares with **side length**s 40, 60, 80, 100…

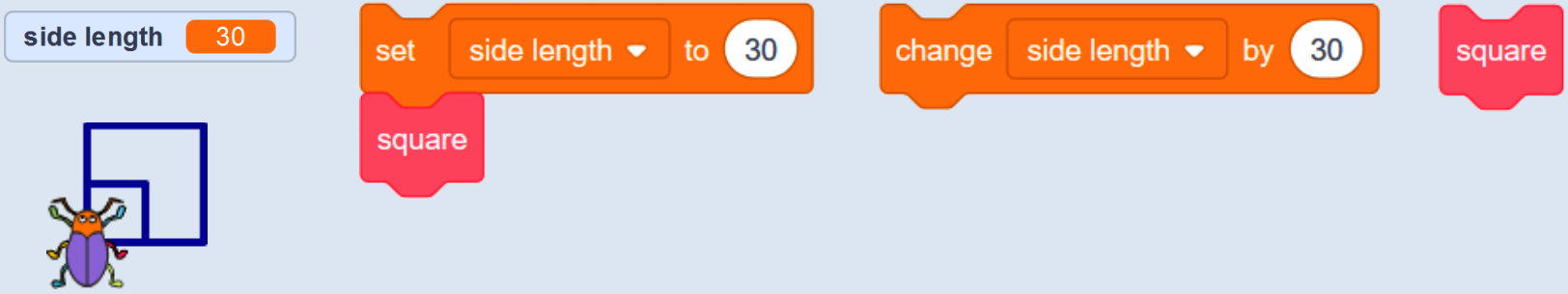
(if you do not clear the stage after drawing each square)

Module 5: Investigation 2

Activity 5.2.1 – Sequence of Squares

- Drag in the **change** *side length* **by...** block and keep it isolated. Explore it, use it.

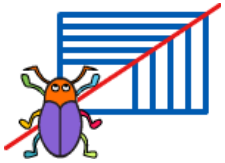
  Explore the **side length** monitor in the stage.



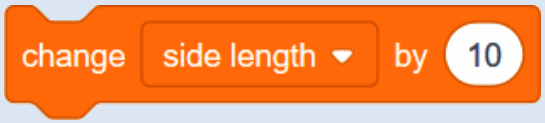
- **What is the difference between the blocks change *side length* by... and set *side length* to... ?**

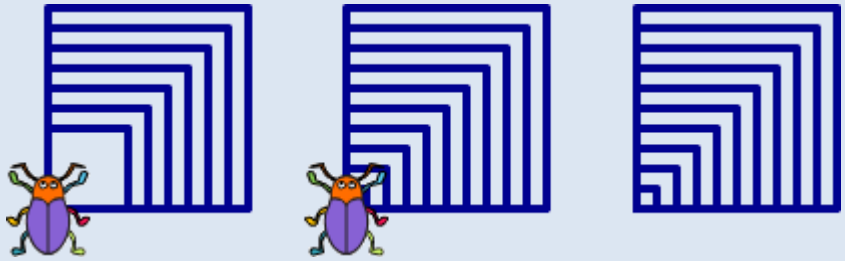
Module 5: Investigation 2

Activity 5.2.1 – Sequence of Squares



- Clear the screen and build a script to draw the whole pattern of growing squares in one click.





- Have you used the repeat block to make your script short?
- How many squares are there in your pattern?
- What is the side length of the first square? The second square?
- What is the final side length drawn? What is the value of the side length variable at the end? Explain the difference.

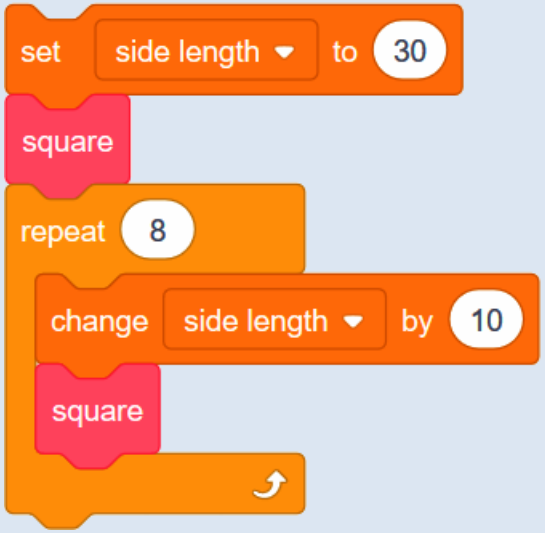
?

Module 5: Investigation 2

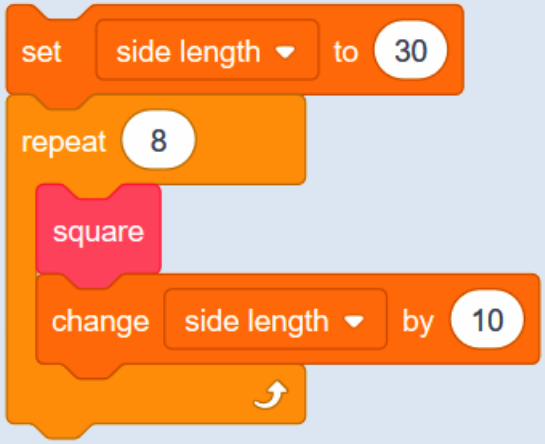
Activity 5.2.1 – Sequence of Squares

- Discuss scripts 1 to 6 (2 slides), envisage the output of each script.

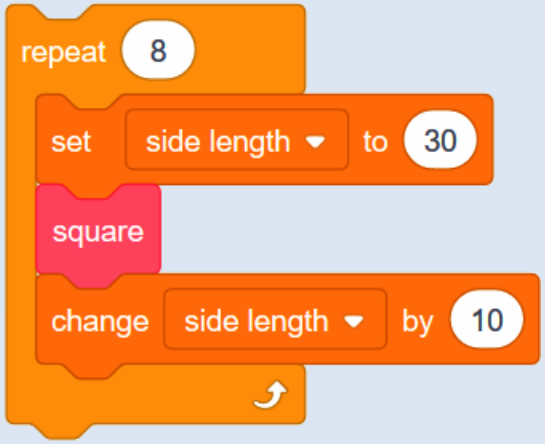
1



2



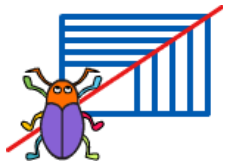
3



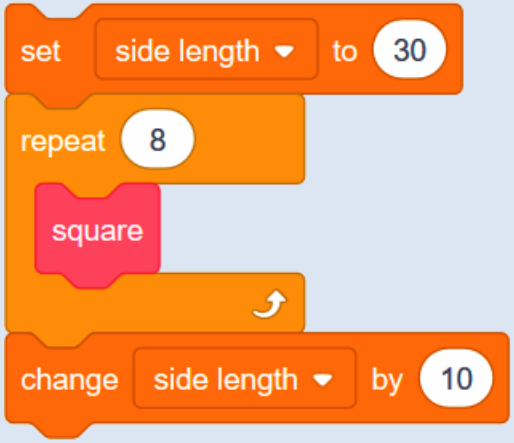
continued ▶

Module 5: Investigation 2

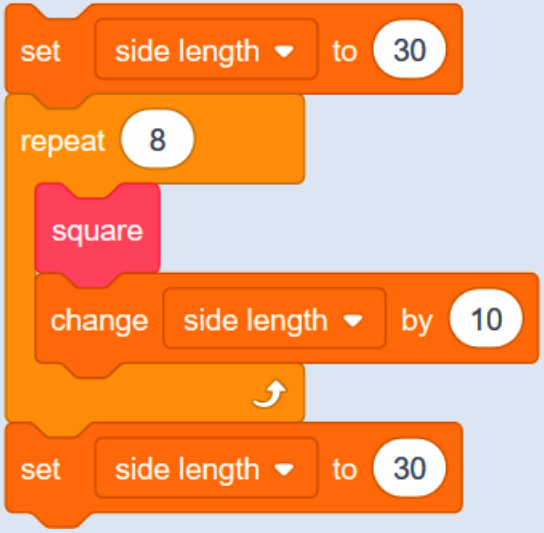
Activity 5.2.1 – Sequence of Squares



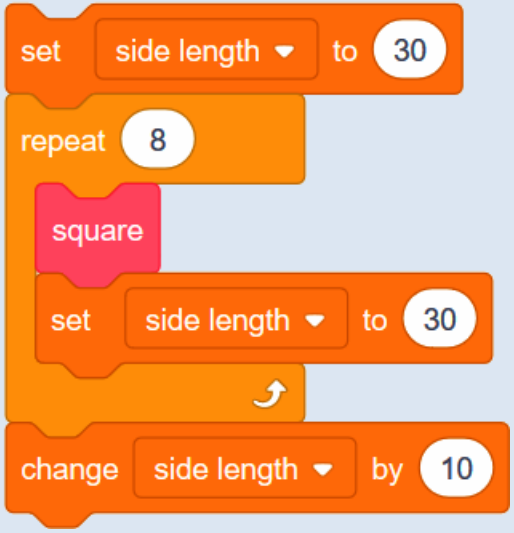
4



5



6



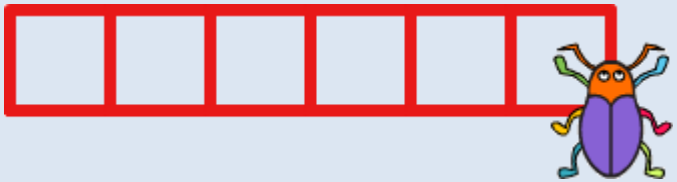
What is the initial value of the side length variable in each script?
What is its final value after finishing the repeat loop?

?

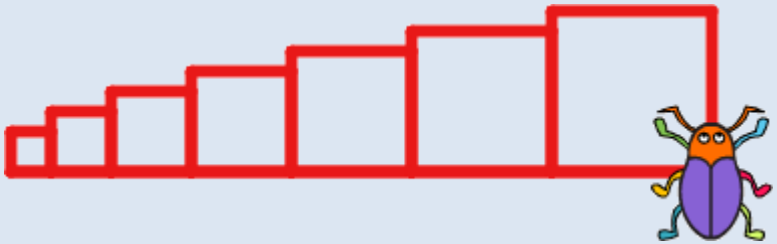
Module 5: Investigation 2

Activity 5.2.1 – Sequence of Squares

- Build a script to draw a row of identical squares next to each other.



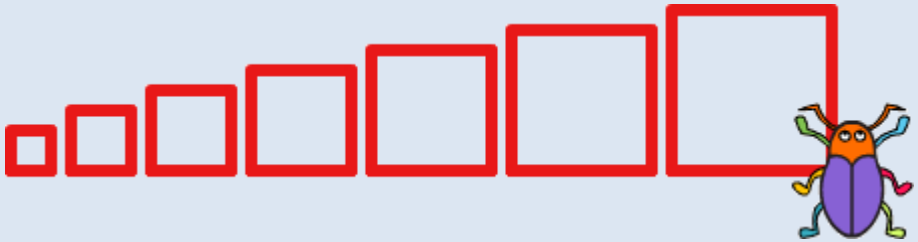
- Build a script to draw a row of increasing squares, the first one having the **side length** of 20 and each one increasing by 10.



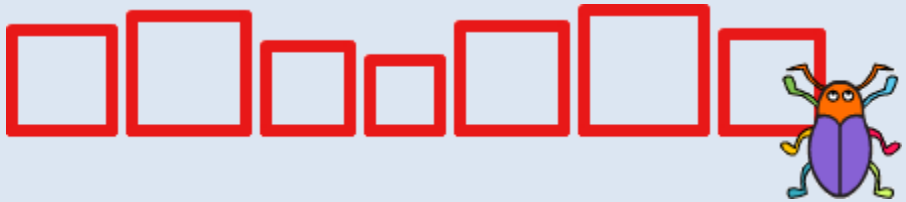
Module 5: Investigation 2

Activity 5.2.1 – [Extension] Sequence of Squares

- **[Extension]** Modify your previous script so the squares have a gap of 10 between them.



- **[Extension]** Modify your script so that each square has a random side length between 30 and 60.

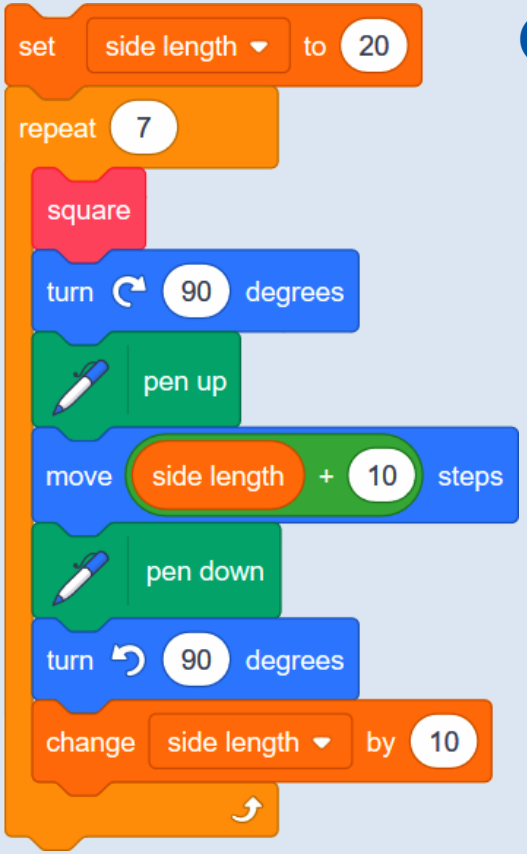


Module 5: Investigation 2

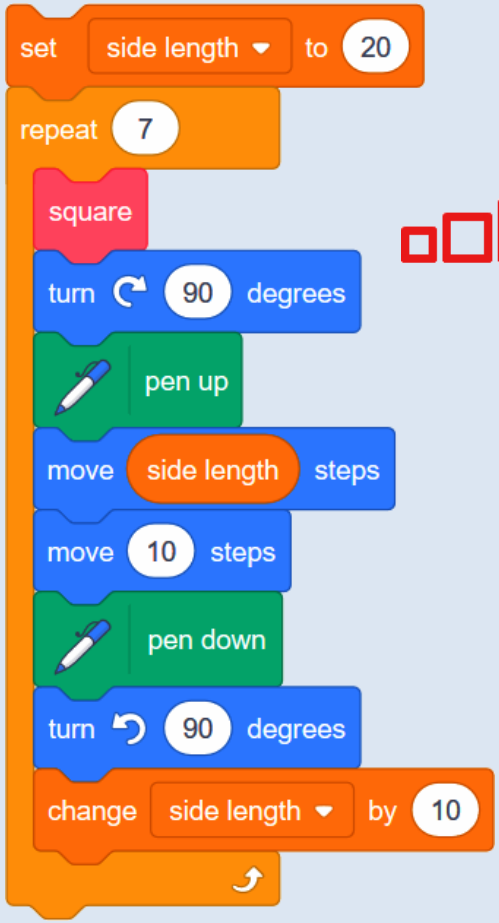
Activity 5.2.1 – [Extension] Sequence of Squares

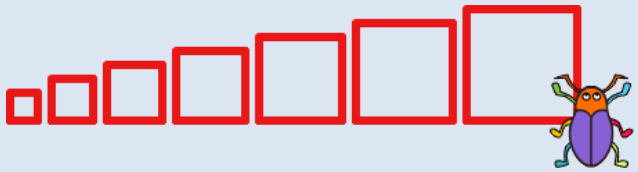
[Extension] Here are three alternative solutions **(2 slides)** which all draw the output below. **Discuss:** which one is easier to read?

1



2

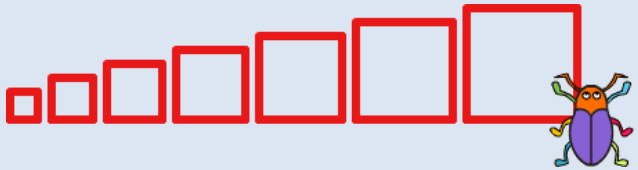




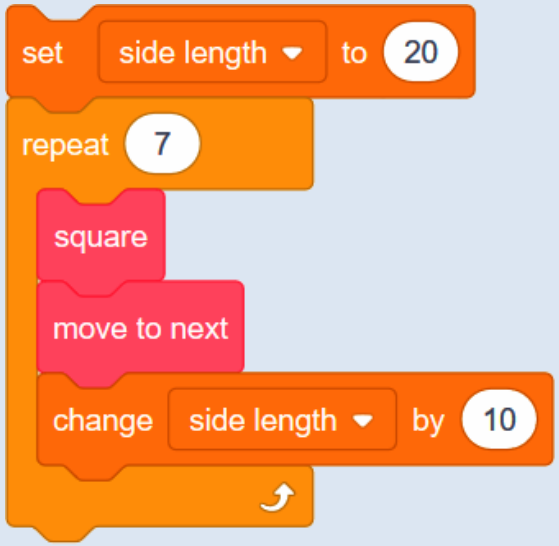
continued ▶

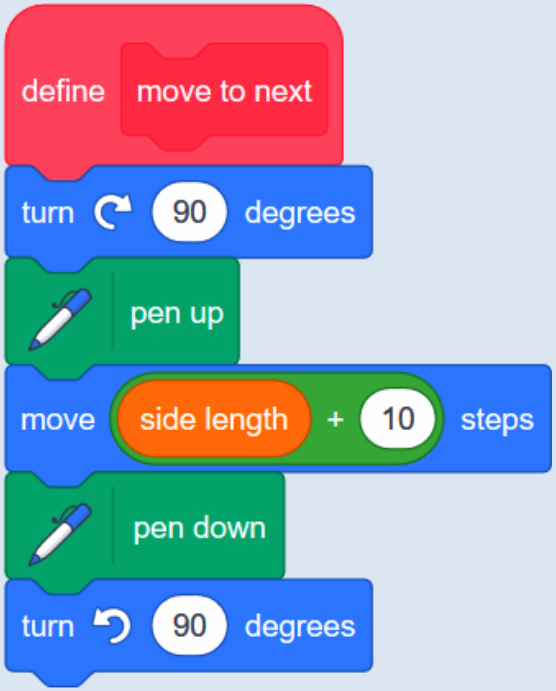
Module 5: Investigation 2

Activity 5.2.1 – [Extension] Sequence of Squares



3

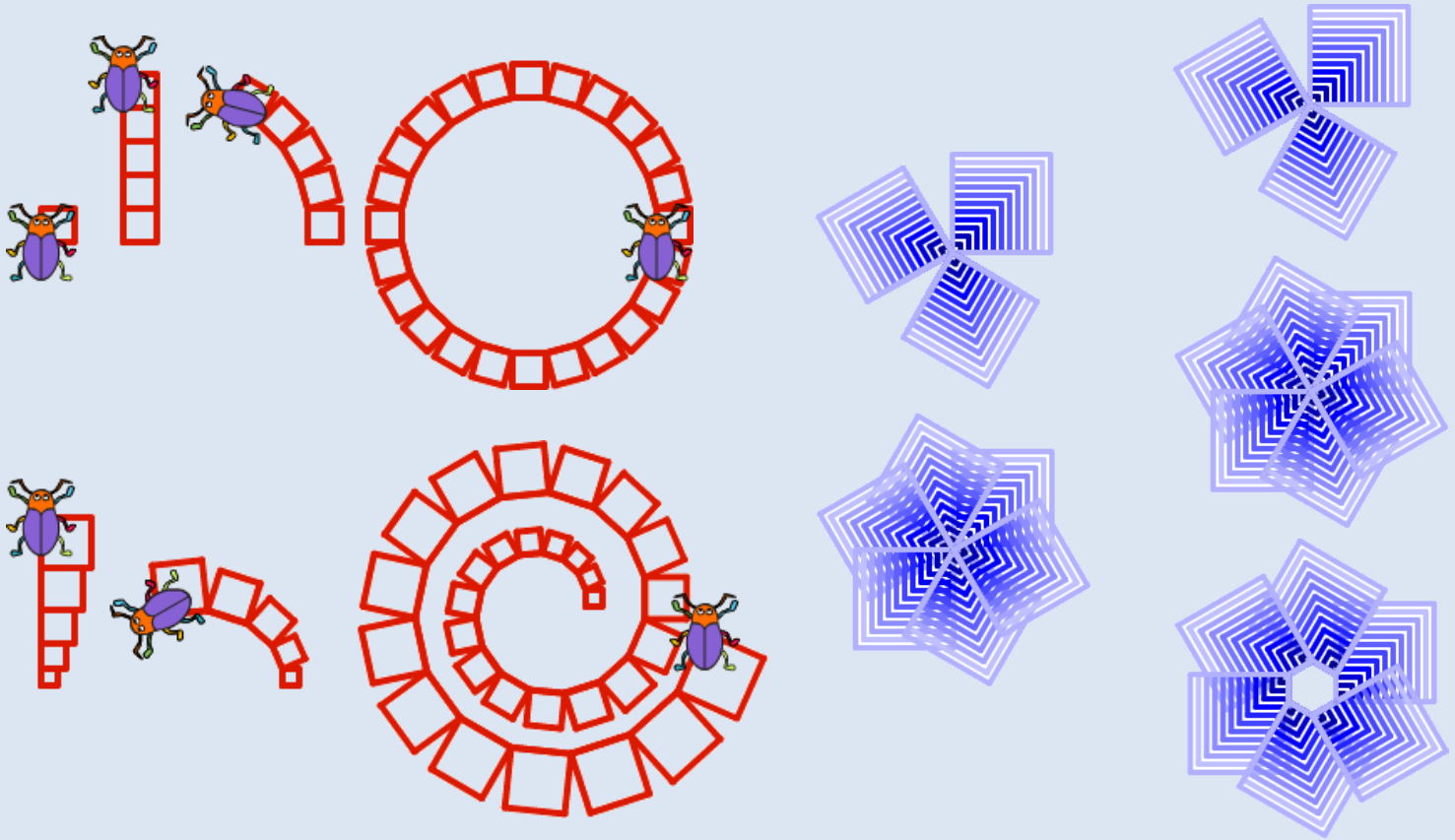


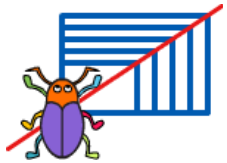


Module 5: Investigation 2

Activity 5.2.1 – [Extension] Sequence of Squares

- **[Extension]** Try and recreate some of the patterns below by building on what you have done so far. Think of your own.





ACTIVITY 5.2.2

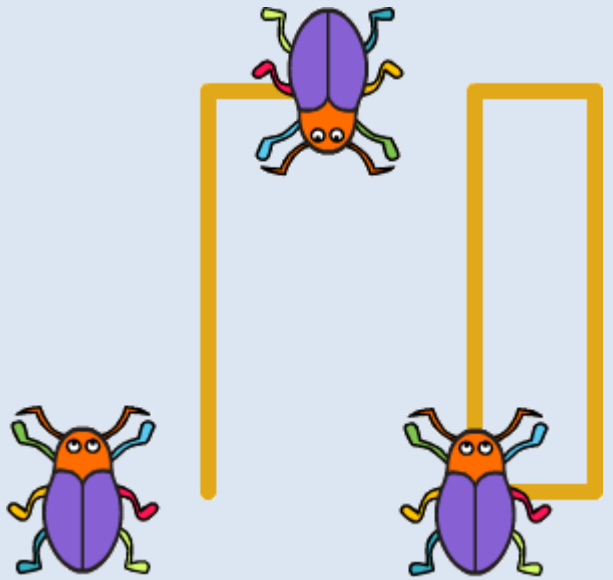
Altering Rectangles

Module 5: Investigation 2

Activity 5.2.2 – Altering Rectangles

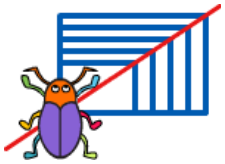
Continue in your **52-Altering Polygons** project.

- Build a script to draw a rectangle with a height of 100 and base of 30.
- Make a new block called **rectangle**.

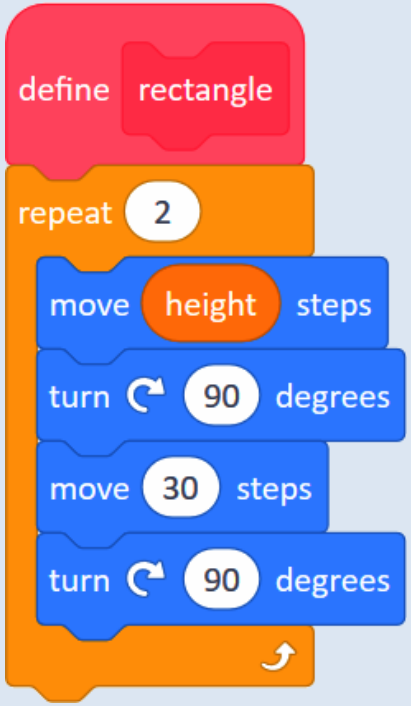


Module 5: Investigation 2

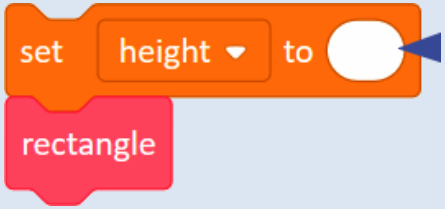
Activity 5.2.2 – Altering Rectangles

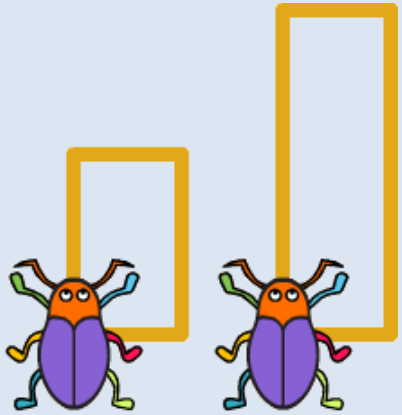


- Make a new variable called **height** and use it in the **move** block within the **rectangle** definition.



- Draw different rectangles by setting the value of **height** and running the block **rectangle**.

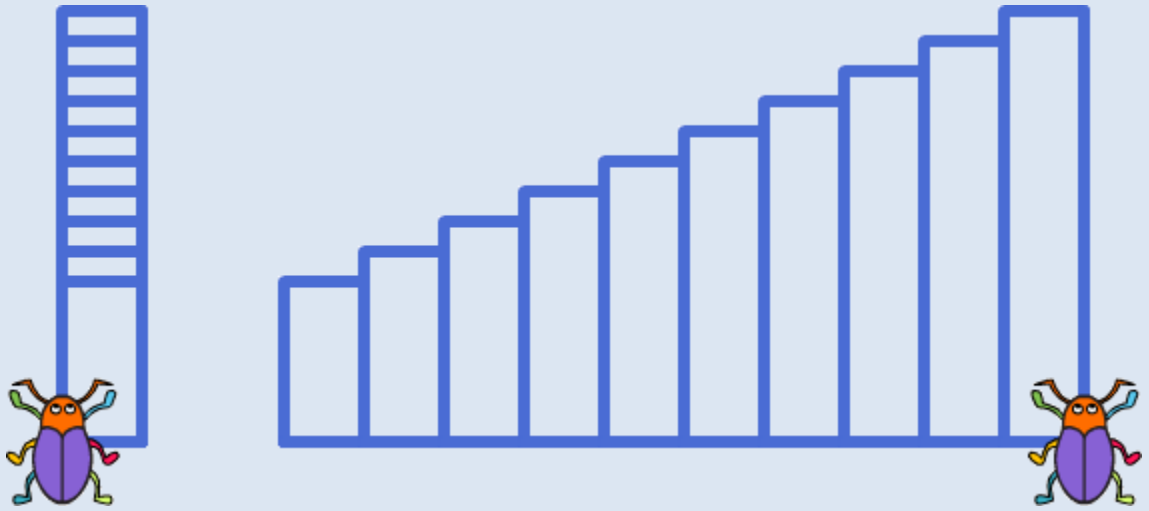




Module 5: Investigation 2

Activity 5.2.2 – Altering Rectangles

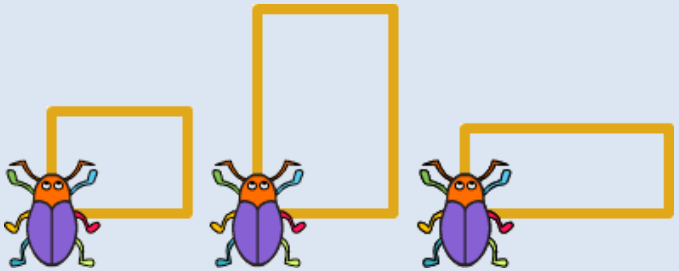
- Use the block **change** *height* **by…** inside **repeat** to draw various patterns of growing rectangles.



Module 5: Investigation 2

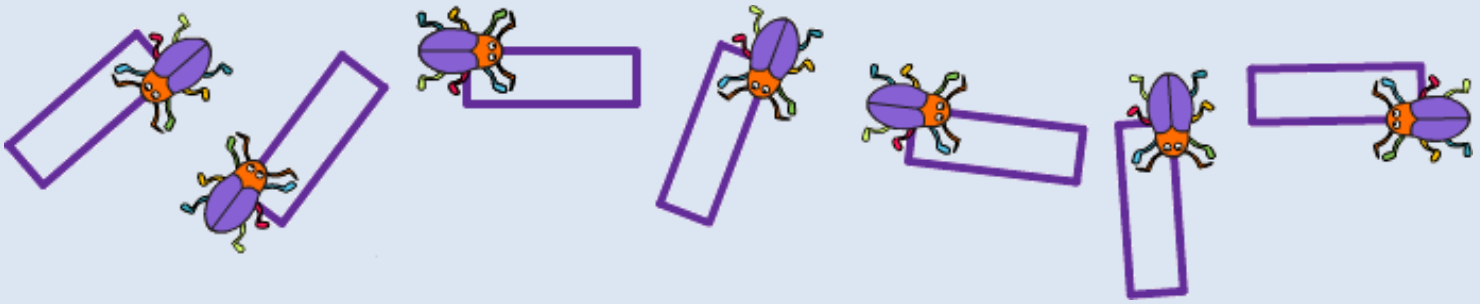
Activity 5.2.2 – Altering Rectangles

- Make a new variable called **base** and change your rectangle definition so that it uses both the variables **height** and **base**.



- **What is the *same* and what is *different* about your rectangles?** ?

- Experiment with the Beetle pointing in different directions and drawing the same rectangle.



Module 5: Investigation 2

Activity 5.2.2 – Altering Rectangles

- Read the scripts below and envisage the outcomes.
  Match the script with the set of rectangles it would create.

a

```
set height to 60
set base to 30
repeat 8
    rectangle
    change base by 10
```

b

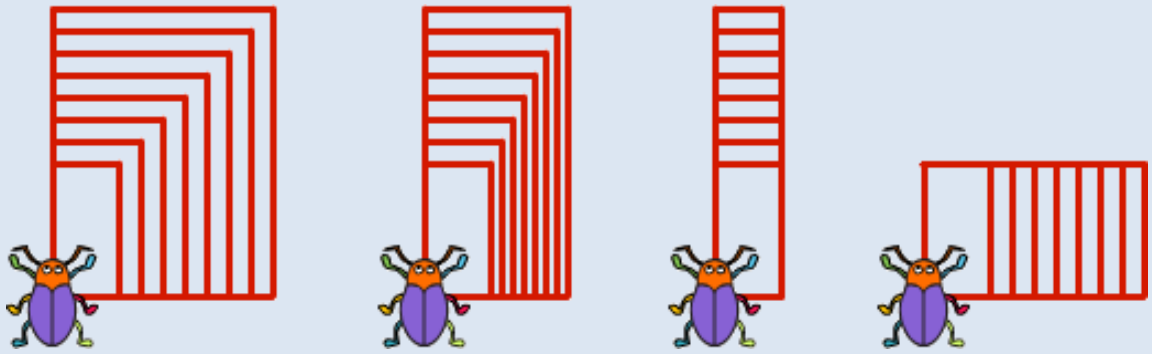
```
set height to 60
set base to 30
repeat 8
    rectangle
    change height by 10
```

c

```
set height to 60
set base to 30
repeat 8
    rectangle
    change height by 10
    change base by 10
```

d

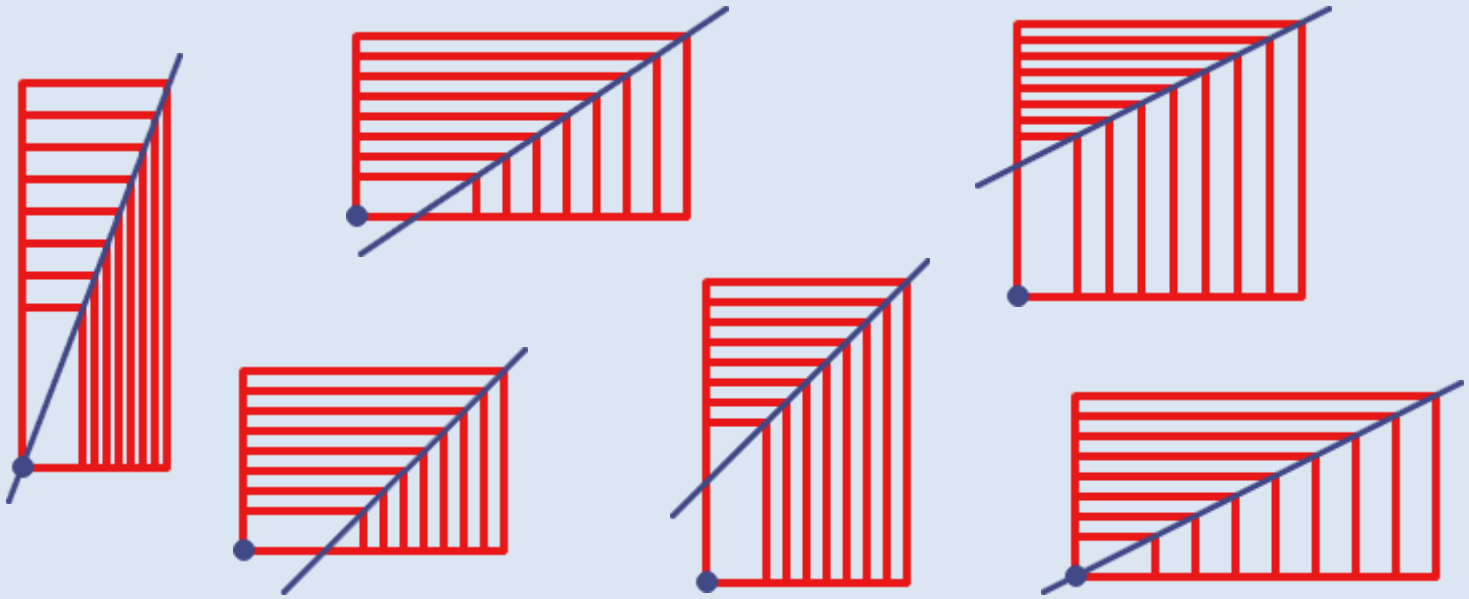
```
set height to 60
set base to 30
repeat 8
    rectangle
    change height by 10
    change base by 5
```



Module 5: Investigation 2

Activity 5.2.2 – Altering Rectangles

- Explore the line connecting the upper right corners of the rectangles. Some of them we call “magic”.



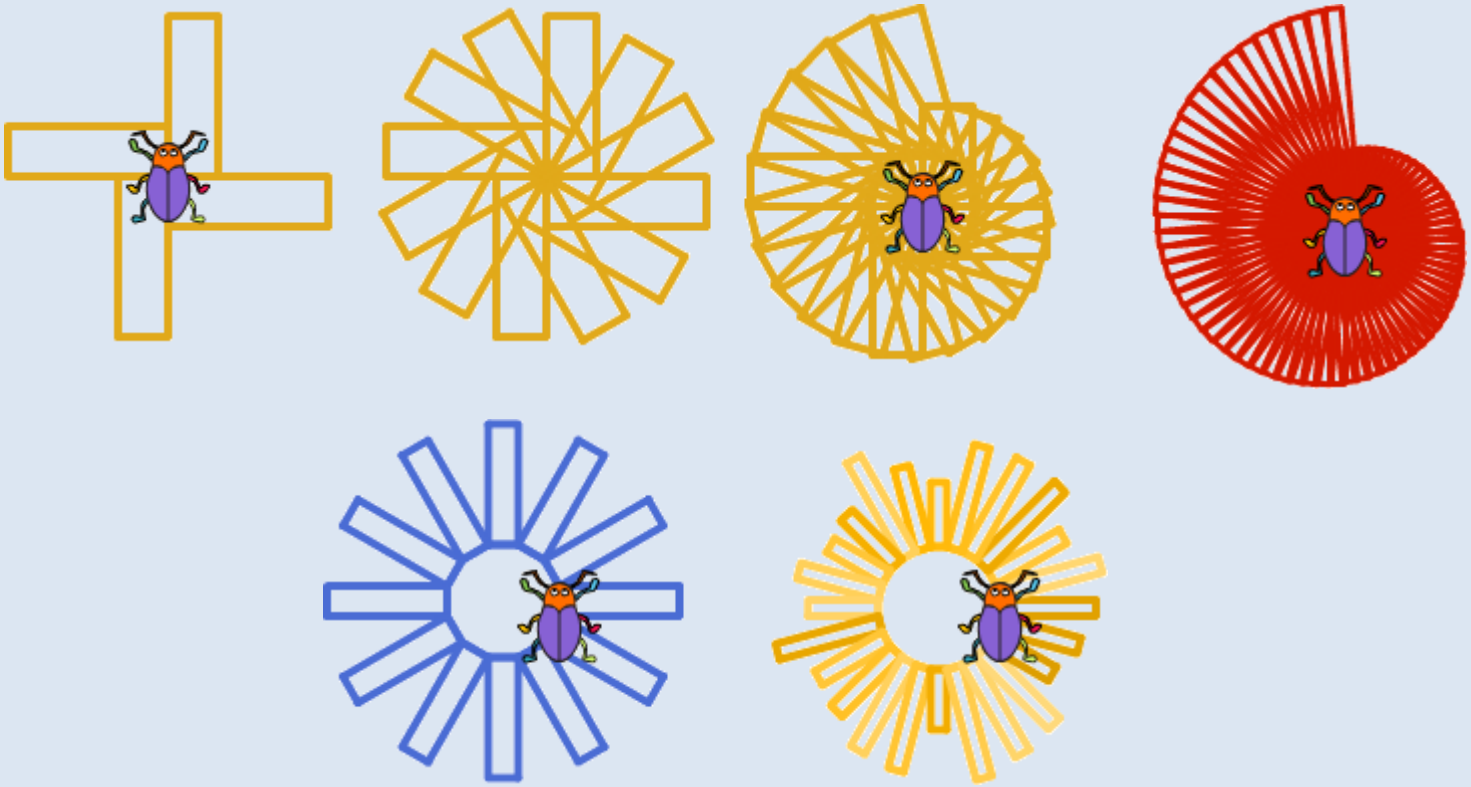
- What do you notice about the “magic” line?
- Are the first and last rectangles in each sequence the same?

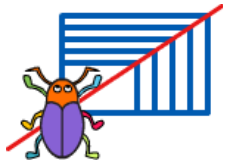
?

Module 5: Investigation 2

Activity 5.2.2 – [Extension] Altering Rectangles

- **[Extension]** Try to create the patterns below or similar using your **rectangle** block:





ACTIVITY 5.2.3

Exploring Mathematical Similarity

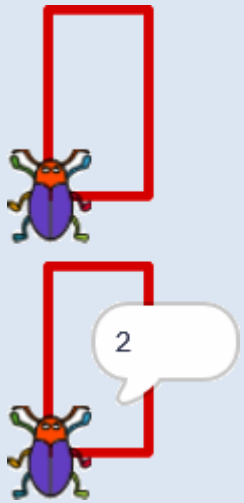
Module 5: Investigation 2

Activity 5.2.3 – Exploring Mathematical Similarity

Continue in your project **52-Altering Polygons**.

- Build a script that sets the variables **height** to 60 and **base** to 30. Draw a **rectangle** using these values.

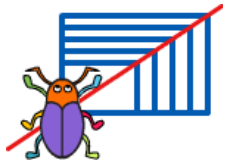
- Make the **Beetle** use the **say…** block to calculate and say the value of **height** divided by **base**.



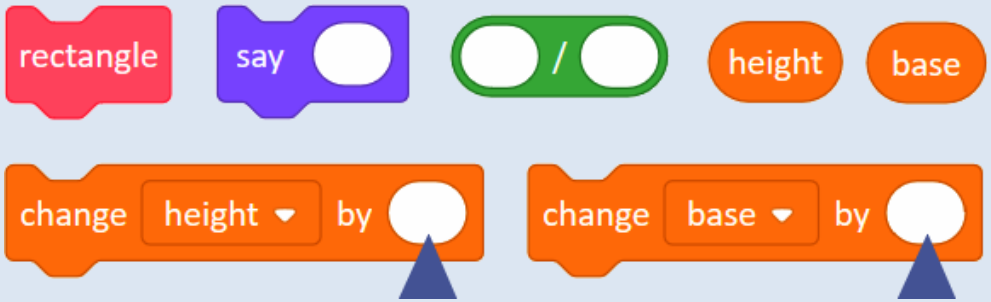
- **In the example above what does the number 2 represent?**

Module 5: Investigation 2

Activity 5.2.3 – Exploring Mathematical Similarity



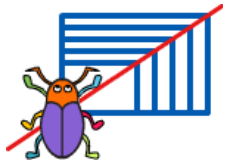
- Build another script which draws a **rectangle**, **says…** the value of **height / base** and then changes the values of **height** and **base**.



- Run the script several times and observe the sequence of rectangles and values.

Module 5: Investigation 2

Activity 5.2.3 – Exploring Mathematical Similarity

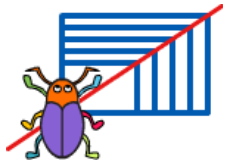


- Complete the tables **A** to **D** on your worksheet by doing the following steps:
  - Build the two scripts.
  - Click on the **set** blocks to set the **height** and **base** values.
  - Click the second script and then note down the value displayed in the table – repeat this process seven more times.

  Ensure you have correctly set the **height** and **base** values before clicking on the second script.

Module 5: Investigation 2

Activity 5.2.3 – Exploring Mathematical Similarity



Sequence Of Rectangles A

```
set height to 40
set base to 20

rectangle
say height / base
change height by 10
change base by 10
```

1	
2	
3	
4	
5	
6	
7	
8	

Sequence Of Rectangles B

```
set height to 40
set base to 20

rectangle
say height / base
change height by 10
```

1	
2	
3	
4	
5	
6	
7	
8	

Sequence Of Rectangles C

```
set height to 40
set base to 20

rectangle
say height / base
change base by 10
```

1	
2	
3	
4	
5	
6	
7	
8	

Sequence Of Rectangles D

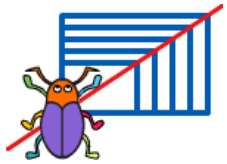
```
set height to 40
set base to 20

rectangle
say height / base
change height by 10
change base by 5
```

1	
2	
3	
4	
5	
6	
7	
8	

Module 5: Investigation 2

Activity 5.2.3 – Exploring Mathematical Similarity

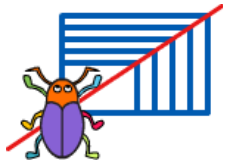


- Complete the tables **E** to **H** on your worksheet by doing the following steps:
  - Build the two scripts.
  - Choose the **initial values** and the values to **change … by …** and type these into the empty holes (also note down on your worksheet).
  - Click on the **set** blocks to set the **height** and **base** values.
  - Click the second script and then note down the value displayed in the table – repeat this process seven more times.

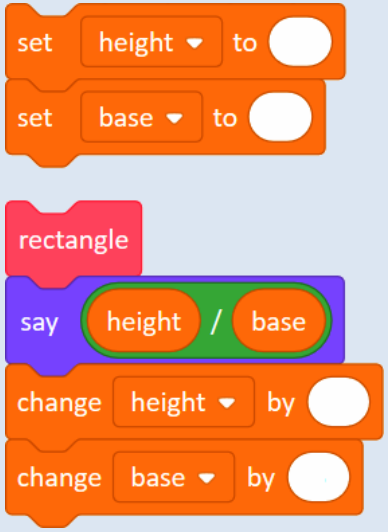
- **Can you build a script so that your sequence of rectangles has a "magic" line? Explain how you did this to another pupil.** ?
- **When there is a "magic" line what will the Beetle say?**

Module 5: Investigation 2

Activity 5.2.3 – Exploring Mathematical Similarity

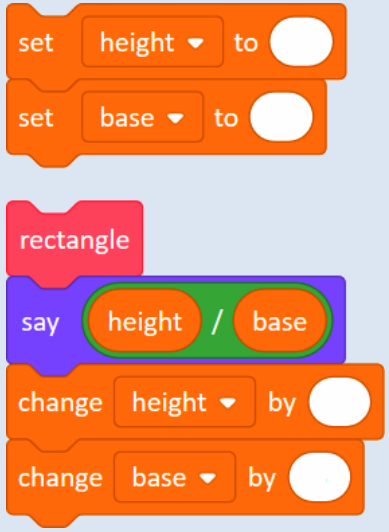


Sequence Of Rectangles E



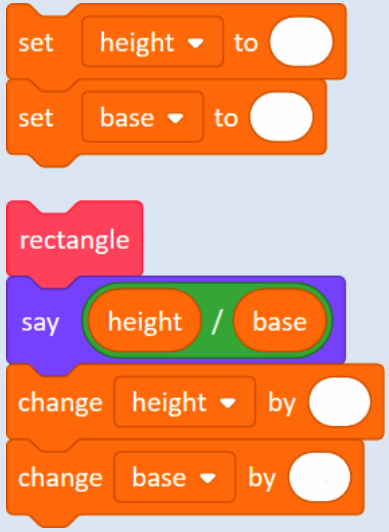
1	
2	
3	
4	
5	
6	
7	
8	

Sequence Of Rectangles F



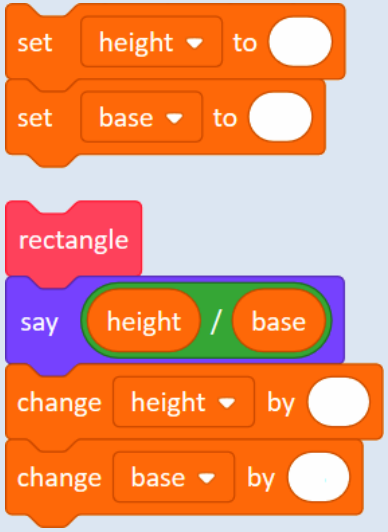
1	
2	
3	
4	
5	
6	
7	
8	

Sequence Of Rectangles G

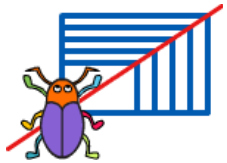


1	
2	
3	
4	
5	
6	
7	
8	

Sequence Of Rectangles H



1	
2	
3	
4	
5	
6	
7	
8	



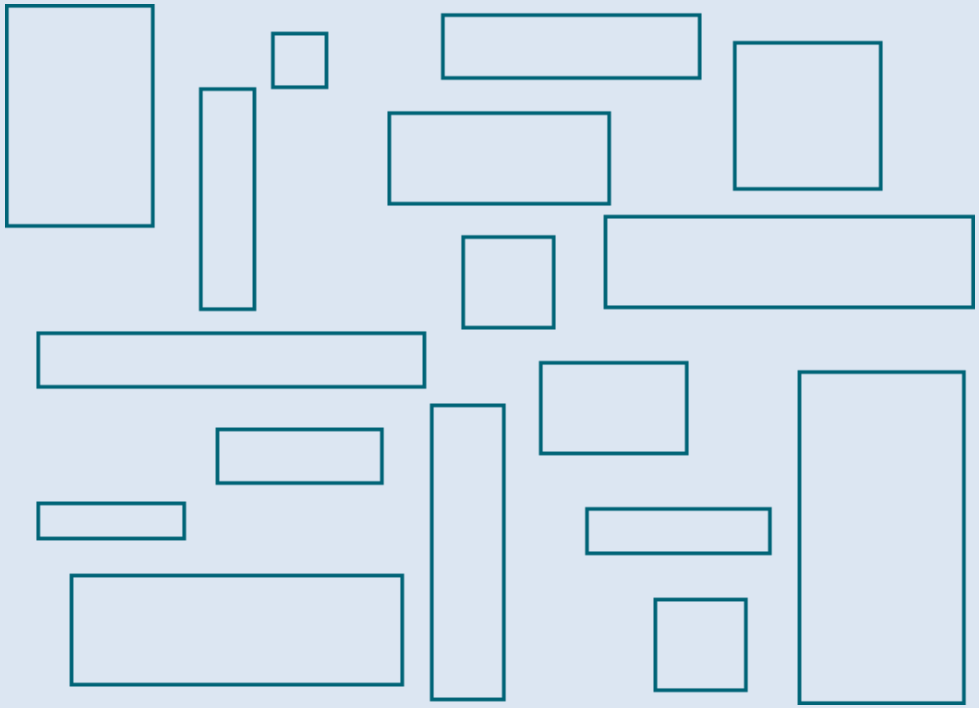
EXTENSION ACTIVITY 5.2.4

Unplugged: Rectangle Jumble

Module 5: Investigation 2

Ext. Activity 5.2.4 – Unplugged: Rectangle Jumble

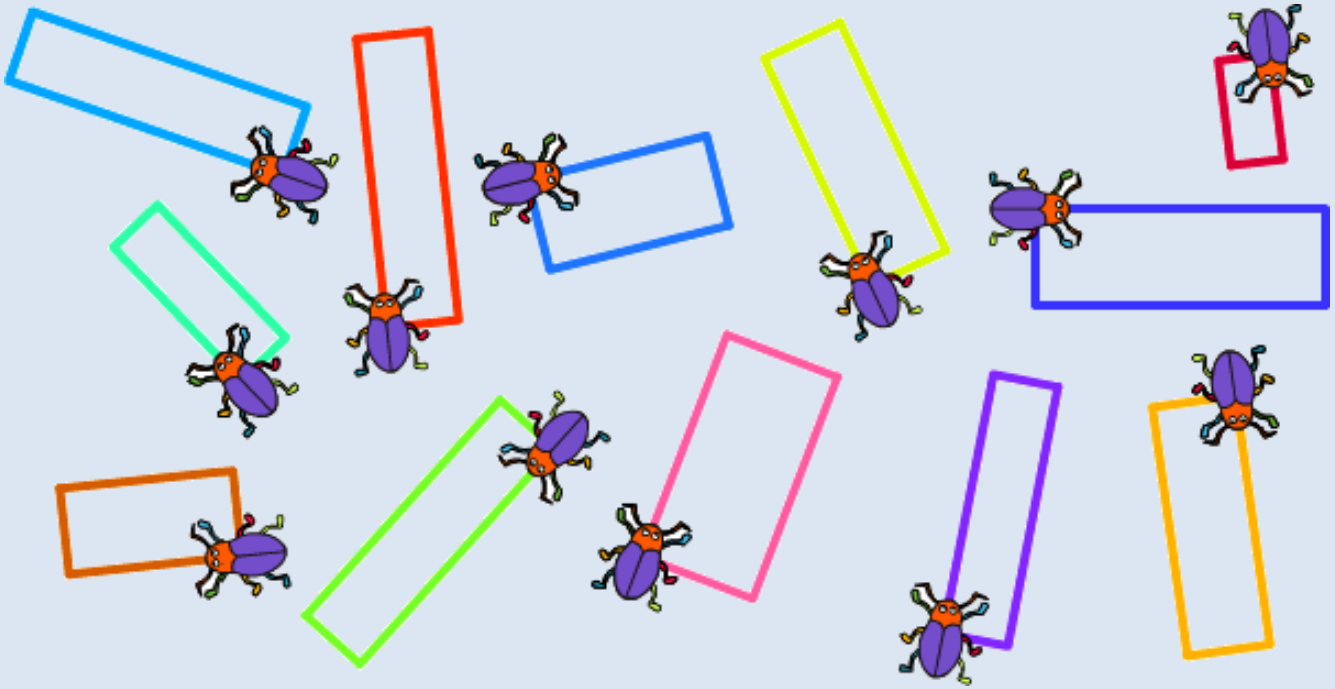
- A school has a swimming pool that is **60 x 15 metres**. Discuss which of these plans could be a scale drawing of the pool.



Module 5: Investigation 2

Ext. Activity 5.2.4 – Unplugged: Rectangle Jumble

- Sort these rectangles into three groups:
  - rectangles with height 2 times the base (2 to 1)
  - rectangles with height 3 times the base (3 to 1)
  - rectangles with height 4 times the base (4 to 1)



Module 5: Investigation 2

Ext. Activity 5.2.4 – Unplugged: Rectangle Jumble

- For each of the scripts on the top row find a script on the bottom row that will draw a **proportional rectangle**.

1

```
set height to 60
set base to 30
rectangle
```

2

```
set height to 30
set base to 20
rectangle
```

3

```
set height to 120
set base to 40
rectangle
```

4

```
set height to 180
set base to 45
rectangle
```

5

```
set height to 80
set base to 60
rectangle
```

a

```
set height to 60
set base to 40
rectangle
```

b

```
set height to 90
set base to 30
rectangle
```

c

```
set height to 40
set base to 30
rectangle
```

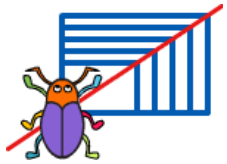
d

```
set height to 100
set base to 50
rectangle
```

e

```
set height to 200
set base to 50
rectangle
```

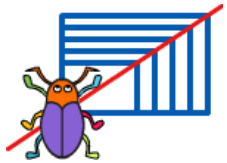
MODULE 5: INVESTIGATION 2

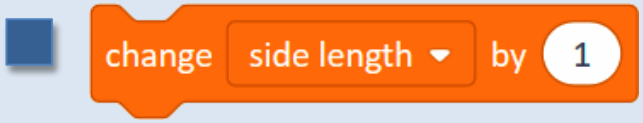


My Investigation 2 check list:

- ☐ I built a script which draws a square using a variable for the side length.
- ☐ I built a script that draws a pattern of increasing squares using the **change by** block.
- ☐ I built a script to draw a rectangle using variables for the height and base.
- ☐ I built a script that draws a pattern of increasing rectangles using the **change by** block.
- ☐ I created a pattern of proportionally similar rectangles and explained the “magic” line.
- ☐ I envisaged which rectangles were proportionally similar to each other (from images as well as scripts).

MODULE 5 INVESTIGATION 2: Key Vocabulary





a **Variables block** which will change the current value of a variable by a specified amount