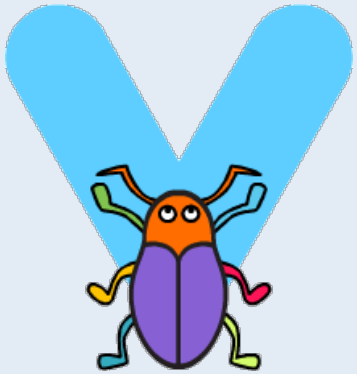
ScratchMaths

Beetle Geometry
Module 2: Investigation 1

Exploring Pen



ACTIVITY 2.1.1

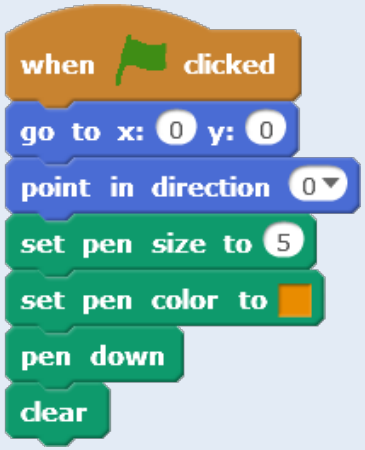
Drawing Numerals

MODULE 2: INVESTIGATION 1

Activity 2.1.1 – Drawing Numerals

Open project **2-Drawing Numerals**, save as a copy and rename.

☐ Read the *setup script* and explain what it does line by line.



Module 2: Investigation 1

Activity 2.1.1 – Drawing Numerals

- ☐ Explore each of the pen blocks in the scripts area, but **do not snap them together yet.**

- ☐ Investigate how pen colours can be set and reset using the **set pen color to _** block.

- ☐ Try changing the size of the pen using the **set pen size to…** block.

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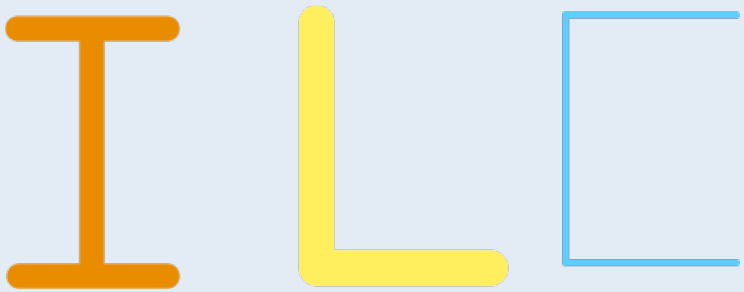
Activity 2.1.1 – Drawing Numerals

- [ ] Choose one of the roman numerals below and build a script to draw it (try one of the top numerals first).



Discussion Questions

- What does **pen down** mean? What would happen if this block was not in the *setup script*?
- How can you set and reset the colour of the pen?
- How can you reset the pen size?
- How did you draw your numeral? Which blocks do you have in your script?
- Which roman numeral have you managed to draw? What number does it represent?

ACTIVITY 2.1.2

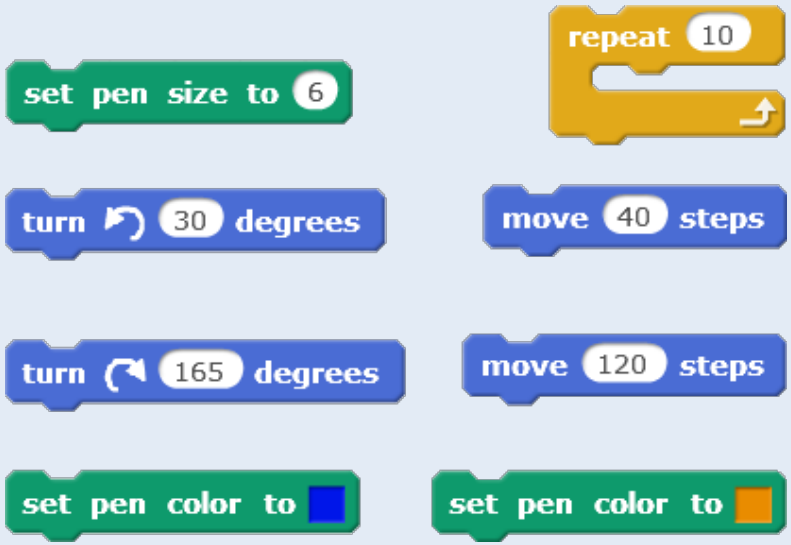
Swapping Blocks

MODULE 2: INVESTIGATION 1

Activity 2.1.2 – Swapping Blocks

Open project **2-Swapping Blocks**, save as a copy and rename.

- ☐ Look at the eight individual blocks in the scripts area and discuss what they do.



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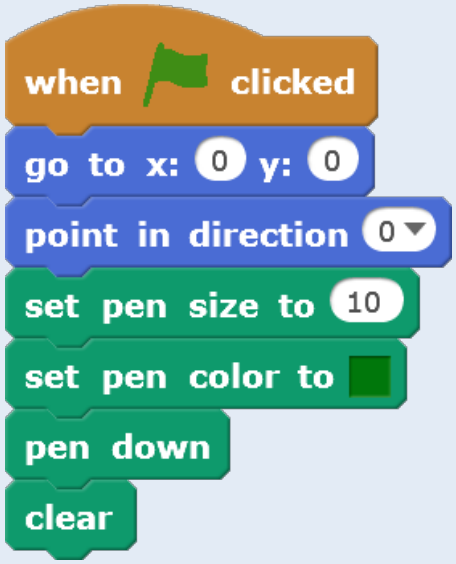
Activity 2.1.2 – Swapping Blocks

- ☐ Run the *setup script* and discuss what the blocks do.



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Activity 2.1.2 – Swapping Blocks

- Combine the blocks in any way to make a script, following the three rules below:

  - **You cannot duplicate or drag in any new blocks – you should have no more than the original eight blocks in your script.**
  - **You don't have to use all the blocks.**
  - **You cannot change the values inside the blocks.**

Discussion Questions

- What drawing have you created? Which blocks did you use and in what order?
- Did you try putting the **turn** and **move** blocks in front of and inside the **repeat** block – what was the difference?
- What happened if you put the two **set color** blocks next to one another?
- What is the total number of steps your Beetle moved to create your drawing?

ACTIVITY 2.1.3: UNPLUGGED

I am Beetle

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Activity 2.1.3 – Unplugged: I am Beetle

- ☐ Choose one person to act as the Beetle (P1) and another person to read the instructions (P2).
- ☐ P2 should read the instructions and then instruct P1 where to walk to trace out the shape on the floor.
- ☐ P1 should guess what shape they have just traced out on the floor.

Repeat for the other cards.

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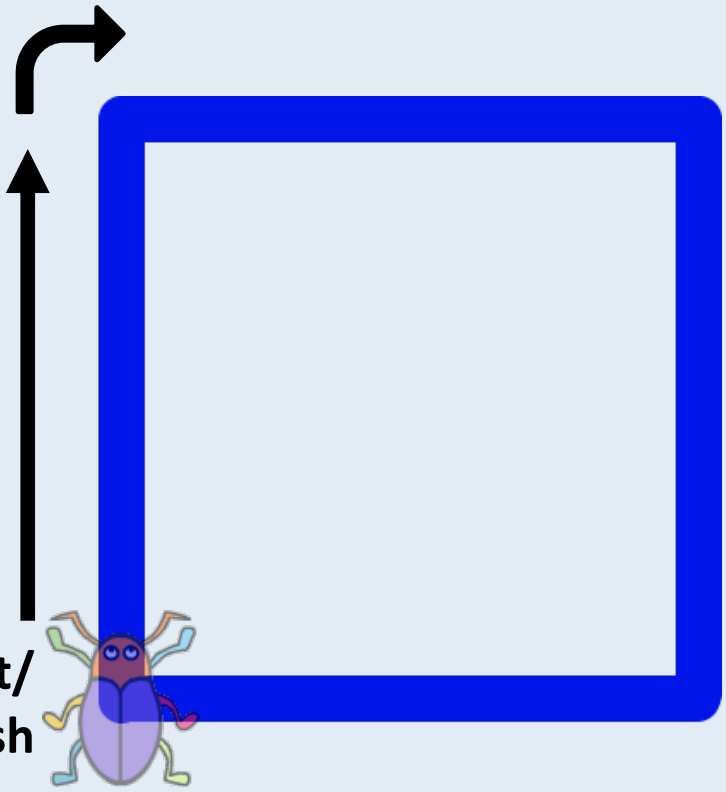
Activity 2.1.3 – Unplugged: I am Beetle

Turn _ degrees
work out the angle the Beetle needs to turn

Walk forward _ steps
choose any number less than 10



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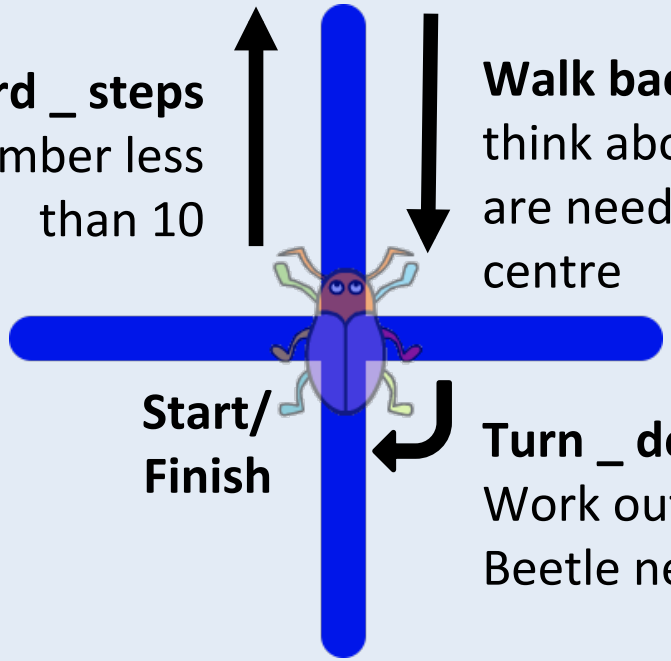
Activity 2.1.3 – Unplugged: I am Beetle



Walk forward _ steps
choose any number less than 10

Walk backward _ steps
think about how many steps are needed to get back to the centre

Start/ Finish

Turn _ degrees
Work out the angle the Beetle needs to turn

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Activity 2.1.3 – Unplugged: I am Beetle

Turn _ degrees
work out the angle
the Beetle needs
to turn

Walk
forward _ steps
choose any
number
less than 5

Start/Finish

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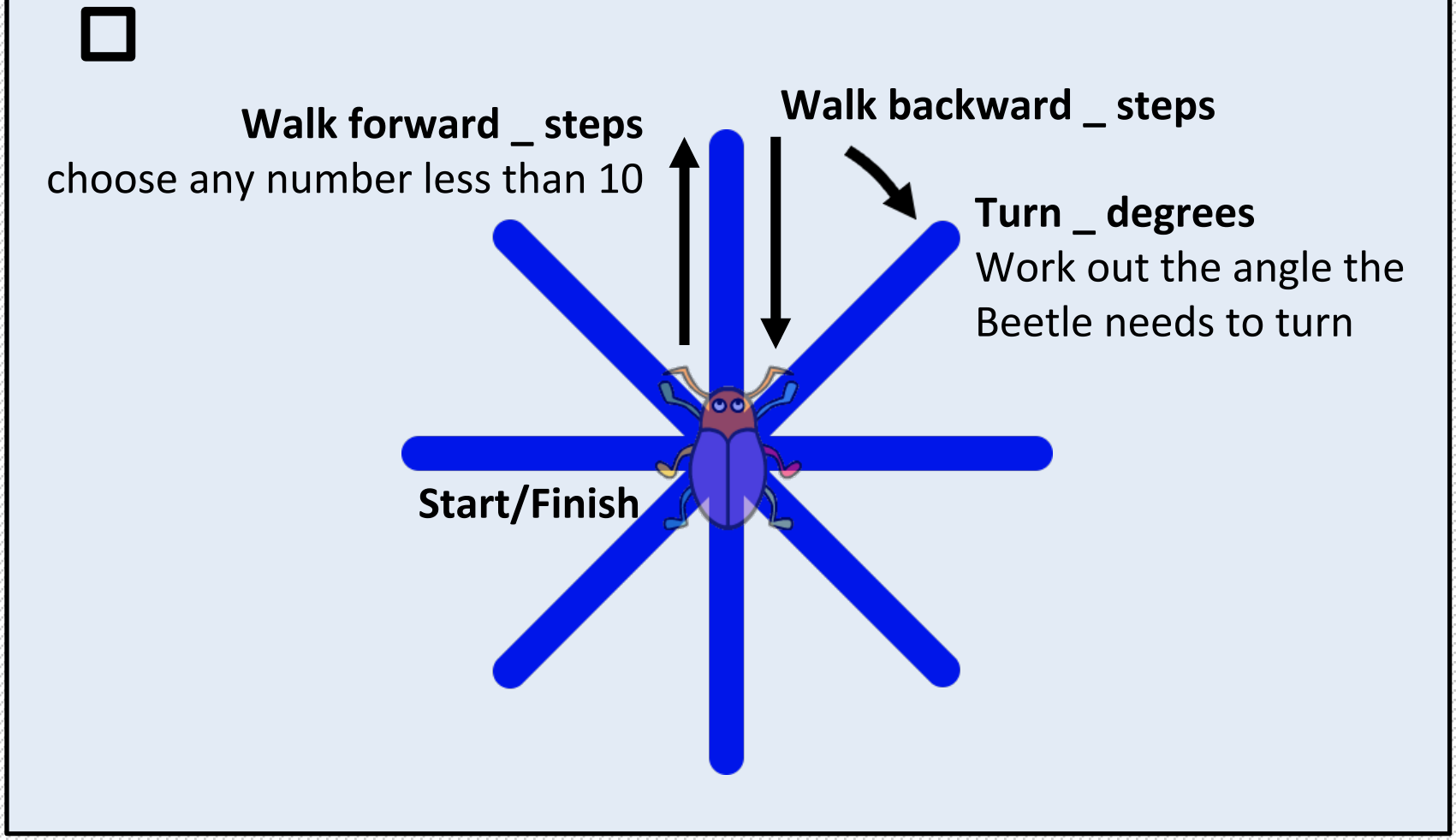
Activity 2.1.3 – [Extension] Unplugged: I am Beetle



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Activity 2.1.3 – I am Beetle

Discussion Questions

- Did your partner always move where you wanted them to? If not why not?
- What was important for you to make clear when instructing them what to do?
- What information did you remember to help you recreate the drawing on paper?

ACTIVITY 2.1.4

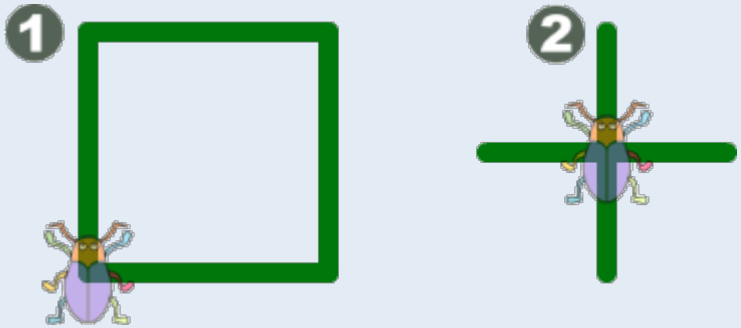
Different Drawing Algorithms

MODULE 2: INVESTIGATION 1

Activity 2.1.4 – Different Drawing Algorithms

Continue in **2-Swapping Blocks**, save as a copy and rename.

- ☐ Working in pairs - each choose a different drawing from the two below and build a script in Scratch to recreate your chosen drawing.

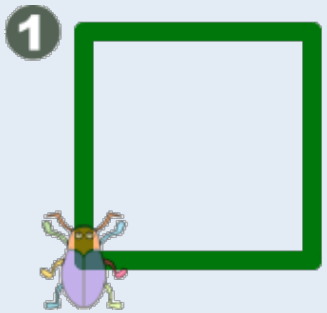


- ☐ Explain to your partner what you have done and help them to build the same script.

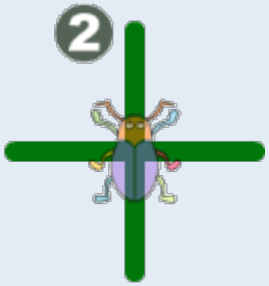
Module 2: Investigation 1

Activity 2.1.4 – [Extension] Different Drawing Algorithms

- [ ] **[Extension]** Imagine Beetle can only move backwards – recreate Drawing 1 only moving the Beetle sprite backwards.



- [ ] **[Extension]** Imagine Beetle can only move forwards – recreate Drawing 2 only moving the Beetle sprite forwards.



Discussion Questions

- How did you explain your script to your partner? Did you have any difficulties doing this?
- What were the differences between the two scripts?
- In Drawing 1 how could you calculate the total number of steps your Beetle moved? What is this distance known as in mathematics?
- In Drawing 1 how could you calculate the total number of degrees your Beetle turned?

MODULE 2: INVESTIGATION 1

My Investigation 1 check list:

- ☐ I read and explained the setup script.
- ☐ I changed the colour and size of the pen.
- ☐ I built a script to draw a roman numeral.
- ☐ I experimented with the order of the blocks and saw how it changed what was drawn on the stage.
- ☐ I imagined myself as the Beetle and followed a set of instructions given by someone else.
- ☐ I built a script that follows a specific drawing algorithm and was able to explain it to someone else.

Module 2 Investigation 1: Key Vocabulary

☐ **pen tool**	each sprite has a pen tool and can draw lines on the stage when its pen tool is down
☐ **pen down**	after running this block, the sprite will continuously draw a trail wherever it moves (until **pen up** block is used)
☐ **set pen blocks**	allow you to change the colour and width of the line that is drawn