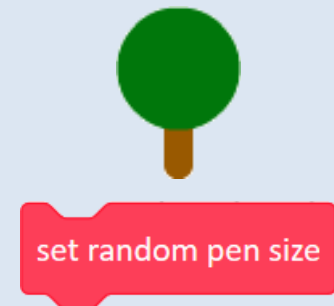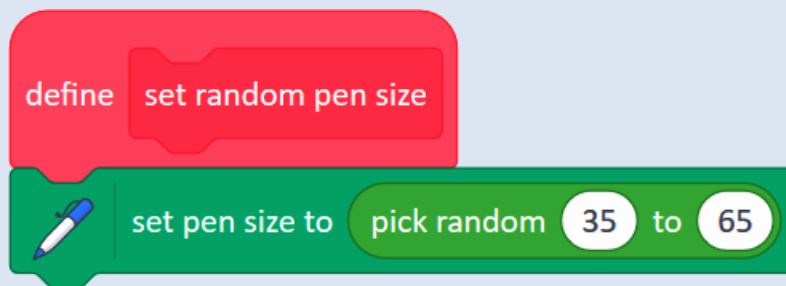# Pen Project: Nature Scenes

ACTIVITY **2.4.1**

Drawing Trees

Open project **25-Pen Project**.

◼ Run the *setup script* and discuss what it does.

◼ Build a script to draw a tree with a trunk of length **40** and a tree top that is a randomly sized dot between **35** and **65**.

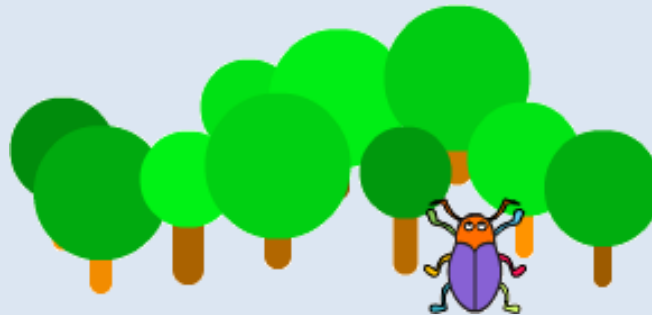Hint: use the **set random pen size** block for the tree top.

◼ Define a new **my tree** block with your tree script as the definition.

◼ Build a script to draw many trees randomly positioned around the stage.

◼ Make your trees more random by adding **set random pen shade** for both the trunk and the tree top.

■ **[Extension]** Change your **tree** script so it has a **random trunk size** and random **trunk length**.

■ **[Extension]** Switch the backdrop to *night horizon* and build a script to draw many trees only in the lower dark green area.

Discussion Questions

⬤ In the first solution we used the constant **move 40** to draw a trunk then added a randomly sized tree top between 35 and 65. When running this script several times the trunk lengths seemed to vary – why?

⬤ Where did you put your **pen down** and **pen up** blocks when drawing many trees?

⬤ Does the Beetle change direction when drawing your tree?

ACTIVITY 2.4.2: UNPLUGGED

Reading Scripts

Read each task and answer:

1 Which **direction** would my Beetle point if I clicked on the block below? (circle the correct picture)

point in direction 180

Up

Right

Down

Left

2 If the Beetle starts pointing in direction 0 (up) and I click the script on the right which **direction** will it end up pointing? (circle correct picture)

Starting direction

move 60 steps

turn 90 degrees

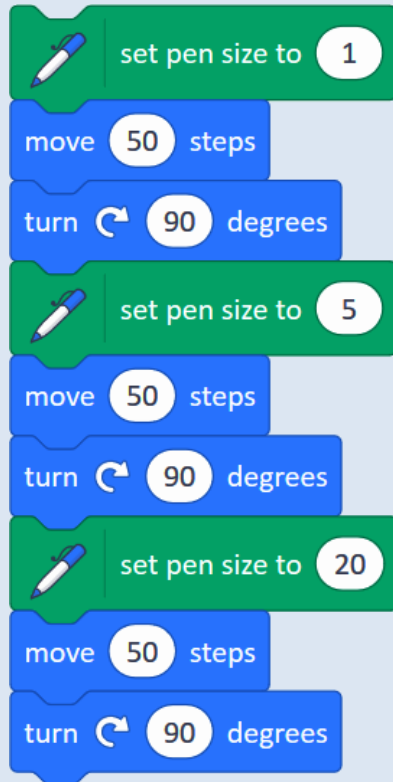move 30 steps

turn 180 degrees

move 60 steps

Up

Right

Down

Left

3 What will the **pen size** of the Beetle be when it completes this script?


```
set pen size to 1
move 50 steps
turn ↻ 90 degrees
set pen size to 5
move 50 steps
turn ↻ 90 degrees
set pen size to 20
move 50 steps
turn ↻ 90 degrees
```

Pen size = [ ]

4 What is the **lowest number** that I need to put in the **repeat** block to draw a regular polygon?


```
set random pen colour
repeat ( )
    move 40 steps
    turn ↺ 45 degrees
```

?

Repeat number = [ ]

5 What **number** do I need to put into the **turn** block to create a hexagon?

set random pen colour

set random pen size

repeat 6

move 50 steps

turn ↺ ⬭ degrees

?
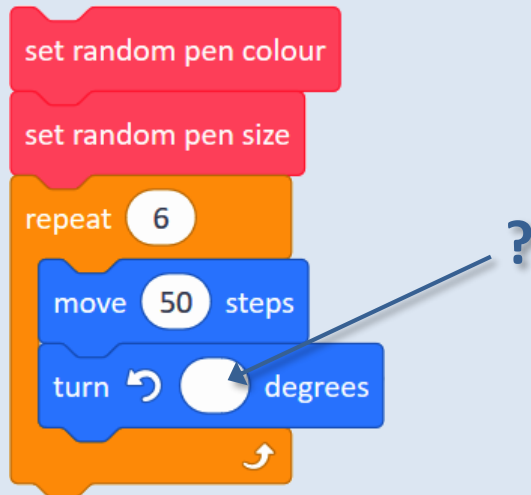
Number of degrees =

6 The **dot** block draws a dot on the stage each time it is run. If I click on this script **how many dots** will be drawn?
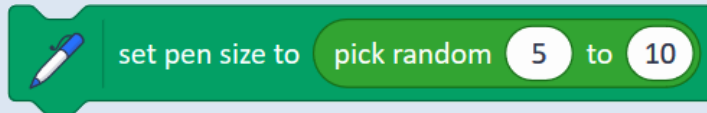
set pen color to ⬤
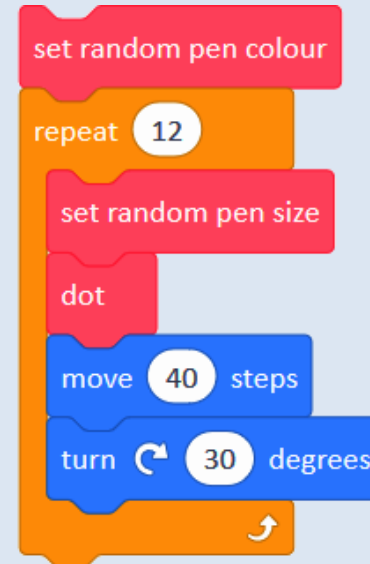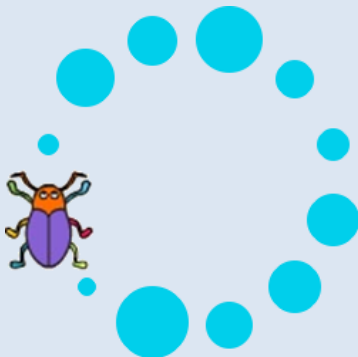
set pen size to 10

repeat 200

jump to random position

dot

Number of dots =

7 What are the possible **pen sizes** the Beetle could have if I click on this block?

Possible pen sizes =

set pen size to   pick random   5   to   10

8 Circle **the script** that produced the drawing below.

set random pen size
set random pen colour
repeat 12
dot
move 40 steps
turn 30 degrees

set random pen colour
repeat 12
set random pen size
dot
move 40 steps
turn 30 degrees

repeat 12
set random pen size
set random pen colour
dot
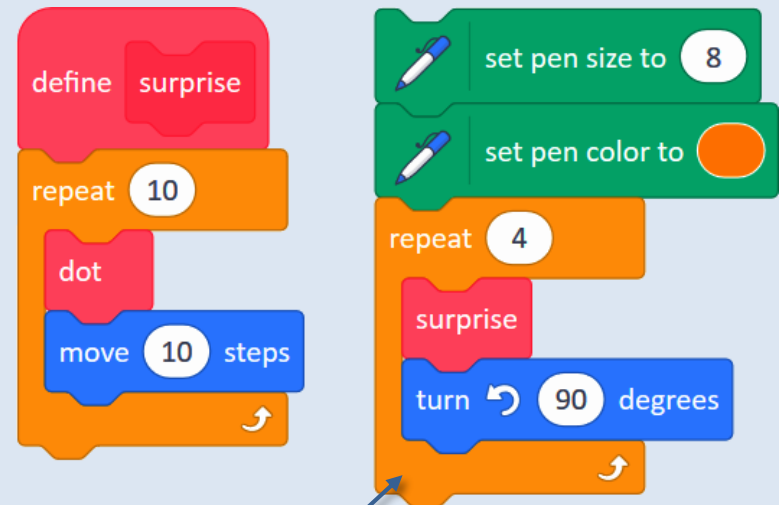move 40 steps
turn 30 degrees

9 I have made a new block called **square**. **How many steps** will the Beetle move in total if I click on the script on the right?

define square

repeat 4
  move 50 steps
  turn ↻ 90 degrees

If I click on this script **?**
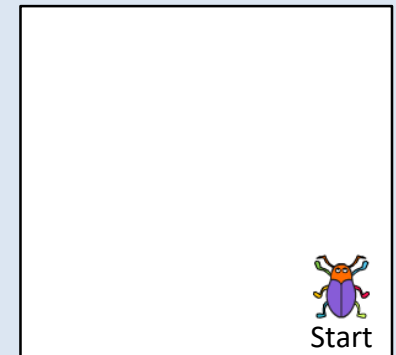
repeat 3
  square
  turn ↻ 120 degrees
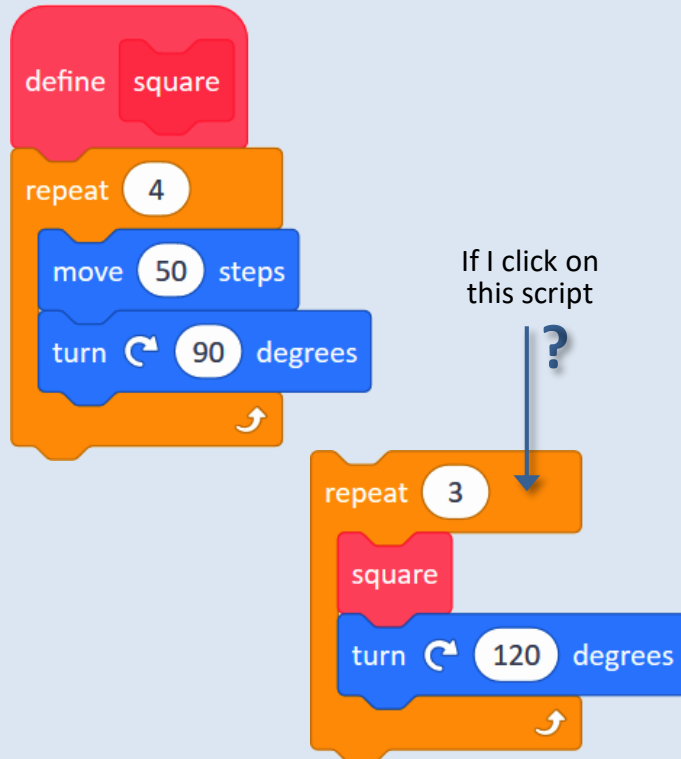
Total number of steps =

[Extension]

10 I have made another new block called **surprise**. In the box **draw** what the Beetle would draw if clicked on the script on the right?

define surprise

repeat 10
  dot
  move 10 steps

set pen size to 8

set pen color to ⬤

repeat 4
  surprise
  turn ↺ 90 degrees

? If I click on this script

Start

ACTIVITY 2.4.3 [EXTENSION]

A Walk in the Woods

Continue in your project **25-Pen Project**.

■ Change the backdrop to the *forest scene.*

■ Add some stars to the sky (as in Activity 2.3.4).

■ Define a block called **cabin** and create a script that draws a house in the same way you did before.

■ Use your **cabin** block to draw some wood cabins by dragging the Beetle and running the block.

■ Add some trees using the **tree** block you defined earlier.

Build another script by copying the **tree** definition and changing the **set pen size**, **set pen colour** and **move** blocks to create smaller mushrooms.

Discussion Questions

● How did you draw a forest cabin? Is each cabin drawn with a random pen colour?

● Did you build a script which will draw stars, then cabins and trees (i.e. the whole scene created by a single click)?

● How did you ensure that all the stars were only drawn in the sky? In which direction did you have to restrict/change the values?

ACTIVITY 2.4.4 [EXTENSION]

Life's a Beach

Continue in your project **25-Pen Project**.

Run the *setup script.*

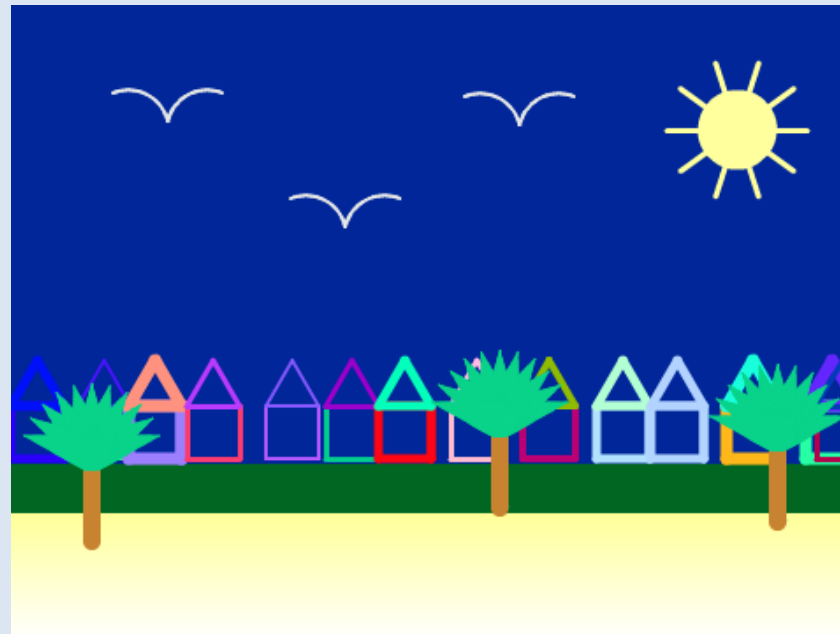Change your backdrop to a beach scene (e.g. from Scratch library or create your own).

■ Create some blocks to draw the sun, seagulls or palm trees (see example below) or think of your own drawings to add.

Discussion Questions

- What drawings did you add to your beach scene?

- Can you describe how you created these?

- Which of the techniques that you learned during Module 2 have you managed to use in your beach scene?

MODULE 2: INVESTIGATION 4

My Investigation 3 check list:

☐ I defined a new block to draw a tree with a randomly sized tree top.

☐ I built a script to draw multiple trees randomly across the stage.

☐ I edited my tree script to draw trees of random shades.

☐ I used what I learned during Module 2 to predict what would happen when different scripts are clicked.

☐ I used my knowledge of drawing stars, houses and trees to create a forest scene. **[Extension]**

☐ I used what I learned during Module 2 to define multiple new blocks that each draw a different feature of a beach scene. **[Extension]**