MODULE 4: INVESTIGATION 1

Place Value Models

ACTIVITY 4.1.1

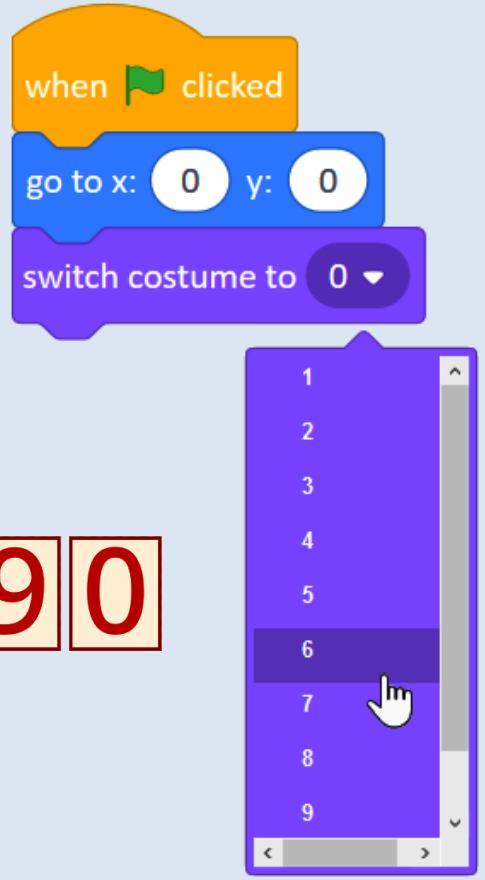
Digits Up, Digits Down

Module 4: Investigation 1

Activity 4.1.1 – Digits Up, Digits Down

Open project **41-Digits Up**.

- Explore the project. Change the **costume number** of the sprite.

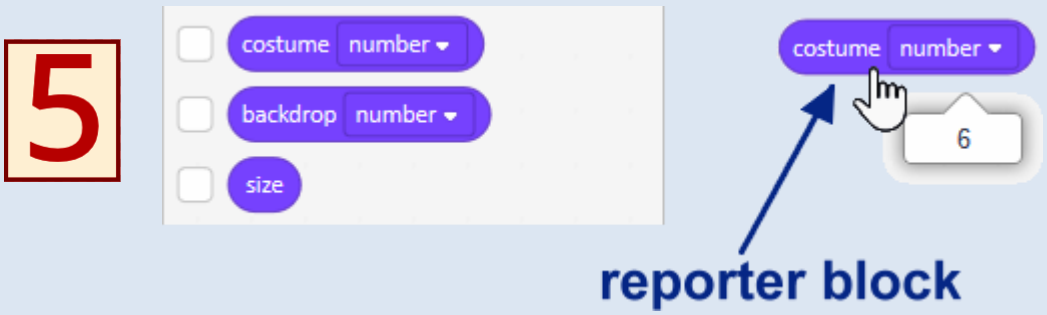


1 2 3 4 5 6 7 8 9 0

Module 4: Investigation 1

Activity 4.1.1 – Digits Up, Digits Down

- From the **Looks** group drag in the **costume** *number* **reporter block** and explore it.



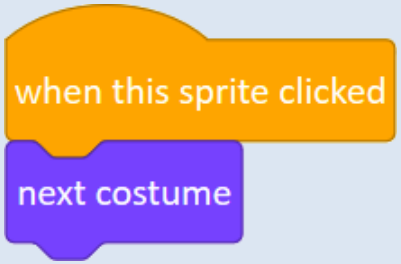
- Drag the **next costume** block into the scripts area and click it repeatedly.

- **What happens after digit 9? Can we show 10? If not, why?** ?

Module 4: Investigation 1

Activity 4.1.1 – Digits Up, Digits Down

- Add the **when this sprite clicked** hat block and explore the script.



- Choose one of the following tasks and report back.
  Modify your script so when the **ones** sprite is clicked it will:
  - increase its value by 3
  - set its value to 5
  - increase its value by 7 (use **repeat**)
  - set its value to a random value

Module 4: Investigation 1

Activity 4.1.1 – Digits Up, Digits Down

- Now choose one of the following tasks below and again report back. Combine the blocks:

Use the **operators** blocks for adding or subtracting, so that when **ones** is clicked its value will:

- change by adding 2
- change by subtracting 1
- change by subtracting 7

- **What is the connection between the costume # and the displayed digit? What would costume number 15 be? Costume number 21? Or costume number -1?** ?

ACTIVITY 4.1.2

Unplugged:
Flip Flip Nudge Nudge

Module 4: Investigation 1

Activity 4.1.2 – Unplugged: Flip Flip Nudge Nudge

- Four pupils stand at the front. Use four flip books.
- Set the initial number by giving each pupil a flip book – pupils at the front **must not** see each others flip books, **everyone else must check they do not cheat!**
- Agree a target number – explain the rules.
- Play the game!

ACTIVITY 4.1.3

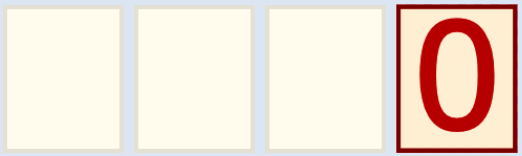
Playing with Place Value

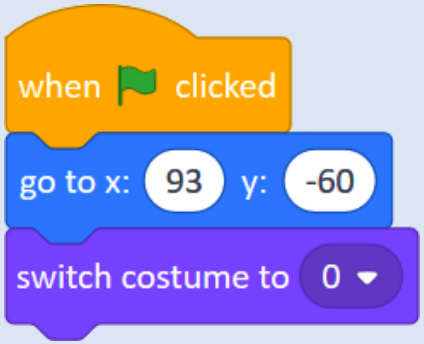
Module 4: Investigation 1

Activity 4.1.3 – Playing with Place Value

Continue in your **41-Digits Up** project.

- Change the backdrop to *4 digits* (with four empty placeholders).
- Modify the setup script of **ones** to be positioned over the far right placeholder. Be sure that **ones** has no more scripts.

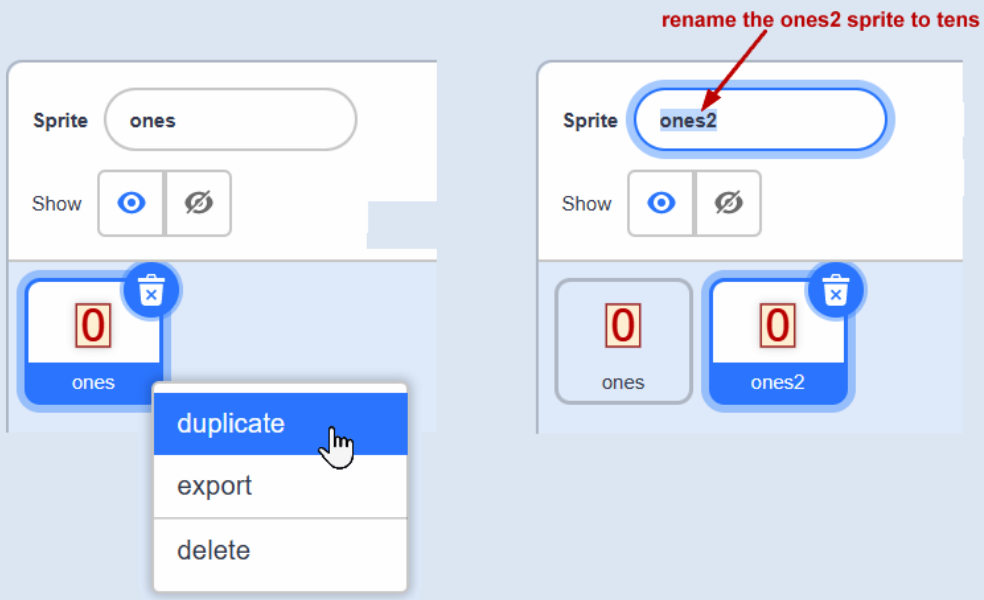




Module 4: Investigation 1

Activity 4.1.3 – Playing with Place Value

- Duplicate the **ones** sprite and rename the new sprite to **tens**.



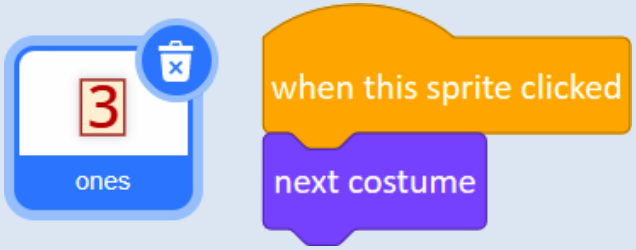
- Modify the *setup script* of **tens** so the sprite is positioned next to **ones**.

- Duplicate two more times, rename new sprites to **hundreds** and **thousands**. Modify their *setup scripts*.

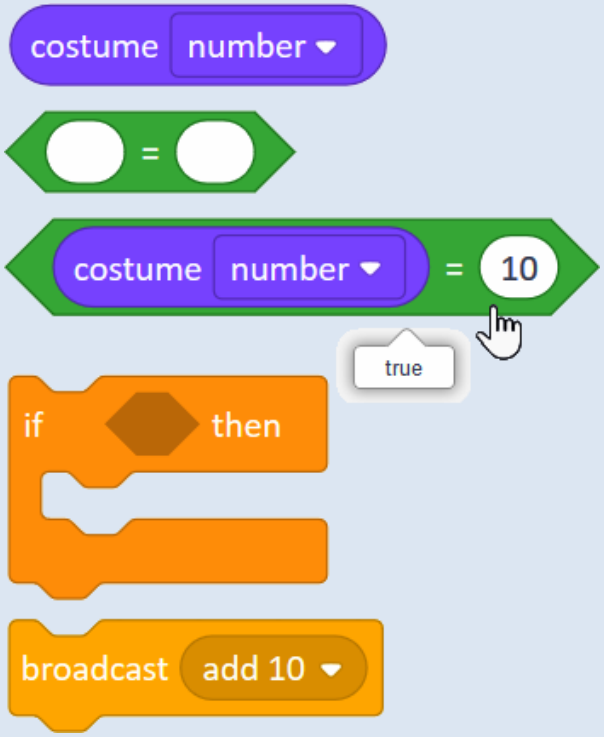
Module 4: Investigation 1

Activity 4.1.3 – Playing with Place Value

- Only the **ones** sprite will have a **when this sprite clicked** script.



- When should **ones** 'nudge' the **tens**? For **ones** build an isolated condition and fill in the costume number for when **tens** should increase.



- Add the **if … then …** block after the **next costume** of **ones**. Include your condition and add the 'nudging reaction' (broadcast the message *add 10*).

Module 4: Investigation 1

Activity 4.1.3 – Playing with Place Value

- The **tens** sprite will react to the *add 10* message by going to its **next costume**.

- **Tens**, **hundreds** and **thousands** will react only to 'nudging'.
  Set **tens** costume to be 9 and try clicking **ones**. Is **tens** nudging **hundreds**?

- Extend the reaction of **tens** so that it broadcasts *add 100* when it reaches 0 (which is its last costume).

Module 4: Investigation 1

Activity 4.1.3 – Playing with Place Value

- Build the reaction of the **hundreds** sprite so that its value will change based on what happens with the **tens** sprite. Add the 'nudging behaviour' *add 1000*.

- Build the reaction of the **thousands**. Test your 4-digit number. Set their initial values for testing in their setup scripts.

- **What would happen if the hundreds sprite reacted to the *add 10* message instead of reacting to *add 100*? Envisage then try in Scratch.**
- **Why do we not need any if and broadcast blocks for the thousands sprite?**

?

ACTIVITY 4.1.4

Sequences

Module 4: Investigation 1

Activity 4.1.4 – [Extension] Sequences

Open project **42-Sequences**.

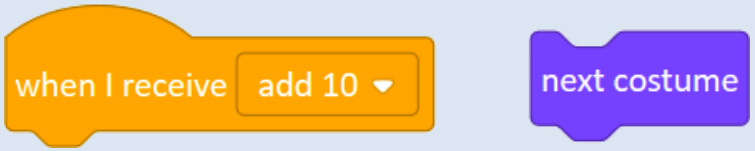
- Explore the behaviours of the two sprites **ones** and **add**.
- In the **add** sprite make a new block **add myself** and attach the **repeat** block to the **define** hat block.

- Use the **costume** *number* block as the **repeat** value.
- Add the **broadcast** *add 1* block within the **repeat** block and a small **wait** i.e. 0.1 secs.

Module 4: Investigation 1

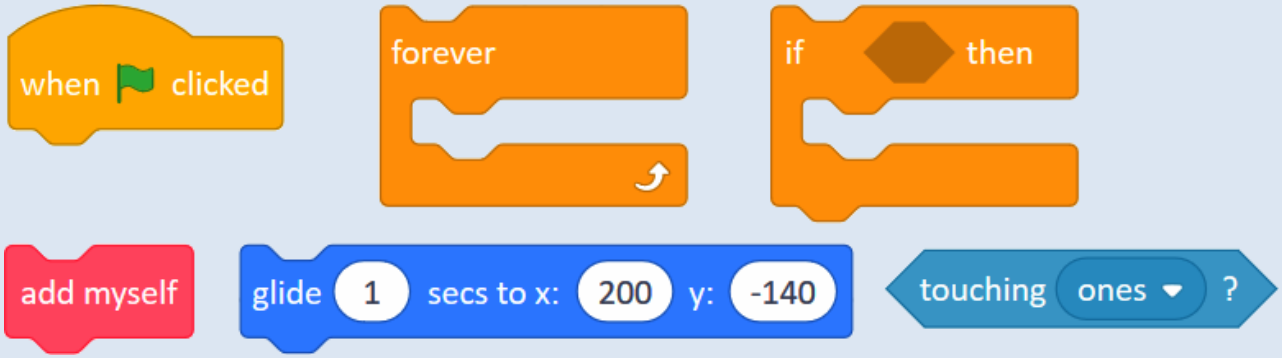
Activity 4.1.4 – [Extension] Sequences

- In the **ones** sprite build a **when I receive** *add 1* script and attach the **next costume** block.



- **[Extension]** In the **add** sprite build a *whenever* script that will **forever** check if the sprite is **touching** the **ones** sprite.

  if it is touching **then** it will run the **add myself** script and **glide** back to its starting position.



Module 4: Investigation 1

Activity 4.1.4 – [Extension] Sequences

- Explore different sequences.

  Click on both the **ones** and the **add** sprite to select the starting numbers. Drag the **add** sprite over the **ones** sprite repeatedly.

- **How long is the sequence? Is it always the same? What would be the longest sequence or the shortest one?**

Module 4: Investigation 1

Activity 4.1.4 – [Extension] Sequences

- Write down the next three terms in this sequence 3, 7, 1, 5… ?
- For the sequence 0, 3, 6, 9, 2, 5, 8, 1, 4, 7 what value was added, what was the initial value?
- What was your strategy for working out the next number when the sequence goes past 0?

- **[Extension]** When the **add** sprite is 0, the **add myself** block adds 1 to **ones** 10 times. Why? Try to change your script to avoid this happening.

Module 4: Investigation 1

17

My Investigation 1 check list:

- ☐ I made a script that would increase the value of my sprite by different amounts when clicked.
- ☐ I made a script that would decrease the value of my sprite by different amounts when clicked.
- ☐ I built a 'nudge' script to correctly display numbers up to 99.
- ☐ I built a 'nudge' script to correctly display numbers up to 999.
- ☐ I built a 'nudge' script to correctly display numbers up to 9999.
- ☐ **[Extension]** I built a script to explore different sequences of numbers.
- ☐ **[Extension]** I found out the longest and shortest sequence of numbers I could make using one digit.

Module 4 Investigation 1: Key Vocabulary

this block is a reporter block which reports the sprite's current costume number. When clicked it will show the current costume number in a speech bubble

this block is a reporter block which adds two values (typed in values or other reporter blocks) and reports the result

this block is a reporter block which subtracts the second value from the first (typed in values or other reporter blocks) and reports the result

this block is an operators block, which checks if the value on the left is equal to the value on the value on the right. If they are equal it reports ***true*** otherwise it reports ***false***