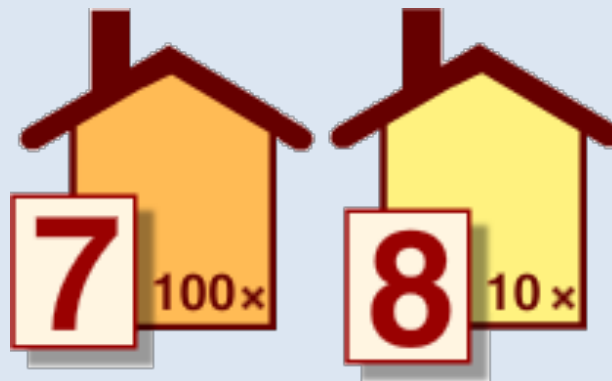
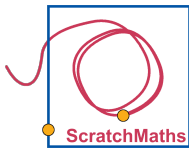


BUILDING WITH NUMBERS

MODULE 4: INVESTIGATION 3

The Conversion Game





MODULE 4: INVESTIGATION 3

Activity 4.3.1 – Unplugged: Playing the Conversion Game



ACTIVITY 4.3.1

Unplugged: Playing the Conversion Game

MODULE 4: INVESTIGATION 3

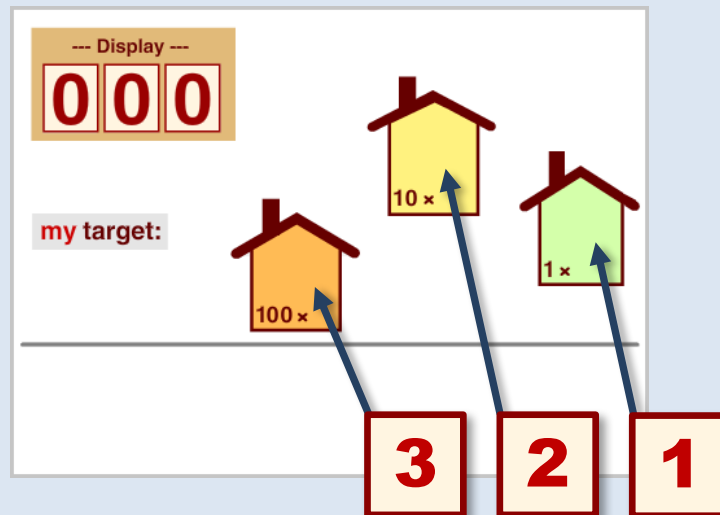
Activity 4.3.1 – Unplugged: Playing the Conversion Game

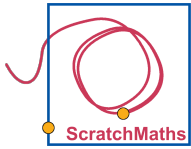


- ☐ Tear your paper into three and write the following numbers on the squares of paper:

3 **2** **1**

- ☐ Use your three digits to create bigger numbers by placing them into the different houses on your hand-out.



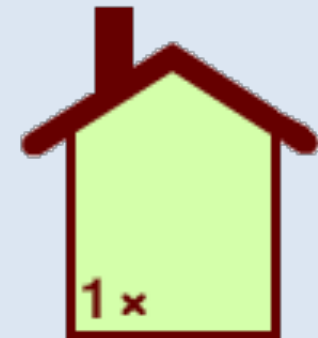
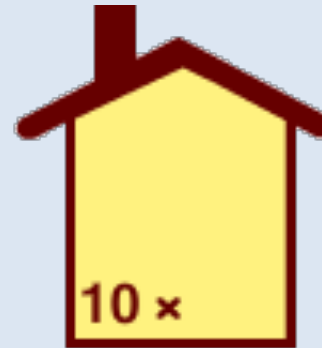


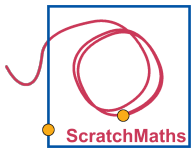
MODULE 4: INVESTIGATION 3

Activity 4.3.1 – Unplugged: Playing the Conversion Game



my target:



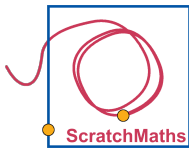


MODULE 4: INVESTIGATION 3

Activity 4.3.1 – Unplugged: Playing the Conversion Game



- ☐ Create the biggest number you can.
- ☐ Create the smallest number you can.
- ☐ Try to create the following numbers using your three digits:
 - 420
 - 15
 - 321
 - 240
 - 50



MODULE 4: INVESTIGATION 3

Ext. Activity 4.3.2 – Building Conversion Game: The Display



EXTENSION ACTIVITY 4.3.2

Building Conversion Game: The Display

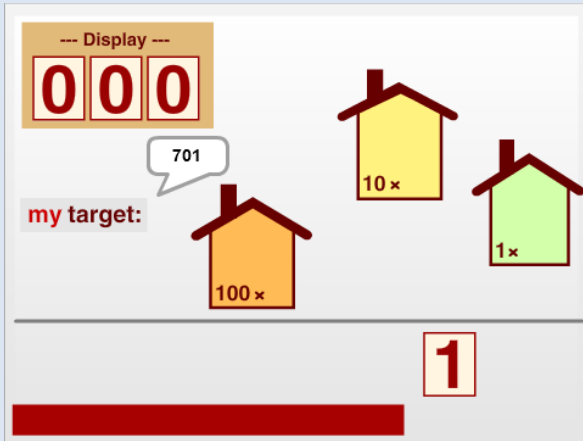
MODULE 4: INVESTIGATION 3

Ext. Activity 4.3.2 – Building Conversion Game: The Display

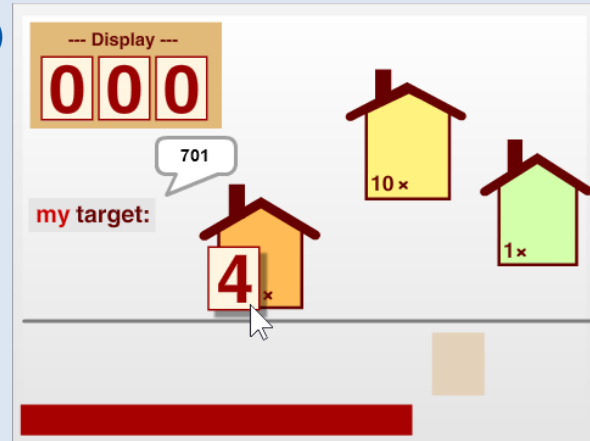


☐ Open **4-Conversion Game FINAL** and play the game as a class.

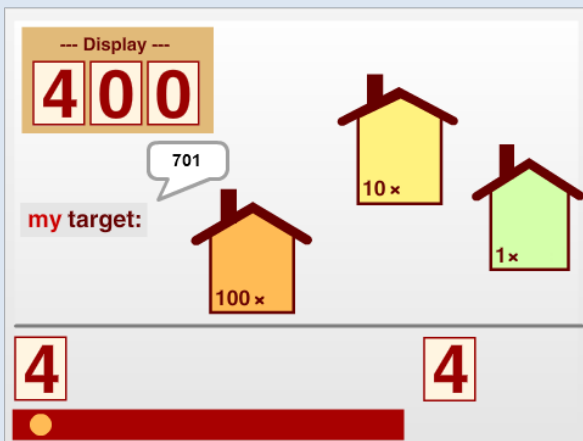
1



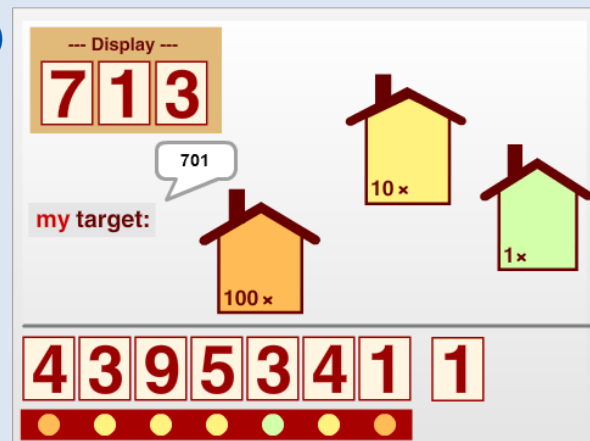
2

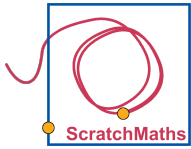


3



4





MODULE 4: INVESTIGATION 3

Ext. Activity 4.3.2 – Building Conversion Game: The Display

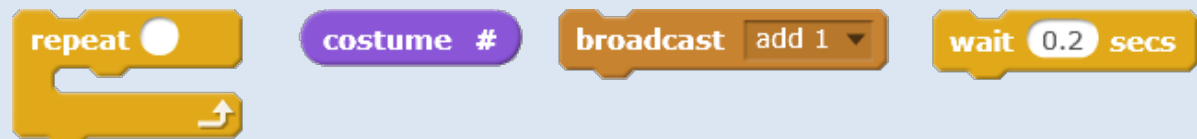


Open project **4-Conversion Game** - if online Save as a copy and add your name
- if offline Save as and add your name

- ☐ Explore the project. Look at the sprites, costumes and *setup scripts*. Note how the **ones** sprite reacts to the *add 1* message .



- ☐ For the **input** sprite build a script to **broadcast add 1** message in the **repeat** loop – repeated as many times as the value it displays.

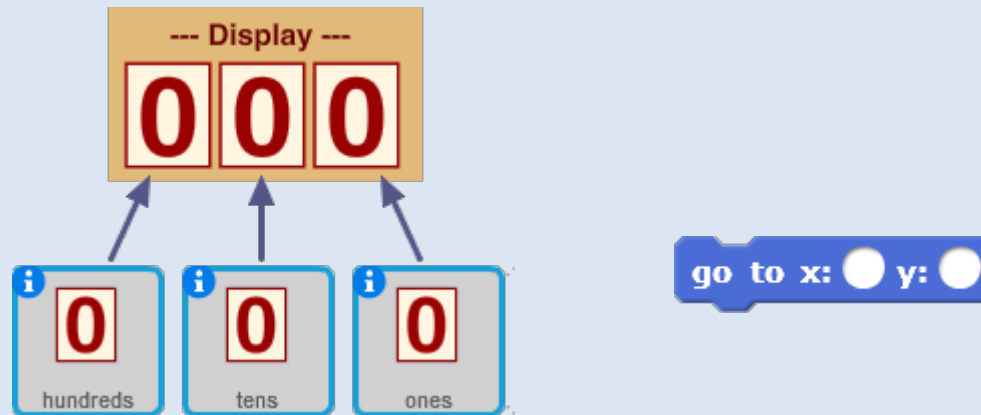


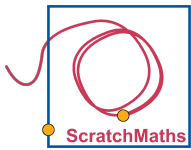
MODULE 4: INVESTIGATION 3

Ext. Activity 4.3.2 – Building Conversion Game: The Display



- ☐ Duplicate the **ones** sprite twice and rename the new sprites **tens** and **hundreds**.
- ☐ Update their *setup scripts* so they sit in the correct placeholders.





MODULE 4: INVESTIGATION 3

Ext. Activity 4.3.2 – Building Conversion Game: The Display



While **ones** reacts to the *add 1* message...

- ☐ ... make **tens** react to *when I receive add 10*
- ☐ ... make **hundreds** react to *when I receive add 100*



◆ How should **tens** and **hundreds** react? ?

- ☐ Extend their scripts so that they properly 'nudge':
ones nudges **tens** when it reaches 0
tens nudges **hundreds** when it reaches 0



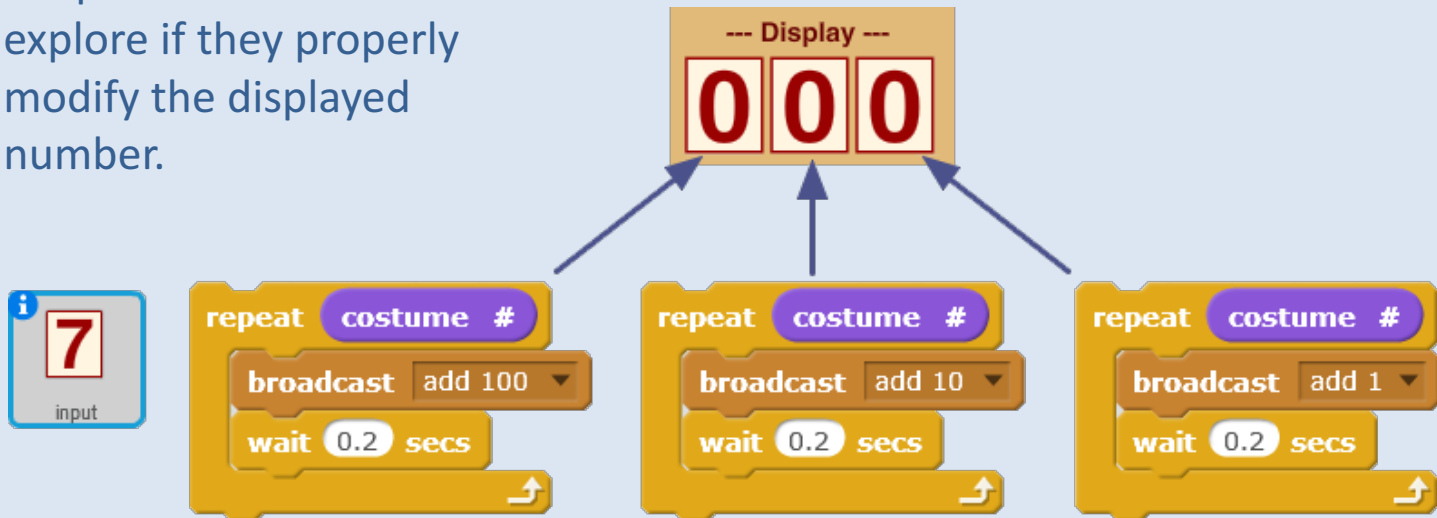


☐ Are your scripts similar to the below?
Discuss any alternative solutions.



- ❑ In the **input** sprite duplicate twice the **repeat costume # ...** script, modify their broadcasts to *add 100*, *add 10* and *add 1*.

Keep them isolated and explore if they properly modify the displayed number.



- ◆ Are there several ways how to generate the same target number by using different combinations of these scripts and the **input** value?

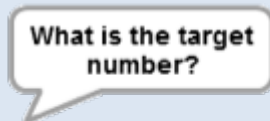


MODULE 4: INVESTIGATION 3

Ext. Activity 4.3.2 – Building Conversion Game: The Display



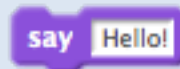
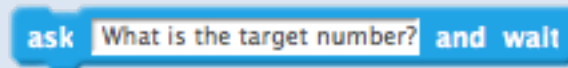
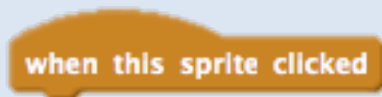
- For the **target number** sprite build a **when this sprite clicked** script so that it will **ask** for the target number then in a bubble **say** the **answer**:



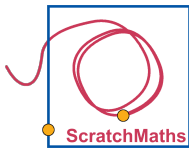
my target:



The **target number** will first display the question. When we type in the number and press Enter, it is stored in the **answer** block and can be used in the **say** block.



my target:



MODULE 4: INVESTIGATION 3

Ext. Activity 4.3.3 – Building Conversion Game: Coloured Houses



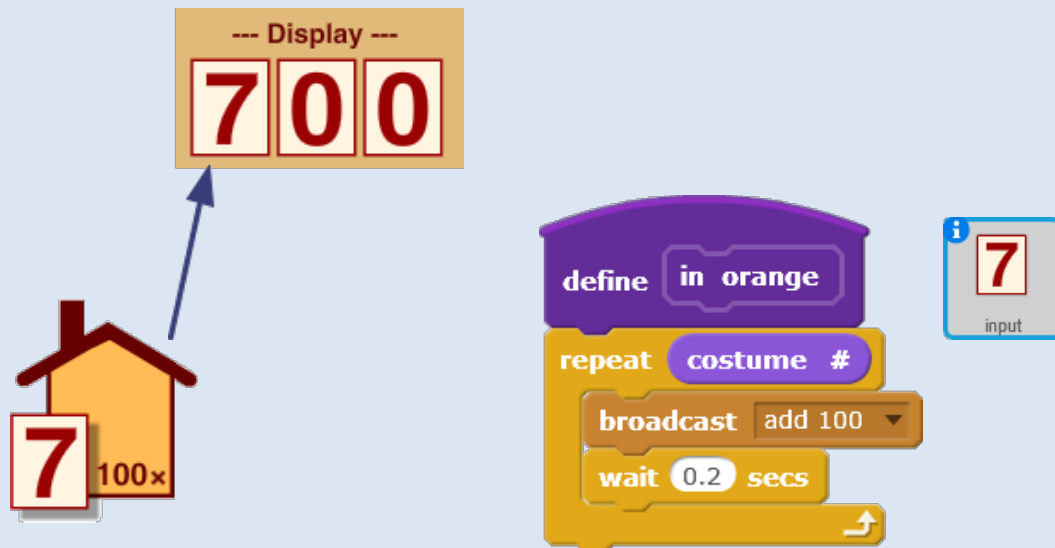
EXTENSION ACTIVITY 4.3.3

Building Conversion Game: Coloured Houses

Continue in your **4-Conversion Game** project.

- ☐ Continue working with the three **repeat costume # ...** scripts of **input**.

The script with **add 100** will be used when we put the **input** value into the orange house. Therefore give it a name **in orange**.

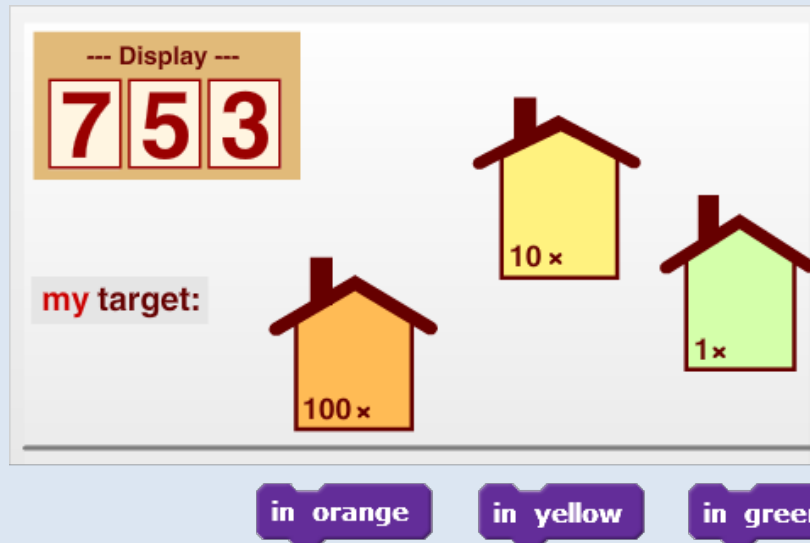


MODULE 4: INVESTIGATION 3

Ext. Activity 4.3.3 – Building Conversion Game: Coloured Houses



- ☐ Similarly, give names to two other **repeat costume # ...** scripts.



- ◆ What will happen with the Display when you use these three new blocks? ?
(Envisage before clicking on them)

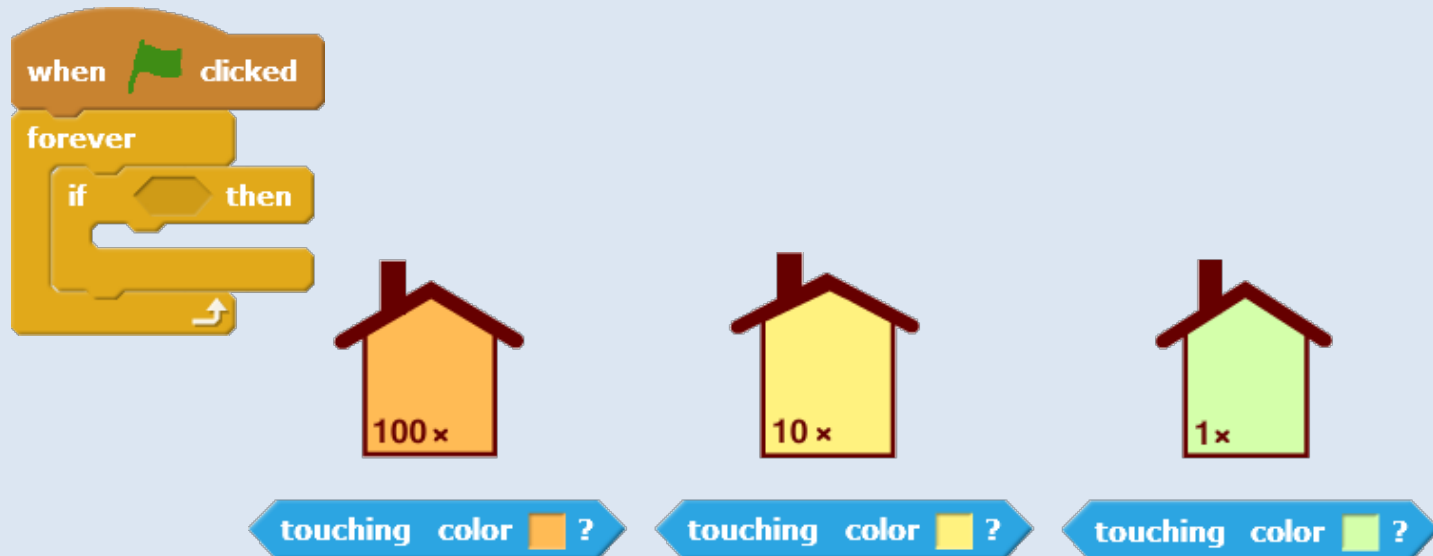
MODULE 4: INVESTIGATION 3

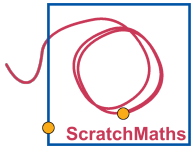
Ext. Activity 4.3.3 – Building Conversion Game: Coloured Houses



We want to drag the **input** sprite into one of houses to 'convert' its value and add it to the Display.

- ☐ For the **input** sprite build three 'whenever scripts' to monitor if the sprite is **touching** the different house colours:





MODULE 4: INVESTIGATION 3

Ext. Activity 4.3.3 – Building Conversion Game: Coloured Houses



- ☐ Build a script so that whenever the **input** sprite is dragged over the orange house, it will:
 - run the **in orange** block to add its value to **hundreds**,
 - then **glide home**.

Complete all three *whenever scripts* so that when **input** is dragged over any of the houses, it will correctly update the Display.

- ☐ Modify the **input**'s behaviour: when clicked, it will switch to a random value (costume) – avoid switching to 0 (the last costume).

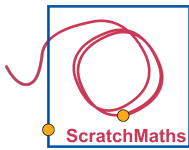
MODULE 4: INVESTIGATION 3

Ext. Activity 4.3.3 – Building Conversion Game: Coloured Houses



☐ Are your scripts similar to the below?
Discuss any alternative solutions.





MODULE 4: INVESTIGATION 3

Ext. Activity 4.3.4 – Building Conversion Game: Record Keeping

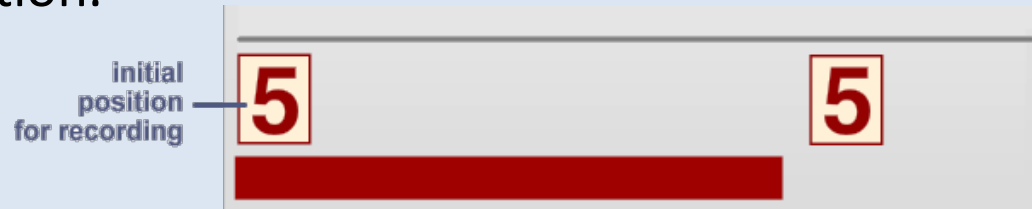


EXTENSION ACTIVITY 4.3.4

Building Conversion Game: Record Keeping

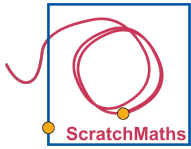
Continue in your **4-Conversion Game** project.

- ☐ Duplicate one of the sprites from the Display, rename it **record**. Delete all its scripts except the *setup script*. Modify its initial position.



- ☐ Extend the *setup script* of **record** by adding the **forever** block: **record** will always show the same costume as **input**.





MODULE 4: INVESTIGATION 3

Ext. Activity 4.3.4 – Building Conversion Game: Record Keeping



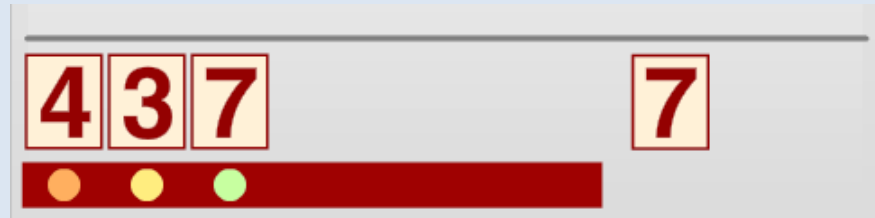
- ◆ What is the algorithm for the recording sprite? ?
- ◆ How do we find the position for the next stamp?



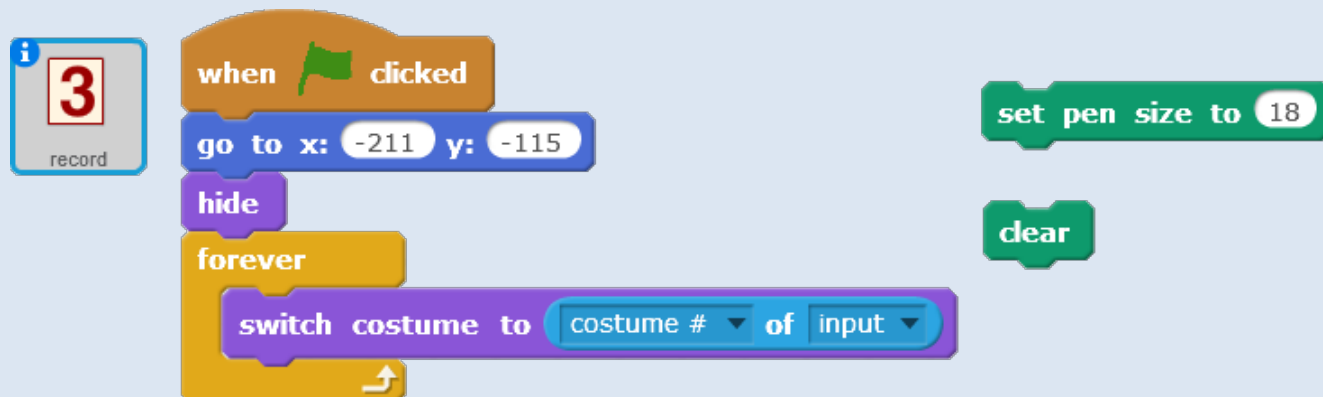
- ☐ The **record** sprite will react to the *record* message (broadcast by the **input** sprite) by **stamping** itself and jumping to the right by 46 steps. Build this *when I receive record* script.
- ☐ The **input** sprite will **broadcast record** whenever it has been dragged into one of the houses, before it runs **glide home**.

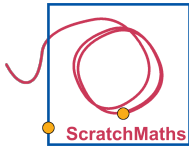
You may consider having the **record** sprite **hide** in its *setup script*.

Finally we want to add big colour dots below each stamp.



- If we want the **record** sprite to draw big dots, we have to first extend its *setup script* by setting its **pen size** and **clearing** the stage (so it will remove any previous dots and stamps...).





MODULE 4: INVESTIGATION 3

Ext. Activity 4.3.4 – Building Conversion Game: Record Keeping



◆ How could we solve the problem of keeping a record of the house colour the digit was dragged to? How does the recording algorithm change?



- ☐ The dots will be drawn by the **record** sprite itself: instead of reacting to one common *record*, it will react to three different messages *record orange*, *record yellow*, and *record green* from **input** – when it is dragged over the matching house.

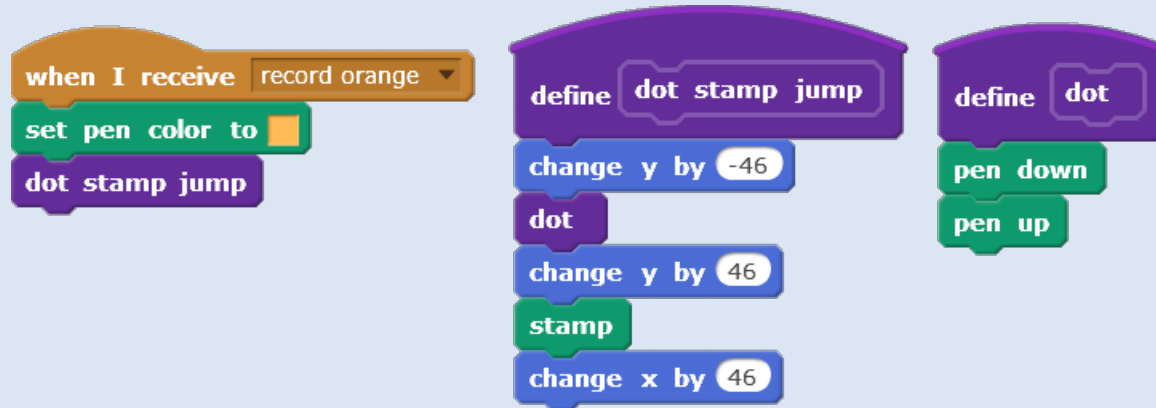
- ☐ Build similar reactions for *record yellow* and *record green*.

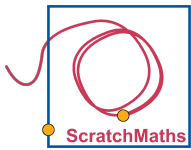
MODULE 4: INVESTIGATION 3

Ext. Activity 4.3.4 – Building Conversion Game: Record Keeping



- ☐ Are your scripts similar to the below?
Discuss any alternative solutions.





MODULE 4: INVESTIGATION 3

Ext. Activity 4.3.4 – Building Conversion Game: Record Keeping



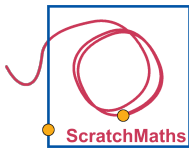
- ◆ What number would be displayed based on this record?



- ◆ And this one?



- ◆ Select a target number – can you explore and explain three different ways to build it?
- ◆ Is it possible to build 133 using only the input value 6? (use as many times as needed)
- ◆ Is it possible to build 201 using only the input values 7 and 9? (use as many times as needed)

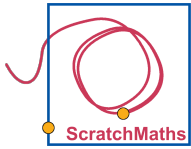


MODULE 4: INVESTIGATION 3



My **Investigation 3** check list:

- ☐ I explored how to generate different numbers by playing the conversion game on paper and explained how I generated specific numbers.
- ☐ **[Extension]** I built a display in Scratch that correctly increased in increments of 1, 10 and 100 by using my knowledge of place value.
- ☐ I explored different ways of generating the same target number within the conversion game.
- ☐ **[Extension]** I built scripts so my display would increase by the correct amount when I dragged my sprite over different coloured conversion houses.
- ☐ **[Extension]** I built a record keeping feature within my game.
- ☐ **[Extension]** I envisaged the display number from the record of digits and coloured dots.



MODULE 4 INVESTIGATION 3: Key Vocabulary



costume # ▼ of input ▼

is a sensing and reporter block that reports the specified value (e.g. costume #) of the specified sprite (e.g. input)