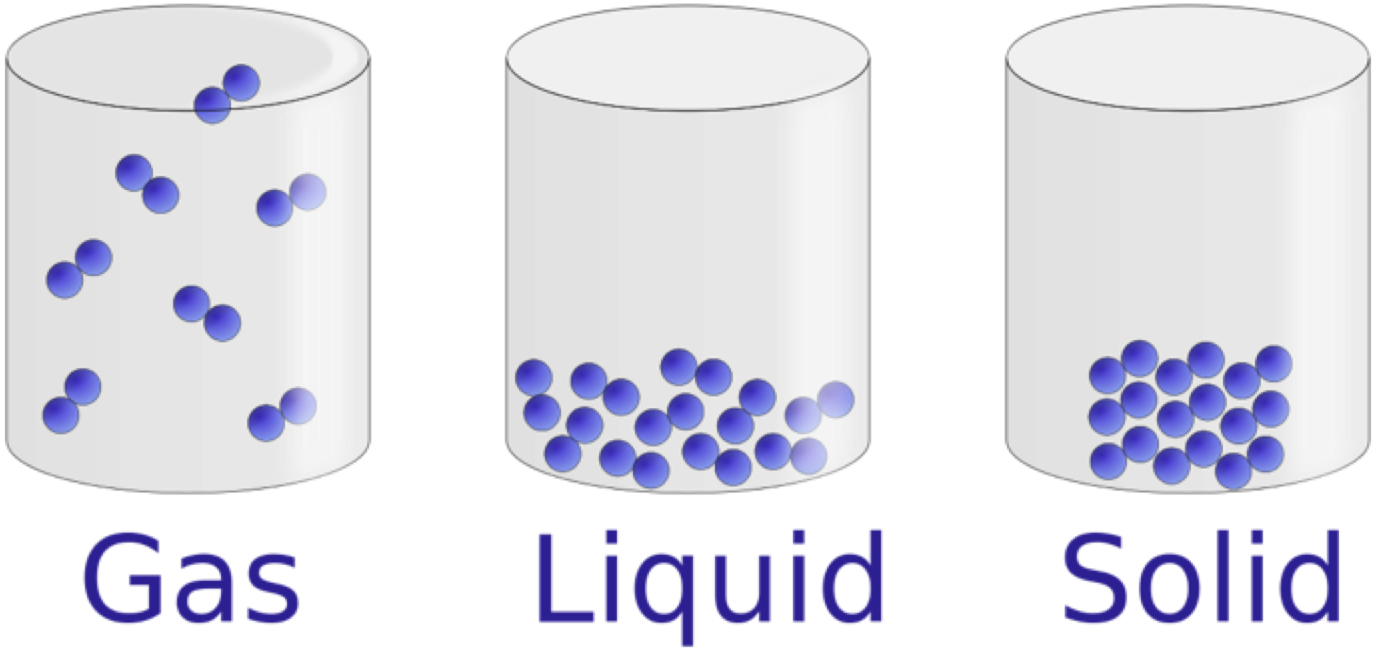
Properties of Matter

Warm Up

Can we identify an object by touch?

Mini-lesson

What properties do we use to identify an object?



Vocabulary

Match or define keywords in your workbook

- Solid
- Liquid
- Gas
- Matter
- State of matter

Checks for understanding

1. ***What are three possible states of matter?***

   A. Hot, cold and hard

   B. Solid, liquid and gas

   C. Marshmallows, a stick, paper

2. ***In your workbooks or with a partner, record, discuss, or share one example of an object that can change its state. Define whether the change is reversible or irreversible.***

Worked Example

Step 1.
Gather the equipment.

- Saucepan
- Chocolate

Step 2.
Observe the chocolate. *What are its material properties?*

Step 3.
Place the chocolate in saucepan.

Worked Example

Step 4.
Heat the chocolate.

Step 5.
Predict what will happen if cold temperatures are applied to the chocolate liquid.

Challenge 1

Step 1.
Drag the blocks to the workspace.

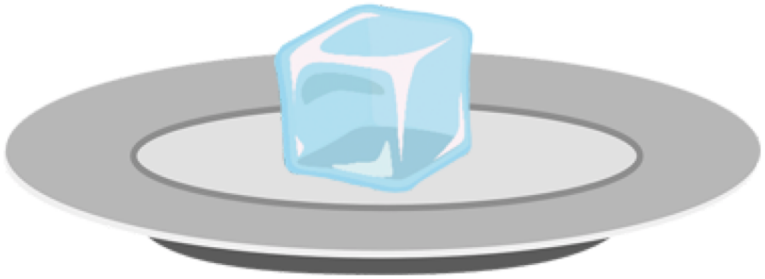
- Camera block
- Time trigger block x 5

Step 2.
Set the Time Trigger blocks.

Step 3.
Connect all Time Trigger blocks to the Camera block.

Challenge 1

Step 4.
Put an ice cube on a plate.



Step 5.
Point the camera at the ice cube.

Checks for understanding

1. ***What is applied to the ice cube to make it melt?***

   A. *A plate*

   B. *Warm temperatures*

   C. *Cold temperatures*

1. ***What will happen to the ice cube if it is put into the fridge as a liquid?***

   A. *Nothing*

   B. *It will reverse to a solid*

   C. *It will turn to a gas*

Challenge 1- Debug it!

Step 1.
Drag a Sound Player block onto the workspace.

Step 2.
Set the sound.

Step 3.
Connect all Time Trigger blocks to the Sound Player block.

Challenge 2

Step 1.

Turn on and pair:

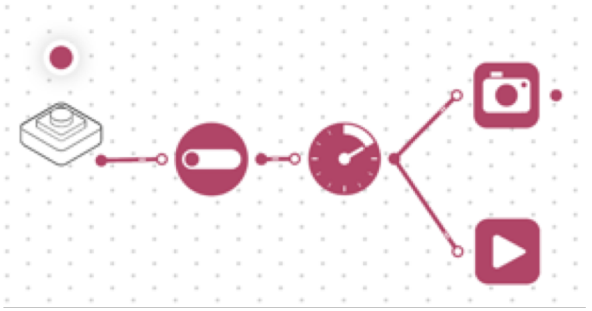
- Button/Virtual Button block

Drag the following blocks to the workspace:

- Toggle block
- Interval block
- Camera block
- Sound block

Step 2.

Connect the blocks in this order; Button block to Toggle block to Interval block and into both Camera and Sound Player blocks.



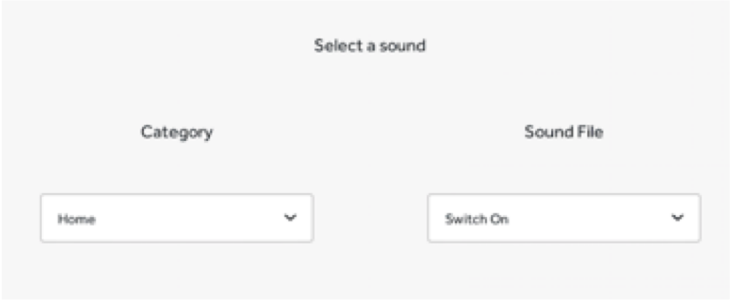
Step 3.

Set the Interval block.

Challenge 2

Step 4.

Set the Sound Player block to Category - Home and SoundFile - Switch On.



Step 5.

Place an ice cube on a plate. Note the changes as they occur.

Checks for understanding

1. ***What is the purpose of the Toggle block?***

   A. *To act as a switch to be on or off*
   B. *To take the picture*
   C. *To make the sound*

1. ***Why is this system more efficient?***

   A. *The system can be switched on and off*
   B. *The camera will continue to take pictures till it is switched off*
   C. *Both A and B*

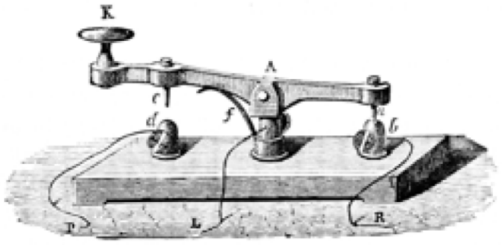
Tidy Up/Exit Ticket

✓ **Today I learned….**

Morse Code

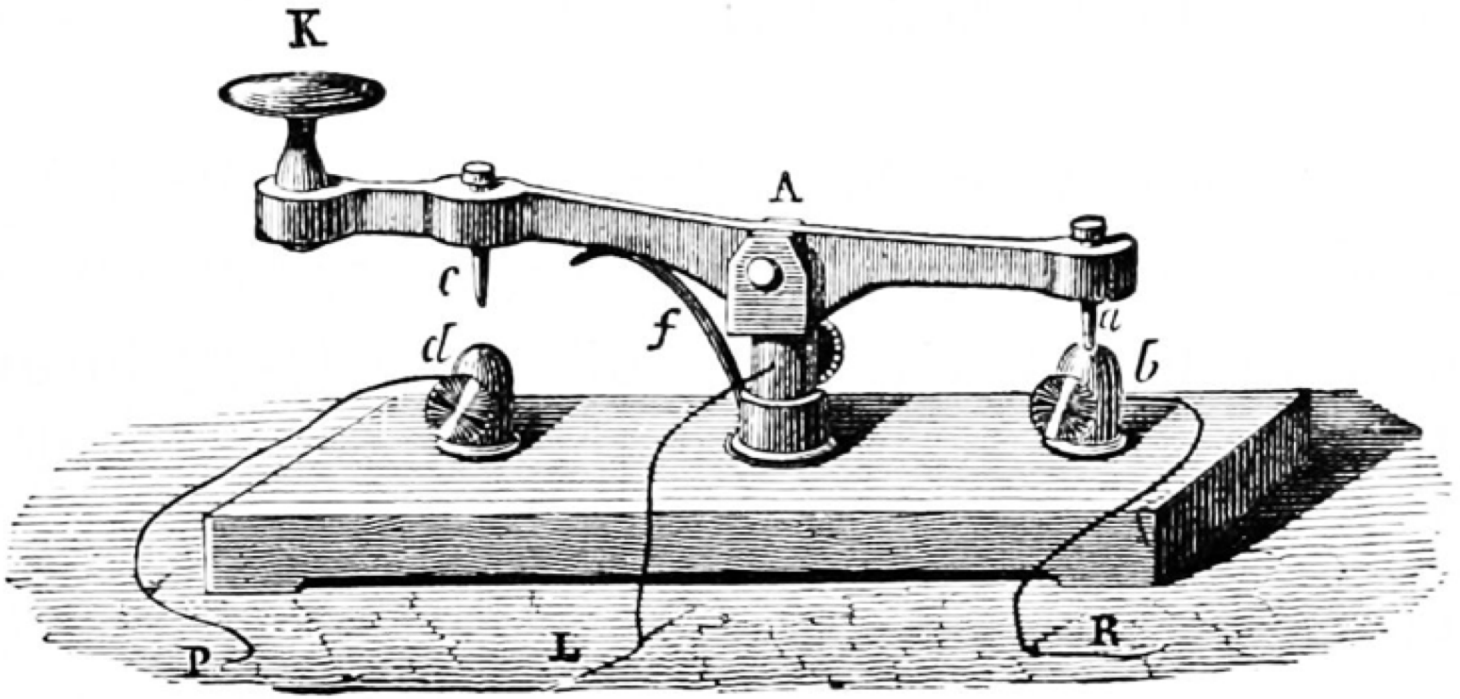
Warm Up

How has communication developed?



Mini-lesson

How was Morse Code innovative?



Vocabulary

Match or define keywords in your workbook

- Morse
- Dot
- Dash
- Telegraph
- Communication

Checks for understanding

1. ***How did Morse represent letters with buzzes?***

   A. *With different dots*

   B. *With a different combination of dots and dashes for each letter*

   C. *Using dotted letters*

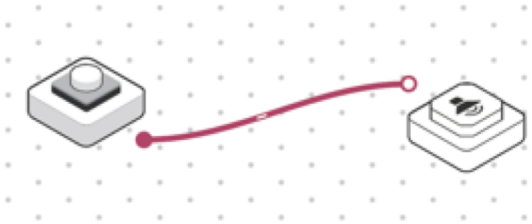
1. ***In your workbooks or with a partner, record, discuss, or share one reason why Morse Code was innovative.***

Worked Example

Step 1.

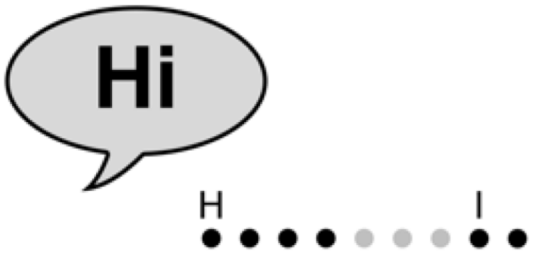
Turn on and pair:

- 1 Buzzer/Virtual Buzzer block
- 1 Button/Virtual block



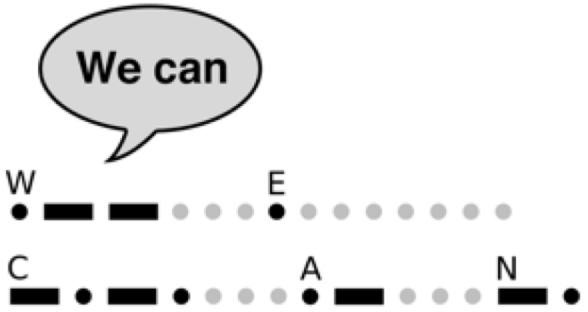
Step 2.

Send the message 'Hi'.



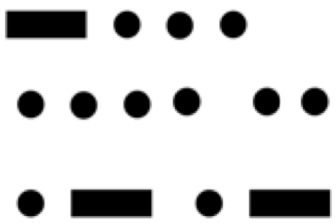
Step 3.

Now send a short phrase of 2 - 3 words like ‘We can’.

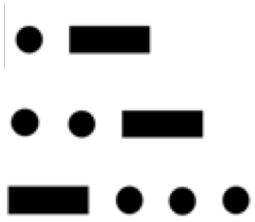


Checks for understanding

1. *What is Morse Code for “Hi”?*



2. What is the letter “A” in Morse Code?



A.

Challenge 1

Step 1.

Drag the following blocks on the workspace:

- Text block
- Morse Code block

Connect them in this order: button to Text block, Text to Morse Code block, Morse to Buzzer block.

Step 2.

Access the settings of the Text block and enter the word ‘Hi’.

Step 3.

Test your system.

Checks for understanding

1. ***What is the purpose of the Text block?***

   A. *To send a text message*

   B. *To add the Morse Code*

   C. *To add the text you want sent through*

1. ***What is the purpose of the Morse Code block?***

   A. *To receive a Morse Code message*

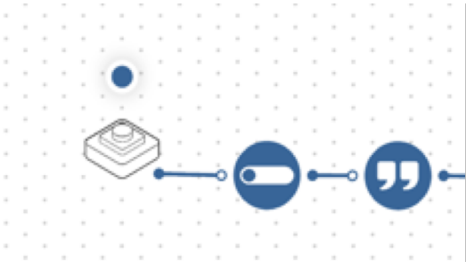
   B. *To translate the text sent into Morse Code to transmit*

   C. *To add the dots and dashes to*

Challenge 1- Debug it!

Step 1.
Drag on and add a Toggle block.

Step 2.
Connect the Toggle block between the Button block and the Text block.



Step 3.
Test your system.

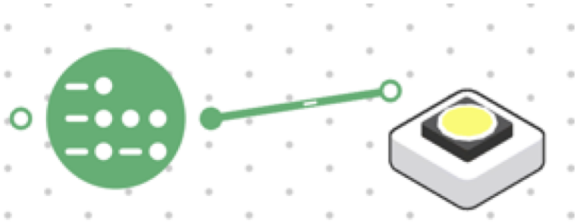
Challenge 2

Step 1.
Turn on and pair:

- RGB LED

Drag it onto the workspace.

Step 2.
Add the RGB LED to the output of the Morse Code block.



Step 3.
Change the color of the RGB LED.

Challenge 2

Step 4.
Test your system and code another message.

Checks for understanding

1. ***Which block is the input to the system?***
    A. *Toggle block*
    B. *Text block*
    C. *Button block*

1. ***Which block is the output to the system?***
    A. *RGB LED*
    B. *Buzzer block*
    C. *Both of the above*

Tidy Up/Exit Ticket

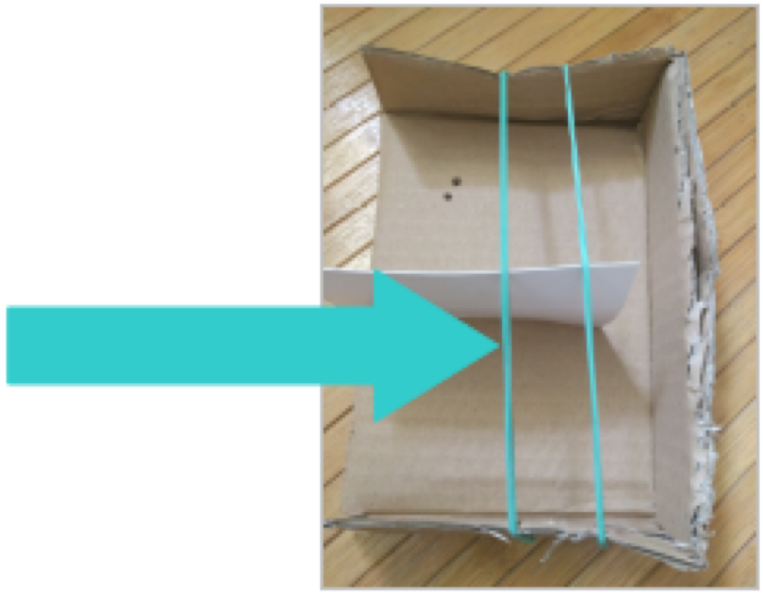
✓ **Today I learned….**

Guitar

Warm Up

Mini-lesson

How are stringed instruments designed to produce music?



Keywords

Match or define keywords in your workbook

- Strings
- Plucking
- Pitch
- Frequency
- Rub

Checks for understanding

1. ***Will the sound be lower or higher with a longer string?***

   A. *Lower*

   B. *Higher*

   C. *Depends on the instrument*

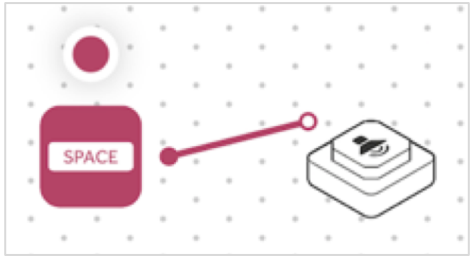
1. ***In your workbooks or with a partner, record, discuss, or share*** ***one example of how a stringed instrument is designed to produce a certain kind of music.***

Worked Example

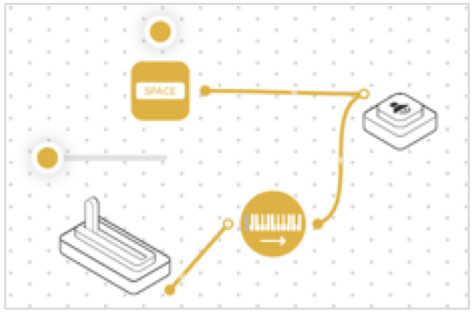
Step 1.

Turn on and pair:

- Buzzer/Virtual Buzzer block.
- Slider/Virtual Slider block.



Drag a Key Press block onto to the workspace and connect it to the Buzzer.



Step 2.

Drag a Note block onto the workspace. Connect the Slider to the Note block and the Note to the Buzzer block.

Step 3.

Test your system.

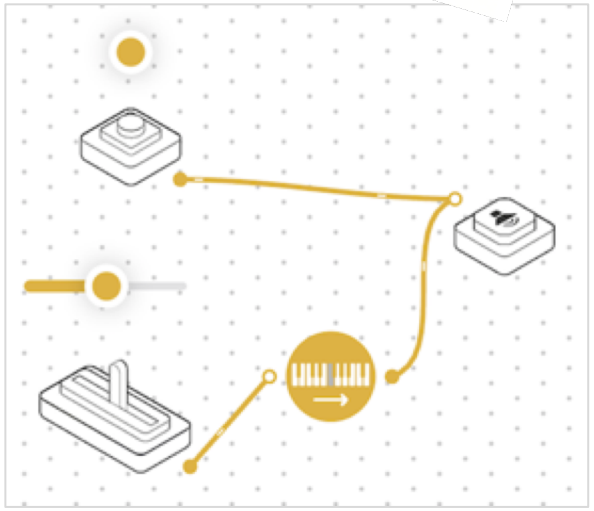
Challenge 1

Step 1.
Trace and cut out a guitar shape fror
cardboard or cardstock.

Step 2.
Turn on and pair:

- Button/Virtual Button block

Replace the Key Press with the Button.



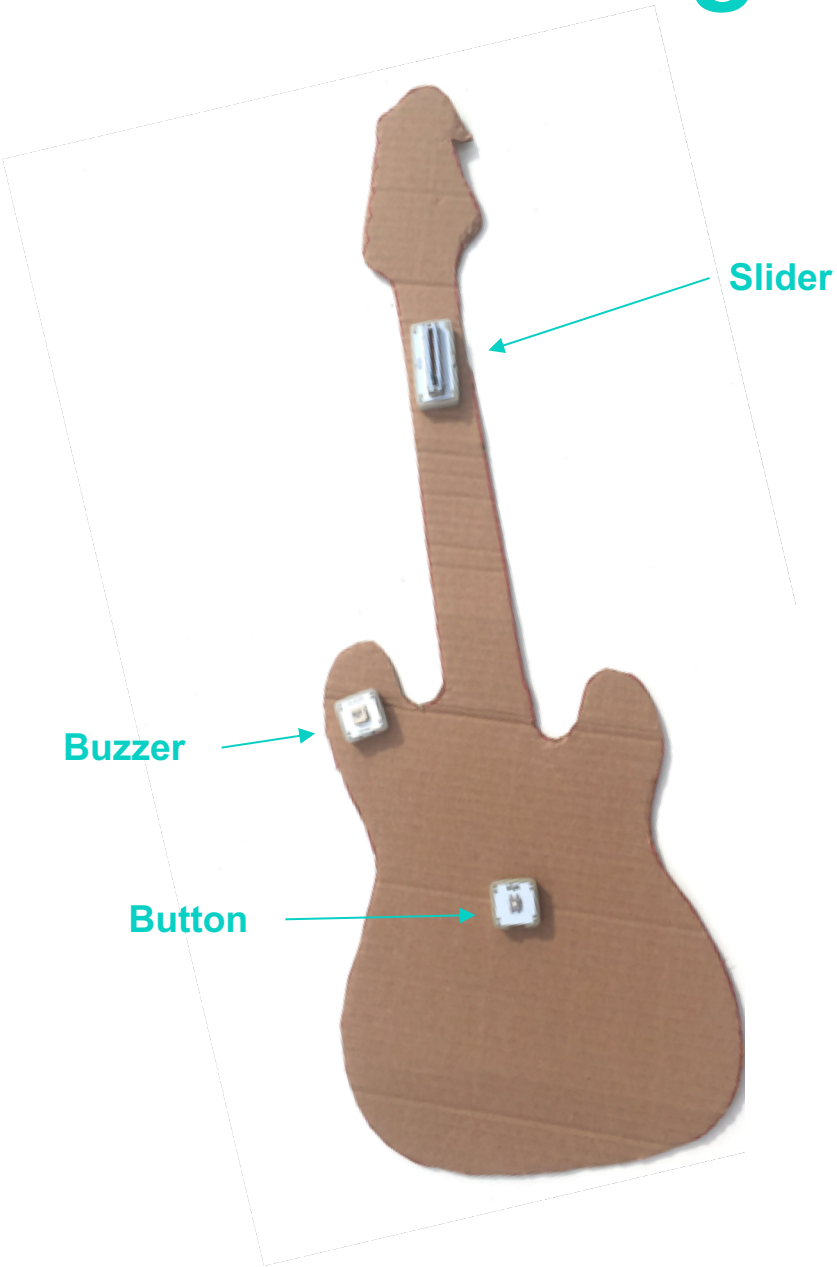
Challenge 1

Step 3.

Consider where to place the:

- Button
- Slider
- Buzzer

Blocks should be placed to emulate a real guitar.



Checks for understanding

1. ***How does the Slider emulate how a guitar is actually played?***

   A. *It plays the note*

   B. *It makes the sound louder or softer*

   C. *It makes the sound higher or lower*

1. ***How does the Key Press emulate how a guitar is actually player?***

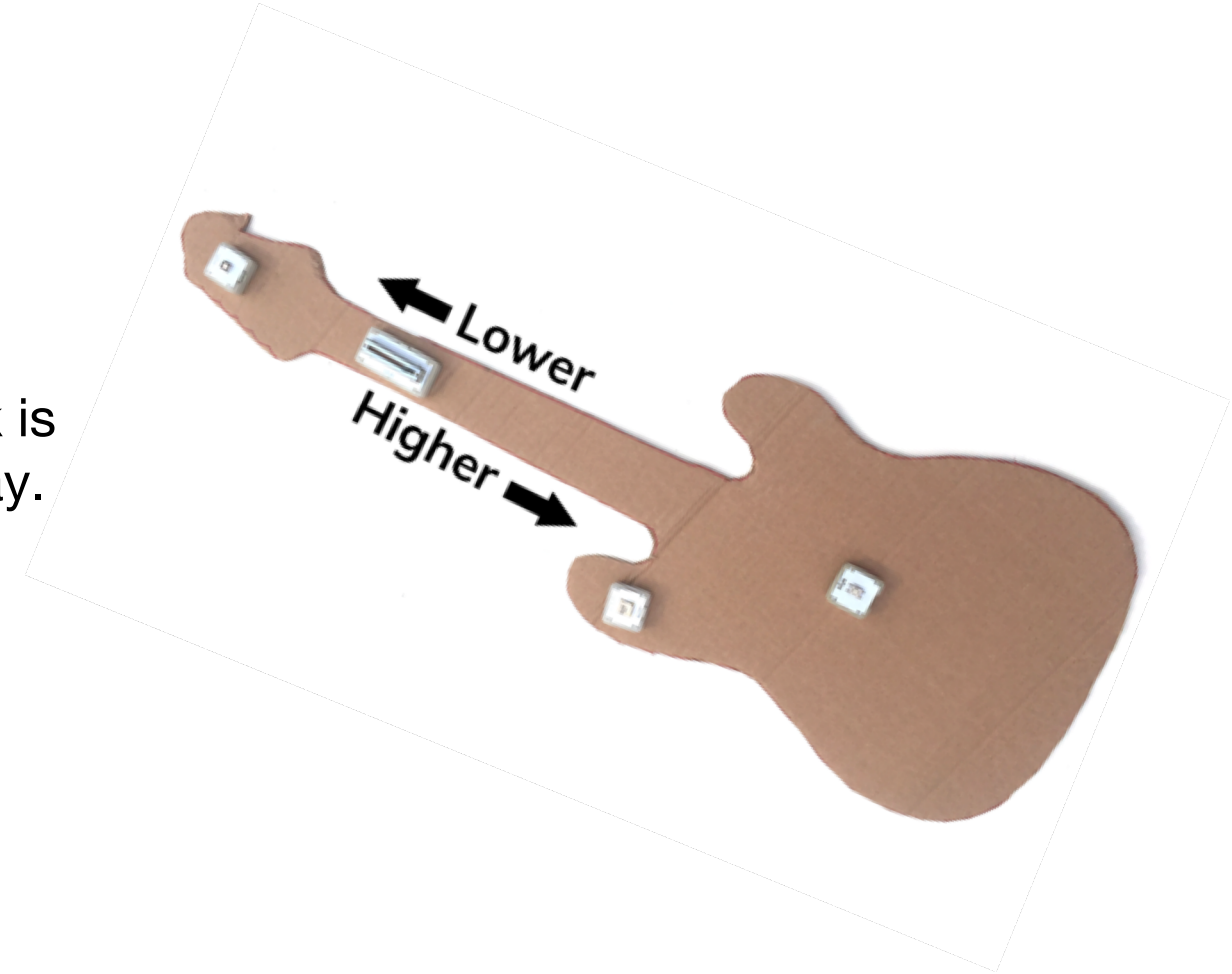
   A. *It plays the note*

   B. *It makes the sound louder or softer*

   C. *It makes the sound higher or lower*

Challenge 1 - Debug it

Step 1.
Ensure the Slider block is oriented the correct way.



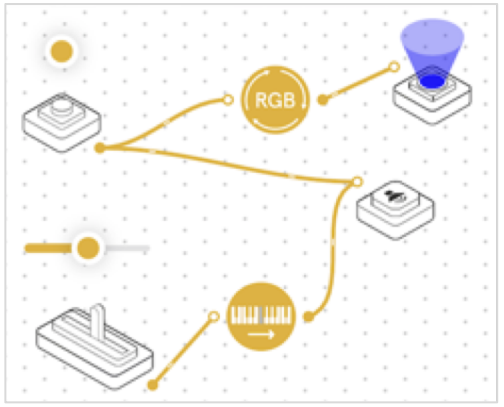
Challenge 2

Step 1.

Turn on and pair:

- RGB LED block

Add a Cycle Color block to the workspace. Connect the Cycle Colors block to the Button and RGB LED.

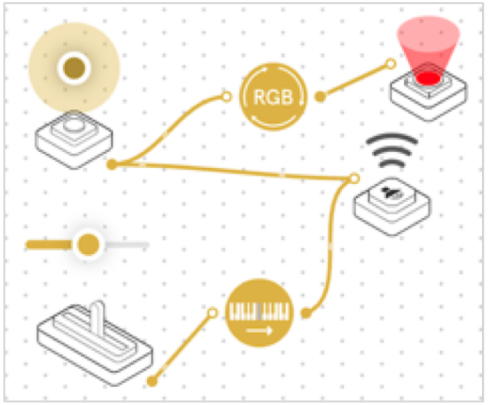


Step 2.

Secure the RGB LED on the neck of the guitar.

Step 3.

Test your system.



Checks for understanding

1. ***What does RGB stand for?***
    A. *Red, Grey, Blue*
    B. *Red, Green, Brown*
    C. *Red, Green, Blue*
2. ***What are the outputs now for the system?***
    A. *Buzzer block*
    B. *RGB LED*
    C. *A and B*

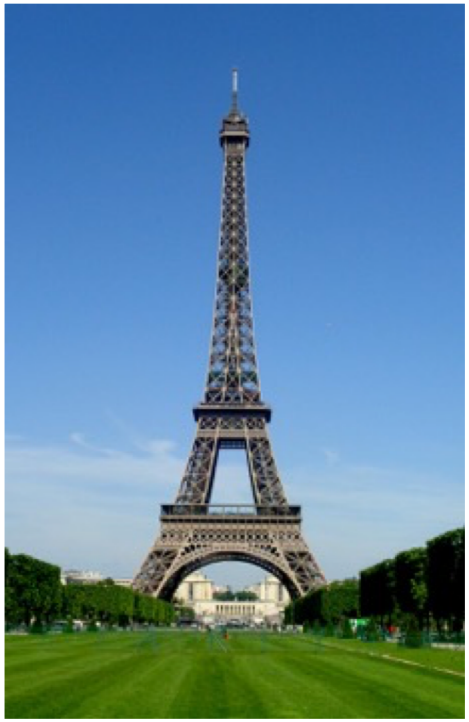
Tidy Up/Exit Ticket

✓ **Today I learned….**

Earthquake Simulator

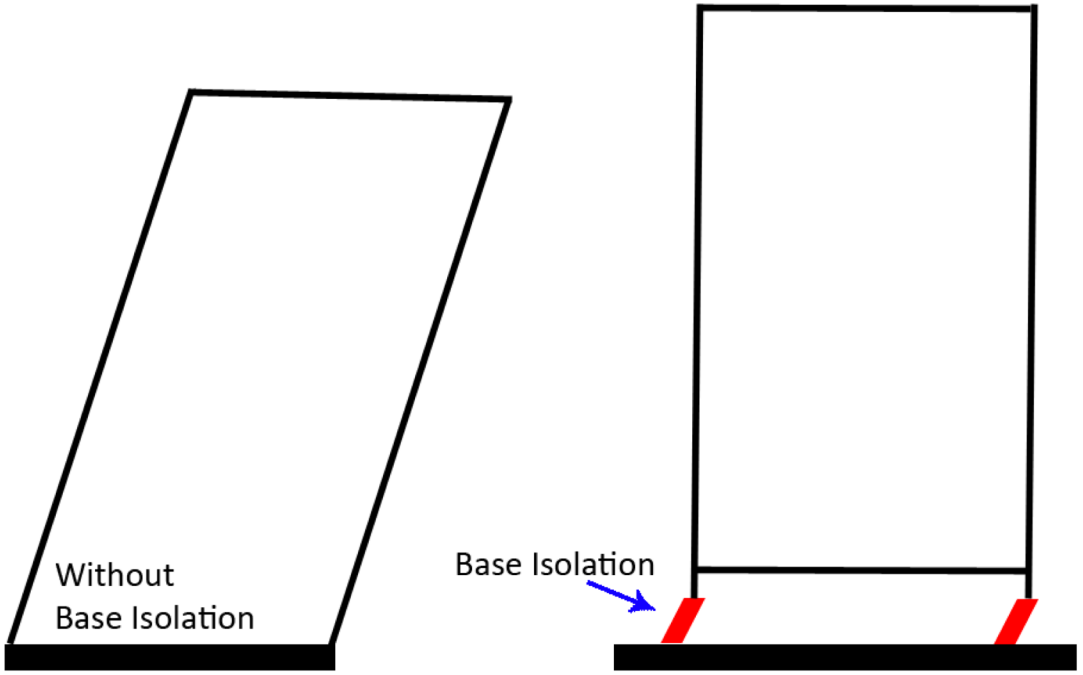
Warm Up

If an earthquake occurs, will these structures shake?



Mini-lesson

What is an earthquake?
How can we make a sound structure?



Vocabulary

Fill in the blanks in your workbook

- Tectonic
- Structure
- Earthquake
- Richter
- Isolation
- Crust

Checks for understanding

1. ***What is "Base Isolation"?***

    A. *Securing the base to the ground*

    B. *Isolating the building from others*

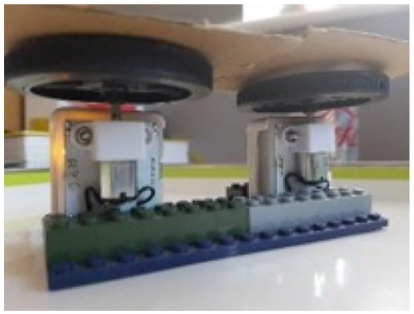
    C. *Isolate the building from the ground on shock like absorbers*

1. ***In your workbook or with a partner, record, discuss, or share how an earthquake's strength is measured and recorded.***

Worked Example

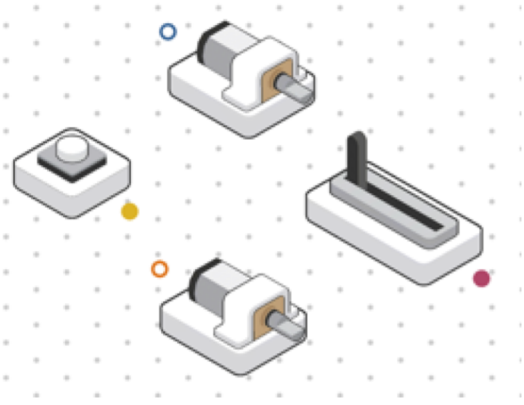
Step 1.
Use a sheet of cardboard and cut a zig zag line down the middle.

Step 2.
Attach the wheels to your DC Motor blocks and secure to a Lego base. Fix the cardboard to the top of the wheels.



Step 3.
Turn on and pair:

- 2 x Motor Blocks
- 1 x Slider/Virtual Slider Block
- 1 Button/Virtual Button block



Add them to the workspace.

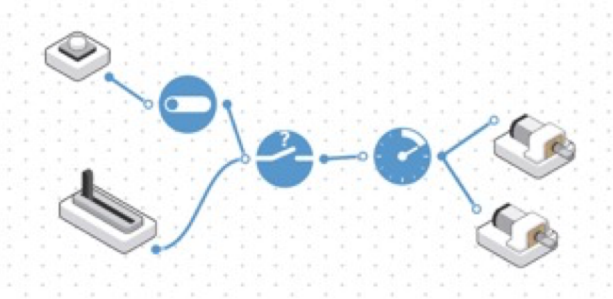
Worked Example

Step 4.
Drag the following blocks onto the workspace:

- 1 x Toggle block
- 1 x Switch block
- 1 x Interval block

Step 5.
Connect the blocks together in this order;

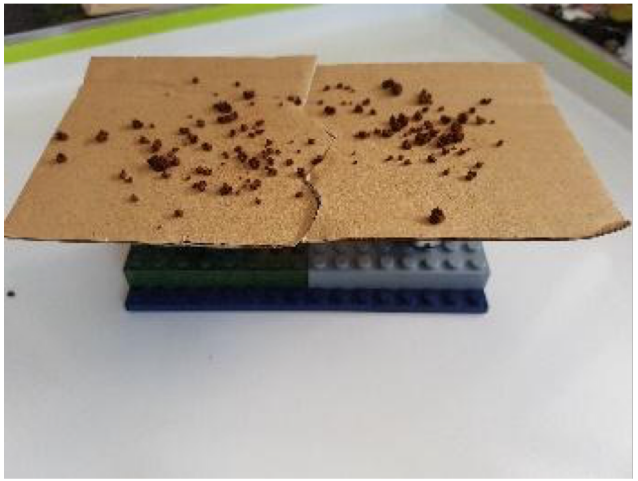
- Key Press block to Toggle block to Switch block.
- Slider block to Switch block
- Switch block to Interval block to both DC Motor blocks



Step 6.
Open the Switch block settings and choose ‘Slider’ from the drop down menu.

Worked Example

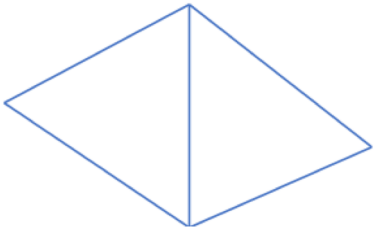
Step 7.
Place a substance on top of your cardboard ‘tectonic plates’



Step 8.
Test your system.

Challenge 1

Step 1.
Plan the structure out on paper.



Step 2.
Gather materials for your structure.
You may want to use straws and blu tack.

Step 3.
Construct a base to hold your structure in place.

Challenge 1

Step 4.
Using the straws, build the structure up and use blu tack at the joints.

Step 5.
Have a look at other group's structures. *How do they compare to yours?*

Checks for understanding

1. ***Why should we avoid using too much blu tack to hold the structure together?***

   A. *It won't look good*

   B. *It will make it too heavy*

   C. *It will make it too blue*

2. ***Why do we add joints to the structure?***

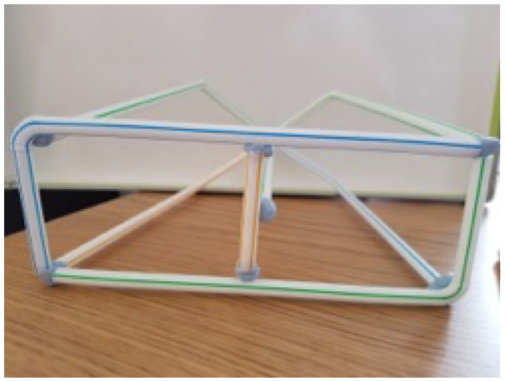
   A. *To help keep it stable*

   B. *To make it look good*

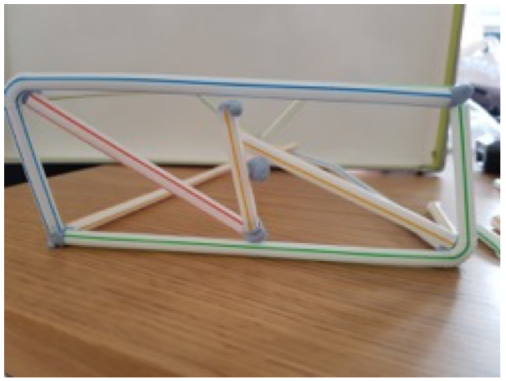
   C. *To make it look complicated*

Challenge 1- Debug it!

Step 1.
Look at the base and think about how to make it stronger



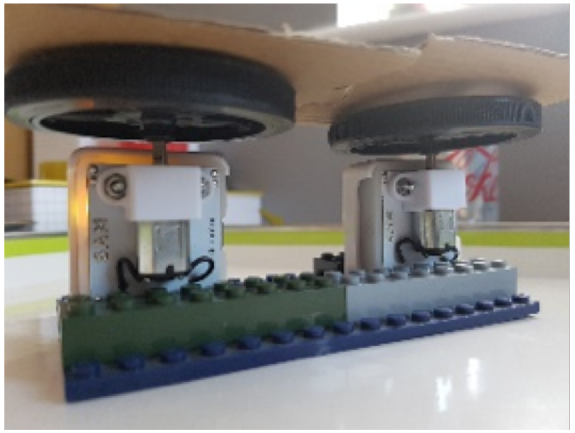
Step 2.
Add straws and blu-tack to your structure



Step 3.
Could your structure survive an earthquake? Test your system.

Challenge 2

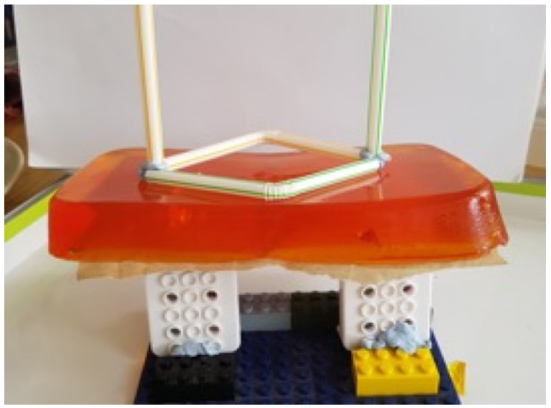
Step 1.
Set up the tectonic plates.



Step 2.
Add the jello to the top of the tectonic plates.

Challenge 2

Step 3.
Add your structure to the top of the jello



Step 4.
Start activating your Slider block

Step 5.
Whose will last the longest?

Checks for understanding

1. ***What was the purpose of the cardboard and the motors?***

   A. *To act as tectonic plates*

   B. *To act as tectonic plates and simulate an earthquake*

   C. *To hold the jelly in place*

1. ***Why did we use jello?***

   A. *We can eat it after*

   B. *It falls apart easy*

   C. *It will shake and show the earthquake effects*

Tidy Up/Exit Ticket

✓ **Today I learned….**

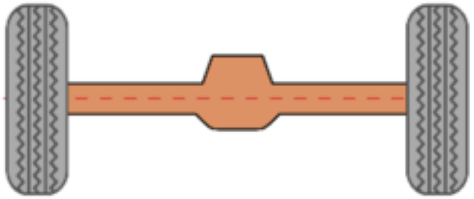
Mars Rover

Warm Up

What is the purpose of Mars Rover?

Mini-lesson

What steering capabilities does the Mars Rover need to fulfil its objective?



Keywords

Match or define keywords in your workbook

- Design technology
- Tracked vehicle
- Exploration
- Rocker-bogie suspension

Let's Discuss

1. ***How does the design of Mars Rover help it to achieve its main objective?***

   A. *The Rover is designed with specific technical capabilities to help it to fulfil its purpose*

   B. *The Rover is designed to be state of the art*

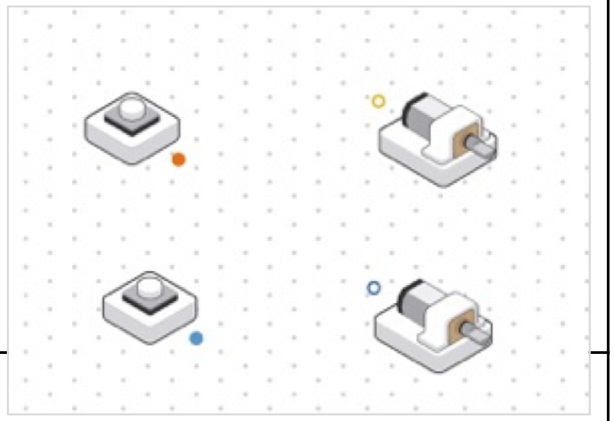
   C. *The Rover can only be designed one way to fulfil its purpose*

2. In your workbooks or with a partner, sketch out key the steering system in a car versus that of Mars Rover. What are the key differences?

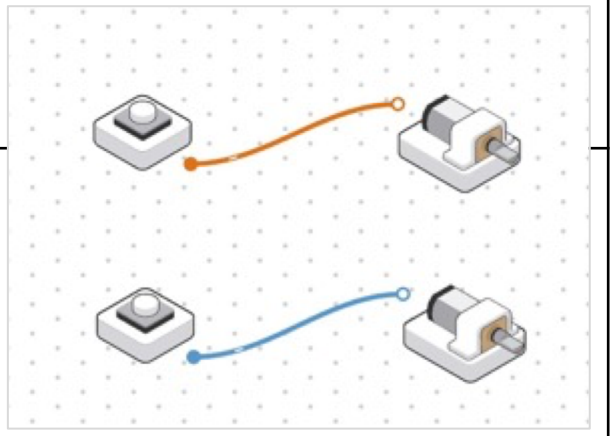
Worked Example

Step 1.
Turn on and pair:

- 2 DC Motors
- 2 Button blocks

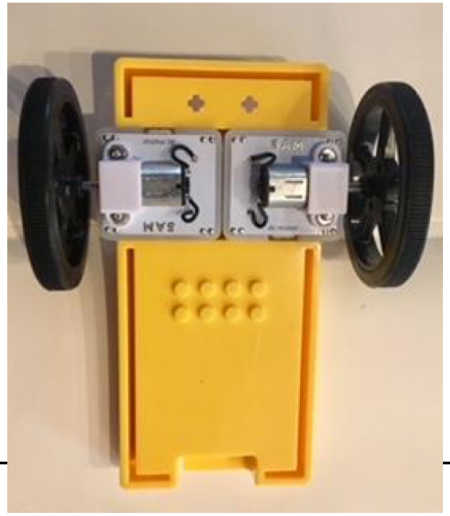


Step 2.
Drag them onto the workspace.
Connect each Button to one Motor.

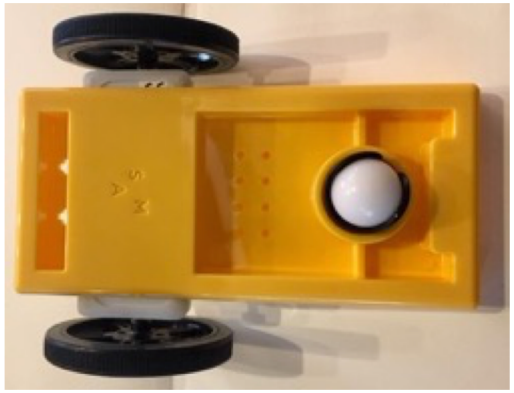


Step 3.
Test your system

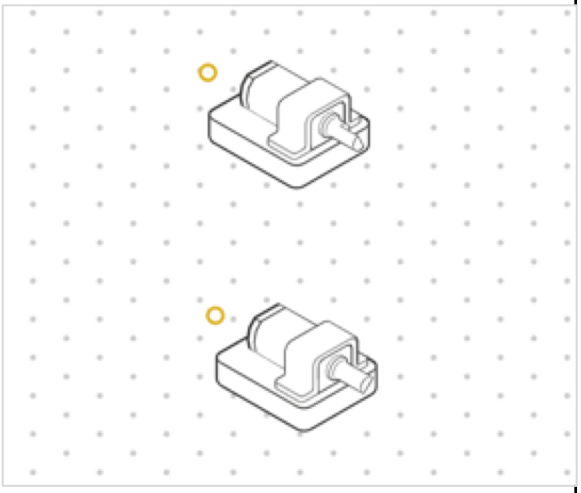
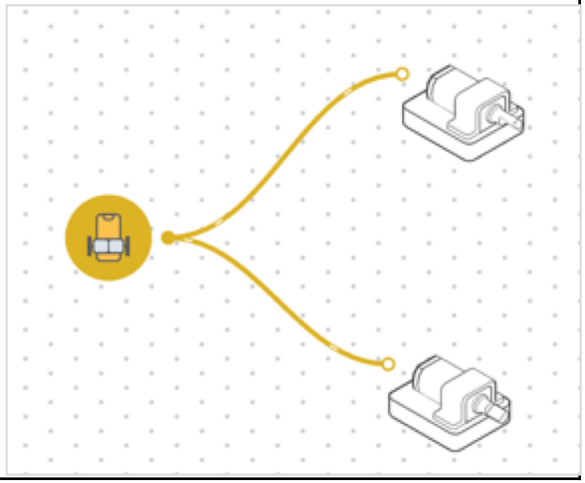
Challenge 1

Step 1. Connect the wheels to the Motors. *Be sure to match the flat part of the wheel with the flat part of the axel.*	
Step 2. Fit the DC motors into the yellow car chassis	

Challenge 1

Step 3. Turn the car over and add the roller. Then, find some floorspace to test your Rover.	
Step 4. Hold one Button in each hand. Press down both Buttons simultaneously to drive the Rover straight. **Step 5.** To turn the Rover right or left, press down one Button and then the other.	

Challenge 1

Step 7. Add the Car Controller block to the workspace connect it to the Motors.	
Step 8. Use your device to make the Rover drive straight, right and left.	

Checks for understanding

1. ***What is the purpose of the Buttons in the first Rover design?***

   A. To regulate the speed of the Rover.

   B. To replicate traditional steering as with a car.

   C. To replicate specialised tracked steering.

1. ***What are the outputs of both systems?***

   A. The Buttons

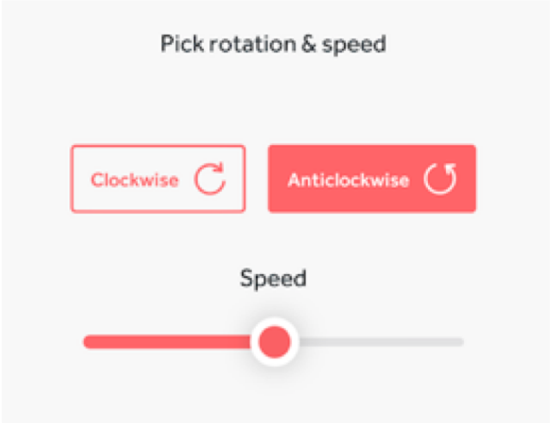
   B. The DC Motors

   C. Both

Challenge 1 - Debug it

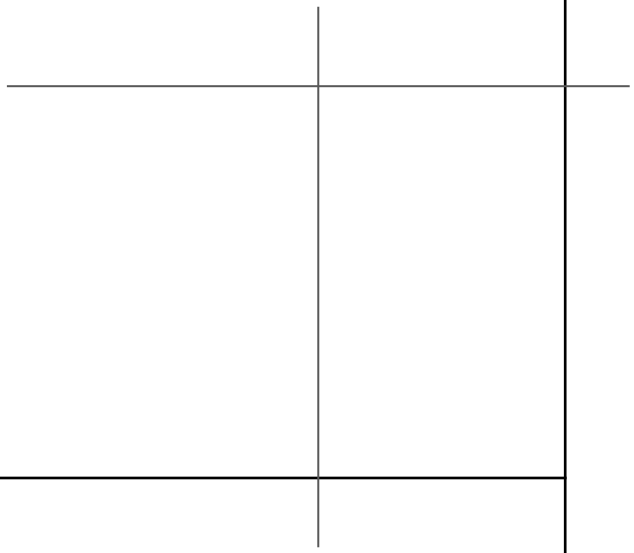
Step 1.
Using the Car Controller block to drive your Rover, open the settings and set the value to one that makes it easiest to maneuver accurately.

Step 2.
Using Buttons to drive your rover, open the Motor settings and modify the speed of the Motors so that the Rover doesn't move too quickly.



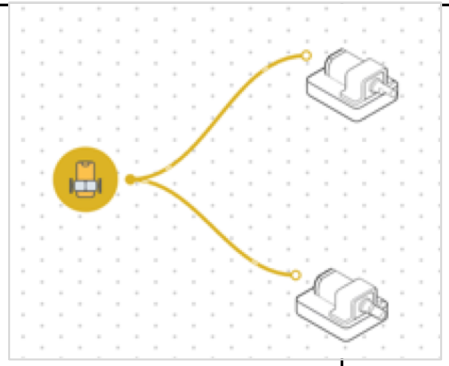
Challenge 1 - Debug it

Step 3.
Use a T-chart to compare and contrast both steering systems.
Which is design helps the Rover to accomplish its objective?

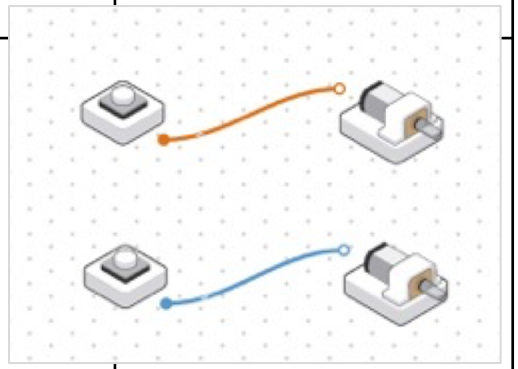


Challenge 2

Step 1.
Get into a small group.
Choose the design you think is most effective and build it.



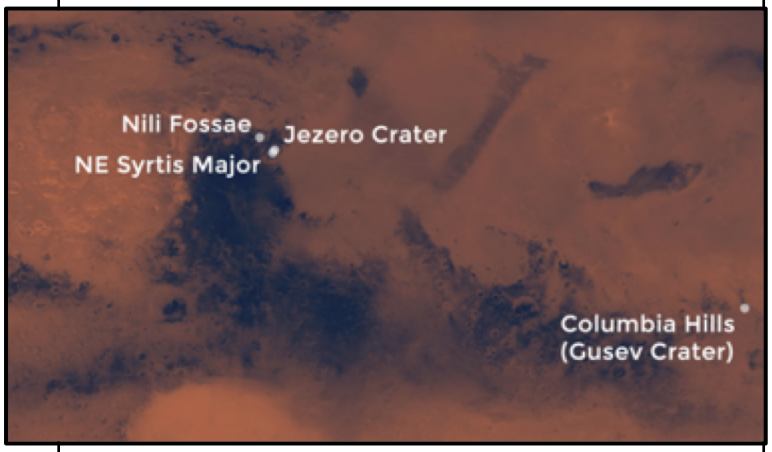
Step 2.
Assign group members one of the following tasks:



- ➔ ***Note-taker:***
  You take notes on what works and could be improved in the Rover's design
- ➔ ***Driver****:*
  You drive the Rover
- ➔ ***Checker****:*
  You ensure the Rover completes the task
- ➔ ***Timer****:*
  You time the mission

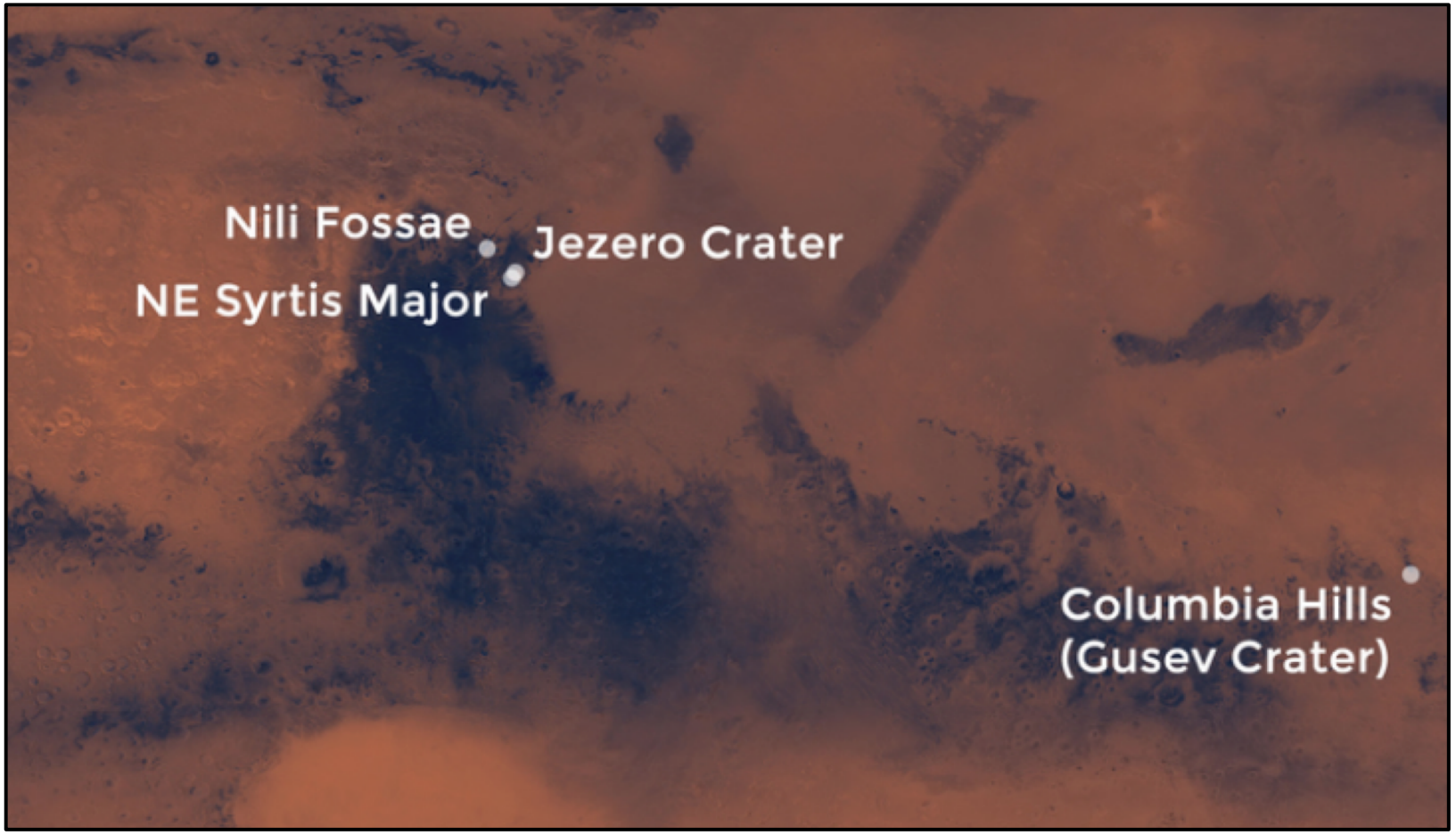
Challenge 2

Step 3.
Plan out the most efficient route between Columbia Hills, Jezero Crater, Nili Fossae and NE Syrtis Major.
Test it! Time your Rover.



Step 4.
Can you improve your time?
Can you add anything else to the Rover's design to improve it?

Challenge 2



Checks for understanding

1. ***What is the purpose of the Mars Rover?***
   A. *To set up a future human colony*
   B. *To measure the distance between Earth and Mars*
   C. *To explore the surface of Mars in order to discover evidence of life.*

1. ***What other input could you use to control the Rover?***
   A. *Key Press*
   B. *Light Sensor*
   C. *Both*

Tidy Up/Exit Ticket

✓ **Today I learned….**

The Lighthouse

Warm Up

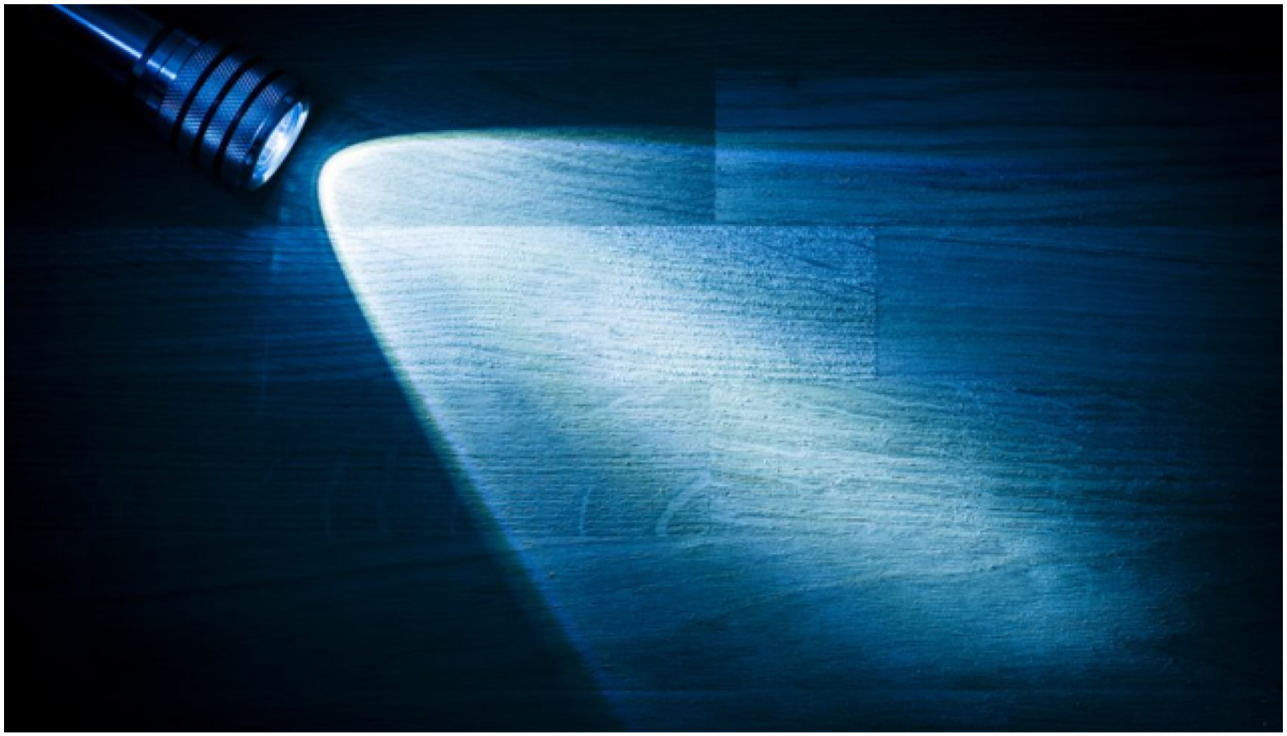
What happens first?

Reflect and Absorb

Which objects will reflect and which will absorb?

Mini-lesson

Can you 'bend' a light wave?



Keywords

Use these keywords to complete the sentences in your workbook.

- Light wave
- Reflect
- Absorb
- Smooth
- Shiny
- Dark
- Dull

Mini-lesson

You are going to be building a SAM Lighthouse using Lego bricks. Sketch your design in your workbook.

Let's Discuss

1. ***Why is it important for a Lighthouse to be a tall structure?***

   A. So it doesn't take up as much space

   B. So it is visible further out at sea

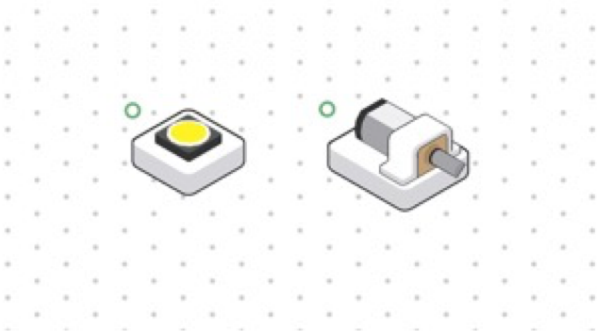
   C. So the SAM Lighthouse keeper can see the ships

***2. In your workbook or with a partner, record, discuss, or share* your Lighthouse design with a partner. Can they think of a way to help you improve it?**

Worked Example

Step 1.
Pair and add the following blocks to the Workspace:

- 1x DC Motor Blocks
- RGB LED block



Step 2.
Drag the following blocks onto the Workspace:

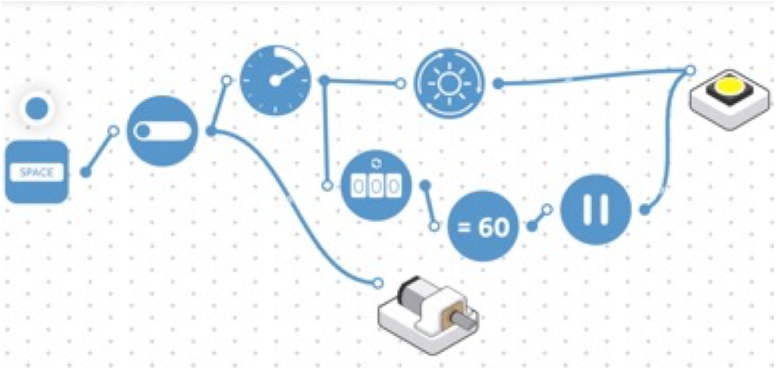
- Key Press block
- Toggle block
- Compare block
- Interval block
- Counter block
- Cycle Brightness block
- Hold block

Worked Example

Step 3.

Connect in the following order:

- Key Press block to the Toggle block.
- Toggle block to the DC Motor block and the Interval block.
- Interval block to the Cycle Brightness block, then to the RGB LED block.



Step 4.

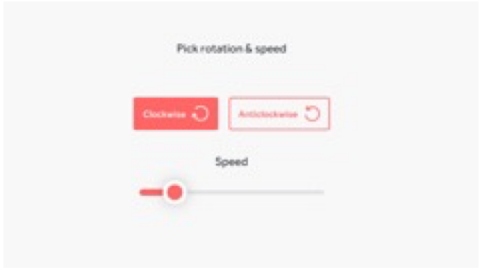
Connect in the following order:

- Interval block to the Counter block
- Counter block to the Compare block
- Compare block to the Hold block.
- Connect the Hold block to the RGB LED block.

Worked Example

Step 5.
Access the settings of the Light block and select a color. Ensure the brightness is at its highest setting.

Step 6.
Access the settings of the motor and lower the speed.



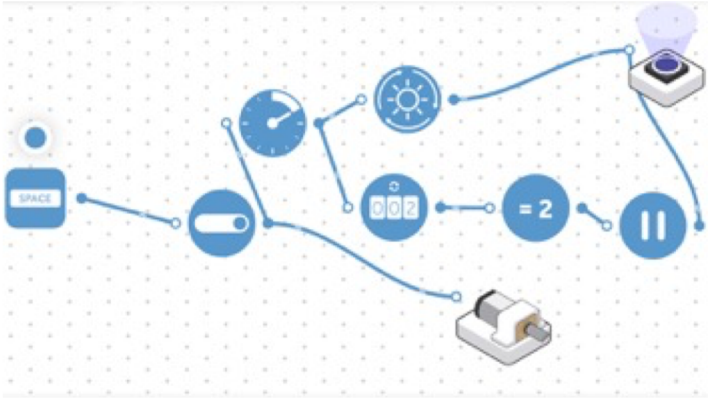
Step 7.
Access the settings of the Interval block. Set the interval to 750 milliseconds.

Worked Example

Step 8.
Access the settings of the Counter block and slide the counter down to 2. Ensure the ‘Restart’ option is selected.

Step 9.
Access the settings of the Compare block and select = 2

Step 10.
Test the system.

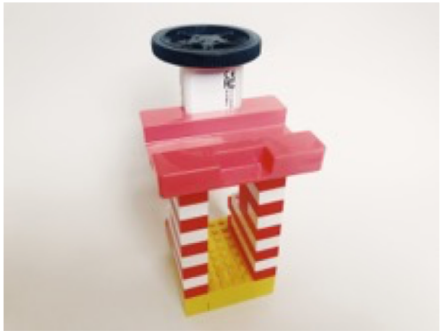


Challenge 1

Step 1.
Build the structure of the Lighthouse using Lego bricks.

Step 2.
Secure the Car Controller to the top of the structure.

Step 3.
Attach a wheel to the DC Motor block and secure the block into the space on the Car Controller.



Challenge 1

Step 4.
Use Blu tack to secure the Light to the wheel.

Step 5.
Secure a small mirror to the Car Controller using blu tack.

Challenge 1

Step 6.
Attach a second mirror to the back of the Lighthouse using blu tack.

Step 7.
Test the system.

Checks for Understanding

1. ***Why is it important the light flashes?***

   A. A flashing light makes the lighthouse seem taller

   B. A flashing light is visible from a greater distance

   C. A non-flashing light could be confused with the sun

1. ***Why will the mirrors increase the visibility of the light?***

   A. Because light reflects well off a shiny surface

   B. Because the mirrors made the Lighthouse bigger

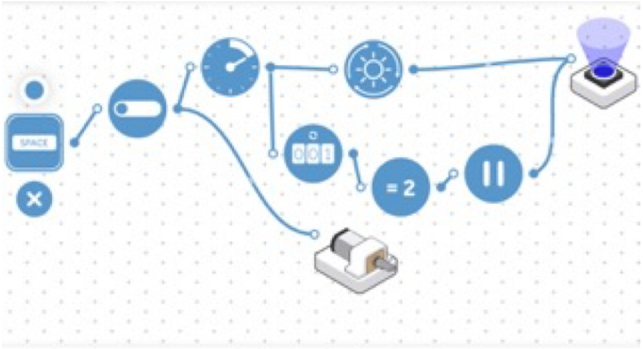
   C. Because the mirrors made the Lighthouse taller

Challenge 1 - Debug it!

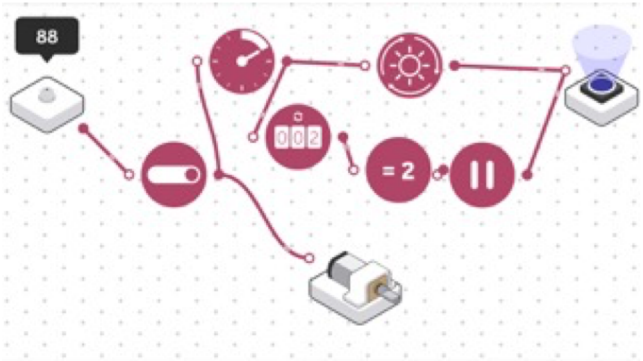
Step 1.
Turn on and pair:

- Light Sensor block

Step 2.
Delete the Key Press block from the system.

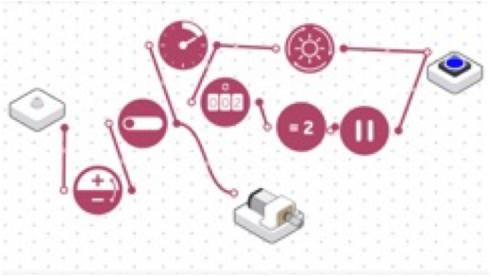


Step 3.
Connect the Light Sensor block to the Toggle block.



Challenge 1 - Debug it!

Step 4.
Drag an Inverse block onto the workspace and connect it between the Light Sensor and the Toggle blocks.



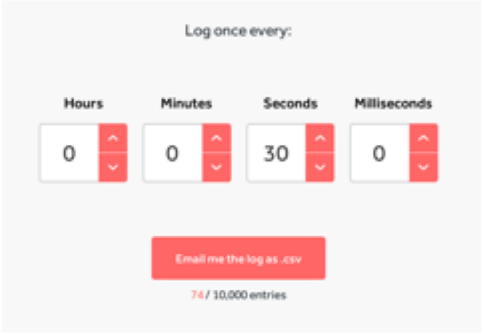
Step 5.
Place the Light Sensor block into the space at the front of the Car Controller.

Challenge 2

Step 1.
Drag a Log Findings block onto the workspace.

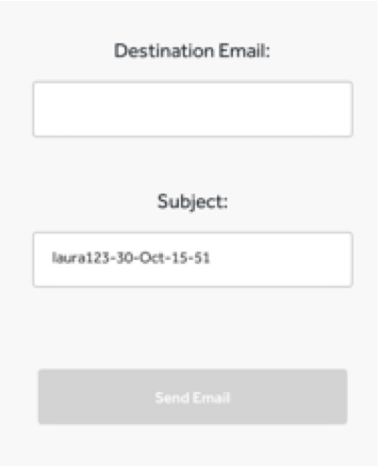
Step 2.
Connect the Log Findings block to the Light Sensor and RGB LED.

Step 3.
Access the settings of the Log Findings block. Change the timer so results are logged once every 30 seconds.



Challenge 2

Step 4.
Let the system run for a couple of minutes, then access the settings of the Log Findings block. Select the email function and enter a destination email address. Press ‘Send Email’ to send the stored data.



Step 5.
Retrieve the data from the given email address and download the findings.

log.csv

	A	B	C
1	date	module	value
2	10/30/2018 14:24:24	Light Sensor	43
3	10/30/2018 14:24:24	Light Sensor	40
4	10/30/2018 14:24:24	Light Sensor	42
5	10/30/2018 14:24:24	Light Sensor	38
6	10/30/2018 14:24:25	Light Sensor	35
7	10/30/2018 14:24:25	Light Sensor	32
8	10/30/2018 14:24:25	Light Sensor	30
9	10/30/2018 14:24:25	Light Sensor	26
10	10/30/2018 14:24:25	Light Sensor	24

Checks for Understanding

1. ***Why did we replace the Key Press block with a Light Sensor?***

   A. So we could attach the Light Sensor to the front of the Lighthouse

   B. So the Lighthouse came on automatically as it went dark

   C. To increase the visibility of the light

2. ***What would happen to the values of the Light Sensor if we built the system outside on a sunny day?***

   A. The values of the Light Sensor will increase

   B. The values of the Light Sensor will decrease

   C. The values of the Light Sensor will remain the same

Exit ticket

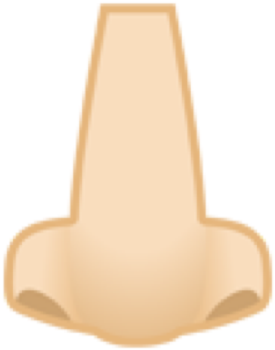
✓ **Today I learned…**

SAM Spider

Warm Up

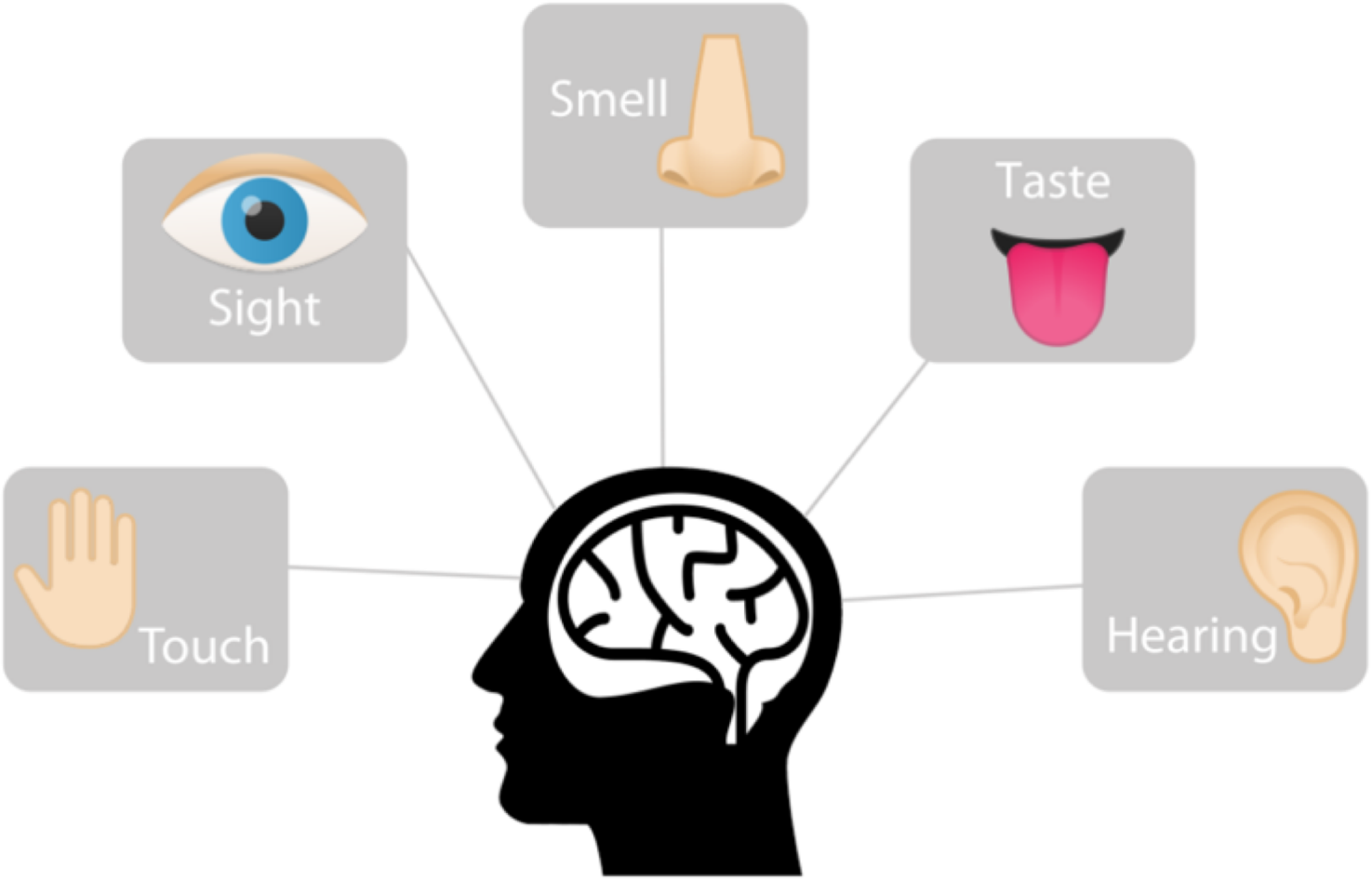
How does your body communicate information from one part to another?




Mini-lesson

Why do we have senses and how do they help us survive?



Keywords

Match or define keywords in your workbook

- Senses
- Brain
- React
- Sight
- Touch
- Smell
- Taste
- Hearing

Let's Discuss

1. ***Why do we need our senses?***

   A. *Work together to tell your brain what is happening around you*

   B. *Stop you eating vegetables*

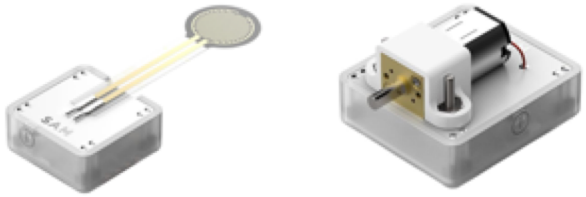
   C. *We don't need them really just part of our body*

2. In your workbook or with a partner, record, discuss, or share an example of how you would sense a change in the weather and how you would react to it.

Worked Example

Step 1.
Turn on and pair:

- Pressure Sensor block
- DC Motor block

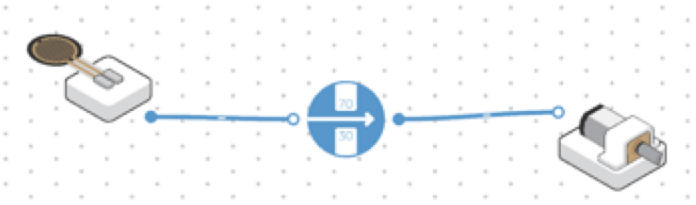


Step 2.
Drag the Pressure Sensor block and DC Motor block onto the workspace and connect them.

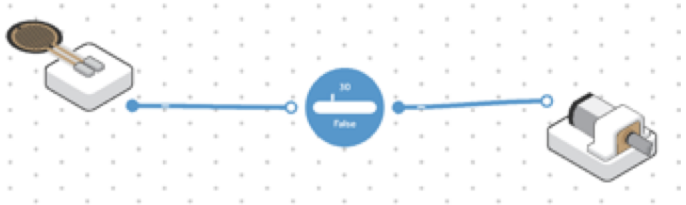
Step 3.
Drag on a Filter block to the workspace. Connect between the Pressure Sensor and DC Motor blocks.

Worked Example

Step 4.
Test your system

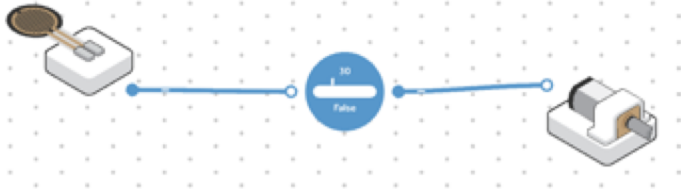


Step 5.
Swap the Filter block for a Threshold block.



Step 6.
Edit the settings of the Threshold block to 30.

Step 7.
Test your system.



Challenge 1

Step 1.
Cut 4 x pipe cleaners in half

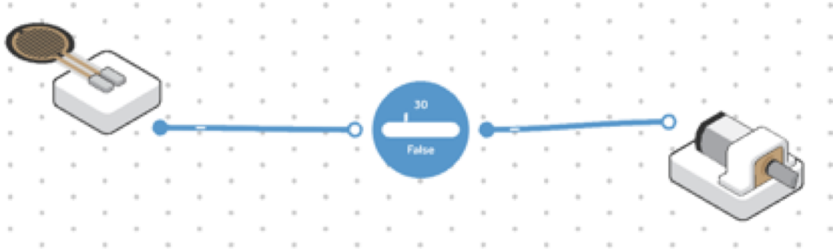
Step 2.
Attach the pipe cleaners to the Wheel.

Step 3.
Attach the DC Motor block to the Wheel.

Challenge 1

Step 4.
Bend the legs towards the table like a spider.

Step 5.
Test your system.



Checks for Understanding

1. ***What sense is the Pressure Sensor block simulating?***

   A. Sight

   B. Touch

   C. Hearing

2. ***What is the purpose of the Threshold block?***

   A. To set the top amount of pressure on the sensor

   B. To set no pressure on the sensor

   C. To set the starting amount of pressure on the sensor

Challenge 1 - Debug it!

Step 1.
Decrease the Threshold to 15.

Step 2.
Increase the Threshold to 75.

Challenge 2

Step 1.
Turn on and pair:

- Light Sensor block

Step 2.
Secure the Light Sensor block to the top of the spider on the Wheel.

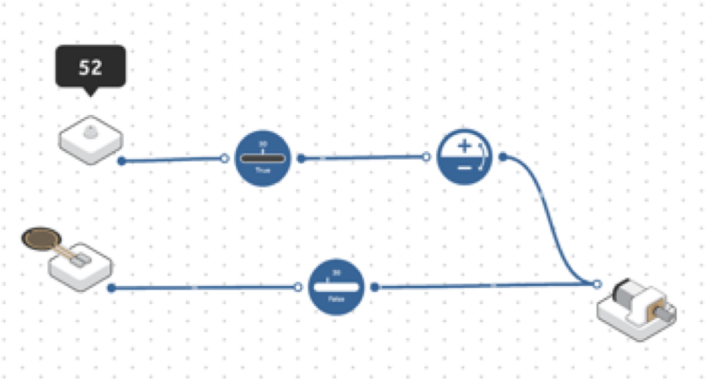
Step 3.
Drag on the following blocks to the workspace:

- Light Sensor block
- Threshold block
- Inverse block

Challenge 2

Step 4.
Connect the blocks in the following order:

- Light Sensor block to Threshold block
- Threshold block to Inverse block
- Inverse block to DC Motor block



Step 5.
Edit the settings of the Threshold block to 30.

Step 6.
Test your system.

Checks for Understanding

1. ***What sense has been simulated in challenge 2?***

   A. Sight

   B. Touch

   C. Hearing

2. ***What is the purpose of the Inverse block?***

   A. To speed up the movement of the DC Motor

   B. To switch the direction of the DC Motor

   C. To stop the movement of the DC Motor

Exit ticket

✓ **Today I learned…**

SAM Lava Lamp

Warm Up

What will happen if we mix them?

Mini-lesson

How can properties change?

Keywords

Match or define keywords in your workbook

- Solid
- Liquid
- Gas
- Substance
- Interaction

Let's Discuss

1. ***What happens when baking powder and vinegar are mixed?***

   A. Both B and C

   B. It creates a gas

   C. It creates carbon dioxide

2. In your workbook or with a partner, record, discuss, or share one example of other substances that can be mixed together to create a new substance.

Worked Example

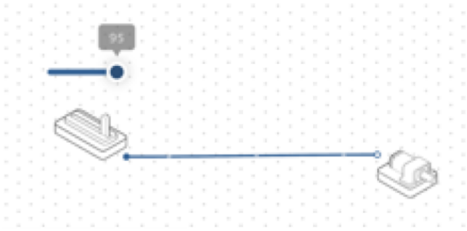
Step 1.
Turn on and pair:

- 1 Slider block
- 1 DC Motor

Step 2.
Connect the Slider block to the DC Motor block

Step 3.
Connect the wheel to the DC Motor

Step 4.
Move the Slider to increase the speed



Challenge 1

Step 1.
Using a plastic tub make a small hole in the end

Step 2.
Push the DC Motor through the hole and attach the wheel

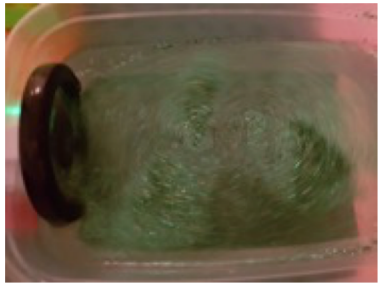
Step 3.
Add about an inch of water

Challenge 1

Step 4.
Use the system from the worked example

Step 5.
Add a lump of glitter to the water

Step 6.
Start the DC Motor by the Slider block



Checks for Understanding

1. ***What happens to the glitter when the DC Motor is started?***

   A. It sinks

   B. It blows away

   C. It mixes with the water

2. ***Which block is the output in the system?***

   A. Slider block

   B. DC Motor block

   C. Both

Challenge 1 - Debug it!

Step 1.

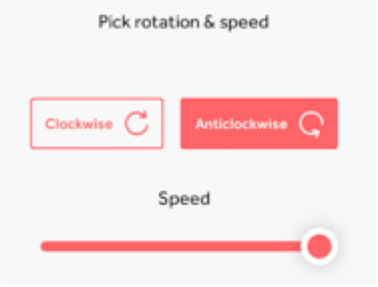
Turn on and pair:

- A Button/Virtual Button block

Drag a Toggle block to the workspace

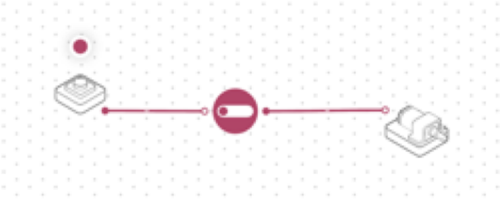
Step 2.

Open the Settings icon of the DC Motor and make sure speed at the maximum



Step 3.

Remove the Slider block. Replace it with the Button block into the Toggle block.



Challenge 2

Step 1.

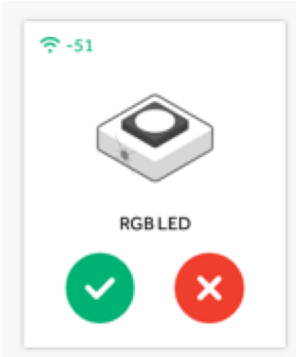
Drag on an Interval block and Cycle Colors block.

Step 2.

Turn on and pair:

- RGB LED

Add it to the workspace.



Step 3.

Connect the blocks from the output of the Toggle block in this order;

- Interval block to Cycle Colors block to RGB LED.
- Toggle block to RGB LED

Challenge 2

Step 4.

Create a base using the Car Chassis and Lego. Secure the DC Motor pointing up with the RGB secured to the wheel.

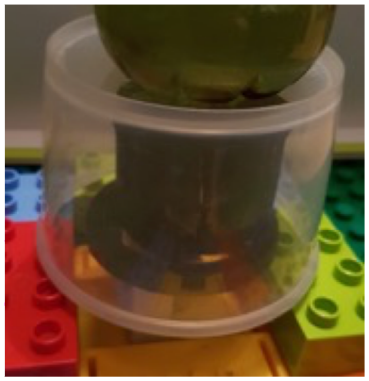
Step 5.

Collect a clear plastic bottle, water, vegetable oil, food coloring, alka-seltzer and a small plastic tub.

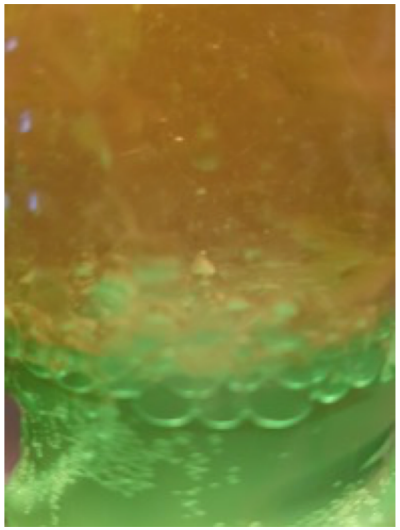
Step 6.

Add ⅓ water to ⅔ vegetable oil into the bottle and drops of the food coloring.

Challenge 2



Step 4.
Place the bottle on top of the plastic tub over the wheel of the DC Motor and add half an alka seltzer



Step 5.
Activate the system and see the bubbles generated and the light showcase it

Checks for Understanding

1. ***What causes the bubbles to start?***

   A. Vegetable oil

   B. Alka-Seltzer

   C. Key Press block

2. ***What does RGB stand for?***

   A. Red, Grey, Blue

   B. Red, Grey, Brown

   C. Red, Green, Blue

Exit ticket

✓ **Today I learned…**

Describing Expressions

Warm Up

What is an expression in mathematics?

- A description with numbers of a single situation
- 2 x 3 is an expression
- A way of using number and symbols to make a statement that can be applied to different situations
- 2 x a is an expression

Keywords

Match or define keywords at your table

- Expression
- Simplified
- Associative
- Distributive

Mini-lesson

Did you use parentheses?

Ben spent 15 minutes playing in his room and Tammy spent 18 minutes playing in her room. It took their dad three times as long to clean up their mess. Write an expression to show how long it took for their dad to clean their rooms.

Which of the expressions below most accurately models the scenario?

A. 15 + 18 x 3

B. (15 + 18) x 3

C. 15 + (18 x 3)

D. 3 x 15 + 18

E. 3 x (15 + 18)

Let's Discuss

1. ***Why are parentheses used in mathematics?***

   A. To indicate the order of operations

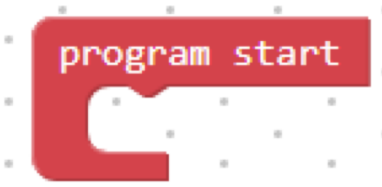
   B. To make mathematical expressions complicated

   C. Because grammar is important in math

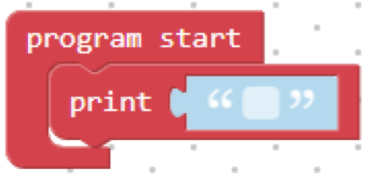
2. In your workbook or with a partner, record, discuss, or share one example of when parentheses are needed in mathematical expressions and when they are not.

Worked Example

Step 1.
Drag on the ‘Program Start’ block from the ‘General’ tab.



Step 2.
Drag on the ‘Print’ block from the ‘General’ tab and snap it into the ‘Program Start’ block.

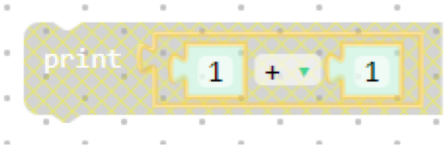


Step 3.
Click the empty space between the quotation marks to enter a text. Click “RUN” to see what will be displayed on the console.

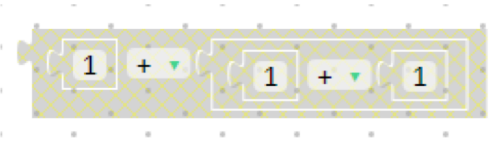
Worked Example

Step 4.
Drag on the ‘Print’ block from the ‘General’ tab onto the workspace.

Step 5.
From the ‘Math’ tab, drag on a '1+1’ block and connect into the ‘Print’ block’s empty space.



Step 6.
Duplicate the '1+1’ block and place it into the second space showing ‘1’. Place them both within the Print block.



Worked Example

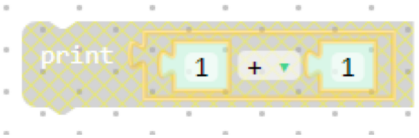
Step 7.

Modify the numerals and operands to display 3 + (2 x 2).

Challenge 1

Step 1.
From the ‘General’ tab drag a ‘Print’ block onto the workspace.

Step 2.
From the ‘Math’ tab, drag a '1+1’ block and connect into the ‘Print’ block.



Step 3.
Drag 2 further '1+1’ blocks onto the workspace and connect as shown.

Challenge 1

Step 4.

Modify the numerals to become an addition of two expressions: Stephen and John's pets.

Step 5.

Repeat the process, but this time make it the sum of Joanna x Stephen and Joanna x John.

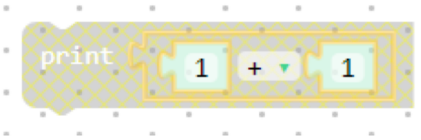
Step 6.

From the 'General' tab drag a new 'Print' block onto the workspace.

Challenge 1

Step 8.

From the ‘Math’ tab, drag a '1+1’ block and connect into the new ‘Print’ block.



Step 9.

Insert a second '1+1’ block into the second space. Modify the expression to become Joanna x (Stephen + John).

Checks for Understanding

1. ***How do we know these expressions are correct?***

   A. They describe the sentence properly

   B. We used parentheses

   C. We put the expression in the correct order

2. ***Why might mathematicians choose the expression from step 9, instead of the other ones?***

   A. It is quicker to write and use

   B. Pencils are expensive

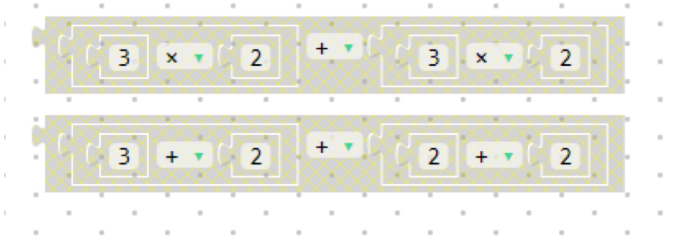
   C. They like to be awkward

Challenge 1 - Debug it!

Step 1.
Inspect the expressions to ensure that the operators are correct.

Step 2.
Ensure that the operands are arranged properly in the expression.

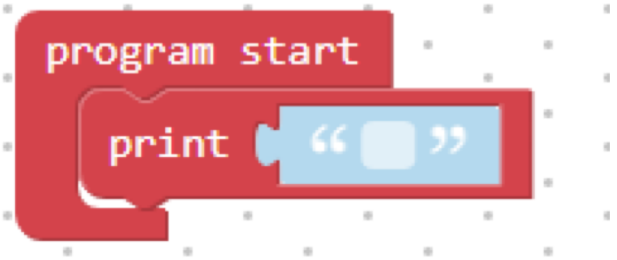
Step 3.
Test to see what would happen if operands or operators were mixed up.



Challenge 2

Step 1.

- Clear the workspace.
- From the ‘General’ tab, drag a ‘Program Start’ block and a ‘Print’ block onto the workspace.
- Connect the ‘Print’ block into the Program Start block.



Step 2.

Click the empty space between the quotation marks on the ‘Print’ block to enter text. Click “RUN” to see what will be displayed on the console.

```
Louise has 5 pieces of fruit. Diane has 7 pieces of fruit and Kalvin has 2 pieces of fruit. Write an expression to display this statement.
```

Challenge 2

Step 3.
Talk about what the statement means and suggest a number of ways it could be written.

Step 4.
Drag a Print block onto workspace add two Math Operator blocks with the space for three operands.

Checks for Understanding

1. ***Which block is essential for this program to run?***

   A. *The Program Start block.*

   B. *The Print block.*

   C. *The Operation block.*

2. ***How do you make sure statements stay together?***

   A. *You need to use the Glue block.*

   B. *You need to make sure they 'click' together properly.*

   C. *The expression is too big to go together.*

Exit ticket

✓ **Today I learned…**

Comparing Expressions

Warm Up

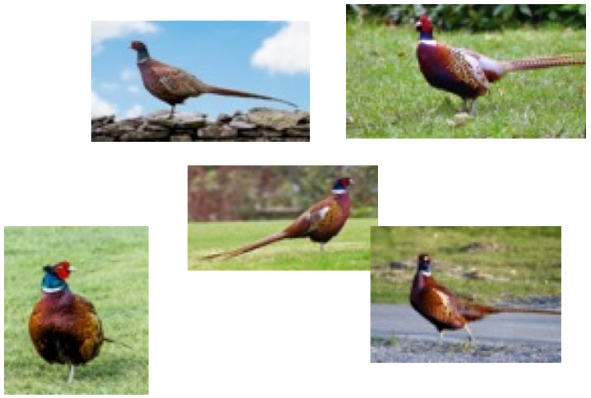
How do we evaluate something and why should we?

- An evaluation is an answer:
  - How did you like your meal?
  - Is that box too heavy?
  - What is 5 x 3?
- Expressions describe a comparison
- Evaluations give the result
- Results can be very important

Mini-lesson

How many in the expression?

James had 3 giant peaches, Charlie had 4 chocolate bars and Danny had 5 pheasants more than Charlie's and James' collections. Write an expression to show how many pheasants Danny had.



James has 3

Charlie has 4

Danny has 5 more than them

Danny has 3 + 4 + 5
Danny has 12 pheasants.

Keywords

Write a one-word synonym for the keywords in your workbook

- Equivalent
- Evaluate
- Operand
- Expression
- Operator

Let's Discuss

1. ***Why are parentheses so important?***

   A. The order of operations matters, sometimes.

   B. They make an expression look fancier.

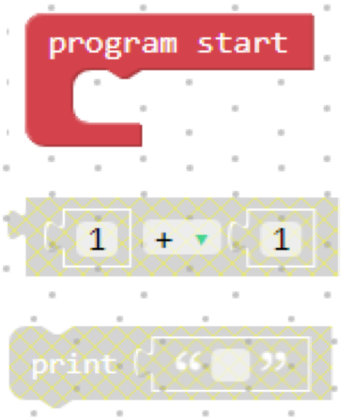
   C. You don't have to worry about the rest of the expression when you have them.

2. In your workbook or with a partner, record, discuss, or share… *The effect parentheses can have on expressions is…*

Worked Example

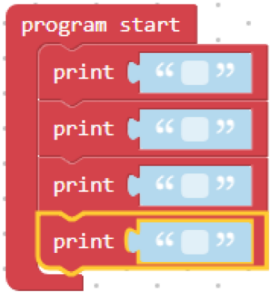
Step 1.

- From the ‘General’ tab; drag on the ‘Program Start’ block and ‘Print’ block;
- From the ‘Math’ tab, drag on the ‘1+1’ block



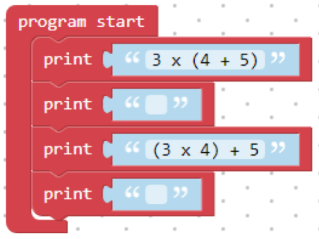
Step 2.

Duplicate the ‘Print’ block 3 times, by ‘Right-clicking’ the ‘Print’ block and choosing ‘Duplicate’, so you will have 4 ‘Print’ blocks in total. Snap them all into the ‘Program Start’ block.



Step 3.

Type the expressions you want to compare into the first and third print blocks. These are just examples.



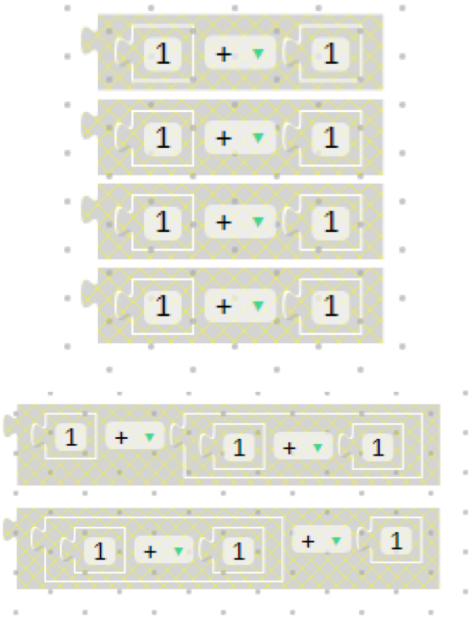
Worked Example

Step 4.

From the ‘Math’ tab, drag on 1 ‘1+1’ block and duplicate 3 times.

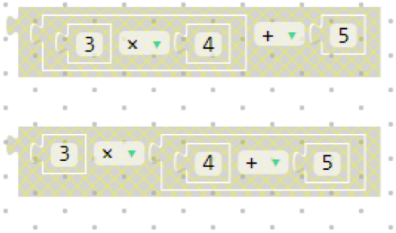
Step 5.

- Snap 1 of the ‘1+1’ blocks into 1st space of another of the ‘1+1’ blocks.
- Repeat this for the 2nd set of ‘1+1’ blocks but into the 2nd space.



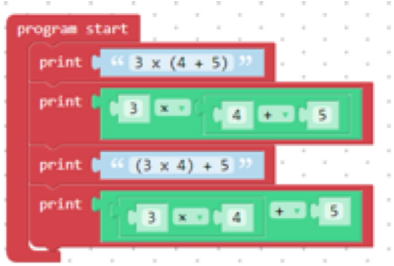
Step 6.

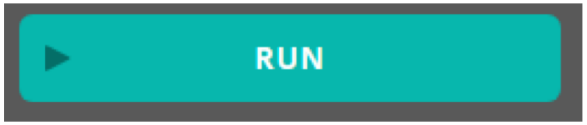
Modify the numerals and the operator in the ‘1+1’ block to match the expressions that have been entered into the ‘Print’ blocks.



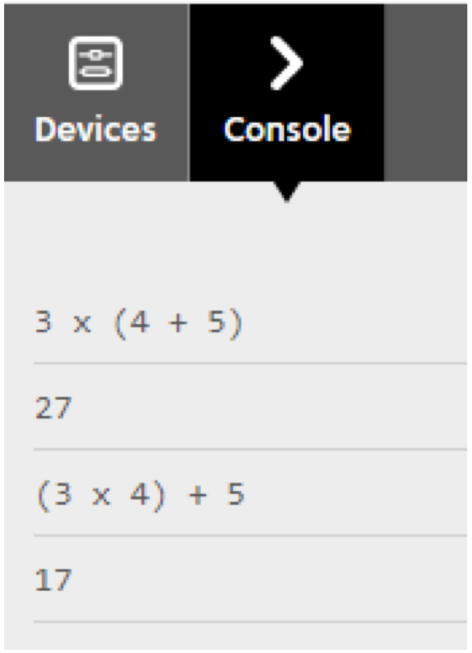
Worked Example

Step 7.
Snap them in to the correct, empty, ‘Print’ block.



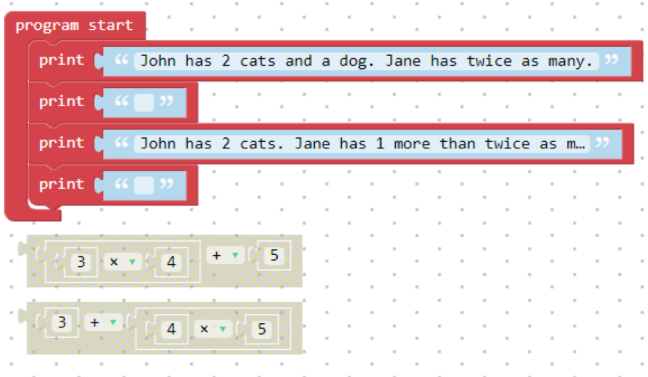


Step 7.
Click “RUN” to see the results in the console.

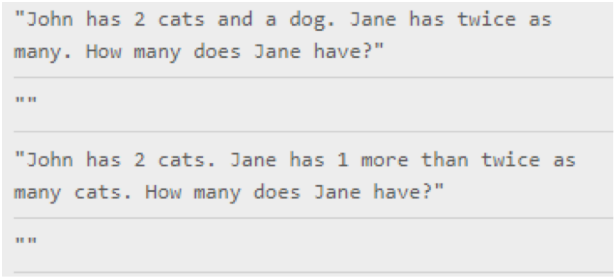


Challenge 1

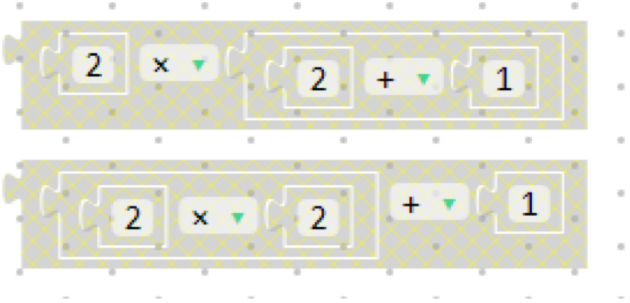
Step 1.
Enter text into the 1st and 3rd of 4 ‘Print’ blocks. Use the same numerals for different sentences.



Step 2.
Click “Run” to see results of the text entry in the console.



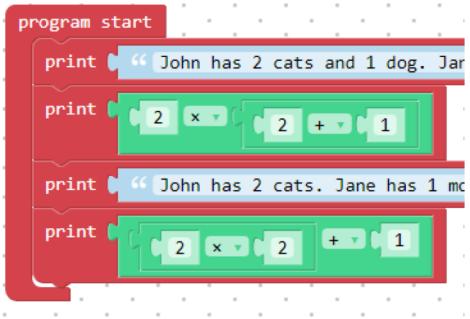
Step 3.
Change the expressions (numerals) from step 5 of the worked example to reflect the new statements (text).



Challenge 1

Step 4.

Snap in the expressions to the appropriate ‘Print’ block.



Step 5.

Press “RUN” to see the results of the expressions.

```
"John has 2 cats and a dog. Jane has twice as many. How many does Jane have?"
"6"
"John has 2 cats. Jane has 1 more than twice as many cats. How many does Jane have?"
"5"
```

Checks for Understanding

1. ***In this case, did the use of parentheses increase or decrease the result?***

   A. It increased the result

   B. It decreased the result

   C. The result stayed the same

2. ***What did the parentheses do to the first expression?***

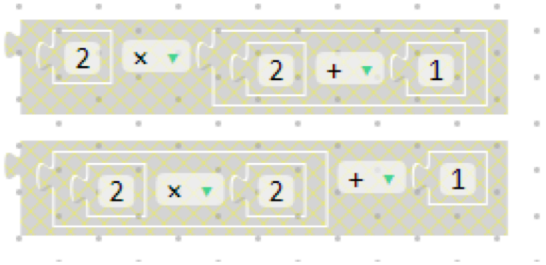
   A. It grouped together the numbers I multiplied

   B. It kept numbers, I multiplied by, separate

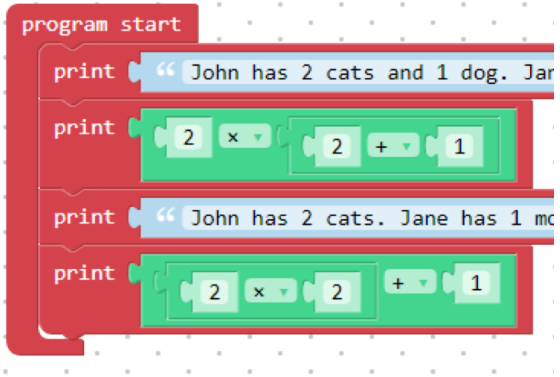
   C. It didn't change anything

Challenge 1 - Debug it!

Step 1.
Check the order of, and numbers and symbols used for, the expression.

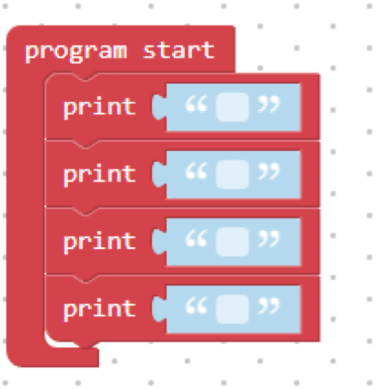


Step 2.
Check that each statement links to the proper expression.

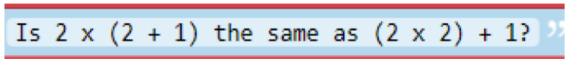


Challenge 2

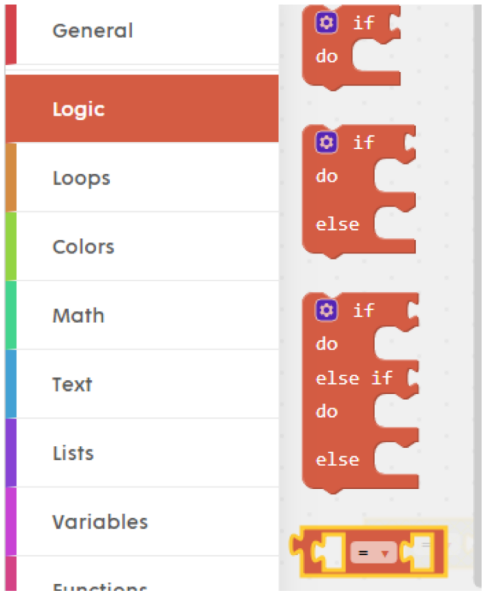
Step 1.
Move all of the content from the ‘Print’ blocks to the trash can.



Step 2.
Enter a comparison statement into the first ‘Print’ block. For this system, we have used: “Is 2 x (2 + 1) the same as (2 x 2) + 1?”



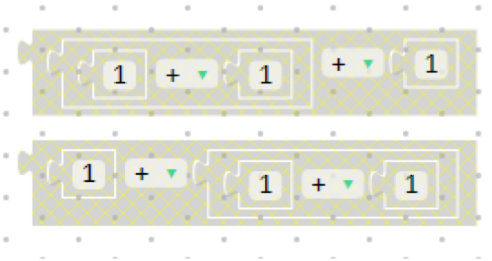
Step 3.
From the ‘Logic’ tab, drag a ‘Comparison’ block onto the workspace.



Challenge 2

Step 4.
From the ‘Math’ tab, drag on 1 ‘1+1’ block and duplicate 3 times.

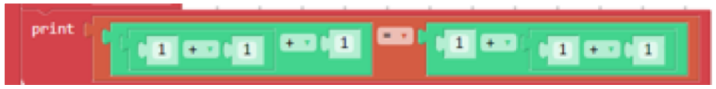
Step 5.
Follow the steps from the Worked Example, step 5.



Challenge 2

Step 6.

- Snap both ‘1+1’ blocks into the empty spaces of the ‘Comparison’ block.
- Snap the ‘Comparison’ block into the 2nd Print block.

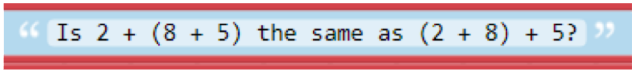


Step 7.

Modify the numbers and symbols to be the same as the text in step 2.

Step 8.

Enter a second comparison statement into the 3rd Print block. Our example is, “Is 2 + (8 + 5) the same as (2 + 8) + 5?”



Challenge 2

Step 9.

- Duplicate the ‘Comparison’ block from step 7.
- Modify the numbers to be from the statement you used in step 8. Our example was, “2 + (8 + 5) = (2 + 8) + 5”.

Step 10. Click RUN to see the results in the Console.

```
Is 2 x (2 + 1) the same as (2 x 2) + 1?
false
Is 2 + (8 + 5) the same as (2 + 8) + 5?
true
```

Checks for Understanding

1. ***Which function was used to tell if two expressions were the same??***

   A. Math Operation

   B. Print

   C. Comparison

2. ***Which expressions always resulted in equivalent values when parentheses were used in different places?***

   A. Expressions that used the same operators.

   B. Expressions that used different operators.

   C. Expressions that used no operators.

Exit ticket

✓ **Today I learned…**

Apostrophes

Warm Up

. , ! ?

Apostrophes

I'm	*Weren't*
Dog's	*Shouldn't*
Haven't	*Laura's*
Sister's	*Didn't*
I've	*Children's*
Dad's	*Brother's*
She's	*Grandma's*
Mum's	*elephant's*

Mini-lesson

How do we form contractions?

Keywords

Unjumble these keywords in your workbook

- *Ssssvieeop*
- *Ppoeastorh*
- *Ncoonttacri*

Let's Discuss

1. ***Which is the correct contraction of 'we will'?***

   A. we'will

   B. we'll

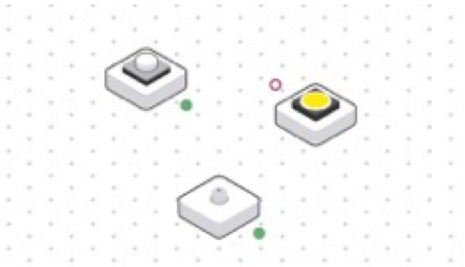
   C. wew'll

2. ***In your workbook or with a partner, record, discuss, or share how we use apostrophes for possession.***

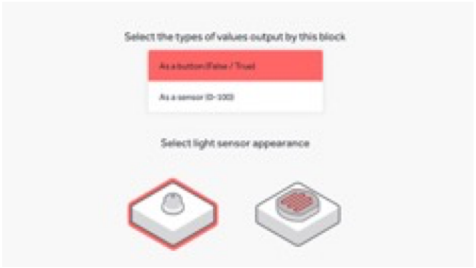
Worked Example

Step 1.
Pair and add the following blocks to the Workspace:

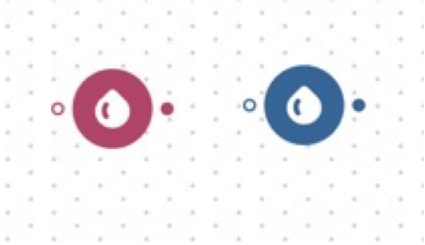
- Button/Virtual Button block
- RGB LED block
- Light Sensor block



Step 2.
Edit the settings of the Light Sensor block to act as a button.

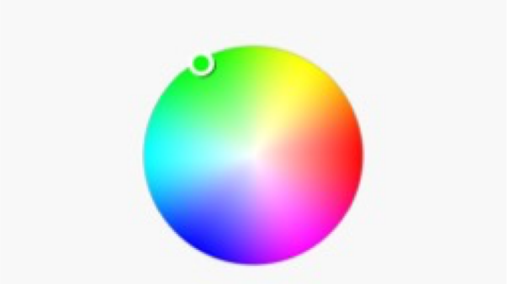


Step 3.
Drag 2 Color blocks onto the Workspace.



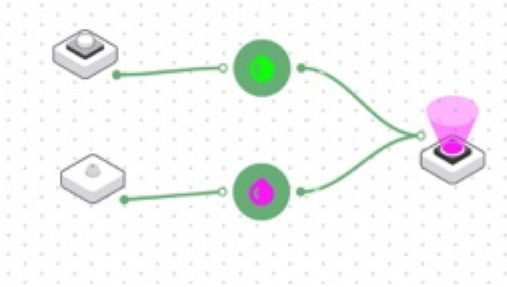
Worked Example

Step 4.
Edit and select a color within the settings of one color block. Repeat for the second color block.



Step 5.
Connect the blocks in the following order:

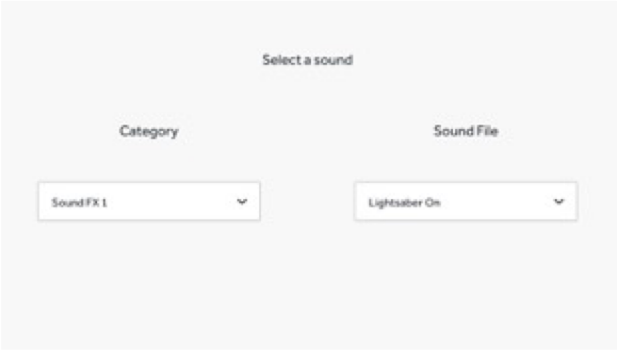
- Button block to Color block then to RGB LED block
- Light Sensor block to second color block then to RGB LED block.



Challenge 1

Step 1.
Drag 2 Sound Player blocks onto the Workspace.

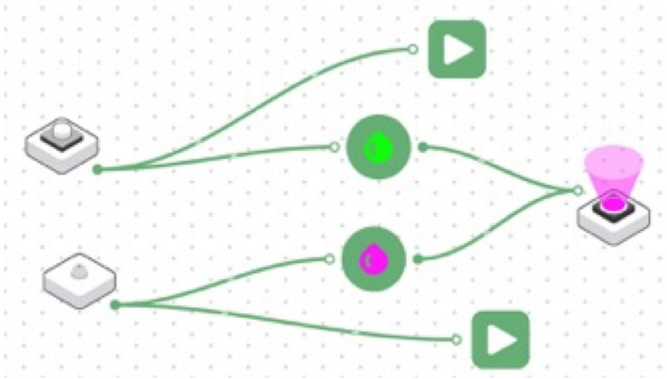
Step 2.
Edit the settings of one Sound Player block and select a sound.



Step 3.
Repeat Step 2 with the second Sound Player block.

Challenge 1

Step 4.
Connect each input to one of the Sound Player blocks.



Step 5.
Test the system.

Checks for Understanding

1. ***Why do we need to use a Light Sensor as a button?***

   A. So the lights will flash different colors

   B. Because the system will not work without it

   C. So we can chose which color to make the light

2. ***Can you identify the output in the system?***

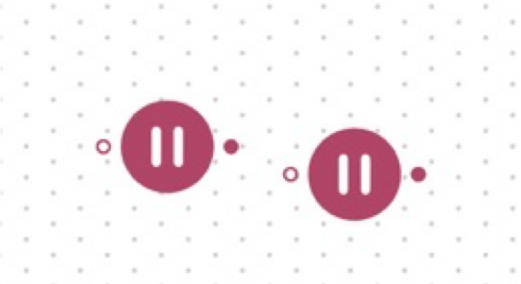
   A. RGB LED

   B. Sound Player

   C. RGB LED and the Sound Player

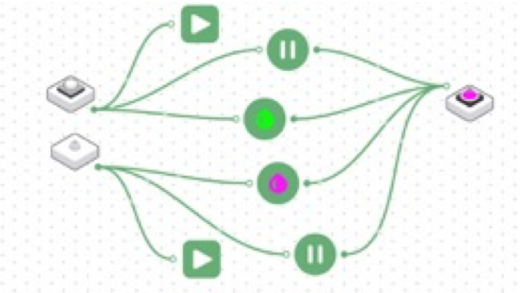
Challenge 1 - Debug it!

Step 1.
Drag 2 Hold blocks onto the Workspace.



Step 2.
Connect the blocks:

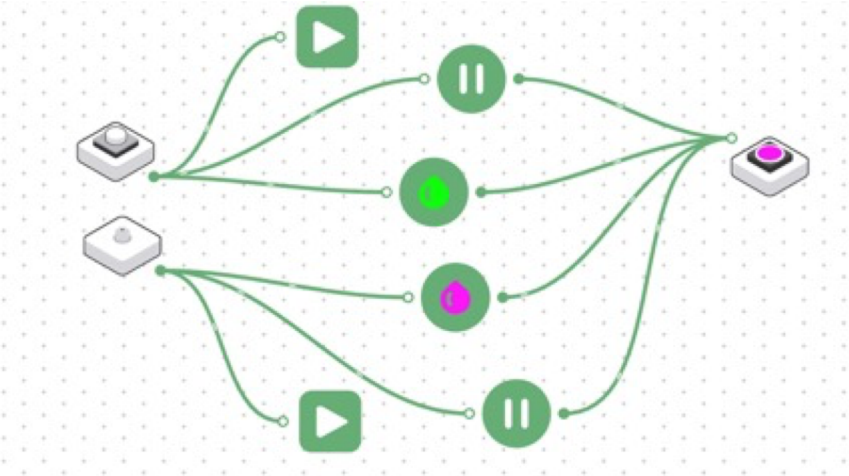
- Button block to the input of the first Hold block and the output to the RGB LED.
- Light Sensor block to the input of the second Hold block and the output to the RGB LED.



Step 3.
Edit the settings of both Hold blocks and set to 1 second.

Challenge 1 - Debug it!

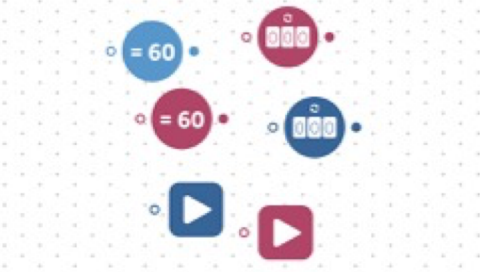
Step 4.
Test the system.



Challenge 2

Step 1.
Drag the following blocks onto the Workspace:

- 2x Counter blocks
- 2x Compare blocks
- 2x Sound Player blocks

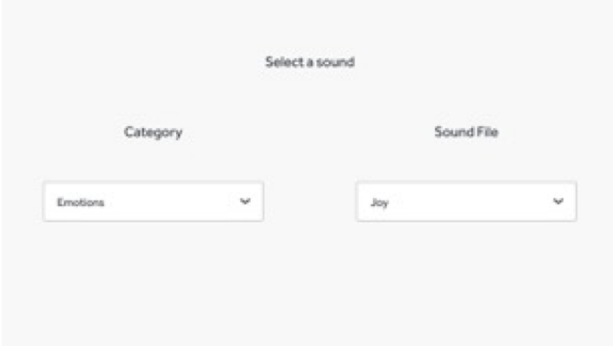


Step 2.
Edit the settings of the Counter block and set the range to 0-5. Select the Reset option.

Step 3.
Edit the settings of the Compare block and set the value to = 5.

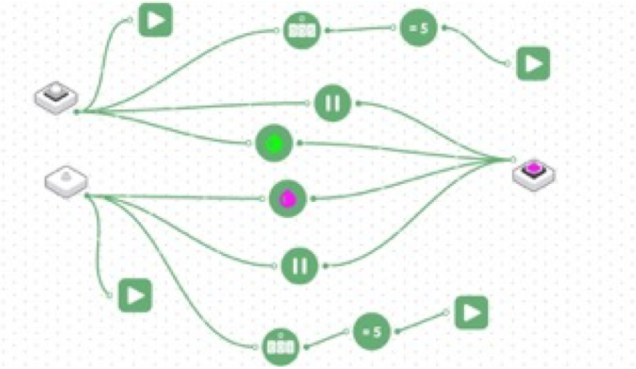
Challenge 2

Step 4.
Edit the settings of the Sound Player block and select the category ‘Emotions’ and the sound file ‘Joy’.



Step 5.
Connect the blocks to the system in this order:

- Button block to Counter block to Compare block to Sound Player block.
- Light Sensor block to 2nd Counter block to 2nd Compare block to 2nd Sound Player block.



Step 6.
Play the Apostrophe Game!

Challenge 2

I'm so happy to be here!

Challenge 2

She's not being very nice today.

Challenge 2

She's not being very nice today.

Challenge 2

He'll definitely love that present.

Challenge 2

The dog's tail is wagging because he's so happy.

Challenge 2

The elephant's trunk was long, grey and wrinkly.

Challenge 2

I wouldn't do that if I were you...

Challenge 2

The cat's green eyes gleamed in the darkness.

Challenge 2

I would've helped you if you'd asked.

Checks for Understanding

1. ***Which of these sentences is correct?***

   A. I cant' wait for the weekend

   B. I cant wait for the weekend

   C. I can't wait for the weekend

2. ***Which of these sentences is correct?***

   A. The lion's mane was golden yellow

   B. The lions' mane was golden yellow

   C. The lions mane was golden yellow

Exit ticket

✓ **Today I learned…**

Rocks and Wind

Warm Up

Which era would the fossil be from?

Cenozoic era *Present day - 65 million years ago*	= modern mammal fossils like cats, dogs, monkeys and humans.
Mesozoic era *65 - 248 million years ago*	= dinosaurs, first flowering plants, birds, and mammals
Paleozoic era *248 - 544 million years ago*	= fish, amphibian, and reptile fossils in that order

Mini-lesson

How are rock formations made and changed?

 **Geosphere**, comes from the greek word for ground and covers all land/rock on Earth.	**Hydrosphere**, comes from the greek word for water and covers all water forms on Earth 
 **Biosphere**, comes from the greek word for life and covers all living things on Earth	**Atmosphere**, comes from the greek word for air and covers all gases on Earth. 

Keywords

Match or define keywords in your workbook

- Hydrosphere
- Geosphere
- Biosphere
- Atmosphere
- Chemical Weathering
- Formation

Let's Discuss

1. ***What is the name of the sphere related to rocks?***

   A. Biosphere

   B. Hydrosphere

   C. Geosphere

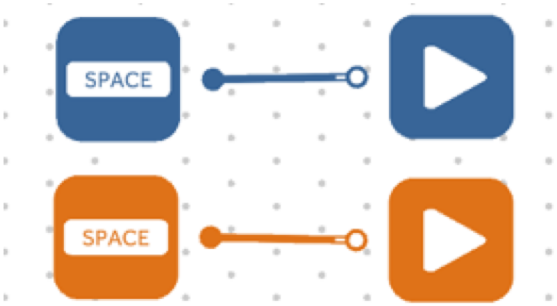
2. In your workbook or with a partner, record, discuss, or share a way each of the four spheres can be remembered.

Worked Example

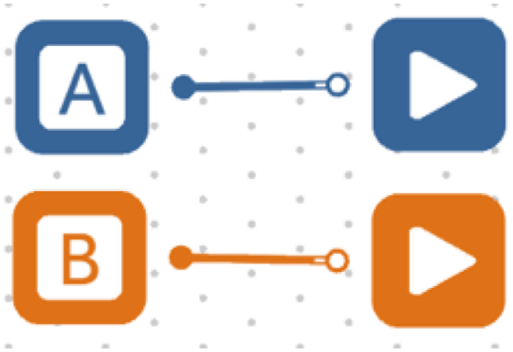
Step 1.
Drag the following blocks onto the workspace:

- 2 x Key Press block
- 2 x Sound Player block

Step 2.
Connect the Key Press block to the Sound Player block. Repeat x 2.



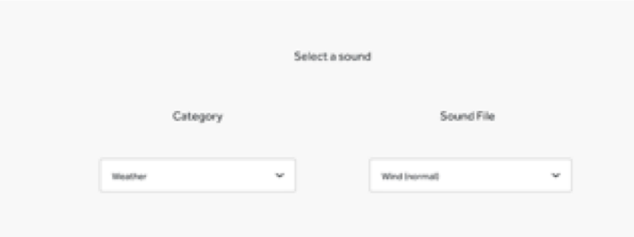
Step 3.
Access the settings of the Key Press blocks and set them to two different options e.g. A and B



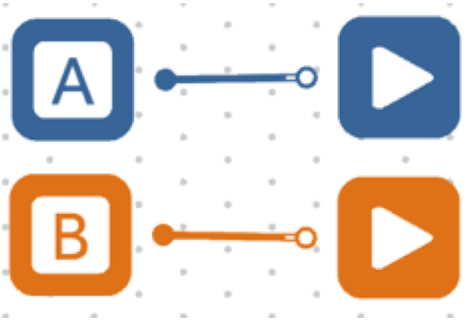
Worked Example

Step 4.
Access the settings of the Sound Player blocks and set to:

- Category = Weather and Sound file = Wind (normal)
- Category = Weather and Sound file = Wind (hurricane)



Step 6.
Test your system.



Challenge 1

Step 1.

Turn on and pair:

- Slider block
- DC Motor block

Drag onto workspace.

Step 2.

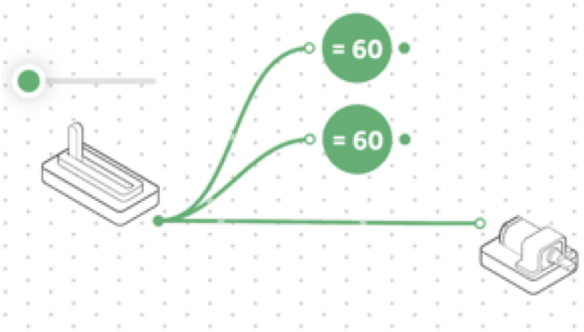
Drag onto the workspace:

- 2 x Compare blocks
- 2 x Interval blocks
- 2 x Sound Player blocks.

Step 3.

Connect the blocks in the following order:

- Slider blocks to DC Motor block
- Slider block to both Compare blocks

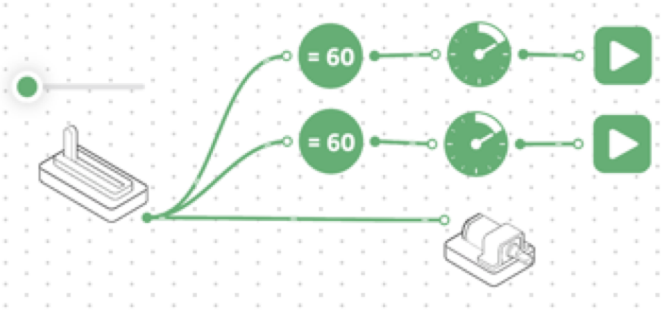


Challenge 1

Step 4.
Connect:

- The Compare block to the Interval Block
- The Interval block to the Sound Player block.

Repeat for both Compare blocks.



Step 5.
Access the Compare block settings and set them to:

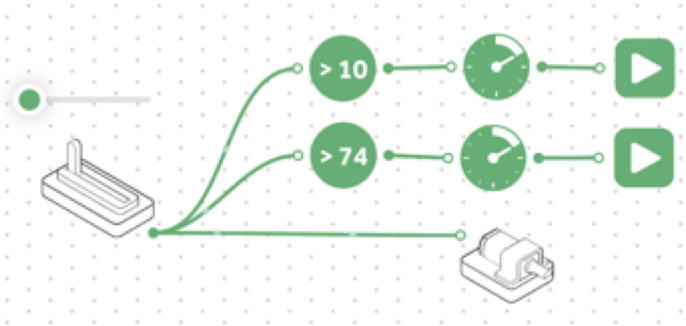
- Top Compare block to '>10'
- Bottom Compare block to '>74'

Step 6.
Access the Sound Player settings and set them to:

- Top Sound Player block to 'Weather' and 'Wind(normal)'
- Bottom Sound Player block to 'Weather' and 'Wind(hurricane)'

Challenge 1

Step 7.
Test your system.



Checks for Understanding

1. ***How many outputs are there to this system?***

   A. 2

   B. 3

   C. 4

2. ***What will happen if the Slider block setting is at 80?***

   A. The DC Motor will stop

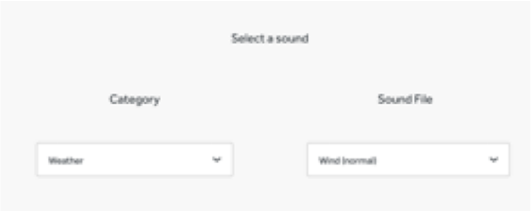
   B. The Sound Player will play wind(normal) and DC Motor will be slow

   C. The Sound Player will play wind(hurricane) and DC Motor will be fast

Challenge 1 Debug it!

Step 1.
Drag on a Key Press block and a Sound Player block. Connect them together.

Step 2.
Access the Sound Player settings and set it to ‘Weather’ and ‘Wind(normal)’



Step 3.
- Using a stopwatch or similar, time how long the sound stays on.
- Access the settings of the Sound Player block and time the second sound.

Step 4.
Set the Interval block to the rounded up number of seconds the sound plays for.

Challenge 2

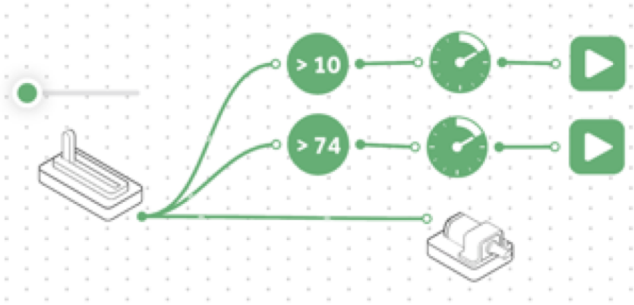
Step 1.
Glue Cheetos to a piece of card.

Step 2.
Connect the wheel to the DC Motor.

Step 3.
Secure a sandpaper block to the wheel with elastic bands.

Challenge 2

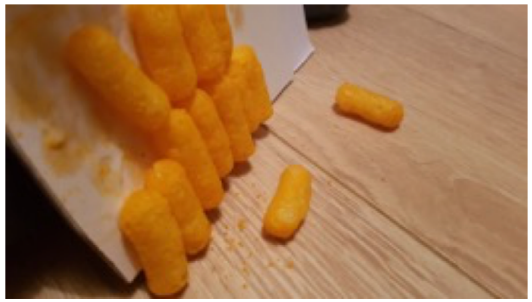
Step 4.
Hold the wall up or secure to an upright surface.



Step 5.

- Hold the DC motor block and turn on the system.
- Move the block closer to the Cheetos wall so that it touches.

Step 6.
Test your system at different settings



Checks for Understanding

1. What does the Slider block simulate?

A. The speed of the wind

B. The sound of the wind

C. The rocks

2. What was the purpose of editing the interval block to 14 seconds?

A. So that there is a pause between sounds

B. To stop the wind sound

C. To allow the sound to play and then loop

Exit ticket

✓ **Today I learned…**