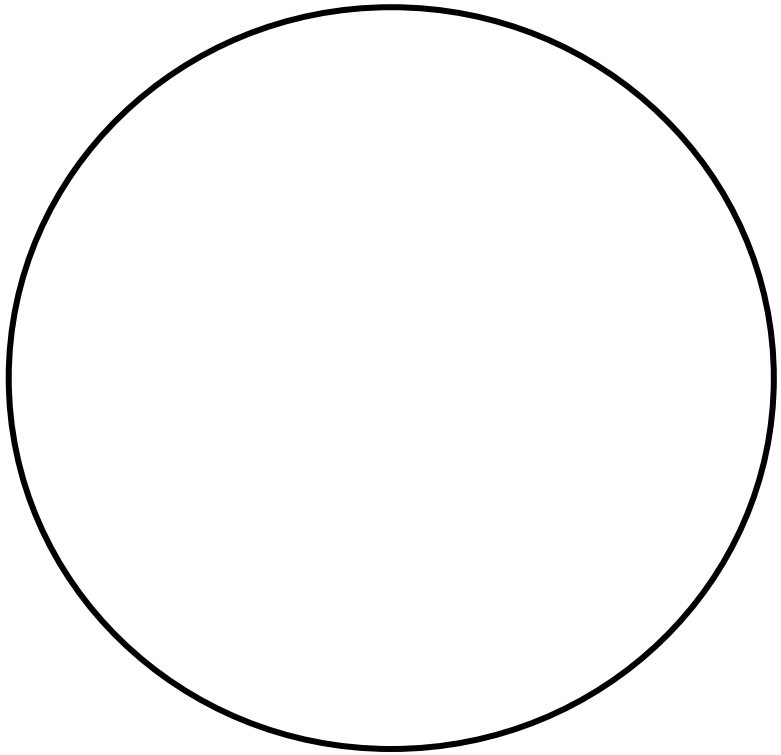
Light and Shadow

Scientific Investigation

What time of day is it in different cities of the world?

Mini-lesson

The Human Eye



Keywords

Match or define keywords in your workbook

- Lens
- Retina
- Pupil
- Color Blindness

Let's Discuss

1. ***How do shadows appear?***

   A. *A shadow appears because it's dark outside.*

   B. *A shadow appears because an object is between light and a surface.*

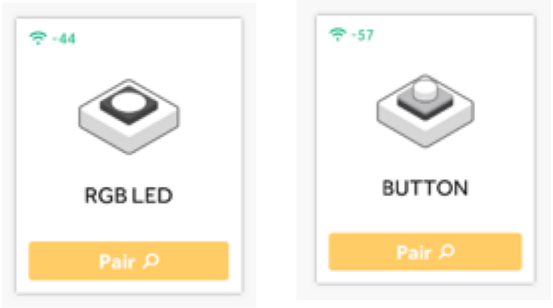
   C. *A shadow appears because it's daytime.*

2. ***In your workbook or with a partner, record, discuss or share an example of how the eye uses light to see.***

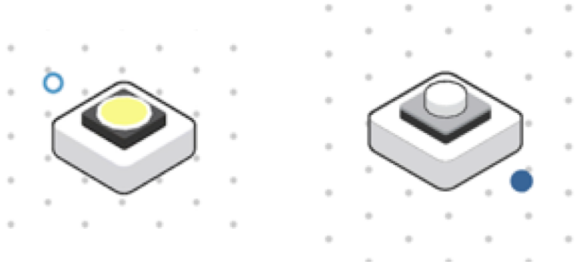
Worked Example

Step 1.
Turn on and pair:

- 1 RGB LED
- 1 Button/Virtual Button block



Step 2.
Drag the RGB LED and Button blocks onto the workspace.



Step 3.
Add a Toggle block to the workspace.

Worked Example

Step 4.

Connect the Button and RGB LED.

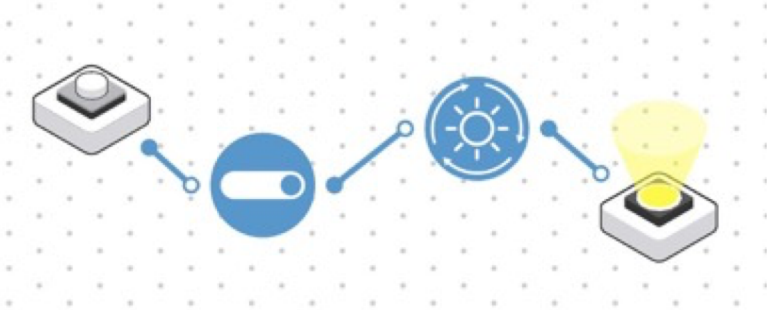
Add the Toggle between them.

Test your system.

Challenge 1

Step 1.
Add a Cycle Brightness block to the workspace.

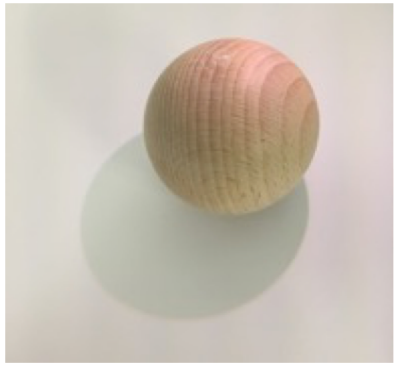
Step 2.
Connect the Cycle Brightness block between the Toggle and the RGB LED.



Challenge 1

Step 3.
Place a ping-pong ball in the middle of the table. Place the RGB LED block in the red car controller and prop it 3 inches from the ping-pong ball.

Step 4.
Press the Button. The brightness of the RGB LED will change intensity with each press.



Checks for understanding

1. ***What happens to the shadow when the light is dimmed?***

   A. *There is no shadow.*

   B. *The shadow is strong and clear.*

   C. *The shadow is harder to see.*

2. ***What happens to the shadow if the light source is moved closer or farther away from the object?***

   A. *The shadow stays in the same position.*

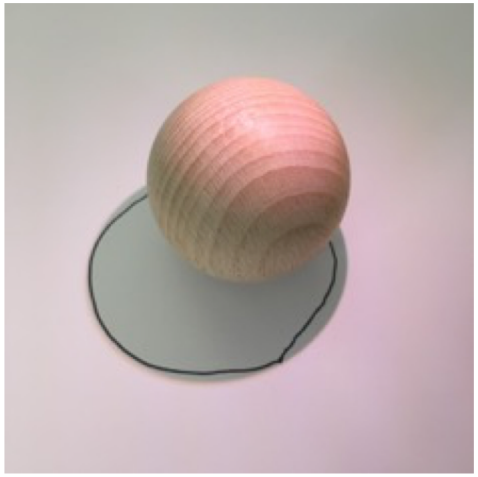
   B. *The shadow moves opposite to the light source.*

   C. *The shadow disappears.*

Challenge 1 - Debug it

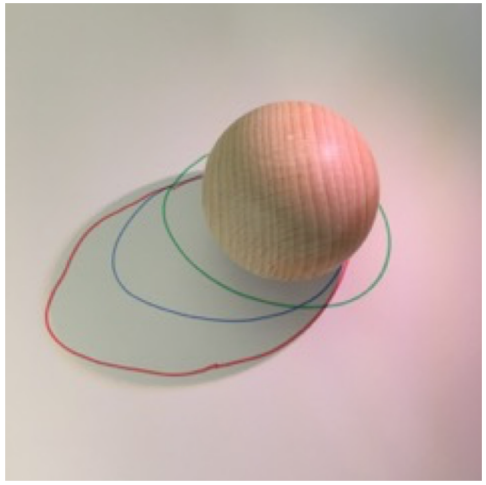
Step 1.

Place the ping pong ball on a white piece of paper and trace the shadow.



Step 2.

Change the distance of the light to the ping-pong - 1 inch, 3 inches and 6 inches from the ball. Trace the shadow each time.



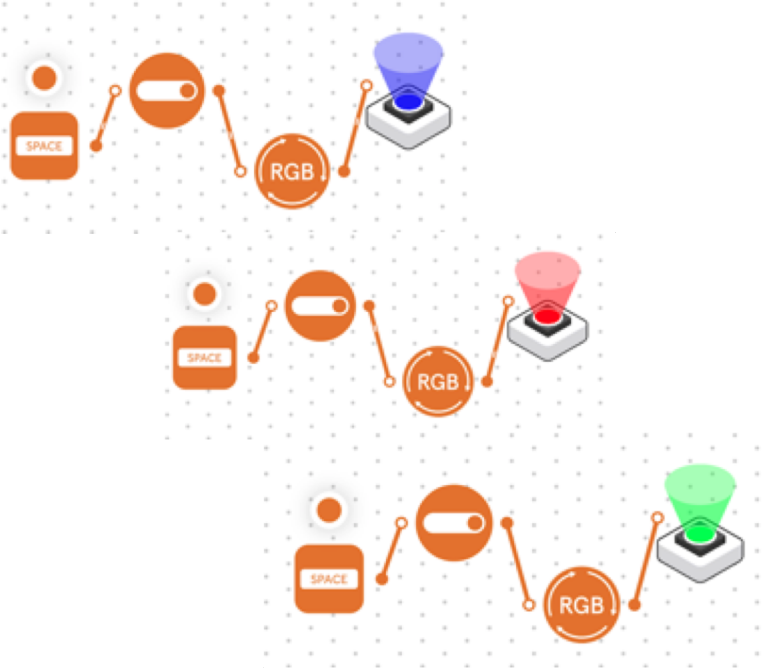
Challenge 2

Step 1.

Remove the Cycle Brightness block from the system and replace with the RGB Cycle Colors block

Step 2.

Place the RGB Cycle Colors block between the Toggle and the RGB LED blocks.

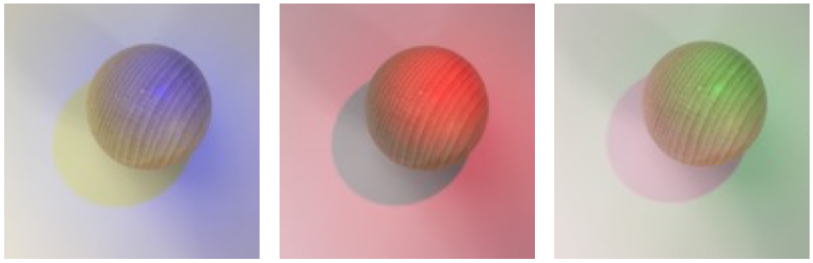


Step 3.

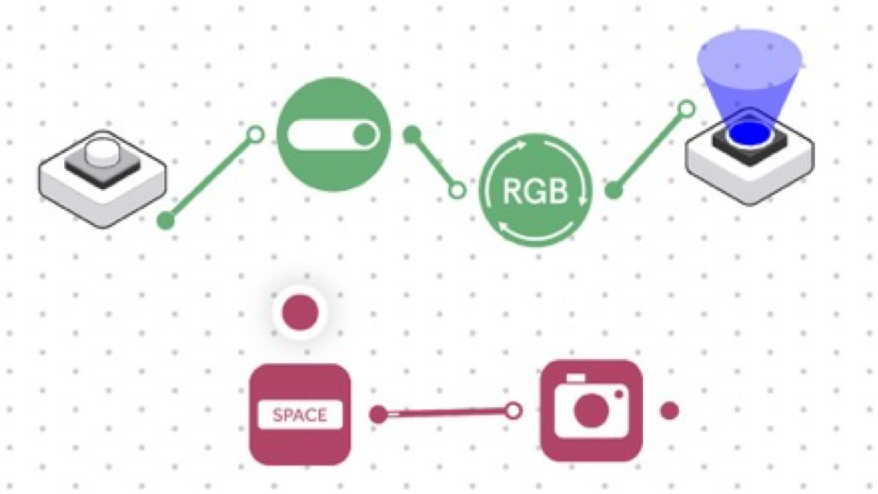
Press the Button to see the light change between the 3 colors red, green and blue.

Challenge 2

Step 4.
What is the difference between the shadows? Which is easiest/hardest to see?



Step 5.
Present your results. To photograph your experiment, add a Key Press and a Camera block to the workspace and connect them. Press the Key Press each time you want to take a photo.



Checks for understanding

1. ***Which block caused the shadow move and change shape?***

   A. *The brightness and proximity of the Light Sensor.*

   B. *The brightness and proximity of the RGB LED.*

   C. *The brightness and proximity of the Toggle.*

1. ***Why do you think yellow is the most common color for lights?***

   A. *Because the human eye is evolved to detect yellow as brightest.*

   B. *Because everyone likes yellow.*

   C. *Because yellow is the color of “caution”.*

Tidy Up/Exit Ticket

✓ **Today I learned….**

Compose a Song

Warm Up

Mini-lesson

How can music help people?

Keywords

Match or define keywords in your workbook

- Notes
- Chord
- Music Therapy
- Melody
- Solfège Scale

Let's Discuss

1. ***How can music therapy help people?***

   A. To express emotion

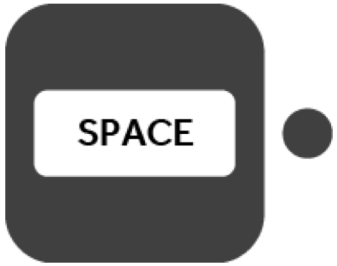
   B. To improve emotional well-being

   C. To improve physical well-being.

2. In your workbook or with a partner, record, discuss, or share your favorite song and what memory you associate with it.

Worked Example

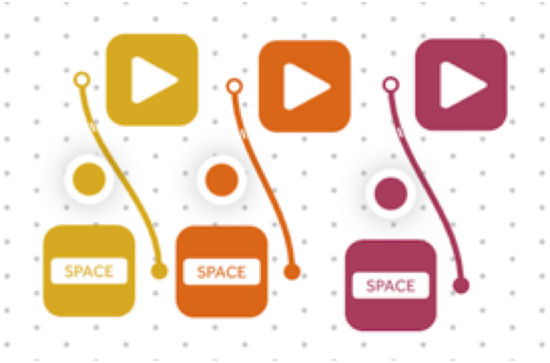
Step 1.
Drag 3 Key Press blocks onto the Workspace.



Step 2.
Drag 3 Sound Player blocks onto the Workspace

Worked Example

Step 3.
Connect each Sound block
to a Key Press.



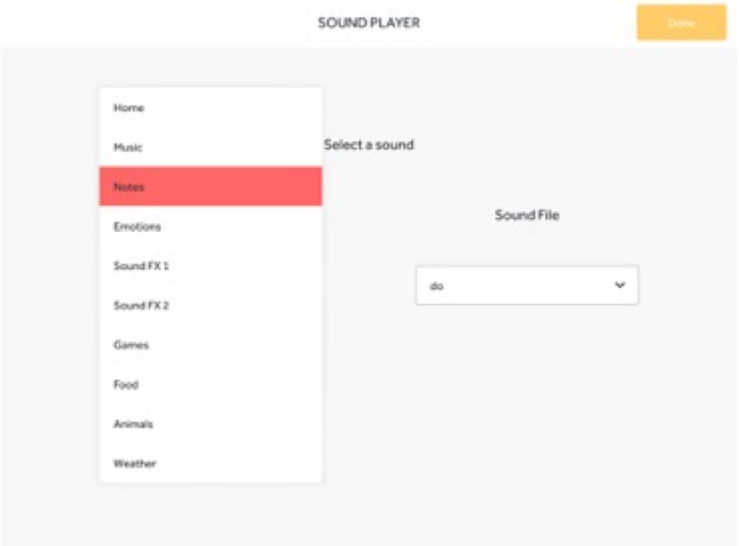
Step 4.
The Key Press block has a dot above it, this will act as our input and help us to play the notes. Test it out.

Worked Example

Step 5.

Open the Settings of the first (top) Sound Player

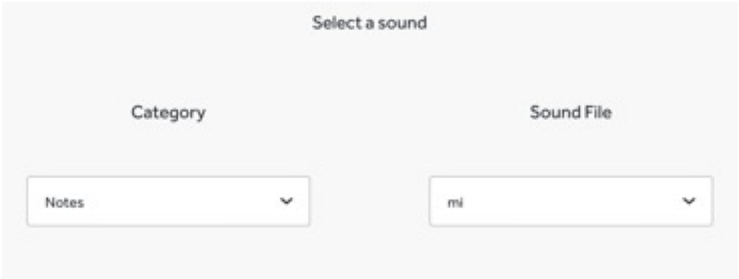
- Select category 'Notes'
- Select sound file 'do'



Step 6.

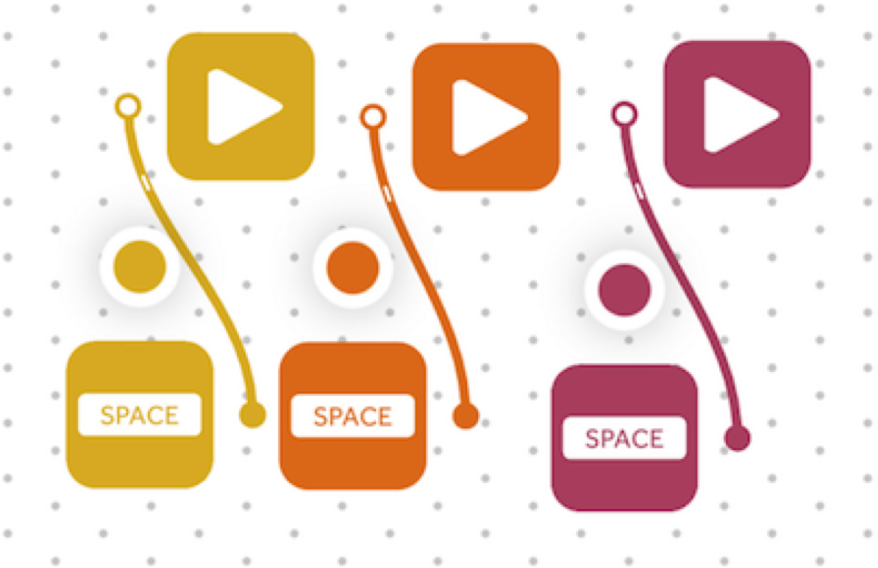
Repeat step 5 with the remaining 2 Sound Player blocks.

- Sound file 're' and 'mi'



Worked Example

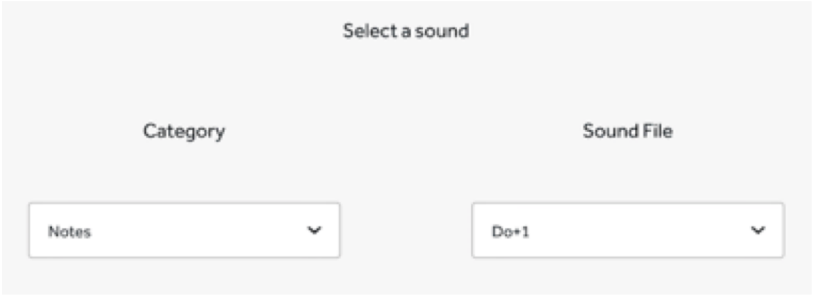
Step 7.
Test your system.



Challenge 1

Step 1.
Drag 5 additional Sound Player and Key Press blocks onto the workspace.

Step 2.
Program each note in the appropriate order of the Do-Re-Mi scale. Ensure the final Sound Player is set to 'do + 1'.



Step 3.
Test your system.

Challenge 1

Step 4.
Let's play some songs. Here is one...

do, do, sol, sol, la, la, sol_
fa, fa, mi, mi, re, re, do_

Step 5.
Play the whole song.

do, do, sol, sol, la, la, sol_
fa, fa, mi, mi, re, re, do_
sol, sol, fa, fa, mi, mi, re_
sol, sol, fa, fa, mi, mi, re_
do, do, sol, sol, la, la, sol_
fa, fa, mi, mi, re, re, do_

Checks for Understanding

1. ***What is the difference between a note and a chord?***

   A. *They are the same thing.*

   B. *A note is a single sound and a chord is a group of sounds.*

   C. *A note is a group of sounds and a chord is a single sound.*

1. ***What is a melody?***

   A. *A sequence of single notes.*

   B. *A single note.*

   C. *A chord.*

Challenge 1 - Debug it!

Step 4.
Hold down the Key Press for notes with '___' after them.

do, do, sol, sol, la, la, sol_
fa, fa, mi, mi, re, re, do_

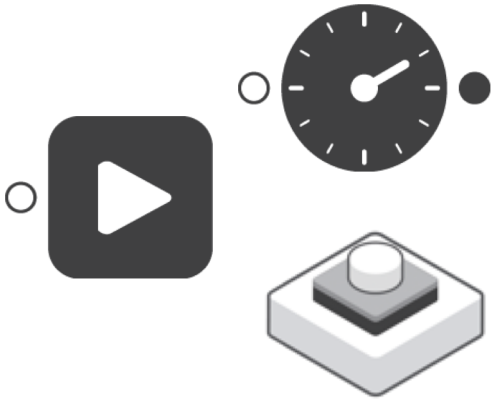
Step 5.
Replay your song.

do, do, sol, sol, la, la, sol_,
fa, fa, mi, mi, re, re, do_

Challenge 2

Step 1.
Turn on and pair:

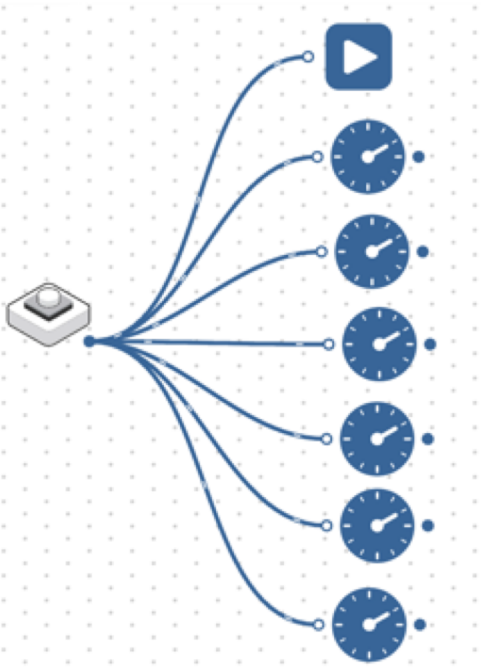
- 1 Button/Virtual Button block



Drag onto the workspace:

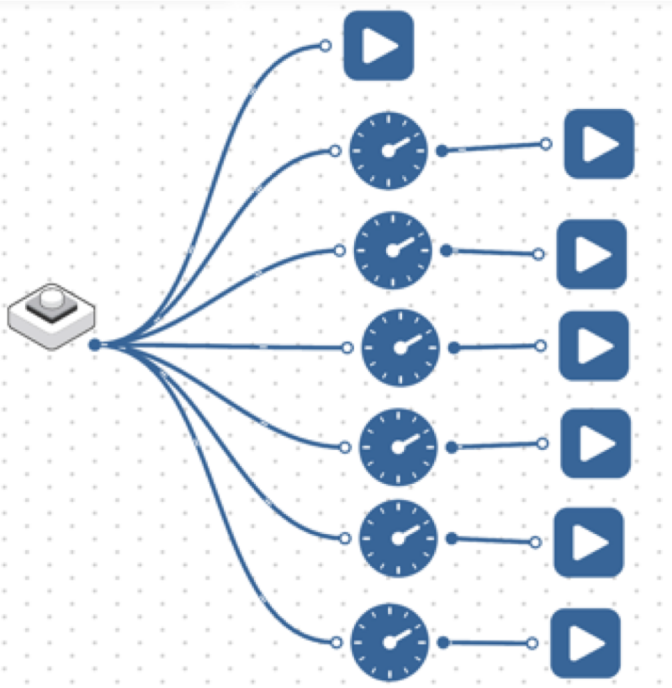
- 6 Delay blocks,
- 7 Sound Player blocks

Step 2.
Connect the Button block to the Sound player block and each of the Delay blocks.



Challenge 2

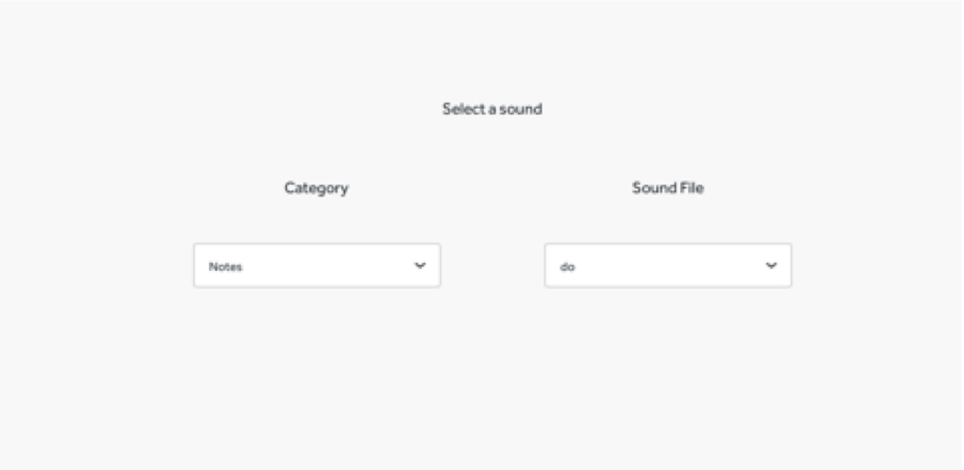
Step 3.
Connect the each Delay blocks to a Sound Player block.



Step 4.
Set the time delay.

Challenge 2

Step 5.
Program each note, following the order of notes for the song you want to play. *The first Sound Player will start with the first note of the song.*



Checks for Understanding

1. What is the complete scale?

A. do to fa

B. do to do + 1

C. do, re, mi

2. Which is the input and output in your system (song)?

A. The Button is both the input and output.

B. The Button is the input and the Sound Player is the output.

C. The Sound Player is the input and the output.

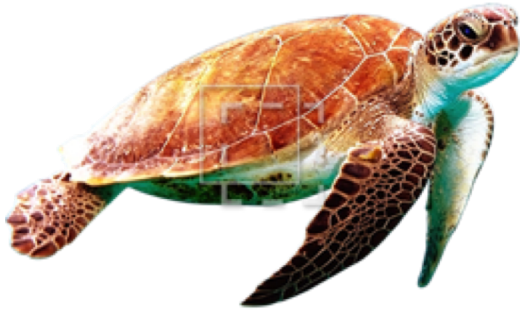
Exit ticket

✓ **Today I learned…**

Design a Habitat

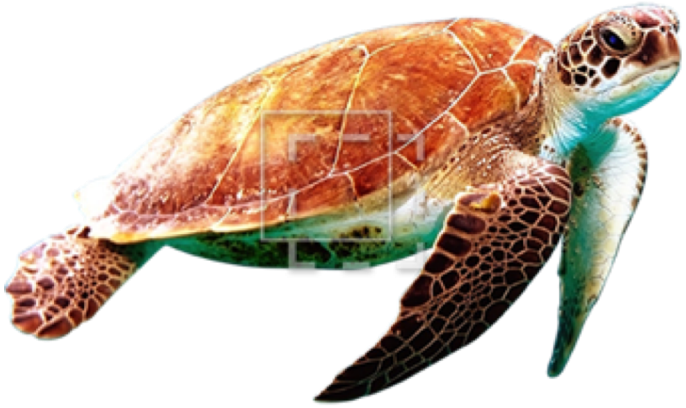
Odd One Out

What do these living things need in order to thrive in their habitat?



Mini-lesson

What do sea turtles need to survive in their habitat and why?



Keywords

Match or define keywords in your workbook

- Habitat
- Class or classification (as in animals)
- Reptile
- Thrive
- Elements
- Need
- Lifecycle
- Survival
- Migration

Let's Discuss

1. ***Why do sea turtles need saltwater and sunshine?***

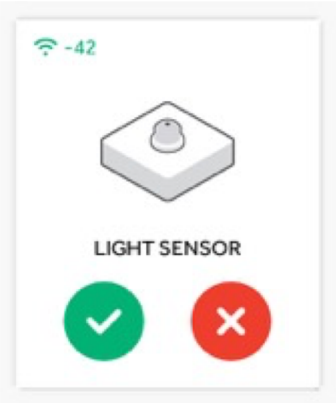
    A. *These basic elements ensure their survival*
    B. *They don't need saltwater or sunshine to survive*
    C. *They like swimming and the sunshine*

2. ***In your workbooks or with a partner, record, discuss, or share an example of how sea turtles access and use one of these elements during their lifecycle.***

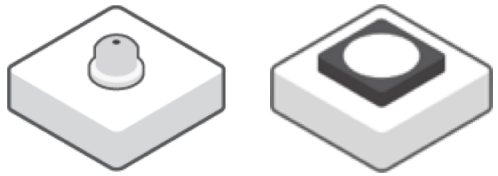
Worked Example

Step 1.
Turn on and pair:

- 1 Light Sensor block
- 1 RGB LED block



Step 2.
Drag the Light Sensor and RGB LED blocks onto the workspace

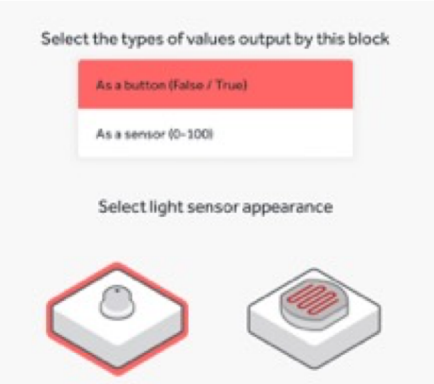


Step 3.
Connect the Light Sensor and RGB LED blocks

Worked Example

Step 4.

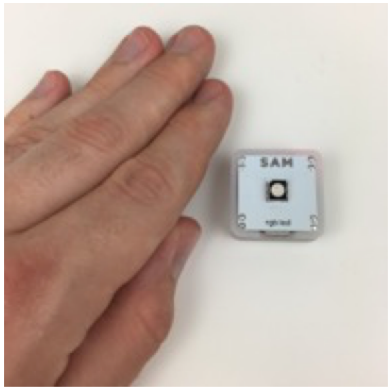
Open the Settings icon of the Light Sensor and select the button option.



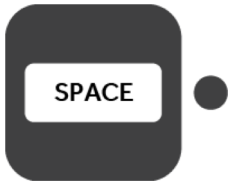
Step 5.

Test your system

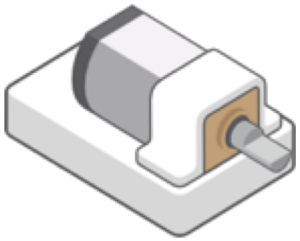
Put your entire palm over the Light Sensor to turn the RGB LED on.



Challenge 1

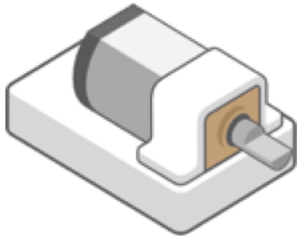


Step 1.
Drag a Key Press onto the Workspace



Step 2.
Turn on and pair:

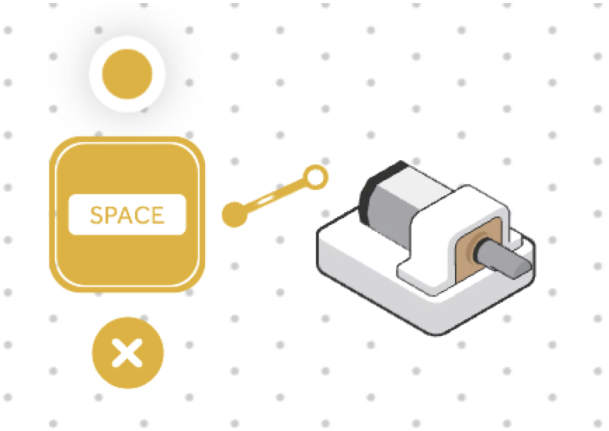
- 2 DC Motors



Step 3.
Drag the DC Motors onto the Workspace

Challenge 1

Step 4.
Drag a Key Press onto the Workspace



Step 5.
Test it! Press the Key Press. T*his should turn the motors on*

Step 6.
Put wheels on the motors.
Be sure to match the flat part of the wheel with the flat part of the axel

Challenge 1

Step 7.
Put the 1st motor in the chassis. Put the 2nd motor in the control block.
This may require some pressure.

Step 5.
Test it! Press the Key Press. T*his should turn the motors on*

Checks for Understanding

1. What is one reason sea turtles require sunlight?

A. To warm their body temperature

B. To sunbathe

C. To migrate from place to place

2. What is one reason sea turtles require sea water?

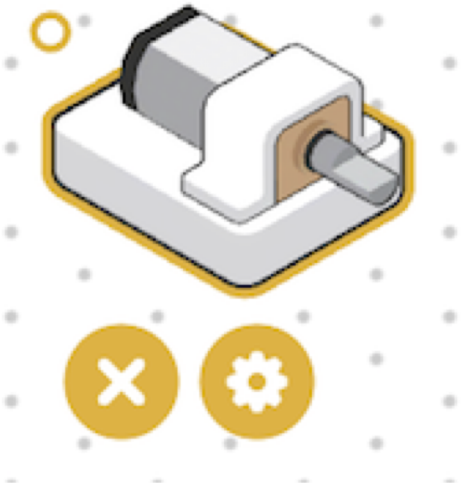
A. To bathe

B. To lay their eggs

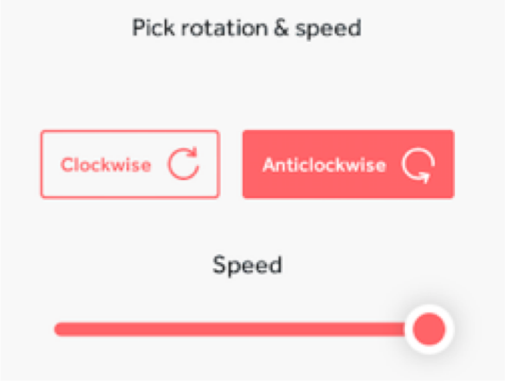
C. To migrate from place to place

Challenge 1 - Debug it!

Step 1.
Open the Settings icon of both DC Motors and lower the speed.



Step 2.
Open the Settings of one of the DC Motors. Change the direction to ‘anticlockwise’.

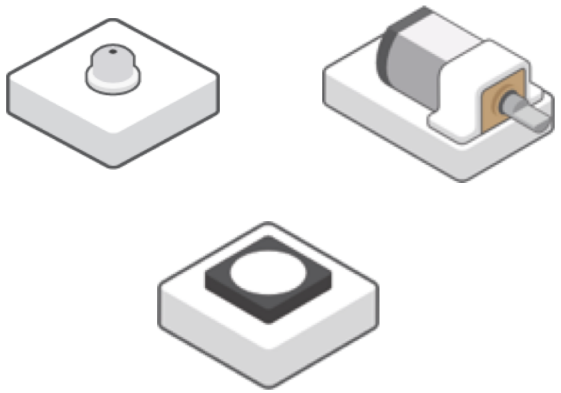


Challenge 2

Step 1.

Turn on and pair:

- 1 Light Sensor block
- 1 RGB LED block
- 2 DC Motors



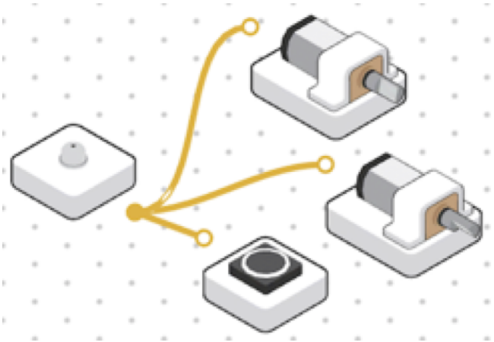
Step 2.

Drag the Light Sensor block, RGB LED block and 2 DC Motors onto the Workspace

Step 3.

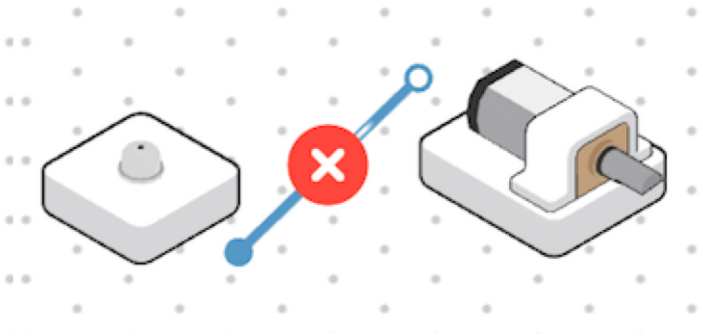
Connect the Light sensor to 2 DC Motors and the RGB LED block.

This will turn the system on



Challenge 2

Step 4.
Select each connection and click “X” to disconnect the system.



Step 5.
Drag an Inverse block to the workspace

Step 6.
Drag a Threshold block to the workspace. Select the settings and edit the threshold value to 51.

Checks for Understanding

1. ***Which output replicates the sunshine in our habitat?***
   A. *The Light sensor*
   B. *The RGB LED*
   C. *The RGB LED, Threshold and Inverse functions*

1. ***Which inputs help replicate the seawater in our habitat?***
   A. *The Light Sensor and RGB LED*
   B. *The DC Motors*
   C. *The Light Sensor, Threshold and Inverse functions*

Exit ticket

✓ **Today I learned…**

Smart Lighting Systems

Scientific Investigation

Which is smart technology?

VS

Mini-lesson

What is smart lighting? What makes it 'smart'?

Keywords

Match or define keywords in your workbook

- Electricity
- Dim
- Sensor
- Smart technology
- Consumption

Let's Discuss

1. ***What is the definition of 'smart technology'?***

   A. *A device that runs when switched on.*

   B. *A device that changes/reacts to the environment around it.*

   C. *Both of the above.*

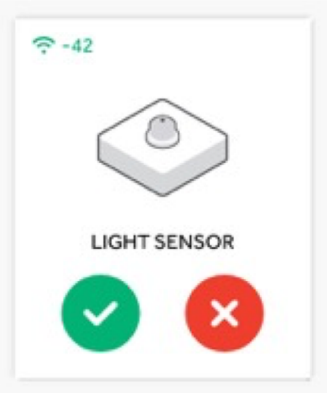
1. ***In your workbook or with a partner, record, discuss, or share one example smart technology and why it is 'smart'.***

Worked Example

Step 1.

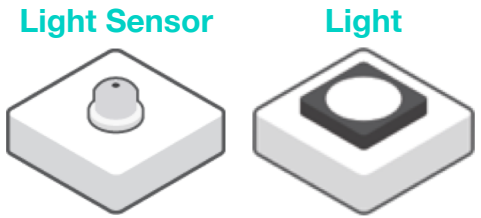
Turn on and pair:

- 1 Light Sensor block
- 1 RGB LED block



Step 2.

Drag the Light Sensor block and RGB LED onto the canvas



Step 3.

Connect the Light Sensor and the RGB LED blocks

Worked Example

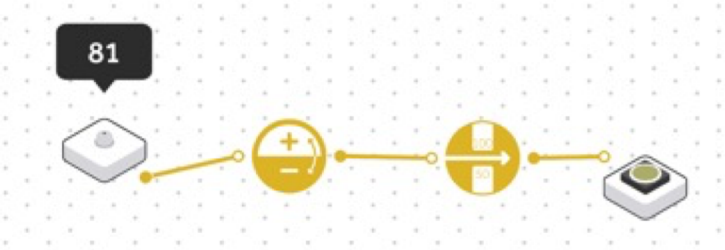
Step 4.
Put one or two fingers over the Light Sensor. This should dim the RGB LED slightly.

Step 5.
Put your entire palm over the Light Sensor and cover it completely. This should turn the RGB LED off.

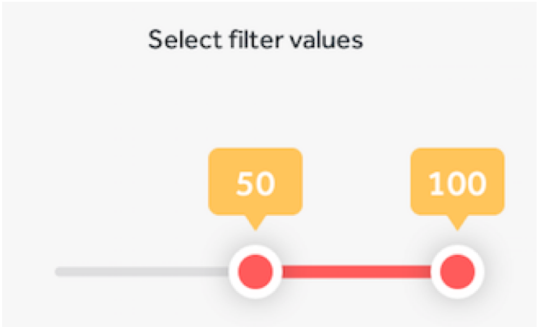
Step 6.
Drag the Inverse block onto the workspace. Connect it between the Light Sensor and RGB LED.

Challenge 1

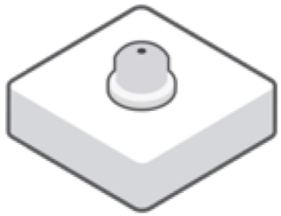
Step 1.
Add the Filter block between the Inverse and RGB LED blocks.



Step 2.
Open the Settings icon on the Filter block and set the filter values to ‘50-100’.

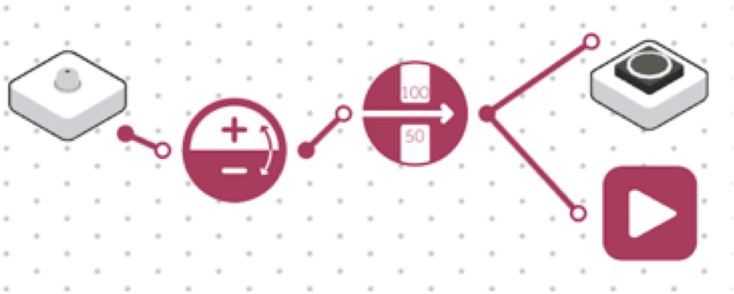


Step 3.
Very slowly, bring your hand closer to, then farther away from, the Light Sensor.

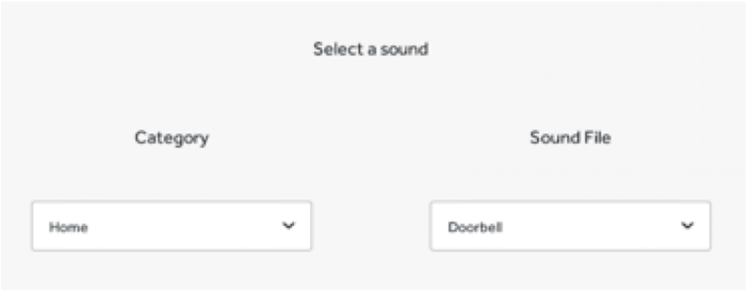


Challenge 1

Step 4.
Let’s add an alert.



Step 5.
Open the Settings icon on the Sound Player and select a sound.



Step 6.
Test your system.
Does the Sound Player play?

Checks for understanding

1. ***In what way does our system use a sensor?***
    A. *It doesn't*
    B. *The presence of a person (hand) controls the light*
    C. *The Light Sensor block has heat detection*

2. ***How is this system 'smart'?***
    A. *It isn't*
    B. *Because the system has a light*
    C. *Because the system has a sensor that detects and respond to the environment*

Challenge 1- Debug it!

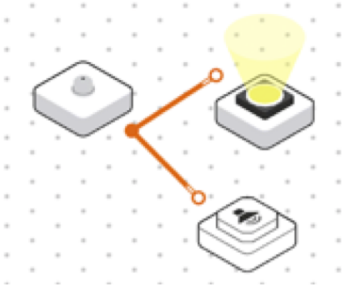
Step 1.
Drag a Toggle block onto the workspace. Connect it between the Filter and Sound Player blocks

Step 2.
Test your system.

Challenge 2

Step 1.
Drag the Light Sensor block, RGB LED block and Sleeping Buzzer onto the Workspace.

Step 2.
Connect the RGB LED and the Buzzer to the Light Sensor.



Step 3.
Find the Filter function and add it to the system. Set the filter values to ‘0-30’.

Challenge 2

Step 4.
Find the On/Off function and add it between the Filter and Buzzer.

Step 5.
Test your system. You may want to replace the Buzzer with Sound Player to see if they work interchangeably.

Checks for understanding

1. ***What does the On/Off block do?***

   A. *It disconnects the system.*

   B. *It turns buttons into sensors.*

   C. *It turns sensors into buttons.*

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

   A. *To filter the light through from the sensor.*

   B. *To only allow a certain range of numbers through to the light.*

   C. *To allow one number from sensor through to the light.*

Tidy Up/Exit Ticket

✓ **Today I learned….**

Time’s Up!

Warm Up

What can the teacher do before school?

Mini-lesson

What activities can you accomplish in an hour?

- Play soccer with friends (24 min)
- Play a game of go-fish (15 min)
- Ride a bicycle to the park (17 min)
- Walk home (10 minutes)
- Watch a video on the internet (12 min)
- Visit a friend or family (35 min)
- Jump rope with a friend (17 min)
- Listen to a song (5 min)
- Read a book (12 min)

Keywords

Match or define keywords in your workbook

- Time
- Minute
- Second
- Calculate
- Hour
- Millisecond

Checks for understanding

1. ***How many seconds and minutes make up an hour?***
   A. *60 seconds, 60 minutes*
   B. *360 seconds, 60 minutes*
   C. *3600 seconds, 60 minutes*

1. ***In your workbooks or with a partner, record, discuss, or share one of the strategies you used to solve the problem.***

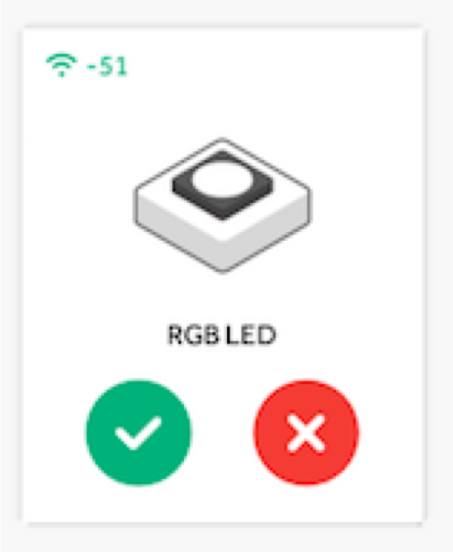
Worked Example

Step 1.

Turn on and pair

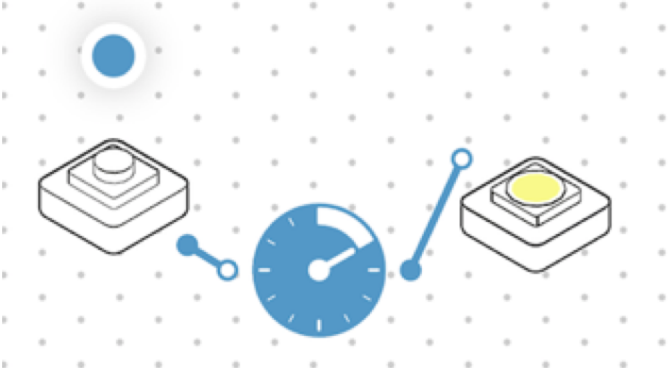
- Button (or Key Press)
- RGB LED block

Drag these blocks onto the Workspace and connect them.



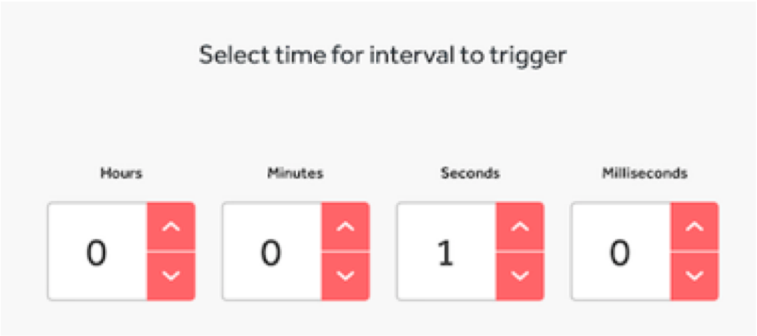
Step 2.

Drag on and add the Interval block between them

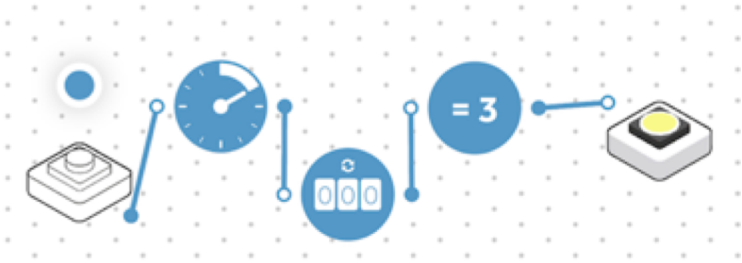


Challenge 1

Step 1.
Set the Interval block to ‘1 second’..



Step 2.
Drag the Counter and Compare block to the workspace between the Interval and
RGB LED block



Checks for Understanding

1. What does the Compare block do in the system?

A. It compares incoming numbers to a set number
B. It compares one variable to another
C. It compares Light Sensor and RGB LED blocks

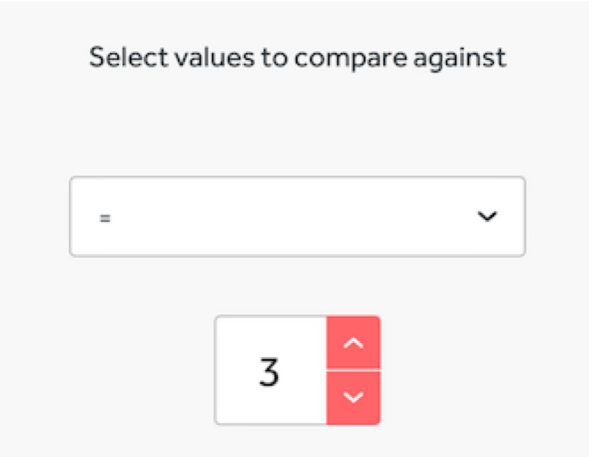
2. What is the input for the system?

A. The Button/Key Press blocks
B. The Interval block
C. The RGB LED block

Challenge 1 - Debug it!

Step 1.
Open the Settings of the Counter block and set it to ‘Restart’ and ‘0-3’.

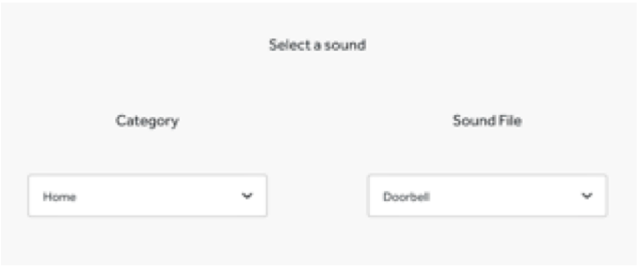
Step 2.
Open the Settings of the Compare block and set to ‘3’. Now, test it!



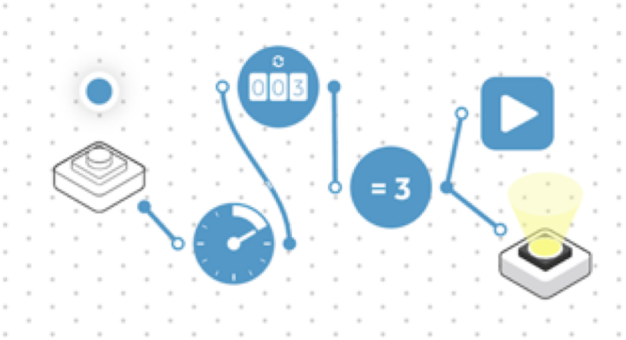
Challenge 2

Step 1.
Drag the Sound Player block to the Workspace.

Step 2.
Open the Settings icon and set the sound.



Step 3.
Connect the Sound Player block to the Compare block and test it!



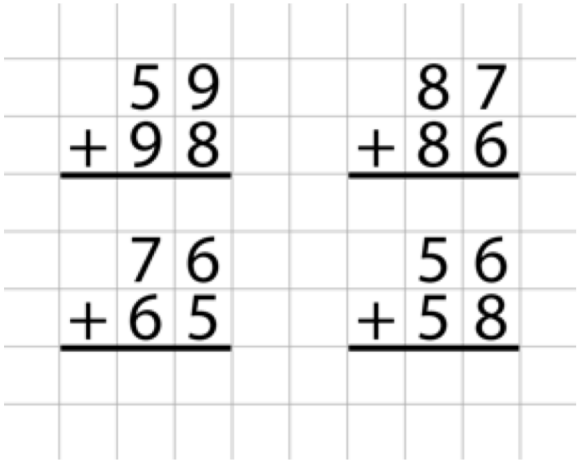
Challenge 2

Step 4.

Write single and double-digit addition and subtraction questions and put them in the canister.

Each student chooses a question and for every question your classmate gets correct, press the button.

Once you get 3 correct, the timer will sound! Keep track of how many your team gets correct!



Checks for Understanding

1. ***What are the main inputs and outputs of our system?***
    A. *Button, Light and Sound*
    B. *Button, Interval, Sound*
    C. *Counter, Light, Sound*

1. ***What does the Counter do in our system?***
    A. *The Light Sensor and RGB LED*
    B. *The DC Motors*
    C. *The Light Sensor, Threshold and Inverse functions*

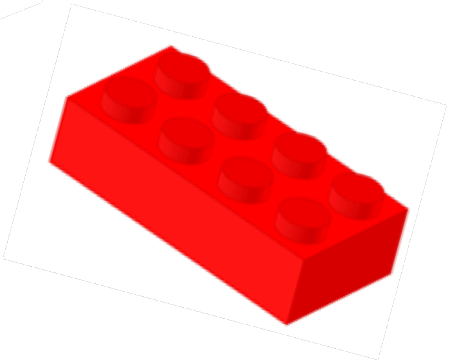
Exit ticket

✓ **Today I learned…**

Build It Up, Break It Down

Build it up!

How many different objects can you make with the same set of Lego bricks?



Mini-lesson

How have these houses been built to withstand an earthquake?

Keywords

Discuss the definition of these keywords

- Earthquake-proof
- Rigid
- Structure

Mini-lesson

Use what you have learnt to design your own earthquake-proof structure

Consider...

- **Height**
- **Strength**
- **Flexibility**

Let's Discuss

1. ***What is an earthquake?***

   A. The earth jumping around

   B. The floor shaking

   C. A movement of the earth's crust

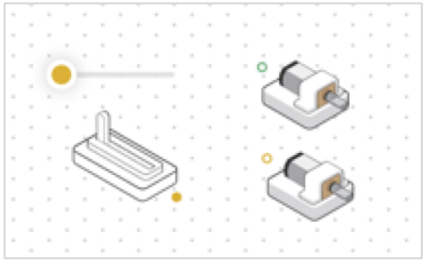
2. What is an earthquake? In your workbook or with a partner, record or discuss the best materials for building an earthquake-proof house.

Worked Example

Step 1.
Turn on and pair:

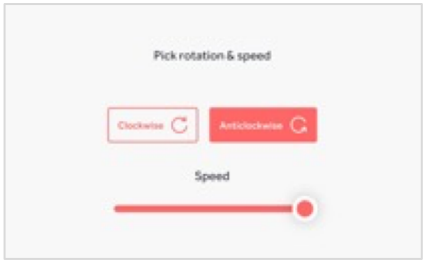
- 2 DC Motor Blocks
- Slider/Virtual Slider Block

Drag them onto the workspace.



Step 2.
Attach the wheels to the motors. Then, fit the motors into the yellow Car Chassis.

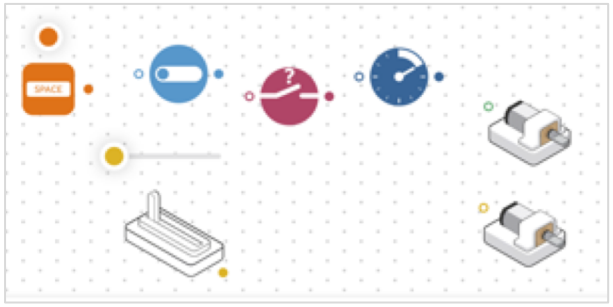
Step 3.
Select the settings icon of one of the motors. Change the direction to ‘anticlockwise’.



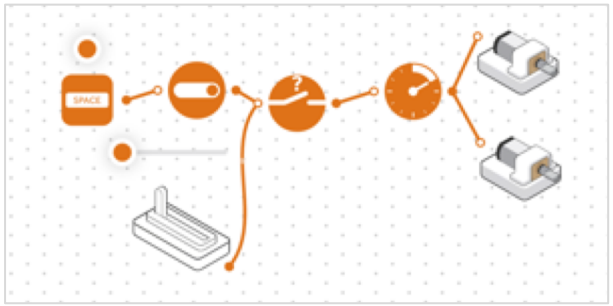
Worked Example

Step 4.
Drag the following blocks onto the workspace:

- Key Press block
- Toggle block
- Switch block
- Interval block



Step 5.
Connect the Key Press to the Toggle, the Toggle to the Slider and Switch. Connect the Switch to the Interval and the Interval to both Motors.



Step 6.
Click on the settings icon of the Switch block and select ‘slider’.

Worked Example

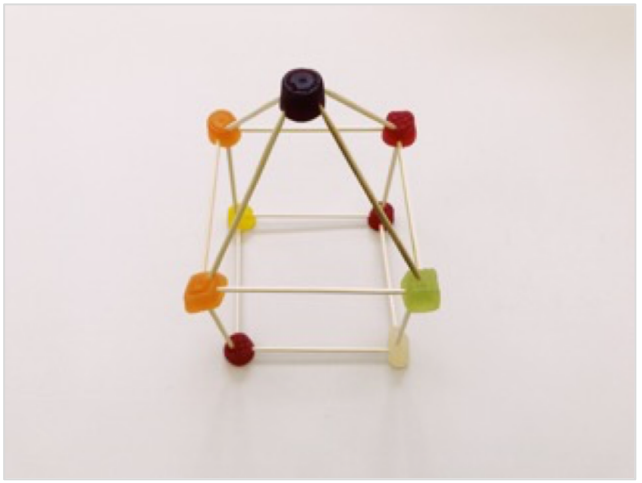
Step 7.
Click on the settings icon of the Interval block and ensure it is set to ‘1’ second.

Step 8.
Place a small dot of blu tack in the center of each wheel.

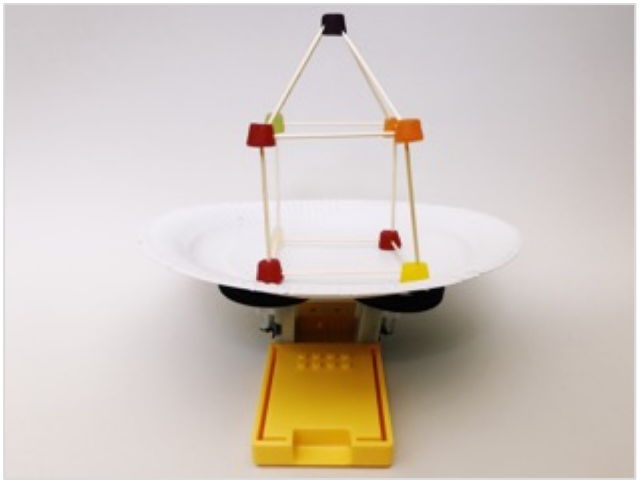
Step 9.
Place a paper plate over the top of both wheels. This will represent the Earth’s crust in the investigation. Test your system.

Challenge 1

Step 1.
Build an earthquake-proof house using gummy candy and cocktail sticks.



Step 2.
Place the structure onto the paper plate.



Step 3.
Slowly move the slider to start the SAM Earthquake Simulator.

Checks for Understanding

1. ***It is important our structure is not too rigid because:***

   A. It is too difficult to move.

   B. It needs to be able to move with the pulse of an earthquake.

   C. It needs to look nice.

2. ***Why do we need to include an Interval block in the system?***

   A. We need to make it more complicated.

   B. We have to include a set amount of buttons in each system.

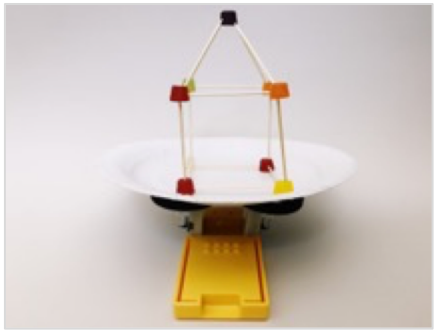
   C. It allows us to mimic the pulse of the earthquake.

Challenge 1 - Debug it!

Step 1.
Click the settings icon on the Interval block.

Step 2.
Set the Interval icon to 1 seconds and 50 milliseconds.

Step 3.
Test your system.

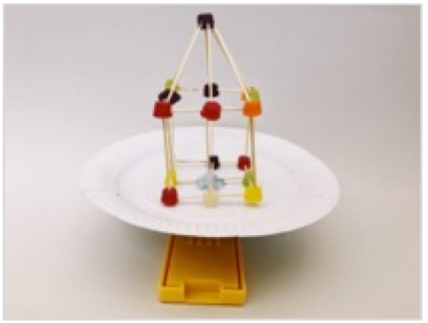


Challenge 2

Step 1.
Students disassemble their structure and evaluate its effectiveness.

Step 2.
Use a combination of new and existing materials to build a new, improved structure.

Step 3.
Test the effectiveness of the new structure using the SAM Earthquake Simulator.



Checks for Understanding

1. ***Which shape makes our structure stronger?***

   A. Triangles

   B. Circles

   C. Pentagons

2. ***Why was it important for us to disassemble our structure?***

   A. To evaluate its effectiveness.

   B. It is fun to take things apart.

   C. To mimic the effect of an earthquake.

Exit ticket

✓ **Today I learned…**

Seed Dispersal

Match up!

Mini-lesson

What part does the Eurasian Red Squirrel play in causing new oak trees to grow?

Keywords

Match or define keywords in your workbook

- Dispersal
- Acorns
- Oak Tree
- Unwittingly
- Seeds

Let's Discuss

1. ***What word is used to describe spreading seeds over a wide area?***

   A. Dispersal

   B. Acorns

   C. Scattering

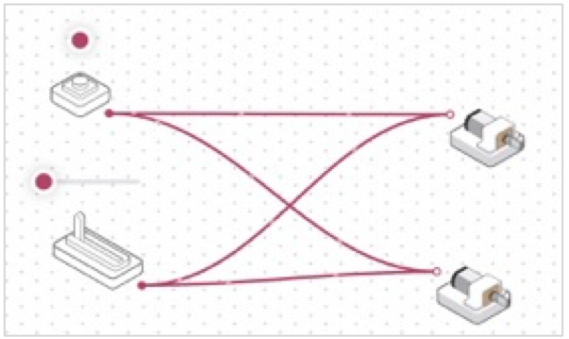
2. In your workbook or with a partner, record, discuss, or share the process by which a Eurasian Red Squirrel disperses seeds using the keywords to help.

Worked Example

Step 1.

Turn on and pair:

- 1 Slider/Virtual Slider block
- 1 Button/Virtual Button block
- 2 DC Motors



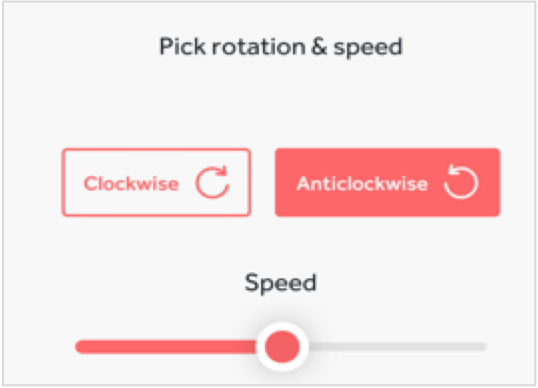
Connect the Slider and Button to both motors.

Step 2.

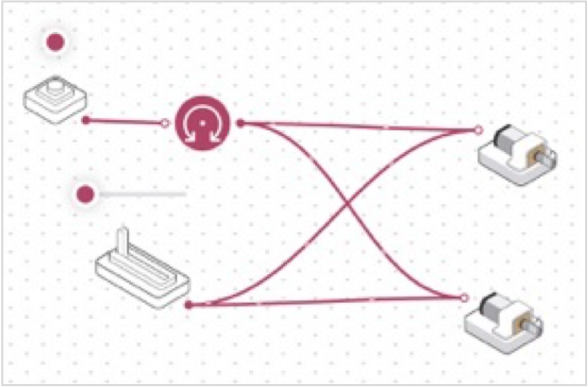
Connect the 2 wheels to the DC Motors and fit them into the yellow Car Chassis. Insert the roller underneath the car. Test your system.

Worked Example

Step 3.
Click the settings icon of one of the DC Motors. Set it to ‘anti-clockwise’.



Step 4.
Add a Switch Direction block to the workspace. Place it between the Button and the 2 DC Motors. Now, test your system again.



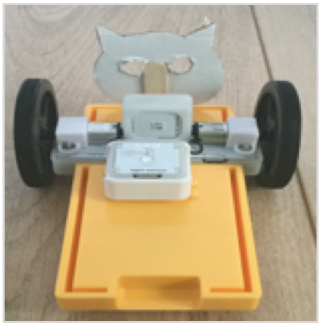
Challenge 1

Step 1.
Print and cut out a squirrel head.

Step 2.
Cut out the eyes.

Step 3.
Secure the Light Sensor block to Car Chassis.

Challenge 1

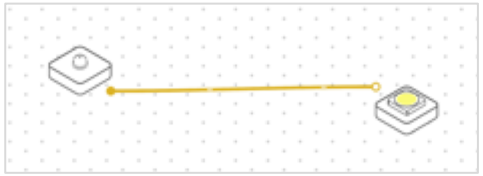


Step 4.
Secure the RGB LED behind the eyes of the squirrel.

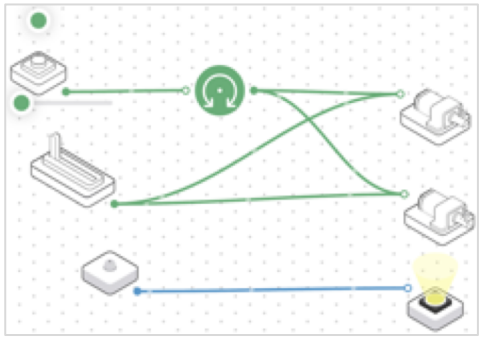
Step 5.
Turn on and pair:

- Light Sensor block
- RGB LED block

Add them to the workspace.



Step 6.
Connect the Light Sensor to the RGB LED.



Step 7.
Test your system.

Checks for Understanding

1. ***Which block is now acting as our new input?***

   A. RGB LED

   B. Light Sensor block

   C. Both

2. ***Which block is now acting as our new output?***

   A. RGB LED

   B. Light Sensor block

   C. Both

Challenge 1 - Debug it!

Step 1.
Add an Inverse block to the workspace.

Step 2.
Place the Inverse block between
the Light Sensor and the RGB LED.

Step 3.
Test your system.

Challenge 2

Step 1.
Collect a yogurt pot and cut
a hole in the lower side.

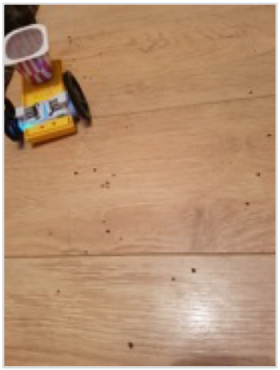
Step 2.
Use blue tack to secure to the Car Chassis.

Step 3.
Add coffee beans (seeds) to the yogurt pot.

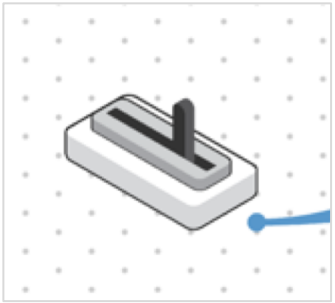
Challenge 2

Step 4.
Direct the SAM Robo Squirrel.

Step 5.
Measure dispersal area.



Step 6.
Change the speed.



Checks for Understanding

1. ***What is the function of the Slider block?***

   A. It adjusts the speed of the DC Motor

   B. It is the input and starts the system

   C. Both A and B

2. ***Which block enables you to change direction?***

   A. Slider block

   B. Switch Direction button

   C. Button block

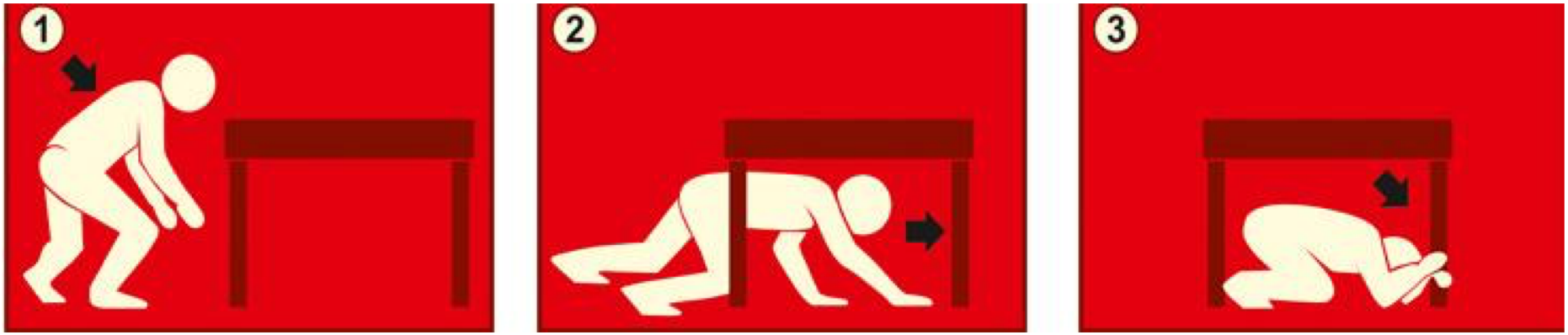
Exit ticket

✓ **Today I learned…**

Earthquake Alert

Stay Safe

How do we stay safe when an earthquake occurs?



Mini-lesson

What is causes an earthquake?

Keywords

Match or define keywords in your workbook

- Earthquake
- Tectonic Plates
- Crust
- Warning
- Epicentre

Let's Discuss

1. ***What is the center of an earthquake called?***

   A. Epicenter

   B. Center

   C. Tectonic plates

2. In your workbook or with a partner, record, discuss, or share an idea of how we could warn others when an earthquake starts?

Worked Example

Step 1.

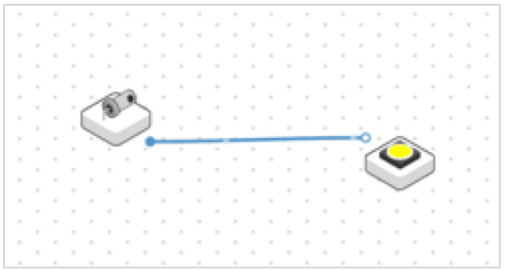
Turn on and pair:

- 1 Tilt Sensor
- 1 RGB LED block

Drag them onto the workspace.

Step 2.

Connect the Tilt Sensor to the RGB LED.



Step 3.

Click on the settings icon of the RGB LED.
Select a color for an alert.

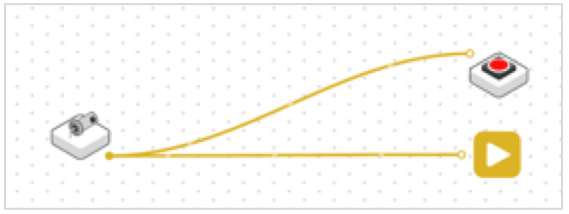
Step 4.

Test your Tilt Sensor by shaking it.

Challenge 1

Step 1.
Drag on a Sound Player block.

Step 2.
Connect the Sound Player block
to the Tilt Sensor.



Step 3.
Click on the settings icon of the Sound
Player block. Set the sound.

Step 4.
Test your system.

Checks for Understanding

1. ***What are the outputs of the system?***

   A. *RGB LED*

   B. *Sound Player block*

   C. *Both A and B*

2. ***What causes an earthquake?***

   A. *The epicenter*

   B. *Tectonic plates colliding*

   C. *Shaking*

Challenge 1 - Debug it!

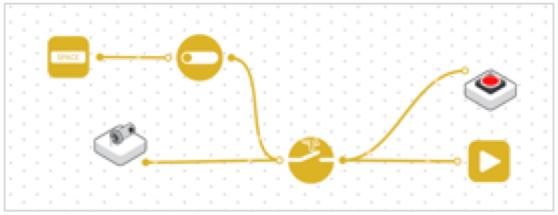
Step 1.
Drag a Key Press block, Switch block and a Toggle block onto the workspace.

Step 2.
Connect the Switch in between the Tilt Sensor, the RGB LED and Sound Player block.

Step 3.
Set the input for the Switch block to be the Toggle.

Challenge 1 - Debug it!

Step 4.
Connect the Key Press block to the Toggle block and the Toggle to the Switch block.



Step 5.
Test your system.

Challenge 2

Step 1.

Turn on and pair:

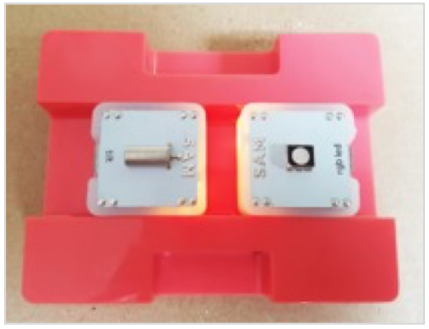
- 1 DC Motor

Step 2.

Attach a Lego base to even the weight.

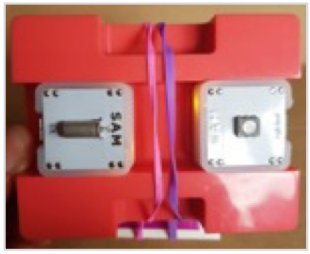
Step 3.

Add the Tilt Sensor and the RGB LED to the red Car Controller accessory.



Challenge 2

Step 4.
Using elastic bands secure the controller to the heel of the DC Motor.



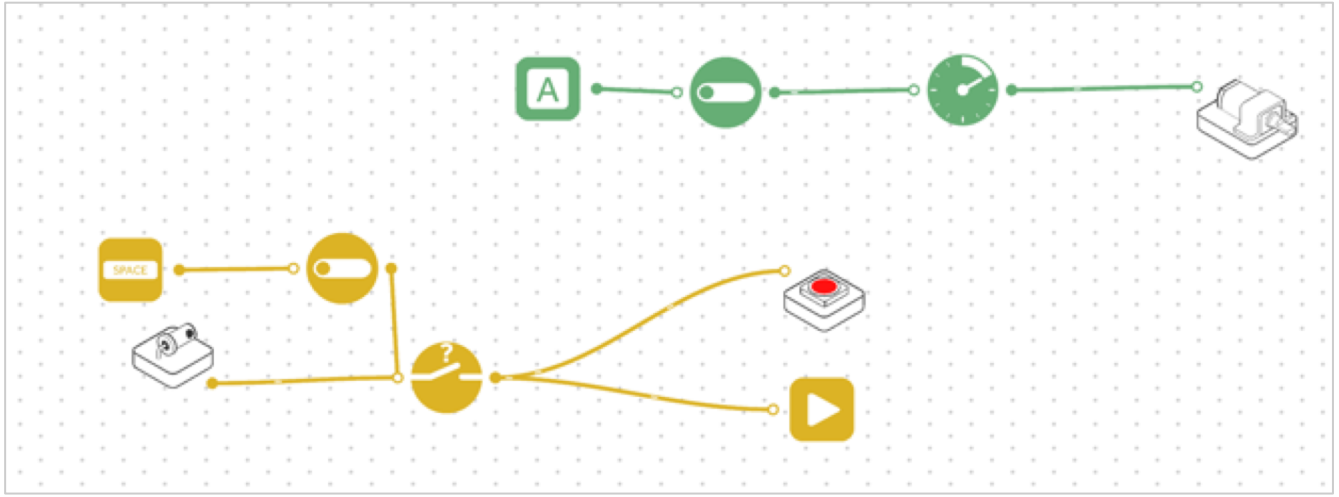

Step 5.
Drag a Key Press block, Toggle block, Interval block and DC Motor block to the workspace.

Step 6.
Connect the Key Press block to the Toggle, the Toggle to the Interval block and Interval to DC Motor.

Challenge 2

Step 7.
Set the Interval block to ‘250’ milliseconds.

Step 8.
Test your system.



Checks for Understanding

1. ***What is the output in the earthquake simulator system?***

   A. Interval block

   B. Toggle block

   C. DC Motor

2. ***What is the outer layer of the earth called?***

   A. Tectonic plates

   B. Crust

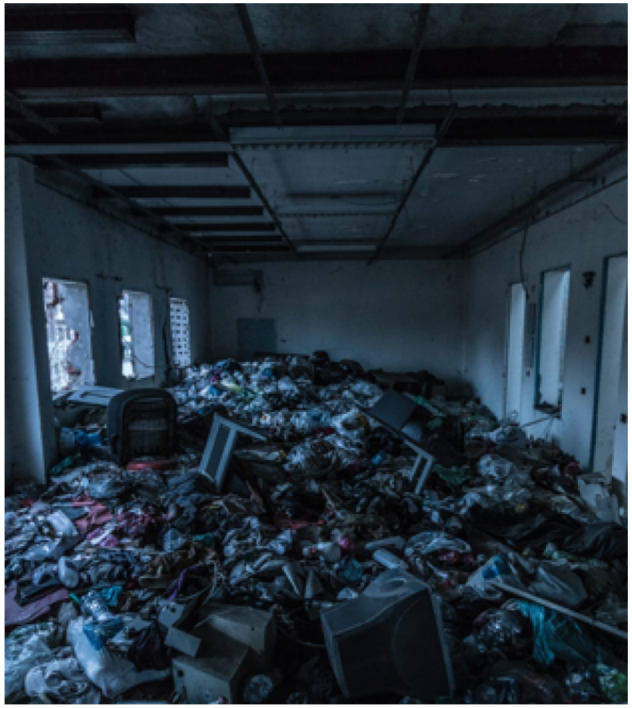
   C. Epicentre

Exit ticket

✓ **Today I learned…**

Reduce, Reuse, Recycle

What is recycling?



Mini-lesson

What can you recycle?

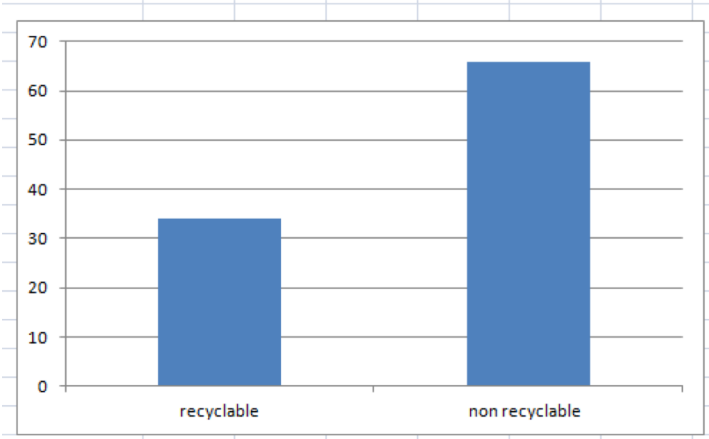
Keywords

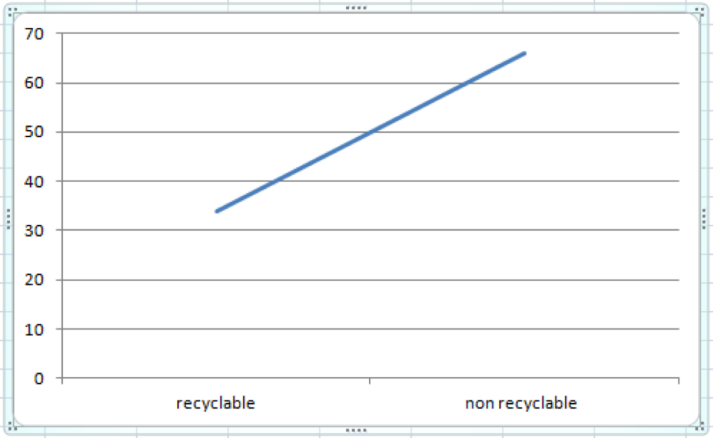
Match or define keywords in your workbook

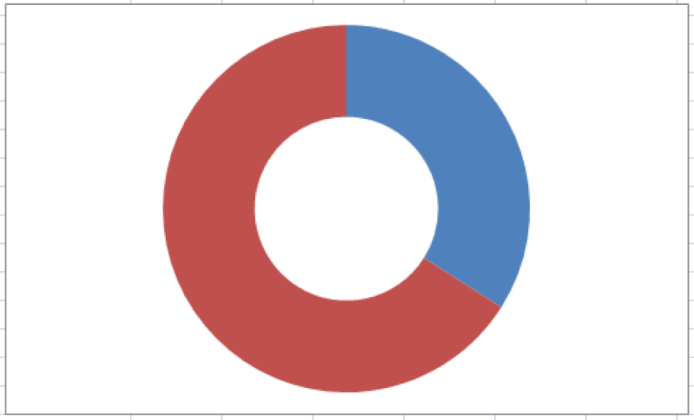
- Reduce
- Reuse
- Recycle
- Log
- Environment

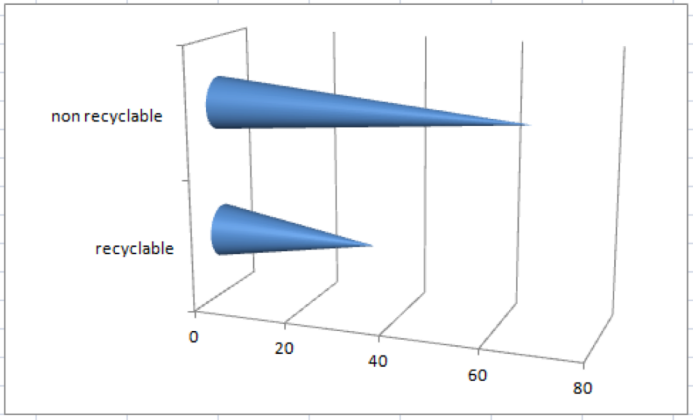
Mini-lesson

How can data help us to achieve our recycling goals?









Let's Discuss

1. ***What does 34% mean?***

   A. 34 objects out of the 100 objects are recycled

   B. 34 objects are recycled

   C. About a third of everything.

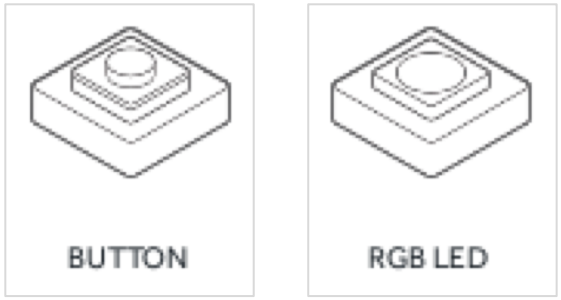
2. *In your workbook or with a partner, record, discuss, or share one way we can recycle more of your household trash.*

Worked Example

Step 1.

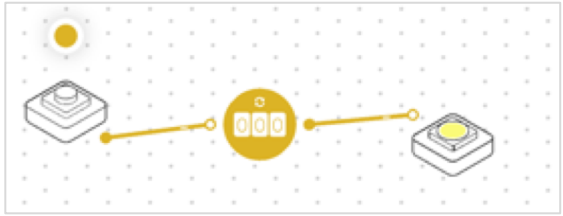
Turn on and pair:

- 1 Button/Virtual Button block
- 1 RGB LED block



Step 2.

Connect the Button to the RGB LED. Add a Counter block between them.



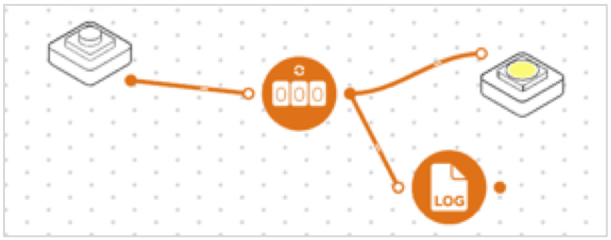
Step 3.

Add a Log Findings block to the output of the Counter. Adjust the settings to log data once a minute.

Worked Example

Step 4.

Sort your trash! Press the Button every time you have something you can recycle.



Challenge 1

Step 1.
Drag a Key Press and Text block onto the workspace.

Step 2.
Connect the Text block to the Counter and the Key Press.

Step 3.
Program the Text block to say ‘reset’ all in lowercase.

Step 4.
Test your system.

Checks for Understanding

1. ***Does the Counter increase when you touch the Button?***

   A. Yes

   B. No

   C. Sometimes

2. ***What is one reason that it is helpful to track the amount we recycle?***

   A. To improve our results

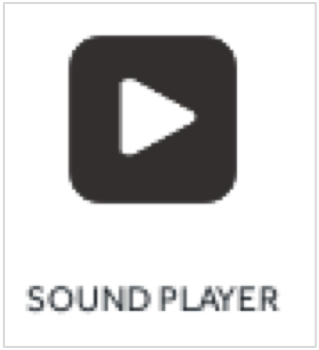
   B. Because numbers are fun

   C. To recycle less

Challenge 1 - Debug it!

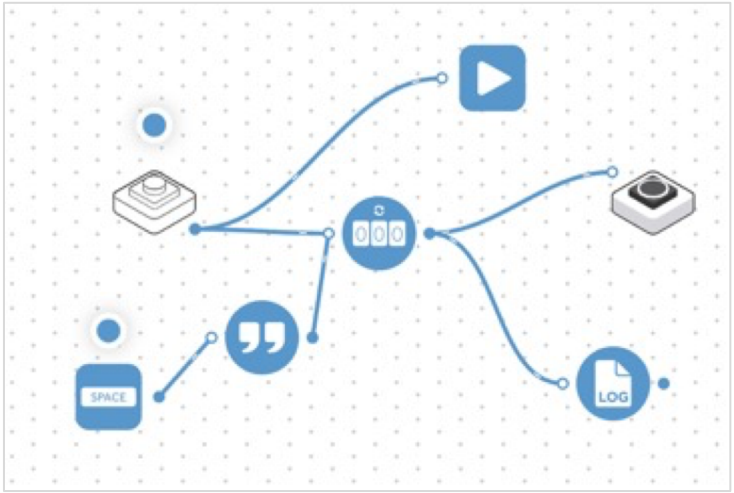
Step 1.

Drag a Sound Player block onto the workspace. Choose ‘joy’ from the Emotions sound set.



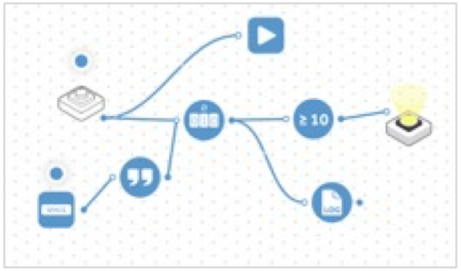
Step 2.

Connect the Sound Player block to the Button block. Test your system.



Challenge 2

Step 1.
Drag a Compare block onto the workspace. Connect it between your Counter and RGB LED.



Step 2.
Program your Compare block to '10' (or whatever your recycling target might be).

Step 3.
Download your ‘Log Findings’ data.
Present your results to the class.

07/28/2018 17:2	Light Sensor	15
07/28/2018 17:2	Light Sensor	13
07/28/2018 17:2	Light Sensor	11
07/28/2018 17:2	Light Sensor	9
07/28/2018 17:2	Light Sensor	11
07/28/2018 17:2	Light Sensor	13

Checks for Understanding

1. ***How does the Log Findings block work?***

   A. It randomly references the Counter and keeps a note of the number.

   B. It references the Counter every minute and records the number.

   C. It guesses what to log.

2. ***Why do we need accurate data?***

   A. So we can track our progress.

   B. We don't need accurate data.

   C. Because it's good to be accurate.

Exit ticket

✓ **Today I learned…**

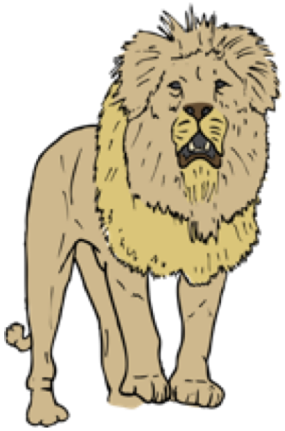
Interactive Storybook

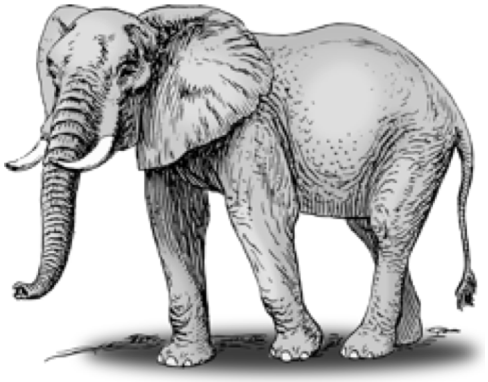
Warm Up

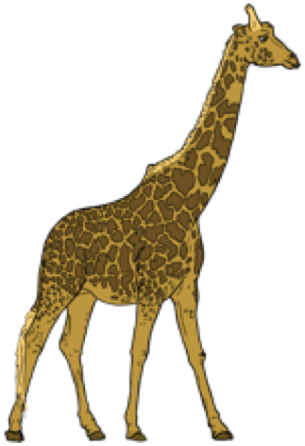
What makes a storybook interactive?

Warm Up

What sounds can you add to the story?







Mini-lesson

Plan Your Story

Beginning	
Who are your characters: 	*Where will the story happen?* 
Middle	
What happens to your characters?	
End	
How does your story end?	

Let's Discuss

1. ***What is the definition of the word interactive?***

   A. A two-way flow of information between a computer and a computer-user; in response to a user's input

   B. Essential

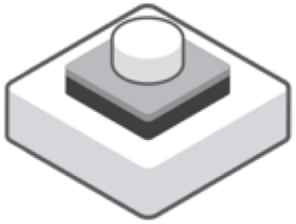
   C. Not important

2. In your workbook or with a partner, record, discuss, or share an example of how you can make your story interactive and fun.

Worked Example

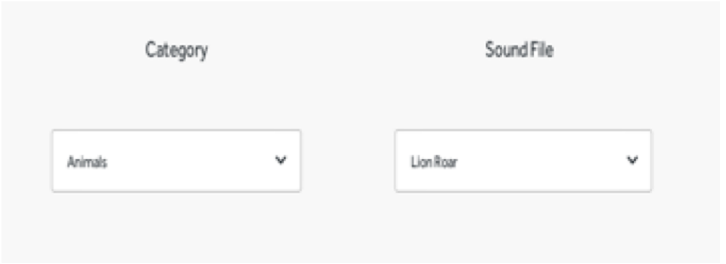
Step 1.
Turn on and pair:

- 3 Button/Virtual Button blocks.



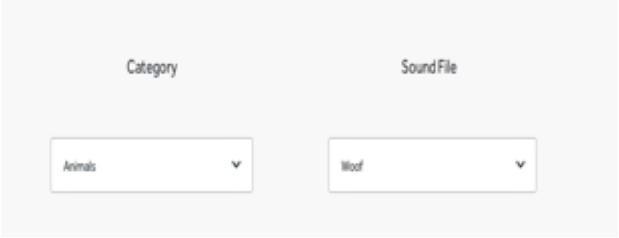
Step 2.
Drag 3 Sound Player blocks onto the workspace. Connect each Button to a Sound Player.

Step 3.
Choose the settings icon of the Sound Player. Set the first Sound Player block to play your first selected sound.

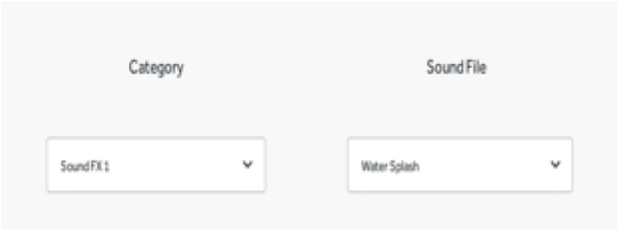


Worked Example

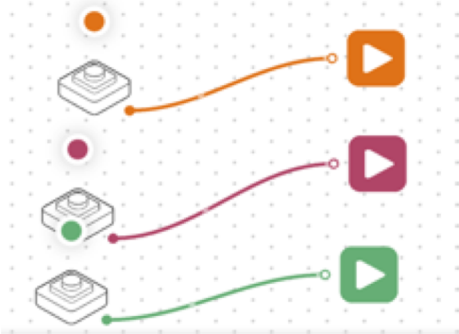
Step 4.
Set the second Sound Player block to your next sound.



Step 5.
Set the third Sound Player block to play your third sound and so on.

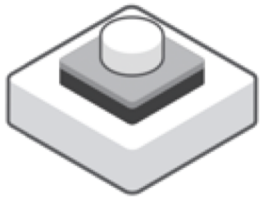


Step 6.
Test your system.



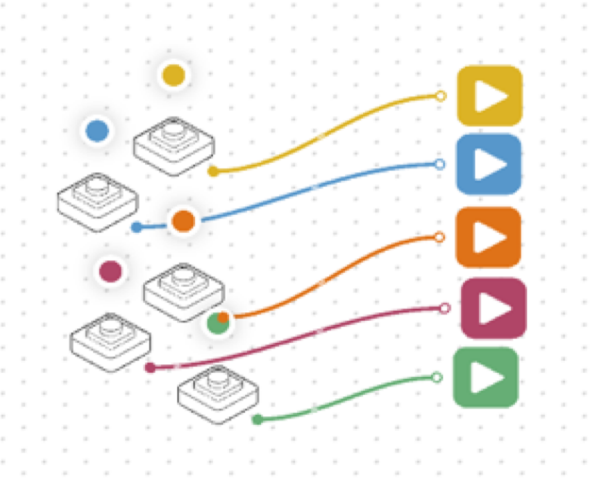
Challenge 1

Step 1.
Drag 2 additional Buttons onto your workspace.

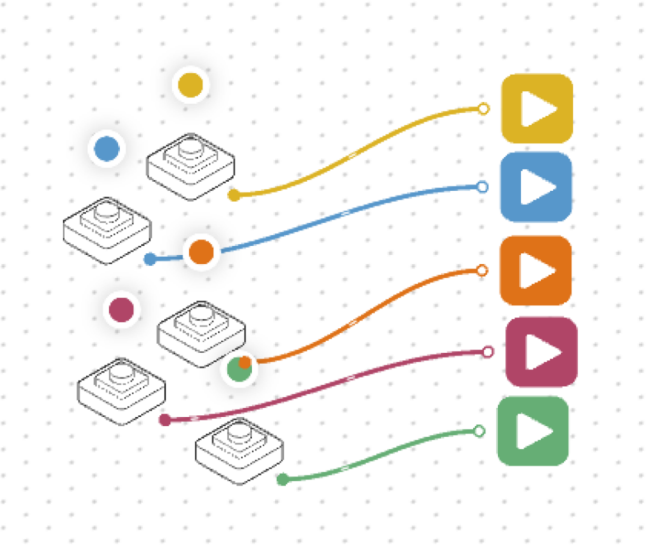


Step 2.
Drag 2 additional Sound Player blocks into your workspace.

Step 3.
Connect your Buttons to the Sound Player blocks.



Challenge 1



Step 4.
Program your sounds in the remaining Sound Players. Test your system.

Step 5.
Read your story to a partner. Encourage them to join in, pressing the Buttons in the correct places.

Checks for Understanding

1. ***What is your input, what is your output?***

   A. Input = Sound Player, Output = Button

   B. Input = Button, Output = Sound Player

   C. Input = Button, Output = Screen

2. **How have you made your storybook interactive?**

   A. By programming a sound when a word is said

   B. By writing a story

   C. By working with a partner

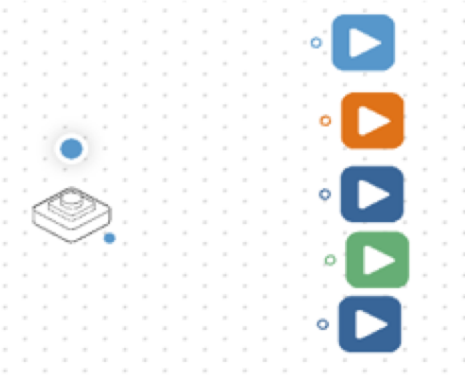
Challenge 1 - Debug it!

Step 1.
Create a label for your sound on a Post-it.

Step 2.
Label your blocks so the reader knows which Button produces each sound.

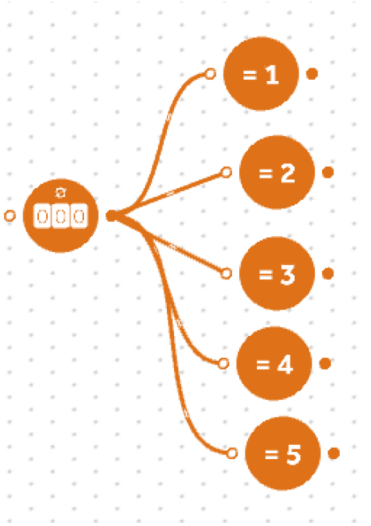
Challenge 2

Step 1.
Remove 4 Buttons so you are left with just one Button in your workspace.



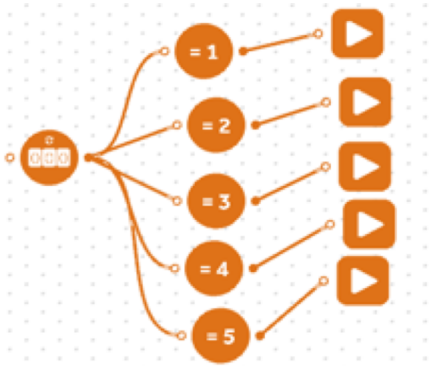
Step 2.
Drag a Counter block into your workspace and program it to reset after ‘5’.

Step 3.
Drag 5 Compare blocks into your workspace. Set the Compare blocks so they read =1, =2, =3, =4, =5 and connect them all to the Counter block.



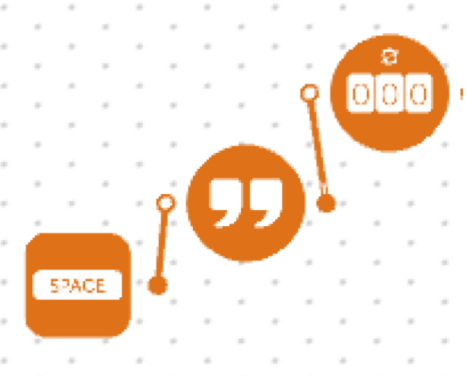
Challenge 2

Step 4.
Connect the output of the Compare block to the input of the Sound Player blocks.



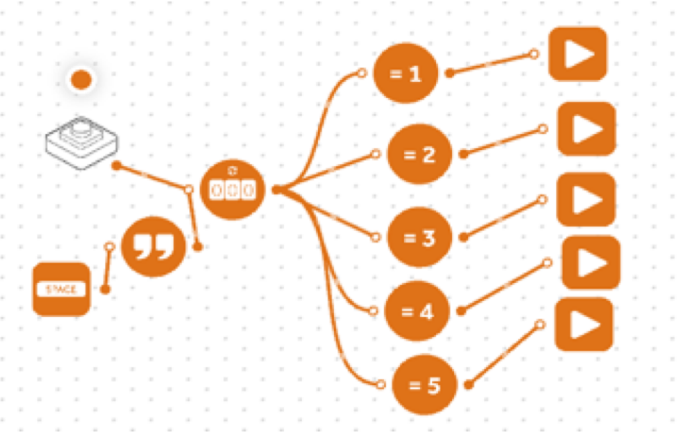
Step 5.
Drag a Key Press block and Text block onto your workplace. Click on the settings icon of the Text block. Type the word ‘reset’ into the field.

Step 6.
Connect the Key Press block to the Text block. Connect the output from the Text block to the input of the Counter.



Challenge 2

Step 7.
Connect the Button to Counter block. As you read a word, press the Button. Test your system.



Checks for Understanding

1. ***Why is it important to test a system while you are developing it?***

   A. You may not know if your system will work

   B. It makes it easier to find the problems.

   C. So you can find the mistakes as you go along.

2. ***What is an onomatopoeia?***

   A. A word which names the sound as well as sounding like the sound.

   B. A word the relates to a sound like chuckle or laugh

   C. A complicated word.

Exit ticket

✓ **Today I learned…**

SAM Safe

Warm Up

1.

2.

3.

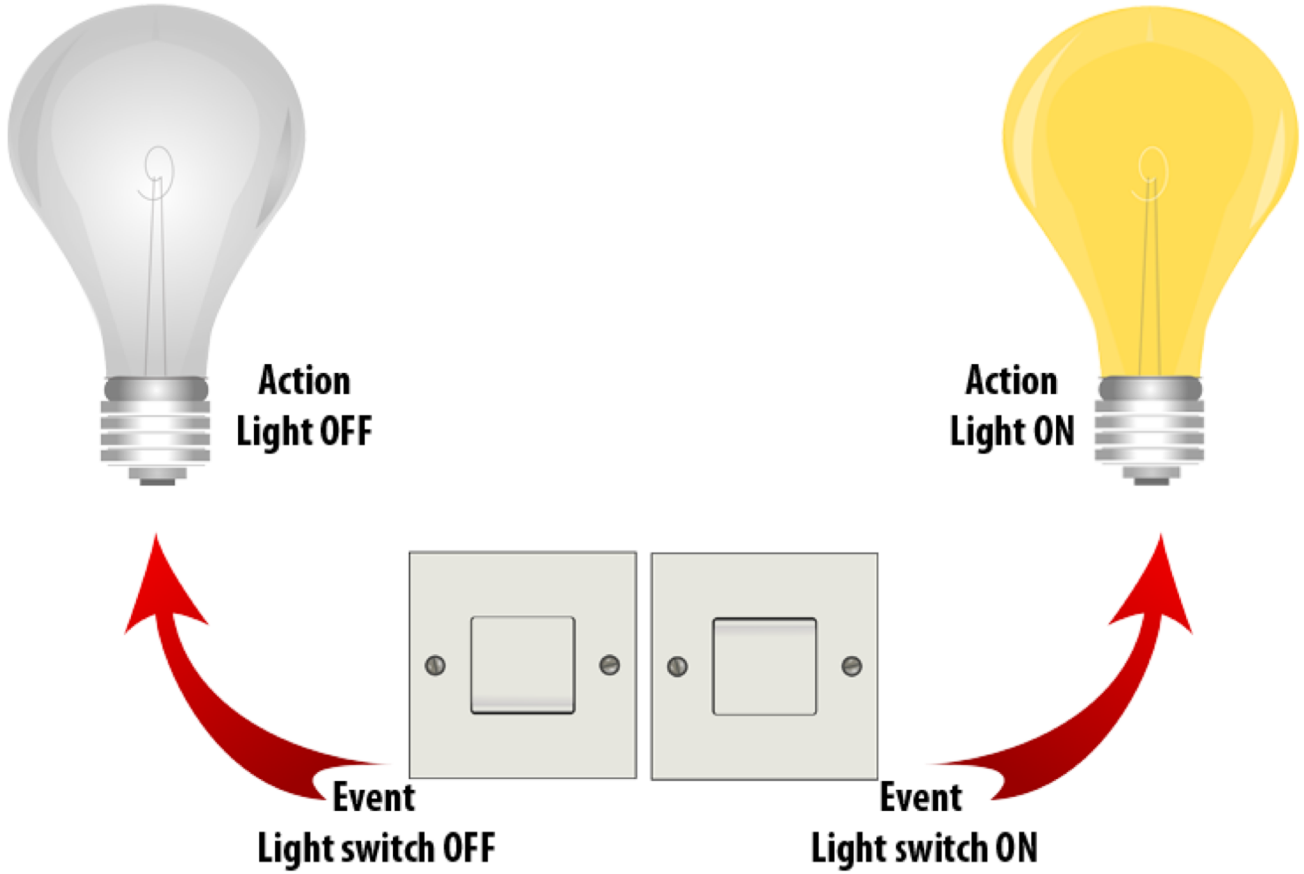
4.

5.

What is an algorithm?

Mini-lesson

Constructing an algorithm with 'Events' and 'Actions'



Keywords

Match or define keywords in your workbook

- Algorithm
- Input
- Output
- Event
- Action

Let's Discuss

1. ***In computing terms, what is a set of instructions called?***

   A. Event and Action.

   B. Algorithm.

   C. A List.

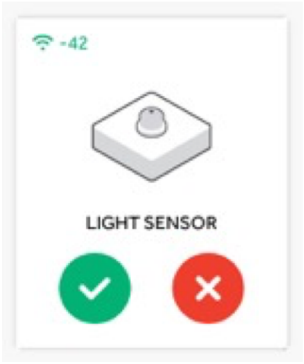
2. In your workbook or with a partner, record, discuss, or share the event and action for your safe and how they will work together.

Worked Example

Step 1.

Turn on and pair:

- 1 Light Sensor block
- 1 RGB LED block



Step 2.

Drag onto the workspace:

- Light Sensor block
- RGB LED block
- 2 x Compare blocks

Step 3.

Connect the blocks in the following order:

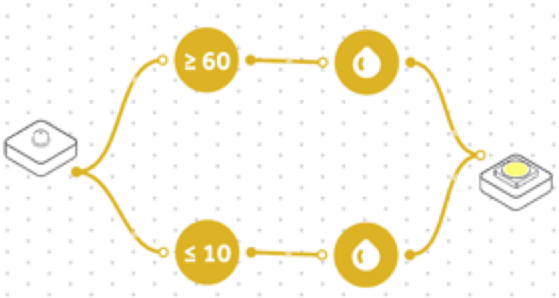
- Light Sensor block to both Compare blocks
- Both Compare blocks to the RGB LED block.

Worked Example

Step 4.
Access the settings icon of:

- The first Compare block and set it to ‘≥60’.
- The second Compare block and set it to ‘≤10’.

Step 5.
Drag two Color blocks onto the workspace. Connect one between each of the Compare and RGB LED blocks.



Step 6.
Access the settings of the Color blocks and set the Color block:

- After the ‘≥60’ Compare block to red
- After the ‘≤10’ to yellow.

Worked Example

Step 7.
Fix your Light Sensor inside your safe and your RGB LED outside of it. Test your system.

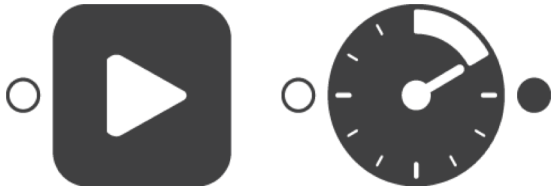
If *the box is closed,* ***then*** *the RGB LED is yellow.*
If *you open the box,* ***then*** *the RGB LED turns red.*

Challenge 1

Step 1.

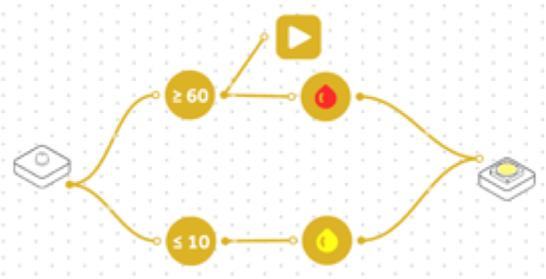
Drag onto the workspace:

- Sound Player block
- Interval block.



Step 2.

Connect the Sound Player block to the output of the '≥60' Compare block.

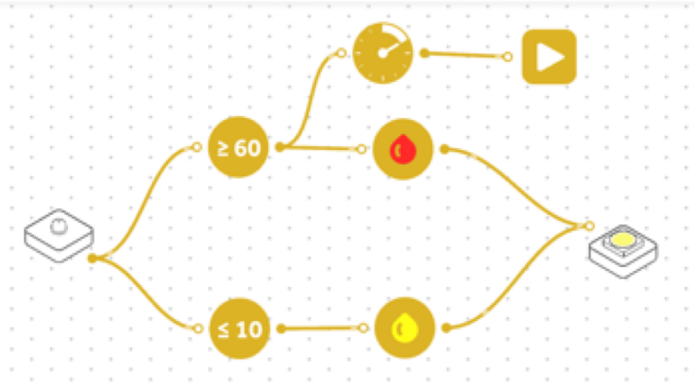


Step 3.

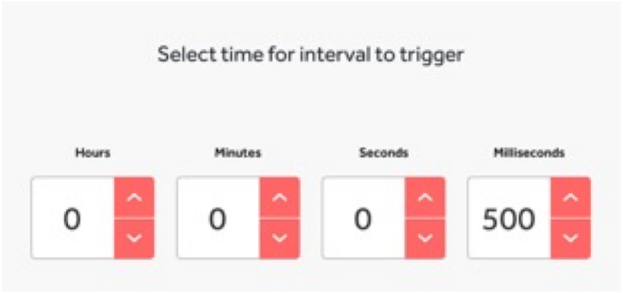
Access the settings of the Sound Player block and select a sound for your alarm.

Challenge 1

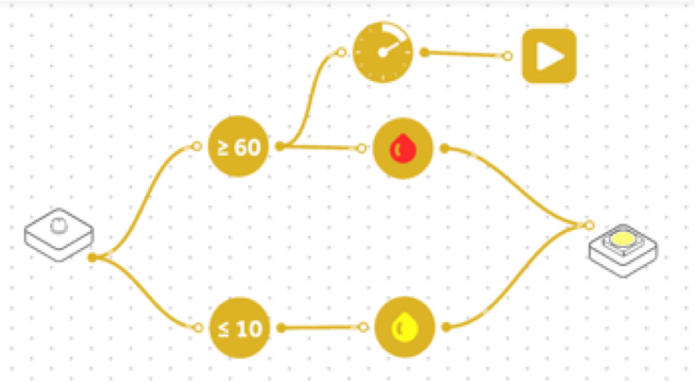
Step 4.
Connect the Interval block between the '≥60' Compare and the Sound Player blocks.



Step 5.
Access the settings of the Interval block and set to '500' milliseconds.



Step 6.
Test your system.



Checks for Understanding

1. ***What does the symbol ≥ mean?***

   A. *Greater than*

   B. *Greater than and equal to*

   C. *Less than and equal to*

2. ***What is the output of an 'event'?***

   A. *Action*

   B. *Input*

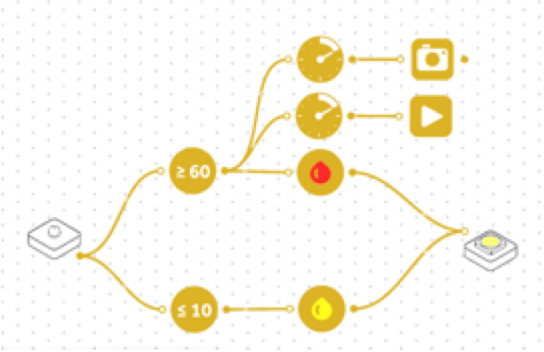
   C. *Output*

Challenge 1 - Debug it!

Step 1.
What is the resting value of the Light Sensor?

Step 2.
Access the settings of the '≥60' Compare block and edit the number to ensure it is greater than the room resting value.

Step 3.
Test your system.



Challenge 2

Step 1.
Drag onto the workspace:

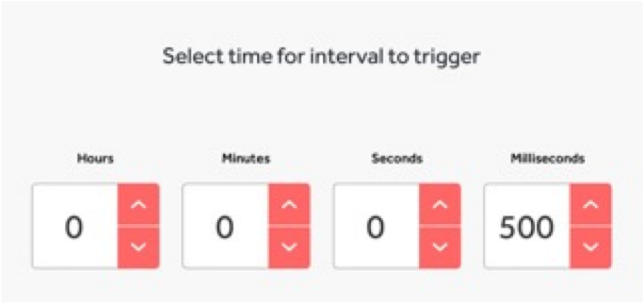
- Camera block
- Interval block

Step 2.
Connect the '≥60' Compare block to the Interval block.

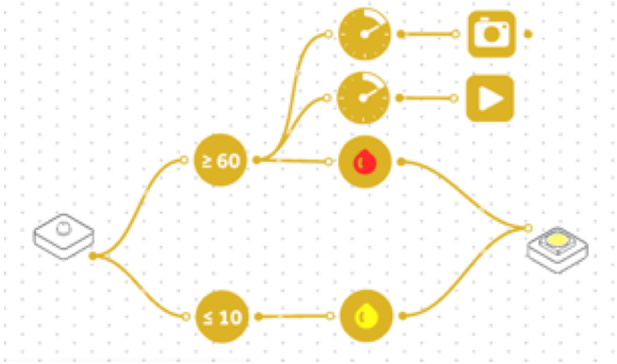
Step 3.
Connect the Interval block to the Camera block.

Challenge 2

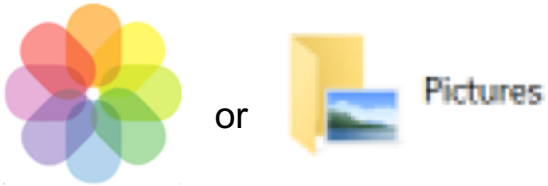
Step 4.
Access the settings of the Interval block connected to the Camera block and set to 500 milliseconds.



Step 5.
Test your system.

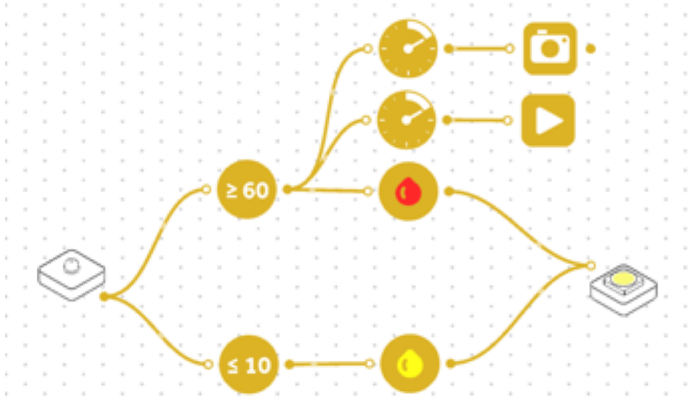


Step 6.
Access the photos.



Challenge 2

Step 7.
Discuss the system.



Checks for Understanding

1. ***What is the purpose of the Interval block to the Camera block?***

   A. To take one picture

   B. To keep taking pictures at random intervals

   C. To keep taking pictures at set intervals

2. ***What is the event in this system?***

   A. Compare block

   B. Light Sensor block

   C. RGB LED block

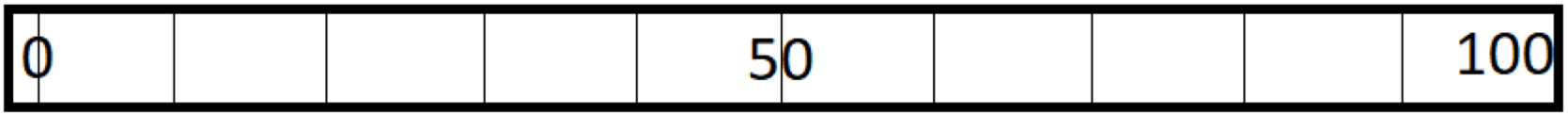
Exit ticket

Today I learned...

Round and Round

Warm Up

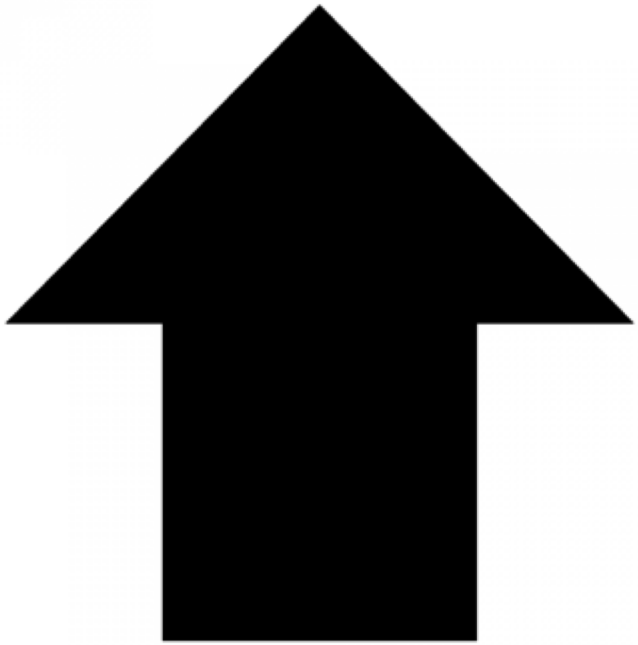
Where do they go?

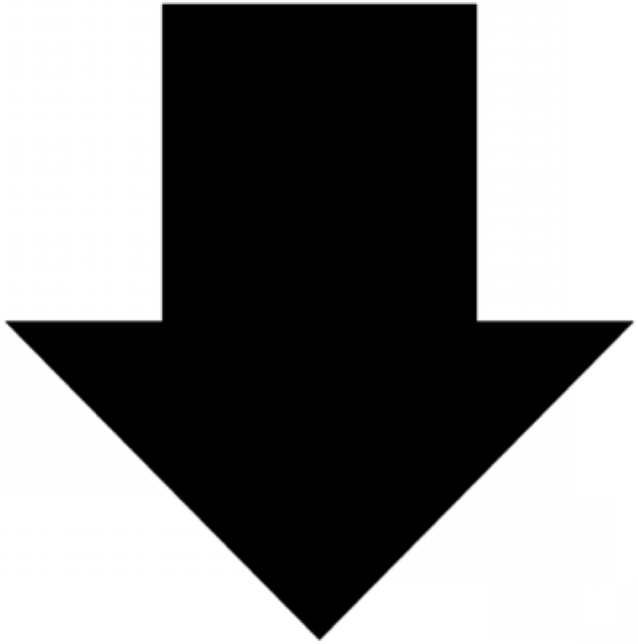


36 83 79 11 45 62

Mini-lesson

Up or down?





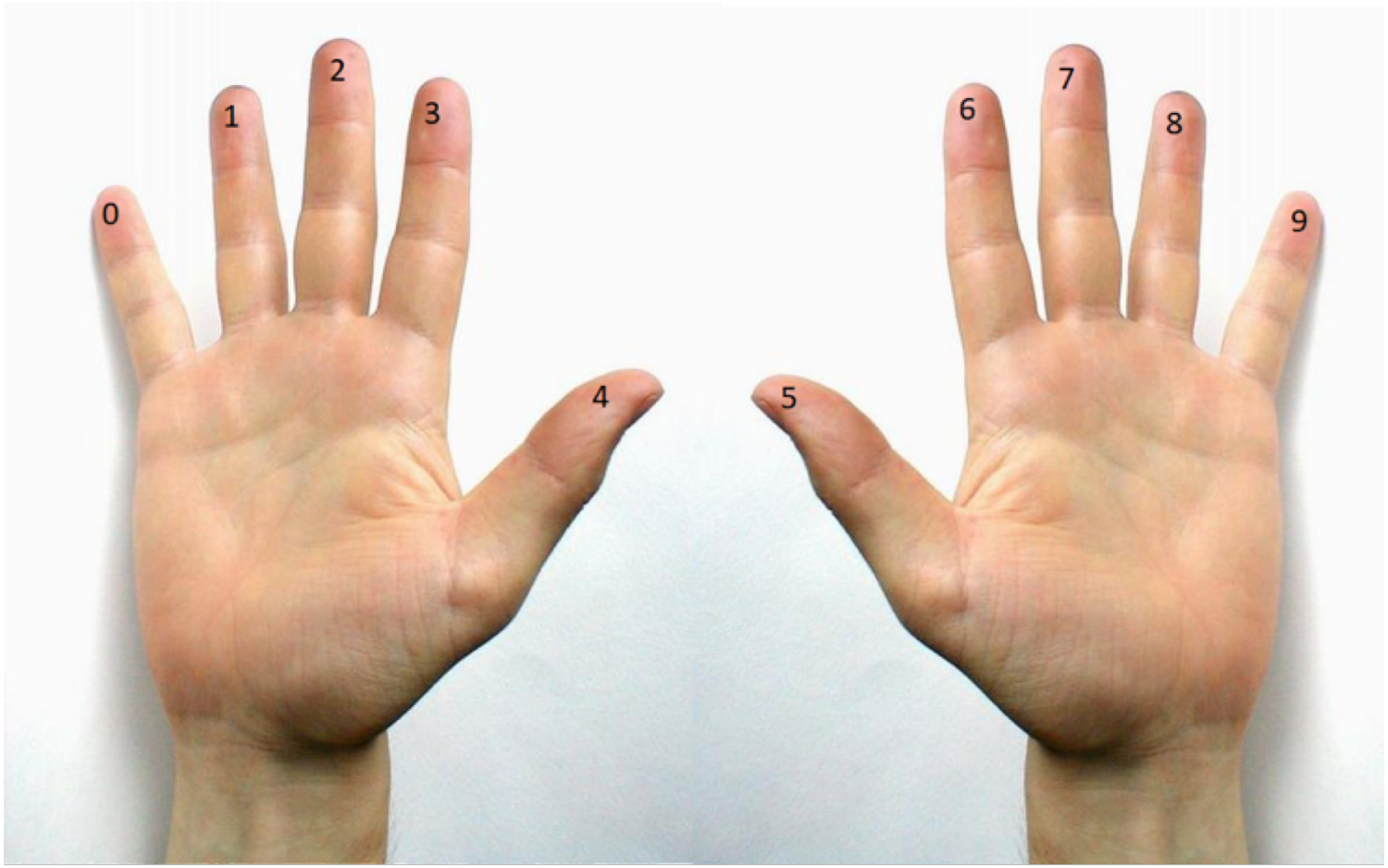
Keywords

Match or define keywords in your workbook

- Tens
- Half way
- Ones
- Round

Mini-lesson

When to round up or down?



Let's Discuss

1. ***Why does a number with a 5 in the ones place round up?***

   A. *5, 6, 7, 8 and 9 round up, they are half of the ones.*

   B. *Because 5 is in the middle.*

   C. *5 doesn't round up, 5 rounds down.*

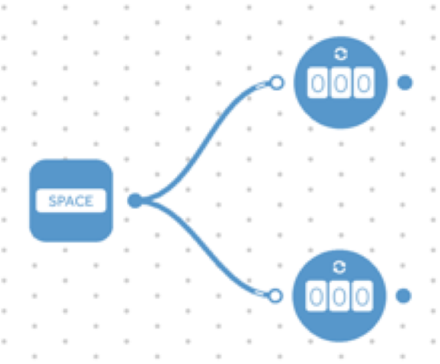
2. In your workbook or with a partner, record, discuss, or share how you would explain rounding to your family.

Worked Example

Step 1.
Drag a Key Press block onto the workspace.

Step 2.
Drag 2 Counter blocks onto the workspace.

Step 3.
Connect the Key Press block to both of the Counter blocks.



Worked Example

Step 4.

Open the settings for 1 of the Counter blocks. Set the Counter block to go from 0 - 9. Leave the settings for the other Counter block alone.

Challenge 1

Step 1.
Disconnect the Key Press block from the 2 Counter blocks.

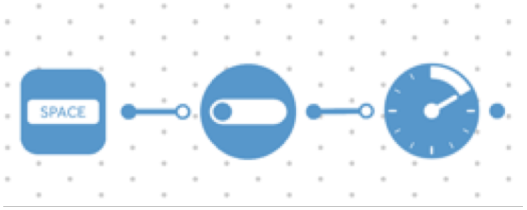
Step 2.
Drag a Toggle block onto the workspace.

Step 3.
Connect the Key Press block to the Toggle block.

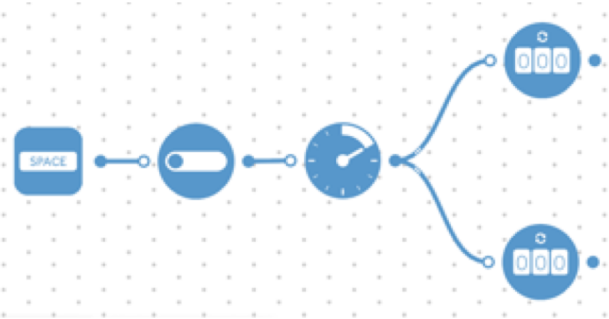
Challenge 1

Step 4.
Drag an Interval block onto the workspace.

Step 5.
Connect the Toggle block to the Interval block.



Step 6.
Connect the Interval block to both of the Counter blocks.



Checks for Understanding

1. ***If I round to the nearest ten what is in the ones place?***

   A. *5*

   B. *0*

   C. *9*

2. ***How do we decide when to round up and when to round down to nearest ten?***

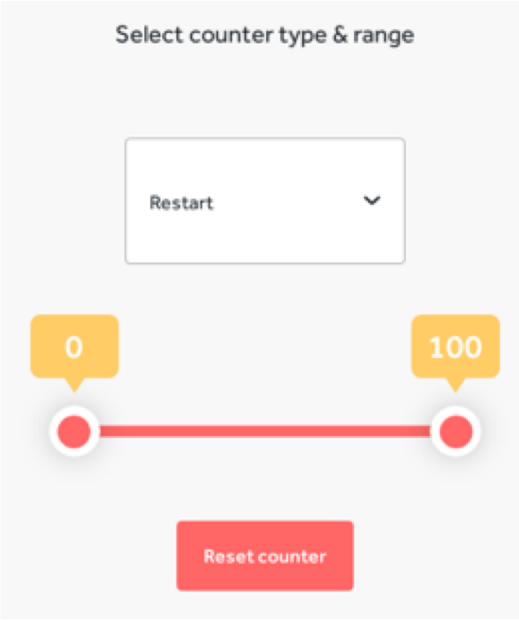
   A. *Look at the ones place*

   B. *Look at the tens place*

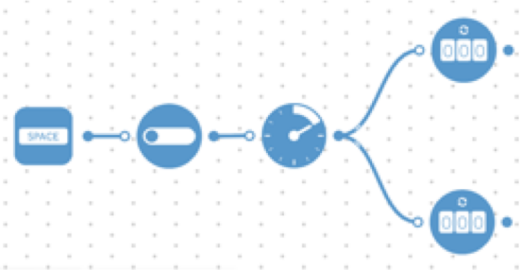
   C. *The whole number is important*

Challenge 1 - Debug it!

Step 1.
Open the Settings icon for the Counter blocks to check settings.



Step 2.
Remove any direct connection between the Key Press block and the Counter blocks.

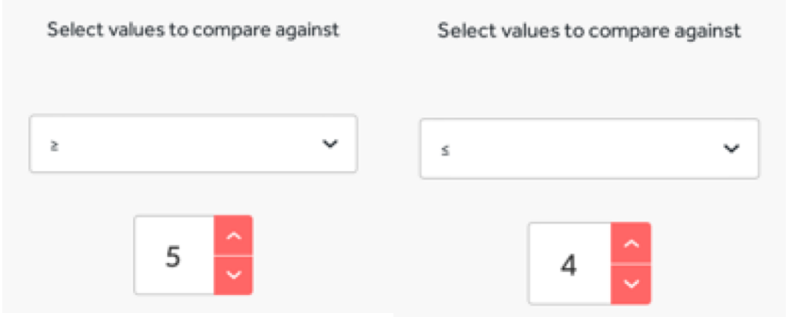


Challenge 2

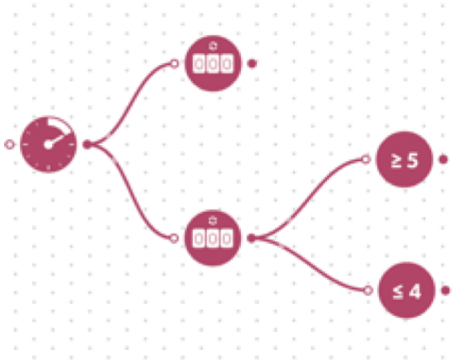
Step 1.
Drag 2 Compare blocks onto the workspace.

Step 2.
Access the settings;

- 1st Compare block set to ≥5 ‘greater than and equal to 5’.
- 2nd Compare block set to ≤4 ‘less than and equal to 4’.



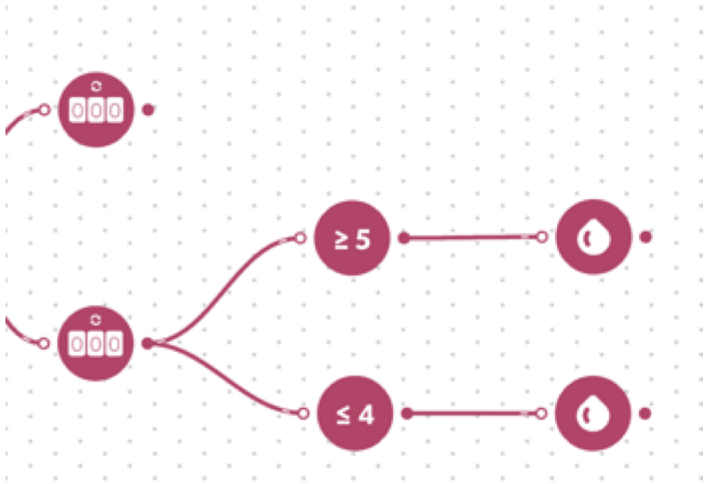
Step 3.
Connect the output of the bottom Counter block, that is set to 0 - 9, to both inputs of the Compare blocks.



Challenge 2

Step 4.

- Drag 2 Color blocks onto the workspace.
- Connect 1 Color block to each of the Compare blocks.



Step 5.

Change the color settings:

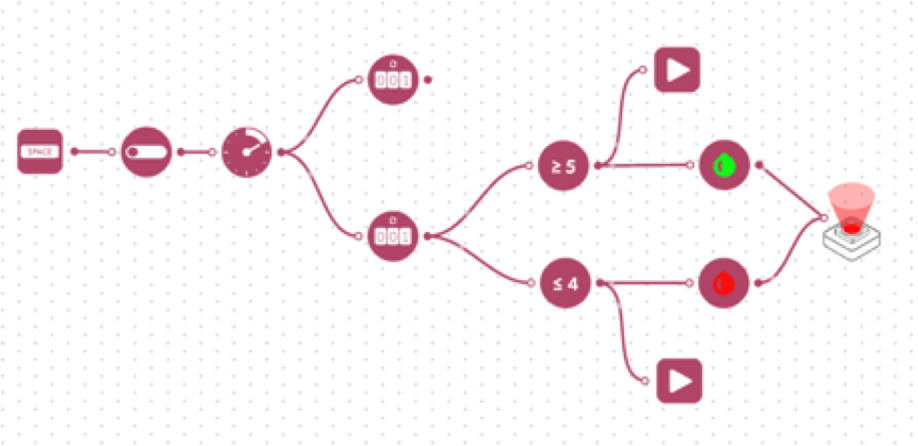
- The Color block connected to the ≥ 5 Compare block to green.
- The Color block connected to the ≤4 Compare block to red.

Challenge 2

Step 6.
Drag 2 Sound Player blocks onto the workspace.

- Connect one to the ≥5 Compare block and set it the note ‘ti’
- Connect the other to the ≤4 Compare block and set it the note ‘do’.

Step 7.
Test the system to ensure that the lights and sounds change with the count.



Checks for Understanding

1. ***Why are there two Compare blocks from 1 of the Counter blocks and none for the other?***

   A. *1 of the Counter blocks tells when to round.*

   B. *1 of the counter blocks changes more quickly.*

   C. *1 of the counter blocks counts in tens.*

2. ***Why do both the Sound and Light blocks have to connect to the Compare blocks?***

   A. *They don't have to connect there.*

   B. *The Compare blocks say when something is true.*

   C. *The Compare blocks can't make sounds or light.*

Exit ticket

✓ **Today I learned…**