Night Light

Which is the best nightlight?

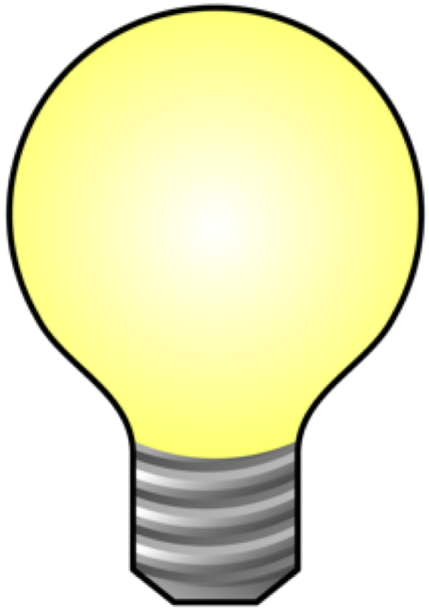
$50

10c

$50

Mini-lesson

What is the purpose of different types of manmade light?



Keywords

Match or define keywords in your workbook

- Purpose
- Reflection
- Design
- Feature

Checks for understanding

1. ***What does the word 'reflection' mean?***

   A. *Light bouncing off anything*

   B. *A mirror*

   C. *Light bouncing off a surface*

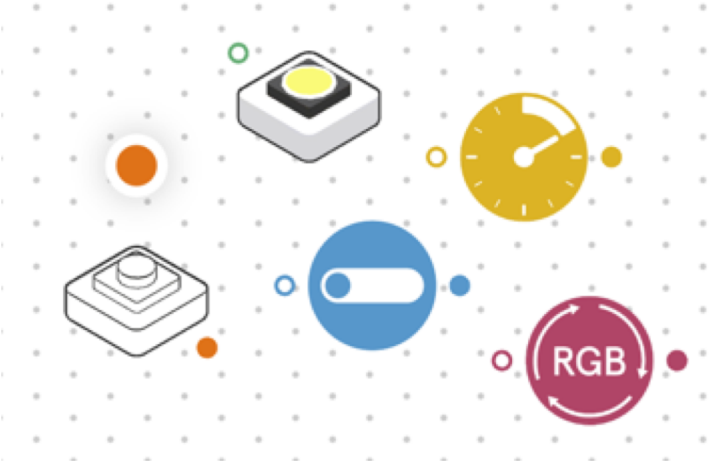
In your workbooks or with a partner, record, discuss, or share one example of manmade light and its purpose.

Worked Example

Step 1.

Drag on and pair:

- Button/Virtual block
- RGB LED block



Drag the following blocks onto the workspace:

- Toggle block
- Interval block
- Cycle Colors block

Step 2.

Connect the blocks together in this order; Button block, Toggle block, Interval block, Cycle Colors block, RGB LED block.

Worked Example

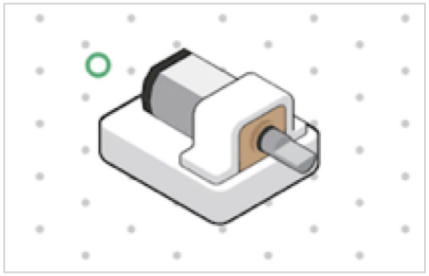
Step 3.
Drag on a second Toggle block. Connect it between the Button and RGB LED.

Step 4.
Place a colander over the top of the RGB LED. Press the Button to activate the system.

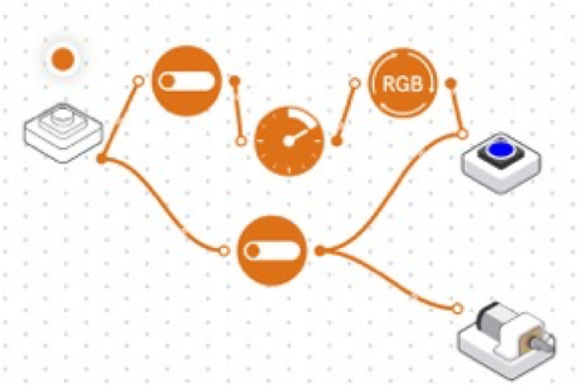
Challenge 1

Step 1.
Turn on and pair:

- DC Motor block



Step 2.
Connect the DC motor block to the output of the toggle block.



Step 3.
Set the motor to clockwise or anti-clockwise. *What are the effects of each direction?*

Challenge 1

Step 4.

Place the wheel on the DC Motor. Secure the RGB LED on across two spokes of the wheel with blu tack.

Step 5.

Place a colander over the top of the blocks and activate the system again.

Checks for Understanding

1. ***Why is it important to make the light stay on without having to constantly press the input?***

   A. *We want to be able to turn it on and off*

   B. *We can't keep a hand on the Button all night*

   C. *Both A and B*

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

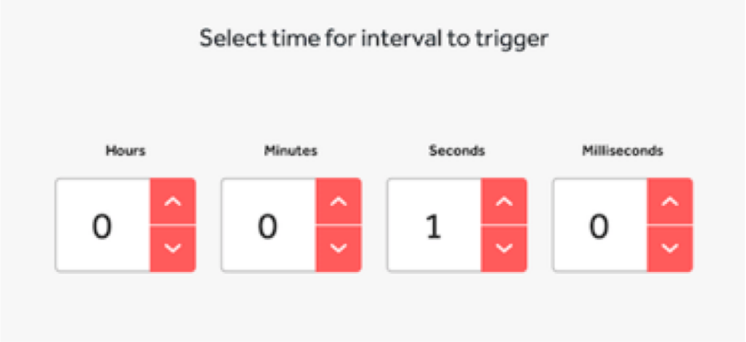
   A. *Red, Green, Brown*

   B. *Red, Green, Blue*

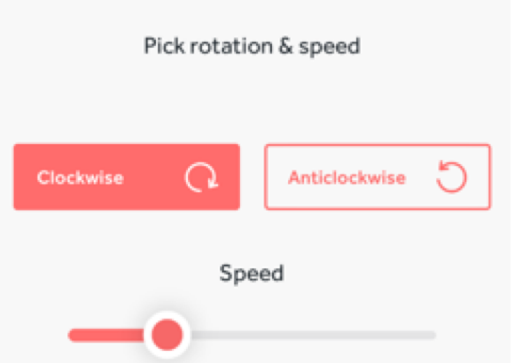
   C. *Red, Grey, Blue*

Challenge 1 - Debug it!

Step 1.
Edit the settings of the Interval block so that the light changes color at a slower rate.



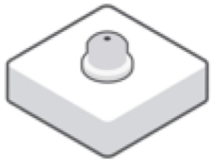
Step 2.
Edit the settings of the DC Motor so that it runs at a slower speed.



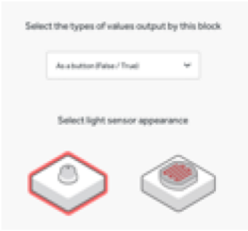
Challenge 2

Step 1.
Remove the Button block.
Turn on and pair:

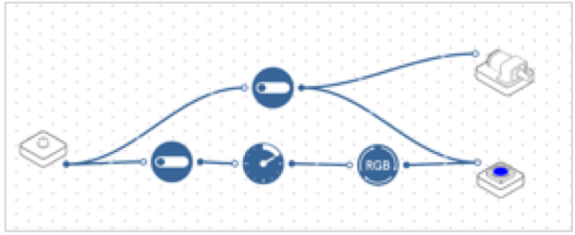
- Light Sensor block



Step 2.
Change the the Light Sensor into a Button.



Step 3.
When the block is covered (making it dark) the system will be activated. *Are there other ways you can improve your night light?*



Step 4.
Present your night light to the class.

Checks for Understanding

1. ***Which block, in our final system, detects light and activates the night light?***
   A. *The Light Sensor*
   B. *The RGB LED*
   C. *The Toggle*

1. ***Which block sets the time for changing the color?***
   A. *The RGB LED*
   B. *The Cycle Colours*
   C. *The Interval*

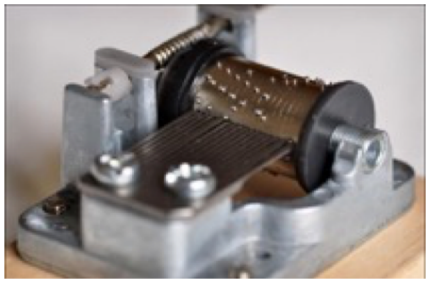
Exit ticket

✓ **Today I learned…**

Music Box

Warm Up

What is the history of music storage?



Mini-lesson

What is similar and different about today's versus yesterday's streaming technology?

Vocabulary

Match or define keywords in your workbook

- On-demand
- Streaming
- Storage
- Compose
- Internet

Checks for understanding

1. ***What is meant by "streaming" music?***

   A. *Listening to music without downloading*

   B. *Playing music whenever you want to listen to it*

   C. *Both of these are true*

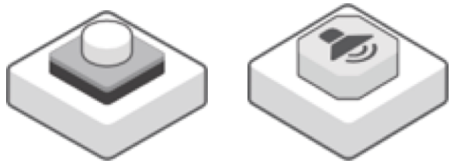
In your workbooks or with a partner, record, discuss, or share what music you like best and how you stream it.

Worked Example

Step 1.

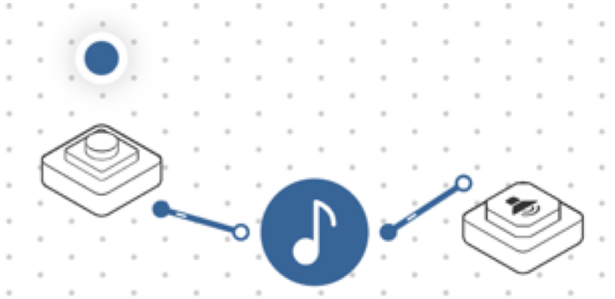
Turn on and pair:

- Button/Virtual Button
- Buzzer/Virtual Buzzer block



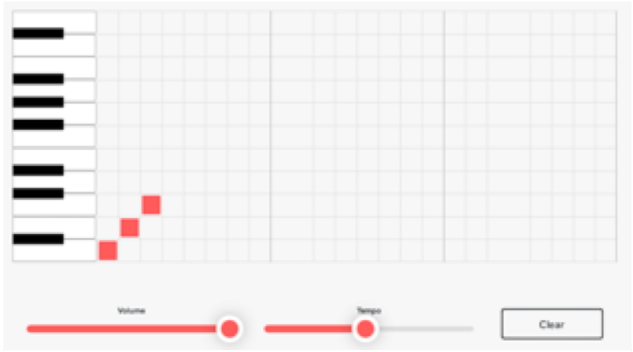
Step 2.

Drag on the Sequencer block. Connect it between the Button and Buzzer blocks.



Step 3.

Open the Settings of the Sequencer block. Choose 3 notes. Test your system.



Worked Example

Step 4.

Add more notes. *Press and hold the Button to play the sequence.*

Challenge 1

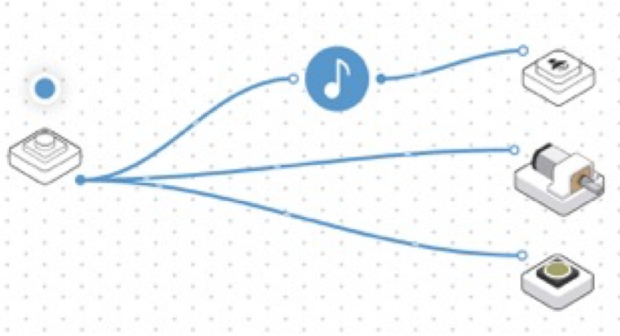
Step 1.

Turn on and pair:

- DC Motor block
- RGB LED

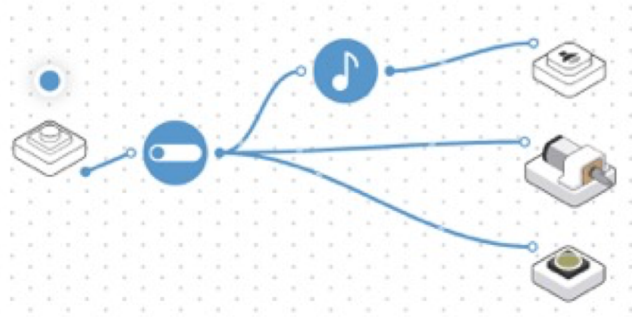
Step 2.

Connect the DC Motor block and RGB LED to the Button.



Step 3.

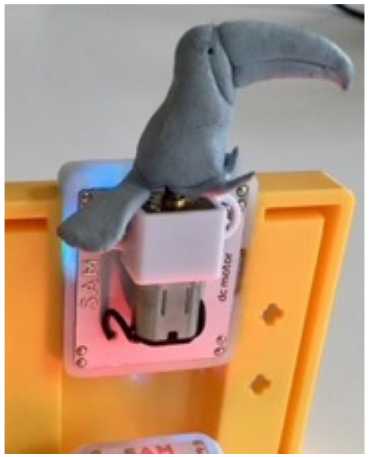
Add a Toggle block to the workspace. Add it between the Button, Buzzer, DC Motor, RGB LED. Test your system.



Challenge 1

Music Box

Step 1.
Create a figurine to attach to the motor.



Step 2.
Use a small box to hold your music box.

Checks for understanding

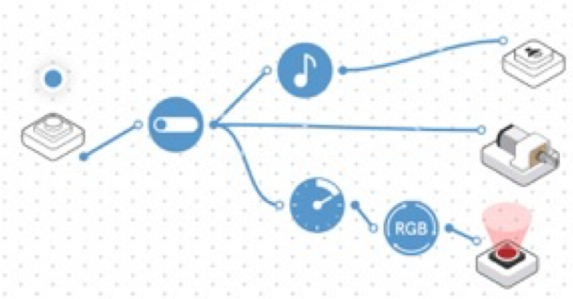
1. ***What does each square represent in the Sequencer?***
   A. *melody*
   B. *sequence*
   C. *note in a sequence, melody or song*

1. ***Where are the Sequencer instructions "sent" to play the music?***
   A. *The Key Press block*
   B. *The Buzzer block*
   C. *The Sequencer block*

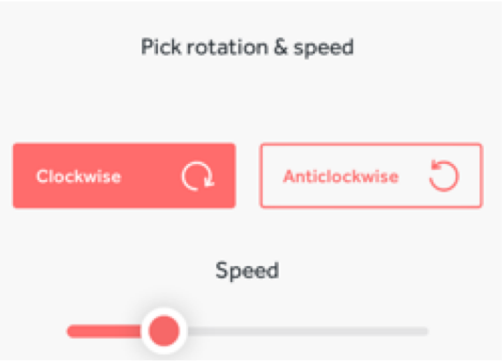
Challenge 1- Debug it

Step 1.
Add a Interval block and Cycle Colors block to the workspace.

Step 2.
Connect them between the Toggle and RGB LED.



Step 3.
Edit the Settings of the DC Motor block so that it rotates at a slower speed. Test your system.



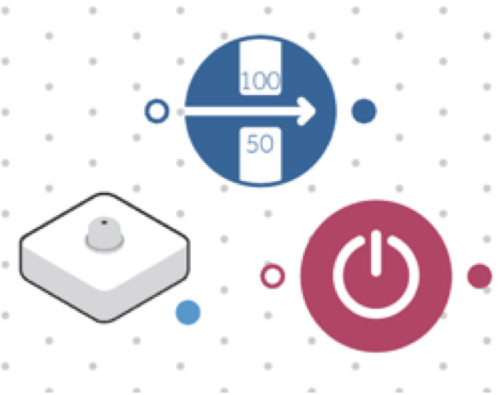
Challenge 2

Step 1.

Remove the Button block.
Turn on and pair:

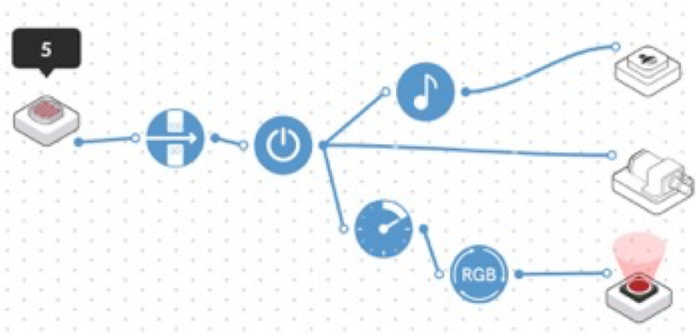
- Light Sensor block

Drag a Filter and On/Off blocks onto the workspace.



Step 2.

Connect the Filter to the Light Sensor and the On/Off Block to the Filter and Interval, Sequencer and DC Motor blocks.



Step 3.

Set the Filter value to ‘50-100’.
Test your system.

Checks for understanding

1. ***Which block is the input in the final system?***

    A. *The Sequencer block*

    B. *The Light Sensor block*

    C. *The Buzzer block*

1. ***Which part of the system stores the melody?***

    A. *The Buzzer block*

    B. *The Sequencer block*

    C. *The Key Press block*

Tidy Up/Exit Ticket

✓ **Today I learned….**

Sow and Grow

Warm Up

Can we observe change as it takes place?

Mini-lesson

Exploring the speed of change

Keywords

Match or define keywords in your workbook

- Imperceptible
- Perceptible
- Observe
- Change
- Grow

Let's Discuss

1. ***What does "perceptible change" mean?***

   A. *A change you cannot see.*

   B. *A change that you can see.*

   C. *A change you can see from one angle.*

In your workbooks or with a partner, record, discuss, or share one example of perceptible and imperceptible change.

Worked Example

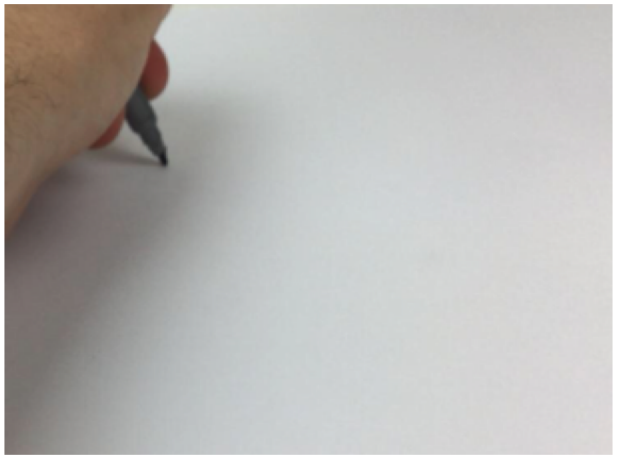
Step 1.
Drag the Time Trigger block, Interval Block and Camera block onto the Workspace.

Step 2.
Set the Time Trigger block to a few minutes after the current time and the Interval block at 10 second intervals.

Worked Example

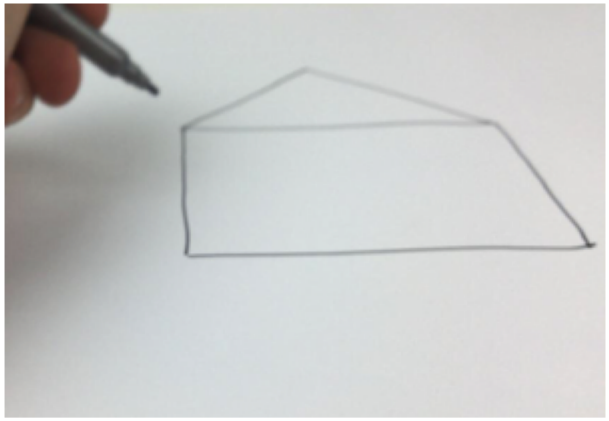
Step 3.
Connect the blocks in this order;
Time Trigger block to Interval block
to Camera block.

Step 4.
Position the camera so that it is pointing
at a piece of paper.



Worked Example

Step 5.
Draw a picture.

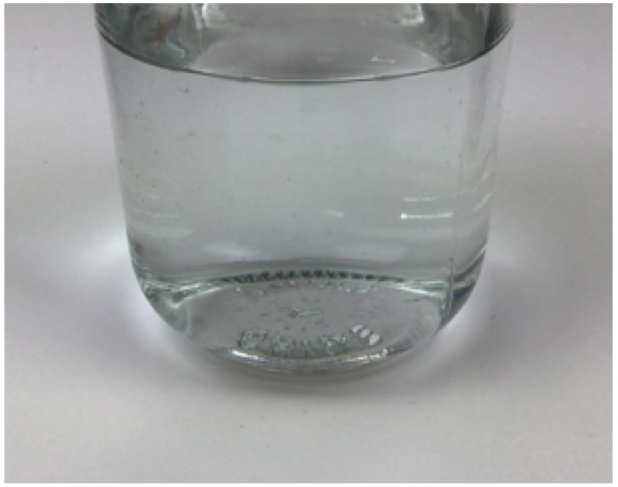


Step 6.
After one minute ask them to stop
and to check the photos in the device.

Challenge 1

Step 1.
Starting with the system created in the worked example.

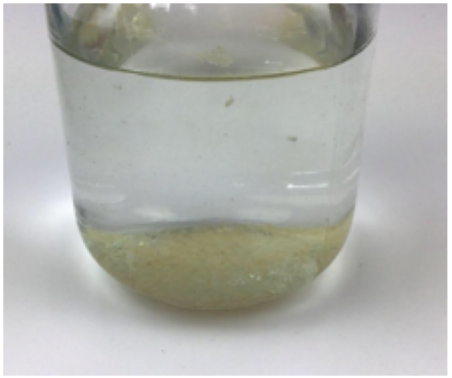
Step 2.
Place a glass with some water in front of the camera.



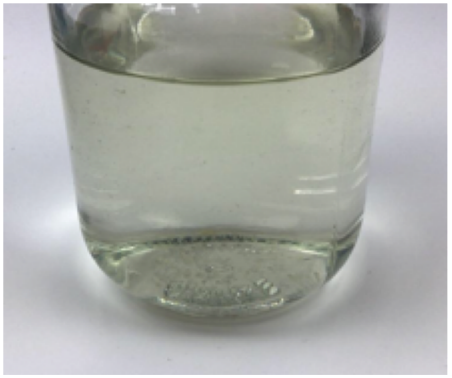
Challenge 1

Step 3.
Set the Interval block to trigger every 20 seconds. Set the Time Trigger block to start a few minutes ahead.

Step 4.
When the actual time is the same as the Time Trigger block, put a small amount of sugar in the water and start the system.



Step 5.
After 3 minutes look at the pictures.



Checks for understanding

1. **Which block communicates with the Camera to take the pictures every 20 seconds?**

   A. *Time Trigger block*

   B. *Interval block*

   C. *Camera block*

1. ***What is the purpose of the Time Trigger block?***

   A. *To take the picture*

   B. *To set the time the pictures need to be taken*

   C. *To set the start time of the system*

Challenge 1- Debug it!

Step 1.
Edit the Settings of the Interval block so that they capture the sugar dissolving.

Challenge 2

Step 1.
Put a folded sheet of wet kitchen roll in the bottom of the pot. Place cress seeds on top of the kitchen roll, evenly space apart. Cover the seeds with a few cotton balls. Place the pot near a window.

Step 2.
Add 7 time trigger blocks and a Camera block to the workspace.

Challenge 2

Step 3.
Edit the settings of all the Time Trigger blocks to the same time for 7 consecutive days.

Challenge 2

Step 4.

Connect the outputs of the Time Trigger blocks to the input of a Camera block.

Step 5.

Leave the system for 7 days.
Present your findings.

Checks for understanding

1. ***Why did the Time Trigger blocks have the same time each day?***

   A. *So you can take the picture*

   B. *To make it a fair test with equal time between pictures*

   C. *Easier to set the Time Trigger block by just changing the date*

1. ***How many inputs are there in this system?***

   A. *So you can take the picture*

   B. *To make it a fair test with equal time between pictures*

   C. *Easier to set the Time Trigger block by just changing the date*

Tidy Up/Exit Ticket

✓ **Today I learned….**

Resistance and Friction

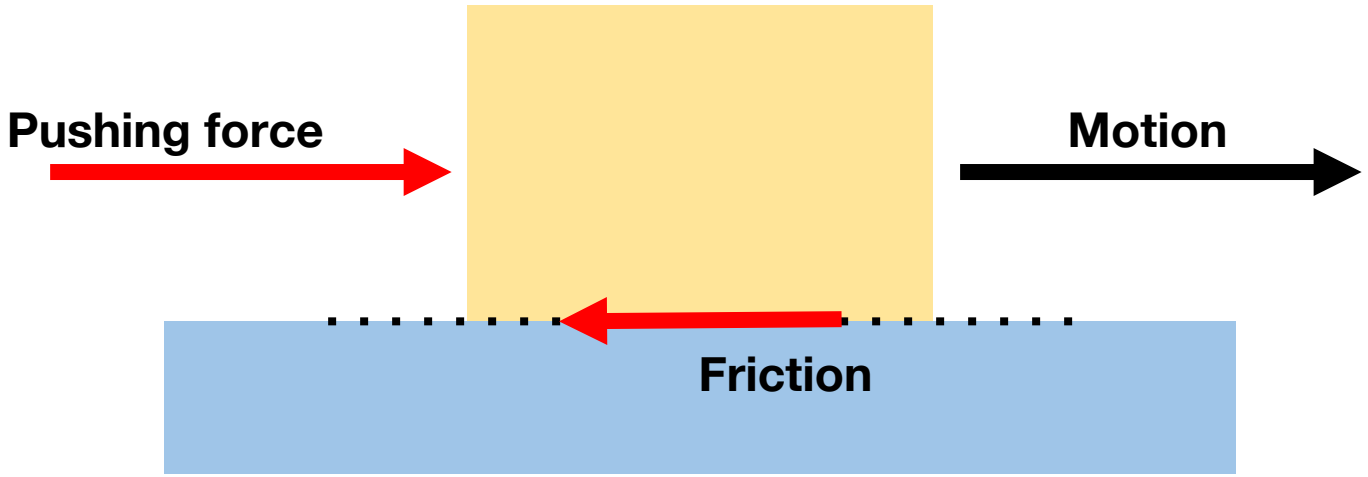
What do they mean?

Can you find the common meaning behind these warning signs?

Mini-lesson

What is friction?

Why is friction important when designing vehicles?



Keywords

Match or define keywords in your workbook

- Friction
- Force
- Rover
- Resistance

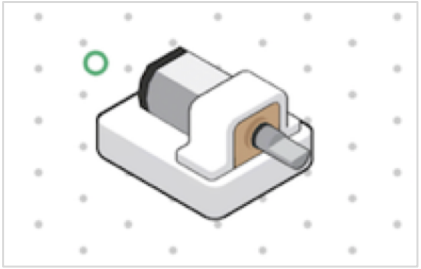
Checks for understanding

1. ***What is unhelpful friction?***
   A. *Friction caused between a tyre and the road*
   B. *Friction caused when we don't want it*
   C. *Friction caused when walking*

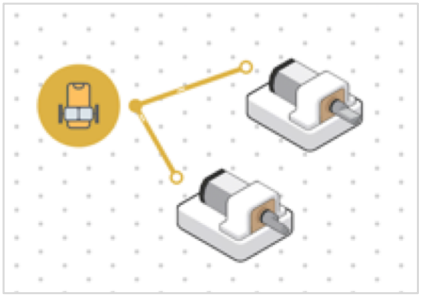
1. ***In your workbook or with a partner, record, discuss, or share one example of 'Helpful Friction' and 'Unhelpful Friction'.***

Worked Example

Step 1.
Turn on and pair 2 DC Motor blocks.



Step 2.
Drag 2 DC Motor blocks and
a Car Controller block onto the Workspace
and connect them together.



Step 3.
Connect the 2 Wheels to the DC Motors and insert into the Yellow Car Chassis. Insert the Rollerball underneath the car.

Worked Example

Step 4.
Test the car using the Car Controller to control the direction and speed of the car.

Step 5.
Test it on grass.

Challenge 1

Step 1.
Make a ramp.

Step 2.
Cover the ramp in cardboard.

Step 3.
Test the car on cardboard.

Challenge 1

Step 4.
Cover the cardboard with foil.

Step 5.
Test the car on foil.

Checks for understanding

1. ***Why do the cardboard and foil surfaces affect the speed of the car or its ability to climb?***

   A. *The friction is reduced on the cardboard*
   B. *The friction is increased on the foil*
   C. *The friction is increased on the cardboard*

1. ***Why does the car move on both surfaces?***

   A. *The Slider makes it move*
   B. *The friction caused between tires and surface make it move*
   C. *The friction caused between tires and surface make it stop*

Challenge 1- Debug it

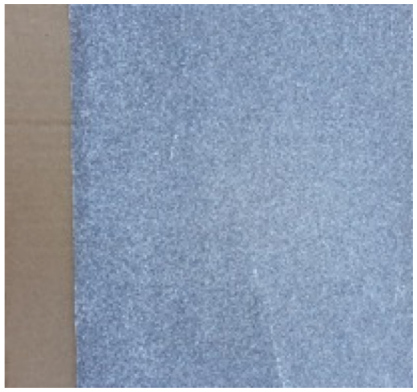
Step 1.
Take the wheels out of the chassis.

Step 2.
Remove the tires from the wheels.

Step 3.
Place the motors back into
the chassis and test.

Challenge 2

Step 1.
Cover the first section of the ramp
with sandpaper.



Step 2.
Place the car at the bottom of the ramp.

Step 3.
Test it.

Step 4.
Test other surfaces.

Checks for understanding

1. ***Why do the tires help the movement?***
   A. *Because minimal friction is produced*
   B. *The tires are too big*
   C. *Rough rubber tires create more friction*

1. ***Why did the car move better on the sandpaper than on the foil?***
   A. *There was no difference*
   B. *The cardboard was too high*
   C. *Sandpaper is rough, so creates more friction and therefore more grip*

Tidy Up/Exit Ticket

✓ **Today I learned….**

Smart Doorbell

Warm up

How can sensors be used in security systems?

Mini-Lesson

How can sensors be used to optimize everyday items or tasks?

Keywords

Match or define keywords in your workbook

- Sensor
- Infrared sensor
- Magnetic sensor
- Temperature sensor
- Heat sensitive sensor

Let's Discuss

1. ***What is a sensor?***

   A. An output in a system.

   B. A part of the system that makes change.

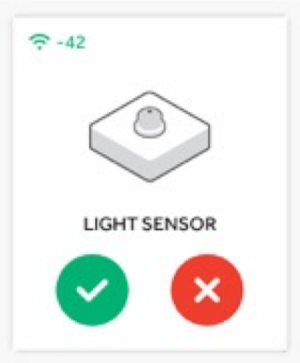
   C. A part of the system that detects change.

2. ***In your workbook or with a partner, record, discuss, or share** on example of how a sensor can be useful to completing an everyday task.*

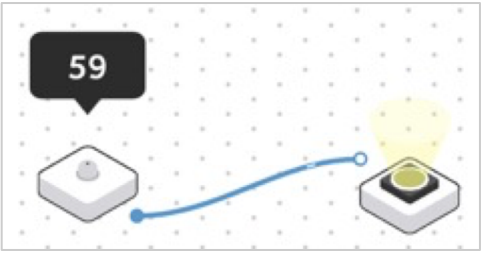
Worked Example

Step 1.
Turn on and pair:

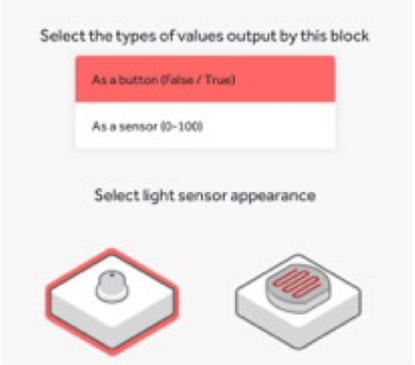
- 1 Button/Virtual Button
- 1 RGB LED block



Step 2.
Drag the Button and RGB LED onto the workspace and connect them.



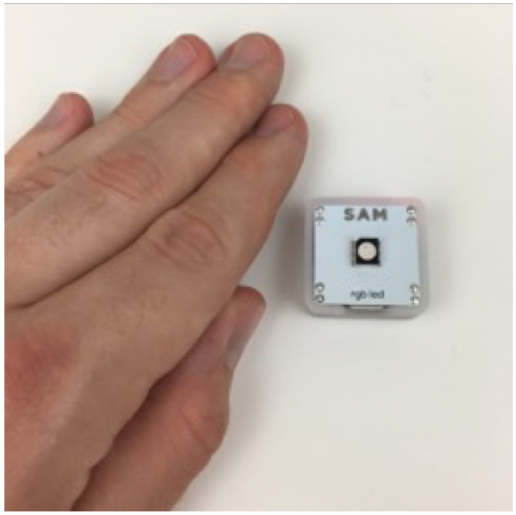
Step 3.
Select the settings icon and turn the Light Sensor into a button.



Worked Example

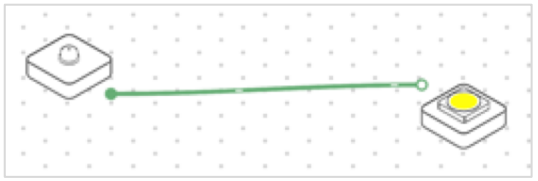
Step 4.

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

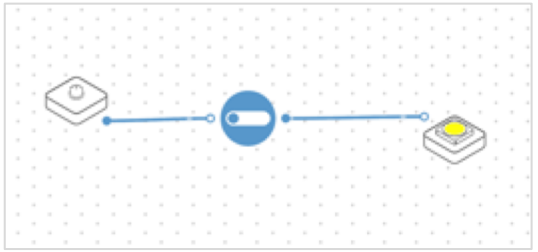


Challenge 1

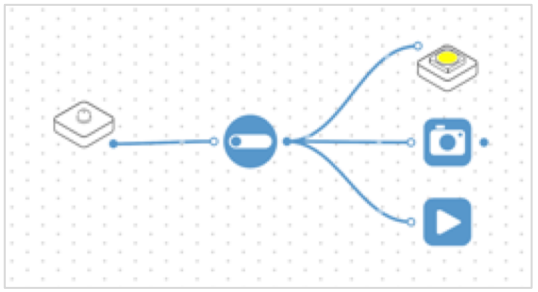
Step 1.
Start with the system from the worked example.



Step 2.
Drag on a Toggle block onto the workspace. Connect it between the the Light Sensor and RGB LED blocks.



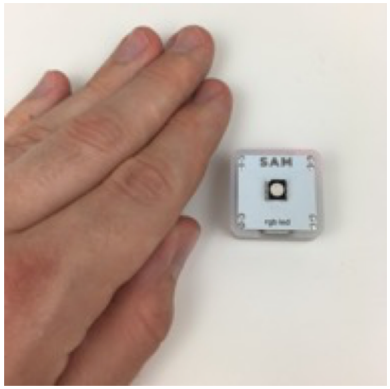
Step 3.
Drag on a Camera Block and a Sound Player block onto the workspace. Connect to the Toggle block.



Challenge 1

Step 4.
Set the Sound Player block to ‘Doorbell’.

Step 5.
Test your system.



Checks for understanding

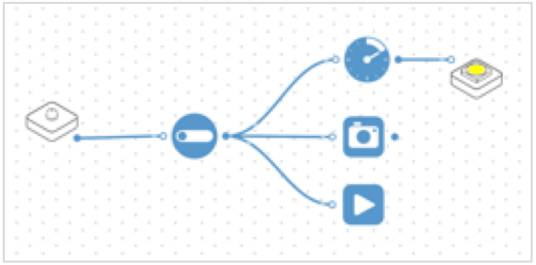
1. ***Which part of the system is the input?***
    A. *Camera block*
    B. *Light Sensor block*
    C. *RGB LED*

2. ***How many outputs are there in the system?***
    A. *1*
    B. *2*
    C. *3*

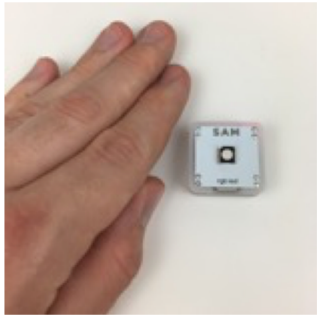
Challenge 1 - Debug it!

Step 1.
Drag on an Interval block to the workspace

Step 2.
Connect the Interval block between the Toggle block and the RGB LED.

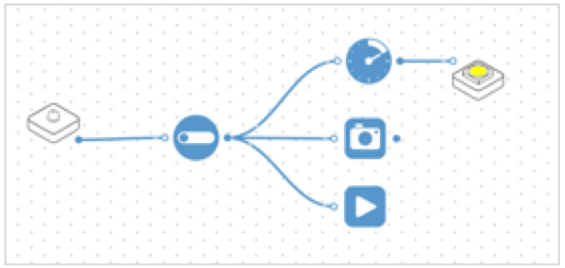


Step 3.
Test your system.



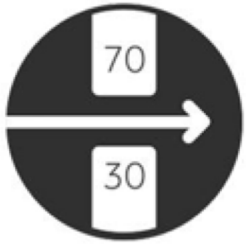
Challenge 2

Step 1.
Start with the system created
in Challenge 1.



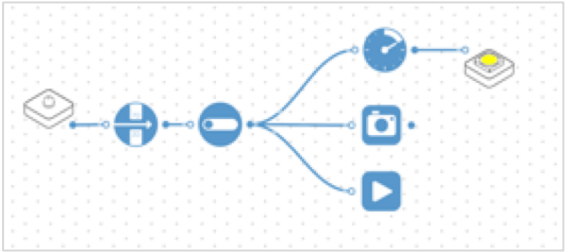
Step 2.
Edit the settings of the Light Sensor block
to be a ‘As a sensor’.

Step 3.
Drag on a Filter block to the workspace.



Challenge 2

Step 4.
Add the Filter block between the Light Sensor block and the Toggle block.

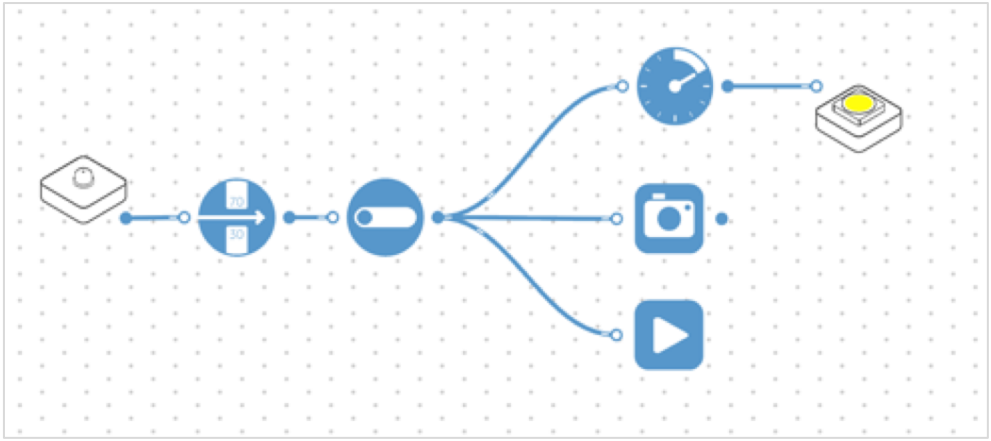


Step 5.
Set the range of the Filter block.

Step 6.
How can you optimize the doorbell further?
For example, if you have the Proximity block swap with the Light Sensor block.

Challenge 2

Step 7.
Test your system.



Checks for understanding

1. ***Why is a Filter block used in the system?***

    A. *To filter the color to the RGB LED*

    B. *To filter the range set from the Light Sensor block*

    C. *To filter the sound to the Sound Player block*

1. ***What is the role of the Interval block in the system?***

    A. *To send the input through at a specified time lapse*

    B. *To give the system a break*

    C. *To send the input through continuously*

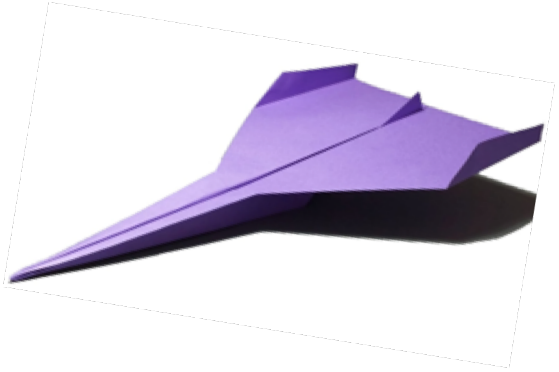
Tidy Up/Exit Ticket

✓ **Today I learned…**

Magnetic Forces

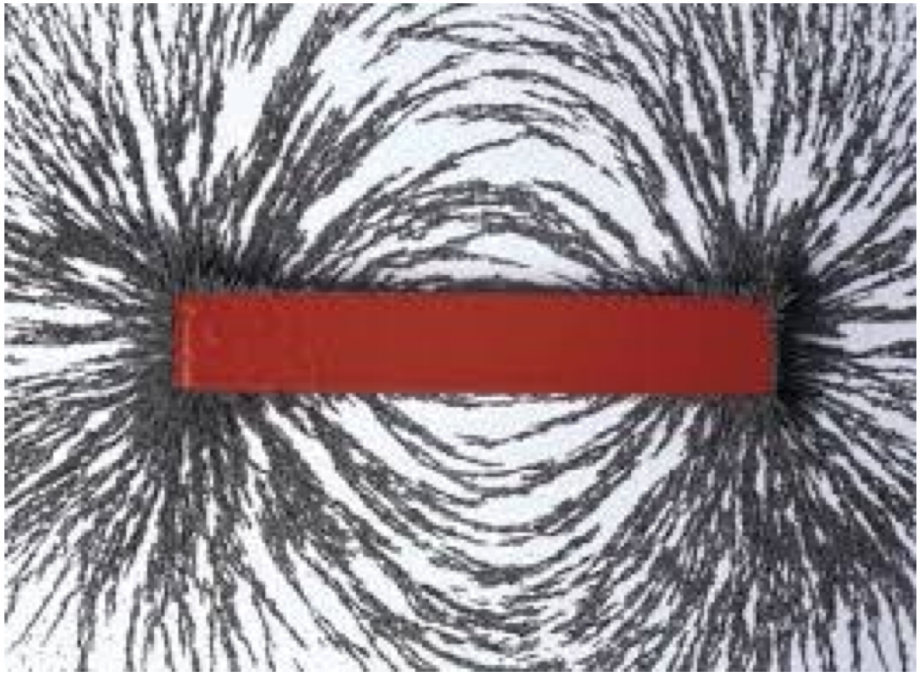
Magnetic Materials

Are all objects attracted to magnets?



Mini-lesson

How do magnets react when placed in contact with each other?



Keywords

Match or define keywords in your workbook

- Attract
- Repel
- Magnetic field
- Poles
- North Pole
- South Pole

Let's Discuss

1. ***Which materials are attracted to magnets?***

   A. All metals

   B. Only some metals

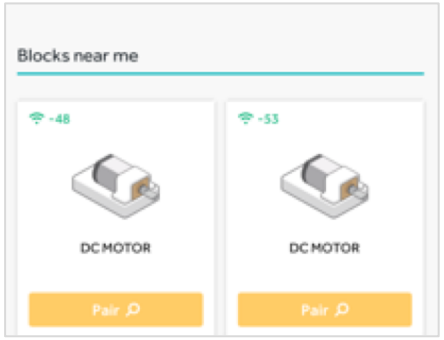
   C. Plastic and glass

2. In your workbook or with a partner, record, discuss, or share why this is the case.

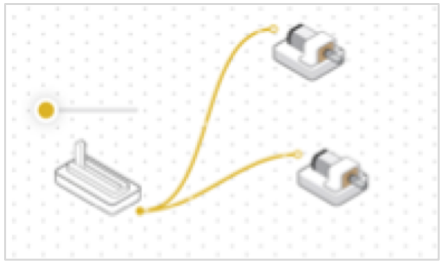
Worked Example

Step 1.
Turn on and pair:

- 2 DC motors
- Slider/Virtual Slider Block



Drag the DC Motors and the Slider onto the workspace.



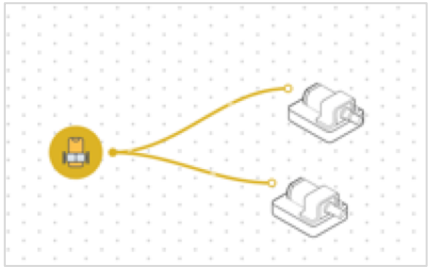
Step 2.
Connect the Slider to both DC Motors.

Step 3.
Click the setting icon of one of the DC motors. Set it to ‘anticlockwise’.

Worked Example

Step 4.
Add the two motors with wheels to the Car Chassis. Add the roller underneath the car. Test your system.

Step 5.
Now, let's try another build. Delete the Slider block by selecting the connection and pressing the 'X'. Drag the Car Controller onto the Workspace and connect it to the motors. Test your system.



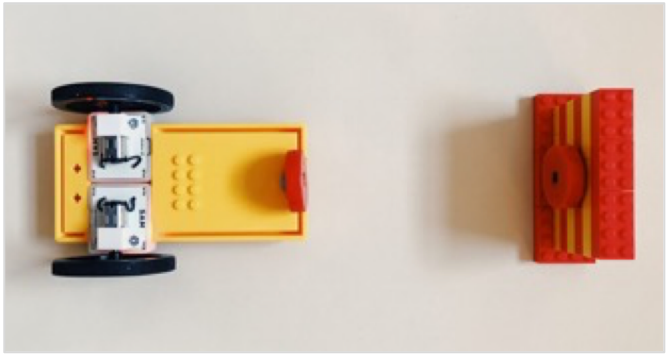
Step 6.
Decide which of the systems will help you conduct the experiment in Challenge 1.

Challenge 1

Step 1.
Attach a magnet to the front of the car.

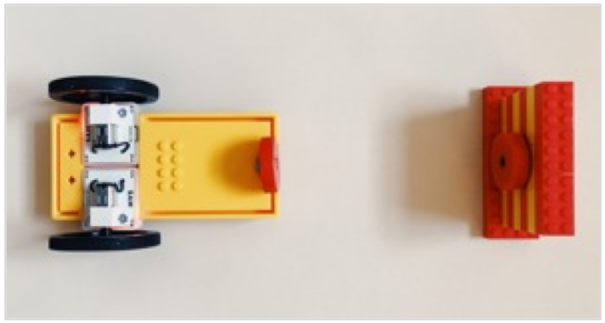
Step 2.
Build a small wall using Lego bricks.
Secure another magnet to the back
of the wall.

Step 3.
Drive the car towards the wall and see
what happens.



Challenge 1

Step 4.
Place a marker on the floor at the point the force of the magnet is first visible. Measure the distance between the marker and the wall.



Step 5.
Alter the orientation of the magnet behind the wall so it is the opposite way round. Repeat Steps 3 and 4.

Checks for Understanding

1. ***When opposite poles are facing, the car will:***

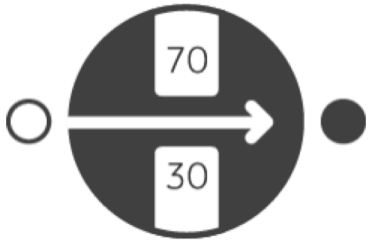
   A. Increase in speed towards the wall
   B. Decrease in speed
   C. Be pushed away from the wall

2. ***When like poles are facing, the car will:***

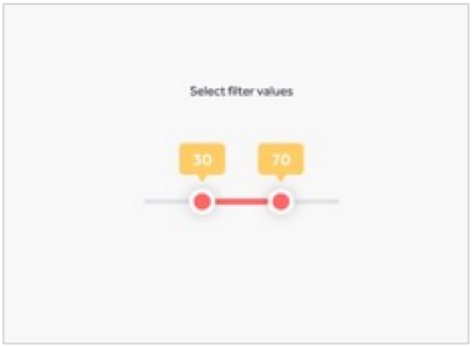
   A. Increase in speed towards the wall
   B. Decrease in speed
   C. Be pushed away from the wall

Challenge 1 - Debug it!

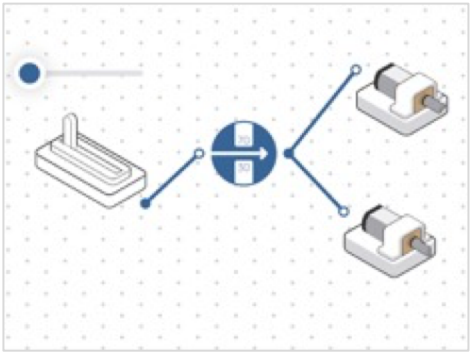
Step 1.
Drag a Filter block onto the workspace.



Step 2.
Enter the settings of the Filter block.
Select a filter of ‘15 - 50’.

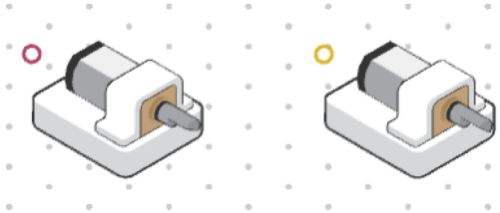


Step 3.
Connect the Filter block between the Slider and DC Motors. Test your system.



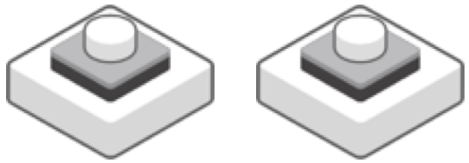
Challenge 2

Step 1.
Delete the Filter block and Slider block from the workspace.



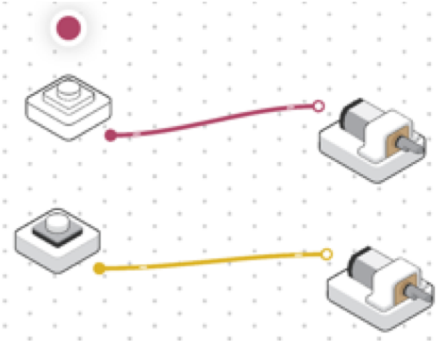
Step 2.
Turn on and pair:

- 2 x Button/Virtual Button



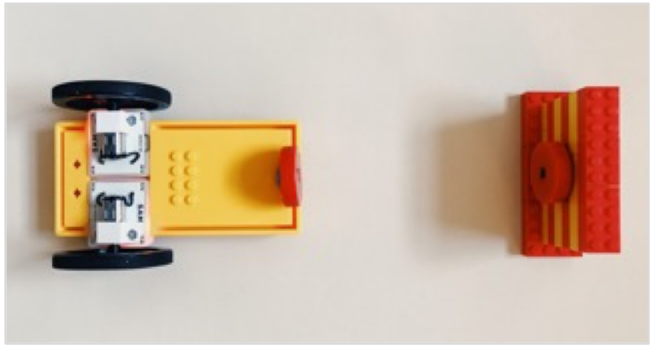
Drag them onto the workspace.

Step 3.
Connect each Button to one of the motors.



Challenge 2

Step 4.
Use your new design to repeat the experiment in Challenge 1.



Checks for Understanding

1. ***Which of the following was used as an input in our system to control the car?***

   A. Button block
   B. Car Controller block
   C. Slider block

2. ***Driving towards the magnet wall made the car harder to control because:***

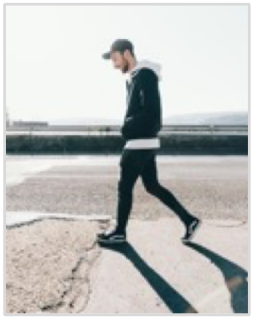
   A. The force of the magnetic field was acting on the magnet on the car
   B. The Lego wall was distracting
   C. The Lego wall got in the way of the car

Exit ticket

✓ **Today I learned…**

Energy in Motion

Which has the most energy?



Mini-lesson

What is energy?
What can happen to the energy of a moving object?

Keywords

In your workbook, match each keyword to its correct definition

- Energy
- Motion
- Impact
- Speed
- Force

Checks for understanding

1. ***How can we see the transfer of energy?***
   A. *The moving object doesn't stop moving*
   B. *When a moving object collides with a stationary one there is often movement or sound*
   C. *A moving object will make a loud sound*

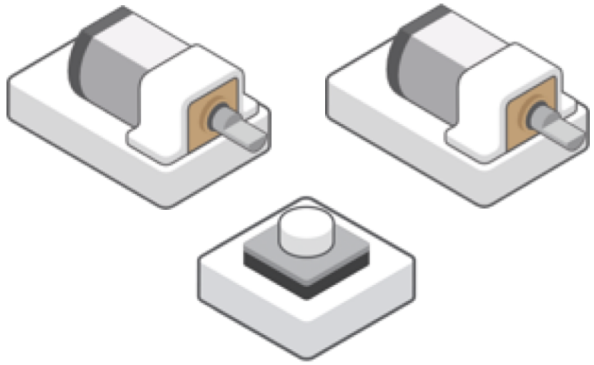
1. ***Share an example with a partner of the effect of a moving object transferring its energy by colliding with another object.***

Worked Example

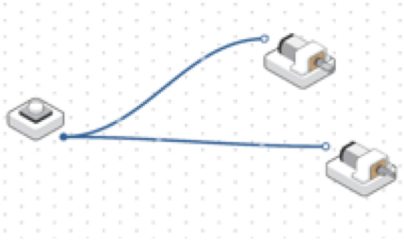
Step 1.
Turn on and pair:

- 2 DC Motors
- 1 Button/Virtual Button

Add them to the workspace.



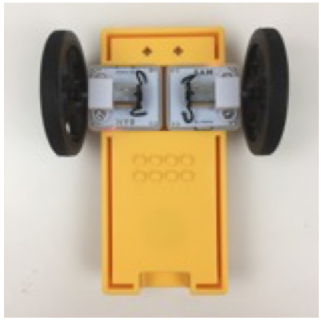
Step 2.
Drag the Motors and Button onto the workspace and connect by dragging a line between the button and the motor.



Step 3.
Connect the 2 Wheels to the DC Motors and insert into the Yellow Car Chassis. Insert the Rollerball underneath the car.

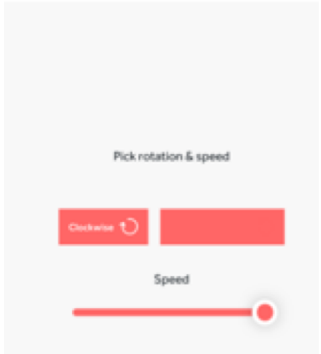
Worked Example

Step 4.
Test the car using the Button to control the start and stop of the car's movement.



DC MOTOR

Step 5.
Open the Settings icon of the Motors.



Step 6.
Test the speed slider in the Settings icon of the Motors.

Challenge 1

Step 1.
Select 2-3 different materials to test the car colliding with and attach blu tack or sticky tape to the corners.

Step 2.
Attach the first material to test to two table legs with approximately a foot between them.

Step 3.
Test the impact of the car driving towards the material.

Challenge 1

Step 4.
Attach a different material to the table legs.

Checks for understanding

1. ***What can be the effect of a moving object colliding with a stationary one?***

   A. *The stationary object always stays still.*

   B. *The stationary object will always travel faster than then.*

   C. *The stationary object can move as a result of the collision.*

2. ***Why do you think there was a difference in the movement of the different materials?***

   A. *The car was travelling at different speeds.*

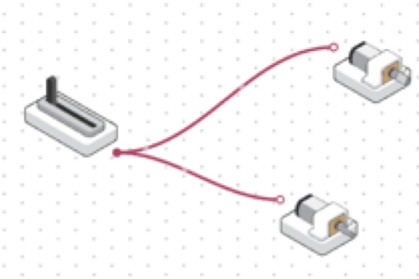
   B. *The materials had different densities which made them react differently..*

   C. *The energy transferred changed.*

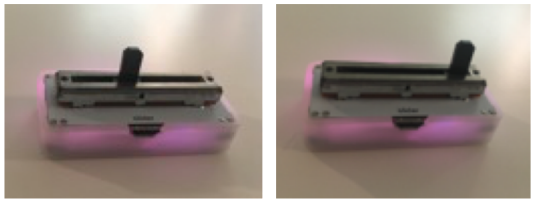
Challenge 1 - Debug it!

Step 1.
Turn on and pair a Slider block.

Step 2.
Drag onto the workspace and connect to the motors



Step 3.
Test the impact of the car driving into the material at two different speeds.

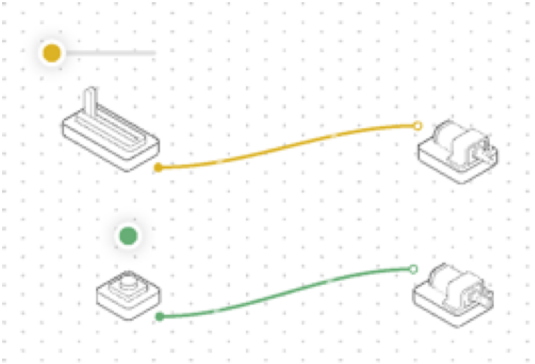


Challenge 2

Step 1.

Add Turn on and pair:

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



Step 2.

Drag onto the workspace and connect the Slider to one motor and the Button to another.

Step 3.

Test driving the car with one student on the slider control and one on the button.

Challenge 2

Step 4.
Set up the plastic bottles or aluminum cans like skittles.

Step 5.
Test the result of impact of the car's energy into the skittles.

Step 6.
Open the settings of each motor to set the speed.

Challenge 2

Step 7.

Repeat the test as a fair test to record results.

Speed of Motors	Skittles knocked down
First Attempt	
Second Attempt	

Checks for understanding

1. ***What is one way have we seen evidence of the transfer of energy?***
   A. *The objects moved faster than the car after the impact.*
   B. *The objects stayed stationary when the car collided with them.*
   C. *The stationary objects moved on impact with the car.*
2. ***What difference did the increased speed have?***
   A. *No skittles were knocked over.*
   B. *More skittles were knocked over.*
   C. *Less skittles were knocked over.*

Tidy Up/Exit Ticket

✓ **Today I learned….**

Erosion

Odd One Out

What are the different forms of erosion?

Mini-lesson

What is water erosion?

Keywords

Match or define keywords in your workbook

- Erosion
- Waves
- Rain
- River
- Flood

Let's Discuss

1. ***What are the four types of water erosion?***

   A. Puddle, Rain, Flood, River

   B. Waves, Rain, Lake, River

   C. Waves, Rain, Flood, River

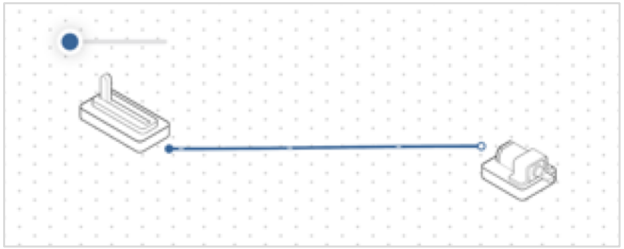
2. In your workbook or with a partner, record, discuss, or share an example of erosion and how it can shape the landscape.

Worked Example

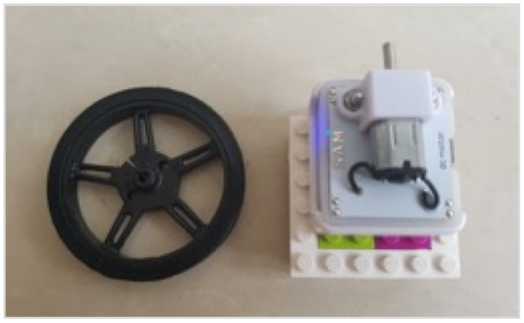
Step 1.
Turn on and pair:

- 1 Slider/Virtual Slider block
- 1 DC Motor

Step 2.
Connect the Slider to the DC Motor.



Step 3.
Connect the wheel to the DC Motor.



Worked Example

Step 4.
Move the Slider up and down to increase and decrease the speed of the motor.

Challenge 1

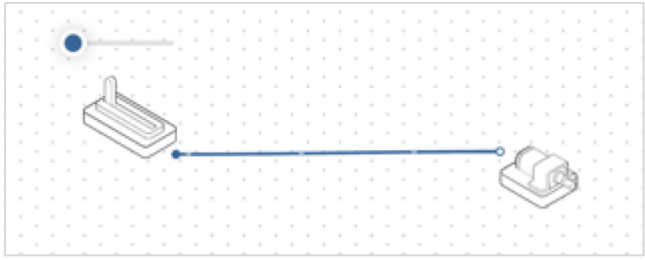
Step 1.
Make a small hole in the end of a plastic tub (to fit the motor axel).

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.
Adjust the speed of the Slider to increase and decrease the intensity of the waves.



Checks for Understanding

1. ***Does the input or output generate the waves?***

   A. Input

   B. Output

   C. Both

2. ***Which block is the input?***

   A. Slider

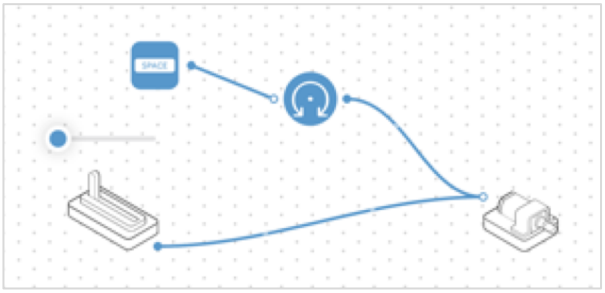
   B. DC Motor

   C. Wheel

Challenge 1 - Debug it!

Step 1.
Drag on a Key Press and Switch Direction block to the workspace.

Step 2.
Connect the Key Press block to the Switch Direction block and the Switch Direction block to the DC Motor.



Step 3.
Test your system.

Challenge 2

Step 1.
Add a few handfuls of sand to one side of the tub.

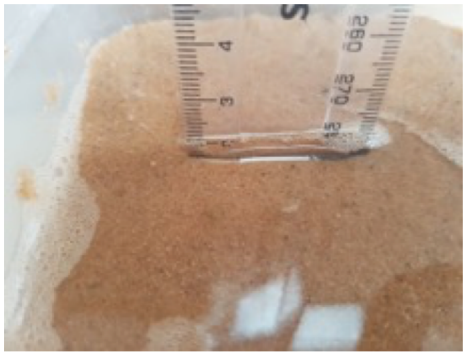
Step 2.
Ensure the DC Motor is paired and the wheel is secure.

Step 3.
Measure the depth of the sand.

Challenge 2

Step 4.
Start the DC Motor.

Step 5.
Now, measure the effect of water erosion on the sand. Has anything changed?



Checks for Understanding

1. ***What erosion method can be seen in our system?***

   A. Wind

   B. Water

   C. Glacial

2. ***What are the inputs in our final system?***

   A. Slider block

   B. Key Press block

   C. Both

Exit ticket

✓ **Today I learned…**

Paired up Numbers

Warm Up

How do we find the factors of a number?

- Sharing
- Times Tables
- Dividing
- Counting

Mini-lesson

What can help us to find the factors

Is 2 is a factor of 8? Is 3 is a factor of 9? How do you know?

Mini-lesson

You have eight items. Can you split the items evenly into the boxes?

Mini-lesson

You have nine items. Can you split the items evenly into the boxes?

Keywords

Match or define keywords at your table

- Factor
- Multiple
- Factor pair
- Product
- Sort

Let's Discuss

1. ***How can we find the factors of a number?***

   A. Add one number to another to get a factor.
   B. Take away one number from another to get a factor.
   C. Divide one number by another to get a factor.

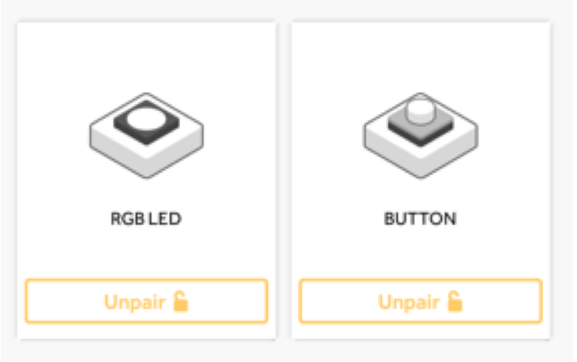
2. In your workbook or with a partner, record or discuss one example of a factor and factor pair.

Worked Example

Step 1.
Turn on and pair:

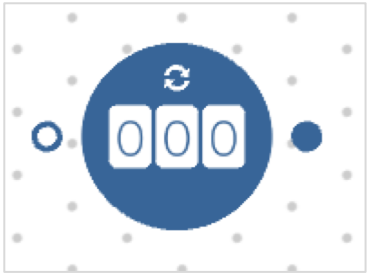
- Button/Virtual Button
- RGB LED

Drag them onto the workspace.



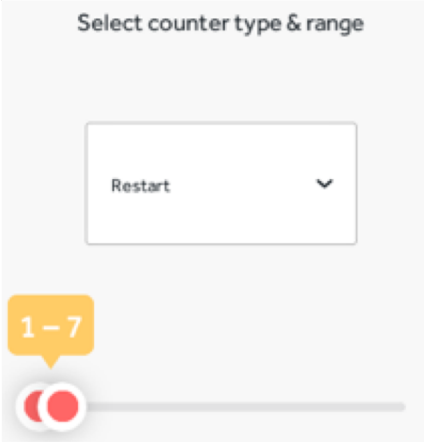
Step 2.
Connect the Button and RGB LED.

Step 3.
Drag a Counter onto the workspace. Connect it between the Button and RGB LED.

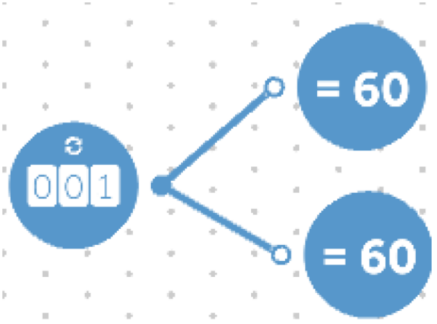


Worked Example

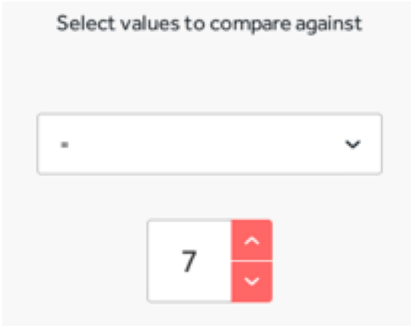
Step 4.
Click the settings for your Counter to go from 1 to a number of your choosing.



Step 5.
Add two Compare blocks to the workspace. Connect them between the Counter and RGB LED.

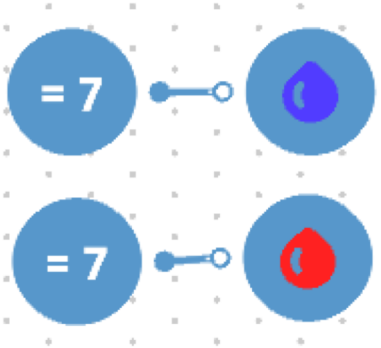


Step 6.
Click for the settings icon on the Compare and make one ‘=’ a number of your choice and one ‘<’ and number of you choice.

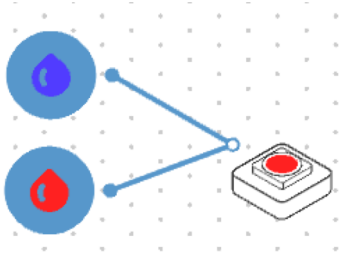


Worked Example

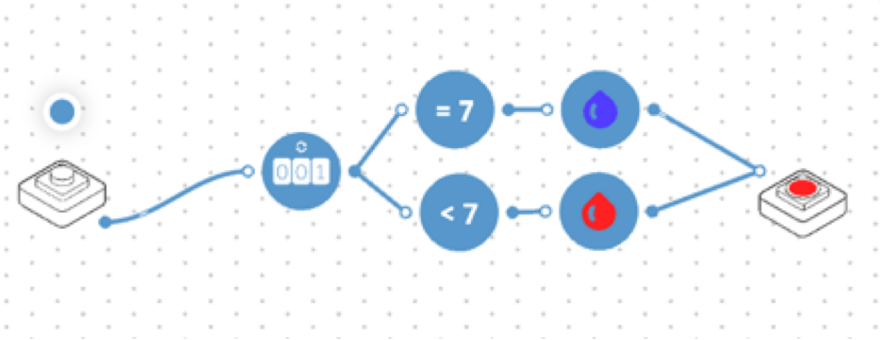
Step 7.
Drag two Color blocks onto the workspace, one for each of the Compare blocks. Choose a different color for each.



Step 8.
Connect both of the Color blocks to the RGB LED block.



Step 9.
Here is an example of the system.

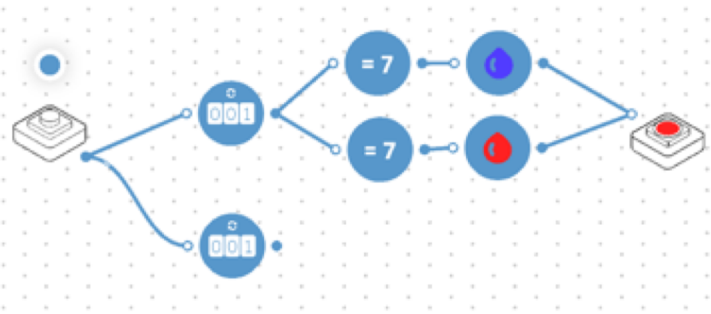


Challenge 1

Step 1.
Add a second Counter block and connect it to the Button. Choose a number to factor.

Step 2.
Enter a range of 1 - ‘the number you want to factor’ for the second Counter.

Step 3.
Test to see if the RGB LED changes color when the Counter reaches the number you are trying to factor.

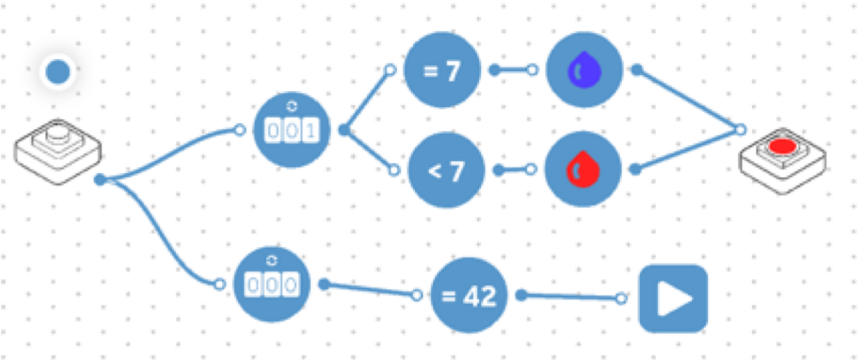


Challenge 1

Step 4.
Add a Compare block and connect it to the Counter. Set the number to be what you want to factor, I chose ‘42’ in step 3.

Step 5.
Add a Sound Player block to the Compare block to alert the student when they have reached their number.

Step 6.
An example of the system



Checks for Understanding

1. ***What does it mean if the color does not change?***

   A. *The light is broken.*
   B. *The colors are the same for both lights.*
   C. *Your number range could be wrong.*

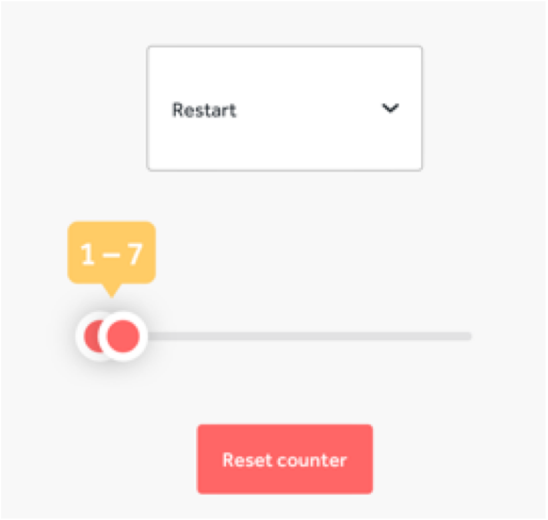
2. ***Why does one color show more often than the other one when checking for factors for 3, 5 and 7?***

   A. *These numbers are all odd.*
   B. *More numbers are not factors of 3, 5 and 7 than are.*
   C. *They are all less than 10.*

Challenge 1 - Debug it!

Step 1.

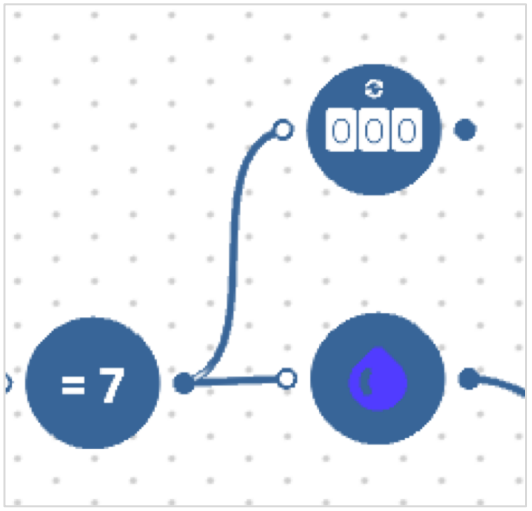
Open the settings for the Counter blocks.
Ensure that you reset them both.



Challenge 2

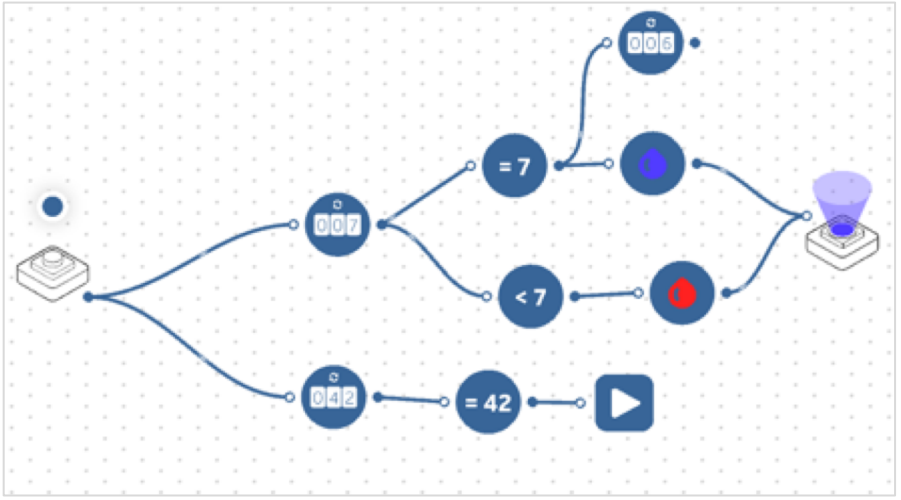
Step 1.

Drag a new Counter block onto the workspace. Connect it to the topmost Compare block.



Step 2.

Test your system to see if the factor pairs are accurate!



Checks for Understanding

1. ***What are the main inputs and outputs of our system?***

   A. *Button, Counter and RGB LED*
   B. *Button, Sound and RGB LED*
   C. *Counter, Sound and RGB LED*

2. ***What does the Counter do in our system?***

   A. *Changes the colors and plays the sound*
   B. *Finds the factors and plays a sound*
   C. *Changes the colors and finds the factors*

Exit ticket

✓ **Today I learned…**

There Can Be Only, Two

Warm Up

How can we sort numbers?

- Evens and odds
- Multiples and not multiples
- Primes and non-primes (composites)
- Other methods?

Keywords

Match or define keywords at your table

- Factor
- Multiple
- Prime
- Product
- Non-prime/Composite

Mini-lesson

Multiples you found

2	4	6	8	10	12	14	16	18
	20	22	24	26	28	30	32	34
	36	38	40	42	44	46	48	50
	52	56	58	60	62	64	66	68
	70	72	74	76	78	80	82	84
	86	88	90	92	94	96	98	100
3	6	9	12	15	18	21	24	27
	30	33	36	39	42	45	48	51
	54	57	60	63	66	69	72	75
	78	81	84	87	90	93	96	99

Let's Discuss

1. ***Are there more prime or composite numbers overall?***

   A. More primes

   B. It's the same

   C. More non-primes/composites

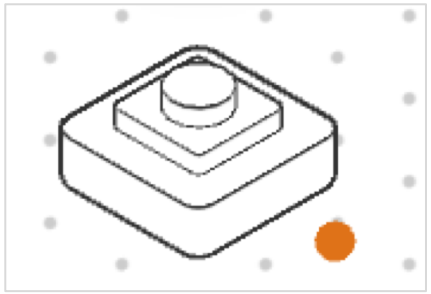
2. In your workbook or with a partner, record or discuss how you can use math to identify a prime and non-prime/composite number.

Worked Example

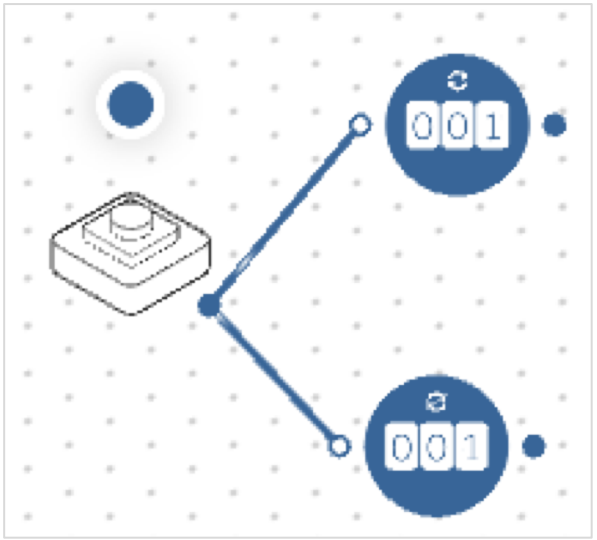
Step 1.
Turn on and pair:

- A Button/Virtual Button block

Add it to the workspace.

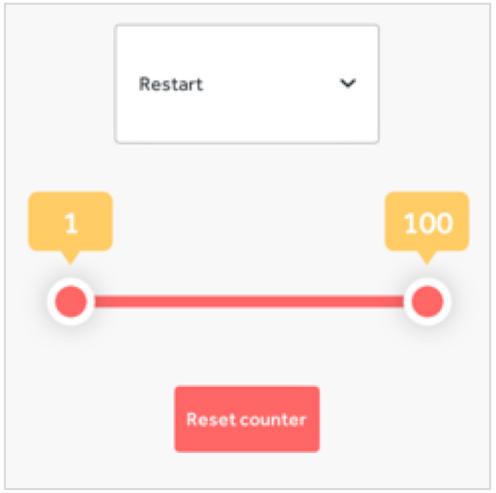


Step 2.
Drag two Counters onto the workspace.
Connect them to the Button.

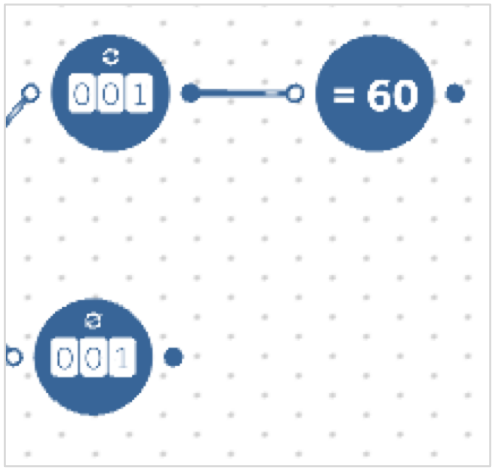


Worked Example

Step 3.
Click the settings icon for the first Counter to go from ‘1 - 2’. Set the second counter from ‘1 - 100’.

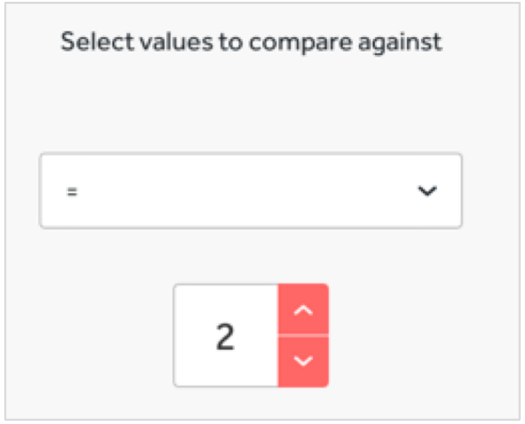


Step 4.
Drag a Compare block onto the workspace and connect it to the first Counter.

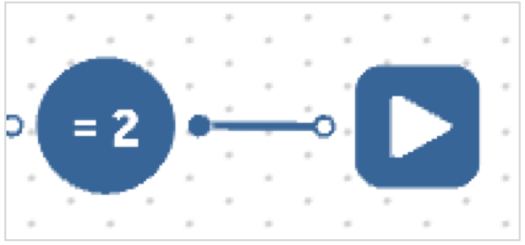


Worked Example

Step 5.
Set the Compare block to be = to 2.



Step 6.
Add a Sound Player block to the workspace and connect it to the Counter.



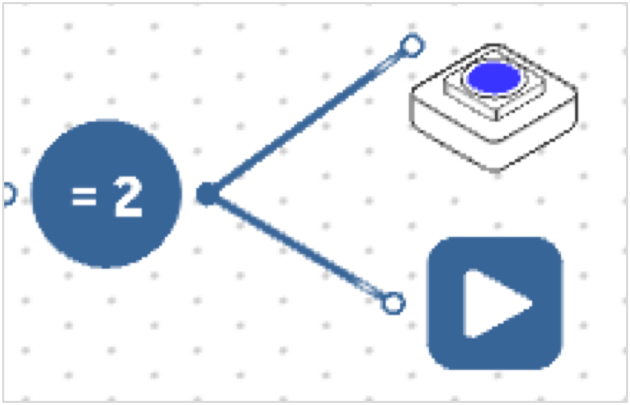
Worked Example

Step 7.
Click the settings of the Sound Player block. Choose Note and ‘Do’.

Step 8.
Turn on and pair:

- RGB LED block

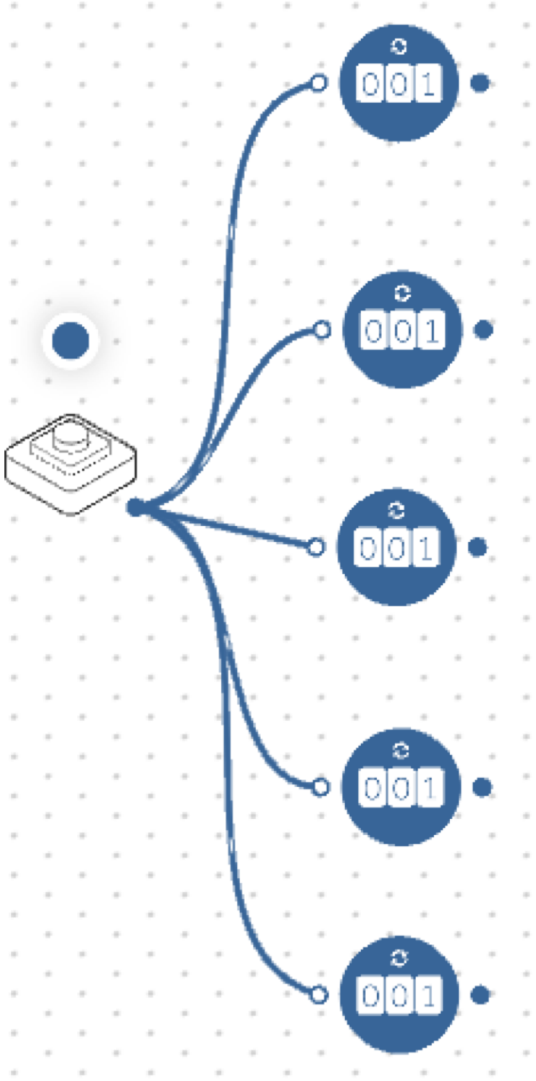
Connect it to the Compare block and choose a color through the settings.



Challenge 1

Step 1.
Add 3 more Counter blocks and attach them all to the first Button. Arrange it so that the counter block set to 1 - 100 is at the bottom of the workspace.

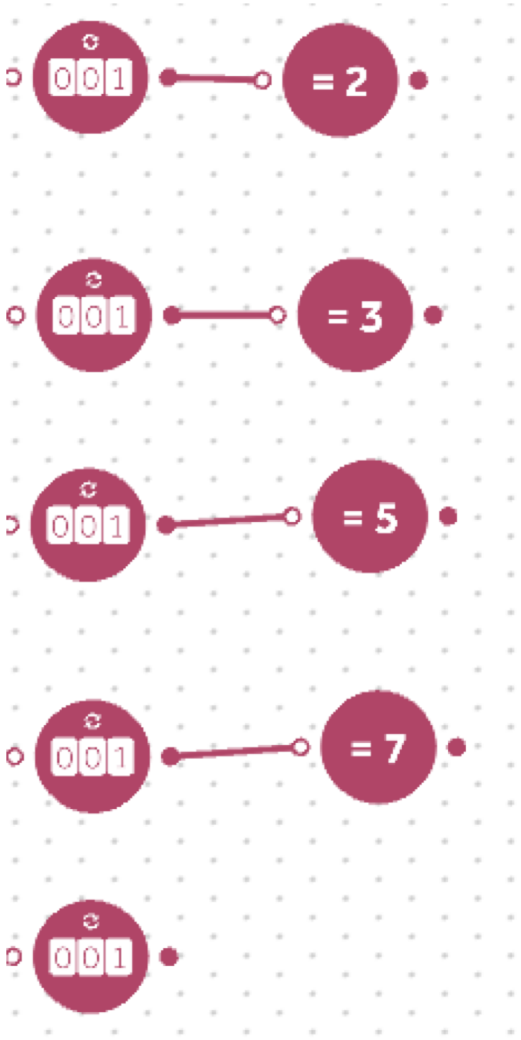
Step 2.
Enter a range of ‘1 - 3’, ‘1 - 5’ and ‘1 - 7’ for each of the other Counters.



Challenge 1

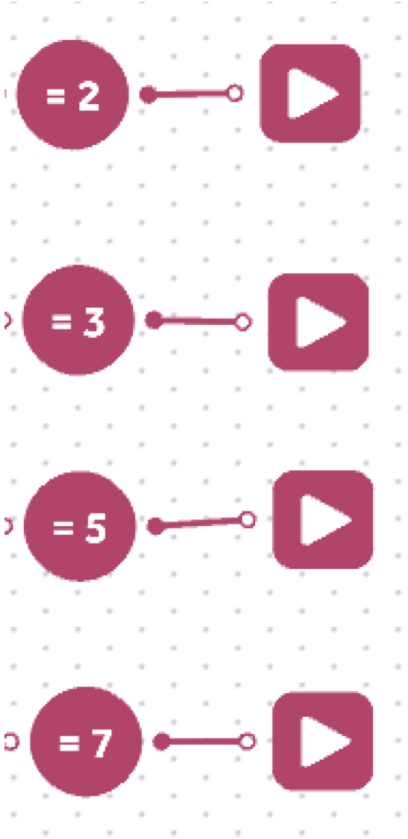
Step 3.

Add three more Compare blocks and connect them to each of the new Counter blocks. Set each of the Compare blocks to = ‘3, 5 and 7’, depending on the Counter to which they are connected.

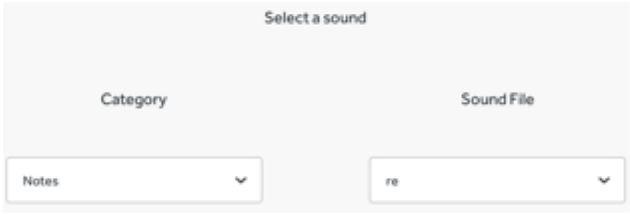


Challenge 1

Step 4.
Add a Sound block to each Compare block.



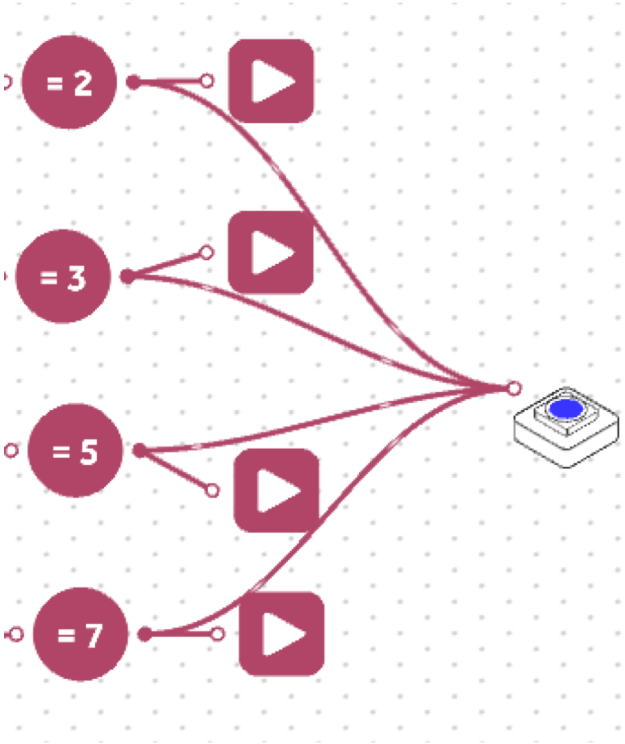
Step 5.
Set the Sound Player blocks to Note and ‘Mi’ for 3, ‘Sol’ for 5 and ‘La’ for 7.



Challenge 1

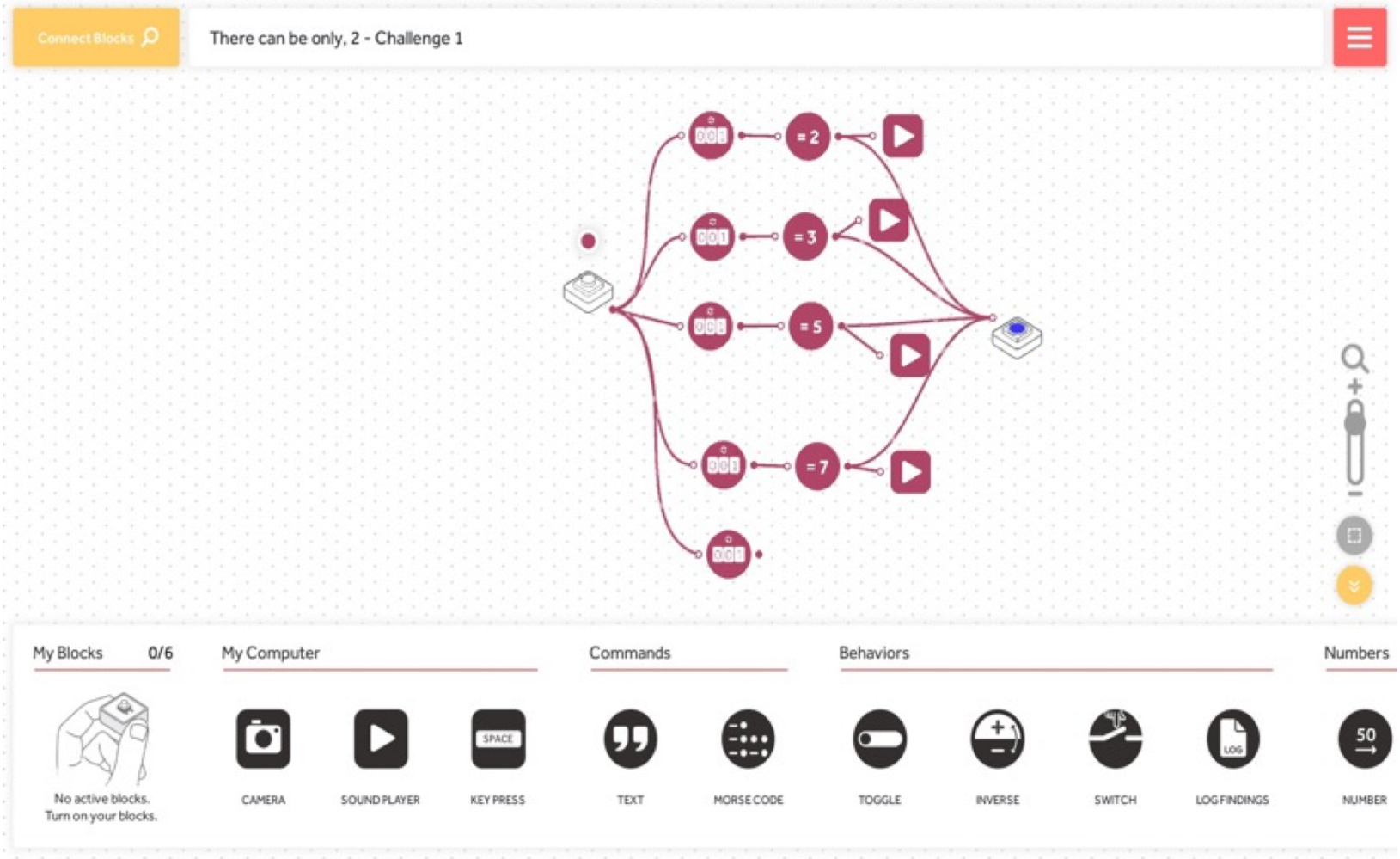
Step 6.

Connect all of the Sound Player blocks to the RGB LED. Test it by checking if you hear the correct tone for 2, 3, 5 and 7.



Challenge 1

Example of full system.



Checks for Understanding

1. ***What is a prime number?***

   A. A number that must have only two factors.

   B. A number that must be odd.

   C. number that must be less than 10.

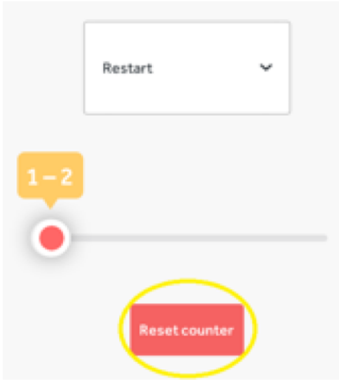
2. ***What is a composite number?***

   A. A number that must be more than 10.

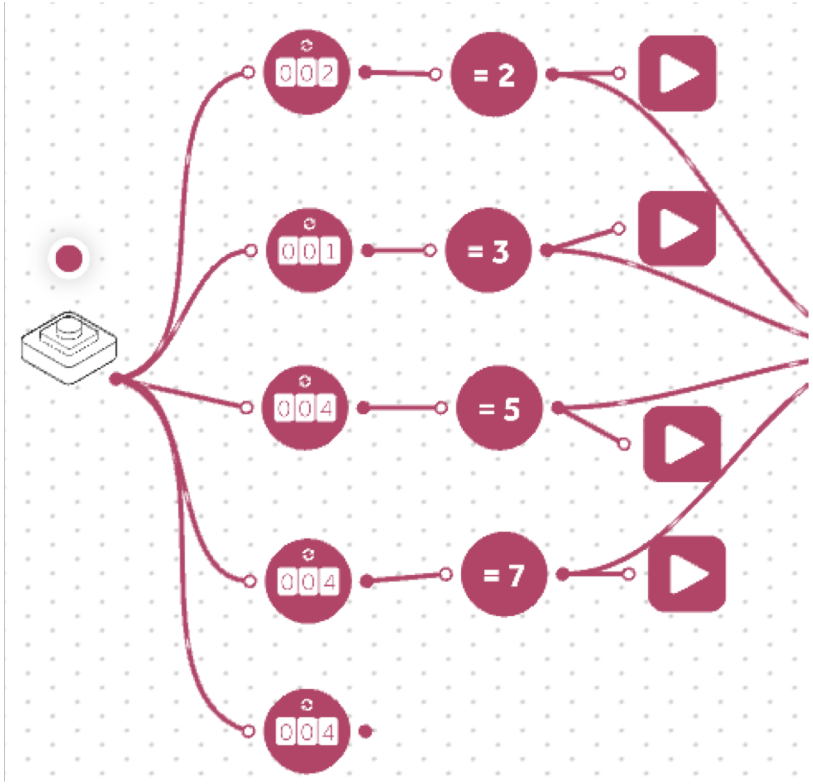
   B. A number that must be even.

   C. A number that must have more than two factors.

Challenge 1 - Debug it!



Step 1.
Be sure to reset your Counters after the worked example.

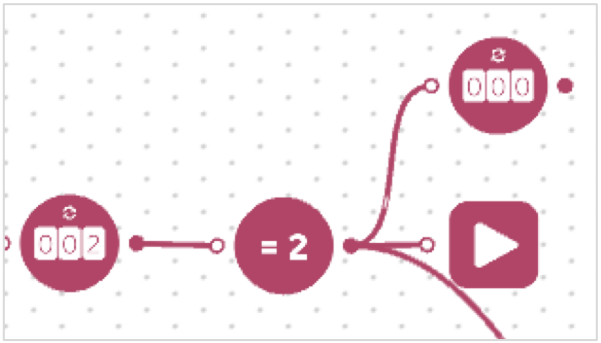


Step 2.
Check your connections.

Challenge 2

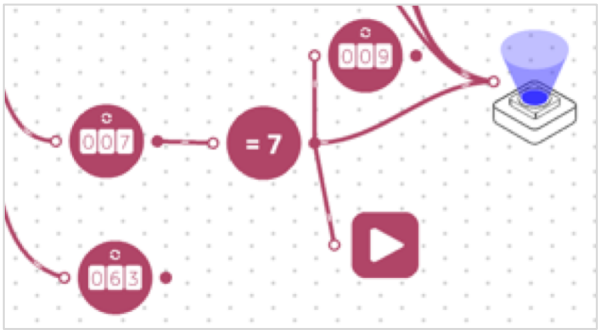
Step 1.

- Drag 4 new Counter blocks onto the workspace used in challenge 1, there will now be 9 Counter blocks in total.
- Connect each new Counter block to each of the Compare blocks.
- Set each new counter to 0 - 100.



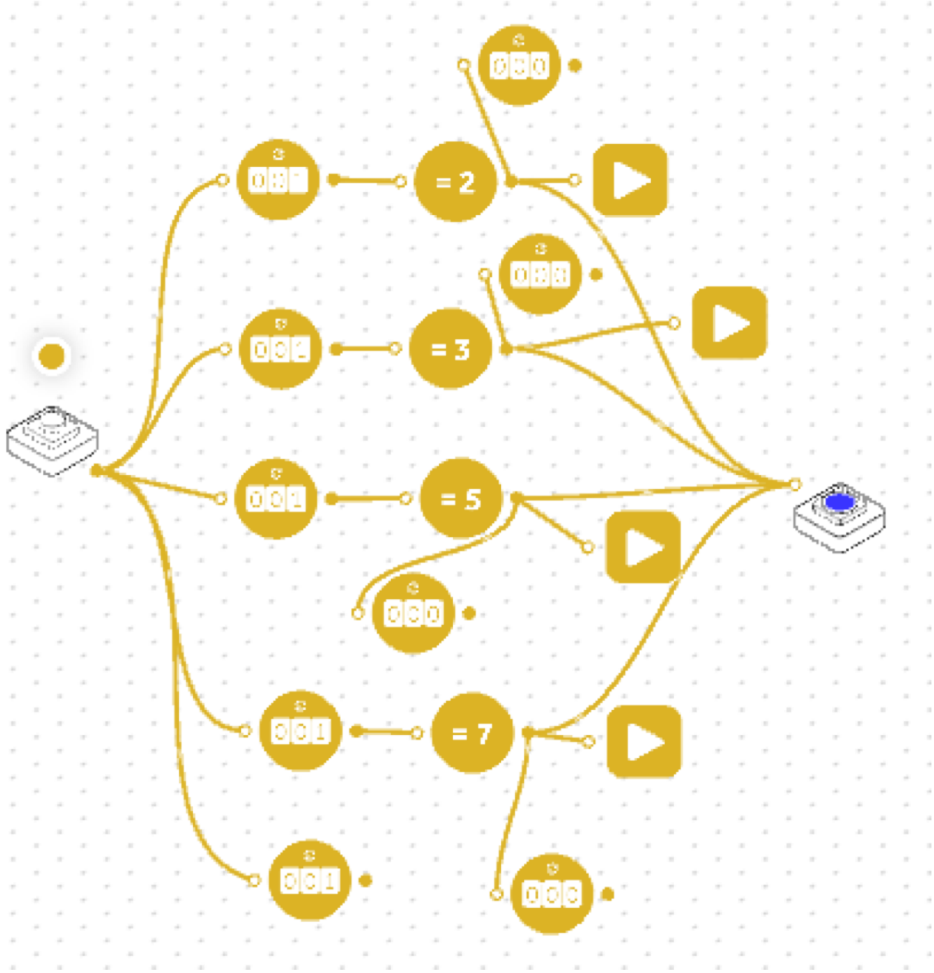
Step 2.

Test the workspace to see if the numbers, identified as prime in the student workbooks, are prime in the workspace. Examples might be 29, 37, 61, etc.



Challenge 2

Example of full system.



Checks for Understanding

1. ***What does it mean if there is no sound?***

   A. It was too noisy in the classroom

   B. There is a missing connection

   C. Some of the numbers are wrong

2. ***Why might two or three notes play at the same time?***

   A. A number has more than two factors

   B. A number has more than two multiples

   C. A number is prime

Exit ticket

✓ **Today I learned…**