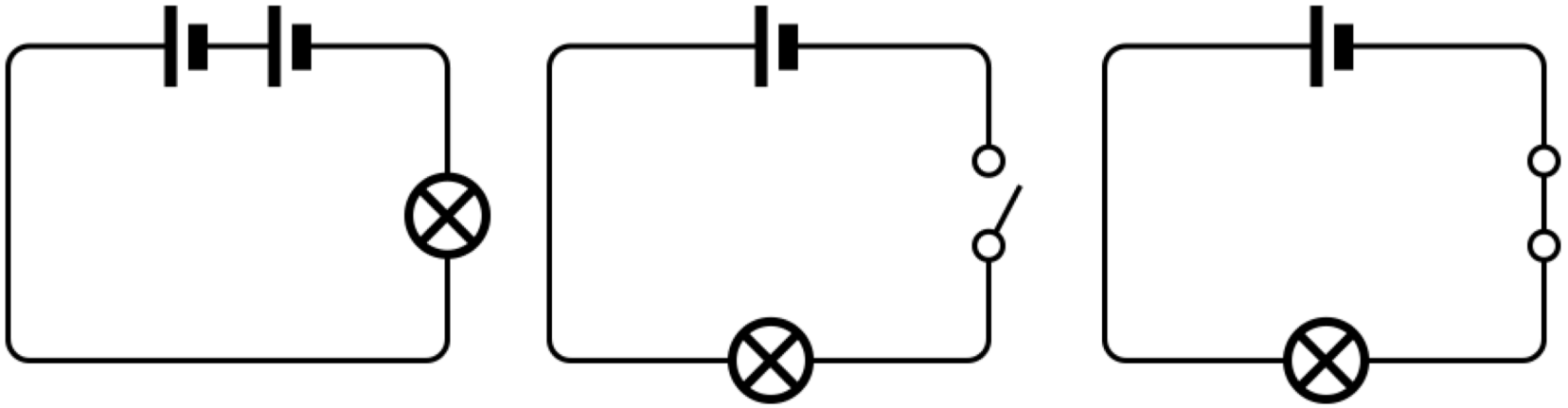
Exploring Circuits

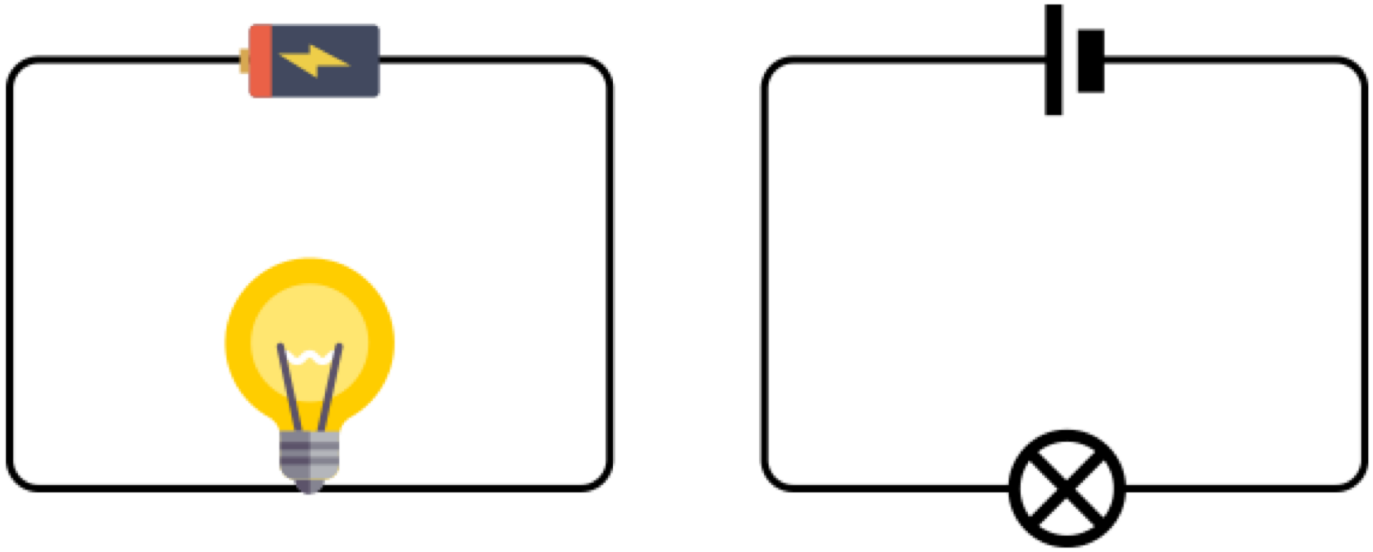
Spot the Difference

Are these circuits on or off?



Mini-lesson

Can circuits be drawn without images?



Keywords

Match or define keywords in your workbook

- Circuit
- Battery
- Switch
- Electricity

Let's Discuss

1. ***Why do we use symbols instead of images for circuits?***

   A. *Because circuits are hard to understand*

   B. *To make it clear what is connected in the circuit*

   C. *Because symbols are cool*

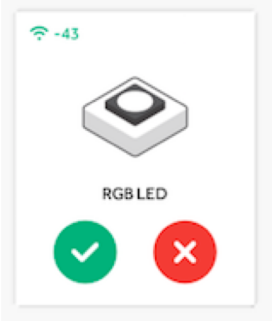
1. ***In your workbook or with a partner, record, discuss, or share one 'real world' example of an open and closed circuit.***

Worked Example

Step 1.

Turn on and pair

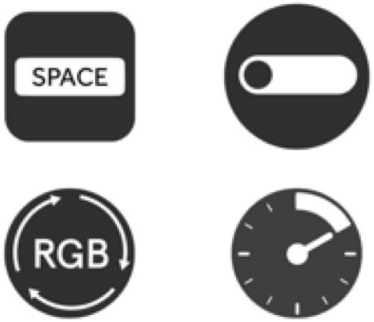
- RGB LED block



Step 2.

Drag on and add the following blocks to the Workspace

- Key Press block
- Toggle block
- Interval block
- Cycle Colours block



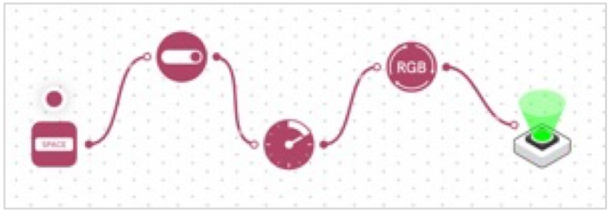
Step 3.

Connect the blocks in the following order; Key Press block, Toggle block, Interval block, Cycle Colors block and RGB LED

Worked Example

Step 4.
Set the Interval block to 500 milliseconds

Step 5.
Test your system



Challenge 1

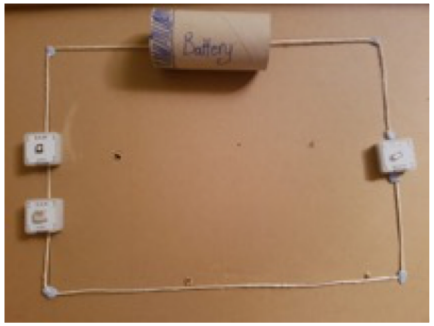
Step 1.
Using cardboard, draw a square to represent the wire.

Step 2.
Use a cylinder shape (like a paper roll) to create a battery. Label it.

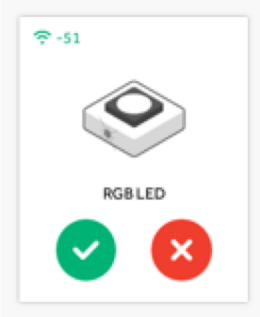
Step 3.
Fix the string or draw a line in the shape of a rectangle.

Challenge 1

Step 4.
Fix the RGB LED, Light Sensor and, if available, the Buzzer block onto the string circuit.

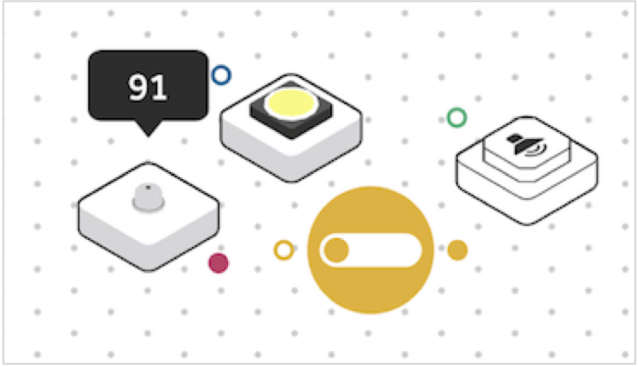


Step 5.
Turn on and pair the Light Sensor and RGB LED.



Step 6.
Add the following blocks to the Workspace

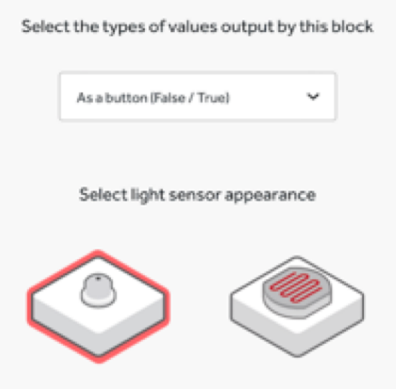
- Light Sensor block
- RGB LED
- Toggle block
- Buzzer block (/Sound Player block)



Challenge 1

Step 7.

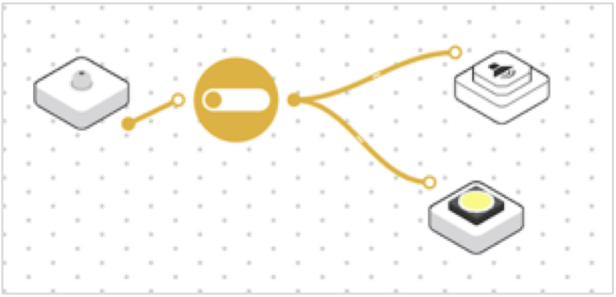
Change the Light Sensor to be a button within the settings



Step 8.

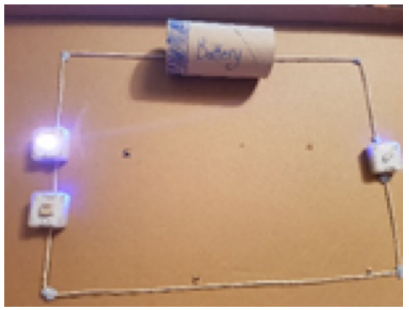
Connect the blocks in this order:

- Light Sensor block to the Toggle block
- Toggle block to the RGB LED and Buzzer (or Sound Player)



Step 9.

Test your system



Checks for understanding

1. ***What is the function of the Toggle in the system?***
   A. *The Toggle ensures the Light Sensor acts as a switch*
   B. *The Toggle ensures the RGB LED is bright*
   C. *The Toggle doesn't have a function in this system*

2. ***What is a correct algorithmic description of the system?***
   A. *When the Light Sensor is pressed, the Toggle sends a true value, this lights up the RGB LED and sounds the Buzzer*
   B. *When the Light Sensor is pressed, the Toggle sends a false value, this lights up the RGB LED but doesn't sound the Buzzer*
   C. *When the Light Sensor is pressed, the Toggle sends a false value, this sounds the Buzzer but doesn't light up the RGB LED*

Challenge 1- Debug it

Step 1.
Open the settings icon to edit the pitch of the Buzzer (/Sound Player).

Step 2.
Test your system

Challenge 2

Step 1.

Drag onto the Workspace

- Key Press block
- Switch block

Step 2.

Connect the blocks in the following order:

- Key Press block to Switch block
- Light Sensor to Toggle to Switch
- Switch to RGB LED and Buzzer block

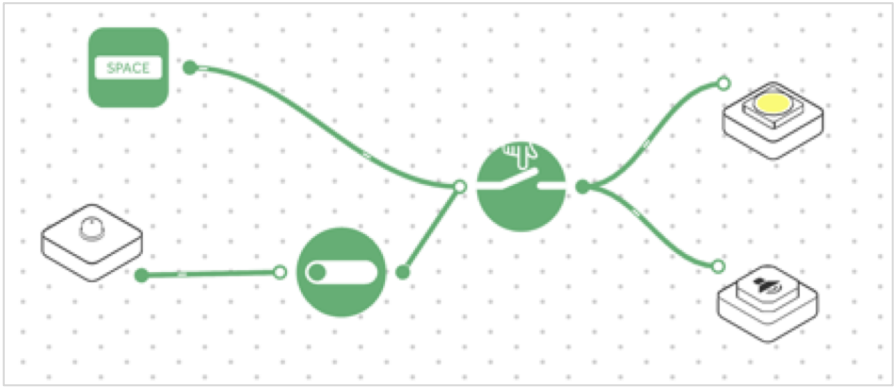
Challenge 2

Step 3.

In the settings icon of the Switch block select the Toggle block to control it

Step 4.

Test your system



Checks for understanding

1. ***What does the Switch do in our system?***
   A. *The Switch regulates the brightness of the RGB LED*
   B. *The Switch regulates the amount of 'electricity' in our system*
   C. *The Switch turns the circuit on and off*

1. ***Why is a battery required in a circuit?***
   A. *A battery is an energy source which gets the current flowing in a circuit*
   B. *A battery turns the circuit on*
   C. *A battery turns the circuit off*

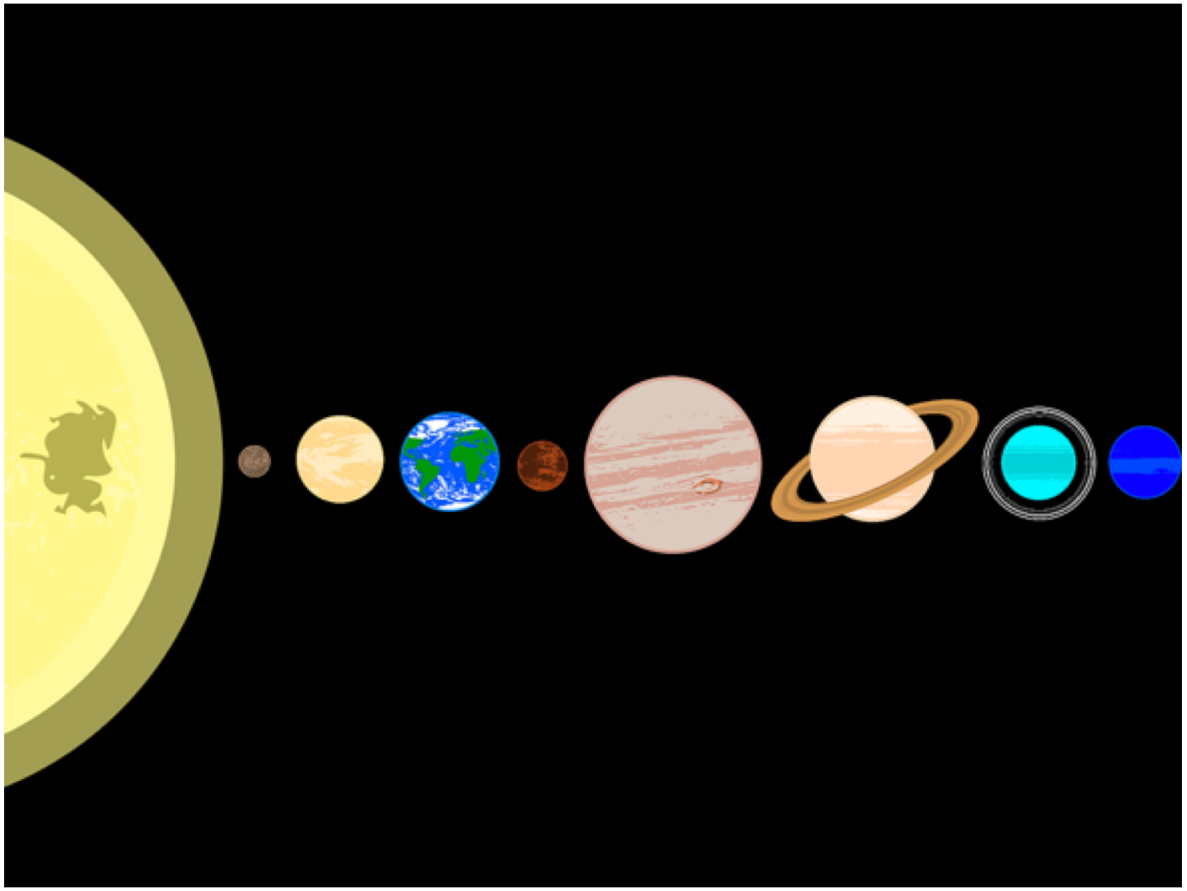
Tidy Up/Exit Ticket

✓ **Today I learned….**

Earth and Orbit

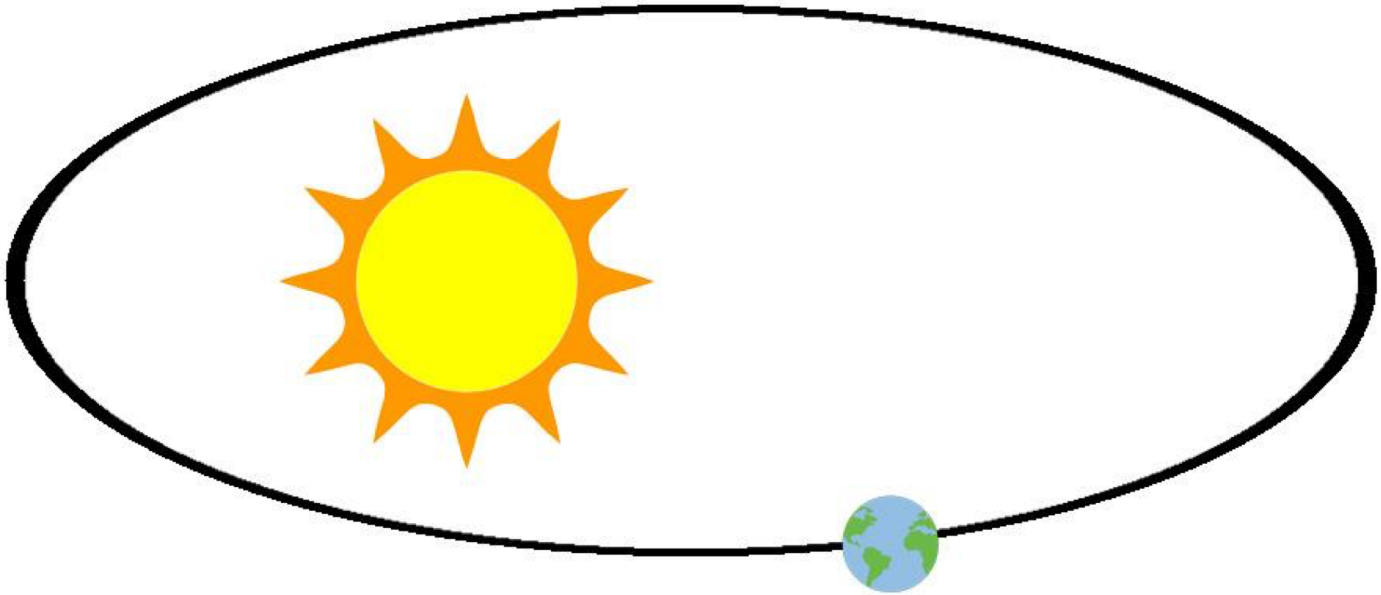
Warm Up

How can we remember the order of planets from the Sun?



Mini-lesson

What is an orbit?



Vocabulary

Match or define keywords in your workbook

- Orbit
- Elliptical
- Earth
- Space
- Low level orbit
- Planets

Checks for understanding

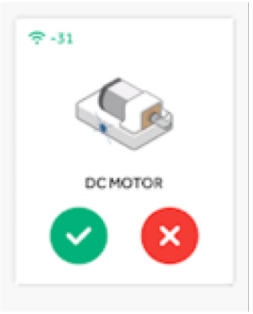
1. ***What is an orbit?***
    A. *Circle path around a planet or star.*
    B. *Elliptical path around a planet or star.*
    C. *Path around a sun*

In your workbook or with a partner, record, discuss, or share your definition of a low level orbit.

Worked Example

Step 1.

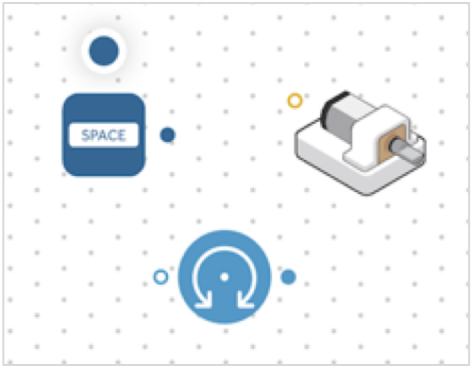
Turn on and pair a DC Motor block.



Step 2.

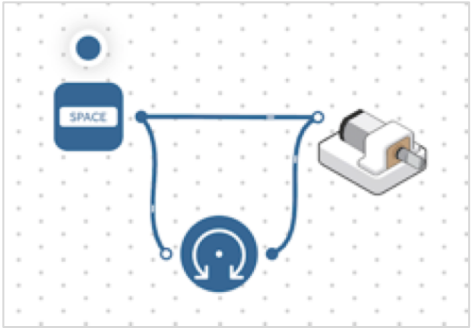
Drag these blocks to the Workspace

- ➔ DC Motor block
- ➔ Switch Direction block
- ➔ Key Press block



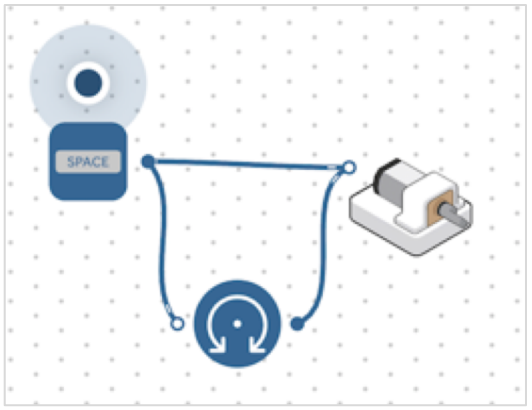
Step 3.

- ➔ Connect the Key Press block to both the Switch Direction block and the DC Motor.
- ➔ Connect the Switch Direction block to the DC Motor too.

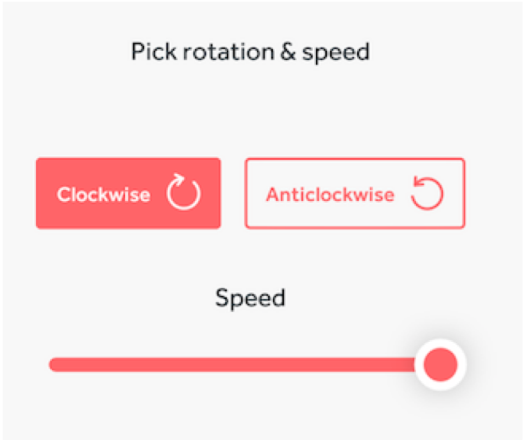


Worked Example

Step 4.
Use the Key Press block to test your system!



Step 5.
Open the DC Motor block settings to change the speed



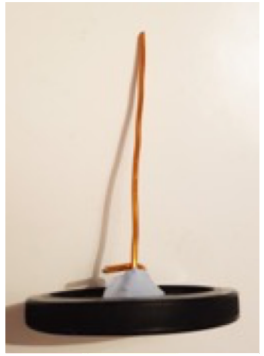
Challenge 1

Step 1.
Collect materials:

- Wire - floral
- Blu Tack
- 2 x different sized styrofoam balls

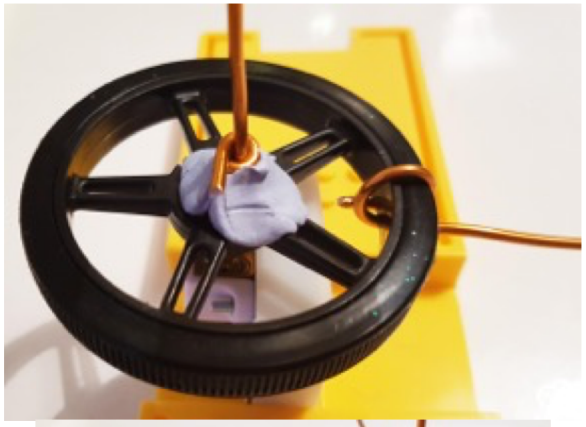
Step 2.
Cut a piece of wire and attach to the DC Motor Wheel.

Step 3.
Wind the two ends together to have one piece of wire going up and secure down with blue tack.



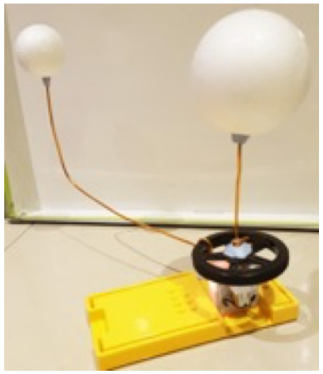
Challenge 1

Step 4.
Cut a second piece of wire and secure to wheel edge.



Step 5.
Secure the Wheel to DC Motor and the Car Chassis.

Step 6.
Attach the Styrofoam balls to the top of the wires.

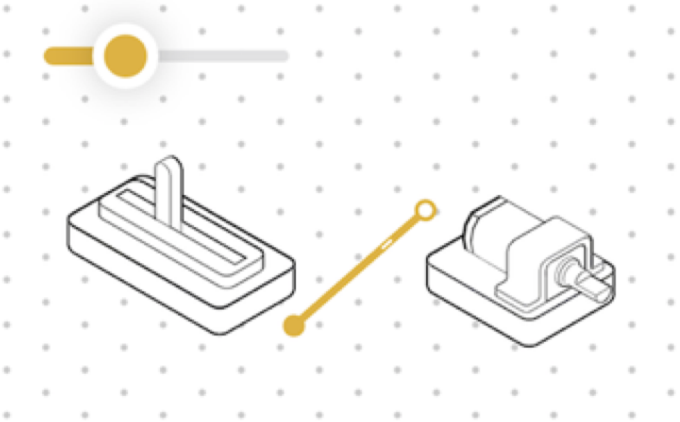


Challenge 1

Step 7.
Turn on and pair:

- 1 Slider/Virtual Slider
- 1 DC Motor block

Step 8.
Connect the Slider block to the DC Motor block.



Step 9.
Test your system.

Checks for understanding

1. What is the purpose of the slider?

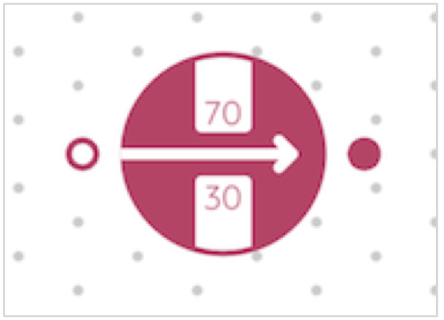
A. To just turn the motor on and off
B. To adjust the speed
C. To change the direction of the motor

2. How long is one orbit of the sun?

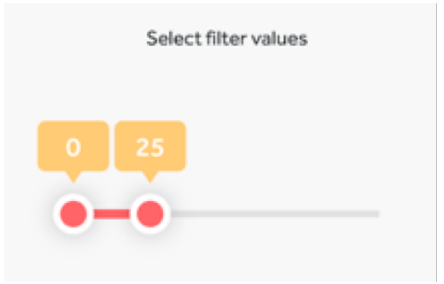
A. 365 days
B. 1 year
C. Both A and B are the same

Challenge 1- Debug it!

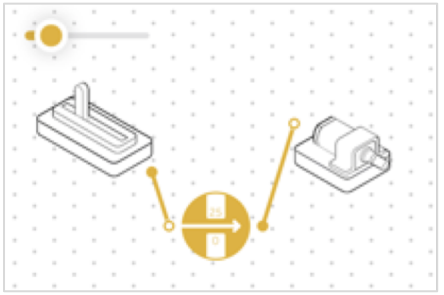
Step 1. Drag a Filter block to the Workspace



Step 2. Edit the range of the block to 0-25



Step 3. Connect the Filter block in between the Slider block and the DC Motor block and test



Challenge 2

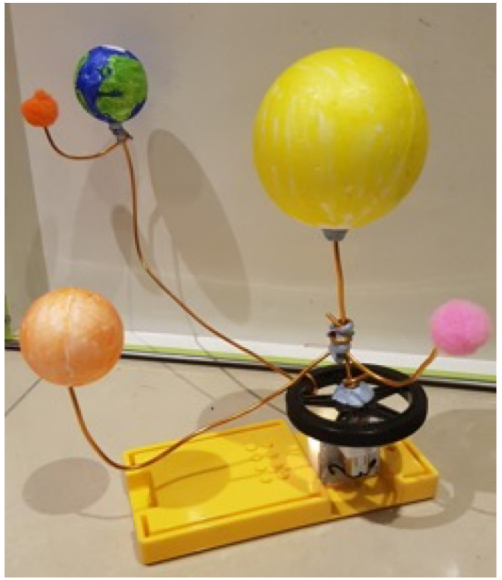
Step 1.
Decorate the Sun and Earth.

Step 2.
Cut a piece of wire smaller than the others to show the closest planet to the Sun, Mercury.

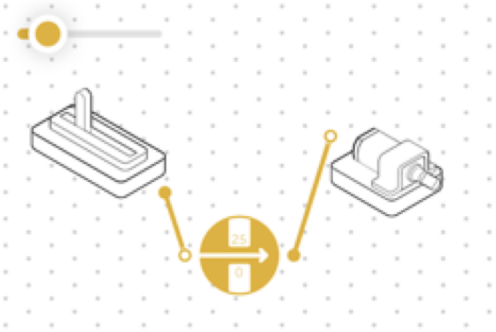
Step 3.
Cut a small piece of wire and attach a small pom pom and attach to the Earth wire as the Moon.

Challenge 2

Step 4.
Decorate a third styrofoam ball as Venus and cut and attach a piece of wire to the Sun wire so the distance is between the Earth and Mercury.



Step 5.
Pair the blocks, test the system and edit the Filter block range if required.



Checks for understanding

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

   A. *To set the speed of the DC Motor*
   B. *To stop the speed of the DC Motor*
   C. *To set the range of the speed of the DC Motor block*

1. ***What shape does the Earth orbit the Sun in?***

   A. *Circle*
   B. *Elliptical*
   C. *Square*

Tidy Up/Exit Ticket

✓ **Today I learned….**

Night and Day

Warm Up

What do you already know about how the Earth spins?

Mini-lesson

What's the relationship between the Earth's axis and the time of day or season it is?

Keywords

Match or define keywords in your workbook

- Axis
- Tilted
- Sun
- Day
- Night
- Earth

Checks for understanding

1. ***How does the Earth move?***

   A. *The Sun goes round the Earth*

   B. *The Earth spins on its axis as it goes round the Sun*

   C. *The Sun spins on its axis*

1. ***In your workbooks or with a partner, record, discuss, or share how the Earth spins and how the position of the sun can tell the time.***

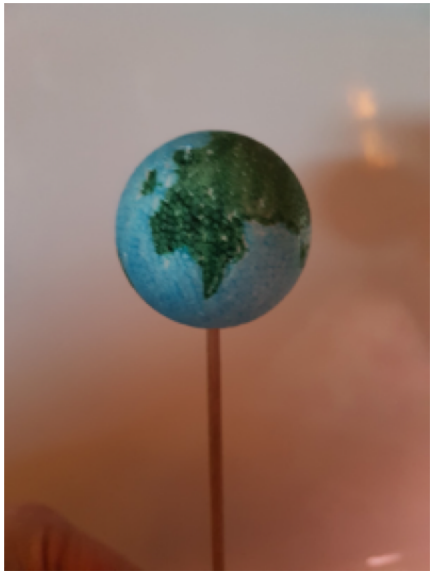
Worked Example

Step 1.

Color a small styrofoam ball to represent the Earth.

Step 2.

Using a wooden stick or pencil - place the ball so that the Earth is on a stick.



Worked Example

Step 3.

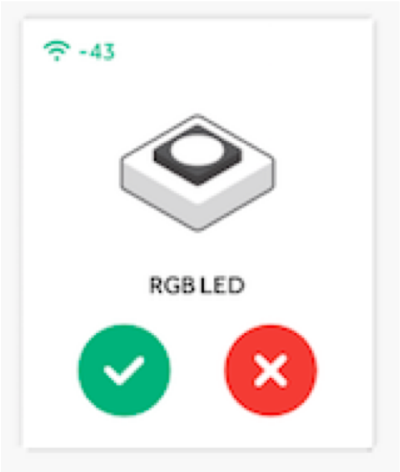
Cut out a circle on yellow card and pierce the middle so the RGB LED can be placed through the hole.

Step 4.

Turn on and pair:

- RGB LED block
- Button/Virtual Button block

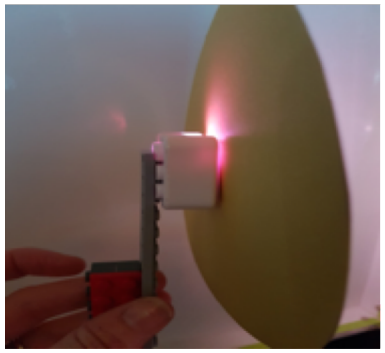
Add both blocks and a Toggle to the workspace.



Worked Example

Step 5.

Mount the RGB LED onto a stand to make the ‘sun’ free standing.

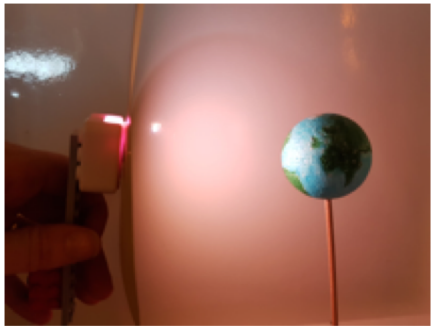


Step 6.

Connect the Button to the Toggle. Connect the Toggle to the RGB LED.

Step 7.

Hold the ‘Sun’ a hands-length away from the sphere. Test the system.

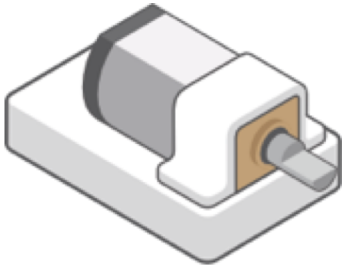


Challenge 1

Step 1.

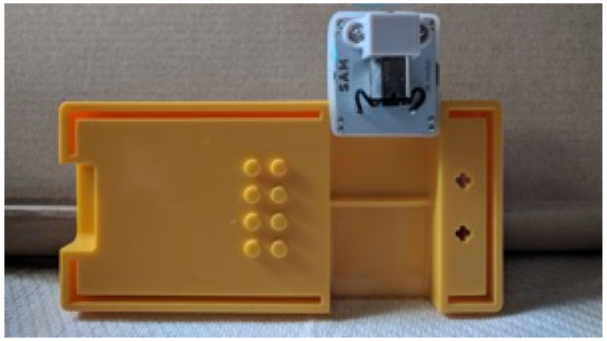
Turn on and pair:

- DC motor



Step 2.

Secure the DC Motor block sideways on the Car Chassis.

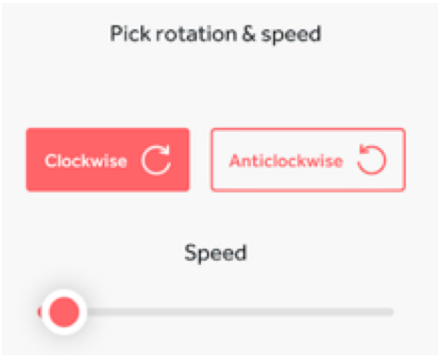


Step 3.

Connect the DC Motor to the Toggle block.

Challenge 1

Step 4.
Open the DC Motor blocks settings. Reduce the speed of the motor to slow as possible without it stopping.



Step 5.
Mount a small stick onto the wheel. Remount the Earth onto the opposite side of the stick with blu tack.

Step 6.
Add a 2nd wheel to the motor. Place the two motors together

Step 7.
Test your system.

Checks for understanding

1. ***What is the purpose of having two wheels on the DC Motor?***

   A. To spin twice
   B. To add weight and slow it down
   C. To speed it up

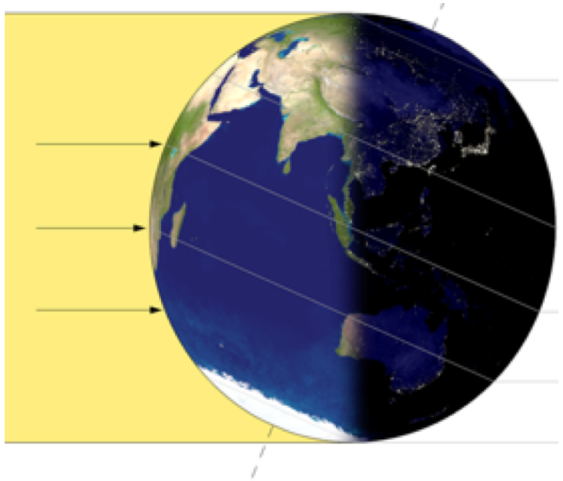
1. ***What is the purpose of the Toggle block?***

   A. It is a switch that is ON/OFF
   B. It is the Input
   C. It is the Output

Challenge 1- Debug it!

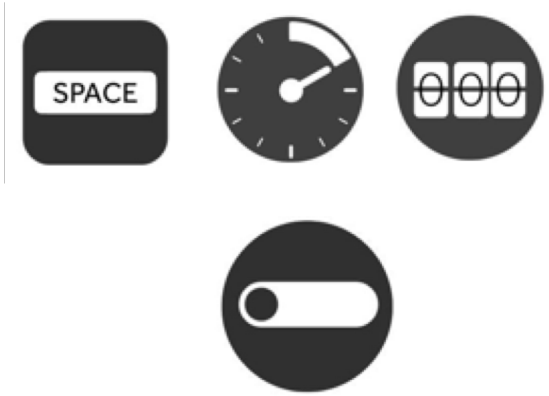
Step 1.
Adjust the tilt of the DC Motor block - Incline it to about 23°.

Step 2.
Test your system.



Challenge 2

Step 1.
Disconnect the RGB LED from the Toggle. Drag the following blocks onto the workspace:



- Key Press
- Toggle block
- Interval block
- Counter block

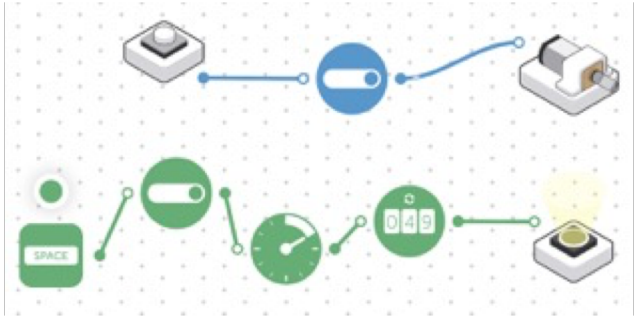
Step 2.
Connect the blocks in the following order; Key Press block, Toggle block, Interval block, Counter block, RGB LED.

Step 3.
Access the settings of the Interval block and set to 100 milliseconds.

Challenge 2

Step 4.
Access the settings of the Counter Block.

Step 5.
Test your system.

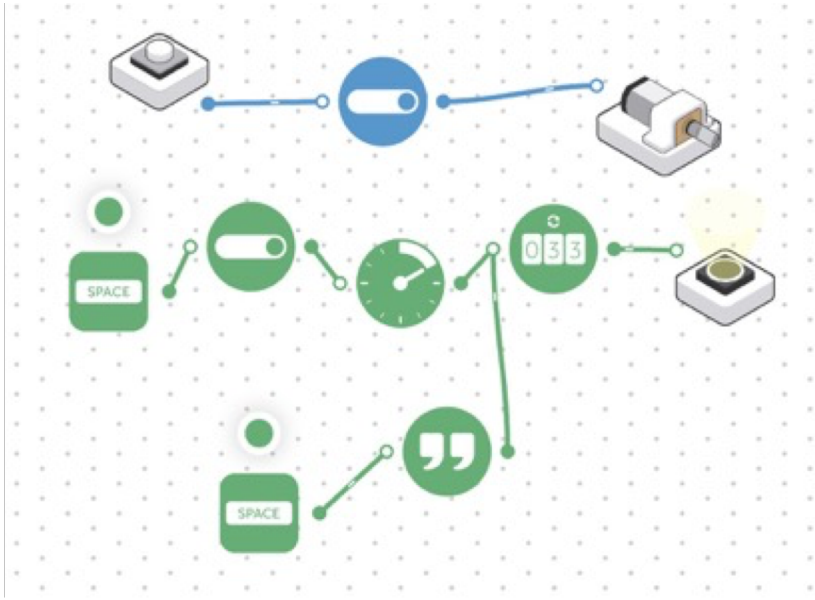


Step 6.
Drag on and connect another Key Press block to a Text block into the Counter block.

Challenge 2

Step 7.
Edit the settings of the Text block to ‘reset’.

Step 8.
Test your system.



Checks for understanding

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

   A. *To label the system*

   B. *To reset the system*

   C. *To start the system*

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

   A. *To act as a timer for the sunrise*

   B. *To count the number of times the Key Press block is pressed*

   C. *To stop the system*

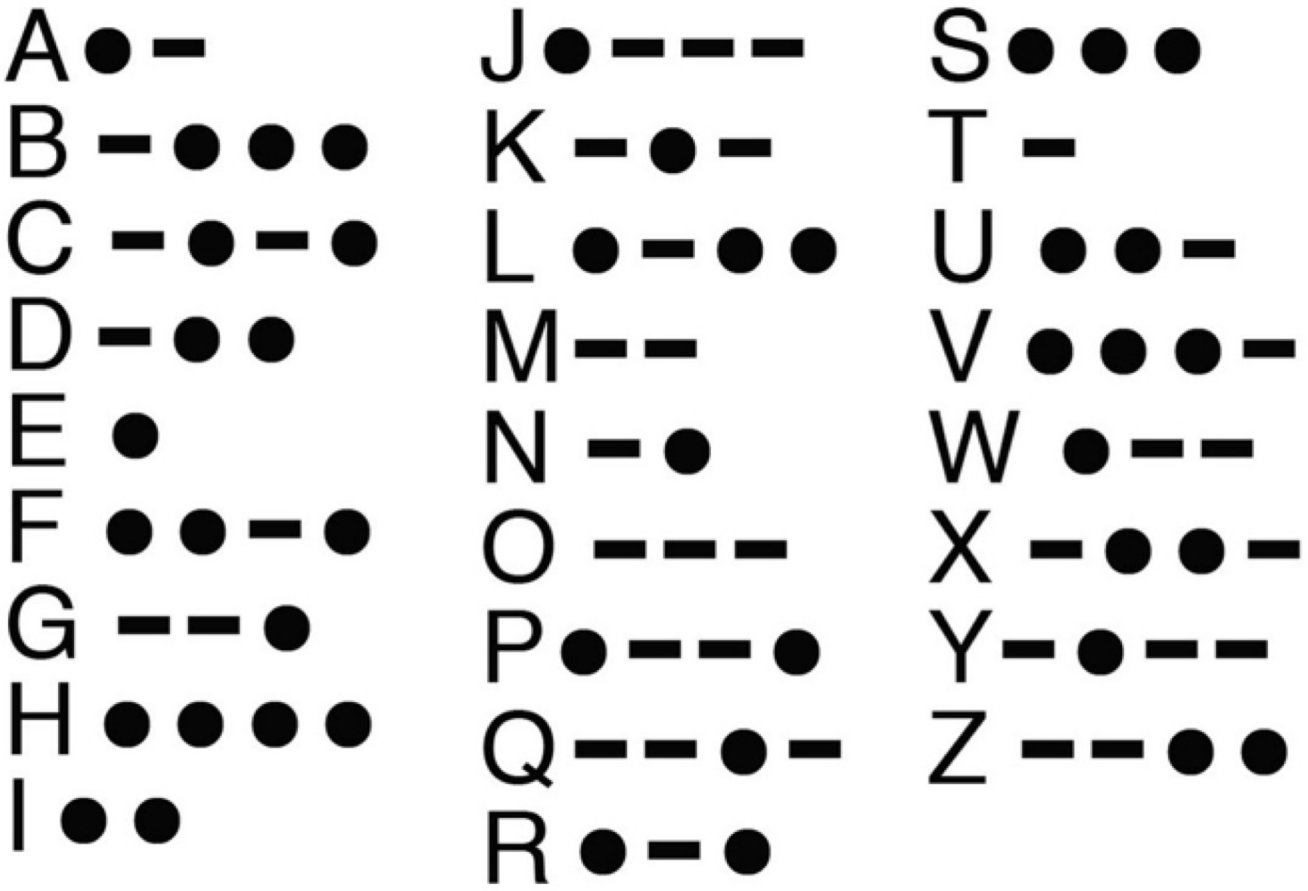
Tidy Up/Exit Ticket

✓ **Today I learned….**

Morse Code Alert

Warm Up

Can you decipher the code and find the hidden message?



Mini-lesson

How was Morse Code used to send and receive messages?

Keywords

Match or define keywords in your workbook

- American Civil War
- Morse Code
- Decipher
- Telegraph
- Messages
- Encrypted

Let's Discuss

1. **How were Morse Code messages sent?**

   A. *Horse*

   B. *Telegraph*

   C. *Telephone*

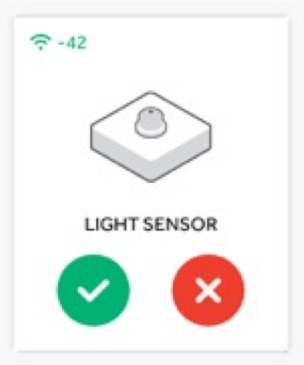
2. In your workbook or with a partner, record, discuss, or share where Morse Code helped the American Civil War.

Worked Example

Step 1.

Turn on and pair:

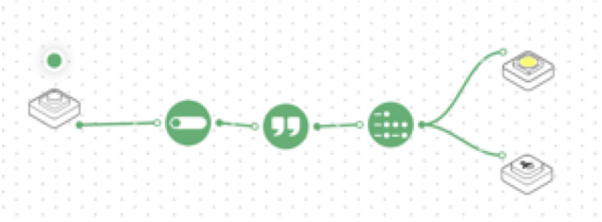
- RGB LED block
- Button block
- Buzzer block



Step 2.

Connect the blocks in this order;

- Button block, Toggle block, Text block, Morse Code block
- Morse Code block to both the RGB LED and the BUzzer block



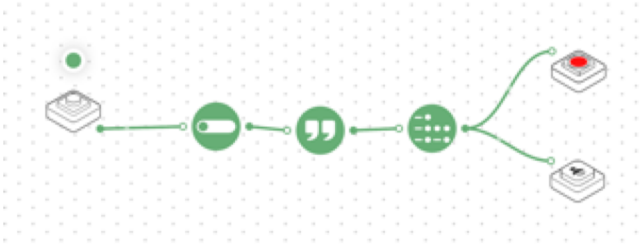
Step 3.

Edit the settings of the Text block to ‘SOS’

Worked Example

Step 4.
Edit the color of the RGB LED block to red

Step 5.
Test your system

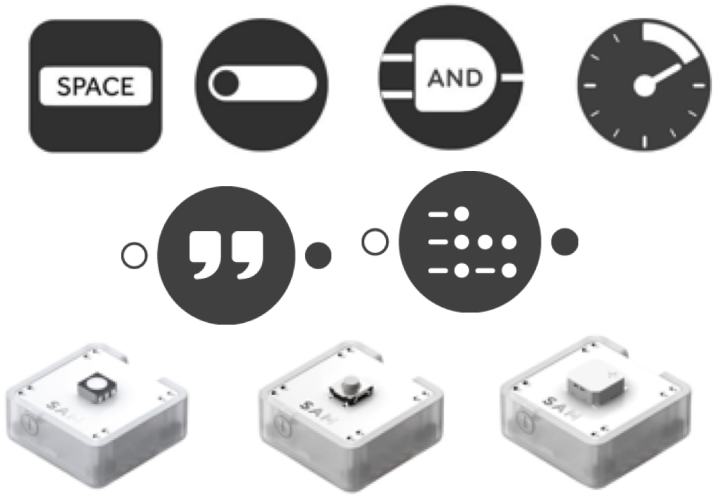


Challenge 1

Step 1.

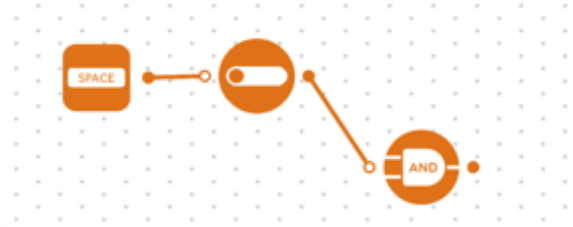
Drag on and add to the workspace:

- Key Press block
- Toggle block x 2
- Button block
- AND gate block
- Interval block
- Text block
- Morse Code block
- RGB LED block



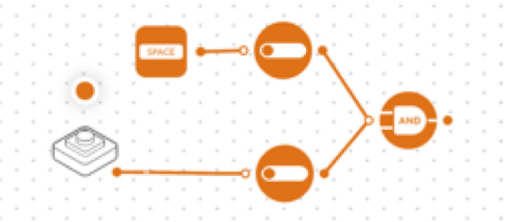
Step 2.

Connect the Key Press block to a Toggle block and into the AND gate block



Step 3.

Connect the Button Block to the other Toggle block and into the AND gate block



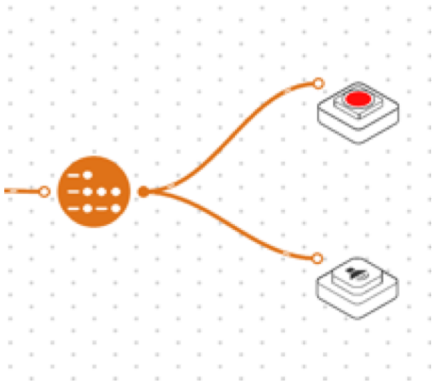
Challenge 1

Step 4.

Connect the output of the AND gate block to the other blocks in this order; Interval block, Text block, Morse Code block

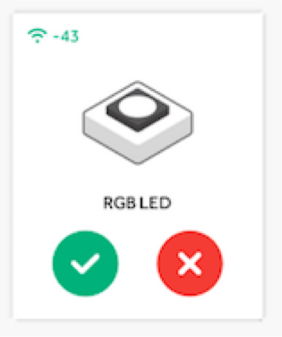
Step 5.

Connect the output of the Morse Code block to the RGB LED block and the Buzzer block



Step 6.

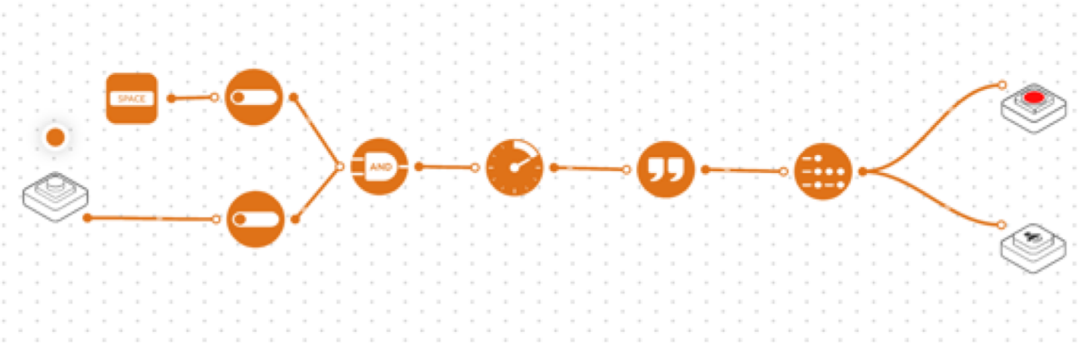
Pair the Button block, RGB LED block and the Buzzer block with the system



Challenge 1

Step 7.

Test your system



Checks for Understanding

1. ***Which inputs need to be ON with the AND gate block for the system to work?***

   A. *Key Press block*

   B. *Button block*

   C. *Both A and B*

2. ***Which blocks are the inputs for this system?***

   A. *Toggle block and Button block*

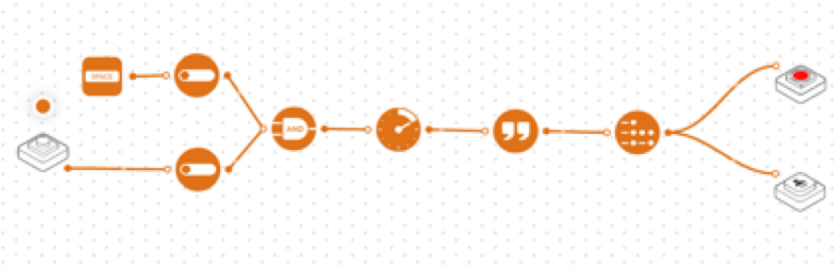
   B. *Button block and Key Press block*

   C. *Key Press block and Toggle block*

Challenge 1 - Debug it!

Step 1.
Open the Settings icon of the Interval block

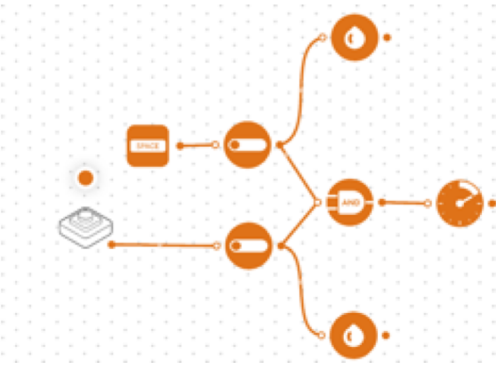
Step 2.
Test your system



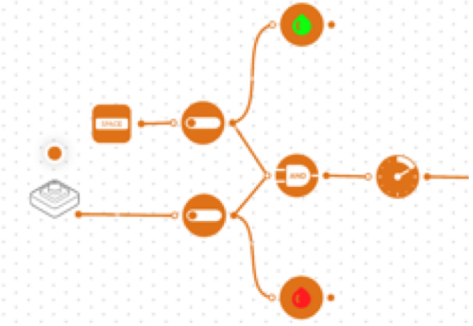
Challenge 2

Step 1.
Drag on 2x Color blocks

Step 2.
Connect the Color block to the Toggle block - so each Toggle block has one attached to it

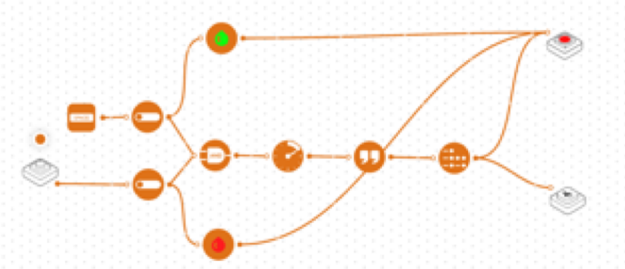


Step 3.
Select the settings of the Color blocks and set to Green and Red

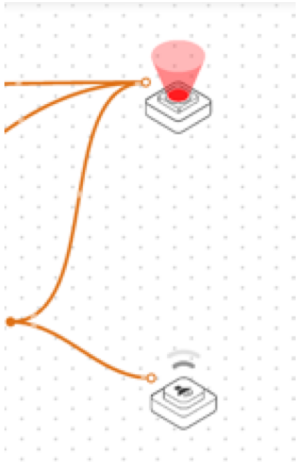


Challenge 2

Step 4.
Connect both outputs of the Color blocks to the RGB LED



Step 5.
Test your system



Checks for Understanding

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

   A. *To set a color*

   B. *To cycle through colors*

   C. *To delete all color*

2. ***What would happen if the Key Press was OFF and the Button block was pressed?***

   A. *The system would run*

   B. *The Button and Toggle would be ON and wait for the other input to be pressed*

   C. *The Toggle would turn itself off*

Exit ticket

✓ **Today I learned…**

Passwords and Patterns

Warm Up

Which is the strongest?

SAM LABS

Mini-lesson

Why should we be safe online?

Keywords

Match or define keywords in your workbook

- Cyberbullying
- E-safety
- Trolling
- Sexting
- Identity theft
- Hacking
- Grooming

Let's Discuss

1. **What information online is used by universities and employers to check a candidate?**

   A. *Social Media Posts and comments*

   B. *Images uploaded*

   C. *A and B*

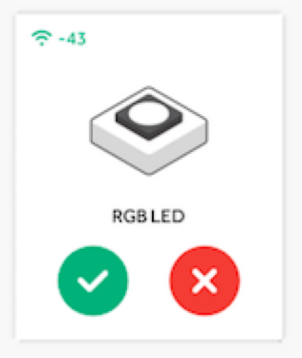
2. In your workbook or with a partner, record, discuss, or share what you can do to make sure you stay safe online and not fall victim to cyberbullying.

Worked Example

Step 1.

Turn on and pair:

- 1 RGB LED block



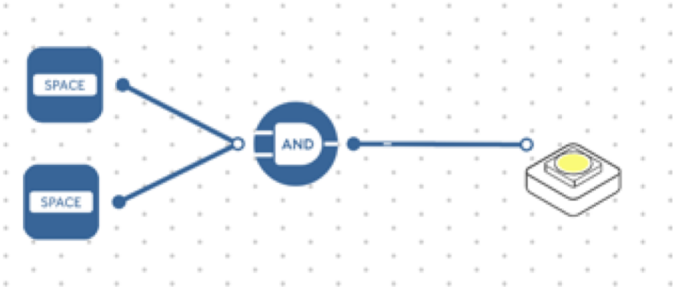
Step 2.

Drag on to the workspace

- 2 x Key Press blocks
- 1 x AND gate block

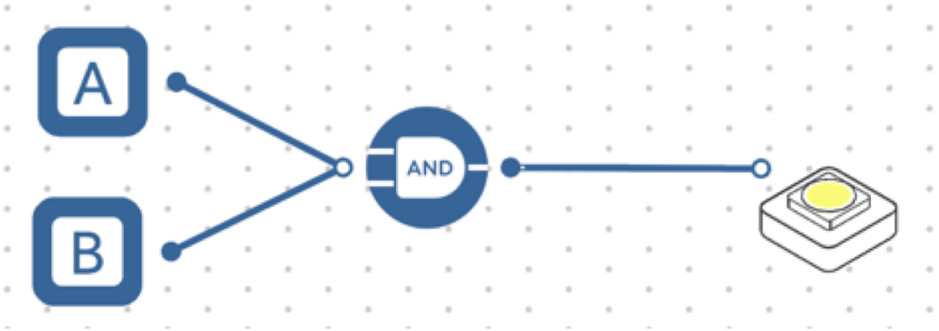
Step 3.

Connect both the Key Press blocks to the input of the AND gate block. Connect the AND gate output to the RGB LED block.



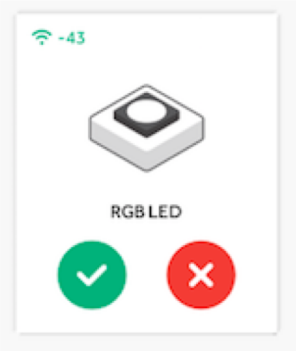
Worked Example

Step 4.
Access the settings of the Key Press blocks and set them to A and B.



Step 5.
Test your system.

Challenge 1



Step 1.

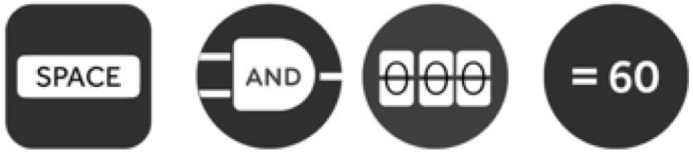
Turn on and pair:

- 1 RGB LED block

Step 2.

Drag on to the workspace

- 3 x Key Press blocks
- 3 x Counter blocks
- 3 x Compare blocks
- 2 x AND gate block



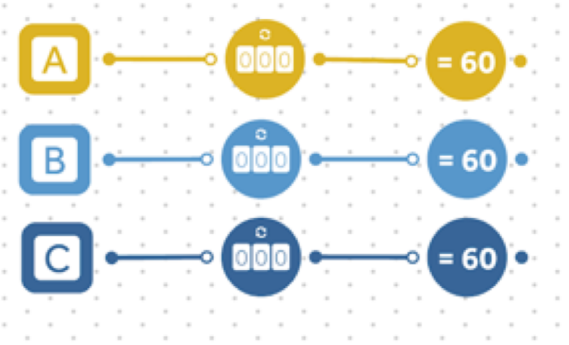
Step 3.

Edit the Key Press blocks to A, B and C

Challenge 1

Step 4.

Connect each Key Press block to its own Counter block and then into a Compare block



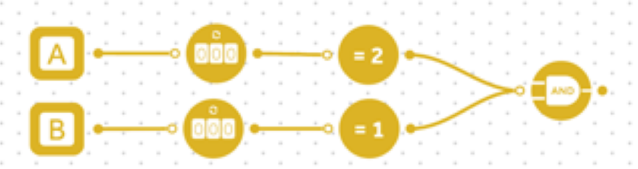
Step 5.

Each Compare block needs to be edited within the settings to:

- A = 2
- B = 1
- C = 1

Step 6.

Connect the output of A and B Compare blocks to an AND gate block



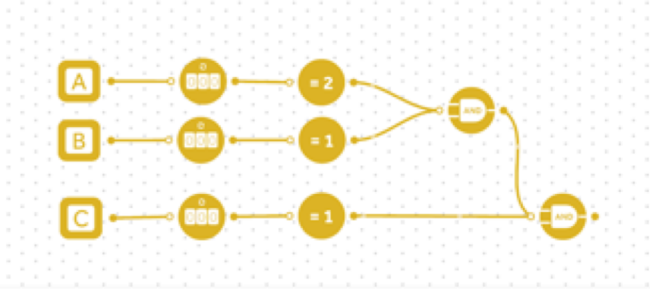
Challenge 1

Step 7.

Connect the output of C Compare block to an AND gate block

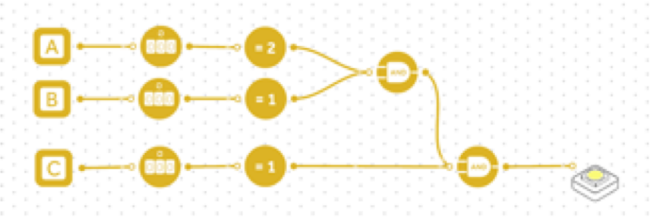
Step 8.

Connect the output of the first AND gate block to the input of the second AND gate block



Step 9.

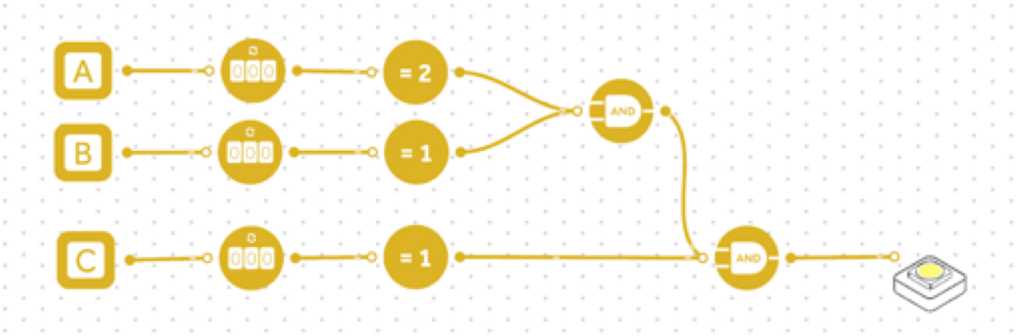
Connect the output of the AND gate to the RGB LED



Challenge 1

Step 10.

Test your system



Checks for Understanding

1. ***What is the purpose of the AND gate block?***

   A. *To connect two blocks together*

   B. *To only allow the system to continue if both inputs are ON*

   C. *To only allow the system to continue if both inputs are OFF*

2. ***What does '= 2' mean on the Compare block?***

   A. *greater than 2*

   B. *less than 2*

   C. *equal to 2*

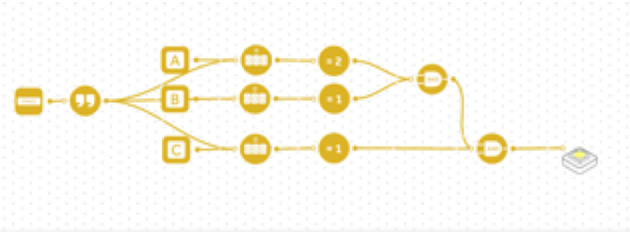
Challenge 1 - Debug it!

Step 1.
Set the range of each Counter block

Step 2.
Drag onto the workspace:

- Key Press block
- Text block

Step 3.
Connect the Key Press block to the Text block and the output of the Text block to all Counter block inputs



Challenge 1 - Debug it!

Step 4.
Edit the settings of the Text block to ‘reset’

Challenge 2

Step 1.

Drag on to the workspace

- 4 x Key Press blocks
- 1 x Counter blocks
- 3 x Compare blocks
- 5 x AND gate block
- 1 x Text block
- 3 x Toggle blocks
- 1 x Sound Player block

Step 2.

Edit the Key Press blocks to A, B and C

Step 3.

Connect the output of the Key Press blocks A, B and C into the Counter block

Challenge 2

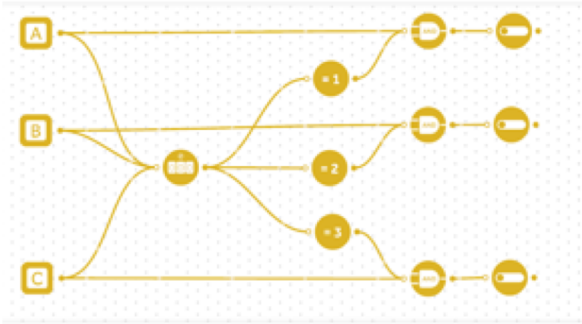
Step 4.

Connect the output of the Counter block to the 3 x Compare blocks and set them to; ‘=1’, ‘=2’, ‘=3’

Step 5.

Connect

- The output of A and the output of ‘=1’ Compare block to an AND gate block
- The output of B and the output of ‘=2’ Compare block to an AND gate block
- The output of CA and the output of ‘=3’ Compare block to an AND gate block



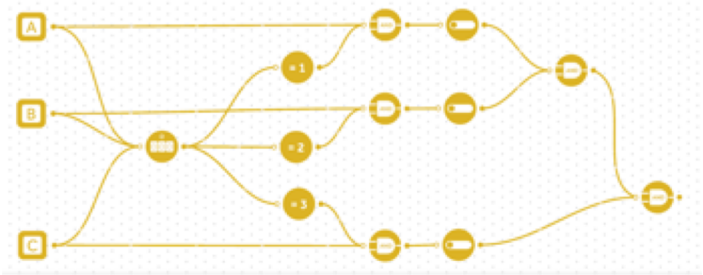
Step 6.

Connect each AND gate block to a Toggle block

Challenge 2

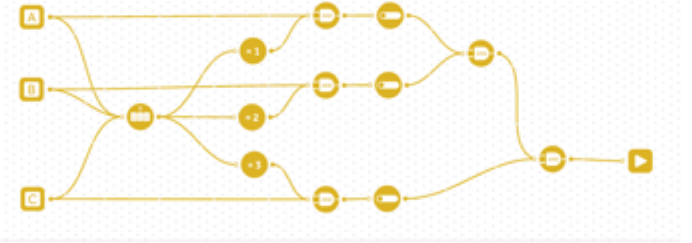
Step 7.

- Connect the top two Toggle blocks to an AND gate block
- Connect the third Toggle block to an AND gate and the output of the other AND gate to the input of this AND gate too



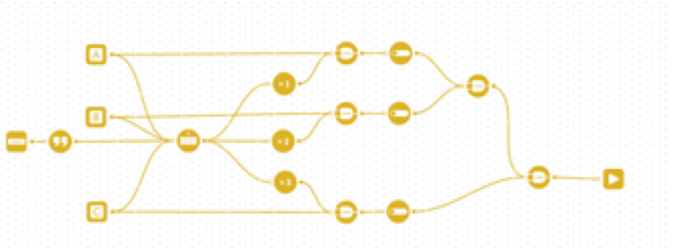
Step 8.

Connect the output of the AND gate block to a Sound Player block and set the sound within the settings



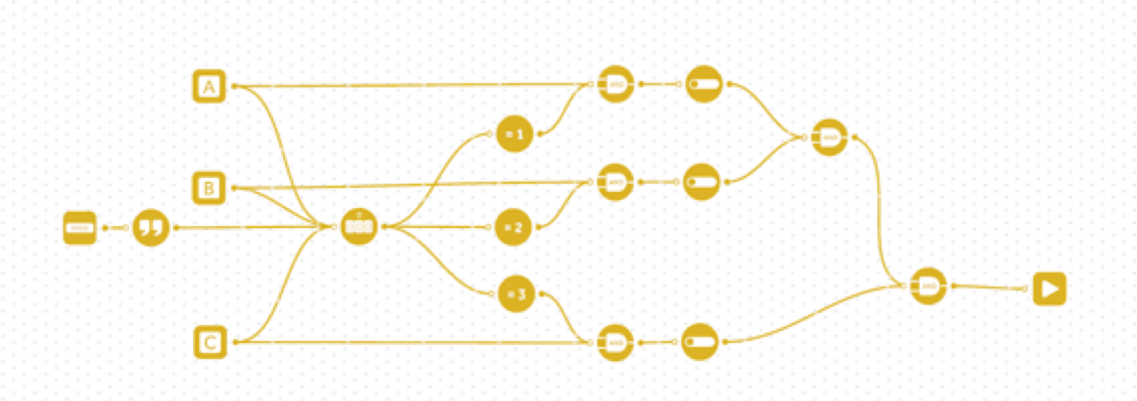
Step 9.

Add the reset option using the Key Press block and the Text block



Challenge 2

Step 10.
Test your system



Checks for Understanding

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

   A. *3*

   B. *2*

   C. *4*

2. ***How many passwords are there to open this system?***

   A. *1*

   B. *2*

   C. *3*

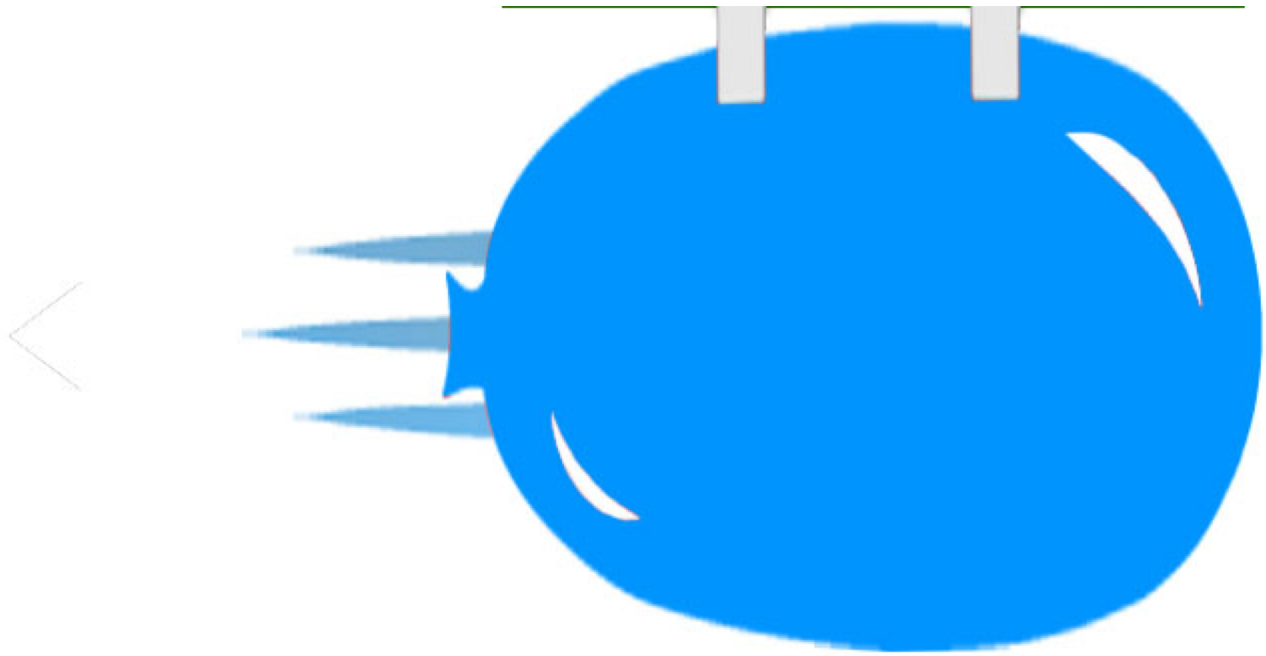
Exit ticket

✓ **Today I learned…**

Every Action...

Let it go

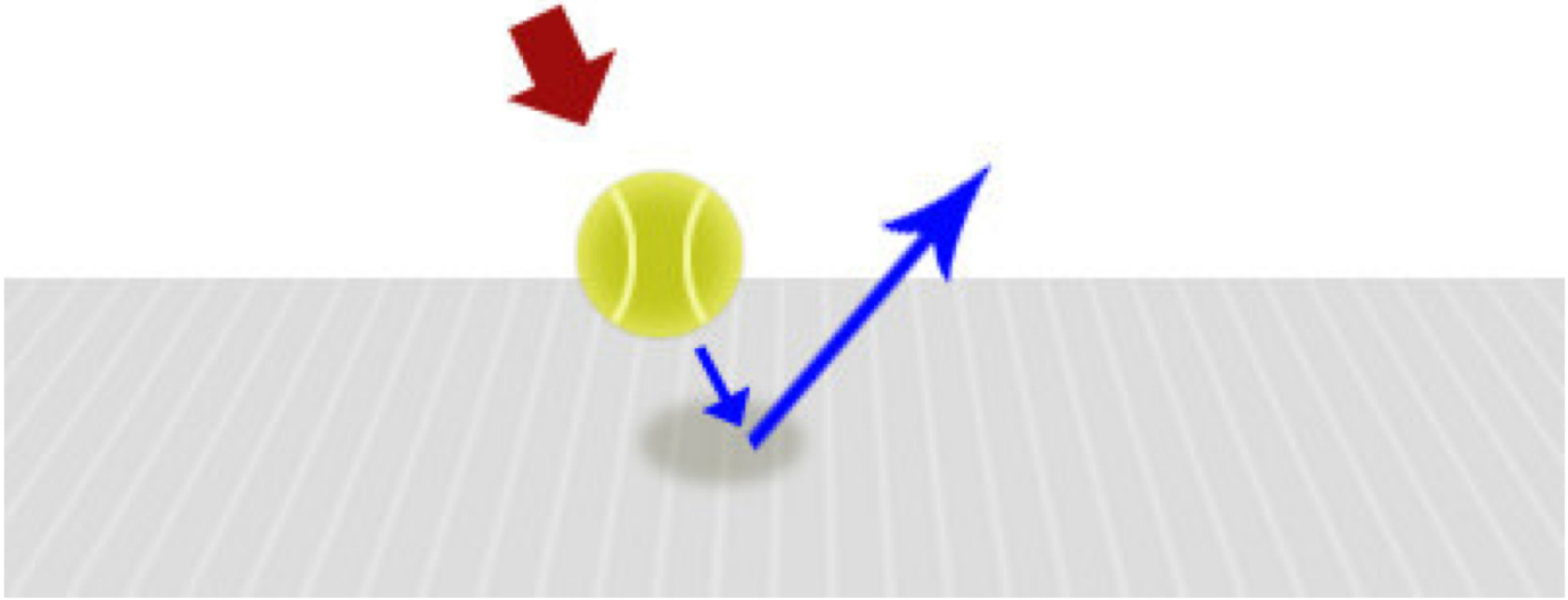
How does a balloon move forward?



Mini-lesson

What is Newton's Third Law of Motion?

Every action has an equal and opposite reaction



Keywords

Match or define keywords in your workbook

- Newton's Third Law
- Motion
- Action
- Reaction
- Opposite
- Equal

Let's Discuss

1. ***What is applied to every action?***

   A. *Equal reaction*

   B. *Opposite reaction*

   C. *Equal and Opposite reaction*

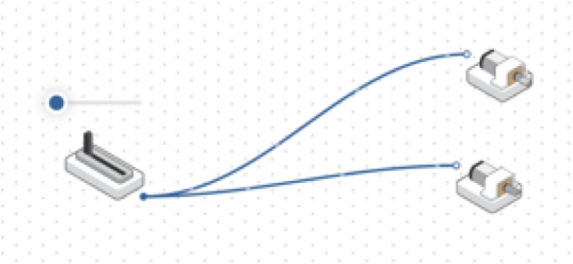
2. In your workbook or with a partner, record, discuss, or share an example of how Newton's Third Law of Motion can be seen.

Worked Example

Step 1.
Turn on, pair and drag onto the workspace:

- 2 DC Motor blocks
- 1 Slider block

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

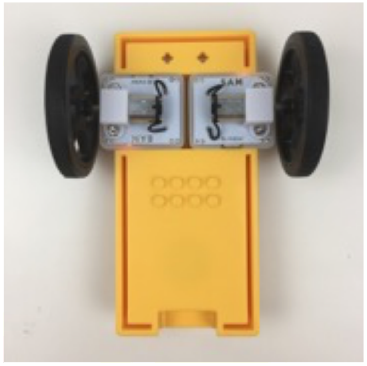


Step 3.
Access the settings of one of the DC Motors and set to anti-clockwise

Worked Example

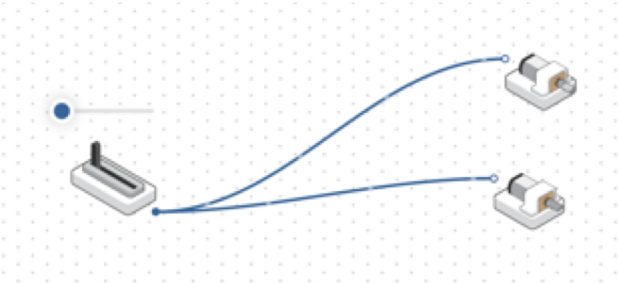
Step 4.
Connect the 2 Wheels to the DC Motors and insert into the Yellow Car Chassis.
Insert the Rollerball underneath the car.

Step 5.
Test it

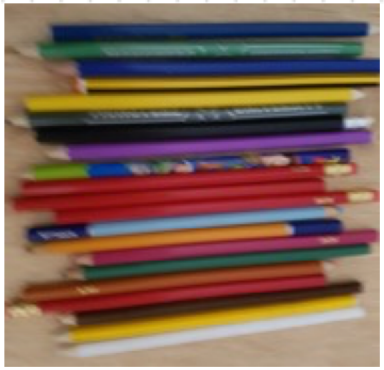


Challenge 1

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



Step 2.
Place pencils on the surface



Step 3.
Place a cardboard on top of the pencils

Challenge 1

Step 4.
Place the car on top of the cardboard

Step 5.
Test it!

Step 6.
Experiment with speed

Checks for Understanding

1. ***What happens to the cardboard as the car moves forward?***

   A. *Moves forward*

   B. *Stays still*

   C. *Moves backwards*

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

   A. *DC Motor blocks*

   B. *Slider block*

   C. *Both*

Challenge 1 - Debug it!

Step 1.
Drag on and add a Threshold block between the Slider and DC Motor blocks

Step 2.
Set the Threshold to 50

Challenge 2

Step 1.
Use a rectangle cardboard box and pierce a hole through the end

Step 2.
Push the end of the DC Motor through and attach a plastic propeller

Step 3.
Balance the weight

Challenge 2

Step 4.
Fill a container with water

Step 5.
Place the boat in the water at the one side

Step 6.
Use the system from challenge 1

Challenge 2

Step 7.
Start the DC Motors

Checks for Understanding

1. ***When the boat moves forward what is pushed back in this experiment?***

   A. *The boat*

   B. *The water*

   C. *The DC Motor*

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

   A. *To start the motor at a higher, specific number*

   B. *To start the motor at a lower, specific number*

   C. *To define the speed at one number*

Exit ticket

✓ **Today I learned…**

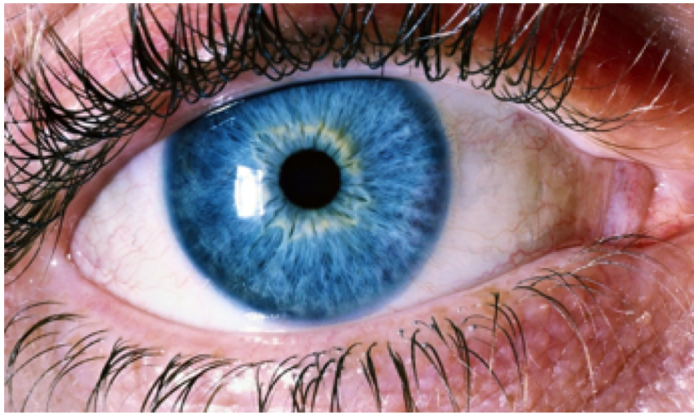
Exploring Heredity

Warm Up

What makes some people look similar to their parents?

Mini-lesson

Are these traits shared by everybody?



Mini-lesson

What is a Punnett square and how does it work?

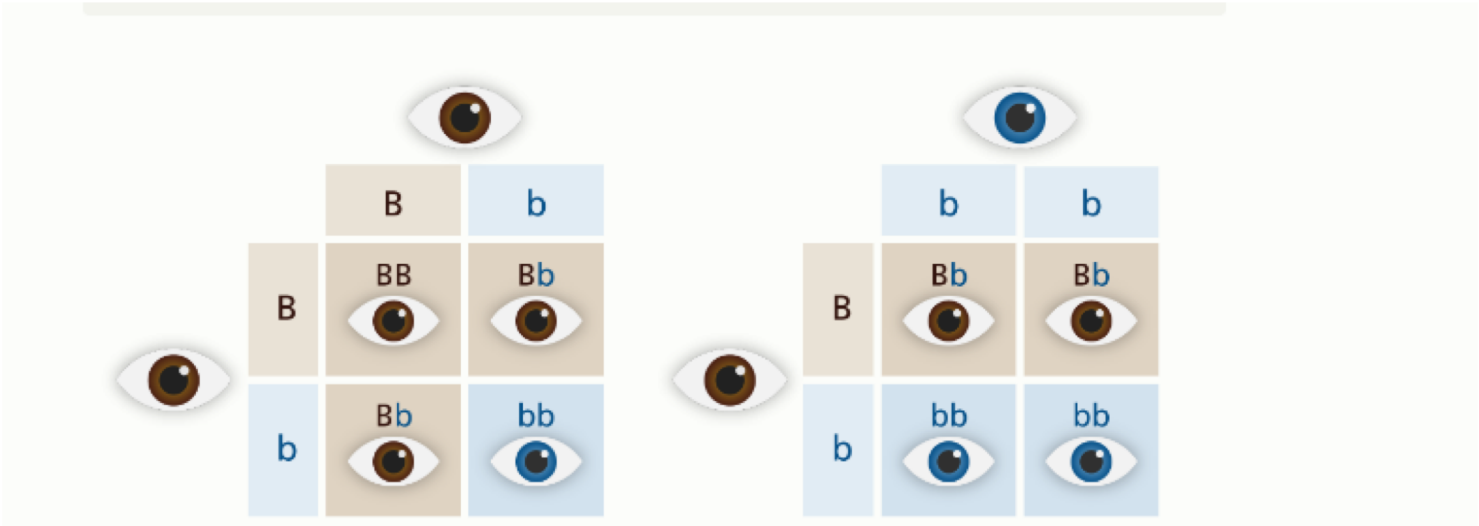


Illustration to show the inheritance of dominant and recessive alleles for eye colour.

Image credit: Genome Research Limited

Mini-lesson

What is a Punnett square and how does it work?

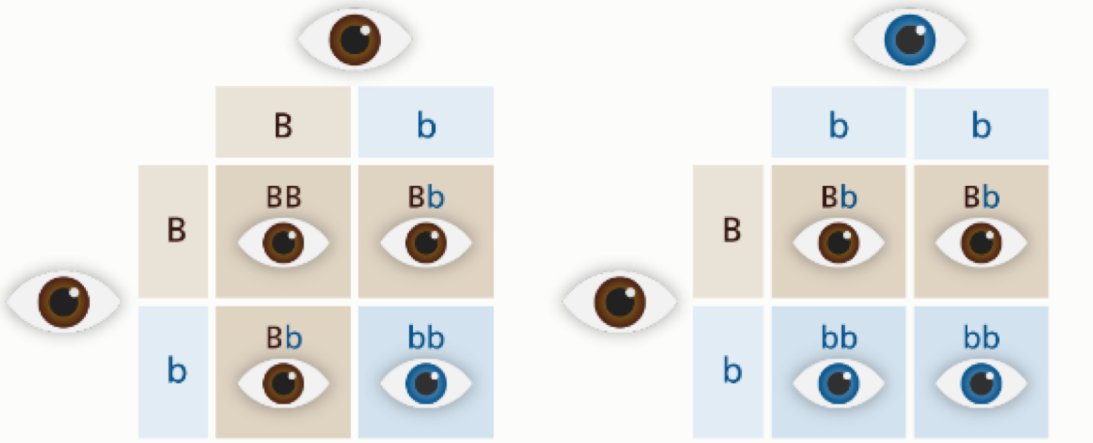


Illustration to show the inheritance of dominant and recessive alleles for eye colour.

Image credit: Genome Research Limited

Keywords

Match or define keywords in your workbook

- Allele
- Dominant
- Recessive
- Gene
- DNA

Let's Discuss

1. ***Why do we need to understand our genes?***

   A. *So we know which style of jeans to wear.*

   B. *To warn us about future disease*

   C. *So we know what to put in our body to make us healthy.*

2. In your workbook or with a partner, record, discuss, or share how understanding our genes can help us in the future.

Worked Example

Step 1.
Turn on and pair:

- RGB LED

Add the RGB LED to the workspace.

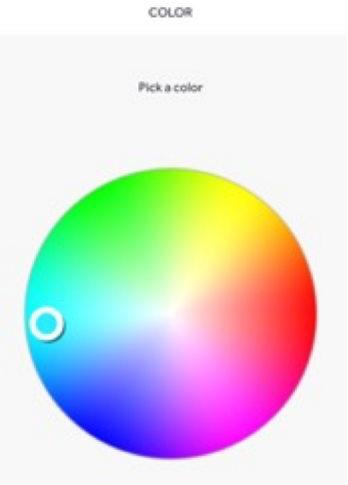
Step 2.
Add to the workspace:

- 2 x Key Press
- 2 x Color blocks

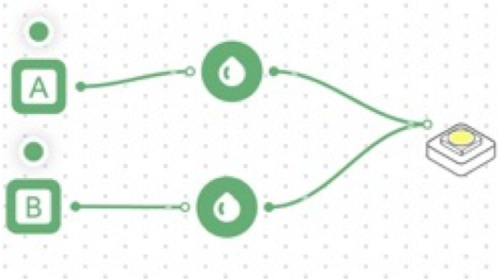
Step 3.
Access the settings of each Key Press to change its label. Select A for the first Key Press and B for the second Key Press.

Worked Example

Step 4.
Access the settings of the Color blocks and change one to blue and one to brown.



Step 5.
Connect each Key Press to a Color block. Connect both Color blocks to the RGB LED.

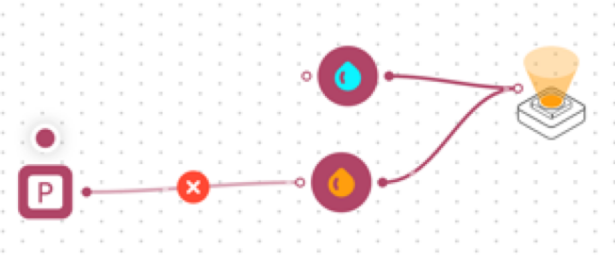


Step 6.
Test your system.

Challenge 1

Step 1.
Delete one Key Press block from the workspace. Access the settings of the remaining Key Press and change the label to P.

Step 2.
Delete the connection between the remaining Key Press and Color block.

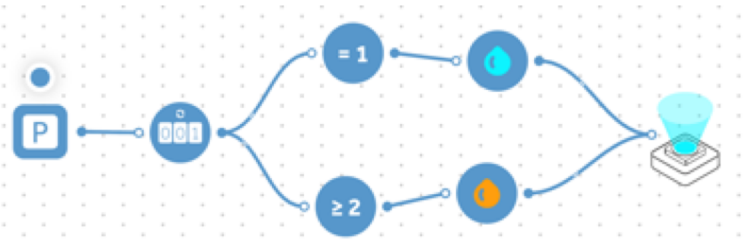


Step 3.
Drag a Counter block and 2 x Compare blocks to the workspace.

Challenge 1

Step 4.
Access the settings of the first compare block and set it to =1.
Access the settings of the second Compare block and set it to ≥ 2.

Step 5.
Connect the Counter block to the Key Press. Connect the Counter block to both Compare blocks, then connect each Compare block to its corresponding Color block.



Step 6.
Connect the output of each Color block to the RGB LED.Test your system.

Checks for Understanding

1. ***How do we end up with our eye color?***

   A. *From our mother*

   B. *From our father*

   C. *From the combination of genes of both our parents.*

2. ***Why do some children have different eye colors to their parents?***

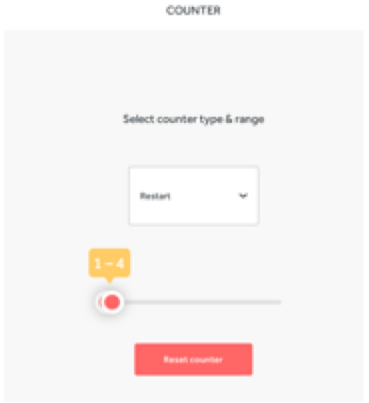
   A. *They are aliens.*

   B. *Eye color is random- it is not affected by our parents genes.*

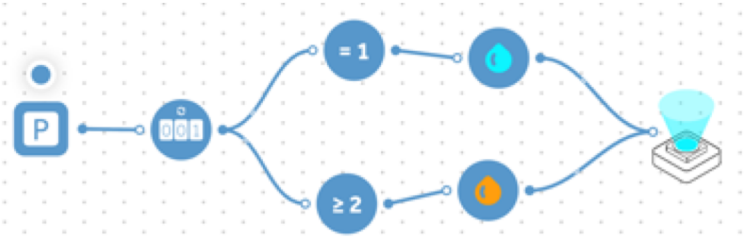
   C. *If both parents have hidden dominance, they might combine to create a different color for their children.*

Challenge 1 - Debug it!

Step 1.
Access the settings of the Counter block and set range to 1-4.



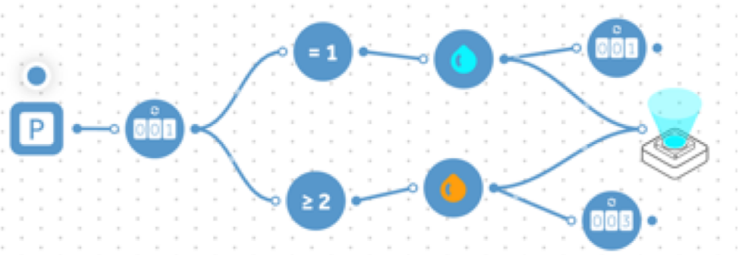
Step 2.
Test your system.



Challenge 2

Step 1.
Drag 2 x Counter blocks onto the workspace.

Step 2.
Connect each Counter block to the Color block output.



Step 3.
Test the system.

Checks for Understanding

1. ***What did the system model in terms of recessive and dominant genes?***

   A. *That they are equal.*

   B. *The mother's genes are always dominant.*

   C. *Both parent's genes go into forming a child's genes.*

2. ***What is the probability of you inheriting your parents eye color?***

   A. It depend on your parents genes.

   B. *50%*

   C. *25%*

Exit ticket

✓ **Today I learned…**

Grey or Ginger Kittens

Warm Up

How do specific genetic variation of traits increase an animal's chance of survival?

Mini-lesson

How have organisms adapted in order to survive?

Keywords

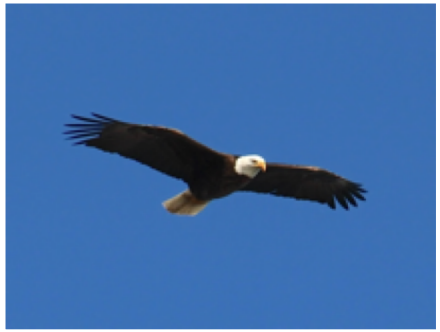
Match the keywords in your workbook

- Evolution
- Genetic variation
- Gene
- Allele
- DNA

Mini-lesson

Can you identify the specific traits each animal has adapted in order to survive in its habitat?



Let's Discuss

1. ***Why do Camels have such wide feet?***

   A. To help them carry heavy loads over the sand

   B. So they can walk for a long time over hot sand

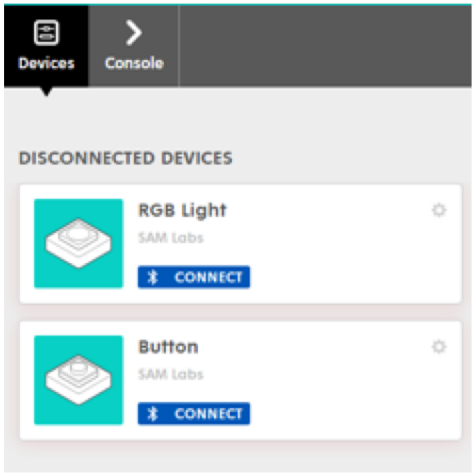
   C. To help them balance

2. In your workbook or with a partner, record, discuss, or share how a giraffe has adapted specific traits in order to aid its survival?

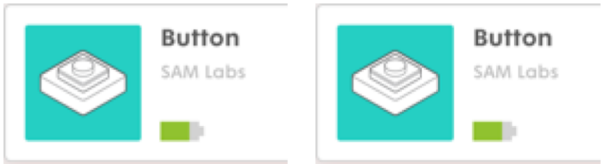
Worked Example

Step 1.
From ‘Devices’, click ‘Add Device’ and select from the list.

- 1 RGB LED
- 1 Button



Step 2.
Connect the RGB Light and Button by pressing ‘Connect’ and ‘Pair’.



Worked Example

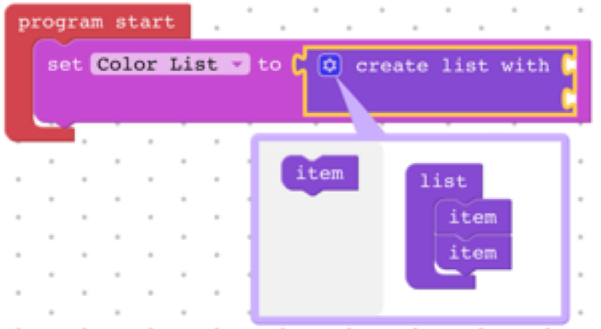
Step 3.
Drag on the ‘Program Start’ button from the ‘General’ tab.

Step 4.
Drag on ‘Set Color List’ from the ‘Variables’ tab. Snap it into place.

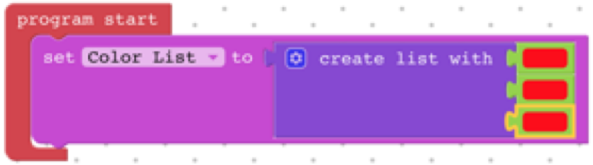
Step 5.
Drag on ‘Create List’ from the ‘List’ tab. Connect it to the variable.

Worked Example

Step 6.
Access the settings of the ‘Create List’ block and drag in one more color option.



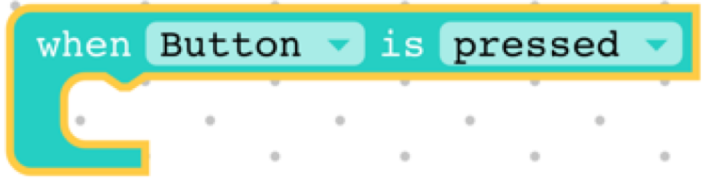
Step 7.
Add in three Colors from the Color settings.



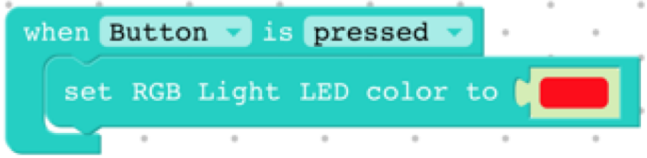
Step 8.
Click on each Color block and select a different color.

Challenge 1

Step 1.
Drag ‘When Button is Pressed’ from the ‘Button’ tab onto the workspace.



Step 2.
Drag on ‘Set RGB Light Color’ from the ‘RGB Light’, ‘Actions’ tab.
Snap into ‘When Button is Pressed’.



Step 3.
Drag on ‘In List Get #’ from the ‘List’ tab.
Snap this into the color section of the ‘Set RGB Light Color’ block.

Challenge 1

Step 4.
Drag on the ‘Random Integer’ block from the ‘Math’ tab and snap into ‘In List Get #’.

Step 5.
Test the system

Checks for Understanding

1. ***Do you expect the dominant or recessive trait to be expressed more frequently?***

   A. Recessive

   B. Dominant

   C. Both expressed an equal amount of times

2. ***Why is the current system not working?***

   A. The blocks are not connected

   B. 'Color List' has not been selected in the List block

   C. The wrong numbers have been selected in the Math block

Challenge 1 - Debug it!

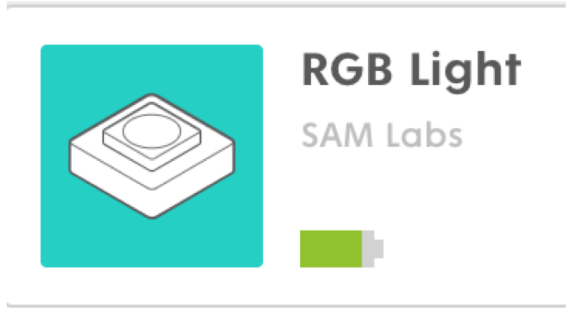
Step 1.
Select the ‘List’ settings on the ‘In List Get #’ . Change it to ‘Color List’.

Step 2.
Test the system. Does the light now flash when the button is pressed?

Challenge 2

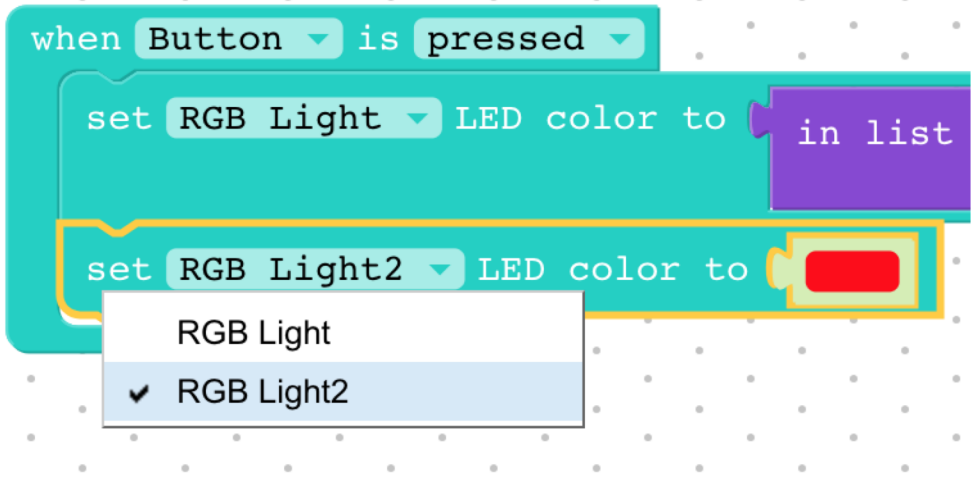
Step 1.
Pair the following block to the workspace:

- RGB LED



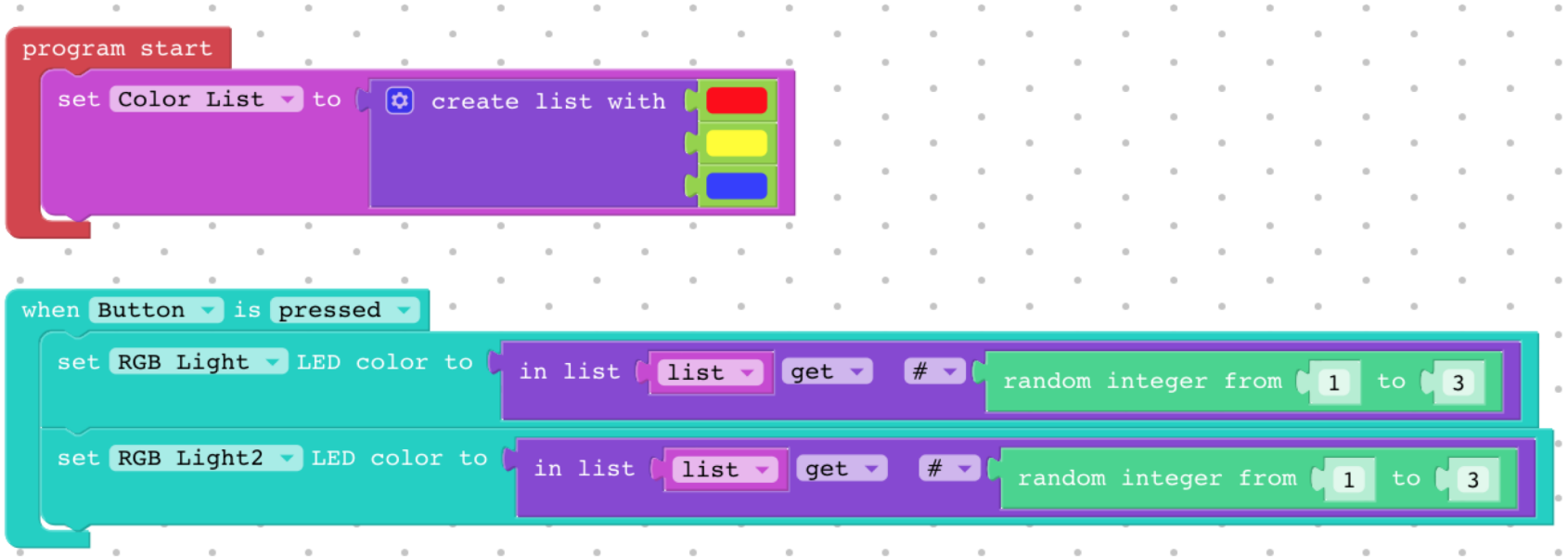
Step 2.
Highlight and duplicate the code instruction the first light.

Step 3.
Select the ‘RGB LED’ menu on the second line of instructions and change it to ‘RGB Light2’.



Challenge 2

Step 4.
Your system now represents the randomization of gene selection from two cats. Test it.



Checks for Understanding

1. ***How many possible color combinations are there?***

   A. 12

   B. 9

   C. 15

2. ***Which is the only color combination that will produce a grey kitten?***

   A. Yellow + Blue

   B. Red + Yellow

   C. Blue + Blue

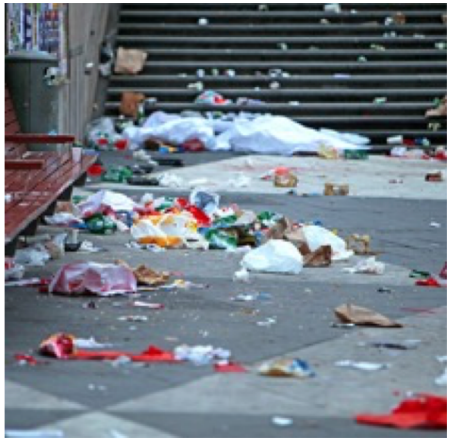
Exit ticket

✓ **Today I learned…**

Solar Energy

Warm Up

Do these human actions have a positive or negative impact on the environment?



Mini-lesson

What is renewable energy and how does it work?

Keywords

Match or define keywords in your workbook

- Fossil Fuels
- Renewable
- Non-renewable
- Solar
- Wind
- Water

Let's Discuss

1. ***What form of renewable energy is most seen on houses?***

   A. Solar panels

   B. Wind Turbines

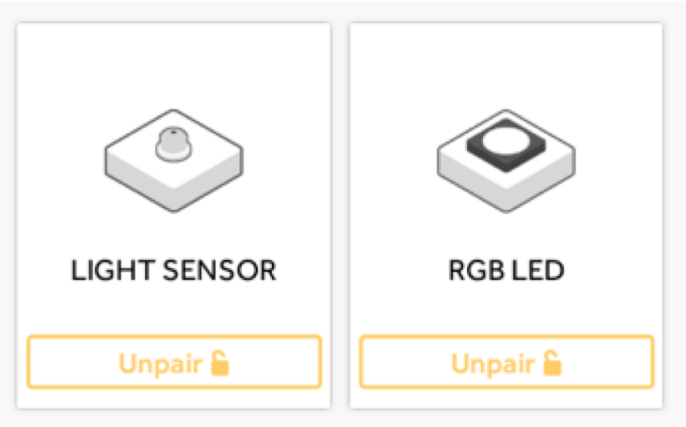
   C. Hydropower

2. In your workbook or with a partner, record, discuss, or share an example of how renewable energy could be used.

Worked Example

Step 1.
Turn on and pair:

- Light Sensor block
- RGB LED block
- Cycle Colors block



Step 2.
Connect the Light Sensor block to Cycle Colors block to RGB LED block.

Worked Example

Step 3.
Place your hand over the Light Sensor block.

Step 4.
Test your system.

Challenge 1

Step 1.
Secure 4 x pieces of tissue paper to the Wheel.

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

Step 3.
Turn on and pair:

- Light Sensor block
- RGB LED block
- DC Motor block

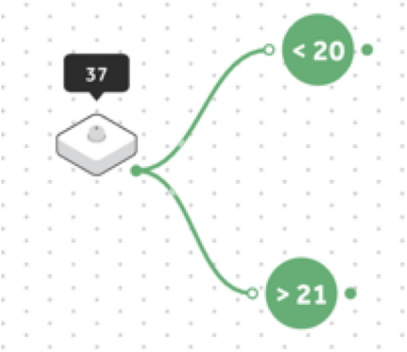
Challenge 1

Step 4.
Drag the following blocks onto the workspace:

- Cycle Colors block
- Compare block x2
- Inverse block

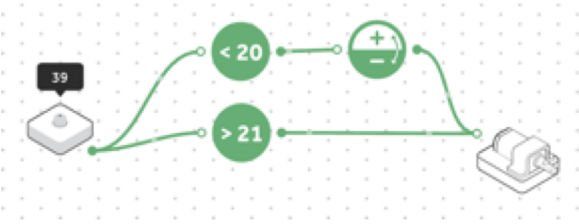
Step 5.
Connect the Compare blocks to the Light Sensor Block. Open the settings and set them to:

- < 20
- > 21



Step 6.
Connect:

- < 20 Compare block to the Inverse block and the Inverse block to the DC Motor block
- > 20 Compare block to the DC Motor block.



Challenge 1

Step 7.
Connect:

- The output of both Compare blocks to the Cycle Colors block
- The Cycle Colors block to the RGB LED block

Step 8.
Secure the Car Controller to the Car Chassis with blu tack and place the blocks in the slots.

Step 9.
Test your system.

Checks for Understanding

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

   A. To set the speed

   B. To change the direction

   C. To turn the input into the opposite

2. ***Why have we used the Cycle Colors block?***

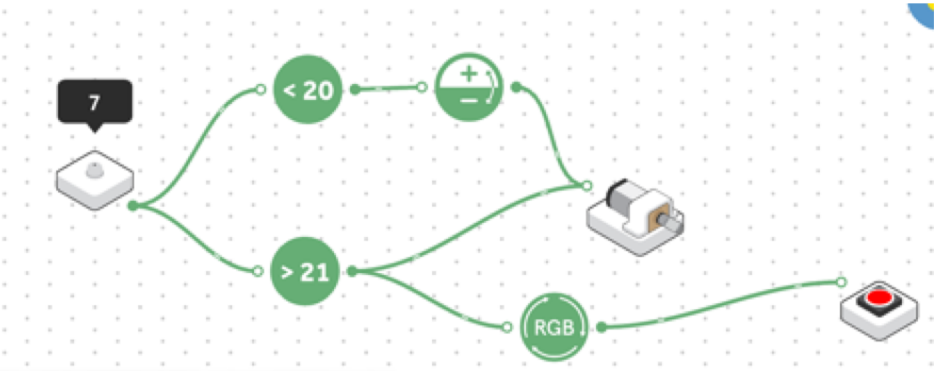
   A. To show that light stays the same around us

   B. To show that light changes around us

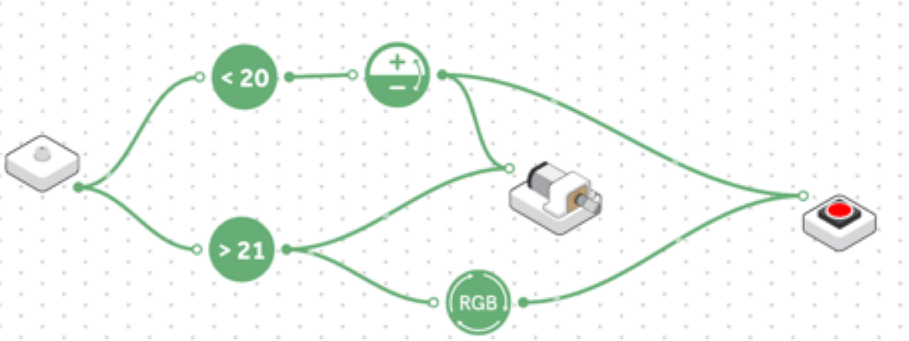
   C. To make it pretty

Challenge 1 Debug it!

Step 1.
Disconnect the Cycle Colors block from the < 20 Compare block.



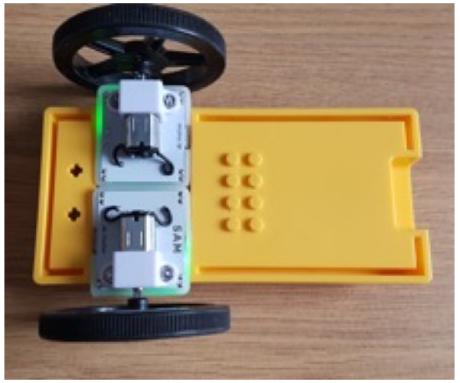
Step 2.
Connect the output of the Inverse block to the RGB LED block.



Step 3.
Test your system.

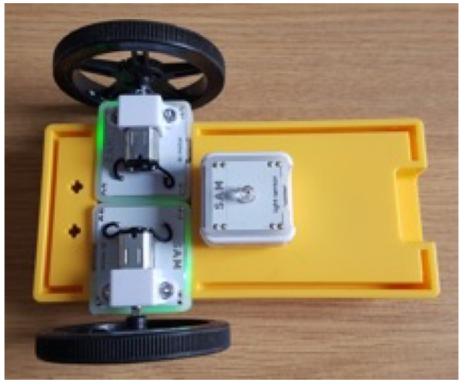
Challenge 2

Step 1.
Secure both DC Motor blocks to the Car chassis.



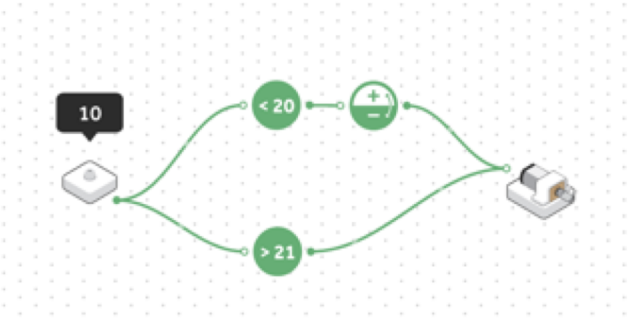
Step 2.
Secure the Roller ball to the bottom of the Car Chassis.

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



Challenge 2

Step 4.
Remove the Cycle Colors and RGB LED blocks from the system.



Step 5.
Turn on and pair a second:

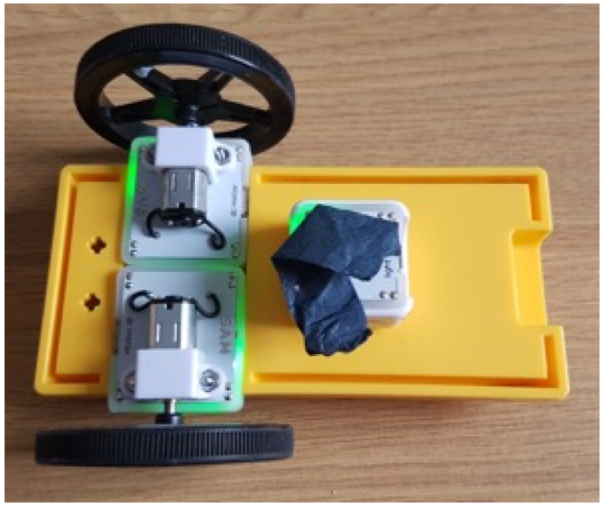
- DC Motor block

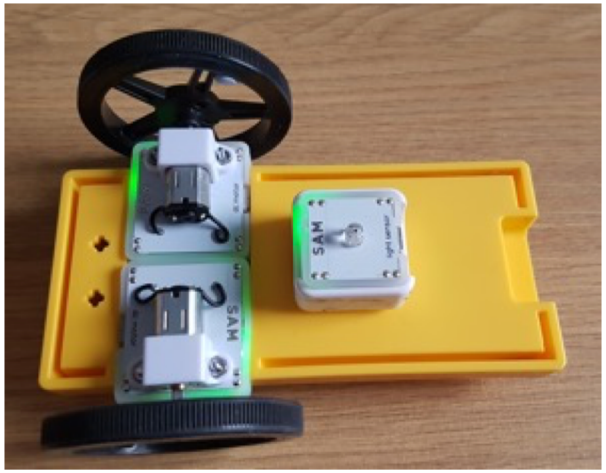
Step 6.
Set the direction and speed of the DC Motor blocks within the settings to:

- 1 x Clockwise
- 1 x Counter Clockwise
- Speed reduced on both but need to be the same

Challenge 2

Step 7.
Test your system.





Checks for Understanding

1. ***What is the purpose of the Compare block and Inverse block together?***

   A. To increase the speed of the DC Motor

   B. To decrease the speed of the DC Motor

   C. To stop the DC Motor

2. ***What will happen if the light detected is 21?***

   A. The Car will stop

   B. The Car will start

   C. The Car will increase speed

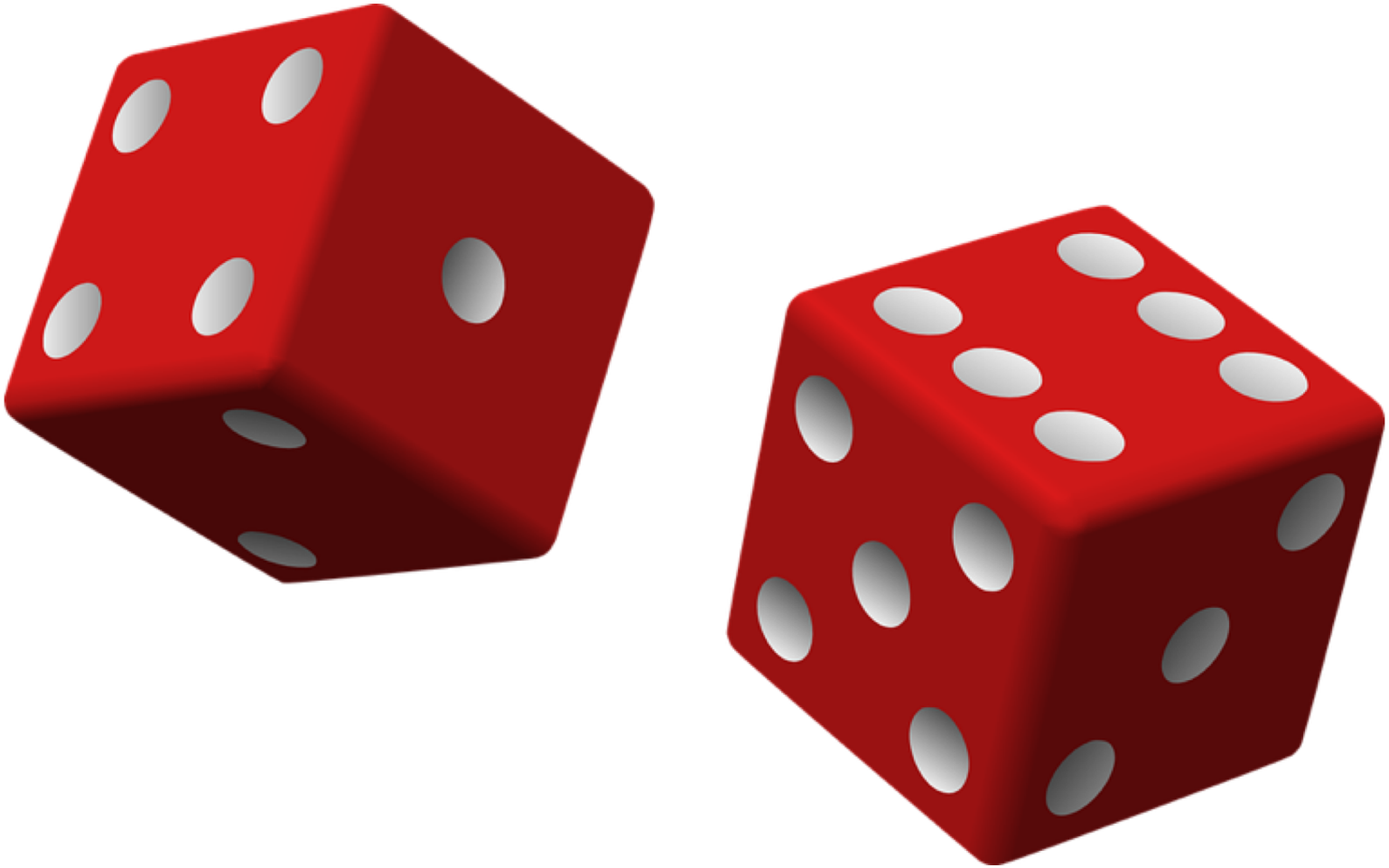
Exit ticket

✓ **Today I learned…**

Random numbers

What can you roll?

What are the possible rolls you can get?



Mini-lesson

What are the possibilities?

1						
2						
3						
4						
5						
6						
	1	2	3	4	5	6

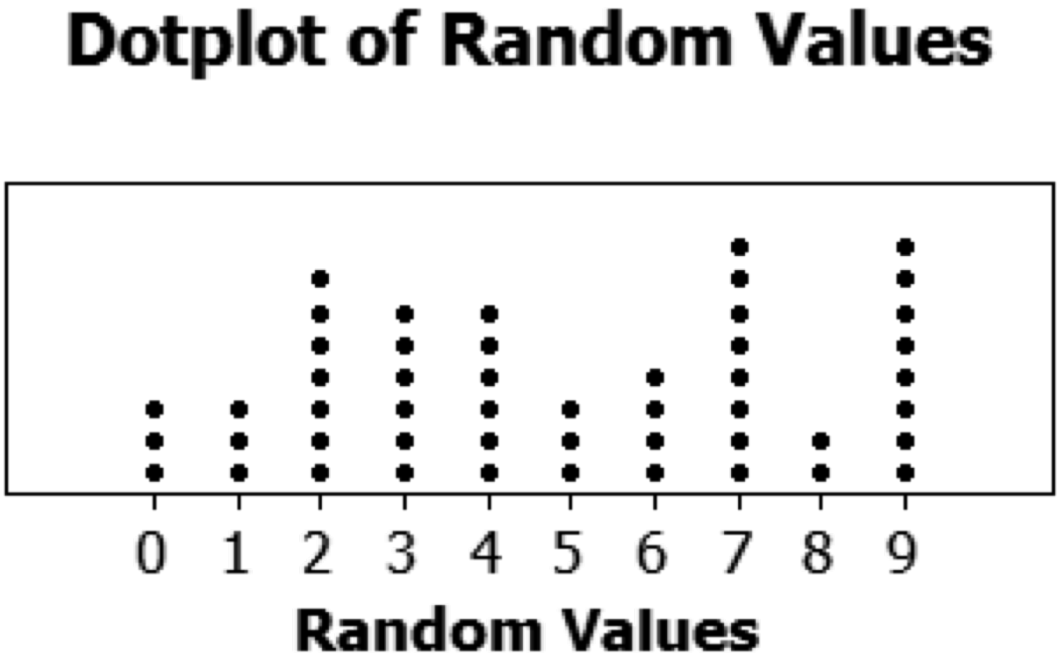
Keywords

Match or define keywords in your workbook

- Mean
- Median
- Mode
- Dot Plot

Mini-lesson

How can we display a list in a graphical format?



Let's Discuss

1. ***How can a graph help to analyze data?***

   A. *Answer option 1*

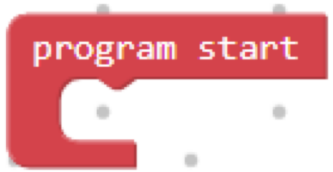
   B. *Answer option 2*

   C. *Answer option 3*

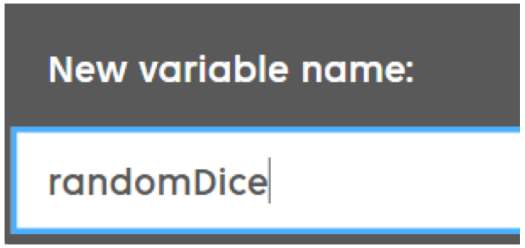
2. In your workbook or with a partner, record, discuss, or share an example of another time when graphical data might be easier to analyze than a list of data.

Worked Example

Step 1.
From the ‘General’ tab, drag a ‘Program Start’ block onto the workspace.

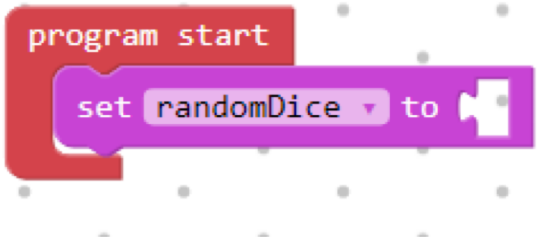


Step 2.
Click the ‘Variables’ tab and ‘Create Variable’. Name it ‘randomDice’.



Step 3.

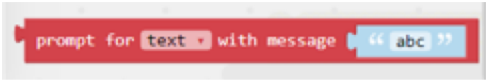
- From the ‘Variable’ tab, drag the ‘Set Variable’ block to the workspace.
- Connect the ‘Set Variable’ block to the ‘Program Start’ block.
- Set the variable to ‘randomDice’.



Worked Example

Step 4.

- From the ‘General’ tab, drag a ‘Prompt for Text’ block onto the workspace.
- Change the drop down menu from ‘text’ to ‘number’.

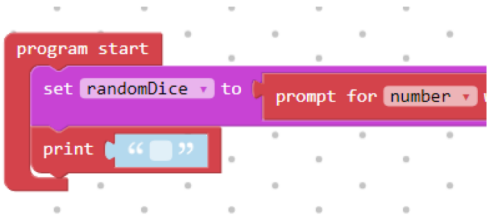


Step 5.

- Change the text in the field ‘abc’ to, “Enter the number you rolled.”
- Connect the ‘Prompt for Number’ block to the ‘Set Variable’ block.

Step 6.

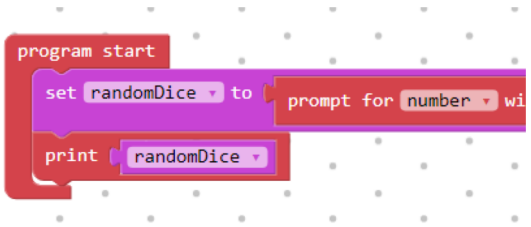
- From the ‘General’ tab, drag a ‘Print’ block onto the workspace.
  Connect the ‘Print’ block below the ‘Set Variable’ block.

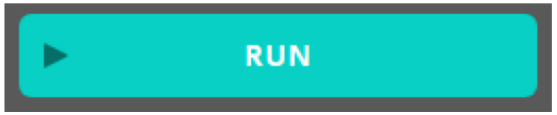


Worked Example

Step 7.

- From the ‘Variable’ tab, drag the ‘randomDice’ Variable block onto the workspace.
- Connect the randomDice Variable block to the Print block.





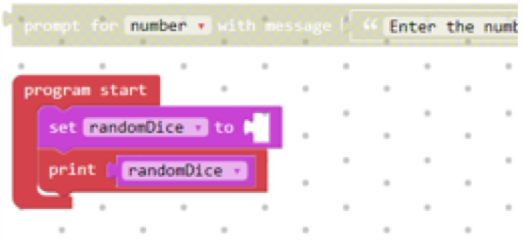
Step 8.

Test the system.

Challenge 1

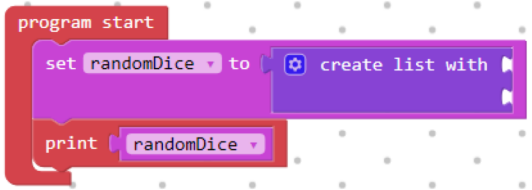
Step 1.

Remove the ‘Prompt for Number’ block from the ‘Set Variable’ block. Keep it on the workspace.



Step 2.

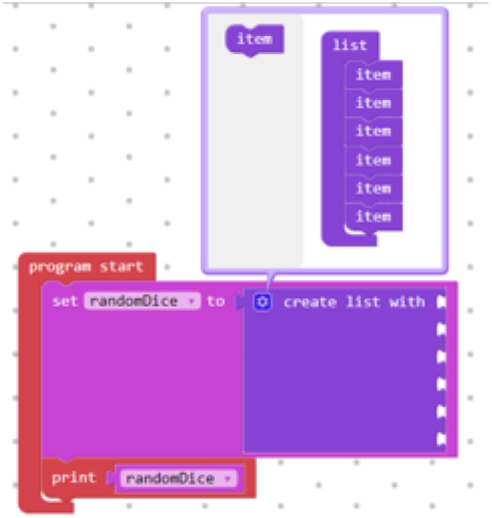
- From the ‘List’ tab, drag a ‘Create List With’ block onto the workspace.
- Connect it to the ‘Set Variable’ block.



Step 3.

- Click the gear icon on the ‘Create List’ block.
- Drag 4 additional ‘Item’ blocks within the ‘List’ block.

There will 6 ‘Item’ blocks altogether.



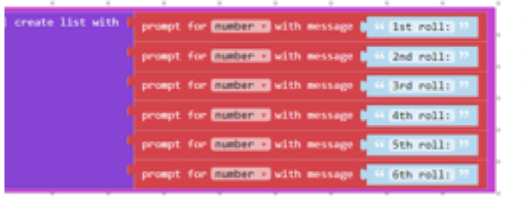
Challenge 1

Step 4.

- Connect the ‘Prompt For Number’ block to the first slot for the Create list block.
- Change the text to “1st roll:”

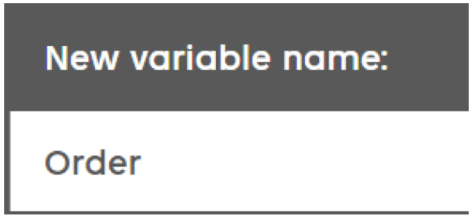
Step 5.

- Duplicate the ‘Prompt For Number’ block and fill the other slots.
- Change the text to “2nd roll:” up to, “6th roll:”



Step 6.

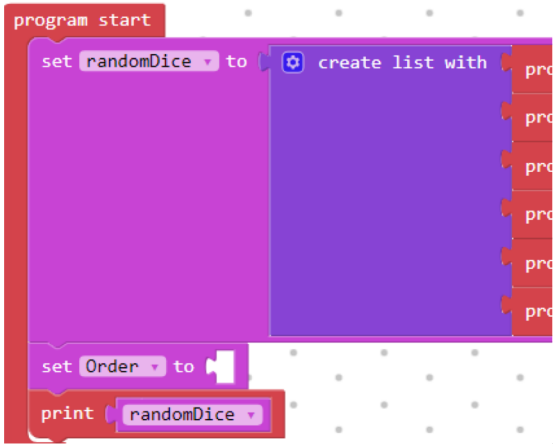
From the ‘Variable’ tab, select ‘Create Variable’ and name it ‘Order’.



Challenge 1

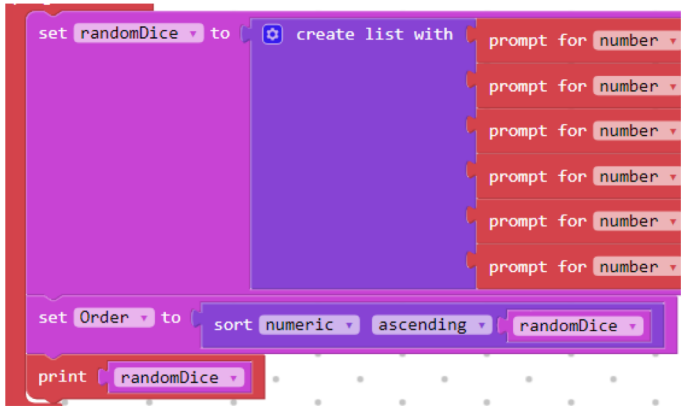
Step 7.

- From the ‘Variables’ tab, drag a ‘Set Variable to’ block onto the workspace.
- Choose ‘Order’ as the variable.
- Attach it between the ‘Print’ block and the 1st ‘Set Variable’ block.



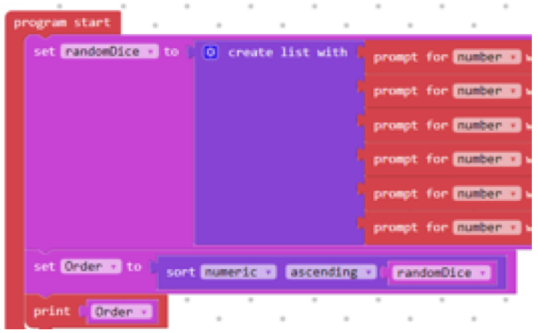
Step 8.

- From the ‘List’ tab, drag a ‘Sort Numeric Ascending’ block to the workspace.
- From the ‘Variables’ tab, drag a ‘Variable’ block to the workspace.
- Ensure the ‘Variable’ block to ‘randomDice’.
- Connect the Sort block to the 2nd Set variable block.



Challenge 1

Step 9.
Change the ‘Print’ block ‘Variable’ to ‘Order’.



Step 10.
Click “RUN” to ensure values can be inputted and that output is ordered.

```
[2,4,5,6,7,7]
```

Checks for Understanding

1. ***Why is it useful to order the entries from most to least when working with data?***

   A. *It makes it easier to find the center.*

   B. *It looks tidier.*

   C. *The most are least are often the most important parts.*

2. ***Why do some people gather information about events?***

   A. *So they can spy on people.*

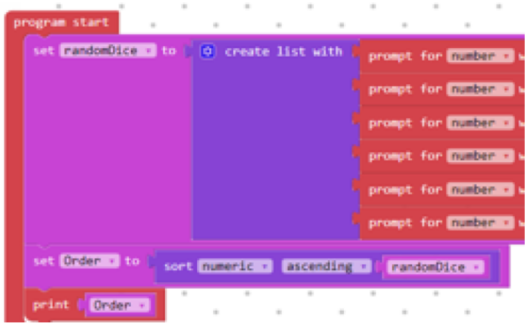
   B. *So they can show off about what they know.*

   C. *So they can understand what is and make predictions.*

Challenge 1 - Debug it!

Step 1.

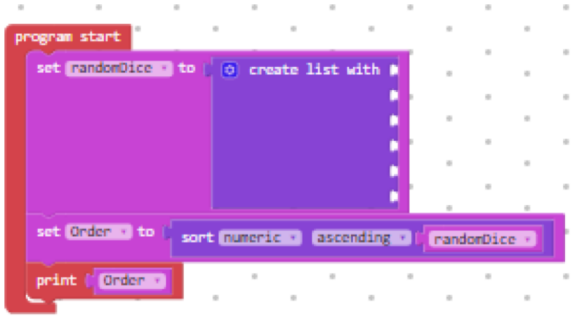
Check that the variable names are proper



Challenge 2

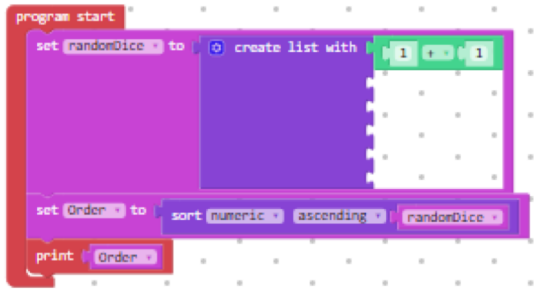
Step 1.

Remove all ‘Prompt for Number’ blocks from the system.



Step 2.

- From the ‘Math’ tab, drag an ‘Operation’ block onto the workspace.
- Connect it to the first slot for the ‘Create List with’ block.



Step 3.

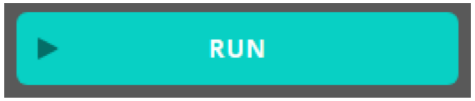
- From the ‘Math’ tab, drag 2 ‘Random Integer from’ blocks onto the workspace.
- Set the values for both to 1 to 6.

Challenge 2

Step 4.
Connect both ‘Random integer’ blocks to the ‘Operation’ block.

Step 5.
Duplicate the ‘Operation’ block to fill all of the empty slots from the ‘Create List with’ block.

Step 6.
Click “RUN” to test the system.



Checks for Understanding

1. ***Why is it worthwhile having different variable names?***

   A. *It would be boring if they were all the same.*

   B. *A variable name should describe its purpose.*

   C. *Numbers after the name would be confusing.*

2. ***Describe the biggest difference between the results of the user- and machine-input systems?***

   A. *Results*

   B. *Accuracy*

   C. *Speed*

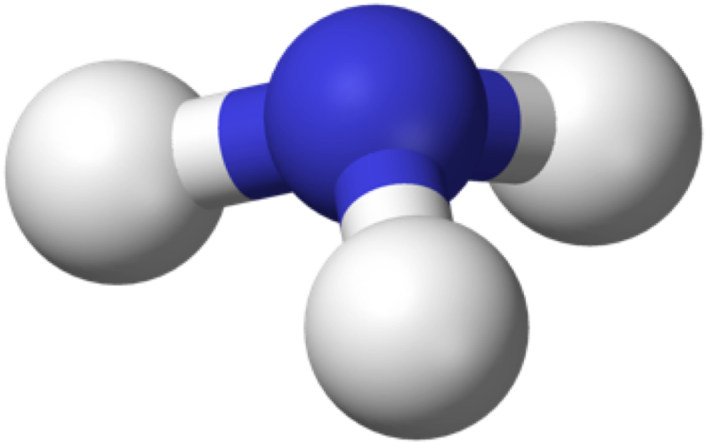
Exit ticket

✓ **Today I learned…**

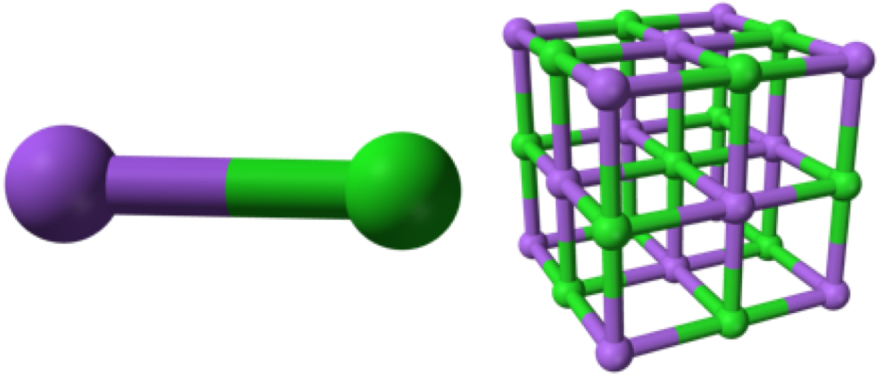
Kinetic Energy and Mass

Warm Up

Can you build the molecule from the picture?



Simple molecule = Ammonia



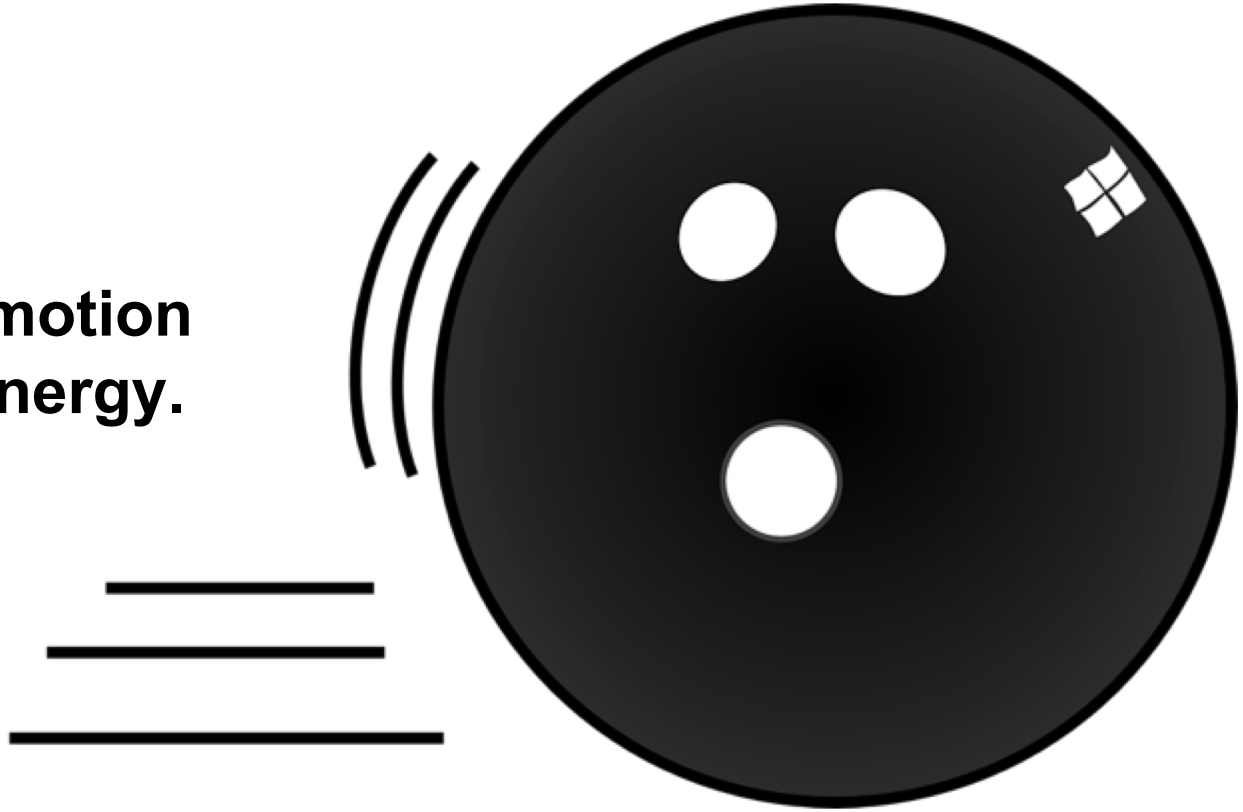
Complex Structure = Sodium Chloride

Mini-lesson

What is kinetic energy?

Kinetic energy = 0.5 x Mass x speed²

All objects in motion have kinetic energy.



Keywords

Match or define keywords in your workbook

- Kinetic energy
- Potential energy
- Mass
- Speed
- Joules
- Velocity

Let's Discuss

1. ***What would the kinetic energy be of a bike with a mass of 200kg and travelling at a speed of 15m/s?***

   A. 22,500 joules

   B. 45,000 joules

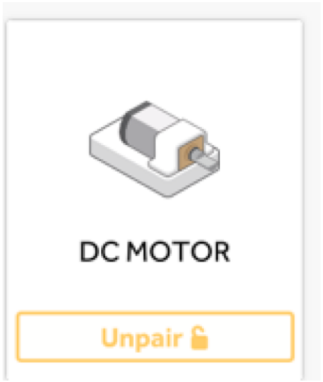
   C. 1500 joules

2. In your workbook or with a partner, record, discuss, or share a range of objects that possess kinetic energy.

Worked Example

Step 1.
Turn on and pair:

- Slider/Virtual block
- DC Motor block



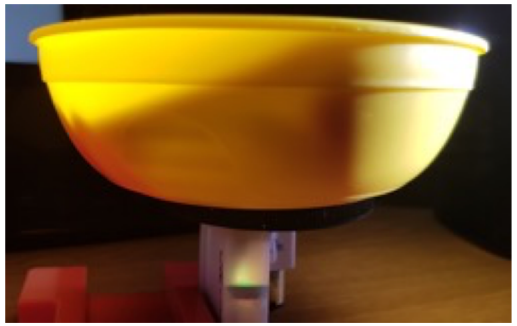
Step 2.
Drag the Slider and DC Motor blocks onto the workspace and connect them.

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

Worked Example

Step 4.
Secure the DC Motor vertically in the red Car Controller accessory.

Step 5.
Using blu tack, secure a plastic bowl to the top of the wheel.



Step 6.
Add jellybeans to the bowl. Increase the Slider speed to see the effect of mass on the speed of the motor

Step 7.
Experiment with mass.

Challenge 1

Step 1.

Turn on and pair:

- Button/Virtual block.

Step 2.

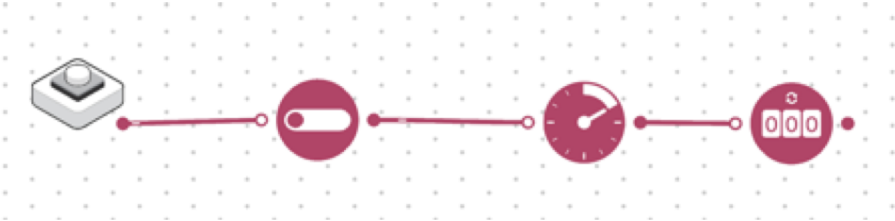
Drag onto the workspace:

- Button block
- Toggle block
- Interval block
- Key Press block
- Text block
- Counter block

Step 3.

Connect the blocks in the following order:

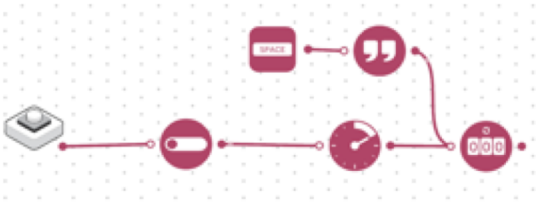
- Button block to Toggle block
- Toggle block to Interval block
- Interval block to Counter block



Challenge 1

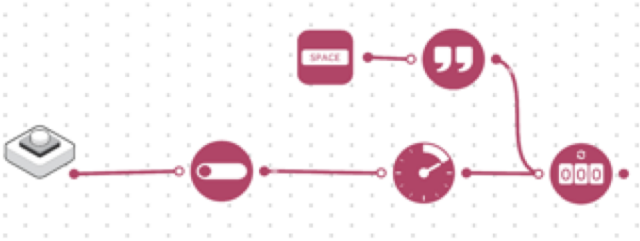
Step 4.
Connect the following blocks to the system to add a reset function.

- The Key Press block to the Text block
- The Text block to the Counter block



Step 5.
Access the settings of the Text block and add the text ‘reset’ all in lowercase.

Step 6.
Test your system.



Checks for Understanding

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

   A. To reset the system

   B. To count the seconds

   C. To set the interval of 1 second

2. ***What does the combination of the Key Press and Text block have in the system?***

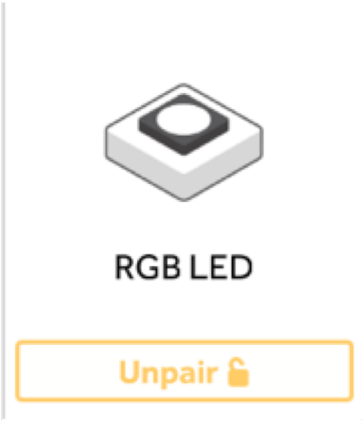
   A. Reset the system

   B. Count the time lapsed

   C. Turn the system on

Challenge 1 Debug it!

Step 1.
Turn on and Pair a RGB LED block.



Step 2.
Drag the RGB LED block onto the workspace. Connect Interval block to RGB LED block.

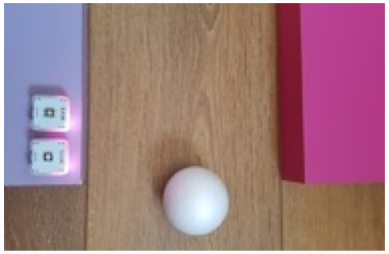
Step 3.
Test your system.

Challenge 2

Step 1.
Create a straight run.

Step 2.
Add a starting point.

Step 3.
Set up the blocks and the ball.



Challenge 2

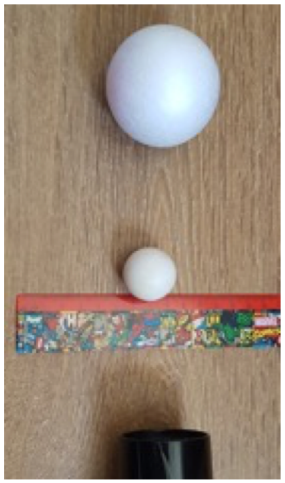
Step 4.
Using a hair dryer turn on at the same time as the button is pressed to start the movement and the timer at the same time.

Step 5.
Capture the data from one object.

Step 6.
Use a heavier object and repeat the experiment.

Challenge 2

Step 7.
Place the lighter object in front of the heavier object and repeat the experiment to see the distance the lighter ball travels when hit by the heavier ball.



Step 8.
Use the data to create a graph.

Checks for Understanding

1. ***What is kinetic energy?***
   A. Energy you switch on

   B. Stored energy

   C. All objects in motion

2. What happens when the air flow behind the ball is increased?

   A. The ball will stop

   B. The ball's speed will decrease

   C. The ball's speed will increase

Exit ticket

✓ **Today I learned…**