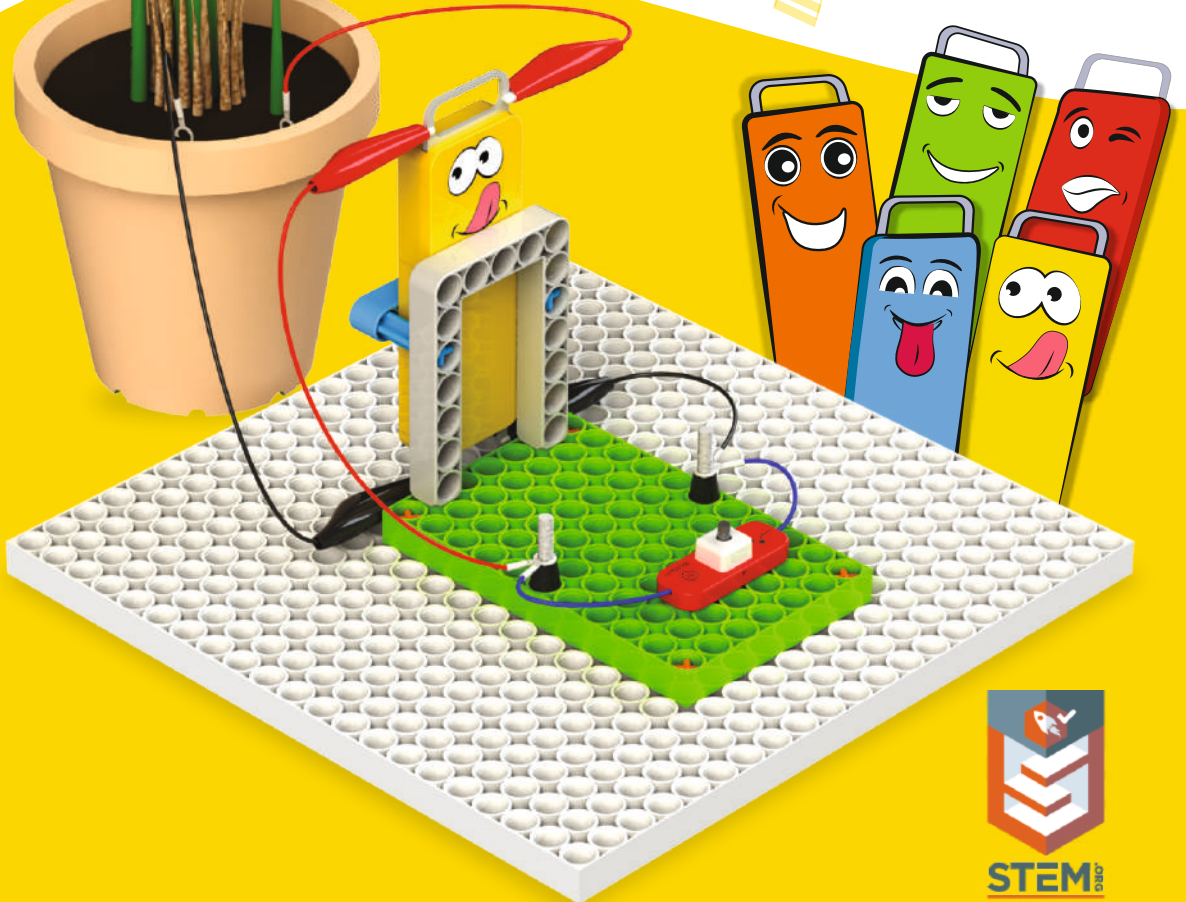


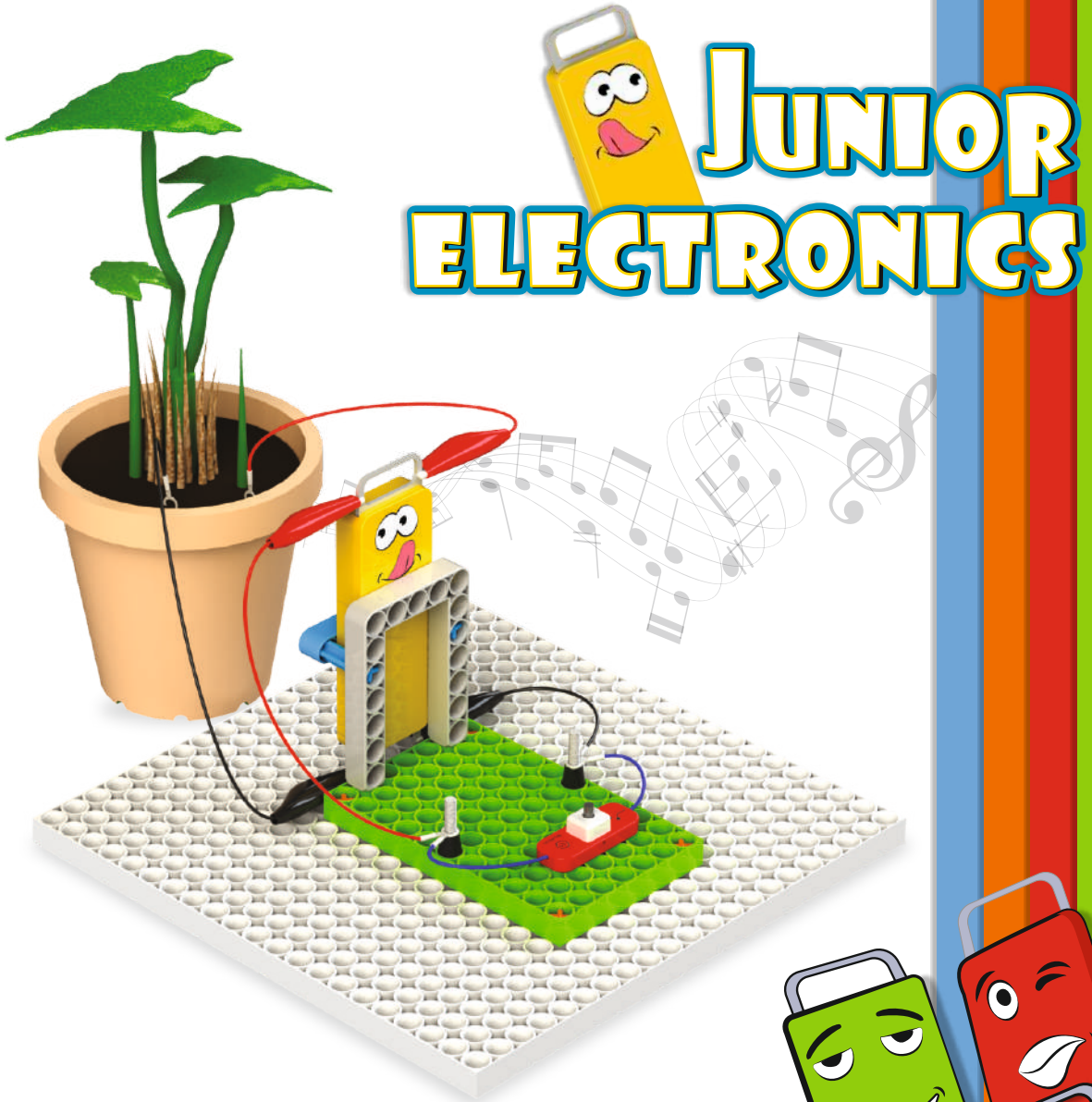


ROBOTIX

JUNIOR ELECTRONICS



STEM
ACCREDITED
EDUCATIONAL EXPERIENCES



JUNIOR ELECTRONICS



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THINGS TO KEEP IN MIND WHILE PLAYING WITH QUEAKY

Playing with a musical STEM (Science, Technology, Engineering, and Mathematics) toy can be a fun and educational experience.

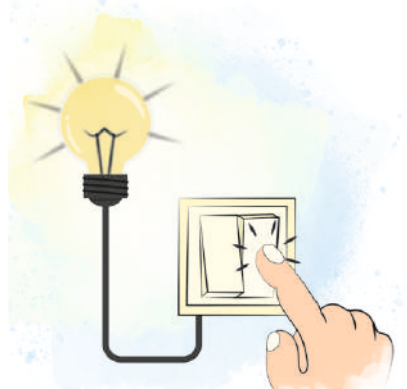
Queaky is a robotic musical instrument, which offers hands on experience in both the science of sound and the joy of music.

Here are some things to keep in mind:

- ▶ Do not ever connect with an external power supply.
- ▶ Don't ever fully immerse Queaky in water.
- ▶ Make sure you turn off the switch once Queaky is not in use.
- ▶ Use Queaky as a conducting material not as the power supply.

INTRODUCTION

Everyone, at some point, has come across or learnt about electricity in one way or another. There might have been experiences such as:



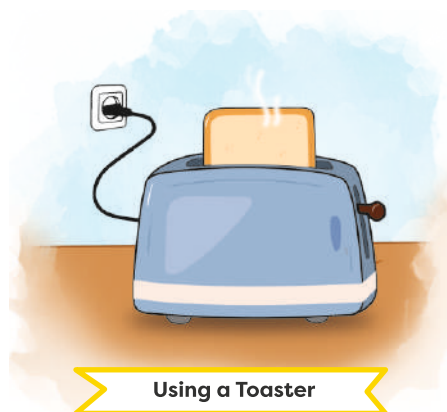
Turning ON Lights



Using a Refrigerator



Watching Television



Using a Toaster

All of these involve electrical devices connected completely through wires, forming a circuit.

These circuits are made entirely of non-living components, and while we can't see or feel the flow of electricity, it's constantly working behind the scenes.

But what if we could learn electricity more excitingly, by using our hands as wires? Imagine the thrill of being directly involved in an electric circuit and watching devices powered up.

The battery is like the music starter, giving the energy to start the game. The children hands are like the wires passing the energy (or the parcel).

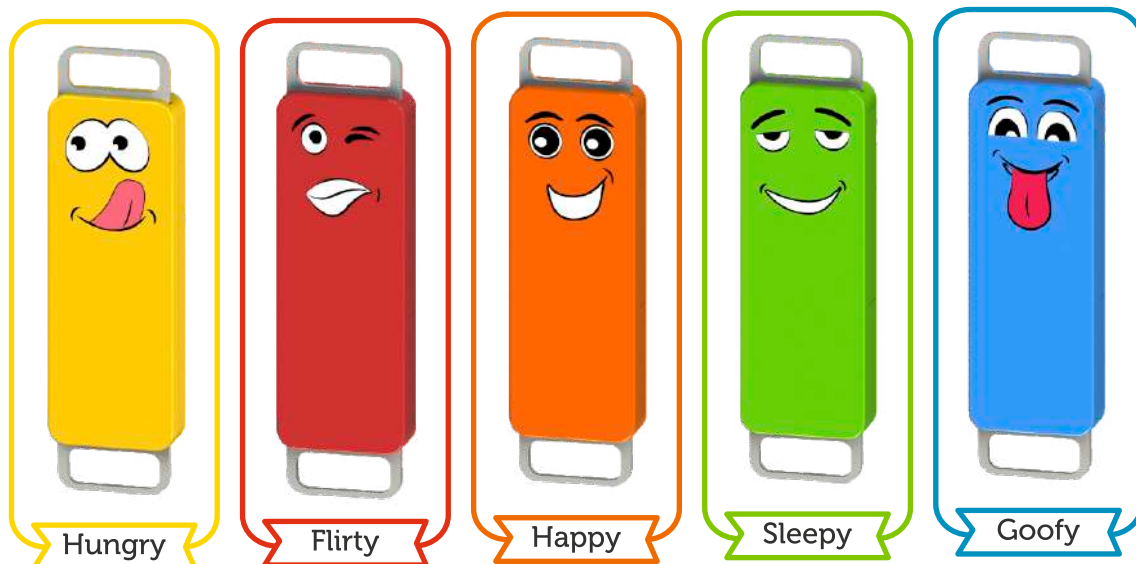


The light bulb is like the child who opens the parcel, using the energy to light up with joy. If someone breaks the circle, the parcel stops - just like when a circuit is broken, the electricity stops flowing, and the light goes off.

Now What is Queaky?

Queaky is something magical yet technical. It has a fancy colourful body with two metallic ears. The moment both ears senses that the circuit is closed meaning there is a loop for the current to flow, it gives out a shout. The tone is based on how much resistance is present in the circuit.

Examine the table below to see the analogy between both circuit types



SR. No.	Electric Circuit	Queaky Circuit
1	Battery	Queaky
2	Terminals	Ears
3	Wires	Human Touch / Body
4	LED / Buzzer / Motors	Inbuilt Buzzer

Let's do an experiment to justify the above table:

Experiment - 1

Make your first Queaky Circuit

Materials Required:

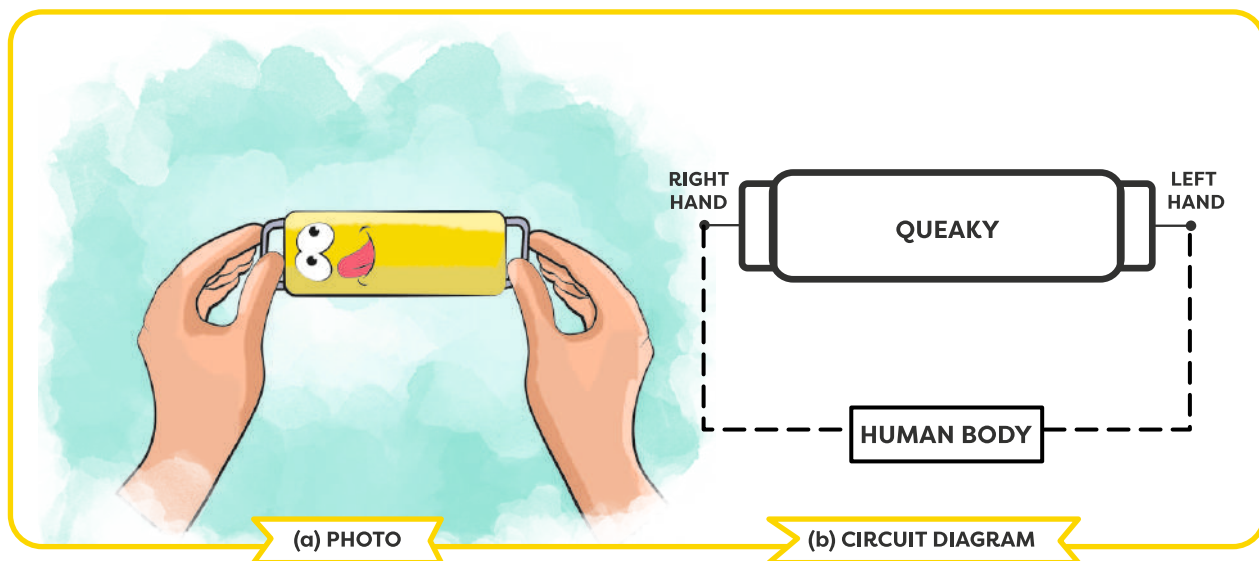
- 1. Queaky Instrument
- 2. A human.

Build Your Queaky Circuit:

1. Turn on the Queaky.



2. Hold an ear of Queaky with one hand.
3. And the other ear with another hand.



Write your Observation:

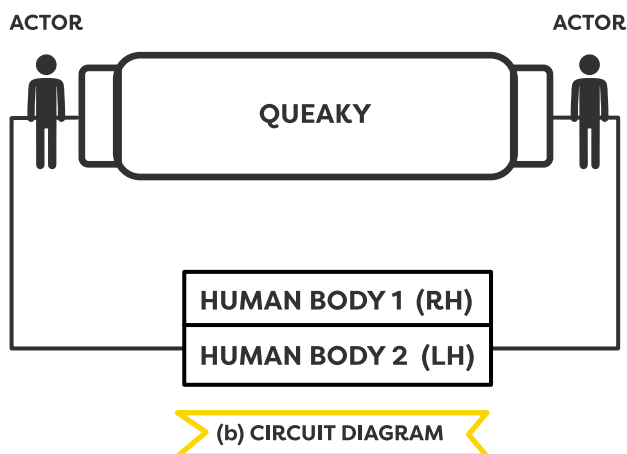
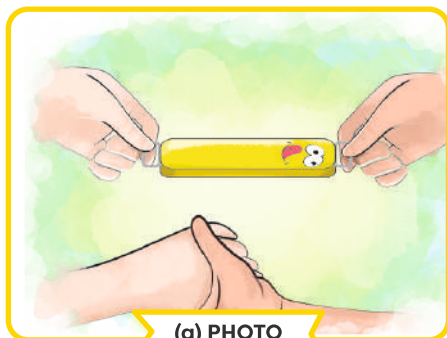
Experiment - 2

To make your Queaky shout using 2 human beings using their hands.

Materials Required:

- 1. Queaky Instrument
- 2. Two humans.

Build Your Queaky Circuit:



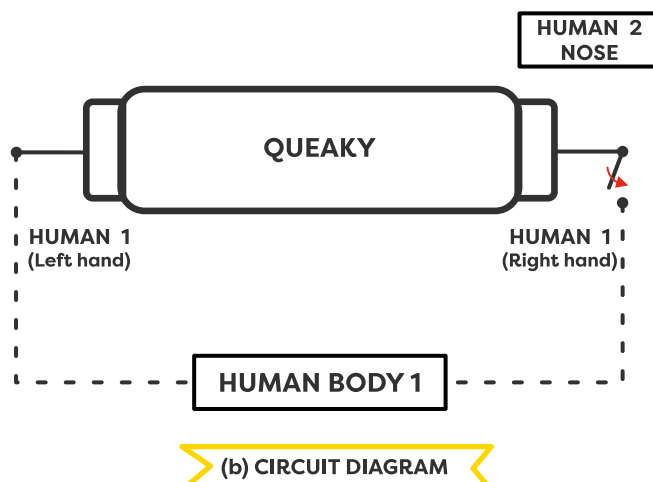
Experiment - 3

To make your Queaky shout using two arms and a nose.

Materials Required:

- 1. Queaky Instrument
- 2. Two humans.

Build Your Queaky Circuit:



CONCLUSION :

When both of Queaky's ears are held in a manner that it completes a closed loop, our queaky shouts.

Whoo-Hoo!! Time for the next concept.

We now know that our Queaky shouts with a variety of connections, but they only respond when connections are made with specific types materials. Based on its response we can categorize those things into conductors and insulators.

Let's understand conductors and insulators in Detail

An electric circuit cannot be completed if a conductor is not connected between the different components and the two terminals of a battery.

"Conductors" are materials that allow electricity to pass easily whereas

"Insulators" are materials that do not allow electricity to pass easily.

So conductors are like nice, new, big, smooth pipes that allow water to flow easily but insulators are like choked pipes that won't let water flow!



Conductors are like smooth pipes



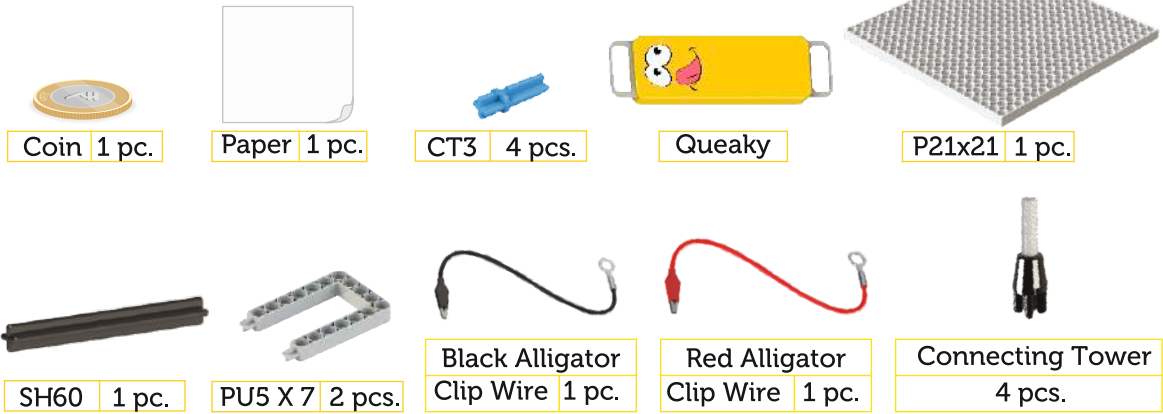
Insulators are like choked pipes

In general, remember that metals like iron, copper, and gold are conductors whereas non-metals like wood, rubber, and plastic are insulators.

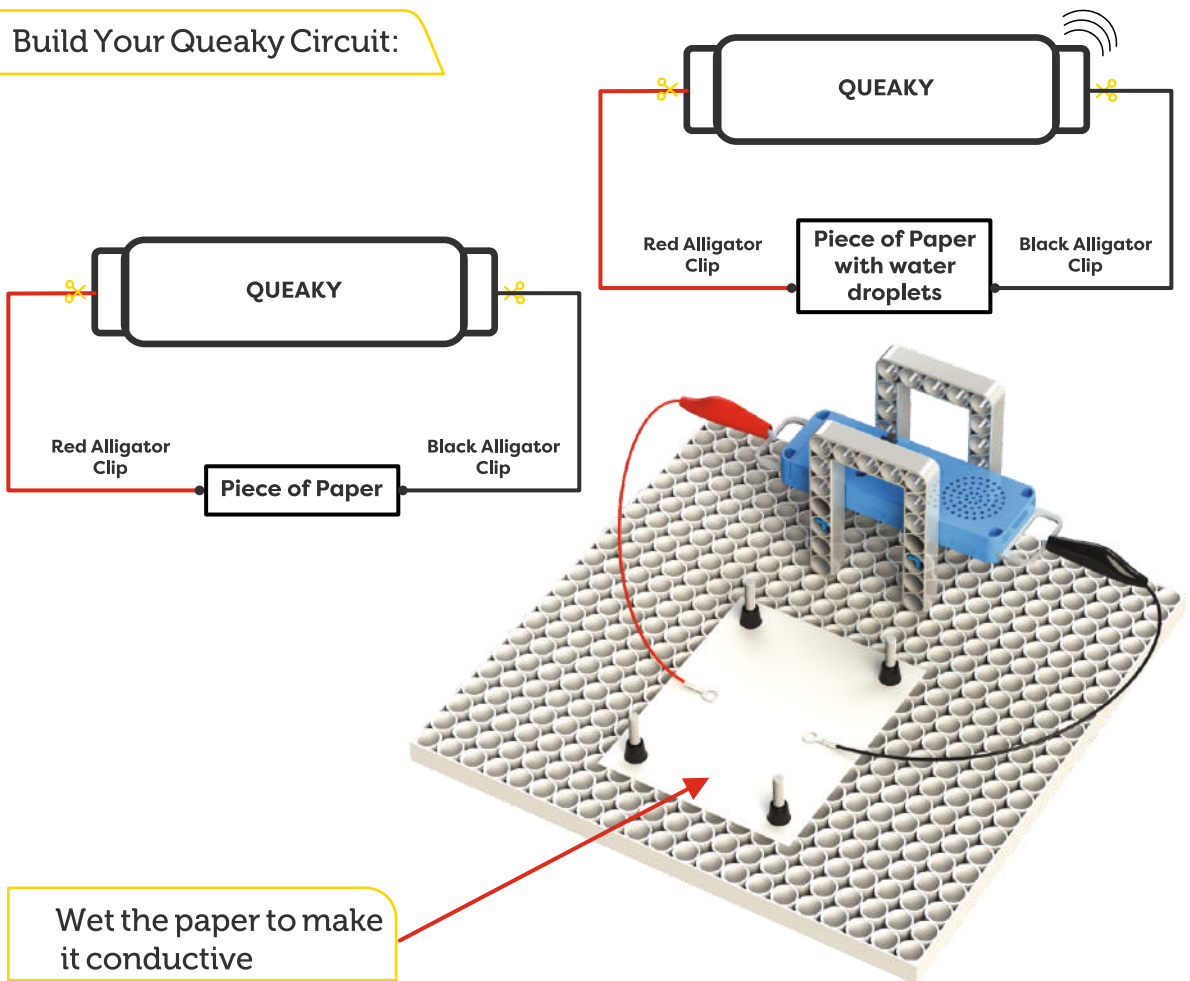
Experiment - 1

Make a Queaky Circuit with paper.

Materials Required:



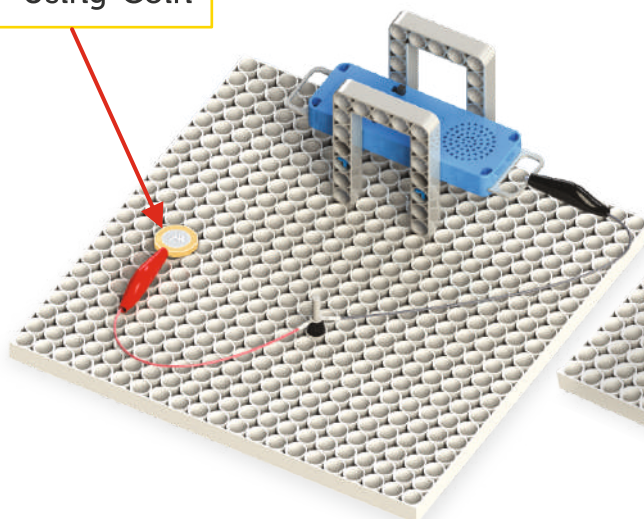
Build Your Queaky Circuit:



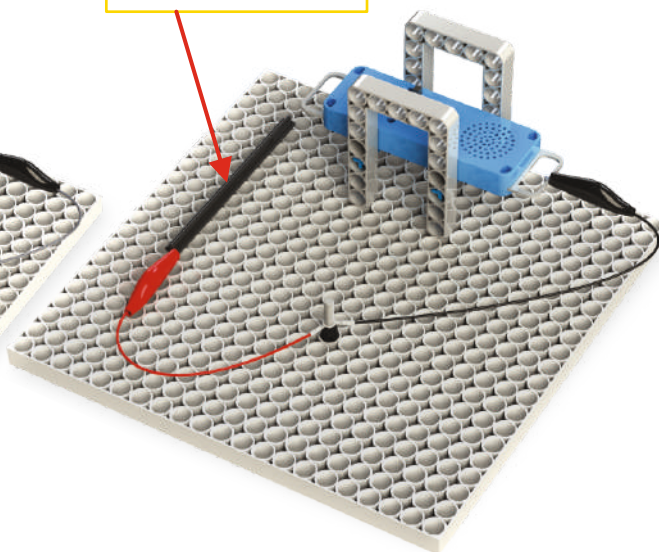
Experiment - 2

Build Your Queaky Circuit:

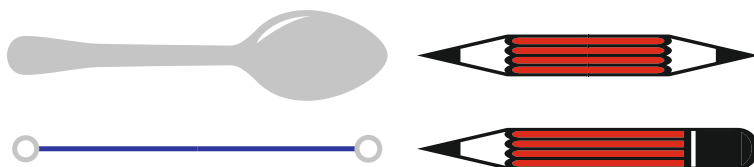
Using Coin



Using SH60



Also, try connecting these objects to the alligator clips as shown. Once fixed, touch the other terminal of the Queaky with it and notice queaky's sound.



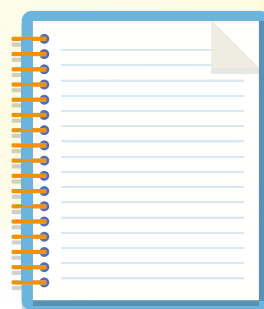
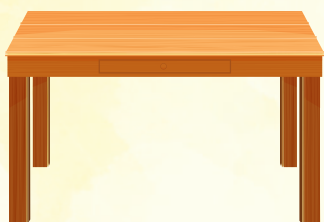
ACTIVITY 1

Based on the above experiments, categorise the following in conductors and insulators.

S.No.	Materials	Conductor or Insulator
1	Spoon	
2	Conducting Wire	
3	Pencil with the one sharp end	
4	Pencil with the sharp two ends	

ACTIVITY 2

Categorise the following items into conductors and insulators with the help of Queaky.



When a conductor is in a closed loop, the fantastic Queaky shouts. However, the sound varies depending on the type of conductor used. The reason for this change is Resistance. Resistance is what makes Queaky's sound differently.

Let's understand resistors in detail:

Consider water flowing through a pipe. If the pipe is of the right diameter, the water can flow easily. But if the pipe's diameter is too big, it's harder for the water to move through it smoothly because it spreads out.

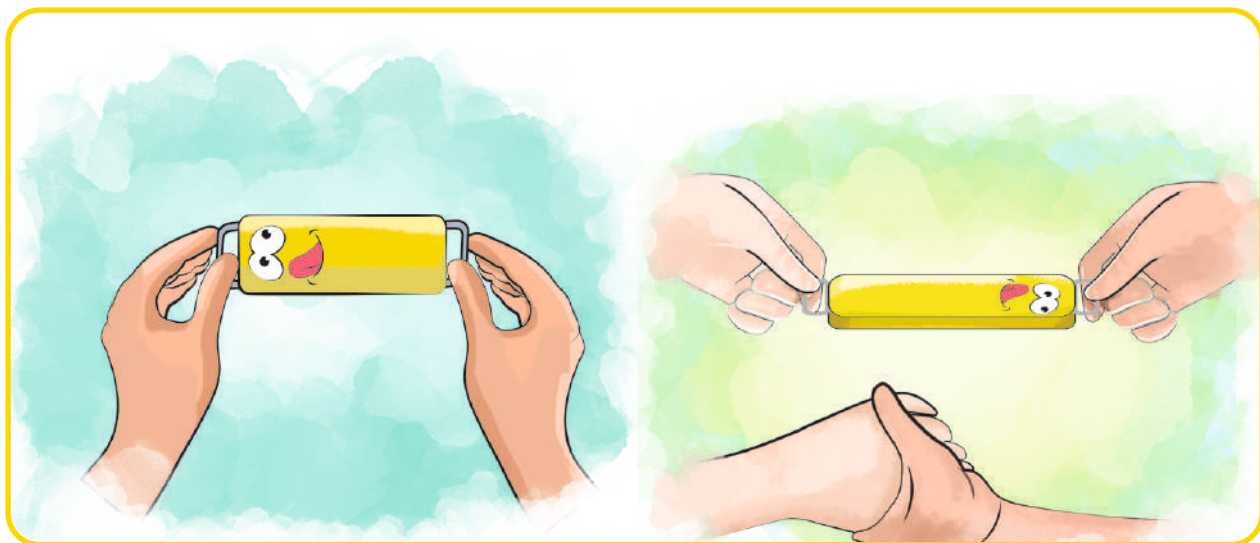


When walking or swimming through the sea or swimming pool, you feel that water is pushing you back.

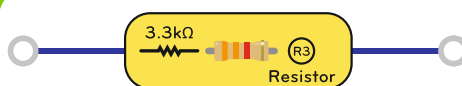
Our bodies have something like that as well. Remember our previous circuits. In the first case, where we tried to complete the circuit of Queaky using both hands of same person, and in the second case, we tried to complete the circuit using two different people, in both the cases, the sound of Queaky was different.

That's because the total body mass in contact changed and they are like, "Wait a minute!" to that shout. That's called body resistance!"

While resistance may seem like it's slowing down things, it actually has some advantages too. In various electric applications, resistances are like a superhero, controlling electricity, so that things just work out right.



NOTE: In various electric applications, resistances are like a superhero, controlling electricity so that things just work out right. It prevents the blowing off of LED and other components due to excess electricity.



Experiment - 1

Make two circuits with two types of resistances and note down the modulation in their tone.

► Materials Required:



3.3kΩ Resistor
1 pc.



10kΩ Resistor
1 pc.



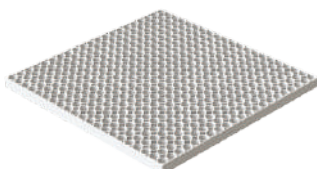
Red Alligator
Clip Wire 1 pc.



Black Alligator
Clip Wire 1 pc.



Push button
Switch 2 pcs.



P21x21 1 pc.



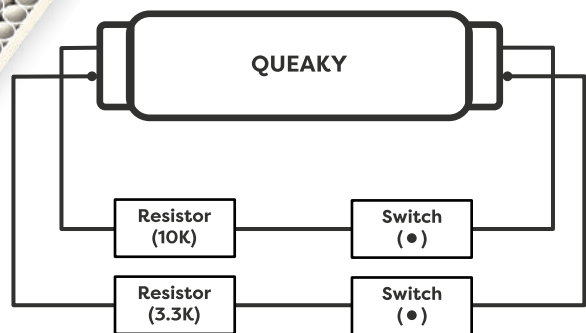
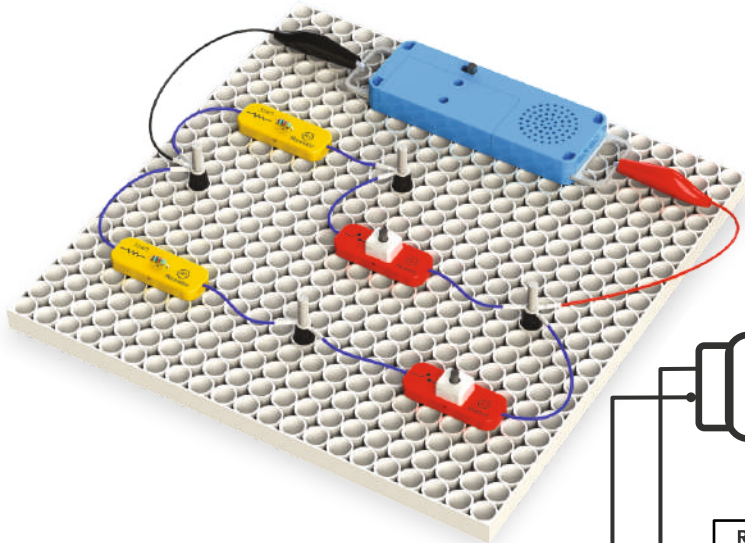
Connecting Tower
4 pcs.



Queaky

Build Your Queaky Circuit:

Press each switch and write your observations below-



SR .No.	Circuit	Sound level (Higher or Lower)
1	Circuit with 10K ohm	
2	Circuit with 3.3K ohm	

ACTIVITY 1

Grab a spoon and a pencil with two pointed ends, and create their circuits. Refer to the table above, and by listening to the sound, determine which material has higher or lower resistance.

SR. No.	Material	Resistance (High or Low)
1	Spoon	
2	Sharp-edged Pencil	

► Hint: Compare the two tables and conclude.

The Earth is often referred to as the largest conductor, providing a vast pathway for electric currents to flow and stabilize. This natural conductivity makes it a safe place to send extra electricity from our machines and gadgets to ensure electrical safety. And that extra electricity is known as "Static Electricity"



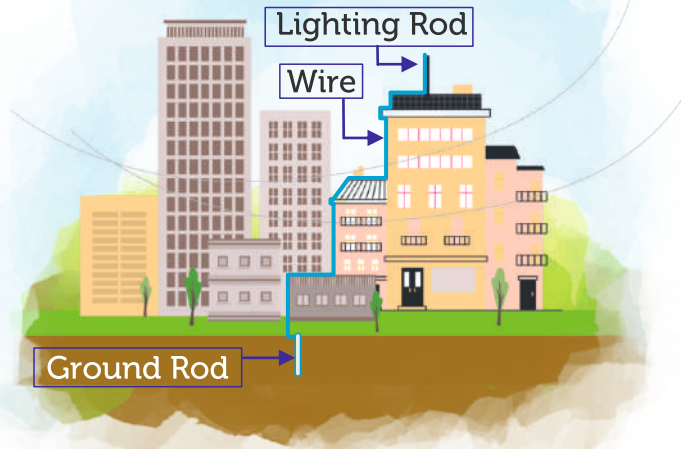
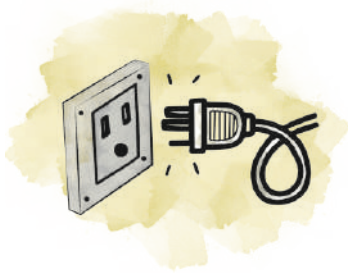
Let's understand this in detail. Imagine you've just gone down a slide at the playground on a sunny day. When you get to the bottom, you might feel a little "shock" when you touch someone or something. It's like tiny little sparks jumping from one place to another. BOOM!! That's static electricity.



Now, think of static electricity as an extra amount of water in a cup, and you want to pour some water out safely. If you pour it onto the ground, the water goes away and everything is okay. But if you pour it on your friends, they might get wet and upset. In the same way, "Earthing" is like absorbing the static electricity (or those little sparks) safely into the ground so no one gets a "shock"

Curiosity Corner:

Why do most electric plugs come with 3 pins instead of 2?



Plugs have three pins to make them safer:

Two pins for power and one extra pin to connect to the Earth, which can take away any unwanted electricity and reduce the risk of shocks. Time to understand the concept of Earthing using Queaky.

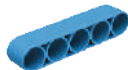
Experiment - 1

Make a Queaky circuit where the electricity is going to the earth when the switch is not pressed.

Materials Required:



CT3 2 pc.



P5 1 pc.



Black Alligator
Clip Wire 2 pcs.



Red Alligator
Clip Wire 2 pcs.



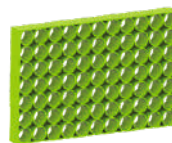
Queaky



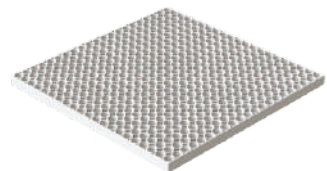
Connecting Tower
2 pcs.



Push button
Switch 1 pc.



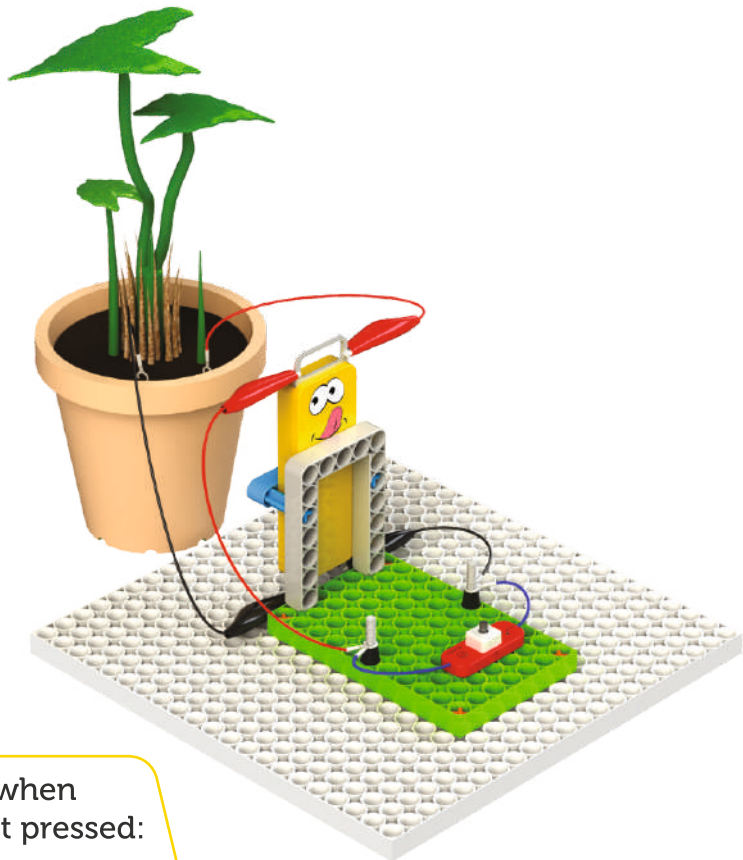
P7 X 11 1 pc.



P21x21 1 pc.

Build Your Queaky Circuit:

1. Make two circuits:
2. First Circuit: Connect Queaky with a switch using alligator clips.
3. Second Circuit: Insert the Alligator clip's terminal terminals into ground as shown, making a complete circuit with ground.



Write your Observation when switch is pressed and not pressed:

CONCLUSION :

The Earth, being a good conductor of electricity and its gigantic size paves a path for the safe discharge of the electric charge.

Yayyyyyyy! Time to try some more amazing experiments.

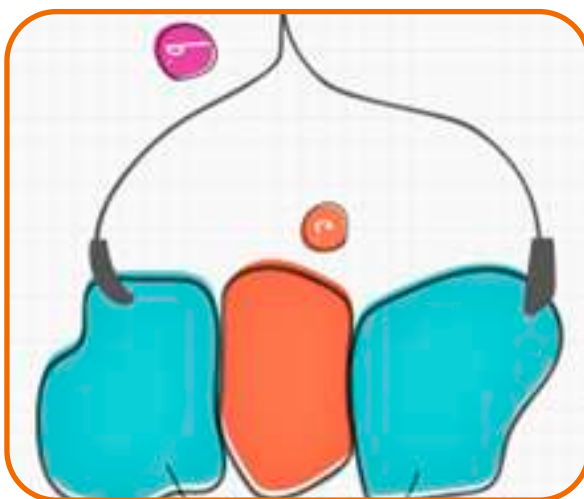
Hello creators, We all have played with Play-Doh or some modelling dough or clay or eatable dough at some point in our lives. It's fun, that it comes in all sorts of colors, and you can give it any shape as per your imagination. What if those dough starts to conduct electricity or we make them fit enough to conduct electricity through Queaky?

Experiment - 1

Make your dough conducting.

► Materials Required:

1. 1 cup of water
2. $\frac{1}{4}$ cup of salt
3. 1 Tbsp vegetable oil
4. Cooking spoon



Procedure:

1. Mix salt water, and vegetable oil in your pot. Add dough to the pot.
2. Put the pot on your stove over medium heat and stir it continuously.
3. Your dough mixture will eventually start to boil and get chunky. Keep stirring until the dough, vegetable oil, and salt water are mixed thoroughly.
4. Turn off the stove. When it's cool, knead the dough.

Experiment - 2

Test if the dough became an electric dough or not.



Queaky



Dough



Jumper Wire
2 pcs.



Black Alligator
Clip Wire 1 pc.



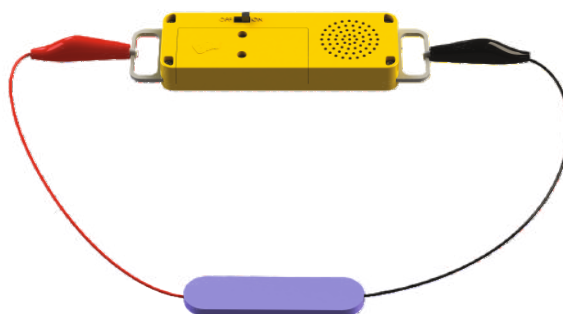
Red Alligator
Clip Wire 1 pc.



Connecting
Tower 2 pcs.

Procedure:

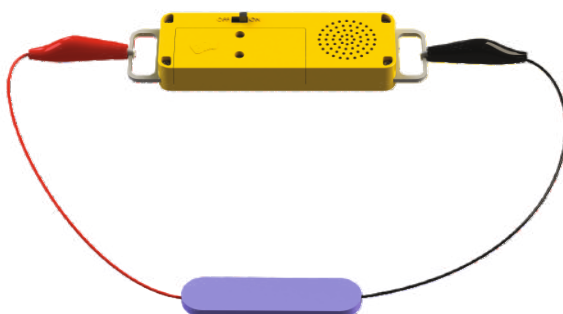
Connect the circuit as shown below.



Write your Observation:

ACTIVITY 1

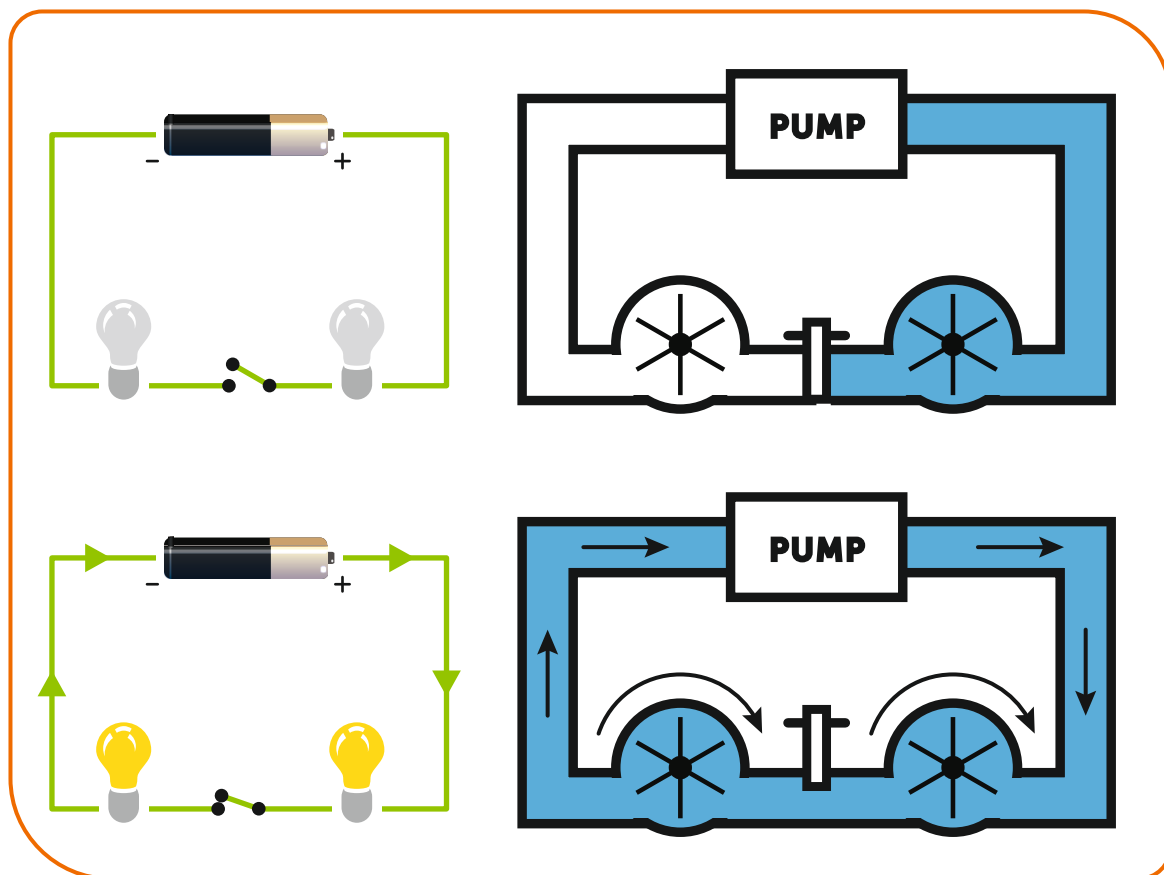
Try the following circuit and see if Queaky shouts or not.



Provide the possible reason in support of your observation:

Series Connections:

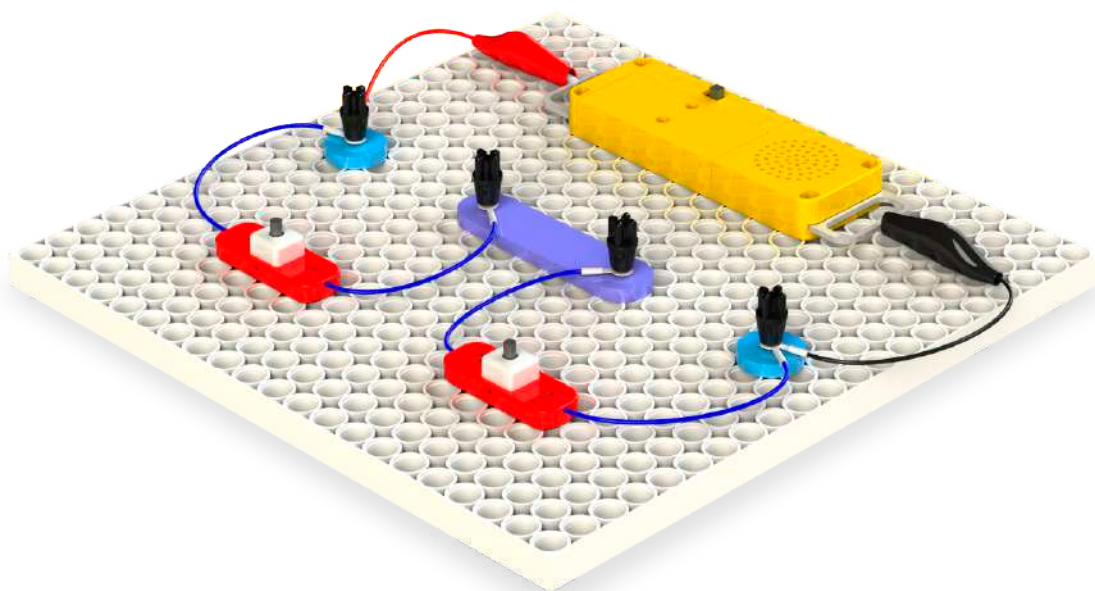
In electronics, there are two major types of connections - 'Series and Parallel'. Series connection means that we are connecting components one after the other in a line, such that electricity has only one path to flow. If any one component is removed or the circuit "opens" at any point, no current will pass through the circuit!



Experiment - 3

Connect the circuit as per the diagram 'Series connection' on the next page:
Here, three pieces of dough are connected in series using two switches. Based on the observation, fill in the following table.

S.No.	Which Switch is pressed	Queaky Shouts (Yes or No)
1	Switch - 1	
2	Switch - 2	
3	Both the switches are pressed	



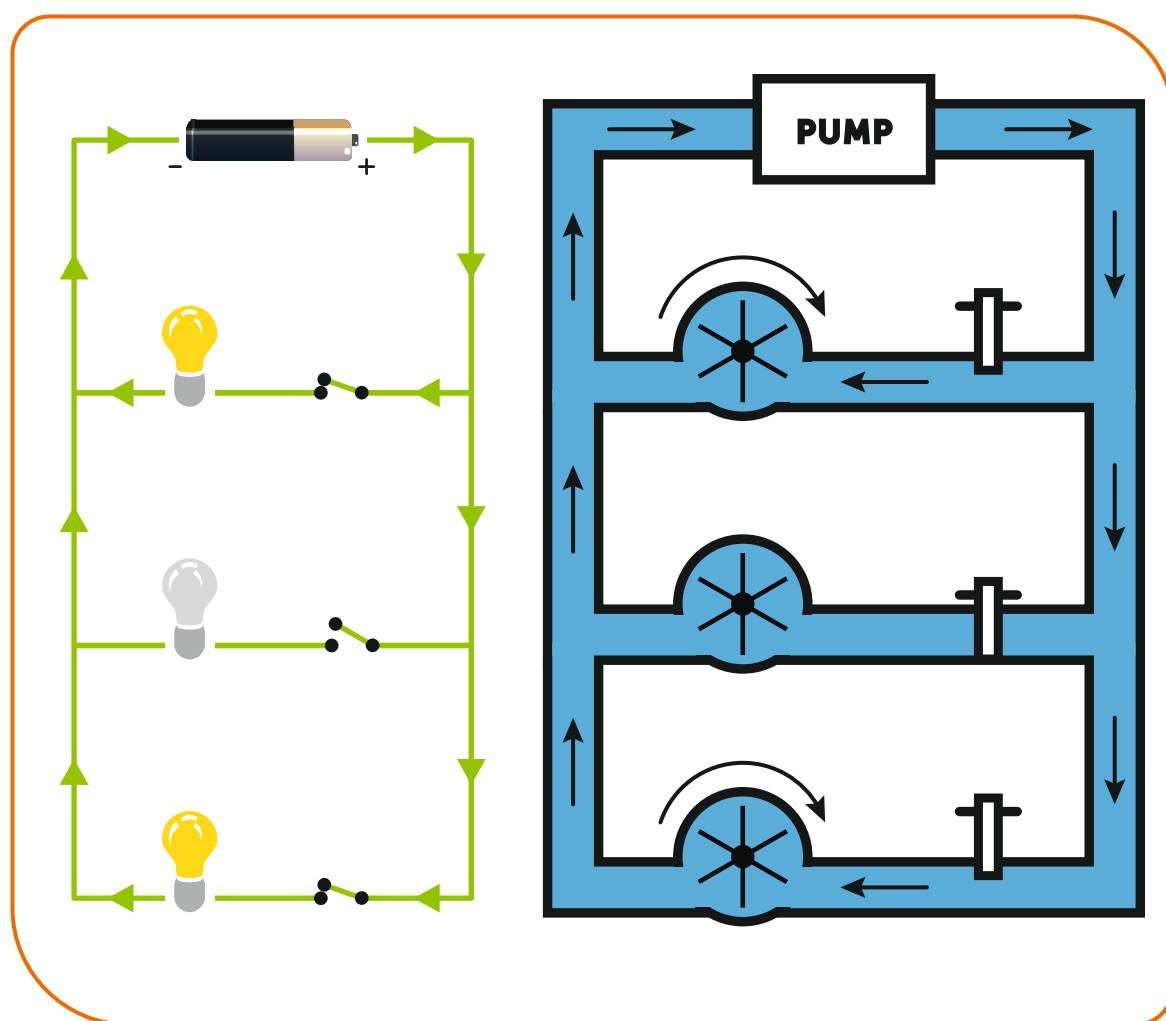
SERIES CONNECTION

The disadvantage of series connections is that if one of the components is off or damaged, then no other component will work as electricity has no other path to flow through them.

Parallel Connections:

In a parallel connection, we connect components side by side, such that electricity has multiple parallel paths to flow and flow through each path independently. Electricity is split between all these paths and if components in one path are damaged or off, other paths are not affected!

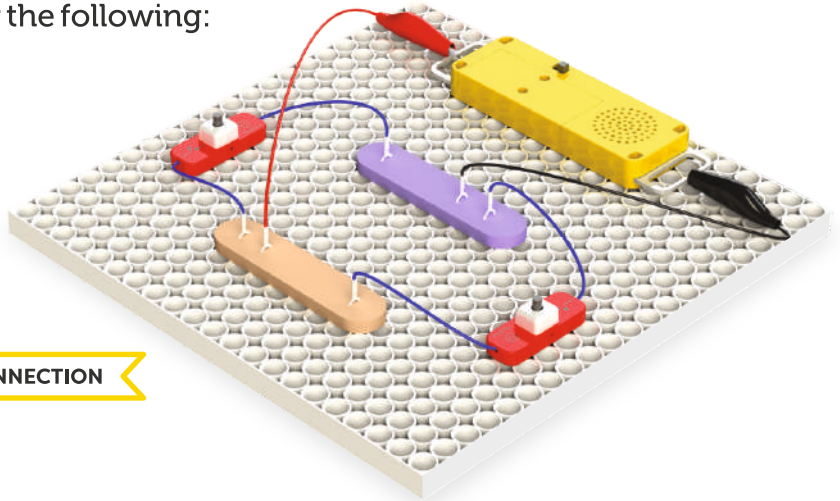
Our homes use parallel circuits, so when you turn off the lights, the fan doesn't get turned off!



Experiment - 4



Connect the circuit as per the following:



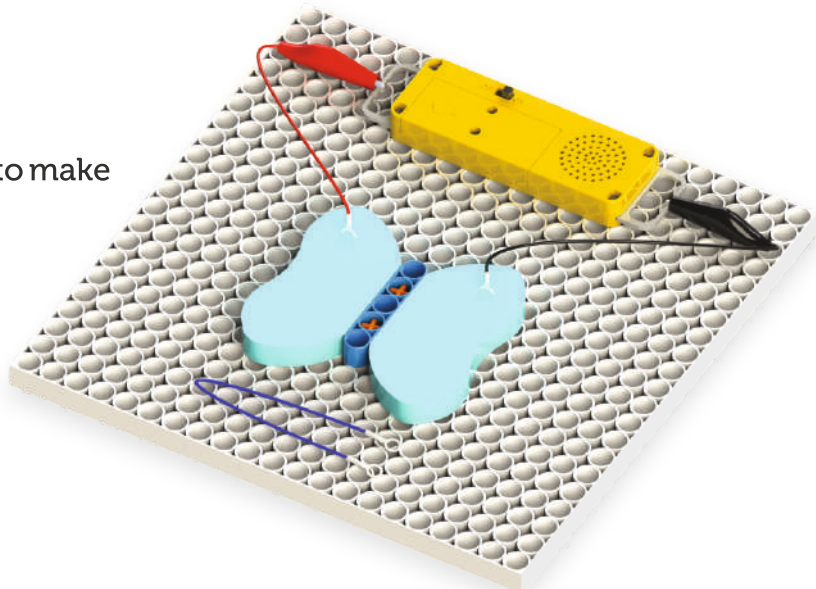
PARALLEL CONNECTION

Here, two pieces of dough are connected in parallel using two switches. Based on the observation, fill in the following table.

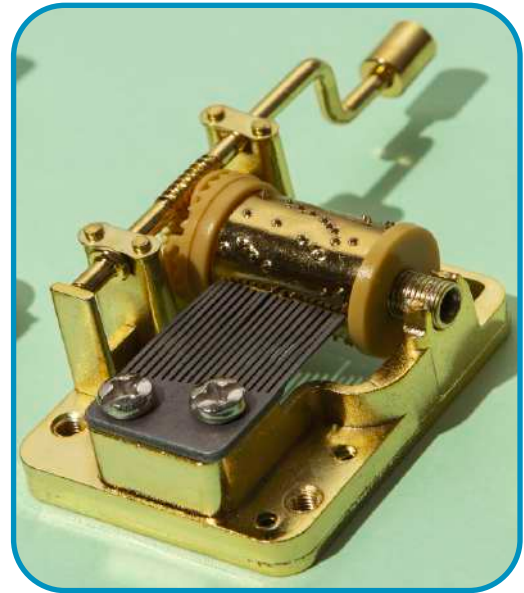
S.No.	Which Switch is pressed	Queaky Shouts (Yes or No)
1	Switch - 1	
2	Switch - 2	
3	Both the switches are pressed	

ACTIVITY 2

Complete the circuit to make Queaky shout.



Hello Creators, Imagine a box where you can create your very own symphony of sounds, where every touch and press brings forth a melody that's uniquely yours.



Experiment - 1

Let's create a Tone Explorer box using Queaky.

► Materials Required:



CT2 20 pcs.



CH2 6 pcs.



CL2 3 pcs.



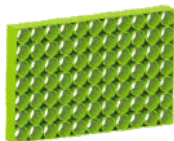
P3 7 pcs.



CT(1x2)
4 pcs.



P11 3 pcs.



P7 X 11 4 pcs.



Connecting Tower
6 pcs.



Queaky

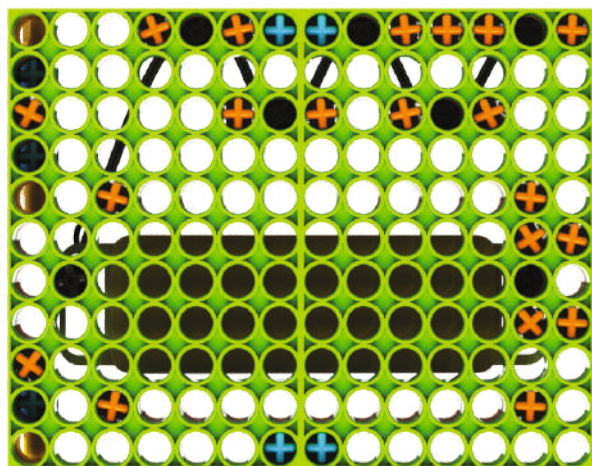


Thread 1 pc.

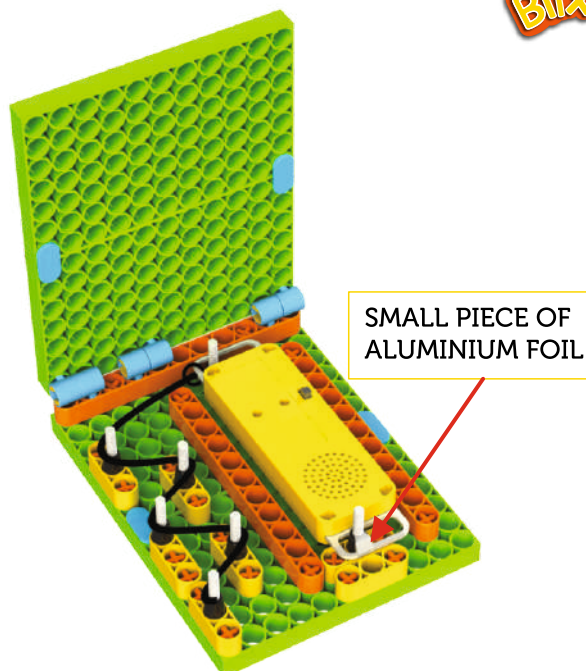


A small square piece
of aluminium foil

Construction:



Closed



Open

In the above model, there are 6 keys in total.

► **NOTE: Wet the strings kept inside.**

Now, Key 0 is a unique key. Hold the key 0 with one of your hands permanently every time you need to make a sound. Play with different keys with your other hand.

ACTIVITY 1

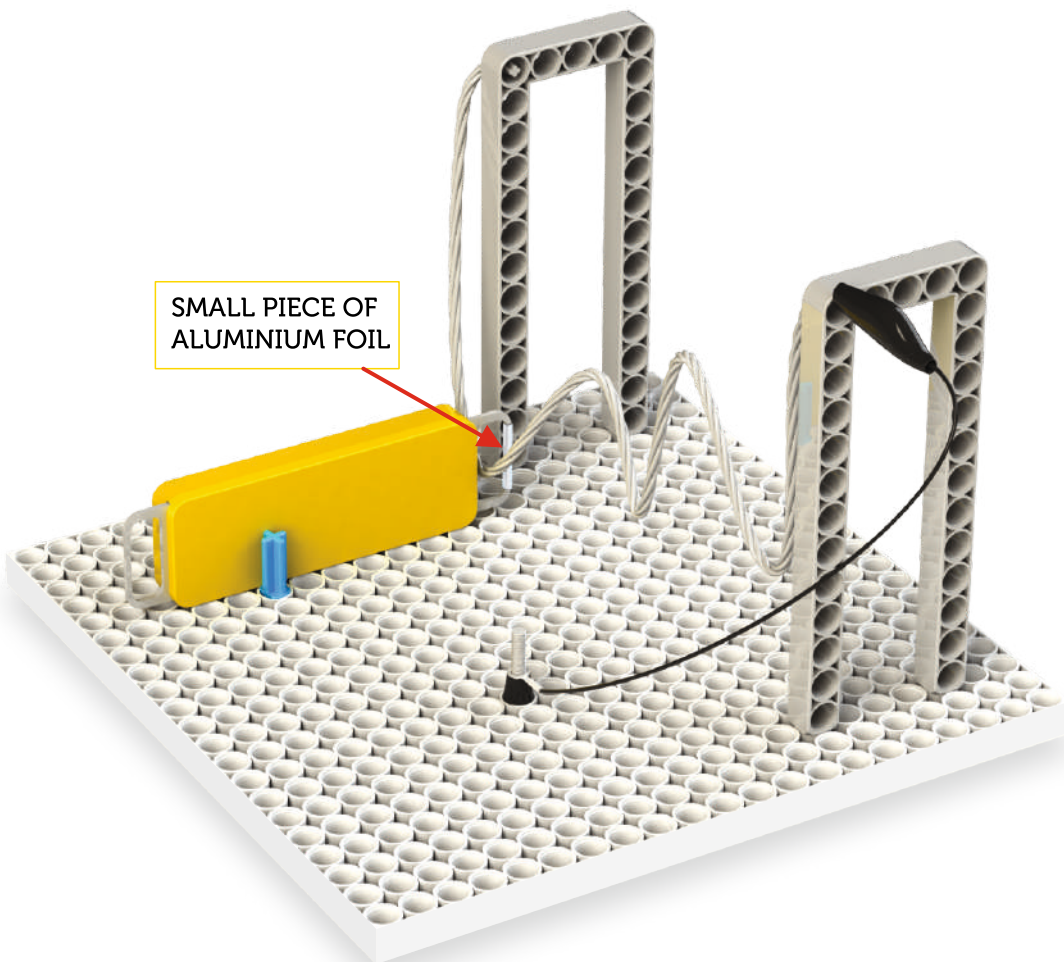
What made the above possible?

ACTIVITY 2

Why was it always necessary to hold the key 0, every time a tone is generated?

Hello Innovators, Today we have an exciting game to introduce called "the Buzz wire loop game ". This game is not only super fun but also a great way to learn about patience, concentration, coordination and mostly learning electric circuit's concepts.

Construction:



Objective:

The students have to navigate the Queaky through a twisted wire loop from start to end without touching the slides. If you do that without making a buzz, you win the game.

► Materials Required:



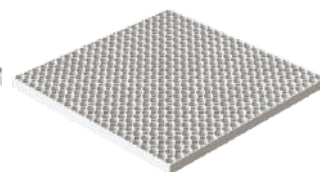
CT3 2 pcs.



Black Alligator
Clip Wire 1 pc.



PU5 X 13 1 pc.



P21x21 1 pc.



Connecting Tower
1 pc.



Queaky



Metal Wire

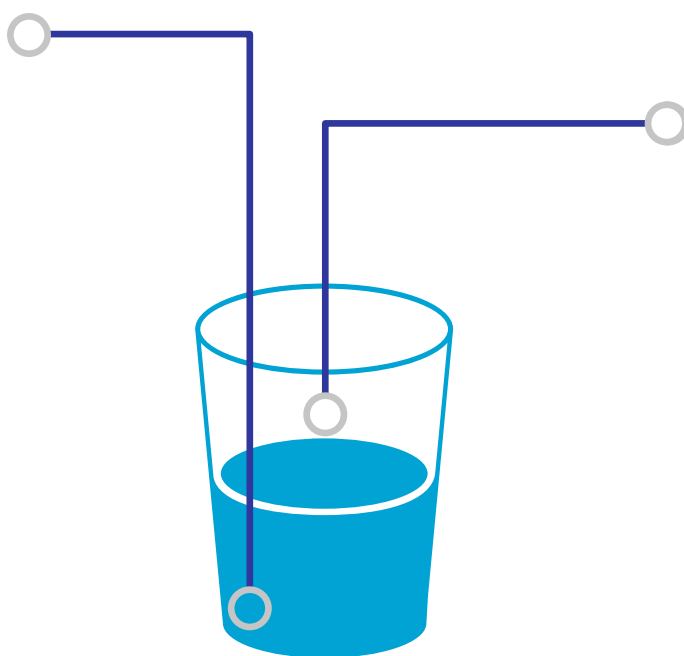
Note: The circuit shown above is yet incomplete which means if Queaky touches the wire it will not make a buzzing sound.

Hold the free ear in your left hand and the connecting tower with your right hand to complete the circuit so that Queaky can buzz once contacted by the wire while passing through it.

Time to play the game and enjoy it.

Have you ever filled up a glass with water and noticed how the water rises? A Water Level Indicator can tell us when something needs more water or has too much of it. Imagine if your plants could say, "I'm thirsty!" or your fishbowl shouted, "Too full!" That's what this indicator can help with.

► Challenge: Make a super cool "Water Level Indicator" using Queaky.



30

PIECE LIST



CT2 20 pcs.



CH2 8 pcs.



P3 2 pcs.



CT3 20 pcs.



CT(1x2)
4 pcs.



P5 2 pcs.



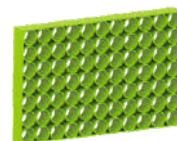
P11 4 pcs.



PU5 X 7 2 pcs.



PU5 X 13 2 pcs.



P7 X 11 4 pcs.



Push button
Switch 2 pcs.



Black Alligator
Clip Wire 1 pc.



Red Alligator
Clip Wire 1 pc.



Jumper Wire
2 pcs.



Connecting
Tower 10 pcs.



Queaky 1 pc.



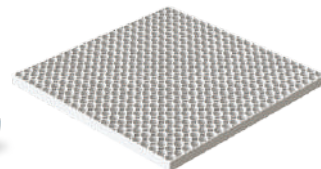
Thread 1 pc.



SH60 1 pc.



Dough



P21x21 1 pc.



Black Alligator
Clip Wire 2 pcs.



Red Alligator
Clip Wire 2 pcs.



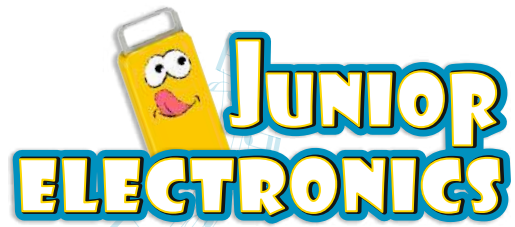
3.3kΩ Resistor
1 pc.



10kΩ Resistor
1 pc.



Metal Wire 2 pc.



For suggestions or feedback, please contact on

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