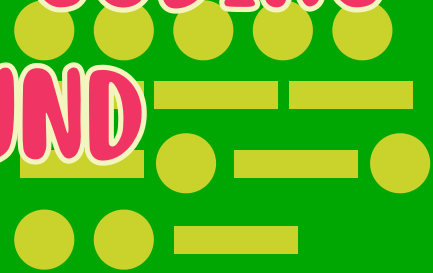


MORSE CODE - CODING WITH SOUND



“

Unit/Theme: Electrical Conduction and Resistance


Purpose: To build an electrical circuit to produce Morse code.
To explore sound transmission through Morse code
and recognize that electrical energy can be converted
into sound.

”


**CURIOUS
BOX** 





Learning Outcomes and Process Components



Recognizes that electrical energy can be converted into sound.



Builds an electrical circuit to test the conductivity of materials.



Analyzes the conductivity of materials based on the results of the experiment.



What Do You Know?

- What is the importance of sound in our lives? What would a world without sound be like?
- How does pressing a button produce sound?
- What is Morse code and how is it used?

Explain what you know!

Let's Spark Curiosity!



Hang the poster in the classroom before the activity!

Today, we will explore the relationship between electricity and sound. By setting up an electrical circuit, we will observe which materials allow electricity to pass through. When the electric current flows in our circuit, we will notice the buzzer working and see how electrical energy is converted into sound energy. In this activity, we will learn by experiencing the connection between conducting electricity, completing the circuit, and transforming energy into sound. Let's get started!

Before the activity, hang the poster "Why do we hear the train's sound before the train arrives?" in the classroom.



The activity video is watched by pausing at certain points. Before starting the activity, check the contents of the kit. All lid-opening and package-opening steps are performed simultaneously with the students.



Kit Contents

- | | |
|-----------------------------------------------|------------------------------------------------------------------|
| <input type="checkbox"/> Wooden Template..... | <input type="checkbox"/> Rubber Band..... |
| <input type="checkbox"/> EVA Template..... | <input type="checkbox"/> Conductive Fabric Tape..... |
| <input type="checkbox"/> 9-Volt Battery..... | <input type="checkbox"/> Scissors (not included in the kit)..... |
| <input type="checkbox"/> Jumper Wire..... | <input type="checkbox"/> "Morse Code" Activity Sheet..... |
| <input type="checkbox"/> Battery Holder..... | <input type="checkbox"/> "Samuel Morse" Scientist Card..... |
| <input type="checkbox"/> Buzzer..... | <input type="checkbox"/> "Why do we hear the train's sound..... |
| <input type="checkbox"/> Washer..... | before the train arrives?" Poster..... |
| <input type="checkbox"/> Rivet..... | |

How Do We Do It?



Complete your
task.
Mark it!



1. First, remove the piece from the EVA template.
2. Then carefully separate the large and small pieces from the wooden template.
3. Great job, Deha! Now attach the battery holder to the battery.
4. Take the wooden piece with the battery slot and turn it upside down.
5. Place the battery into the slot.
6. Position the buzzer, paying attention to the positive (+) and negative (-) terminals; make sure the buzzer leads are not touching the surface.
7. Now attach a jumper wire to the buzzer's positive terminal. Awesome, Deha!
8. Thread the other end of the buzzer through the hole in the wood.
9. Slightly strip the ends of the wires from the battery holder using scissors.
10. Fantastic, you're working like a real scientist!
11. Wrap the wire from the battery's negative terminal around the buzzer's negative terminal to secure it.
12. Now attach the rivet to the end of the wooden piece.
13. Wrap the wire from the battery's positive terminal around the rivet.
14. Place the circuit you've assembled upside down onto the EVA template.
15. Take the small guide pieces and thread them through the holes in both the wooden and EVA templates one by one.
16. Take the other wooden piece and pass the small foot pieces through, securing them with washers. Excellent work, Deha!
17. Take the movable part that will operate the Morse code and place it in the middle of the model, securing it.
18. Attach the rivet to the end of the movable part.
19. Thread the jumper wire through the holes in the movable part.
20. Secure the conductive end with conductive fabric tape so it touches the rivet.
21. The Morse code device is almost ready, Deha!
22. Finally, loop the rubber band around the back.
23. You can now operate the Morse code device to produce sound signals.
24. Move the movable part so it touches the rivet to make sound.

If no sound is coming out, you can check all your connections.

What Should the Scientists of the Future Discover?

Students are asked the following question:

- How can we tell if a substance is a conductor?

Electrical energy moves through a circuit via conductive materials. The buzzer in the circuit converts electrical energy into sound energy. When the electric current passes through the buzzer, its internal vibrating component moves, producing sound. If a non-conductive material is in the circuit, the current cannot flow, and no sound is produced.

Conductive materials are those that allow electrical energy to pass through them. When these materials are used in a circuit, the current completes the path and the buzzer produces sound.

Examples of conductive materials:

- Copper wire
- Aluminum foil
- Paperclip
- Coin
- Metal spoon

Insulating materials are those that prevent electricity from passing through. When used in a circuit, the current cannot complete the path, and the buzzer does not sound.

Examples of insulating materials:

- Plastic
- Wood
- Glass
- Cardboard

When a conductive material is used in the circuit, the current passes through the buzzer, converting electrical energy → sound energy.

Students are asked the following question:

- When we strike a metal spoon, a glass, and a wooden spoon with the same force using the same spoon, why does each produce a different sound?

Sound is a type of energy that comes from vibrating objects. For example, when you play a guitar, the strings vibrate, and these vibrations also make the air molecules around them vibrate. These vibrating molecules create sound waves, and when these waves reach our ears, we hear the sound.

Mediums for Sound to Travel:

Sound needs a material medium to travel. It cannot travel through a vacuum; it requires a solid, liquid, or gas.

Air: When you shout to a friend outside, your voice hits the air molecules and travels far.

- Think: How do you hear your friends cheering when a goal is scored in a football match? Through sound waves traveling in the air!

Water: When speaking underwater, your voice is carried by water molecules. Water transmits sound faster than air, so sounds underwater can seem different.

- Think: If you say “Hello!” to a friend underwater in a pool, your voice may sound strange or distorted because sound travels faster and differently through water.

Solids: When you strike a metal spoon, the sound is very strong and clear because metal conducts sound waves very efficiently.

- Think: The sound of a train passing on the rails — metal rails allow the sound to travel fast and loudly!

If you jumped when you heard an explosion, that explosion produced very strong vibrations!

Reflection and Absorption of Sound

Reflection of Sound:

When sound waves hit a surface, they bounce back. This phenomenon is called reflection.

Absorption of Sound:

When sound waves are absorbed by a material, this is called absorption. Soft materials absorb sound and reduce echoes.

If a room has carpets and curtains, sounds do not echo and are heard softer and clearer. This is why acoustic panels are used in concert halls to ensure sound is heard perfectly!

When you shout into a cave, you hear your voice echo because the sound waves hit the cave walls and bounce back to you. The reflection of sound waves from the cave walls is what causes the echo.

Importance of Sound Insulation:

Walls covered with thick and insulating materials prevent sound from spreading.

Acoustics:

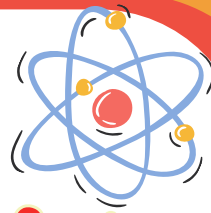
The science that studies how sound travels, reflects, and is absorbed is called acoustics. Acoustic panels in concert halls ensure that sound can be heard clearly and beautifully. This is why singing or listening to music sounds clearer and more enjoyable!

To maintain quiet between rooms at home, you can cover your walls with thick and insulating materials. This prevents loud sounds and noise from disturbing you!

Did You Know?

Sonar devices are technologies that use sound waves to detect the position, depth, and distance of objects. One important feature of these devices, which are used in many fields, is that the signals behave differently in saltwater and freshwater. Saltwater conducts sound waves better than freshwater, which makes sonar more effective for submarine exploration.

A SCIENTIFIC Explanation for the Curious



Students are asked the following questions:

- How is sound produced and how does it travel?
- What is a telegraph, and how and for what purposes did people use it in ancient times?

What Is Sound?

Sound is a type of energy that spreads from a vibrating object. This energy is carried by the vibration of molecules in air, water, or solids. We perceive sound when these vibrations reach our ears.

How Is Sound Produced?

1. Vibrating Object:

Sound is created by a vibrating object. For example, striking a drum, ringing a bell, or the movement of a speaker cone produces vibrations. These vibrations cause the surrounding molecules to move.

2. Transmission of Vibrations:

The vibrating object moves nearby molecules, and this movement forms sound waves. The waves pass from one molecule to another. Air, water, or solids act as the medium carrying these waves.

3. Sound Waves:

Sound waves are energy waves traveling from the vibrating source. They propagate as molecules compress and expand, transmitting the vibration through the medium.

4. Reaching the Ear:

When sound waves reach our ears, they vibrate the eardrum. These vibrations are transmitted to nerve cells in the inner ear, which send signals to the brain. The brain interprets these signals as sound.





Communication in Ancient Times

Since ancient times, people have used different tools to communicate with each other. However, the first electrical communication device developed to transmit information accurately over long distances was the telegraph.

The telegraph used a system of magnetism to allow communication in written, sound, or light forms. The Morse alphabet was developed for telegraph operators to send messages over telegraph wires.

Morse code is a method that uses short and long signals (• and —) and the corresponding sounds or lights to transmit information.

In telegraph systems, sound could be transmitted using a device that converts Morse code into audible signals. These devices produce clicks or “beep-beep” sounds at a certain speed. Telegraph operators would listen to these sounds, decode the message, and turn it into meaningful text.

Morse code was widely used for long-distance communication, military communication, and maritime navigation. Today, it is still used in maritime signaling via light. You can also see Morse code telegraphs in railway museums.

To be fast in this coded language, it is essential to have the Morse alphabet available as a reference.

A	●—	J	●— — —	T	—
B	—●●●	K	—●—	U-Ü	●● —
C-Ç	—●—●	L	●—●●	V	●●● —
D	—●●	M	— —	y	—●— —
E	●	N	—●	Z	— — ●●
F	●●—●	O-Ö	— — —	W	● — —
G-Ğ	— — ●	P	● — — ●	X	— ●● —
H	●●●●	R	● — ●	Q	— — ● —
I-İ	●●	S-Ş	●●●		



What Did We Discover?



“Today, we set up an electric circuit and produced Morse code through it. We observed that electricity only passes through conductive materials. When the electric current flows through the circuit, the buzzer works, and we noticed that electrical energy is converted into sound energy. You can also use the Morse alphabet to send various messages using sound.”

Then, students complete the activity sheet, and the “Samuel Morse” scientist card is read aloud.

What Else Can We Do?



Come on, you try it too!

Dear Teacher,

Today, by producing Morse code, our students not only discovered a communication tool but also realized that electrical energy can be converted into sound. We also recommend carrying out the following activities in the classroom:

Activity 1: Reflection and Absorption of Sound

Materials:

- Morse Code device
- Different types of materials (flat wall, fabric, foam, metal sheet)

Procedure:

- Use the Morse code device to generate sound from the buzzer and direct it toward different surfaces (flat wall, fabric, foam, metal sheet).
- Observe and record how the sound from the buzzer is reflected or absorbed by each surface.

Activity 2: The Importance of Sound Insulation

Materials:

- Morse Code device
- Sound insulation materials (fabric, foam, soundproof panel)
- Cardboard box

Procedure:

- Place the buzzer inside a box lined with sound insulation materials.
- Test how much the sound is blocked or reduced.
- Observe the effectiveness of the insulation and compare results using different soundproofing materials.



Can sound be heard in space?

Question of
the Day



www.miniskop.com.tr