

Unit 1 How Sounds Move

We can hear sounds all around us. How do the sounds reach our ears?

They transfer through things around us.

The sound of a police siren moves through the air.

The sound from a dolphin moves through the water.

Sounds can move through wood or metal, too.

Sounds move through solids, liquids, and gases.

Let's watch sound move through one of these types of matter.

Step 1. Add blue food coloring to a large bowl of water.

Step 2. Put a waterproof speaker in the water and turn on some music.

Step 3. Put a plastic pipe to your ear and try to find the speaker.

Step 4. The music gets louder as the pipe gets closer to the speaker. You can find the speaker at the spot with the loudest sound.

The music came from the speaker. It moved through the water.

It moved through the plastic pipe. Then it arrived in your ears!

Unit 2 Water Music

Every Thursday, Julia's sister Sally goes to her synchronized swimming class.

There, Sally dances to music in the water.

Today, Julia went to see Sally's class. She loved her sister's dancing in the water.

"Mom, how can she dance to music? Can she hear the music in the water? Doesn't the water block her ears?"

Mom answered, "Sound can move through water. She can hear the music in the water."

"Does it only work with special speakers?"

"No. Any sound can move through water. Shout Sally's name out loud. She will hear you and come out of the water."

"Umm... no thank you! I believe you!"

Unit 3 Mirror Vision

We use mirrors every day. We use them to check our hair. A dentist uses them to look at our teeth.

What do you look like in the mirror? Do you look the same?

Let's prepare a mirror and a penguin doll.

Step 1. Raise the left wing of the penguin doll and look at the doll in the mirror.

Step 2. Raise the right wing of the penguin doll and look at the doll in the mirror.

The color of the doll in the mirror is the same as the real one.

The top and bottom are the same, too. But the left and right sides are the wrong way around.

The writing on the front of an ambulance is backward.

When a driver sees it in the car mirror, it's the right way around.

Unit 4 Writing Backward

Kelly and Eva were on their way to school. They saw an ambulance on the road. Eva laughed and spoke to Kelly.

“Kelly, the number and the word on the ambulance are backward! I think someone put them on it the wrong way!”

Kelly said, “They’re meant to be like that.”

“But it’s the wrong way around!” said Eva.

Kelly said, “Mom told me it is meant to be read in the mirror. Drivers see the ambulance in their car mirrors.

They see the number and the word the right way around.”

“Oh! I didn’t know that! That’s so clever!”

“It is! Do you know anything else like that?”

Unit 5 Sedimentary Rocks

Pick up some sand. The sand falls through your fingers. But sand can become rocks. Sand falls to the bottom of the water. Over time, its grains stick together and become sedimentary rocks.

It takes a very long time to make real sedimentary rocks. We can make a model instead.

Step 1. Put glue in a paper cup filled with sand. Mix them together with a stick to make a mixture.

Step 2. Push the mixture down with another paper cup. This will minimize the space between the grains of sand.

Step 3. Leave it for a day, then remove the cup and take out the sedimentary rock model.

Real sedimentary rocks are not the same as the model.

Real sedimentary rocks aren't stuck with glue. The grains of sand stick together until they become a solid mass. They stick together because of pressure.

What are other differences?

Unit 6 Making Rocks From Rocks

I am a sedimentary rock. I am big and strong.

But I didn't use to be big. I used to be gravel.

I was a small rock.

Rain washed me down from the top of a mountain. It washed me down into a river.

I fell to the bottom of the river. My sediment friends, sand and mud, piled on top of me.

We were there for a long time. We pressed together. We got heavier. There was no space between us.

We became a solid mass. We became a sedimentary rock.

Sometimes plants or animals got pressed between us. They became fossils. Isn't it cool?

Unit 7 Fun Fossils

Fossils are made from animals and plants.

These plants and animals lived long ago.

Most fossils are from animal bones. Fossils are found in sedimentary rocks.

An animal dies. Its body falls into the water and gets stuck in mud. Sand and gravel pile on top of it. Over time, the animal bones become fossils.

Let's make fossils.

Step 1. Put a shell on a block of clay. Press it with your hands. Then pull it out.

Step 2. Pour alginate mixture into the shape of the shell.

Step 3. Take the alginate out of the clay when the alginate is firm.

We can look at fossils to learn more about our world.

We can study what life was like a long time ago.

Unit 8 Tony and the Fossil

Tony and his class went on a field trip. They went to a geopark. The teacher told the class to look for fossils.

They looked all over. Tony shouted, "I found a shellfish fossil!"

His friends ran over. They said, "This is so cool!"

There used to be a shellfish that looked like this!"

Later on, their teacher talked to them. "This place is a mountain now. But Tony found a shellfish fossil. So, this area used to be an ocean."

Tony asked, "Do all plants and animals become fossils?"

"No, they don't. Fossils are very rare. We can learn about the past thanks to them."

Unit 9 Bouncing Sounds

Do you like singing? Do you sing in the shower?

Try it one time. What do you notice?

Your voice sounds loud!

Why is this? The bathroom walls are hard. The sound bounces off.

Let's listen to some music. We can hear what happens when sound hits different materials.

Step 1. Put a speaker in a bucket. Play some music and listen to the sound.

Step 2. Hold a Styrofoam board over the plastic bucket and listen to the sound.

Step 3. Hold a wooden board over the bucket and listen to the sound again.

The volume of the speaker was the same. But it sounded different to our ears.

The music hit the soft Styrofoam board. It absorbed the sound.

It sounded softer.

When the music hit the hard wooden board, the sound bounced off.

Sound changes when it hits different materials.

Unit 10 Mountain Echo

Paul's family went hiking. Paul was excited as he reached the top of the mountain.

"The breeze feels so good on my face. Look at this amazing view!"

Dad said, "Wasn't it worth that difficult climb? Let's come here more often."

Dad shouted, "Yoo-hoo!"

Soon after, his voice came back saying, "Yoo-hoo!"

Paul was surprised. "Wow, Dad, how did you do that?"

Dad answered, "The sound bounces off a mountain on the other side and comes back. Do you want to try?"

"Yoo-hoo!" Paul shouted. Then his voice bounced back saying, "Yoo-hoo!"

"This is fun!" Paul shouted. "This is fun!" said his echo.

Unit 11 Sort With Sieves

There are two types of materials. They are pure substances and mixtures.

Salt is a pure substance. Put some salt in a bowl with eggs. That is a mixture.

Let's look at mixtures.

Put rice, soybeans, and red beans in a bowl.

How can you separate them? You can sort them by color. Rice is white, soybeans are yellow, and red beans are red.

But it will take time to do this!

Is there an easier way to separate them?

Step 1. Use a sieve with large holes to separate the mixture of soybeans, red beans, and rice.

Step 2. Use a sieve with smaller holes to separate the mixture again.

Because beans and rice are different sizes, they are easy to sort with sieves.

The big soybeans stay in the first sieve. The red beans stay in the second sieve. It is important to choose the right sieve!

Unit 12 The Incredible Beach-Cleaning Machine

Brian and Jenny were at the beach. They wanted to help clean it up.

“Look at all this mess!” said Brian. “How can we clean it all up?”

Just then, a strange machine came onto the beach. It started picking up sand and waste.

Brian said, “That machine is great! But it’s picking up everything on the beach. It will take away all the sand!”

“Wait,” said Jenny. “Look. The sand is coming out of the bottom.”

“Oh, I see. The waste is large. The grains of sand are small. The grains of sand fall back onto the beach. That’s amazing!”

Unit 13 Drops of Water

Pour cold juice into a glass. Watch what happens.

Water drops form on the outside of the glass.

Why does this happen? There is water in the air in gas form. It's called water vapor. It touches the cold glass. The gas becomes liquid. We call this condensation.

Let's watch it happen.

Step 1. Pour juice and ice in a plastic cup. Put the cup on a foil plate and weigh it.

Step 2. Watch the change on the outside of the cup over time.

Step 3. Later, weigh the cup on the foil plate and compare it with the weight of the cup before.

Water drops formed on the outside of the cup. They fell onto the foil plate.

What happened when we weighed the plate again? It was heavier than before. There was more water than before.

Can we see condensation anywhere else?

Unit 14 Hot Water, Cold Lid

“Mom, I’m hungry!” said Tony. “Can I cook this ramen? I can do it all by myself.”

Mom said, “Be careful. Let me watch you do it.”

Tony took the pot and put some water into it.

Then, he started to boil the water. He was about to put the powder into the pot when he suddenly stopped.

“Mom, look at this! There are water drops on the inside of the pot lid.”

She said, “That’s normal. Boiling water becomes water vapor. When the water vapor meets the cold lid, it becomes liquid water again.”

Tony asked, “Then, can I drink this water as well?”

“Of course, it’s safe to drink.”

Unit 15 Protecting the Environment

We only have one planet. We need to protect it.

But humans create lots of pollution. This is bad for Earth.

How can we look after Earth?

Environmental scientists can help us. They take care of our environment.

They study air, soil, and water. They see where there is pollution.

They study animals. They see how they are living.

They look at how pollution affects our planet.

They suggest how to fix it, too.

How can we fix it? We can use clean energy. We can plant more trees.

Environmental scientists want to protect our planet. They want to help us all.

Unit 16 Geologists Study Earth

The world around us is full of secrets. Geologists are very curious people. They look at our world.

They study it. They try to understand it.

Geologists study rocks. They look at mountains.

They study fossils as well. By looking at these things, they can learn about the past.

What else do they look at?

They look at soil. They see if it is good for farming.

They look for gold and oil.

Geologists don't just look at the past.

They can predict the future as well! They know when earthquakes might happen.

They know all about our world.