

Unit 1 The Three States of Water

Water can be solid, liquid, or gas.

Can you believe it?

Let's take a look. We can see water change from solid to liquid and then to gas.

Step 1. Freeze some water to make ice.

Step 2. Put the ice on your palm and see what happens.

The ice melts and becomes liquid. Later, the water disappears into the air.

A frozen lake is solid. The water on a pool slide is liquid.

The steam at a hot spring is water as gas.

What other solids, liquids, and gases are around us?

Unit 2 Smoke or Steam?

Kelly's dad is boiling water in the kitchen.

He's making noodles for lunch.

What's this? Is there a fire in the kitchen?

"Dad, smoke is coming from the pot!"

"Don't worry, Kelly. This isn't smoke. This is steam.

Boiling water makes steam."

"What is steam, dad? Why does boiling water make it?"

"When water boils, the liquid becomes a hot gas.

This is steam."

"Then it meets the cold air outside the pot.

It becomes small drops of liquid again.

"It's time to eat now. The noodles look delicious!"

Unit 3 Crushing Cups

Do you think paper cups are strong?

They get wet quickly. We can break them easily.

They don't seem strong.

But they can be very strong!

Let's see.

Step 1. Put six paper cups on the floor in two rows.

Step 2. Put a book on top of the paper cups and step on the book carefully.

Step 3. If you can stand on them without breaking them, use fewer cups next time.

How many cups do you need?

When we stand on one paper cup, we put all our weight on one cup.

We crush the cup.

When we stand on six paper cups, we put our weight across six cups.

We can stand on the cups.

* One paper cup can hold about 21kg.

Unit 4 Super Skis

Alice goes skiing with her family.

There is so much snow!

She steps on the snow. Her foot sinks. It's so cold.

"Dad, how can we ski in this snow?"

"You sank because of pressure. That's why we wear skis," Dad says.

"What's pressure? Is it my weight?"

"Almost. Pressure is weight in one area.

Your feet are small, so your weight pushes on a small area.

The pressure is high.

The skis are big and long.

When you wear them, your weight is spread out.

The pressure becomes low. You don't sink!"

Unit 5 Straw Flutes

Take some straws and some tape.

What can we do with this?

We can make a pan flute.

See how it makes sound just by blowing a straw.

Step 1. Take seven straws.

Step 2. Don't cut the first straw. Cut the second straw 1.5cm shorter, the third one 3cm shorter, and so on. Cut each straw 1.5cm shorter than the last one.

Step 3. Arrange the straws from shortest to longest. Make sure the upper part is all lined up, then put tape over them.

Step 4. Hold both sides of the pan flute and blow over the ends!

Does it sound good? I'm sure it does.

Which straw makes the highest sound?

Which straw makes the lowest sound?

Does the length of the straw change the sound?

Can you play a song on your new pan flute?

Unit 6 The Wolf and the Whistle

Tammy walked home at night.

She heard a low sound behind her.

It was a wolf! It made a low growling sound.

Tammy was very scared.

No one else could see the wolf because it was dark.

No one else could hear it because the sound was low.

Then she remembered the whistle in her pocket.

She blew it. It made a high sound.

The wolf was scared.

People heard the sound. They made the wolf run away!

High sounds travel far. Low sounds don't.

Fire alarms and police cars use high sounds.

Unit 7 The Pine Cone's Secret

We can see pine cones in forests.

We can see them in parks and in the city, too.

They're good for winter decorations and they smell good, too.

Pine cones also have a secret.

Let's find out what their secret is.

Step 1. First, look closely at the pine cones. Some are wide open while some are closed.

Step 2. Put the wide open pine cones in a bowl of water for about an hour.

Step 3. Take the pine cones out of the water.

Step 4. A little while later, see what happened to the pine cones.

Pine cones open when they are dry. They shrink when they are wet, or when the air is humid.

Find some pine cones on trees near you.

Look at them closely. What can they tell you?

Is the air dry, or is it humid?

Unit 8 The Story of the Pine Cone

There is a pine tree. It has many pine cones.

The pine cones are full of seeds.

The pine cones look after the seeds.

They're like the seeds' homes.

When it rains, the pine cones close. They protect
the seeds from the wind and the rain.

One warm and sunny day, it's time for the seeds
to go. The pine cones open up.

The wind comes.

It blows the seeds out of the pine cones.

They travel far.

They grow into new pine trees.

Soon, the trees grow more seeds.

Unit 9 Roll a Coin

Vending machines are useful.

We put coins in. We get things out!

How do they work?

They use magnets to stop coins that aren't real.

Let's see!

Step 1. Lay two thick books together.

Step 2. Lean another book against the two thick books to make a slide.

Step 3. Put a stick magnet on the book.

Step 4. Roll a coin and an iron ring along the book.

The coin rolls down the book. It doesn't stick to the magnet.

The iron ring stops. It sticks to the magnet.

Iron sticks to magnets.

Coins are made of other metals (copper and nickel, etc.).

These metals don't stick to magnets.

Unit 10 Toy Coins

Brian and Jason went to a vending machine.

Brian wanted to test something.

He took out some toy coins. They were made of plastic.

He put them in the machine.

He put in some real coins, too.

Only the toy coins came out.

“The size and shape of the coins is the same.

What happened?”

Jason said, “I know why. Real coins are made of metals.

The machine has magnets in it.

Metal coins move slowly past the magnets.

Plastic coins fall quickly. They fall right out!”

Unit 11 Liquid to Solid

We know a solid keeps its shape and volume.

We know a liquid changes its shape but not its volume.

What happens when a liquid changes to a solid?

Step 1. Fill a test tube halfway with water. Mark the height of the water and measure its weight.

Step 2. Mix salt with crushed ice in a cup. Put the test tube in the middle of the cup. Freeze the water.

Step 3. Now measure the height of the ice in the test tube. Weigh the test tube.

Step 4. Put the test tube in a cup of warm water. Measure the water level in the test tube again and weigh it.

The liquid water changed into solid ice.

Then it changed into a liquid again. It changed its volume.

The ice was higher.

But the weight didn't change.

It stayed the same.

Unit 12 Ice Breaker

It was a hot day. Susie opened the freezer.

She was surprised. "Mom, I put a water bottle in the freezer.

Now it's broken!"

Her mom came to see.

"Why did it break?" Susie asked.

"When water freezes, it gets bigger. The ice broke the glass bottle."

"Oh! When I put my yogurt in the freezer, the plastic pack gets bigger.

Is that why?

It's because the yogurt has water in it, isn't it?"

"That's right," says her mom. "Now, can you help me clean up the freezer?"

Unit 13 Rock-breaking Rivers

At the top of the mountain, there are big rocks.

At the bottom, there are smaller rocks.

Near the sea, there is sand.

What makes this happen? Let's find out.

Step 1. Pile some sand high like a mountain. Use colored sand at the top.

Step 2. Pour water on top of the sand. Watch what happens.

The water brought the colored sand to the bottom.

This is what rivers do.

Rivers start on mountains. They go to the sea.

Rivers break up the big rocks at the top of the mountain.

They bring small rocks to the bottom.

They turn rocks into sand!

Unit 14 Adventures of Spring Water

Spring water flowed out of the ground.

She flowed past a big rock.

“I want to be big like you!” she said.

“You can,” said the rock.

“Keep going. You will become a big sea.”

She began a trip.

She flowed down the mountain. She was strong.

She changed the land around her.

She flowed through big rocks. She broke the rocks and made soil.

Plants grew in the soil.

Now she was a big river. She flowed slowly.

She kept going. She flowed to the ocean.

She was so happy!

She traveled around the world.

Unit 15 Building Worlds

Do you know what VR is? VR means virtual reality.

You wear a headset. You turn it on.

You enter a new world!

Walk in Paris. Walk forward and backward.

Walk on the moon! Look up and down.

You can do anything you want.

VR feels real. But it's not.

Virtual world creators make these worlds.

They film things around us.

They use a special camera.

Then virtual world creators make virtual worlds on a computer.

They use a special program.

They take us to new worlds!

Unit 16 Flower Power

Do you like flowers, trees, and plants?

Why not be a botanist?

Botanists work with plants.

They look at plants all day.

They know all about plants.

Some botanists travel all over the world.

They climb mountains. They find new plants.

They help plants that are in trouble.

Botanists see how plants grow.

They can grow plants, too.

Some botanists even make medicines with plants.

Doesn't it sound fun?