

Unit 1 Cleaning Up Space Garbage

Waste is a problem all around the world. It's even a problem in space. People have left 8,000 tonnes of trash there. It's called space debris. It goes around the Earth dangerously fast. It can hit spaceships and even Earth.

It's time to clean it up. One solution scientists have invented is a giant net to catch trash. The scientists will use powerful cameras to find the trash. They will catch it and slow it down. Then they can bring it back to Earth.

Unit 2 Robot Firefighters

Fighting fires is a dangerous and dirty job. Brave people battle fires every day. In the future, we'll have robots to protect us.

There are different firefighting robots. One is small and can fit through doors. A human controls it with a joystick. Another is much bigger. It sprays water 90 meters and fights huge fires. One firefighting robot even has hands and a face. It walks and carries a hose. Scientists are now teaching it to talk. Soon firefighters will have lots of robot helpers.

Unit 3 Cars That Drive Themselves

Companies are making a new type of car. These cars drive themselves.

In some ways, these cars will be great. People won't have to drive their cars. So they can work or relax. Also, this kind of vehicle will be safe. A computer watches the road and prevents problems. It senses other cars and keeps a safe distance. This will mean fewer crashes.

Not everyone likes these cars, though. Some people don't trust a car with no driver. They think computers can make mistakes. And some people just enjoy driving.

Unit 4 Intelligent Machines

Do you have a robot friend? In the future, you might.

Computers and robots have developed a lot. The first computers were created in the Second World War. They could understand enemy messages. By the 1950s, computers could solve difficult math problems. The first intelligent robot was built in the 1970s. Now computers play games like chess and Go. They can even beat human champions.

Many people think computers and robots will soon be more like us. They may soon think and talk. What will they talk about?

Unit 5 Hieroglyphics

Hieroglyphics are the writing system of ancient Egypt. They were used 5,000 years ago.

Hieroglyphics are complicated. So most people then couldn't read or write. There are hundreds of pictures. Some are for one sound. Others are for whole words. Most languages are written in one direction. But hieroglyphics can be written in any direction.

For a long time, no one could read hieroglyphics. In 1799, a French soldier discovered the Rosetta Stone. This stone had the same text written in hieroglyphics and Greek. Experts could use it as a dictionary to translate.

Unit 6 Baseball Signs

When you watch baseball, you may notice something strange. The players use a variety of hand signs. Sometimes, a player holds up his fingers. Sometimes, he touches his glove or head.

There's a good reason. The pitcher and other players stand far apart. But they need to communicate information about the game. They can't shout to each other. They need to keep their plans secret. So they make different signs with their hands. Each team uses different signs. And they change them often so other teams don't learn them.

Unit 7 How Animals Communicate

Human language seems unique. But other animals also have ways to communicate.

Ants use chemicals. An ant leaves a chemical path. Other ants follow it to the food.

Bees do a special dance. A bee moves around. Its body and wings vibrate. This shows where flowers are.

Elephants use low sounds. These sounds travel over long distances.

Dolphins smack their tail on the water. This warns other dolphins of danger.

Animals like the firefly and the glow-worm have another way. They produce flashes of light to communicate.

Unit 8 Barcodes and QR Codes

Airlines put barcodes on your luggage. Theaters put them on your movie tickets. They are everywhere.

A barcode looks like black stripes. Some stripes are thin. Others are thicker. A machine uses a laser to scan them. It reads the stripes as numbers.

Barcodes are useful for some companies. Supermarkets and shipping companies handle lots of items. They need to scan them quickly.

Now there are better barcodes. They are called QR codes. You can scan them with your phone. They use dots instead of bars. And they hold more information.

Unit 9 The Theremin

The theremin is one of the first electronic instruments. And it is very unusual.

It doesn't look like other musical instruments. It is just a wooden box with two antennas.

The way that you play the theremin is also strange. You don't touch it, like a piano or guitar. You wave your hands in the air near the antennas. Your hands change an electric current. This changes the sound.

The theremin's strange sound isn't for everyone. It can even sound spooky. You often hear it in old sci-fi movies.

Unit 10 Beat Machines

Drum machines have recordings of instruments like drums and cymbals. You program beats with these sounds. Drum machines are great, but not everyone likes them.

Drum machines are better than human drummers in some ways. They play faster and longer. They never get tired. They don't make mistakes. And they play a wider variety of sounds.

To some people, drum machines' beats are too perfect. Human drummers make small changes in the beat. These add feeling to the music. Drum machines don't do this. To some people, human drummers are always better.

Unit 11 Auto-Tune

Singing is never perfect. But fixing it used to take a long time. Engineers recorded a song many times. Then, they took the best parts and put them together.

In 1997, Auto-Tune changed everything. Engineers recorded a song once. Then, the software could make it perfect. The song still sounded natural. Nearly every singer wanted to use Auto-Tune.

Engineers started using Auto-Tune in creative new ways. They moved up and down a few tones very quickly. The singer sounded like a robot. Now Auto-Tune is used in almost every song.

Unit 12 The Changing Shape of Music

Listening to music has changed a lot. Long ago, you could only listen to music at concert halls. Starting in the 1850s, people could listen to music at home. Machines played music on tubes or disks. But these machines were too heavy to take around.

That changed in 1983. With the Sony Walkman, people could take music everywhere. It played music on cassettes. And it fit in a pocket.

Now listening to music is convenient. Your computer and phone can play MP3 files. You can also stream music over the internet.

Unit 13 The First Scales

Trade started long ago. It was easy to find the value of some goods. For example, one cow was worth three goats. But it was hard to count other goods, like spices. Merchants weighed these goods.

The first weighing system was simple. Two plates hung from either side of a bar. One plate held the goods. On the other, the merchant placed stones. All merchants used stones of the same size and weight. Stones were added until the two plates were equal. Then, the goods weighed the same as the stones.

Unit 14 Weighing a Planet

Scientists have a way to find the weight of a planet. They look at a planet's moons.

Scientists need to know two things. They need to know the distance between the planet and the moon. And they also need to know how long it takes the object to orbit the planet once.

This tells them about the gravity pulling on the moon. The gravity comes from the weight of the planet. A heavy planet pulls harder on its moons. So they will orbit the planet quickly.

Unit 15 Catching Rain

Rain is important. It gives us water to grow food. But it can also be dangerous. Floods can wipe out whole villages. Luckily, scientists have good tools to study rain.

One tool is called a disdrometer. It uses light. It tells scientists how fast rain is falling. It measures the size and speed of raindrops. Larger drops fall faster. They also contain many times more water. Scientists can tell how much rain is falling per hour. This helps them plan how to best use water. And how to defend us from it.

Unit 16 Weather Models

Big storms are dangerous. Blizzards and hurricanes can even kill. People need to know they are coming. It's the job of weather scientists to predict the weather.

Weather scientists collect information about the weather. They watch how the air moves. They watch changes in temperature and moisture.

This information goes to supercomputers. They run complicated models of the weather. This shows the weather forecast.

The system is not perfect. Scientists can't always get good information. But weather models are getting better all the time.