

6

WHAT DIFFERENT TYPES OF MACHINES ARE THERE?

Look and see...

Which machines have we been using for hundreds of years?



Which machines do you use every day?

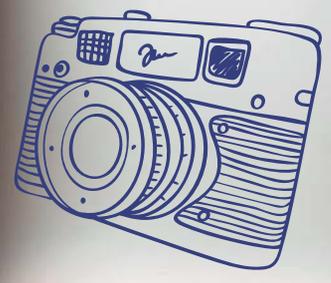




Song
Simple machines



Which of these machines
need electricity to work?



Which of these machines
do we use to communicate?



DOCUMENTARY
Incredible inventions

When I grow up, I want to be a engineer!
Come with me and learn about:

- simple and complex machines.
- how inventions create new technology.
- how technology changes over time.



WHAT IS A SIMPLE MACHINE?

We use machines to make work easier. When we think about machines, we usually imagine a **complex machine**, like a computer. However, there is another type of machine – **simple machines**. Simple machines have no moving parts or few moving parts.

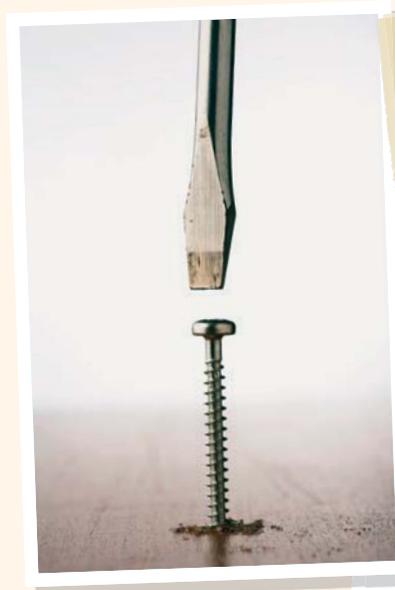
INCLINED PLANE

An **inclined plane** is a surface that goes from a low level to a high level. We use it to move heavy objects up and down.



SCREW

We use **screws** to hold things **together** and also to lift objects.



Find a screw hidden in this unit.

When we put simple machines together, we make a **complex machine**.

MAKE AN INCLINED PLANE

Materials

marbles, sandwich bag, elastic band, books, ruler

Method

- 1 Put the marbles in a sandwich bag and seal it. Tie the elastic band around one end of the bag.
- 2 Put the books in a pile and make a ramp using the ruler.
- 3 Drag the sandwich bag up the ramp by pulling on the elastic band.

Add more books to the pile. Is it easier or more difficult to pull the marbles up the ramp?



Do you know what an Archimedes screw is? Look it up on the internet!



MAKE A SCREW

Materials

paper, scissors, marker, pencil, sticky tape

Method

- 1 Cut the paper to make a right-angled triangle. Draw a line on the longest side of the triangle.
- 2 **Wrap**² the paper around the pencil.
- 3 Stick the paper to the pencil with sticky tape.



What have I learnt?

Read and circle T (true) or F (false).

- | | | |
|--|---|---|
| 1 Simple machines have few or no moving parts. | T | F |
| 2 Inclined planes help us move things between levels. | T | F |
| 3 Simple machines cannot be parts of complex machines. | T | F |
| 4 Screws can be used to lift things. | T | F |

¹to hold (something) together: to keep two or more things united

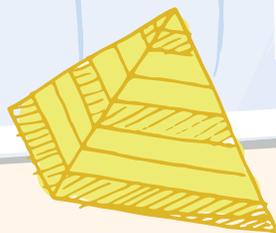
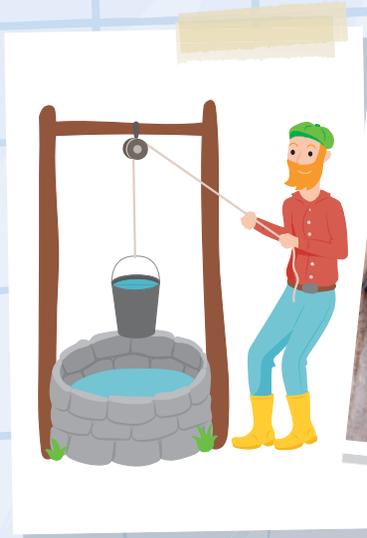
²to wrap around: to put paper or a soft material around an object

HOW DO SIMPLE MACHINES HELP US MOVE THINGS?

A **pulley** and a **wheel and axle** are two more examples of simple machines.

PULLEY

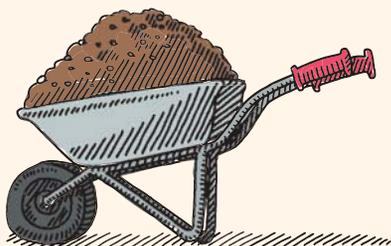
We use a **pulley** when we have to lift or lower something heavy. A pulley uses a **wheel** and a **rope** to lift an object.



Many people think that the Ancient Egyptians used inclined planes and pulleys to build the pyramids ... about 5,000 years ago!

WHEEL AND AXLE

This simple machine is made up of a **wheel** which turns around an **axle**. We use it to move things across the ground more easily, or to apply force more easily.



MAKE A PULLEY

Materials

plastic cup, two pieces of string (one long and one short), stones

Method

- 1 Make two holes near the top of the cup and push the short piece of string through them to make a **handle**¹.
- 2 **Tie**² one end of the long piece of string to the handle. Pass the other end over a door handle.
- 3 Put stones in the cup and pull down on the string to lift the cup.

Is it easier or more difficult to lift the cup with more stones in it?

Have you ever used a pulley to lift something?



MAKE A WHEEL AND AXLE

Materials

cardboard tube, long wooden sticks, four plastic bottle tops

Method:

- 1 Make four holes in the cardboard.
- 2 Push the wooden sticks through the holes to make two axles.
- 3 Make a hole in the centre of the four bottle tops and attach them to the axles.



What have I learnt?

Read and complete.

- 1 Pulleys can be used to and lower things.
- 2 Pulleys have got a and rope.
- 3 In a wheel and axel, the turns around the
- 4 We can use a wheel and axel to apply more easily.

Does your car move more easily with or without wheels?

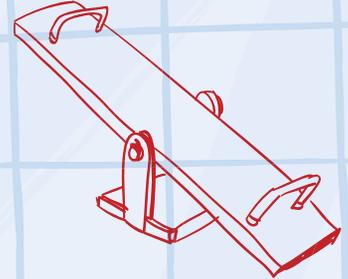
¹**handle:** the part of an object which you use to carry or open it
²**to tie:** to attach one thing to another using string or rope

HOW DO SIMPLE MACHINES HELP US LIFT AND CUT THINGS?

A **lever** and a **wedge** are two more examples of simple machines.

LEVER

A lever is made up of a **rigid¹ bar** and a **fulcrum**. When we push one end of the lever down, the opposite end moves up. It is easier to lift an object when we use a lever.

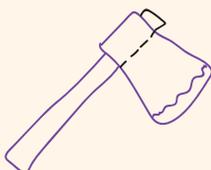
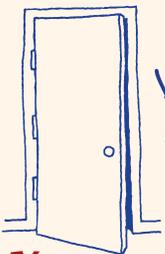


WEDGE

A wedge is an object with a **slanted² surface**, like an inclined plane. When we push down on the flat part of a wedge, we can cut things easily. We can also use a wedge to stop something moving.



What do you think prehistoric people used wedges for?



Look back

Identify the simple machines on pages 70–71.

MAKE A LEVER

Materials

two pencils, plasticine, a rigid ruler, two plastic cups, marbles, coins

Method

- 1 Stick the pencils to the table with plasticine to make the fulcrum. Place the ruler on top.
- 2 Stick a plastic cup to each end of the ruler with plasticine.
- 3 Put marbles into one of the cups. Put coins into the other cup to lift the lever.

How many wedges can you find in your home?



If you move the fulcrum closer to the cup with the marbles, do you need more or fewer coins to lift the marbles?

MAKE A WEDGE

Materials

piece of cardboard, stones, sticky tape

Method:

- 1 Fold the cardboard so that you can see a triangle from the side. Secure it with sticky tape.
- 2 Put stones inside to make it heavier.
- 3 Use a door to test the wedge. Does it stop the door from moving?



What have I learnt?

Read and match.

lever

fulcrum

slanted surface

wedge

- one part of a wedge
- a simple machine which can cut things
- a part of a lever
- a simple machine that can lift things

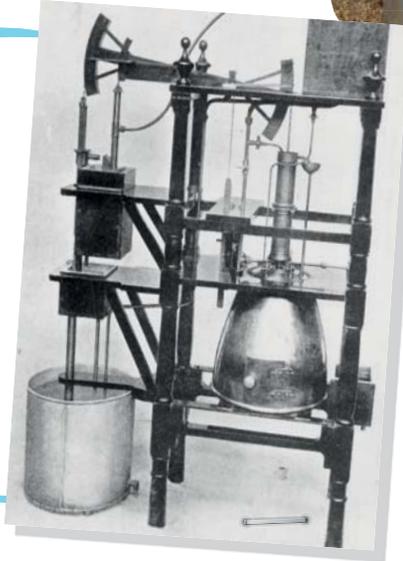
¹**rigid:** not flexible; does not change shape easily

²**slanted:** inclined; sloped in one direction

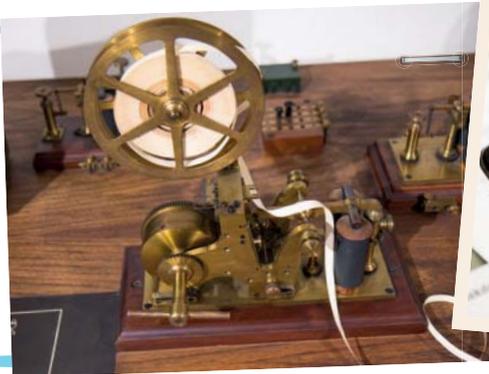
HOW DO MACHINES CHANGE OVER TIME?

It is very difficult to imagine a world without machines. **Inventions** usually begin as an idea and are created later. As time passes, people improve and change the inventions to make them better.

The invention of the **steam engine** started the Industrial Revolution. The engine used water vapour, or steam, to do work. The steam engine powered trains and ships. It also powered machines in factories.



The invention of the **telegraph** meant that people could communicate by sending coded messages. It was the fastest way of communicating over long distances.



Which machine comes between the telegraph and the smartphone?



What do you think humans' most important invention is?



What have I learnt?

Read the definitions and write the words.

- 1 The creation of a new machine:
- 2 The type of machine that powered trains, ships and factory machines:
- 3 The invention that allowed people to send coded messages over long distances:

Our machine makes it easier to ...



CODE BREAKERS

Hands on...

Before you start

People communicated via telegraph using Morse code – a system of long and short clicks. Morse code can also be communicated using a torch.

Materials

torch, pen, paper

Method

- 1 Write your name in Morse code.
- 2 Work with a partner. Use your torches to communicate your names to each other. Keep the light on for one second to represent a dot (•) and three seconds for a dash (-).
- 3 Write other words to communicate to your partner. Send them via Morse code. Keep the light on for seven seconds to represent a space between words.

Conclusions

Were you able to understand your partner's messages? Were they able to understand yours?

Is it easy to communicate via Morse code?

Compare this method with the machines we use to communicate today.

It is faster / easier to communicate with ... than with ...

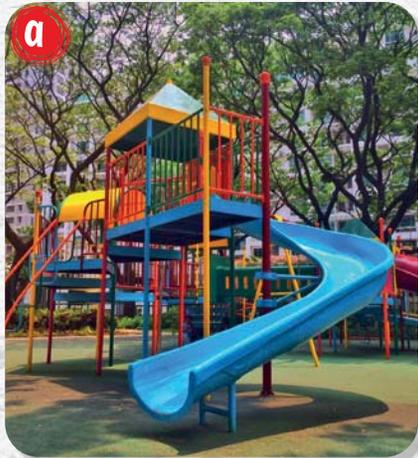
| | | | |
|---|---------|---|---------|
| A | • — | N | — • |
| B | — • • • | O | — — — |
| C | — • — • | P | • — — • |
| D | — • • | Q | — — • — |
| E | • | R | • — • |
| F | • • — • | S | • • • |
| G | — — • | T | — |
| H | • • • • | U | • • — |
| I | • • | V | • • • — |
| J | • — — — | W | • — — |
| K | — • — | X | — • • — |
| L | • — • • | Y | — • — — |
| M | — — | Z | — — • • |



Language skills

1  Listen and write the correct letter in your notebook.

1 Which machine is Jack talking about?



2 Which machine is Emma talking about?



2 Complete the sentences using the words in the box.

into down across around up

a A wheel and axle helps us move things the floor.

b A wedge can cut an object smaller parts.

c When a bicycle moves, the wheels turn

d When one end of a lever goes , the other end goes



Review

- 1** How are these simple machines making work easier?
Identify the differences in the two pictures.



In Picture A they are ... ,
whereas in Picture B ...



This is our invention.
It's called the ...

What have I learnt?

How many stars? Tell a partner.
(★ = I'm still learning / ★★★★★ = I can do it!)

- 1 I can name simple machines.
- 2 I can explain what each simple machine helps us to do.
- 3 I can explain how complex machines and simple machines are different.
- 4 I can give an example of an invention.



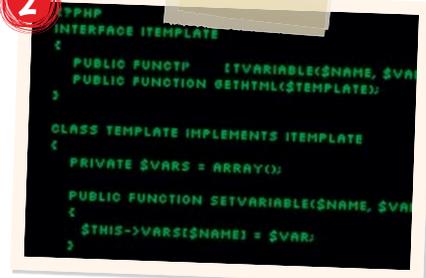
Assessment link
Go to page 94 for more activities.

Throughout history women have changed the world in amazing ways. Many women have **discovered** or **invented** things which have made our lives easier. Other famous women have made the world a better place. Can you match the women with the pictures?

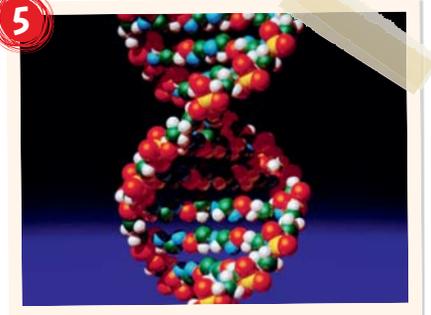
1



2



5



3



4



Marie Curie was a scientist who helped find treatments for cancer.



Amelia Earhart was the first female pilot to fly across the Atlantic Ocean alone.

Do you know any other important women? What did they do?



Rosalind Franklin was a biologist who helped in the discovery of **DNA's** structure.



Ada Lovelace was a mathematician who wrote the instructions for the first computer program.



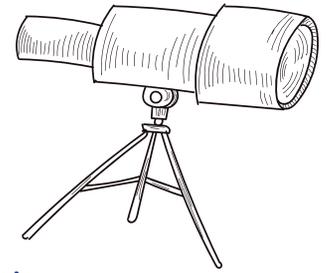
Maria Telkes was an inventor who created a solar-powered house and oven.

Famous women memory card game

Try it out

Step 1: Plan

- 1 Form groups and complete **Poster 3**.
- 2 Investigate four more famous women from history and complete **Worksheet 3**.
- 3 Discuss and decide:  **Let everyone have a turn to speak.**
 - What information will you include on your cards about the four women you investigated and the five women in **Poster 3**?
 - What materials will you need to create the cards?



MATERIALS

| | |
|--------------------------|-------|
| <input type="checkbox"/> | _____ |



Step 2: Prepare

- 1 Work together to make pairs of cards for each woman. Write the woman's name on one card and an interesting fact about her on another.
- 2 Decorate the blank sides of the cards.
- 3 Did everyone let others speak without interrupting?   

Step 3: Present

- 1 Mix up your cards.
- 2 Swap cards with another group and play the game.

