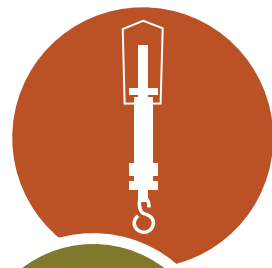
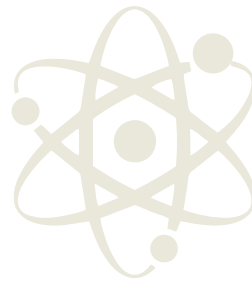




making physics matter



Age
9-11
years

Scientific ideas over time

The history of machines

Till roll timeline

Introduction

Machines are devices that change the direction or size of a force. There are six simple machines: wheels (including gears and rollers); inclined planes (ramps); wedges; levers; screws; and pulleys. Most simple machines reduce the force you need to apply to lift/move a heavy object by making the distance over which you apply the force larger than the distance the object moves.

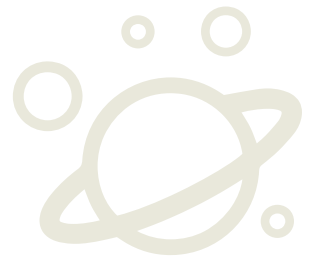
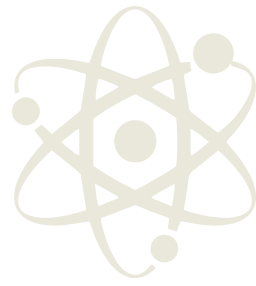
The invention of simple machines changed the way we live by making it easier and faster to do our work. As history has progressed, innovators and inventors have discovered a phenomenal number of ways to combine simple machines to form complex machines which have totally changed the world we live in. The first simple machines were used by stone-age humans in around 50,000 BC and this is where our timeline begins.

Materials per pair

- Till roll
- Scissors
- Tape measure/metre stick
- Pencil
- Ruler
- Our 15 machine inventions that changed the world

Instructions

1. Children work in pairs to carefully measure out a 120cm length of till roll. This represents the time that has passed since simple machines were first used by our ancestors during the stone-age.
2. Ask the pupils to mark one end of the till roll (left) '50,000 BC' and then mark every 20cm in steps of 10,000 years until the '10,000 AD' mark.
3. Show the children the 'machines that changed the world' list and ask them to predict where they think they fit on the timeline – the children can create their own key and mark their predictions on the till roll lightly in pencil. Make it clear that there were in fact significantly more machines, scientists and inventors involved in the full history of the development of machines and this is a very small sample of some of the most significant inventions from around the world.



Fifteen machines that changed the world

Stone-age Africans made the first **levers** to use as tools and weapons.

The first **elevators** were installed in the palaces of Louis XV in France.

Karl Benz began production of Motorwagen, the first **modern car**, in Mannheim, Germany.

The first **bicycle** was invented in German as an alternative form of transport to the horse.

The Egyptians used **inclined planes** (ramps) to build the Great Pyramids.

The **windmill** was first used to grind grain and draw up water in Iran.

The first **railway steam locomotive**, built by Trevithick, was used to carry materials from ironworks in South Wales.

The Romans were first to use a **screw press** to produce wine and olive oil.

People in Mesopotamia first used rope **pulleys** for hoisting water.

The **wheel and axle** were first used in the Middle East as a potter's wheel to make clay pots.

The Egyptians used an **Archimedes screw** to lift water up hills.

The ancient Greeks used **gears** in devices to calculate the positions of objects in the night sky.

The people of Carthage (Tunisia and Algeria) used **cranks** for the handles of the rotary handmills used to grind grain.

The Wright brothers flew the first **powered aircraft** in North Carolina in the United States of America.

The Egyptians used **water wheels** with attached pots to move water from one place to another.

4. Pairs share their ideas with the class – looking for similarities and differences between when they think different machines were first used. Use questioning to encourage children to justify their ideas.
5. Share the positions that the events should be placed on the timeline – the children can then use coloured pens to create their timeline of the history of machines adding illustrations if they want.
6. **Challenge:** only give children the years and ask them to use their mathematical knowledge to create the full timeline and determine the position of each event on the timeline (10,000 years = 20cm, 1,000 years = 2cm and 100 years = 0.2cm)
7. Encourage children to take the timeline home to share and discuss with their families.

The solution

Machine	Year	Position on timeline
Stone-age Africans made the first levers to use as tools and weapons.	50,000BC	Left end of the timeline
The wheel and axle were first used in the Middle East as a potter's wheel to make clay pots.	4000BC	28cm from the right end
The Egyptians used inclined planes (ramps) to build the Great Pyramids.	2600BC	25.2cm from the right end
People in Mesopotamia first used rope pulleys for hoisting water.	1500BC	23cm from the right end
The Egyptians used water wheels with attached pots to move water from one place to another.	350BC	20.7cm from the right end
The Egyptians used an Archimedes screw to lift water up hills.	250BC	20.5cm from the right end
The ancient Greeks used gears in devices to calculate the positions of objects in the night sky.	150BC	20.3cm from the right end
The windmill was first used to grind grain and draw up water in Iran.	600AD	18.8cm from the right end
The people of Carthage (Tunisia and Algeria) used cranks for the handles of the rotary handmills used to grind grain..	550AD	18.9cm from the right end
The Romans were first to use a screw press to produced wine and olive oil.	100AD	19.8cm from the right end
The first elevators were installed in the palaces of Louis XV in France.	1750AD	16.5cm from the right end
The first railway steam locomotive , built by Trevithick, was used to carry materials from ironworks in South Wales.	1804AD	16.4cm from the right end
The first bicycle was invented in German as an alternative form of transport to the horse.	1817AD	16.4cm from the right end
Karl Benz began production of Motorwagen, the first modern car , in Mannheim, Germany.	1885AD	16.2cm from the right end
The Wright brothers flew the first powered aircraft in North Carolina in the United States of America.	1903AD	16.2cm from the right end