

14

Science and Technology



What

you will learn

Science and Technology

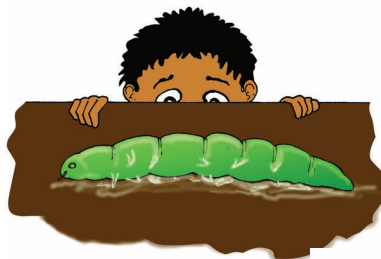
Medicine

Telecommunications

The first vehicles

Science and technology

If it's green and slimy,
..... It's biology.
If you stub your foot against it,
..... It's geology.
If it stinks,
..... It's chemistry.
If it doesn't work,
..... It's physics.



Before you go any further with this chapter, write a short paragraph starting with 'Science is.....'. Try to describe what you think characterises science, and what makes it different from other human activities.

Science is concerned with understanding the way things are and why they behave as they do.

What is technology?

Technology is concerned with finding practical solutions to problems, especially creating something which meets a human need.

Each photo shows a technological solution to a common everyday problem.

In each case describe the object in the illustration and the problem that it solves.



Robot Surgoens

Read the following cutting from *The Guardian* (15th August 1989).

Scalpel ... forceps.... Software...as robot surgeon starts operating

Aileen Ballantyne and Peter Large

SURGERY requiring more precision than the human hand can achieve could be performed by robots within the next 10 to 20 years as a result of a Government –funded research project announced yesterday.

The robot would operate the knife and handle probes under the surgeon's instructions for operations such as correcting short-sightedness, the detection and removal of cancerous tumours and prostate gland and joint surgery.

Professor Barrie Jay said it was 'not science fiction' to suggest that robots could carry out surgery to correct short-sightedness. "Obviously there would have to be an over-ride for the surgeon, but they could be used for operations which require a very accurate series of cuts within the next 20 years". At present, surgery to correct short-sightedness had "many complications".

Mr Peter Jenkins said the robot's main use would be for movements which could not be achieved by a human hand.

Dr John Dawson was amazed at the thought of a robot-controlled knife or laser operating in the abdomen, where there were wide differences in fatty layers and blood-vessel distribution.

The surgeon's skills in such cases went far beyond the craftsman aspects. Robot help for the surgeon might be useful in more uniform areas like the eye but, even there, basic computer science – let alone artificial intelligence – still could not guarantee reliable software running on reliably designed machines.

Source :The Guardian (15th August 1989)



- 1 This is a story about new medical technology. What would the new technology operate?
- 2 What does professor Barrie Jay think this new technology could be used for?
- 3 What does Mr Peter Jenkins think this new technology could be used for?
- 4 Does Dr John Dawson think the idea is a good or bad one?
- 5 Do you think the idea is a good or bad one? Give your reasons.



Ideas

⇒ Science is understanding the way things are and their behaviour.

⇒ Technology tries to find practical solutions to problems.

★ What makes you ill?

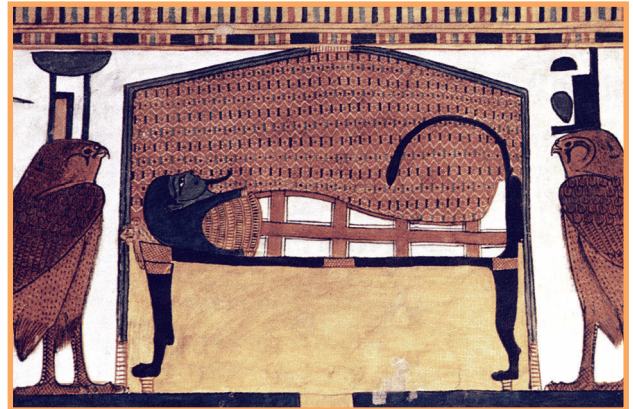
In the early days people had some very strange explanations for feeling ill.

Different people from different parts of the world used many remedies for diseases. For example Egyptians thought diseases were caused by their many gods. Treatments always included sacrifices to the gods.

What did our ancestors thought of diseases?

During the last 300 years people have discovered bacteria and viruses. They have discovered how these organisms causes disease.

Vaccination against some diseases was invented. Thanks to these pioneers, we have vaccines today to protect or immunize us against many infectious diseases.



★ Surgical Operations

Operations were made far less painful by the invention of anaesthetics.



Surgery (earlier)



Surgery (modern)



Inhaling anaesthetics

✦ Drugs against Disease

A whole range of powerful microbe-killing drugs were invented.

Recent medical drugs include those designed to prevent a patient rejecting a new heart or other transplanted organ. Yet more new drugs have been invented to control mental illness, allowing patients to live normal lives.



✦ Scanning Machine

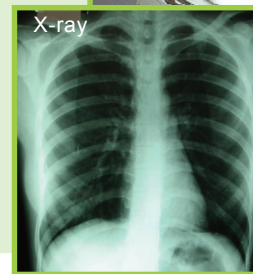
X-rays, which penetrate human body were discovered. More recently body scanners have been invented which include ultra sound machines, which are used to examine babies still inside their mother's wombs. Other scanners are ECG machine which records details of heartbeat, and the EEG machine, which records electrical waves given out by the brain.



EEG



Ultra sound scan machine



X-ray



X-ray machine



- 1 Find out information of the advancement in technology in the following area of medicine:
 - a. Thalassaemia
 - b. Transplants



Ideas

⇨ In the early days people were not aware of how they get ill.

⇨ Now medical technology has improved so much that they can find out the cause and give treatment well.

Telecommunications

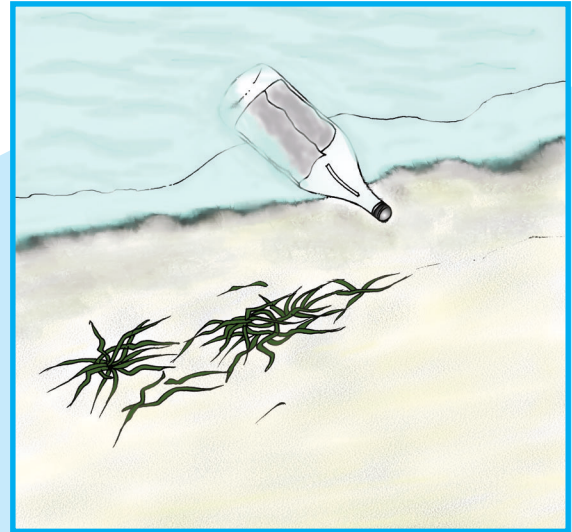
In the early days we had to depend on letters carried by land and sea to communicate with one another at considerable distances.

A letter to reach from one person to another could take weeks or months.

What did our ancestors do to communicate?



By the mid-nineteenth century, new discoveries and inventions in electricity made this faster communication possible.



★ Telegraph

This is an instrument for sending electrical messages from one place to another through a wire cable. But these messages were sent to a distance of about 39 miles.

However, later messages were able to be sent right around the world instantly. Messages typed out at one end were almost immediately printed out automatically at the other end.



Telephone

A telegraph message along a cable needs to be in code, but a telephone allows people to talk to each other directly.

The video telephone is really a new invention, the person making and receiving a call can see, as well as hear, one another.

Mobile phones have become so common that it is a basic necessity now.



Telemetry

Scientists were sending balloons high up into the Earth's atmosphere to record the weather. These sent back their scientific data automatically in the form of radio messages.

Other objects in the sky, such as aircraft, could be remote controlled by radio signals. This is called telemetry. Examples of telemetry today include the control and relay of automatic messages from space satellites and probes.

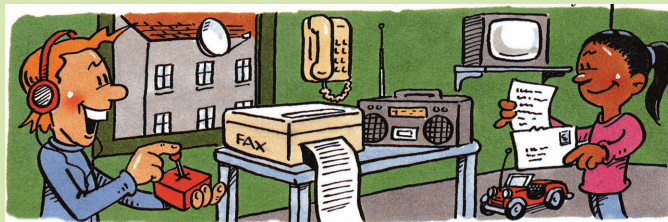


Computers

The use of computers in telecommunication was a huge breakthrough. These days it is common to speak about close friends from the internet, whom we have never actually met in the flesh.



- 1 Examine the cartoon of telecommunication devices below. List all the devices you can spot and write down a short description for each.



Ideas

→ Telecommunication has improved to an extent that we are able to talk to people around the world instantly.

The first vehicles

With the invention of wheel, method of transport has changed dramatically. Personal cars, large trucks, high speed trains all run on wheels were invented.

The earliest methods of vehicle was wheel barrow. The next improvement of vehicles was four wheeled war chariots.

To travel by river or across lakes or sea people built rafts or canoes. Ancient rafts sometimes made sea journeys of many thousand of miles.

Bigger and better ships came into existence afterwards. Maps and compasses to show the exact direction in which the ship was travelling were invented.

More recently radars and global positioning systems (GPS) were invented.



large truck



Wheel barrow



Canoe



Ship

What were the methods of transport that our ancestors relied?

Look at the pictures.

Can you put these in order from earliest to latest ones.

What are the disadvantages of these?



Riyalu dhoani



Air taxi



Passenger line



Wooden raft

• Hobby horse

First ancestor of the bicycle was the 'hobby horse', a crude two-wheeled vehicle. Later pedal driven bicycle was invented. Inflatable rubber tires were invented later.



• Motor cycle

A year later, a gas-engined motor bicycle was built.



• Aircraft

Balloons

People first used to fly through the air using a hot air balloon. Later balloon filled with hydrogen gas were more often used.

Hydrogen gas is much lighter than air, but it is dangerously flammable.

So a safer gas, helium was used. Since hydrogen was dangerous and helium expensive, giant airships soon became a thing of the past.



• Airplanes

The earliest airplanes were model gliders. The real beginnings of modern airplane started when a gas-engined biplane started flying. It flew to a distance of 850ft. Gas-engined airplanes rapidly increased in size, speed, and safety.

The fastest and biggest airplanes today are the jet airplanes.



Ideas

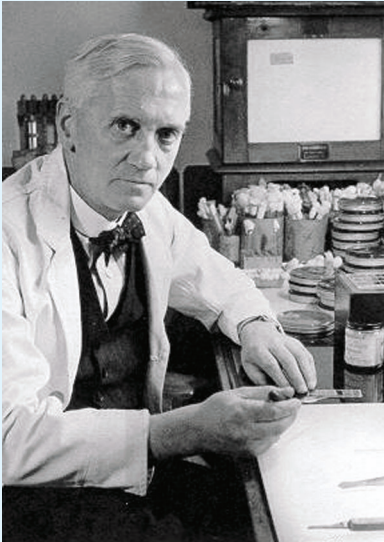
→ The vehicles that we used to travel by sea, air and land has improved to a very great extent.



- 1 Students create a presentation comparing past and present technology to explain how science has benefitted different modes of transport.

SIR ALEXANDER FLEMING

Born in 1867



Sir Alexander Fleming was born near Darvel, Scotland. He got educated at Saint Mary's Hospital Medical School of the University of London. He is a British bacteriologist and a Nobel laureate. He is best known for his discovery of PENICILLIN. He served as professor of bacteriology at St. Mary's Hospital Medical School from 1928 to 1948, when he became professor emeritus.

Fleming conducted outstanding research in bacteriology, chemotherapy, and immunology. In 1922 he discovered lysozyme, an antiseptic found in tears, body secretions, albumen, and certain fish plants. His discovery of penicillin came about accidentally in 1928 in the course of research on influenza. His observation that the mold contaminating one of his culture plates had destroyed the bacteria laid the basis for the development of penicillin therapy.

Fleming was knighted in 1944. In 1945 he shared the Nobel Prize in physiology or medicine with the British scientists Howard Walter Florey and Ernst Boris Chain for their contributions to the development of penicillin.

(J. Boyd & W.WhiteLaw 1989 John Murray)