The amazing human 'machine'

The human body is amazing

The human body is an amazing 'machine'. By the time you are an adult, you will have nearly 100 000 km of blood vessels running through you. You will have about 5 litres of blood in your circulatory system and, if you live to be 75 years old, your heart will have pumped your blood round your body about 2.5 billion times. When you are fully grown, you will be supported by 206 bones and moved by 639 different muscles.

You can detect light, sound, smell, taste, pain, heat, cold and pressure. In your lifetime, you will consume about 75 tonnes of fuel and take in 10 million litres of oxygen to release nearly 400 million units of energy. Even though your brain is more complicated than the most powerful computer, it operates on the same amount of electric power needed to light a 10 watt bulb. Your communication system is made up of 12 billion nerve cells which carry messages at nearly 300 km per hour. You can repair yourself when you become damaged and, when you are grown up and have a partner, you will be able to produce offspring.

Each of us is a finely tuned 'machine' with more parts than there are people in the Caribbean. And, after all this, you are still mainly water! You are a truly amazing living organism.

All living things are made up of tiny structures called cells

In Year 1, you learned that cells are the microscopic building blocks of all living things, including humans. They make up the skin, bones, muscles, nerves, heart, brain, kidneys, liver and every other part of your body. All your activities involve about 50 trillion cells of different shapes and sizes, all working together.

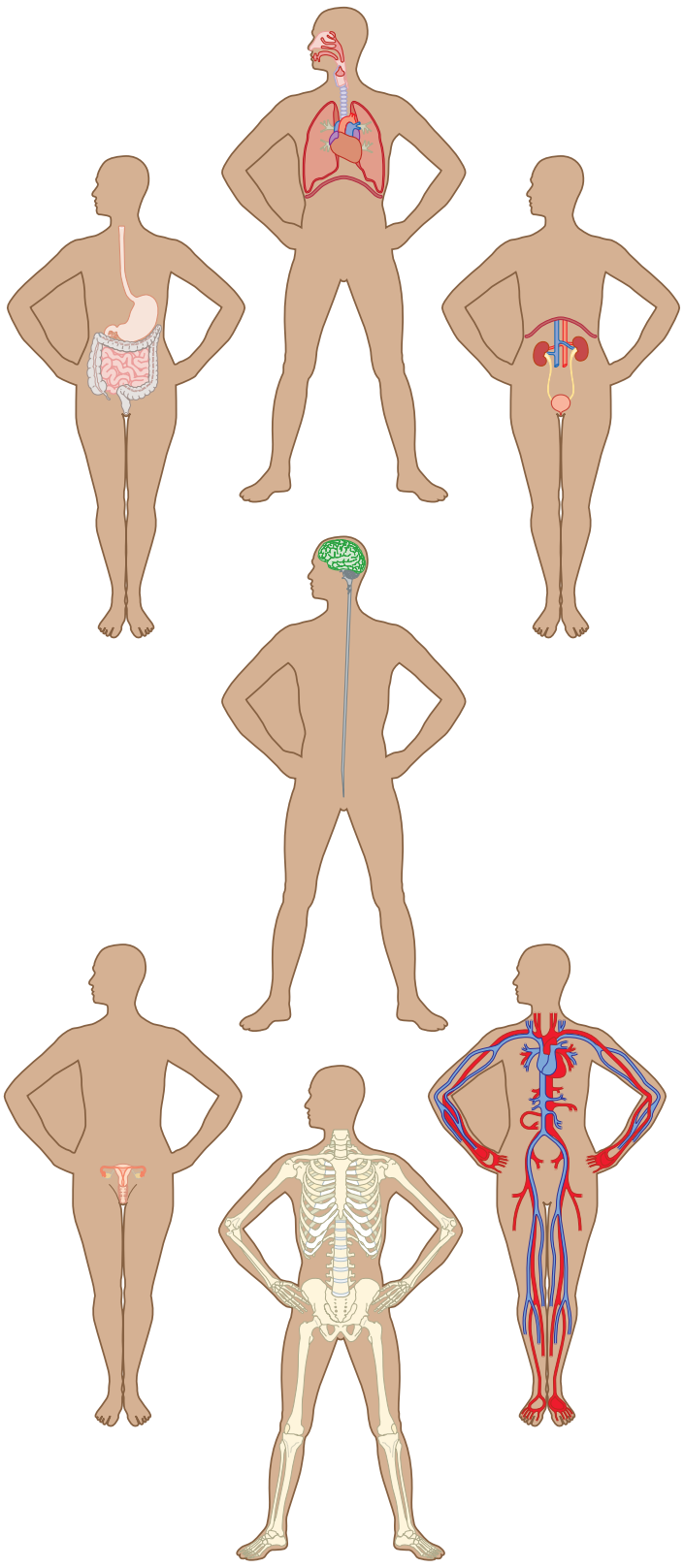
In Year 1, you also learned that, although all cells have the same basic structure, they vary in size and shape. Some cells are thinner than others, some are fatter than others, some are longer than others and

some are flatter than others. The reason cells vary in shape is because they have different jobs to do. Cells are **specialised** to carry out specific functions.

In the body, there are different levels of cell organisation. Cells of the same type which specialise in the same activity are usually found grouped together. A group of cells like this is called a **tissue**. The cells that line the inside of your stomach are specialised. They make special chemicals called enzymes which help you digest the food you eat. These cells make up one kind of tissue. But your stomach also contains other tissues. For example, there is a layer of muscle in the wall of your stomach which is made up of cells that can move. These cells form another type of tissue called muscle tissue. This tissue makes the wall of the stomach move in and out. This movement speeds up digestion by mixing the food with the stomach's enzymes.

All the tissues in the stomach work together, even though they each have their own special job to do. A group of different tissues like this makes up an **organ**. So the stomach is an organ. Other organs in the body include the heart, lungs, liver and kidneys.

The stomach is only one of the organs which help in the digestion of food. Some of the other organs involved include the tongue, the liver, the small intestine, the pancreas and large intestine. All these organs together make up a **system** called the digestive system. There are other systems in the body. The heart is part of the circulatory system, each kidney is part of the excretory system, the skull is part of the skeletal system, each lung is part of the respiratory system and the brain, eyes and ears are part of the nervous system.



The human body is a set of inter-connected organ systems that work together, and which are held together in a structural framework.

2

Different sense organs for different jobs

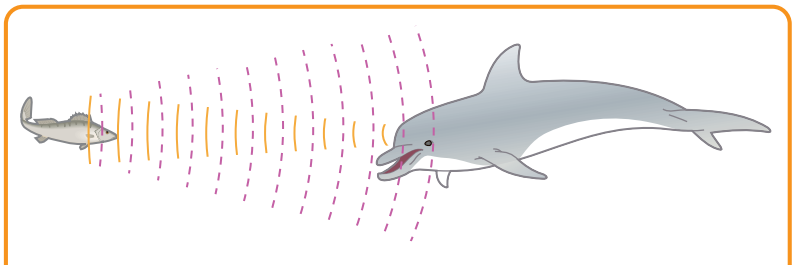
All animals are capable of sensing changes in their surroundings

It is important for animals to be able to pick up information about changes in their environment. A change in the environment is called a **stimulus**. A stimulus can be a change in light, sound, smell, touch, temperature, pressure or pain. Animals have **sense organs** to gather information about all these changes. Sense organs contain sensitive cells or **receptors**. Information received by these receptors is passed to the brain by means of nerves. Some animals, like humans, use a wide range of sense organs. Others rely mainly on only one or two sense organs to tell them about changes in the world about them.

Humans rely on five main sense organs to tell them about the world around them.

Whales and dolphins are highly sensitive to sound

Some animals rely mainly on hearing. Whales, porpoises and dolphins get most of the information from their surroundings by using their sense of hearing. They have their own special sonar system. They send out high-pitched sounds and listen to the echoes bouncing back. Dolphins use their sonar system to navigate and hunt for food.



A dolphin's sound receptors pick up the echoes of the sounds it makes when they bounce back off a group of fish in front of it. These echoes tell the dolphin the exact position of the fish and how far in front of it they are.

Some animals depend more on their nose

A dog's sense of smell is very much better than our sense of smell. Some dogs have such a well-developed sense of smell that they can detect one particle of a substance when it is mixed up in a million particles of air!

Policeman with his cadaver dog in search of possible bodies following Hurricane Katrina on Rhode Island.

Other animals depend mainly on sight

Predatory animals often use their eyes more than their other sense organs. The white hawk lives in forests in northern Trinidad. It has very keen eyesight which it uses to catch small animals including lizards and snakes. Its eyesight is so sharp that it can spot the smallest lizard on the forest floor, even when it is perched high up in a tree 30 m above the ground.

Some snakes can 'see' heat

The bushmaster snake lives in forests in Trinidad. It has small, heat-sensitive pits below its normal eyes which it uses to build up a heat picture of its surroundings. The bushmaster can 'see' the heat given off by small birds and mammals, even in complete darkness. At night-time, it can 'see' the heat image of a rat as easily as we can see it in bright daylight.

The bushmaster snake from Trinidad is a night hunter which can detect the heat being given off by other animals.

Oilbirds listen to their own echoes

During the day, the oilbird, or diablotin, rests in dark caves in some parts of Trinidad. But at night it flies out to feed in nearby forests. Even in the daytime, it is too dark in the caves for it to use its normal eyes. Instead, it finds its way around by means of its own sonar navigation system. It sends out clicking sounds and listens for their return echoes. Once it flies out to feed at night, it uses its big 'night-seeing' eyes to find its way about.

The oilbird, or diablotin, from Trinidad never sees daylight.