

PAPER WORLD

# HUMAN BODY

Take a  
closer look at  
the body – with  
40 flaps to  
lift!



*illustrated by*  
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# HEART & LUNGS

within the bones of the ribcage. The most important organs in the body – the organs of the respiratory system. These are actually two lungs. They are very close together, and you breathe through them. The lungs are made of many air-filled sacs, whose job is to bring oxygen into the body. Every living thing needs oxygen. As you breathe in oxygen, it makes a waste gas called carbon dioxide, which the lungs then remove. This in-out cycle is repeated 22,000 times a day!

organ at the top of the ribcage. The heart muscle is right around the heart. The heart never tires as it carries out its job day and night, beating around the clock.

**Ribs**  
There are 12 pairs of ribs in the ribcage. As you breathe, the ribcage expands by up to 5cm.



**Blood**  
Blood might look red, but it is actually made up of a mixture of different types of cells, all suspended in a yellowish fluid called plasma. Red blood cells carry oxygen. White blood cells fight disease. Platelets gather around cuts to form a clot. There are about 5 billion blood cells in one drop of blood!

**The airways**  
Air comes into the body through the mouth and nose, and travels down the windpipe, or trachea. The trachea is supported by cartilage rings to make sure it never collapses. Inside the chest, the pipe splits into two bronchi, then into smaller bronchioles.

If the lungs were laid flat they would cover an area the size of a tennis court!



**Diaphragm**  
The diaphragm is a special type of muscle that sits underneath the lungs. It helps the lungs to inflate and deflate during breathing.

# THE SENSES

Senses are the body's way of understanding what's happening in the world around us. They mean you can smell a beautiful flower, taste a delicious meal, hear music, see where you're walking and tell whether something is hard or soft. More importantly, the senses keep us safe. If you hear or see danger, you know to run away from it. If you touch something sharp, you can pull your hand away before it cuts you. And if you smell bad food, you know not to eat it!

The five main senses are sight, hearing, touch, taste and smell. The sensory organs of the eyes, ears, nose, tongue and skin send a constant flow of information to the brain for processing. But amazingly, around two-thirds of the information processed by the brain comes from the eyes alone!

## Eyes

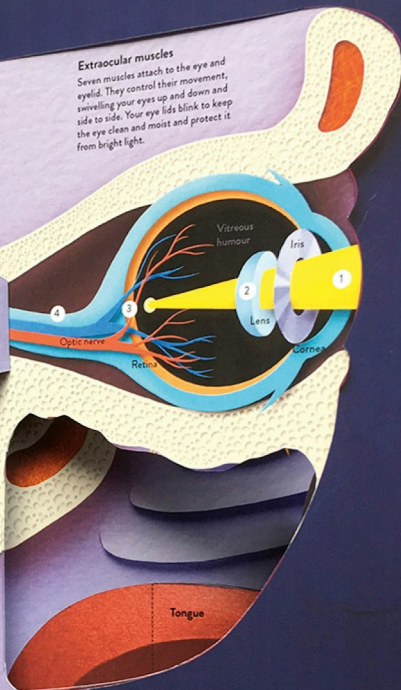
At the front of the eye are the parts you can see if you look in a mirror: the white sclera, the coloured iris and the dark pupil. A transparent dome called the cornea sits over the iris and pupil and focuses light as it enters the eye.

## How we see

Light passes into eye through the pupil (1). The lens focuses it (2) and projects an upside-down image onto the retina at the back of the eye (3). Light-detecting cells send messages down the optic nerve (4) to the brain, and the brain flips the image back to the right way around.

## Extraocular muscles

Seven muscles attach to the eye and eyelid. They control their movement, swivelling your eyes up and down and side to side. Your eye lids blink to keep the eye clean and moist and protect it from bright light.



## Touch

The skin all over your body contains tiny receptors, which detect touch and send signals to the brain. They can tell if something is hot, cold, soft, hard or painful. Some parts of the body – such as the fingertips – are more sensitive because they have more receptor cells.

# THE BRAIN

The brain is the control centre for the whole human body. It works round the clock, receiving signals and sending messages, and is responsible for every single thing you do, from walking and talking, down to digesting food and making the heart pump. The largest part of the brain is the wrinkled cerebrum, where all thoughts take place. It is divided into different areas, which control different functions.

Messages from the brain are sent to the rest of the body via the nervous system – a vast network that stretches through the body like electric cables. Billions of messages travel through the system every second, moving as tiny pulses of electricity.

## Cerebrum

The large wrinkly part of the brain is where all conscious thoughts take place: about movement, speaking, and feelings. It is wrinkled so that your big brain can fit inside your small skull. If you laid it out, it would be as big as a newspaper!

## Spinal cord

The spinal cord is like a telephone wire that messages travel along between the brain and the rest of the body. It runs all the way down the back, protected by the bones of the spine. Together the brain and spinal cord form the central nervous system. This part of the brain controls the movement of your muscles.

## Brainstem

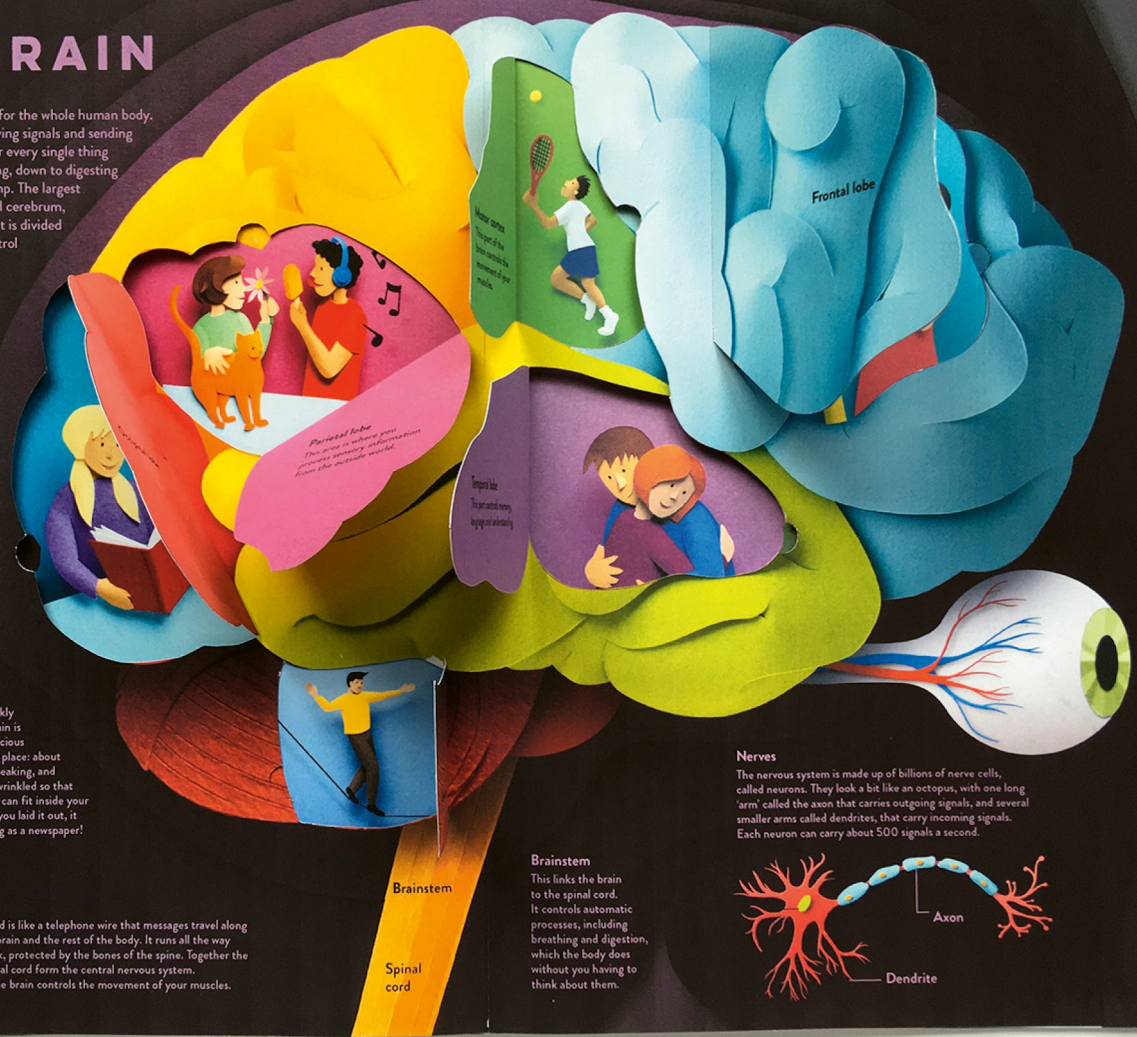
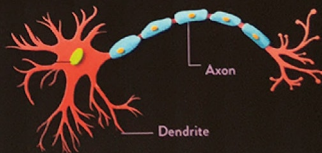
## Spinal cord

## Brainstem

This links the brain to the spinal cord. It controls automatic processes, including breathing and digestion, which the body does without you having to think about them.

## Nerves

The nervous system is made up of billions of nerve cells, called neurons. They look a bit like an octopus, with one long 'arm' called the axon that carries outgoing signals, and several smaller arms called dendrites, that carry incoming signals. Each neuron can carry about 500 signals a second.



Frontal lobe

Motor cortex  
Part of the  
cerebrum that  
controls our  
muscles.

Parietal lobe  
The part in which you  
process sensory information  
from the message world.

Temporal lobe  
The part of the brain  
responsible for hearing.

Cerebrum  
The large wrinkly part  
of the brain is where  
all conscious thoughts  
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Brainstem  
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to the spinal cord.

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Axon

Dendrite

# GROWTH OF A BABY

**The fertilized egg**  
Every single human life starts as one egg joined with one sperm. Once the egg is fertilized, a protective barrier stops any other sperm getting through.

Eggs and sperm contain all the information needed to grow a whole new life. The joined cells divide over and over again to make a ball-shaped clump, which fixes itself to the walls of the womb. The growing baby is now known as an embryo. By the time it is eight weeks old, it has all of its main body parts and looks like a tiny person. For the next seven months, it grows quickly and is known as a foetus.

A growing baby takes everything it needs from its mother, receiving nutrients and oxygen through the placenta. After 40 weeks of pregnancy, the mother gives birth. The walls of the uterus contract and the baby is pushed out. It is entirely dependent on its mother for warmth, food and care.

**Divide and conquer**  
The cell then rapidly divides, again and again. Then the berry-like cluster of cells called a blastocyst attaches to the lining of the uterus.

the  
the  
limbs  
form.

Blastocyst

4 weeks

**Embryo**

The tiny baby is called an embryo until it is around 8 weeks old.

8 weeks

20 weeks

**Checking in**

After about 6 weeks, a baby's heart can usually be detected. Doctors and midwives regularly check the heartbeat to monitor the health of the baby.

**Trimesters**

Pregnancy usually lasts for 9 months, sometimes divided into three periods called 'trimesters'. The first trimester is when all of the baby's main organs and limbs grow.

30 weeks

**Fully grown**

From 37 weeks, the baby is 'full-term' or 'fully-grown' and ready to be born.

37 weeks

40 weeks

**Pregnancy**  
A woman's body goes through many changes during pregnancy. Her breasts will swell, in preparation for feeding the baby with milk after birth. Her hips will slightly relax and widen to allow the passage of the baby during birth. She may also find things smell or taste different. Some women experience cravings for unusual foods!



**Growing up**

A human grows more in the first year of life than at any other time. Newborn babies are dependent on their parents for everything. They can only eat milk, and only communicate by crying.



**On the move**

By the time they are 6-9 months, most babies can crawl or roll. They will start to eat some solids. They will also be making some noises to communicate, and will recognise different adults.



**First steps**

By a year, some babies will be taking their first steps. They will be able to say words like 'mama' and 'dada' and use simple gestures, such as waving goodbye.