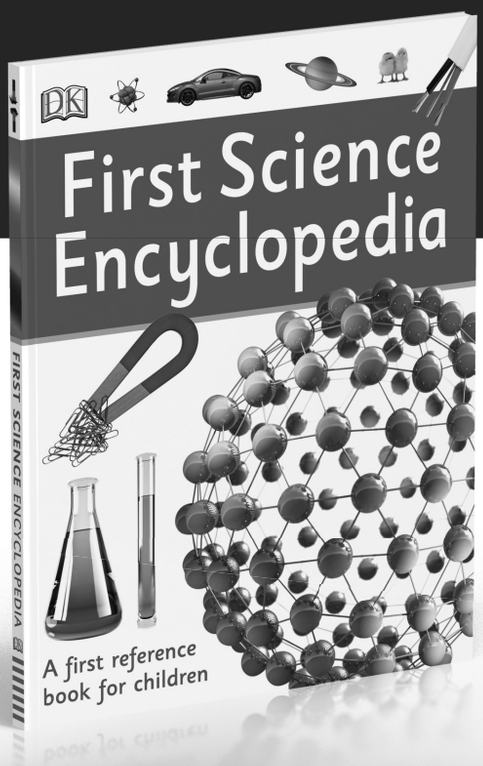
DK CURRICULUM RESOURCE:

SCIENCE!

FUN FACTS AND EXPERIMENTS



THE AIM

This Activity Pack can be used with children either at home or in the classroom. It includes five activities, one for each day of the week.

Children can dip in and out and complete as many activities as they like. The focus of the pack is for children to explore some of their favourite science topics – from the human body, the living world and physical materials, to forces and motion and earth and space.

There are lots of interesting, fun and educational activities and experiments to complete; it's time to GET SCIENTIFIC!

BOOKS INCLUDED IN THIS PACK

DK's *First Science Encyclopedia* is filled with fun science facts about many different subjects, from the human body and animals to facts about space and matter.

From the blood and breathing to rocks and minerals, kids will love getting to grips with this exciting encyclopedia.

Perfect for homework or just for fun, *First Science Encyclopedia* is the ideal starting place for young scientists *aged 7 - 9.*

SCIENCE DK CURRICULUM RESOURCE:

EDUCATIONAL OBJECTIVES & OUTCOMES

- **ACTIVITY 1: LIFE SCIENCE – INHERITANCE AND VARIATION**

  CURRICULUM LINKS: Identifying inherited characteristics in living things; understanding that variation occurs within offspring; understanding the difference between inherited and environmental characteristics.
  OUTCOMES: A completed Inheritance Profile; a list of inherited and environmental characteristics.

- **ACTIVITY 2: LIFE SCIENCE – HEART RATES**

  CURRICULUM LINKS: Understanding and describing the functions of the heart and blood; identifying that the heart rate increases with exercise; recording scientific results using description, drawings, diagrams and tables.
  OUTCOMES: A record of heart rates with exercise; a diagram of the heart with labels.

- **ACTIVITY 3: MATERIALS SCIENCE – PROPERTIES OF MATTER**

  CURRICULUM LINKS: Organising objects according to the material they are made from; describing materials according to their properties; recording and analysing results of a 'sink or float experiment'; creating a new invention with different materials.
  OUTCOMES: A list of materials and objects made from those materials; a description of the properties of materials; a record of results from an experiment; a 'planning sheet' for a new invention.

- **ACTIVITY 4: PHYSICAL SCIENCE – FORCES AND MOTION**

  CURRICULUM LINKS: Understanding and describing the functions of the heart and blood; identifying that the heart rate increases with exercise; recording scientific results using description, drawings, diagrams and tables.
  OUTCOMES: A record of heart rates with exercise; a diagram of the heart with labels.

- **ACTIVITY 5: EARTH AND SPACE SCIENCE – STARRY SKIES**

- **CURRICULUM LINKS:** Defining the different features of the solar system; creating an informative leaflet about the life cycle of a star; observing and creating an image of the night-sky.
  OUTCOMES: A leaflet about the life cycle of a star; drawings and crafted pictures of the night-sky.

ACTIVITY ONE:

LIFE SCIENCE – INHERITANCE

[Pages 32–33]

Note, for this activity, children need photos of themselves, their siblings and their parents or relatives. It might also be helpful to have pictures of their parents when they were the age the children are now.

DID YOU KNOW?

Your genes are a set of chemical instructions for building someone just like you. You inherit them from your parents, which is why you are like them in many ways. But unless you are a twin, your genes are unique. *[Page 32]* Look at any photographs of your parents. Discuss which characteristics you have inherited from your parents.

Do you share any characteristics with your siblings, or do they look different to you? Use the following categories as starting points:

- Eye colour
- Face shape
- Hair colour
- Ear lobes (attached or not)

GET SCIENTIFIC!

Copy and complete the Inheritance Profile on this page by inserting images and notes to show the things that you and any of your siblings have inherited from your parents.

PARENT 1

PARENT 2

OFFSPRING 1

OFFSPRING 2

INHERITED:

FINAL TASK

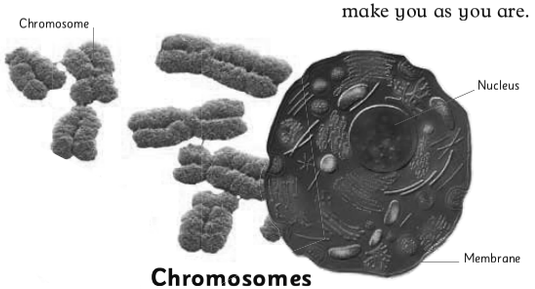
What are the differences or variations between you and your siblings? So far, you've added 'inherited' characteristics to your profile, but what about 'environmental' characteristics?
What could these be?

Inheritance

Your genes are a set of chemical instructions for building someone just like you. You inherit them from your parents, which is why you are like them in many ways. But unless you are a twin, your genes are unique.

Tiny cells

Cells are the building blocks that make up all living things. Each cell in your body contains a complete set of genes – the information to make you as you are.



Chromosomes

Your genes are organised into 46 chromosomes, arranged in 23 pairs. Genes and chromosomes are made from the chemical called DNA.

Amazing DNA

DNA is made of long molecules. Each molecule is made up of two parts joined together like a twisted rope ladder. DNA carries instructions on how to make cells work, and how different types of cells develop and join together to build a living thing, such as a plant or animal.

What is a gene?

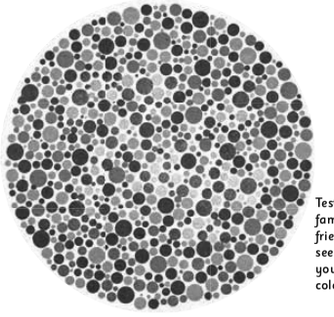
Every cell in your body contains a set of about 20,000 genes. All living things pass on their genes to their offspring. Sexual reproduction combines two sets of genes. You've got two of each gene, one from your mother and one from your father. Sometimes the gene from your mother comes into action, and other times your father's gene wins out.

You can only roll your tongue if the right genes are active.

What does DNA stand for?

Colour blindness

Some people have a gene which causes them to be colour blind. Look at the circle below. If you can see the number inside then you aren't colour blind.



Test your family and friends to see if anyone you know is colour blind.

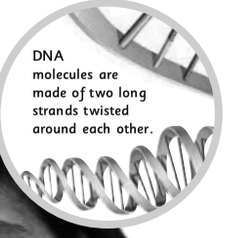
Seeing double

Identical twins share most of their genes. A quarter of these are mirror twins, which means that they are a mirror image of each other. For example, they might have an identical mole, but on the opposite arm to each other.

Who do you look like?

Children have a mixture of genes from their parents. This is why you might have your mum's eyes but your dad's smile!

The chromosomes of your father determine whether you will be a boy or a girl.



This child has inherited her hair and skin colour from her mother.

Deoxyribonucleic acid.

ACTIVITY TWO:

LIFE SCIENCE – HEART RATES

[Pages 36–37]

DID YOU KNOW?

Every time your heart beats, it pumps blood around your body. Half of the heart sends blood through your lungs. The other half sends blood around the rest of your body. *[Page 36]*

Our heart is a muscle which functions as a very powerful pump to transport blood around the body. It beats somewhere between 60 and 100 times a minute (B.P.M.), but can beat even faster than that if needed. The more you move and exercise, the higher your B.P.M.

Match the following exercises to the right heart rates. Explain your choices:

Walking slowly	105 B.P.M
Sleeping	67 B.P.M
Sprinting	140 B.P.M
Reading	120 B.P.M
Jogging	78 B.P.M.
Walking fast	95 B.P.M

GET SCIENTIFIC!

Find some space to get active! With a sibling, friend or family member, you need to record each other's heart rates when you do the following exercises:

	BEATS IN 10 SECONDS	MULTIPLY BY 6	BEATS PER MINUTE
RESTING			
JOGGING			
STAR JUMPS			
RESTING			

What pattern do you see?
Can you identify that heart rate increases or decreases with exercise?
Why do you think this happens?
What is the heart working harder to do?

Answers: Sleeping 67 B.P.M.; Reading 78 B.P.M.; Walking slowly 95 B.P.M.; Walking fast 105 B.P.M.; Jogging 120 B.P.M.; Sprinting 140 B.P.M.

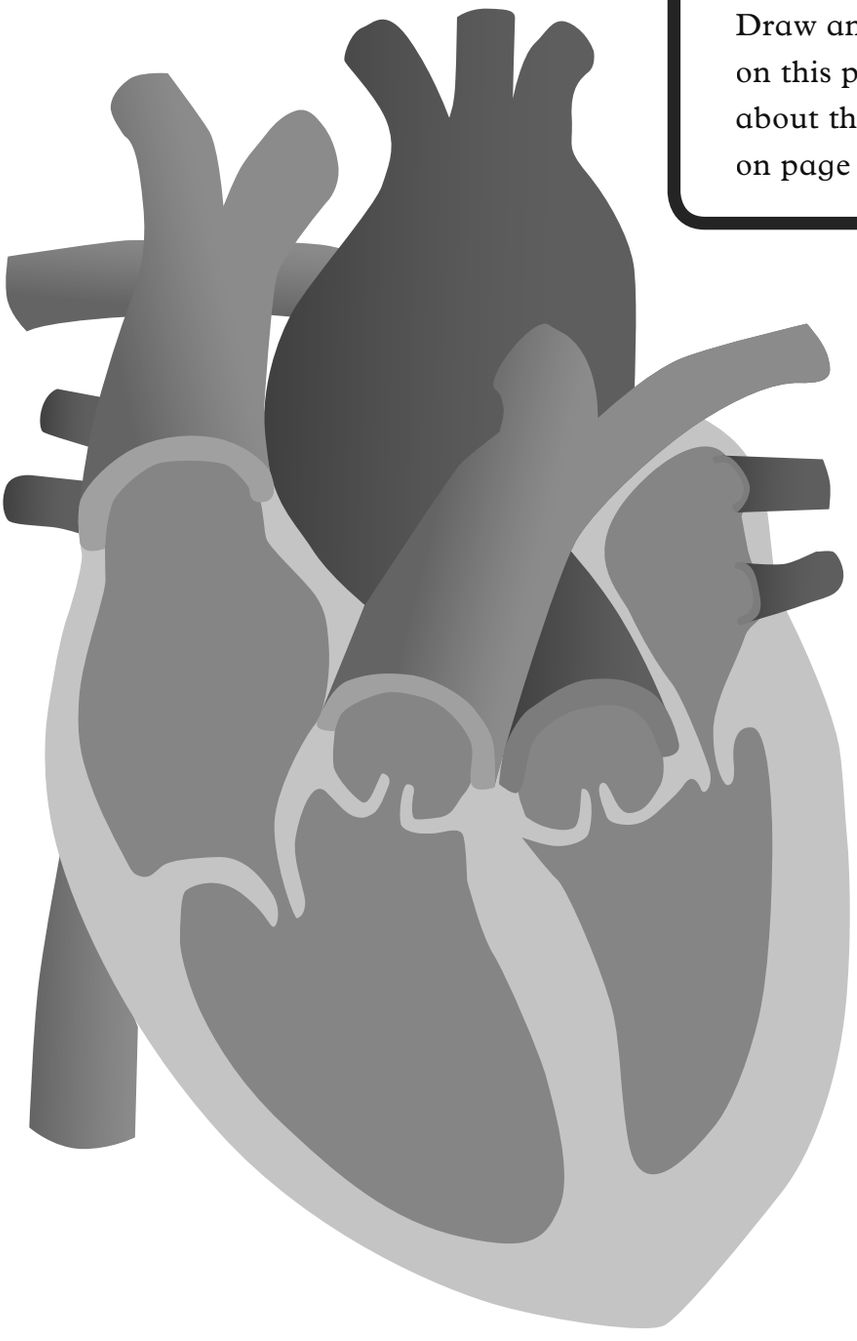
ACTIVITY TWO:

LIFE SCIENCE – HEART RATES

[Pages 36–37]

FINAL TASK

Draw and label the heart diagram on this page using what you know about the heart and the information on page 7 of this activity pack.



Use this list to help you!

- Right atrium
- Left atrium
- Oxygen-rich blood from the lungs
- Left ventricle
- Right ventricle
- Oxygen-poor blood from the body

Blood and breathing

Every few seconds you breathe in air. Inside your lungs, oxygen from the air passes into your blood, which then carries the oxygen all round your body.

Liquid of life

Blood is made up of three types of cells floating in plasma.

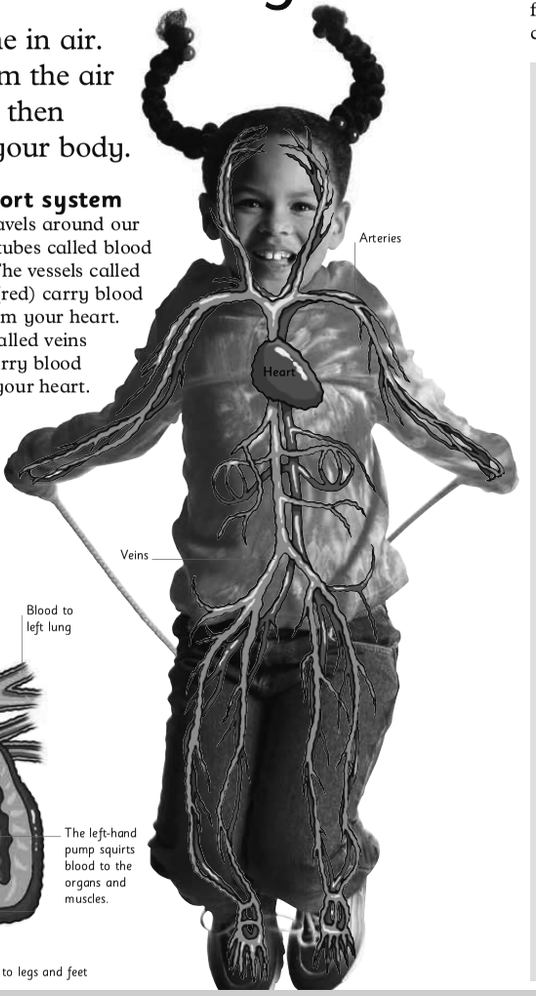
Red blood cells, the most common type of blood cell, carry oxygen.

White blood cells, which are part of the immune system, fight disease.

Platelets help to repair broken skin and blood vessels.

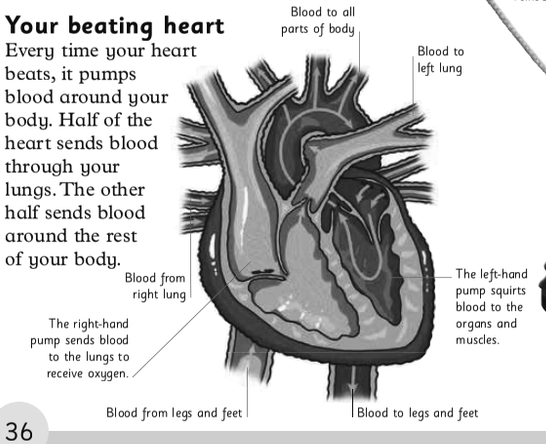
Transport system

Blood travels around our body in tubes called blood vessels. The vessels called arteries (red) carry blood away from your heart. Vessels called veins (blue) carry blood back to your heart.



Your beating heart

Every time your heart beats, it pumps blood around your body. Half of the heart sends blood through your lungs. The other half sends blood around the rest of your body.



Lungs

Your lungs fill most of the space inside your ribcage. They take in oxygen from the air and send out waste carbon dioxide.

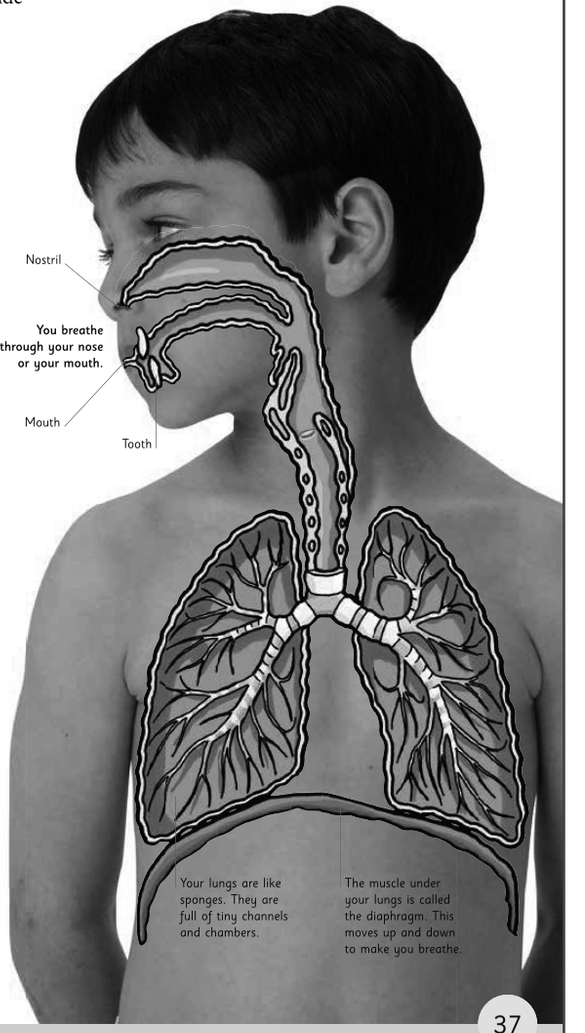
No lungs

Not every animal has lungs. There are other ways animals breathe.

Frogs can absorb oxygen through their skin – even underwater.

Insects such as caterpillars breathe through body openings called spiracles.

Many sea creatures such as sharks breathe through gills.



How many times does a child's heart beat every day?

A child's heart beats between 130,000 and 170,000 times a day.

ACTIVITY THREE:

MATERIALS SCIENCE – PROPERTIES OF MATTER

[Pages 54–55]

DID YOU KNOW?

Some materials are hard and brittle, while others are flexible. Some materials are colourful, while others are transparent. These kinds of features are called "properties". [Page 54]

Look at some of the materials listed below and match them to the object that they are suitable for making.

Metal	Envelopes
Plastic	Tables and Chairs
Wood	Windows
Glass	Knives and Forks
Leather	Shoes and Belts
Cotton	T-shirts
Paper	Water Bottles

Answers: Metal, Knives and Forks; Plastic, Water Bottles; Wood, Tables and Chairs; Glass, Windows; Leather, Shoes and Belts; Cotton, T-shirts; Paper, Envelopes.

Use the Wordbank below to help you describe each of the seven objects listed in the box on the left. For example: Shoes and Belts are bendy.

Soft Hard
Smooth
SQUASHABLE
Rough Weak
FRAGILE STRETCHY
STRONG
Dull TWISTABLE
SHINY THIN
Colourful
Reflective

ACTIVITY THREE:

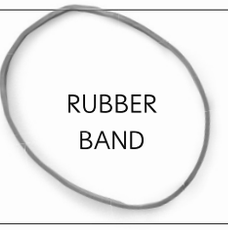
MATERIALS SCIENCE – PROPERTIES OF MATTER

[Pages 54–55]

GET SCIENTIFIC!

Have a guess: which of the materials listed on the previous page might sink in water? Which would float?

Carry out your own Sink or Float experiment at home with a parent/carer or sibling. Use a fairly deep bowl of water along with household objects like those listed on the sheet opposite. Add any of your own objects/materials. Make sure that you record your findings!

OBJECT	FLOAT	SINK
 COIN		
 PENCIL		
 COTTON BALL		
 CRAYON		
 RUBBER BAND		
 WOODEN STICK		

FINAL TASK

Imagine you've been asked to come up with a new invention! What are your ideas?

When you've come up with something, create a list of materials that you'd like to use in your own invention.

Make sure you explain why you'd like to use them and what purpose they serve! Complete a Planning Sheet to show your ideas.

Properties of matter

Main properties

There are many different properties of matter.

Boiling point is the hottest a liquid can get before becoming a gas.

Freezing point is the temperature at which a liquid becomes a solid.

Plasticity is how well a solid can be reshaped.

Conductivity is how well a material lets electricity or heat travel through it.

Malleability is how well a solid can be shaped without breaking.

Tensile strength is how much a material can stretch without breaking.

Flammability is how easily and quickly a substance will catch fire.

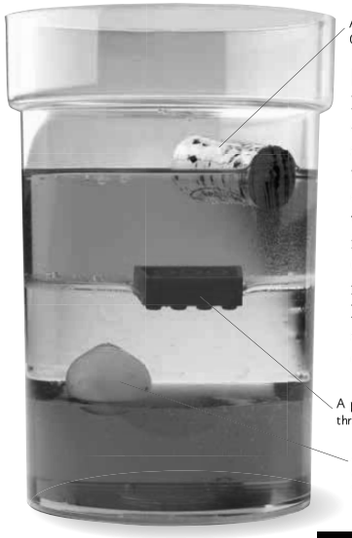
Reflectivity is how well a material reflects light. Water reflects well.

Transparency is how well a material will let light pass through it.

Flexibility is how easily a material can be bent.

Solubility is how well a substance will dissolve, such as salt in water.

Some materials are hard and brittle, while others are flexible. Some materials are colourful, while others are transparent. These kinds of features are called "properties".



Does it float?

It's easy to learn about some properties, such as the ability to float. The amount of matter in a certain volume of an object is called its density. Objects and liquids float on liquids of a higher density and sink through liquids of a lower density.

A good insulator

Heat cannot easily pass through some materials. These are known as insulators. For example, aerogel can completely block the heat of a flame. But don't try this at home!

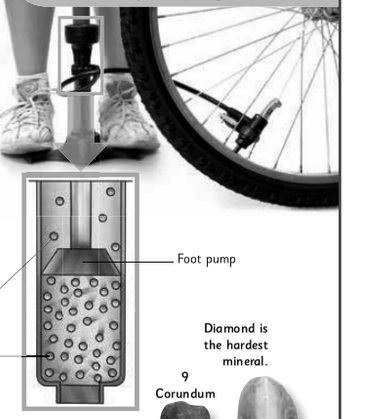
Broken glass

Brittleness

Some materials, such as window glass, are particularly brittle. They will break when pushed out of shape even a small amount.

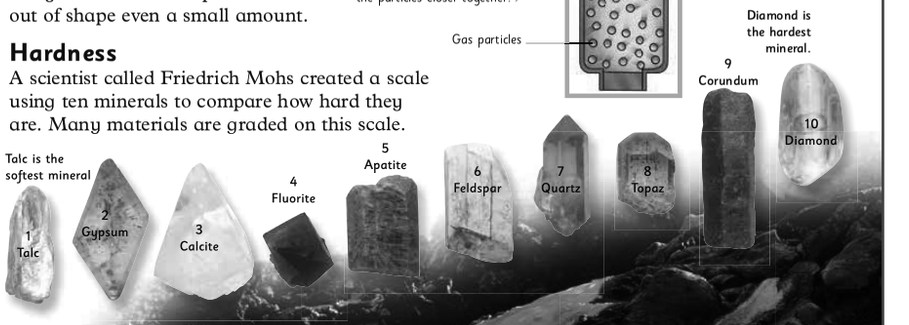
Compressibility

Gases can be squashed, or compressed, by squeezing more into the same space. This is what happens when you pump up a tyre.



Hardness

A scientist called Friedrich Mohs created a scale using ten minerals to compare how hard they are. Many materials are graded on this scale.



hands on

Collect some different pebbles and put them in order of hardness. A pebble is harder than another if it scratches it. This is how Mohs worked out his scale.

A smooth flow

Some liquids flow more easily than others. It depends on their "stickiness", or viscosity. Hot lava from a volcano flows slowly because it is sticky.

ACTIVITY FOUR:

PHYSICAL SCIENCE – FORCES AND MOTION

[Pages 90–91]

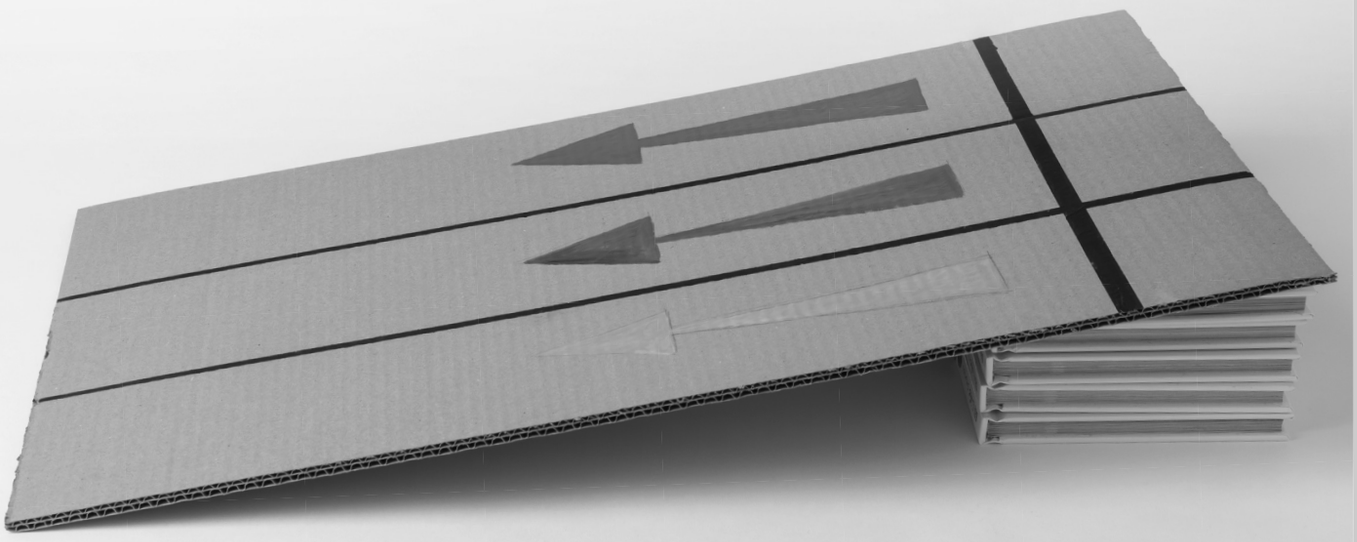
DID YOU KNOW?

It can be difficult to make an object move, but once it is moving, it will go on moving until something stops it. Force is needed to start something moving, make it move faster, and make it stop. [Page 90]

FIND OUT!

You are going to carry out a object-rolling experiment. You need to complete the five stages listed below. Make sure that you record your findings on the experiment sheet on the next page.

1. Make a ramp using five books and a plank of wood or other material.
2. Roll a ball or object down the ramp and measure how far it goes.
3. Consider how you can make it roll further without throwing it.
4. Try this again but **change the ball or object.** Try a different type of ball or another object that rolls, for example a tin of beans or another type of can or bottle. Which do you think will go further and why?
5. Try this again but **change the surface.** Try another smooth surface, as well as a rough surface like carpet. What changes do you see?



ACTIVITY FOUR:

PHYSICAL SCIENCE – FORCES AND MOTION

[Pages 90–91]

GET SCIENTIFIC!

Use an experiment sheet like the one below or create your own to record your results!

EQUIPMENT	WHAT I DID:
WHAT I FOUND OUT:	**A DRAWING OF MY EXPERIMENT:**

FINAL TASK

Read your experiment sheets to see what you have found. Can you describe the different stages of your experiment using some of the following words?

FORCES ACCELERATION
ENERGY **MASS** MOTION
SPEED KINETIC **DECREASE**
INCREASE **HEIGHT** DROP

Forces and motion

It can be difficult to make an object move, but once it is moving, it will go on moving until something stops it. Force is needed to start something moving, make it move faster, and make it stop.

Newton's laws of motion

In 1687, Isaac Newton presented three important rules that explain how forces make things move. They have become the foundation of physics and work for just about everything, from footballs to frogs.

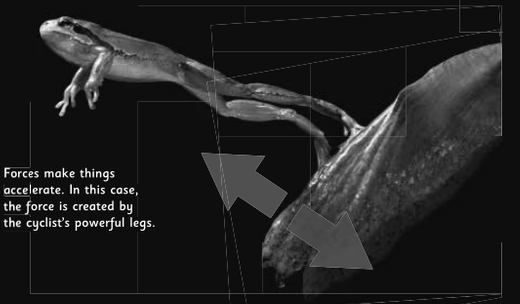
The football would stay still if the footballer didn't kick it.

Newton's first law

An object stays still, or keeps moving in a straight line at a constant speed, if it isn't being pushed or pulled by a force.

Newton's second law

The bigger the force and the lighter the object, the greater the acceleration. A professional cyclist with a lightweight bike will accelerate faster than a normal person cycling to work.



Forces make things accelerate. In this case, the force is created by the cyclist's powerful legs.

Newton's third law

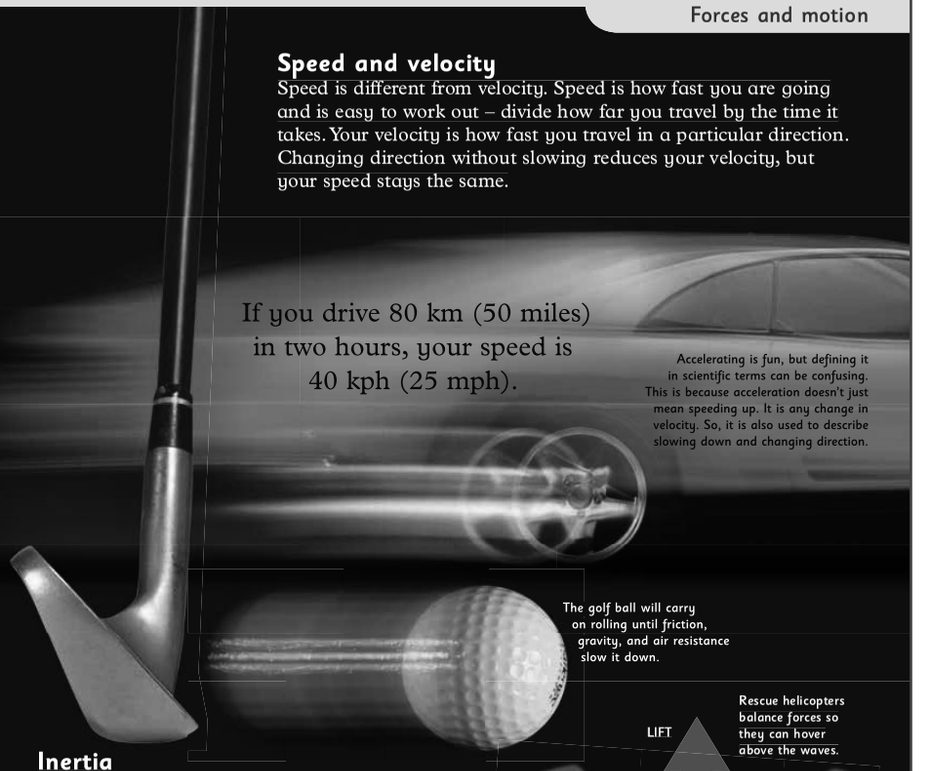
Every action has an equal and opposite reaction. The leaf moves away as the frog leaps in the opposite direction.

Speed and velocity

Speed is different from velocity. Speed is how fast you are going and is easy to work out – divide how far you travel by the time it takes. Your velocity is how fast you travel in a particular direction. Changing direction without slowing reduces your velocity, but your speed stays the same.

If you drive 80 km (50 miles) in two hours, your speed is 40 kph (25 mph).

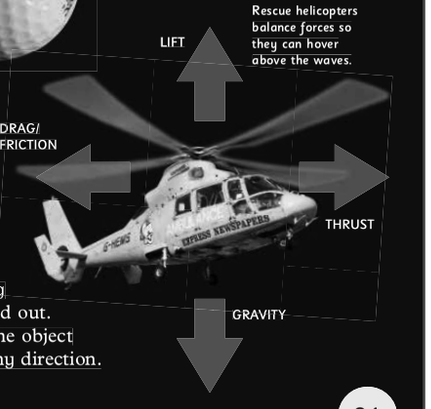
Accelerating is fun, but defining it in scientific terms can be confusing. This is because acceleration doesn't just mean speeding up. It is any change in velocity. So, it is also used to describe slowing down and changing direction.



The golf ball will carry on rolling until friction, gravity, and air resistance slow it down.

Inertia

When things are standing still or moving, they continue to remain in the state they are in (unless force is applied to them to change it). This tendency to be as they are is called inertia.



Rescue helicopters balance forces so they can hover above the waves.

Balanced forces

Forces act on objects all the time. Opposing forces can be balanced out. When this happens, the object won't be pushed in any direction.

ACTIVITY FIVE:

EARTH AND SPACE SCIENCE – STARRY SKIES

[Pages 96–97]

DID YOU KNOW?

There are many more stars in the Universe than there are grains of sand on all the beaches on the Earth. Many are far brighter than our Sun. *[Page 96]*

FIND OUT!

Can you match the following things in our universe to their definition?

Turn to page 15 in this pack to check your answers, using the extract from DK *First Science Encyclopedia.*

SUN	A MEDIUM-SIZED STAR THAT HAS STARTED TO RUN OUT OF FUEL
EARTH	A HUGE GLOWING BALL OF HOT GAS, MAINLY HYDROGEN AND HELIUM
STAR	THE STAR AROUND WHICH THE EARTH ORBITS
GRAVITY	THE PLANET ON WHICH WE LIVE (THE WORLD)
RED GIANT	A SYSTEM OF MILLIONS OR BILLIONS OF STARS HELD TOGETHER BY GRAVITY
GALAXY	THE FORCE THAT ATTRACTS A BODY TOWARDS THE CENTRE OF THE EARTH

GET SCIENTIFIC!

Create an informative leaflet entitled: *The Life Cycle of a Star*. In it, show the stages of a medium-sized star as it burns and eventually dies. There should be at least four stages – so you might want to fold your leaflet into four! Use diagrams and information from the text to help you create your leaflet.

FINAL TASK

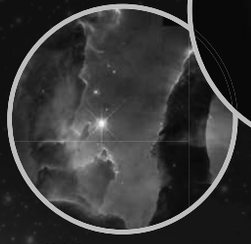
Make it your mission to look up at the stars in the night sky. Sketch what you see using pencil and paper. You might even turn your night-sky into a poster for your bedroom!

Starry skies

There are many more stars in the Universe than there are grains of sand on all the beaches on the Earth. Many are far brighter than our Sun.

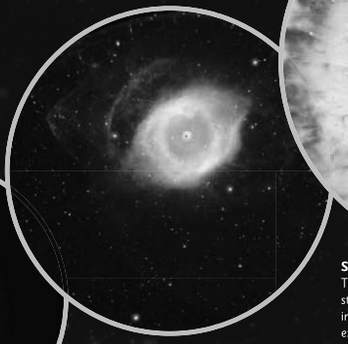
The lives of stars

The lives of stars begin inside thick clouds of gas in space, called nebulae.

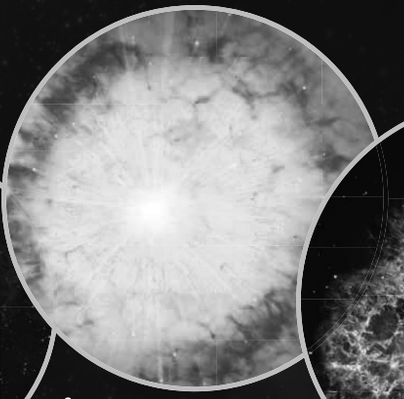


Nebulae
Gravity pulls together little knots of dust and gas inside the nebulae. Each one could become a star, as gravity squeezes it tighter and it becomes hotter.

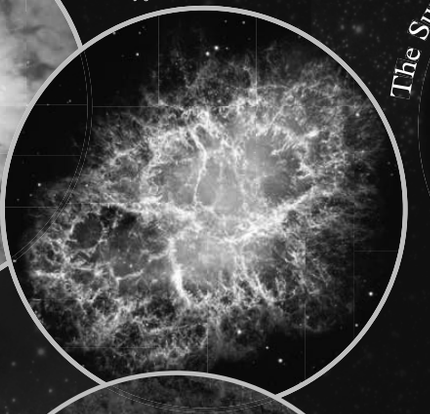
Red giants
Stars are fuelled by the gas hydrogen. They burn until the hydrogen starts to run out. Then they expand, forming a red giant star.



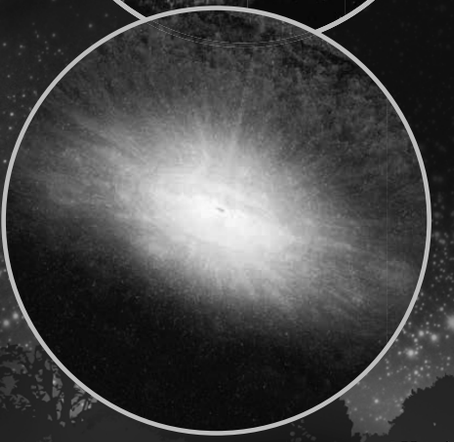
White dwarfs
The outer layers of the star are eventually thrown off into space. The cooling core is left behind. This is called a white dwarf. White dwarfs are no bigger than the Earth.



Supernovae
The most massive stars end their lives in huge supernovae explosions.



Remnants
The fragments of the star can remain glowing in space for hundreds of years.

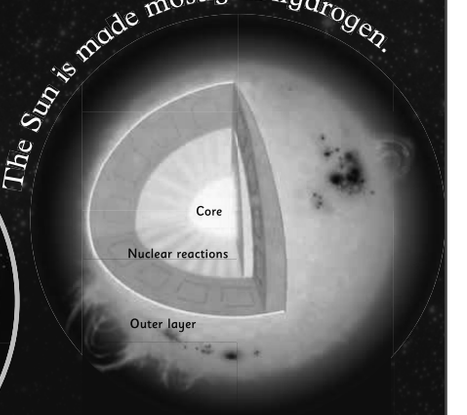


Black holes
When the biggest stars explode, most material is blown outwards. But the core is crushed and collapses to form a black hole.

Leave a camera shutter open for a few hours on a clear night, and you can see the stars leave trails as the Earth rotates.

Stars in motion

The position of the stars seems to change throughout the night. The stars are not really moving, though. It is the Earth that is turning beneath them.



Starshine

Our Sun is a star that is halfway through its life. In the life cycle, it sits between being formed within a nebula and becoming a red giant.

Shapes in the sky

Hundreds of years ago, people grouped stars that appear close together in the sky into shapes called constellations. They all have names – often related to their shapes. This is the Plough, in Ursa Major.

How many stars can you see on a clear, dark night?

About 2,000.