

## Animals, including humans, are fascinating!

In this thought-provoking eBook, find out the incredible secrets of how a variety of different animals get their meals. Read about ants who are farmers, velvet worms who squirt out slime and devious plants that capture insects.

Explore the nutrients that we need to stay healthy and learn how to understand the food labels you see on packaging. Find out about the different types of skeletons that animals have and discover how bones and muscles in the human body enable us to move.

# Healthy Eating, Bones and Bodies



Join Fizzer, Olivia, Murad, Jack and Cally as they venture into the unknown. Together, these five friends form the Discovery Squad - a dream team of learners.

During their travels, this inquisitive group could be joining different celebrations around the world, or taking a closer look inside the human heart! One day they might be transported back in time to when the ancient Egyptians ruled, while on the next they might voyage into the future to glimpse at incredible scientific discoveries that are yet to be made. They embark on each journey with many important questions and one thing is for certain: they always leave their destination with answers.



# Healthy Eating, Bones and Bodies



Twinkl Educational Publishing



The background of the page is a vibrant underwater scene. A scuba diver is shown in profile, swimming towards the left. He has a large silver oxygen tank on his back and is wearing a blue mask and snorkel. Below him, a bright orange fish with white spiky protrusions is swimming. The seabed is covered with various types of coral, including branching yellow corals and green brain corals. The water is a clear blue with some light rays filtering through.

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# Staying Alive

In this book, you will find out all about what makes a healthy diet for humans and other animals. You will also read about bones and muscles and learn how these help animals to move.

All animals need three basic things to stay alive:

## Water



Water is essential for animals to **survive**. Most animals can only live for a few days without water. 60-70% of many animals' bodies are made up of water. Water also helps animals to **digest** the food they eat. When an animal does not have enough water, they become **dehydrated**. Some animals live in water and many animals also use water to keep themselves clean.

## Air



Animals need oxygen, which is essential to stay alive. Humans and other animals that live on land take in oxygen as a gas from the air, by breathing.

## Food



Animals need food for many reasons. Food is needed for **energy**, to grow, to be strong and to be healthy. Animals are able to **survive** for longer without food than they can **survive** without water.



Some animals have **adapted** so that they are able to **survive** for longer periods without food. It has been proven that snakes can stay alive and even grow without food for two months. Some large crocodiles can live for over a year without eating!



## Food for Plants....

Plants also need food, water and air to stay alive, but they are able to make their own food. They use water, sunlight and carbon dioxide (a gas in the air) to produce food within their leaves.





# Food for Animals

Animals cannot produce their own food in the same way that plants can. They gather, hunt or grow their own food.

## Gather .....

Animals who eat plants can collect their food from their own environment.

For example, wild rabbits eat lots of grass and any vegetables that they can find too.



## Hunt .....

Animals who catch other animals to eat may hunt them by hiding and chasing their **prey**.

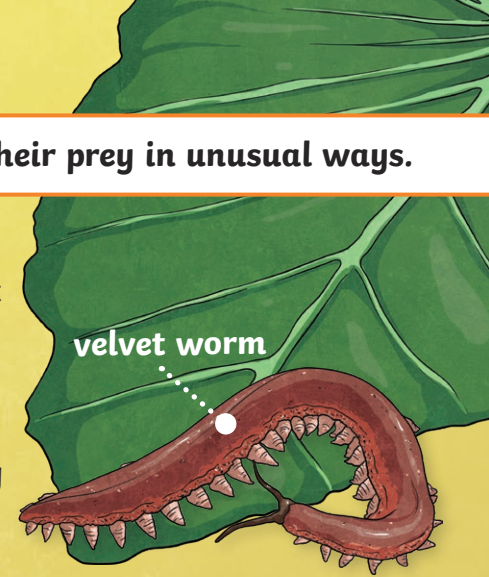


The lioness silently watches her **prey** before choosing the right moment to attack at incredible speed.



Some animals hunt their prey in unusual ways.

This is a velvet worm. They squirt a sticky slime out of their body to catch small insects. Once their **prey** is stuck in the slime, the velvet worm bites into it, covering its insides with saliva to make it easier for them to **digest**.



This is a hairy frogfish. The long part at the front of its head with what looks like worms dangling from it is called a lure and is used to tempt **prey** closer. When a smaller fish swims up to eat what it thinks are worms, the frogfish quickly sucks it in! Amazingly, should a frogfish have its lure bitten off, it will grow back again.

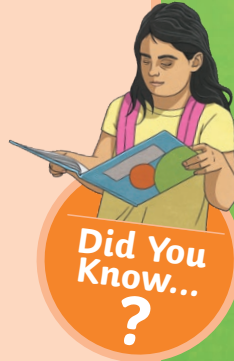




# Grow

## Humans grow their own food to eat.

During the earlier parts of the Stone Age, human beings used to be hunter-gatherers and they moved from place to place so that they could find enough suitable plants to eat and animals to hunt. However, during the Neolithic period, people started to farm their own animals and grow their own food. This allowed them to stay in one place.



Many people believe that humans are the only animals who can grow their own food. However, there are some incredible animals who also grow their own food.



Remarkably, some ants look after herds of aphids - just like how humans farm cows and sheep. The ants care for the aphids and, in return, the aphids provide food for them. Aphids **secrete** a special sugary liquid called 'honeydew' which ants feed upon. It is even believed that ants stroke the aphids when they want them to release some honeydew - similar to how farmers milk cows!



The marsh snail, which is found in the east coast of North America, farms its own fungus to eat! They use their rough tongues to cut the long cordgrass leaves that grow in the marsh, then wait for fungus to grow in the cuts before feasting on it.



Many people buy their food from shops nowadays, rather than growing, hunting or gathering their own. Lots of the food we buy travels from countries very far away. Because of this, people are becoming increasingly concerned about the environmental impact this has.





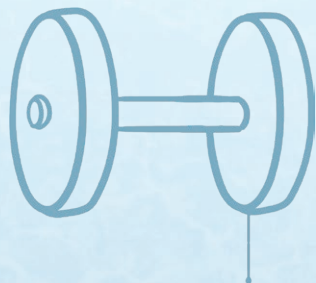
# Staying Healthy

What do we need to stay healthy?

a healthy diet



to be hygienic



exercise

## Why is Exercise Important?

Doing at least one hour of exercise per day has a hugely positive effect on your body. Exercise helps us to have better blood circulation, more **energy**, stronger bones and can make us feel happier too.

## Keeping Clean

Being hygienic (keeping clean) helps us to stay healthy by reducing the spread of germs. This helps to stop illnesses from spreading. We can try to be hygienic by regularly brushing our teeth, having baths or showers and wearing clean clothes. Washing our hands is also very important, particularly:

- after using the toilet;
- before and after preparing food or eating;
- after petting animals;
- after we sneeze, cough or blow our noses;
- before **and** after visiting someone who is unwell.

## How to Wash Your Hands

rinse  
with water



apply soap



rub hands  
together



rinse hands



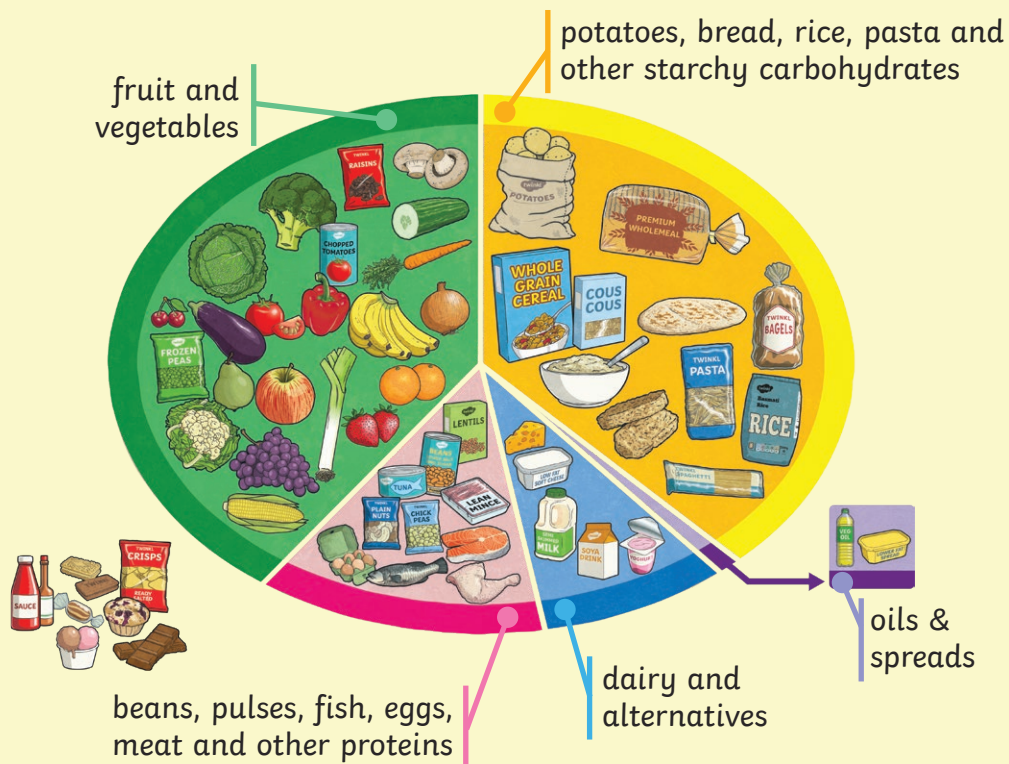
dry hands





# Food Groups

The food that humans eat can be sorted into five main food groups.



This is taken from the Eatwell Guide, which is a guide produced by the UK government to help people to understand what **proportion** of different foods they should eat as part of a healthy diet.

## Fruit and Vegetables

This section is green in the Eatwell Guide. Fruit and vegetables are very important for the body to stay healthy. You should eat a variety of at least five portions of fruit and vegetables every day. One portion is roughly about the size of your own hand and they can be eaten in meals or as snacks.

half of  
an avocado

1 handful of  
carrot sticks

1 medium apple

2 broccoli florets

## Potatoes, Bread, Rice and Pasta

This section is yellow in the Eatwell Guide. These foods are a good **source** of **energy** for the body. To make healthier choices, choose foods in this section which are made from wholegrain and which do not have added fat, salt or sugar.





## Dairy and Alternatives

This section is blue on the Eatwell Guide. Foods in this section contain a mineral called calcium which helps keep your bones and teeth strong. Try to choose foods which are not too high in fat and sugar from this section.



Some people cannot eat certain foods because they have **allergies** to particular foods. Some people do not eat some meats due to their religious beliefs.

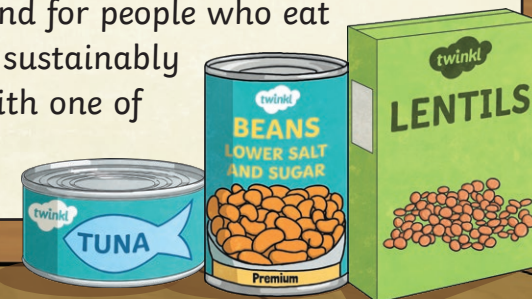
## Oil and Spreads

This section is purple on the Eatwell Guide and it is a very thin section of the whole circle. This shows the small amounts of these foods that we should eat in comparison to other groups. However, these foods do help the body to **absorb** important vitamins.



## Beans, Fish, Eggs, Meat and Pulses

This section is pink on the Eatwell Guide. Foods in this section help the body to grow. People can get protein from different **sources**. Some people do not eat any meat (vegetarians) and some people only eat certain types of meat. Some people (vegans) do not eat any animal products at all, including eggs and dairy. Good protein **sources** for vegetarians and vegans include lentils, peas and beans. The Eatwell Guide advises people to not eat too much **red meat** or **processed meat** and for people who eat fish to eat two portions of sustainably **sourced** fish each week, with one of these being oily.



## Foods That Are High in Sugar and Fat

These foods are grouped outside of the circle. This is because these foods, unlike the other food groups, do not contain many things to help us to stay healthy. Sugar and fat are less nutritious (in large amounts) than many foods in other groups, so should be eaten less often and in smaller amounts.



# Nutrients

Nutrients are substances found in food. Animals need them to stay alive and stay healthy. There are seven nutrients, which can help our bodies in different ways.

## Carbohydrates



provide energy

helps growth and repair

## Protein



helps digestion

## Fibre



## Fats



provide energy

keep you healthy

## Vitamins



keep you healthy

## Minerals

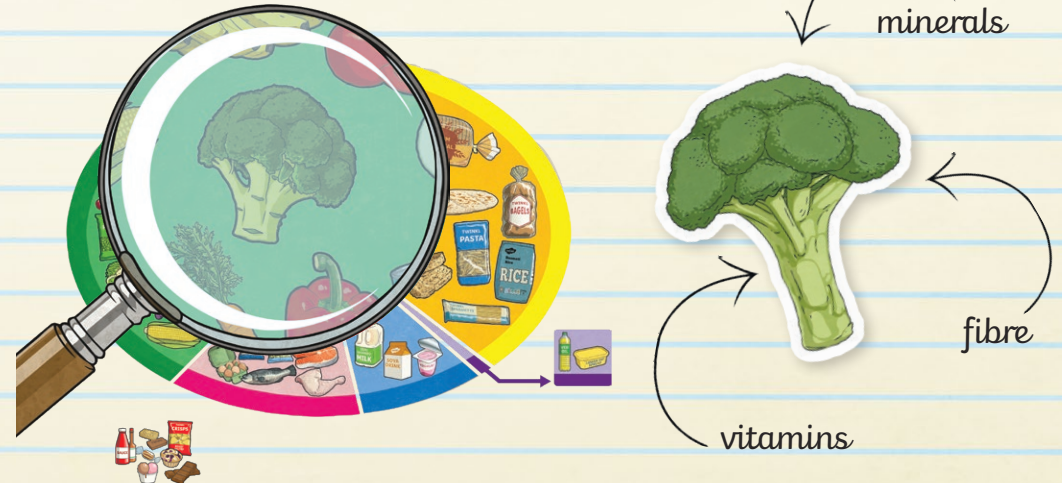


## Water



moves nutrients around your body and helps to get rid of waste

Within each food group, there are many foods which contain more than one type of nutrient.



For example, eating broccoli gives lots of health rewards. It is a great **source** of minerals (especially a mineral called potassium), an excellent **source** of vitamins and it provides the body with fibre.



# Carbohydrates

## SHOPPING LIST

Carbohydrates give our bodies **energy**. Foods that are a good **source** of carbohydrates include:

bread  
pasta  
oats  
cereal  
potatoes  
rice  
couscous  
chickpeas  
crackers  
sweet potatoes  
corn on the cob  
bananas

# Protein

## SHOPPING LIST

Protein helps our bodies to grow and repair themselves. Foods that are high in protein include:

meat  
fish  
beans  
lentils  
milk  
yoghurt  
eggs  
tofu  
chickpeas  
nuts  
sunflower seeds  
peas

# Fats

Fats give our bodies **energy**. Foods that are high in fat include:



oils

nuts

cheese

avocado

butter

As well as providing **energy**, fats also help the body to **absorb** important vitamins. The Eatwell Guide advises people to cut down on the amount of fat they eat and to choose foods that have more unsaturated fats than saturated fats.

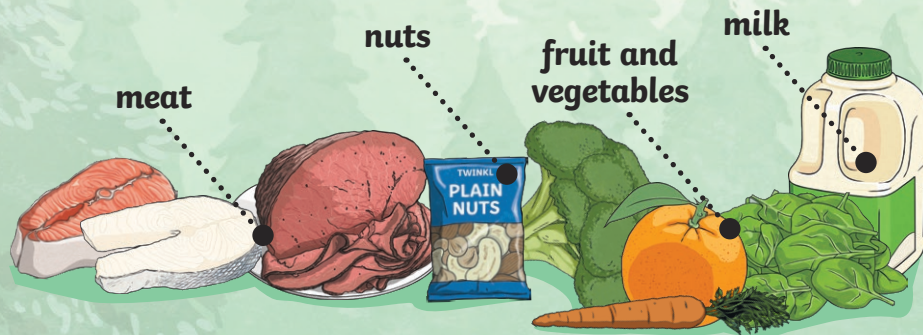
Type of Fat	Definition	Found in...
<b>saturated fats</b>	types of fats considered to be less healthy which should only be eaten in small amounts	sausages, bacon, cheese, ice cream, cakes, biscuits, chocolate
<b>unsaturated fats</b>	fats which give you <b>energy</b> , vitamins and minerals	oily fish, olive oil, nuts, avocados, seeds, peanut butter



## Vitamins .....

Vitamins help to fight infection and keep our skin, blood and bones healthy.

Foods high in vitamins include:



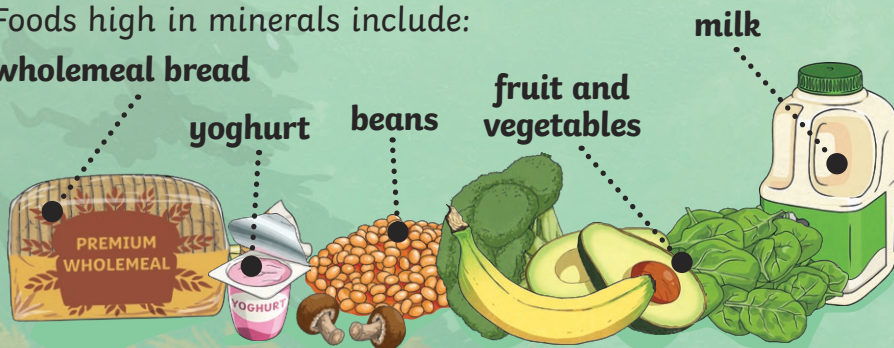
Most people and older children should be able to get all the vitamins they need from the food that they eat if they have a healthy, balanced diet. However, younger children and babies might take extra vitamins in the form of tablets.

## Minerals .....

Minerals keep your body healthy.

Foods high in minerals include:

**wholemeal bread**



Some examples of minerals which our bodies need include calcium, iron, magnesium, potassium and zinc.

## Water .....

Water helps to move nutrients in your body and get rid of waste that you don't need.

It is very important to drink plenty of water, as it is an essential nutrient for **survival**. Remember - many foods contain water too. Foods high in water include:



The Eatwell Guide advises that people drink 6-8 glasses of liquid each day. Although water is the healthiest choice, low-fat milk, sugar-free drinks and tea and coffee can count towards the 6-8 glasses of liquid a day. It is advised that people drink no more than 150ml of fruit juice or smoothie each day as these contain lots of sugar.

**Have you been drinking lots of water today?**





## Fibre .....

Fibre helps you to digest the food that you have eaten.

Foods high in fibre include:



Fibre is found in foods that come from plants. It helps food to move out of the body by bulking up **stools** so that they move well through the **bowel**. Fibre also helps to make **stools** soft which prevents **constipation**.



Most people do not eat enough fibre. Adults should eat **30g** of fibre daily and children aged 5-11 should eat **20g** of fibre every day. Eating plenty of vegetables and fruit with edible skins, as well as wholegrain cereals and bread, can help us to get enough fibre.

Did You Know...  
?

## A Balanced Meal .....

The Eatwell Guide shows us how much of each of the different food groups we should include in our diets, so that we get all of the nutrients that our bodies need.

Here is a jacket potato topped with tuna, cannellini beans and peppers and served with a side salad.



Here are the main food groups that each of the ingredients in this meal belongs to and the main nutrients that they contain:

Food	Main Food Group	Nutrients
<b>Jacket potato</b>	Potatoes, Bread, Rice and Pasta	Carbohydrates, fibre, minerals
<b>Tuna</b>	Beans, Fish, Eggs, Meat and Pulses	Protein, unsaturated fat and minerals
<b>Cannellini beans</b>	Beans, Fish, Eggs, Meat and Pulses	Protein, vitamins, minerals
<b>Vegetables</b>	Fruit and Vegetables	Vitamins and minerals



# Animal Diets

The Eatwell Guide does not apply to animals other than human beings.

Some animals need to eat more of certain nutrients than others.

Animals can be grouped by the type of diet they have.

## Herbivores

These animals only eat plants.



## Carnivores

These animals feed on other animals.



## Omnivores

These animals eat both meat and plants.



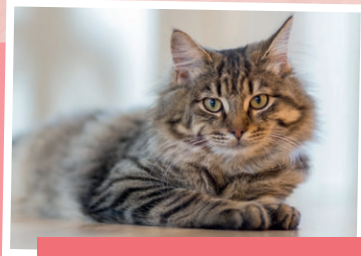
The **proportions** of nutrients an animal needs relates to whether it is a carnivore, herbivore or omnivore. However, the amounts of nutrients needed each day by different species varies a lot.



## Carnivores .....

Carnivores eat lots of meat so they get lots of their **energy** from protein. Their bodies are designed for this. Meat also provides them with vitamins, minerals and fats.

Cats only eat meat in the wild, so it is important that cats are given protein from a meat **source** when they are kept as pets. As cats get older, they need even more protein in their diet to stay healthy.



What other pets might need to get their proteins from a meat source?

Some carnivores are **predators** and they have **evolved** to hunt for food by killing other animals. Other carnivores are **scavengers**. **Scavengers** do not hunt for food but instead they eat animals they find that are already dead.



Vultures are an example of an animal that **scavenges**. They have a strong sense of smell so they are able to easily detect dead animals in their environment. They also have very good eyesight, so they can spot their meals from high in the sky.

There are some plants which are carnivorous too.



A Venus flytrap is a fascinating plant. It can make its own food in the same way that other plants can but it also gains some nutrients by catching and **digesting** insects! Hairs inside its leaves detect when an insect has landed on it. This causes the leaves to clamp shut with the insect still inside.



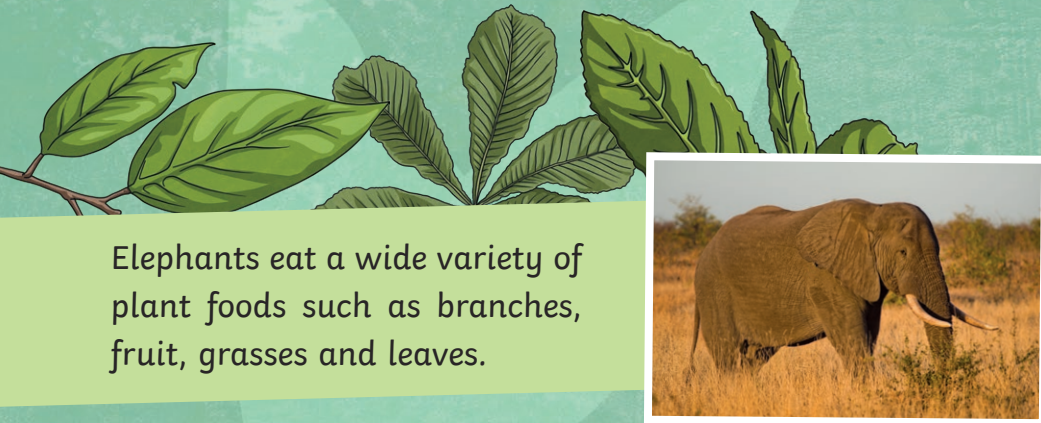
Another **carnivorous** plant is the nepenthes. Some leaves of this plant are shaped like long cups. The cups have sweet-smelling liquid at the bottom that attracts insects. Once they fly in, the insects become trapped and the movement they make prompts the plant to release liquids that help to **digest** the insect. Some species of this plant are so big that they have even **digested** mice or frogs!



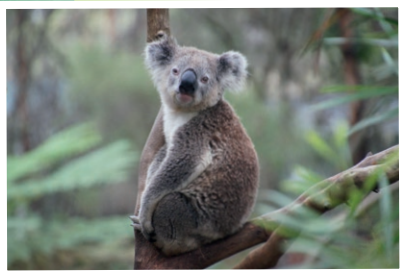


## Herbivores .....

Herbivores get their **energy** from eating plants. As plants are often not high in carbohydrates, protein and fats, herbivores have to eat large amounts of plant-based foods to get the **energy** they need. Some herbivores spend a lot of their day eating.



Elephants eat a wide variety of plant foods such as branches, fruit, grasses and leaves.



Koalas, on the other hand, only eat eucalyptus tree leaves. These leaves do not provide high levels of **energy** for these animals but as koalas sleep for twenty hours a day, they need less **energy** than other animals.

## Omnivores .....

Omnivores get their nutrients from both meat and plants, so can be more flexible in what they eat, often only eating what is available. For example, a brown bear will eat fish when it can catch them, but it will also pick berries to eat if they are available. Even panda bears, which eat bamboo for most of their day, occasionally eat rats or birds.



A red fox's body is designed to gather nutrients from both plants and meat. However, they mainly eat animals such as mice, birds and frogs, occasionally eating berries and other fruits.



Did You Know...  
?

Bears, such as brown bears and pandas, are omnivores. If you are wondering why koalas are herbivores, it's because koalas are not actually bears! Although people call them 'koala bears', they are actually **marsupials** and not part of the bear family.



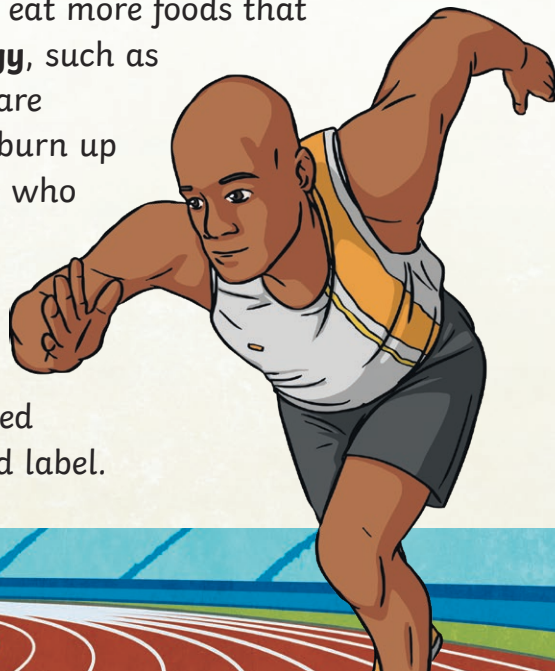


# Nutrients for Humans

Humans are all omnivores. Our bodies have **evolved** in a way that means that we can get all the nutrients we need from both meat and plants. However, as we have learnt, some people do not eat meat. This is known as being vegetarian, rather than being a herbivore, because all people could **survive** on a diet of both meat and plants if they chose to.

All people, whether they are meat-eaters, vegetarians or vegans or have special dietary requirements such as **allergies**, need to make sure that they eat a healthy, balanced diet with the right amounts of nutrients.

Some athletes may need to eat more foods that provide high levels of **energy**, such as carbohydrates, when they are training because they will burn up more **energy** than someone who is less active. The **energy** provided by foods is measured in kilojoules (kJ) or kilocalories (kcal). The **energy** provided by packaged food is displayed on its food label.



# Food Labels

Food labels can help to guide people's dietary choices. Labels on food packaging show whether foods contain a high, low or medium amount of each particular food type. The colour green shows a low amount of that food type, red shows a high amount and orange is used to show a medium amount.

Per 100g serving:

Energy	Fat (total)	Saturated Fat	Sugars	Salt
189kJ 45kcal	0.4g	0.1g	9g	Trace

Blueberries



Food types that should not be eaten too often or in large quantities, such as saturated fats, will have more red labels. Eating too much saturated fat can be harmful, so clear food labels like these can help to guide people to limit foods with high amounts of saturated fats.



Eating too much salt and too much sugar is bad for our health so food labels also show if a food is high or low in these things using the same green, red and yellow labels.





## Looking at Labels .....

The more green sections you see on a food label, the more nutritious a choice it is because it contains less of the food types that should be limited.

Low
  Medium
  High

This label is for some croissants and shows the values per 100g (one serving) of croissants. Serving sizes for different foods vary, so some labels may also show how much of each food type is in a smaller or larger amount than 100g.

Per 100g serving:

Energy	Fat (total)	Saturated Fat	Sugars	Salt
1798kJ 430kcal	24g	15g	5g	1g

100g of croissants contains **24g** of fat in total and of that, **15g** is saturated fat.

Looking at the food label above, do you think that croissants should be eaten in large quantities and regularly? Why?

Food packaging also lists a food's ingredients alongside information about common ingredients that people may have **allergies** to. This is very important to help people with allergies to avoid foods that could be harmful to them.

Did You Know...?

Here is an example of nutritional information which might be shown on a food label. This is from a loaf of wholemeal bread.

Per 100g of bread:

**Energy** 934kJ/221kcal  
**Fat (total)** 2g  
**Saturated Fat** 0.5g  
**Carbohydrates** 38g  
**Fibre** 7g  
**Protein** 1g  
**Salt** 1g  
**Vitamin B1** 0.23mg

Which nutrients is this wholemeal bread high in? Which is it low in?

**PREMIUM  
WHOLEMEAL**

Look at some food packaging yourself. What information can you see? Are you surprised by anything?



# Vertebrates and Invertebrates

Just as animals have different dietary needs, they also have different skeletons. Animals can be sorted into two main groups depending on the structure of their skeletons.

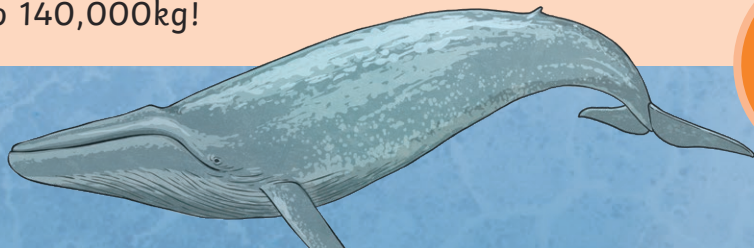
## Vertebrates .....

Vertebrates have a backbone, which is a series of bones that run from the back of an animal's head to the bottom of their back. It is sometimes called a spine, a spinal column or a vertebral column.



Mammals, reptiles, amphibians, birds and fish are all vertebrates.

The largest vertebrate (and the largest animal) to ever live on Earth is the blue whale, which can grow up to almost 30m long and weigh up to 140,000kg!



## Invertebrates .....

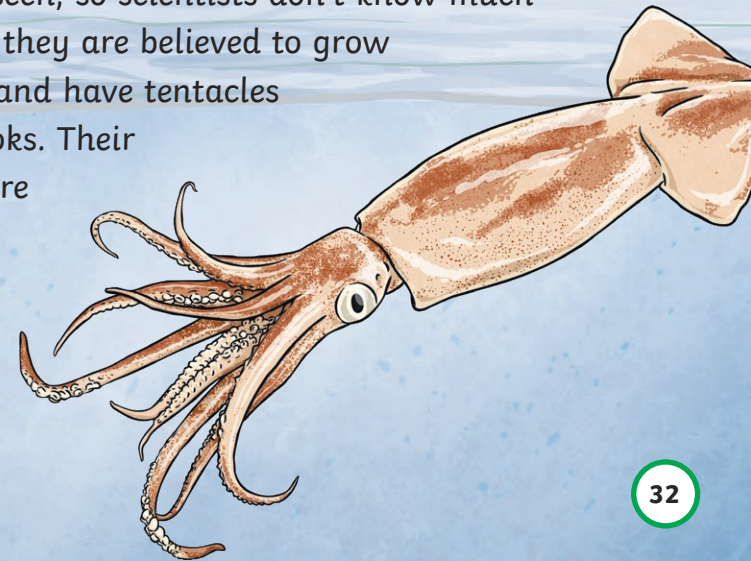
Invertebrates are animals that do not have a backbone.



Examples of animal groups which are invertebrates include molluscs (e.g. slugs and octopuses) and arthropods (e.g. insects and spiders).

There are many more invertebrates in the world than vertebrates. Only about 3% of all animals are vertebrates. This is partly because invertebrates are usually a lot smaller.

The largest invertebrate on Earth is the colossal squid, which lives in the dark depths of the Antarctic Ocean. They are rarely seen, so scientists don't know much about them, but they are believed to grow up to 15m long and have tentacles covered with hooks. Their eyes each measure around 27cm in diameter - about the size of a football!



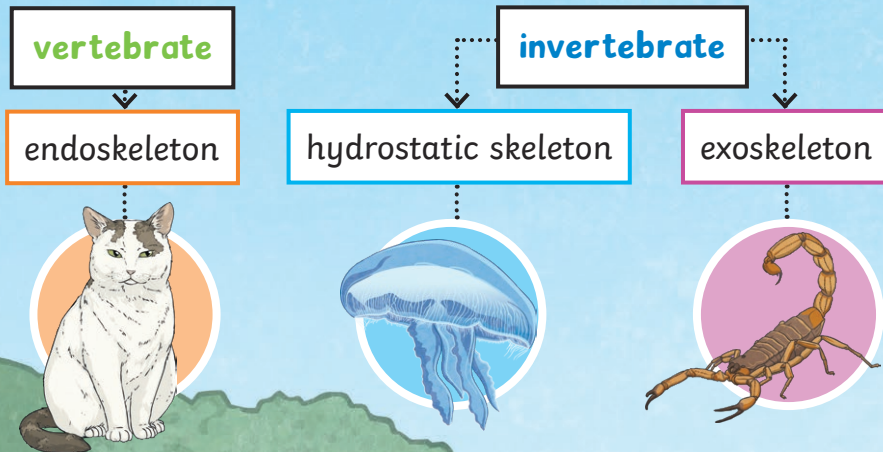


# Types of Skeletons .....

Skeletons are structures of bones or other substances. They do three important jobs:

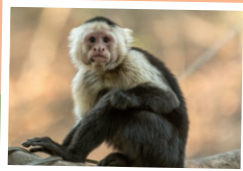
- protect **organs** inside the body;
- allow movement;
- support the body and stop it from falling.

Different animals have different kinds of skeletons.



## Endoskeletons

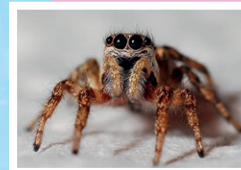
Vertebrates all have an endoskeleton, which is a framework of bones inside the body that grows as the animal grows.



Invertebrates have either one of these two types of skeletons:

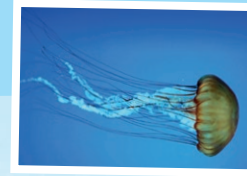
## Exoskeletons

Exoskeletons are support structures which are on the outside of animals. Animals with exoskeletons have a hard covering and are soft on the inside.



## Hydrostatic Skeletons

Hydrostatic skeletons don't have any bones or stiff structures to support them. Instead, these animals have a fluid-filled compartment in their body called a **coelom**.



Did You Know...  
?

An octopus is an invertebrate with a hydrostatic skeleton. Octopuses are very intelligent, particularly compared to other invertebrates. Some have even been seen cleaning, carrying and stacking coconut shells to build their own shelters!



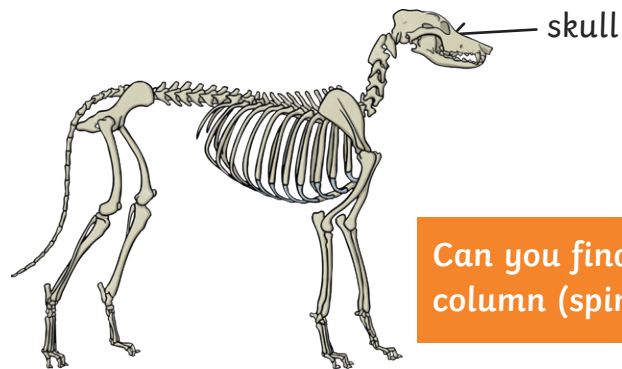


# Endoskeletons .....

All animals with a backbone (vertebrates) have endoskeletons. Endoskeletons grow inside the body as the animals grows and are permanent. Examples of animals with endoskeletons are cats, fish, snakes, giraffes and mice.

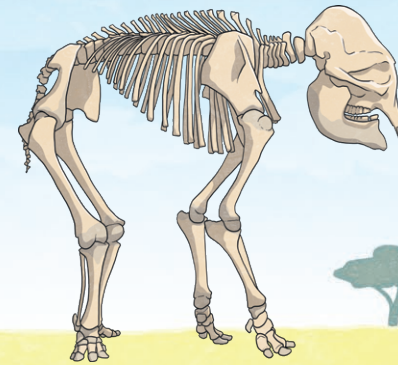


## The endoskeleton of a dog.



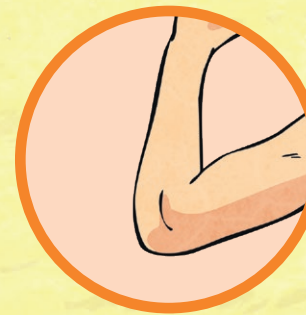
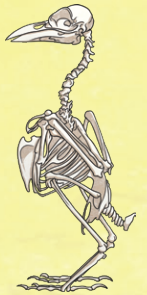
Endoskeletons are specially designed to protect important **organs** in the body. Which important **organ** do you think this dog's skull protects?

Can you point to another part of the dog's skeleton which is designed to protect important **organs**? Which **organs** do you think these might be?

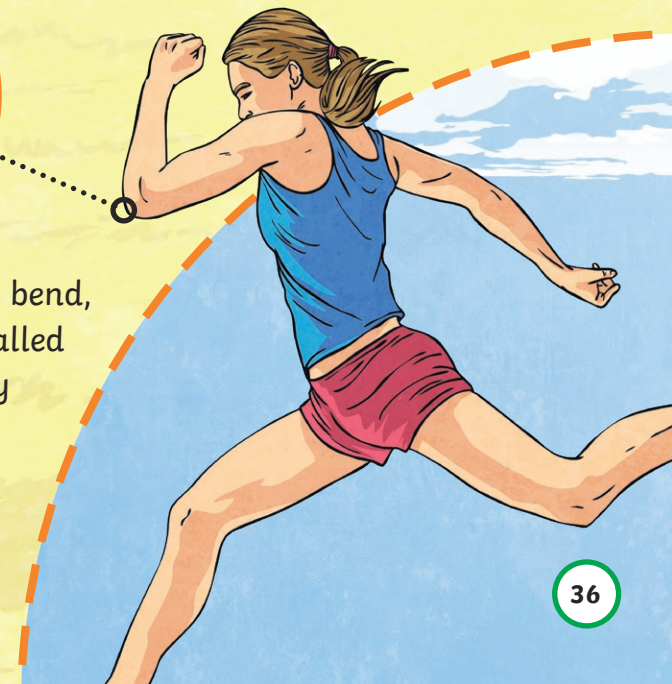


Bones are strong and light. They need to be strong so they are able to protect **organs** and light enough for animals to be able to move. Some skeletons are heavier than others. An elephant has large, thick bones to hold up its large body.

A bird's skeleton is much smaller. Birds also have some **hollow** bones, which help to make their skeletons lighter. Can you think of a reason why a bird's skeleton needs to be particularly light?



Because bones cannot bend, they meet at points called joints to help the body to move. Can you see and feel any joints on your body?





## Exoskeletons .....

Exoskeletons are on the outside of a creature's body. They provide a natural armour to defend the animal from being attacked by **predators** or from other things in their environment which may cause them harm, such as heavy rain. The exoskeleton also stops animals from drying out.

Examples of animals with exoskeletons are ants, grasshoppers, crabs, and beetles.



Exoskeletons are not made of bone, but a hard material that includes minerals, proteins and a natural substance called 'chitin'. They are not living, so they cannot grow as the animal grows. Instead, when an animal becomes too big for its exoskeleton, it **moults** and reveals a new, bigger one. The new exoskeleton is soft at first, which means that the animal is vulnerable to being attacked by **predators** until the exoskeleton has hardened.



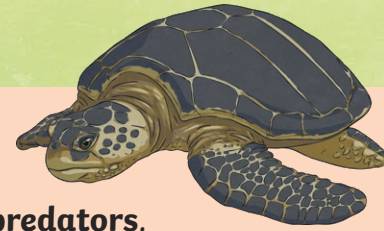
This is the old exoskeleton of a mosquito. It was discarded once the mosquito grew a new exoskeleton.



Where an animal's body needs to bend for movement, the exoskeleton is made up of segments that are joined together. You can see that this millipede's exoskeleton is made up of many small segments so that it can move!



Turtles and tortoises have exoskeletons - their shells, which protect them from **predators**. However, they are vertebrates (they have a backbone) so also have an endoskeleton! Their spine and ribs are fused to their shell.

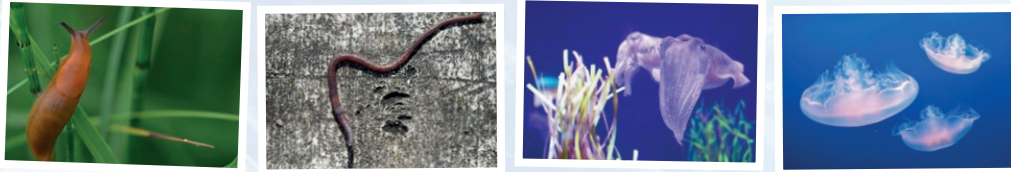


Can you think of any other animals that might have more than one type of skeleton?



## Hydrostatic Skeletons .....

Lots of animals with soft bodies have hydrostatic skeletons, which are sometimes called hydroskeletons. Examples of animals with hydrostatic skeletons include slugs, earthworms, squid and jellyfish.



These animals do not have any bones or hard substances as part of their skeletons. Instead, their body has a part called the **coelom** that is filled with fluid. This fluid moves within the creature and works with its muscles to allow it to move.

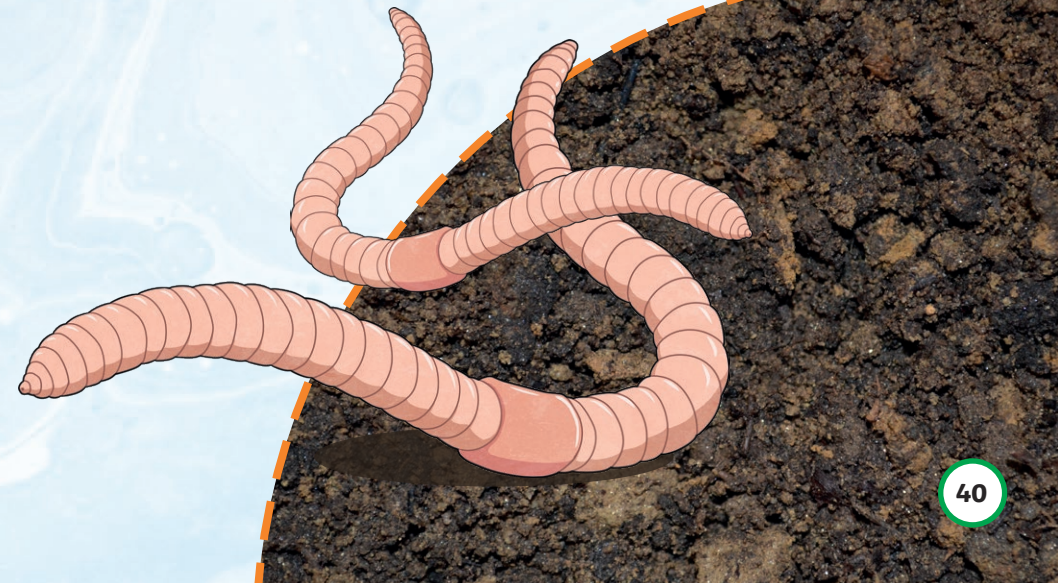


Many animals with hydrostatic skeletons live in water. Those that live on land live in damp places so that they do not dry out. As hydrostatic skeletons are so soft and flexible, animals with these can often squeeze themselves through tight spaces. For example, a slug might squeeze between some rocks to get to some food.



Look at how this octopus is able to squeeze between these rocks.

Hydrostatic skeletons do not provide protection from **predators** and these animals are usually unable to lift up objects. However, with no bones or hard covering to weigh them down, animals with hydrostatic skeletons are generally able to move quickly and they are often able to heal quickly if they are injured.

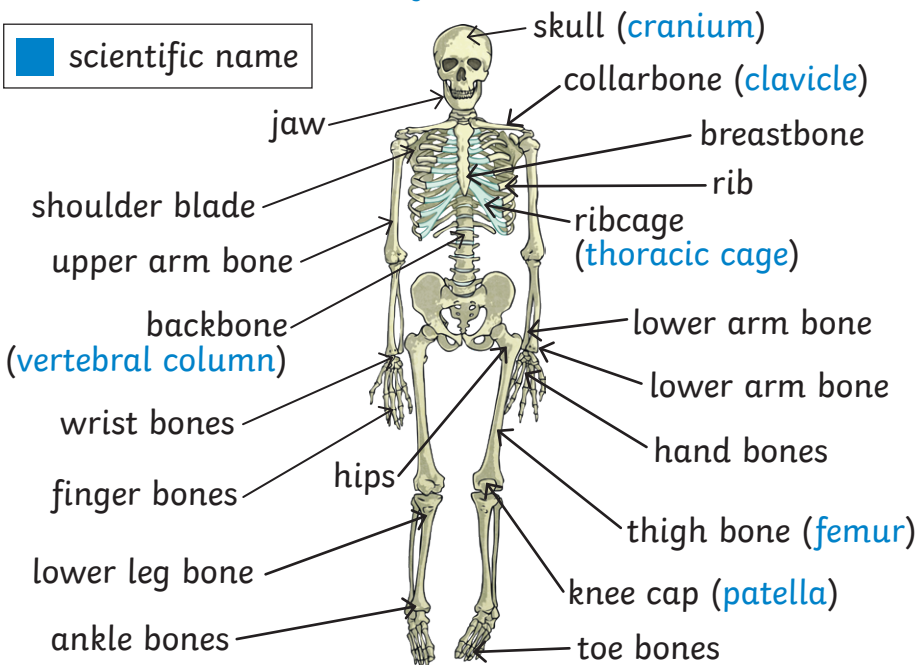




# The Human Skeleton

What would you look like if you had no skeleton? You would just be a blob on the floor! We need our skeletons to support us, to protect the important **organs** inside our bodies and to allow us to move. Our bones have two different names - their everyday (common) name and their more scientific name.

## The Main Bones of the Human Skeleton



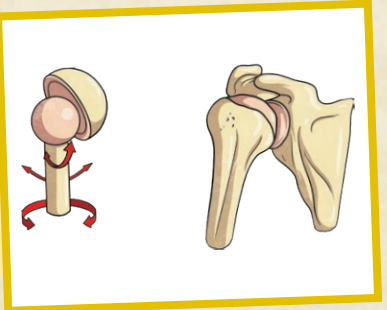
There are 206 bones in an adult human skeleton. 56 of these are in the hands and wrists! Why do you think our hands need so many bones?

## Joints .....

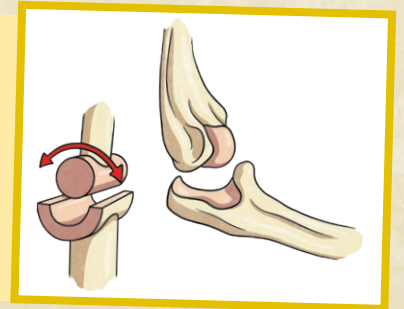
Two bones meet at a joint, where the bones are held together with a tough band of bendy **tissue** called a **ligament**.

There are different sorts of joints.

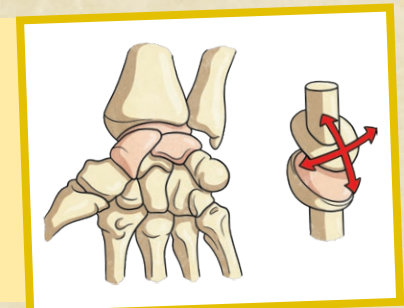
**Ball-and-socket** joints allow the most freedom of movement. One example in the human skeleton is between the hip and leg bones.



**Hinge** joints allow bending and extending movements. One example in the human skeleton is the elbow joint between the upper and lower arm bones.



**Gliding** or 'plane' joints have bones that glide over one another and allow for small movements in different directions. One example is the human wrist bones.





## Bones and Cartilage .....

Endoskeletons are made up of bones and cartilage. Cartilage is a rubbery padding which covers the ends of bones so that they can move across one another at joints. Cartilage is softer and more flexible than bone.



Cartilage at the knee joint.

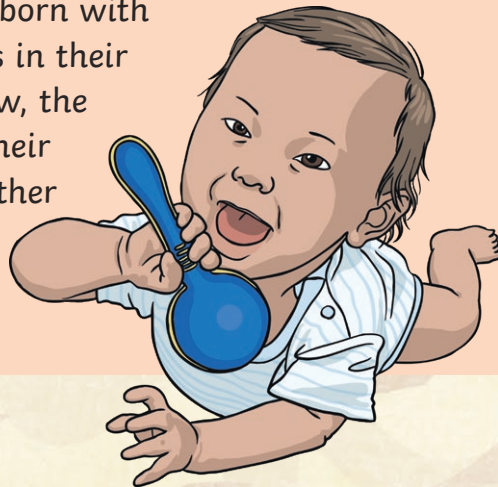


Many baby animals are born with parts of their skeletons made from cartilage which, as they grow, become harder and turn to bone.



Did You Know...  
?

A human baby is born with around 300 bones in their body. As they grow, the smaller parts of their skeleton fuse together to form the 206 bones that adult skeletons have.



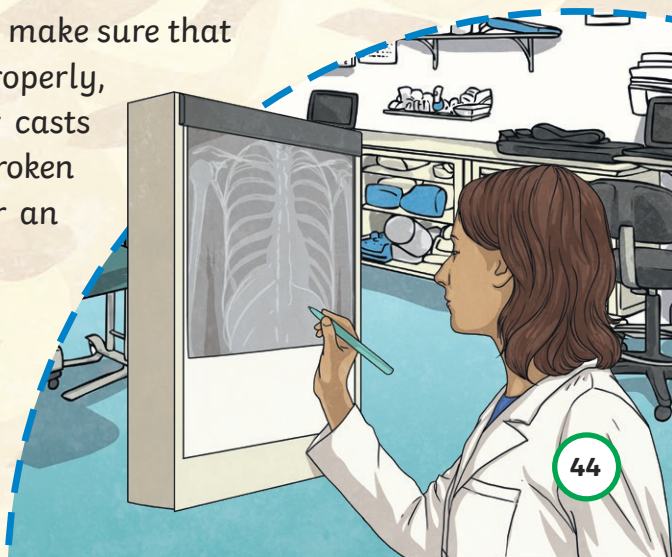
## More About Bones .....

The bones in our bodies, unlike the bones you might have seen in a museum, are living and grow until we are adults. Calcium (a mineral found in foods such as dairy and alternatives) helps bones to grow strong and hard. Vitamin D, which our bodies create when sunlight is on our skin, is also very important for healthy bones.



If you break a bone, you may have an X-ray image taken to find out more about how the bone is broken. X-rays cannot pass as easily through bone as other, softer parts of the body so they show as being clear-white on X-ray images. Incredibly, broken bones heal themselves! The bone joins together

at the point where it was broken and new bone slowly grows there. To make sure that the new bone heals properly, doctors put splints or casts on people around the broken bone (sometimes after an operation).





# Muscles

The bones in the skeleton are pulled by muscles so that the body can move. A muscle is made up of thousands of fibres, which are alive and stretchy. There are different types of muscles in the body.

**Voluntary muscles** - These are muscles that a person chooses to move. For example, if you want to raise your hand in class, you decide that you would like to do it and your brain sends a message to your arm to raise it.

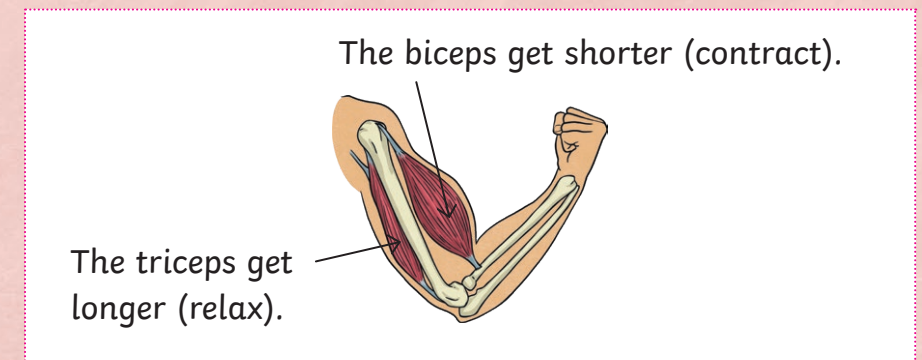
**Involuntary muscles** - These are muscles that work without you thinking about it (they move by themselves), such as those in the heart and **intestines**.

Voluntary muscles	Involuntary muscles	
Skeletal muscles	Smooth muscles	Cardiac muscle
These muscles are attached to bones. The brain sends a message to the muscles to cause them to move. Skeletal muscles can pull but not push.	These muscles are in the walls of some internal <b>organs</b> and help them to work. There are smooth muscles that move food through the <b>intestines</b> .	This is the heart muscle, which makes up most of the mass of the heart and works to pump blood around the body.

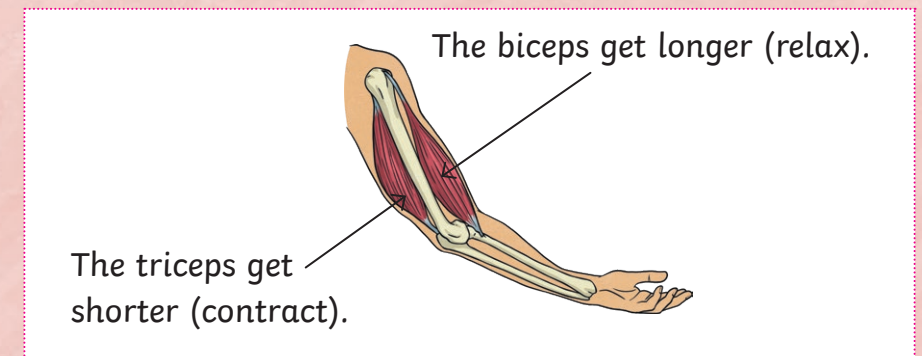
## How Skeletal Muscles Work.....

Skeletal muscles are joined to bones by **tendons** and work in pairs to help bones to move. The muscles shown here in the upper arm are called the biceps and triceps.

When you lift your arm towards your shoulder, the biceps pulls your lower arm in by contracting. This means that the muscle bunches up and gets shorter. As the biceps contract, the triceps relax and get longer.



As the arm goes back down, the opposite happens. The triceps contract, pulling the arm to straighten it out, and the biceps relax.





# Marvellous Muscles .....

We need muscles to do all of the things we do every day.

The most important muscle, of course, is the cardiac muscle (heart muscle) as it pumps blood around the body, carrying with it all the things that the body needs to **survive**.



Many animals also need a cardiac muscle to stay alive. Some animals even have more than one heart - an octopus has three! However, there are also many animals that do not have hearts. These animals include jellyfish, starfish and flatworms.

starfish



jellyfish



The face has 43 muscles. You need these muscles to show different expressions on your face.



Did You Know...  
?

We have learnt how muscles help animals with endoskeletons to move, but animals with exoskeletons or hydrostatic skeletons also use muscles to move. Exoskeletons have muscles on the inside of them and animals with hydrostatic skeletons have muscles to move the fluid inside the **coelom** so that they can move.





# Quiz

How well do you remember the facts you have read about in this book?

1. Can you name three ways that humans can try to stay healthy?
2. Why do we eat fibre in our diets?
3. What is an omnivore?
4. Can you name a carnivorous plant?
5. Which groups of animals are vertebrates?
6. What is the largest animal on the planet?
7. What sort of skeleton does a worm have?
8. How many bones do adult humans have in their skeletons?
9. What is the name given to tough bands of bendy tissue which hold bones together at joints?
10. Which type of muscles are attached to bones by tendons?

**Answers:** 1. Eat a healthy, balanced diet, be hygienic, exercise. 2. To help us **digest** food. 3. An animal that eats both meat and plants. 4. Venus flytrap, nepenthes. 5. Mammals, reptiles, amphibians, birds and fish. 6. Blue Whale. 7. Hydrostatic skeleton. 8. 206. 9. Ligaments. 10. Skeletal muscles.



# Glossary

## Aa

**adapted**

changed to fit a new situation

**absorb**

take in or soak up

**allergies**

bad reactions your body might have to some foods or substances

## Bb

**bowel**

the lower part of the digestive system which food passes through where nutrients are absorbed and waste prepares to leave the body (also known as the intestines)

## Cc

**carnivorous**

an adjective to describe things that feed on other animals

**coelom**

a space within an animal's body which is filled with liquid

**constipation**

a condition where an animal struggles to empty their bowels (poo) as often as they normally do

## Dd

**dehydrated**

when a person/animal has lost lots of water from their body

**digest**

to break down food so that the body can absorb it

## Ee

**energy**

strength to be able to move and grow

**evolved**

changed and developed very slowly

## Hh

**hollow**

having a hole or empty space inside

## Ii

**intestines**

see definition for 'bowel'

## Ll

**ligament**

a tough band of bendy tissue which holds bones together



## Mm

### **marsupials**

mammals whose young are born not fully developed and are carried in the pouch of the mother in their early life

sheds a covering of skin, fur or feathers

nervous system – a complicated system by which messages are sent around the body

### **moults**

## Oo

### **organs**

important parts of the body with different functions to help the body work

## Pp

### **predator**

an animal that hunts and eats other animals

### **prey**

an animal that is hunted and eaten by another animal

### **processed meat**

meat that has been treated to make it last longer

### **proportion**

amount

## Rr

### **red meat**

meat that is red in colour when it is raw (such as beef and lamb)

## Ss

### **scavengers**

animals that eat animals that are already dead rather than hunting them

### **secrete**

to make and release

### **source**

the place in which something can be found

### **stools**

the waste product from animals (poos)

### **survive**

to stay alive

## Tt

### **tendons**

cords that join muscles to bones (like how string might tie two things together)

### **tissue**

the material that animals are made from



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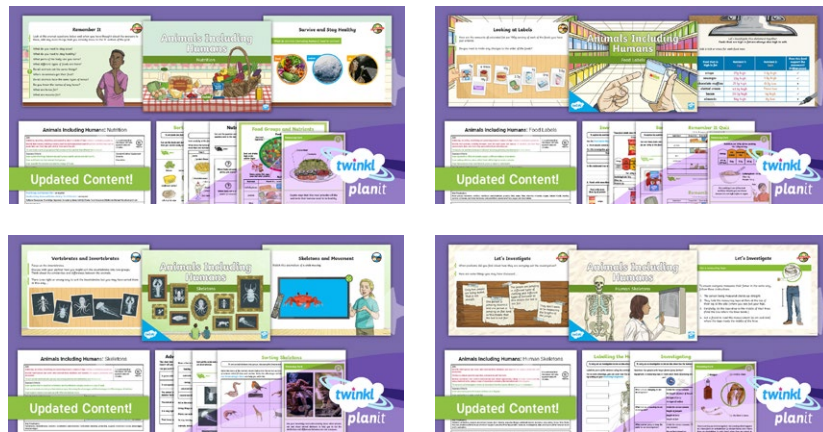




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