YEAR 3: AUTUMN 2 – TIMECOP

SCIENCE: Animals including humans

UNDERSTAND, DESCRIBE AND EXPLAIN: KEY KNOWLEDGE

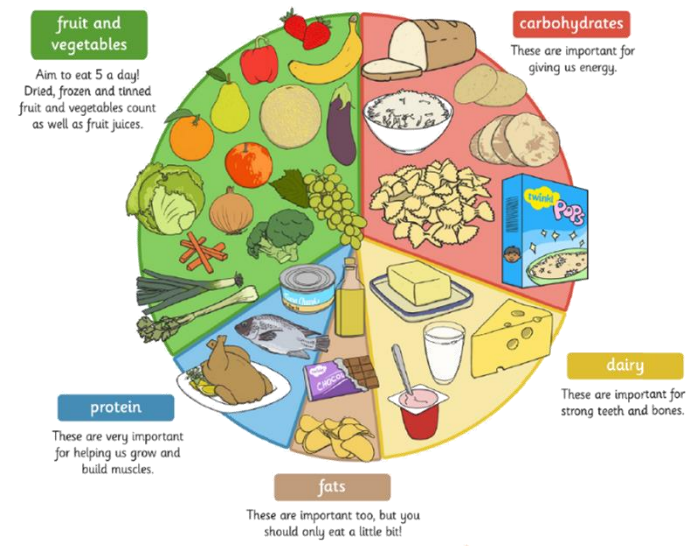
To understand that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat

Learning links:
History:
Stone Age to Iron Age Humans: Hunting, Gathering and Farming

Animals	***Humans** (Homo sapiens)*	***Nutrition***	***Food***	***Water***	***Air***
Eating	***Digesting***	***Drinking***	***Breathing***	***Vitamins***	***Minerals***
Fruit & Vegetables	***Carbohydrates***	***Dairy***	***Proteins***	***Fats***	***Healthy***

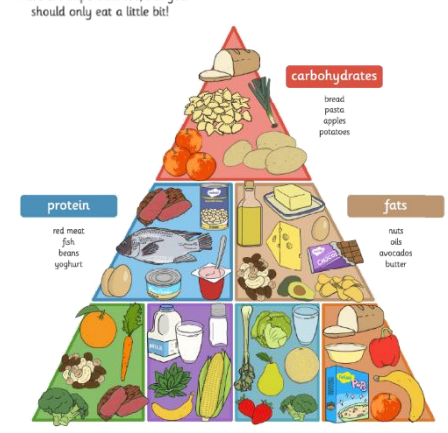
Nutrition in animals including humans:

Living things need ***food*** to ***grow*** and to be ***strong*** and ***healthy***. ***Plants*** can ***make*** their ***own food*** through ***photosynthesis***, but ***animals cannot***.
Animals, including humans, need ***3 things*** to ***survive***: ***food, water and air***. They get this from ***external sources*** by ***eating***, ***drinking*** and ***breathing***.
Animals, including ***humans***, need to get their ***nutrition*** from ***external sources***. They do this by ***eating*** and ***digesting food***.
Different foods contain ***different nutrition***, ***vitamins*** and ***minerals***. That is why it is so ***important*** to have a ***varied*** and ***balanced diet***. To remain ***healthy***, animals, including humans, ***must ensure*** that they eat a ***healthy, balanced diet*** so that their bodies ***receive the nutrition and water*** it needs to ***grow*** and ***stay alive***.
This ***diagram*** shows you ***how much*** of ***each food group*** is necessary for a ***healthy, balanced diet:***



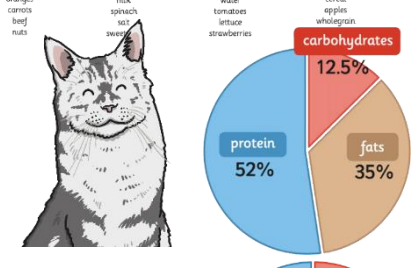
There are ***5 major food groups*** in order of how much you should eat:

1. **Fruit and Vegetables**: give you lots of vitamins and chemicals called antioxidants which keep you healthy. They are also low in calories but high in fibre to keep your digestive system healthy.
2. **Carbohydrates:** give us energy, calcium and B vitamins. Wholegrain carbohydrates give us fibre too!
3. **Dairy:** contain protein and calcium and some vitamins like vitamin B12, vitamin A and vitamin D. Dairy products keep your bones and teeth healthy.
4. **Proteins:** give us protein, iron and some other minerals and vitamins. This helps the body to grow and repair itself.
5. **Fats:** These foods give us a lot of energy (calories) but not many nutrients. Junk foods are often high in fat, sugar and salt. It's important not to have too many foods from this group too often.

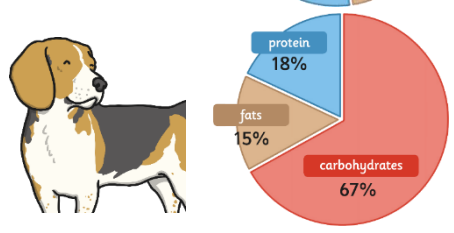


Different animals need ***different amounts*** of each ***food group*** and ***varying amounts*** of each ***nutrients***, ***vitamins*** and ***minerals*** to remain ***healthy***. Here are some examples of different animals and their requirements:

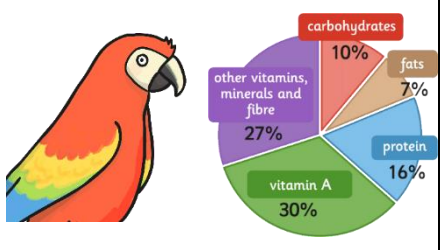
Cats:
Cats need a ***high percentage of protein*** because otherwise they can ***suffer health issues*** like ***blindness*** and ***heart problems***. Cats' bodies ***break down protein quicker*** than other animals, so they ***need more*** in their ***diet***. ***Fat*** is ***necessary*** for ***healthy fur*** and ***skin***, and to help their ***wounds heal quickly***. Cats ***do not require*** any ***fruit or vegetables*** in their diet.



Dogs:
Dogs need ***food*** with a ***fairly high percentage*** of ***carbohydrates*** because they have an ***energetic lifestyle***. ***Carbohydrates*** also break down into ***sugars***, which helps with ***brain function***. ***Protein*** helps with the ***development of skin, hair, nails and muscles***, and ***protects dogs*** from some ***illnesses***. ***Fats prevent*** dogs getting ***dry, itchy skin*** and a ***dull coat***, and ***prevent*** them getting ***heart disease*** and ***diabetes***.



Parrots:
Parrots need ***high levels of Vitamin A*** because it helps the ***growth*** and ***repair*** of their ***bodies***, ***feathers*** and ***claws***. It is also ***vital*** for the healthy function of their ***eyes***, ***hearing***, ***skin*** and ***bones***. It is found in ***fruit and vegetables***, ***not seeds***, so they need a ***varied diet***. They need ***low levels of fat*** because otherwise they can suffer from malnutrition and low amounts of the nutrients that they actually need.



EXPLORE AND INVESTIGATE:

HYPOTHESISE
ENQUIRE
TEST
RECORD
REPORT
CONCLUDE

Do all animals need the same amounts of nutrients?
Investigate and compare the diets of varying animals and explore how this compares to humans.
Group animals together based on their diets – similarities and differences.

KEY ASSESSMENT AND APPLICATION OPPORTUNITIES:

EXS:

- What 3 things do animals need to survive?
- How do animals get the necessary nutrients?
- Name the 5 main food groups and order them.
- Why do we need _____ as part of a balanced diet?
- Why do humans need a balanced diet?
- Describe the balanced diet of a _____.

GDS:

- Explain the difference between how animals and plants gain nutrition.
- As a nutritionist, design a healthy meal plan for a human.
- How does the diet of a ____ differ from the diet of a ____? Why do you think this is?
- What might happen to a human if they did not eat any _____?

UNDERSTAND, DESCRIBE AND EXPLAIN:

To understand that humans and some animals have skeletons and muscles for support, protection and movement

Learning links:

Skeleton	***Skeletal system***	***Support***	***Movement***	***Protection***	***Endoskeleton***	***Exoskeleton***	***Hydrostatic skeleton***
206 bones	***Function***	***Tendons***	***Ligaments***	***Cartilage***	***Muscular system***	***650 muscles***	***Relax & contract***

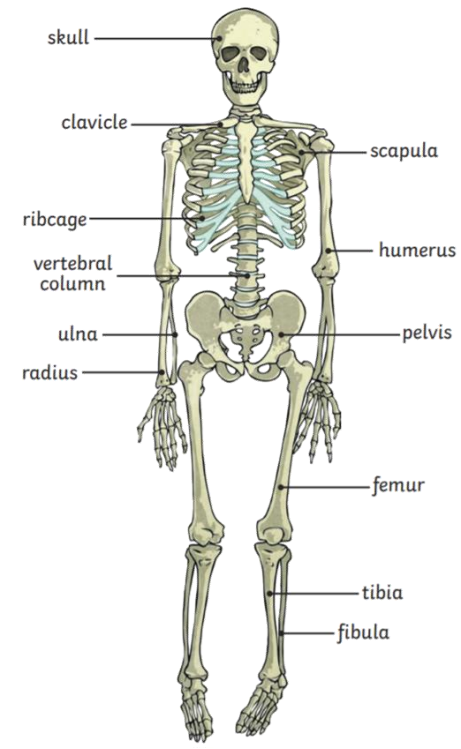
Skeletons and muscles in animals including humans:

Animals, including humans, called ***vertebrates*** have a ***skeletal system*** to provide ***3 things***:

1. ***Support***
2. ***Movement***
3. ***Protection***

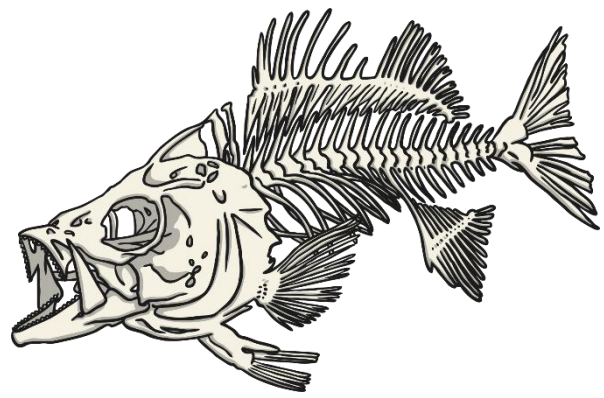
There are ***3 types*** of ***skeleton*** in the animal kingdom:

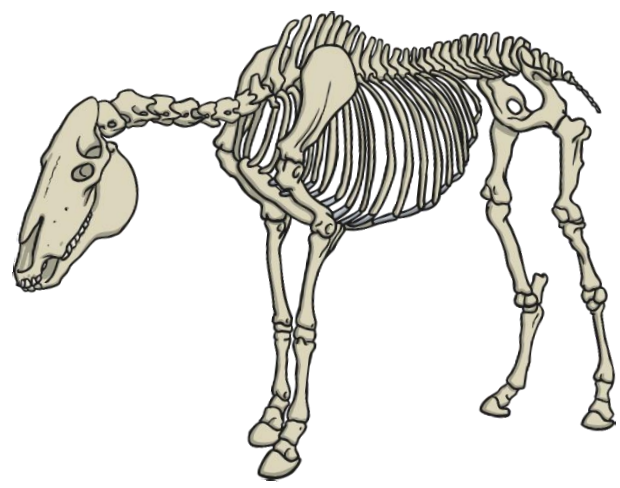
1. ***Endoskeleton***: Animals with a ***skeleton INSIDE*** of their bodies: Humans, cats, dogs, birds etc.
2. ***Exoskeleton***: Animals with a skeleton ***OUTSIDE*** of their bodies: Crabs, lobsters, beetles, spiders etc.
3. ***Hydrostatic skeleton***: Animals with no bones at all. Structure is provided through a fluid called coelom: Slugs, jellyfish, worms etc.



The Human Skeletal System: Bones

All the ***bones*** in the ***human body*** together are called the ***skeletal system***. The ***skeletal system*** provides ***strength*** and ***rigidity*** to our body so we don't just flop around like jellyfish. We have ***206 bones*** in our body. ***Each*** bone ***has a function***. Some bones offer ***protection*** to softer, more fragile parts of body. For example, the ***skull protects the brain*** and the ***rib cage protects*** our ***heart and lungs***. Other bones, like ***bones*** in our ***legs and arms***, help us to ***move*** around by ***providing support for our muscles***. The ***skeletal system*** includes more than just ***bones***. It also includes ***tendons, ligaments, and cartilage***. ***Tendons attach*** our ***bones*** to ***muscles*** so we can ***move around***. ***Ligaments attach bones*** to ***other bones***.

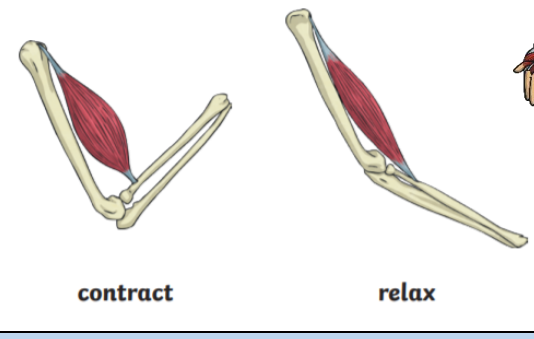


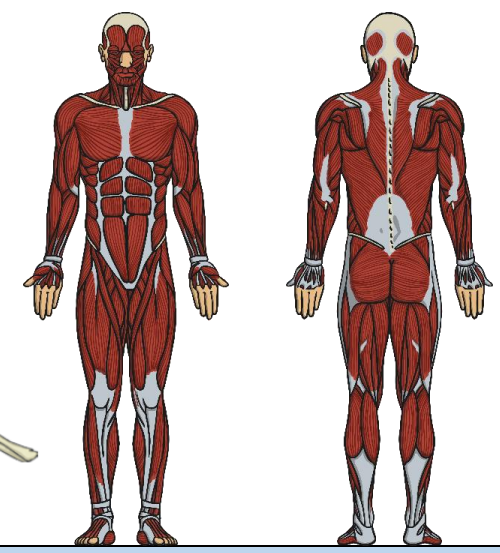


The Human Muscular System: Muscles

Muscles are how we ***move*** and ***live***. All ***movement*** in the body is ***controlled by muscles***. ***Some muscles*** work ***without us thinking***, like our ***heart beating***, while ***other muscles*** are ***controlled by our thoughts*** and allow us to do stuff and ***move around***. All of our ***muscles*** together make up the ***body's muscular system***. There are over ***650 muscles*** in the ***human body***. They are ***under our skin*** and ***cover our bones***. ***Muscles*** often ***work together*** to help us ***move***.

Many of our ***muscles come in pairs***. An example of this is the ***biceps*** and ***triceps*** in our ***arms***. When the ***biceps contract*** the ***triceps*** will ***relax***, this allows our ***arm to bend***. When we want to ***straighten*** our arm back out, the ***biceps*** will ***relax*** and the ***triceps*** will ***contract***.





EXPLORE AND INVESTIGATE:

HYPOTHESISE
ENQUIRE
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REPORT
CONCLUDE

What would happen if humans didn't have skeletons?

Investigate the movement and body shape of skeletons of different animals and compare this to that of humans. Compare the skeletons of different animals – why are they different and how does this suit their lifestyle?

Voluntary or involuntary muscles?

Explore the muscle movements of your body. What is the difference between a voluntary muscle movement and an involuntary muscle movement?
Can you group the muscle movements in to the 2 categories?

KEY ASSESSMENT AND APPLICATION OPPORTUNITIES:

EXS:

- What does a skeleton do?
- What do different bones protect?
- Can you name some of the bones you have in your body? Where can you find them?
- Bones are so hard! Maybe it would be easier for people to move around without them. Do you agree or disagree? Why?
- Do all animals have the same skeletons? What is similar? What is different? Why?
- Why do we have muscles?
- What are the different types of muscles? What are the strongest muscles in our body?
- How do muscles attach to bones to make movement possible?

GDS:

- What are the main advantages of having an internal skeleton (endo) or external (exo) skeleton?
- How is a skeleton of a bird well suited for flying?
- What if our backbone only had one bone?
- How is a _____ skeleton constructed in order to survive in its environment?
- How can muscle be changed? (exercise, diet etc..)
- Why is it important to warm up and cool down before and after physical activity?

YEAR 4: AUTUMN 2 – TIMECOP

SCIENCE: Animals including humans

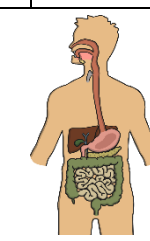
UNDERSTAND, DESCRIBE AND EXPLAIN: KEY KNOWLEDGE

To understand and describe the simple functions of the basic parts of the digestive system in humans

Learning links:
Science
Year 3: Nutrition and food groups

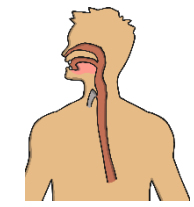
Digestive system	***Nutrients***		***Substances***	***Chewing***	***Swallowing***	***Enzymes***	
Salivary glands	***Saliva***		***Mouth***	***Teeth***	***Tongue***	***Oesophagus***	
Stomach	***Liver***	***Pancreas***	***Gallbladder***	***Small intestine***	***Large intestine***	***Rectum***	***Anus***

The Human Digestive System:

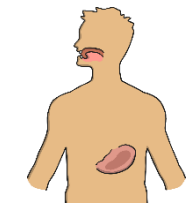


Our ***body needs food*** to provide it with ***energy***, ***vitamins***, and ***minerals***. However, in order to ***get nutrients*** from the food, we must first ***break it down*** into ***substances*** that the various ***organs*** and cells in our ***body can use***. This is the ***job*** of our ***digestive system***. The ***digestive system*** acts in ***stages*** to digest our food. Each ***stage*** is ***important*** and ***prepares*** the ***food*** for the ***next stage***. The ***entire length*** of our digestive system is around ***20 to 30 feet***!

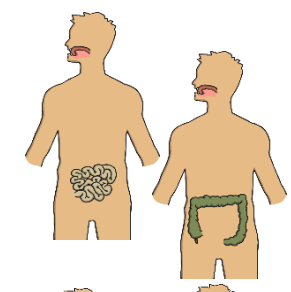
Here are the major stages of the digestive system:



1. **Chewing**: ***Chewing*** is the ***first stage*** of the ***digestive system***. When you chew your food, it ***breaks up big pieces*** into ***little pieces*** that are ***easier to digest*** and ***swallow***. Also, your ***saliva*** is more than just water. It has ***special enzymes*** in it that start to ***break down starchy food*** (potatoes, bread) while you chew.

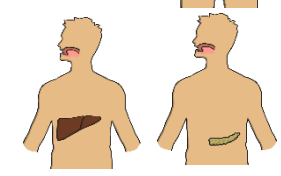


2. **Swallowing**: Swallowing may seem like a simple process to us. It just sort of happens. But food doesn't just fall down our throats into our stomach. First, our ***tongue helps*** to ***push food*** into the ***back of our throat***. Then, there are special ***throat muscles*** that ***force*** the ***food down*** into a ***long tube*** that leads ***to*** our ***stomach***, called the ***oesophagus***. The food doesn't just fall down the pipe, ***muscles push*** the ***food*** along until it gets ***to*** our ***stomach***. At the same time, a ***flap blocks*** off our ***windpipe*** making sure food doesn't go the wrong way. We call this "going down the wrong pipe" and it can make us ***choke***. This flap is called the ***epiglottis*** and, fortunately for us, it ***works automatically***.
3. **Stomach**: The ***next stage*** is the ***stomach***. ***Food remains*** in the ***stomach*** for around ***4 hours***. ***While*** the food sits ***there***, more ***enzymes break*** the ***food down further***, such as ***proteins*** that our ***bodies can use***. The ***stomach kills*** a lot of ***bad bacteria*** as well, so we don't get ***ill***.



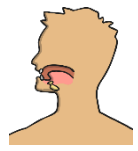
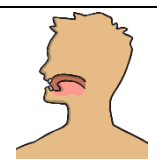
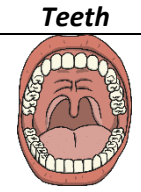
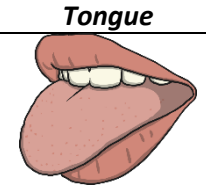
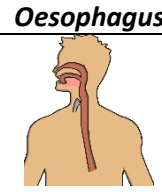
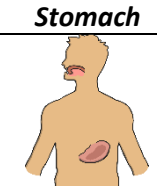
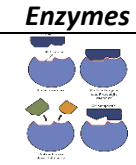
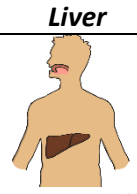
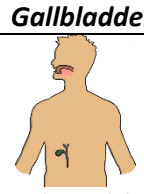
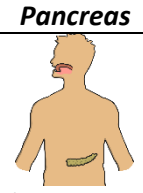
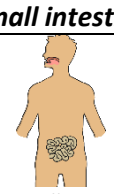
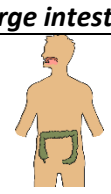
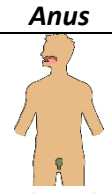
4. **Small Intestine**: The first part of the ***small intestine*** works with ***juices*** from the ***liver*** and ***pancreas*** to ***continue*** to ***break down*** our ***food***. The ***second part*** is where the ***food*** gets ***absorbed*** from the ***intestine*** and into our ***body through*** the ***blood***.
5. **Large Intestine**: The ***last stage*** is the ***large intestine***. Any ***food*** that the ***body doesn't need*** or ***can't use*** is sent to the ***large intestine*** and later ***leaves*** the ***body*** as ***waste***.

The Liver and Pancreas:



The ***liver*** and ***pancreas*** do a lot to ***help*** the ***digestive system*** along. Both ***work with the small intestine***. The ***liver provides bile*** (stored in the gall bladder) that ***helps break up fat*** into smaller bits. The ***pancreas provides additional enzymes*** to ***help digest*** all sorts of food. The ***liver*** also ***processes*** the ***digested food*** from your ***blood before*** it gets ***sent*** to various places in your ***body to be used.***

The main parts and their functions:

Salivary Glands	***Mouth***	***Teeth***	***Tongue***	***Oesophagus***	***Stomach***	***Enzymes***
 These glands produce saliva. This is mostly made of water and it helps you to chew, taste and swallow food. Saliva contains enzymes which start to break down the food we eat.	 This is the entry point for food where saliva mixes with food. It is the location of the tongue and teeth. The top part of the mouth (soft palate) helps move food along to the oesophagus.	 These are used to tear, cut and grind food into smaller pieces.	 This muscle, located in the mouth, helps mix the food and saliva and move the food to support chewing.	 The muscular tube which forms the path from the mouth to the stomach. Muscles contract and relax to move food down the oesophagus to the stomach.	 **Glands** line the stomach produce acid and **enzymes** which breaks the food down further. Muscles in the stomach mix the food.	 Enzymes are special molecules in the body They act to create a chemical reaction. In the digestive system, the reaction they produce breaks down food.
Liver	***Gallbladder***	***Pancreas***	***Small intestine***	***Large intestine***	***Rectum***	***Anus***
 This organ produces bile which helps to absorb fats. Bile is sent to the gallbladder to be stored.	 This releases bile into the duodenum when needed.	 Produces enzymes to break down fats, proteins and carbohydrates. Releases them into the small intestine.	 The small intestine absorbs nutrients from the food and passes any leftover broken down food to the large intestine.	 This connects the small intestine to the rectum. It absorbs water from waste food and forms the waste in to stool.	 This organ stores stool passed to it from the large intestine. It makes the brain aware of a need to go to the toilet.	 This is the end of the digestive process as the anus releases the waste (stool) from the body.

EXPLORE AND INVESTIGATE:

HYPOTHESISE
ENQUIRE
TEST
RECORD
REPORT
CONCLUDE

KEY ASSESSMENT AND APPLICATION OPPORTUNITIES:

EXS:

- Can you describe the process of digestion from beginning to end to a specified audience?
- What would happen if we didn't have a _____ as part of the digestive system?
- Explain why our bodies need food.
- What happens to food that the body doesn't need?

GDS:

- What's an enzyme? Explain its purpose.
- How does the shape of the small intestine help to absorb nutrients into the blood stream?
- Is there a similarity between how plants absorb nutrients/water and how we absorb nutrients/water?
- Why doesn't our stomach acid burn us?
- Do all animals have the same digestive systems? Why are they different?

UNDERSTAND, DESCRIBE AND EXPLAIN:

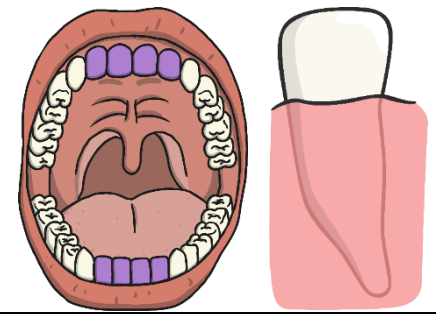
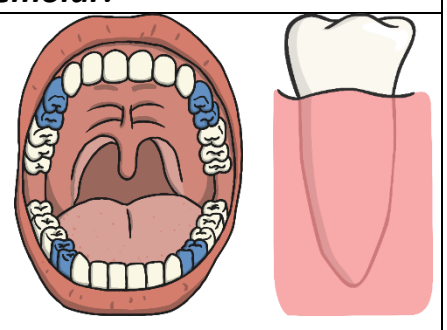
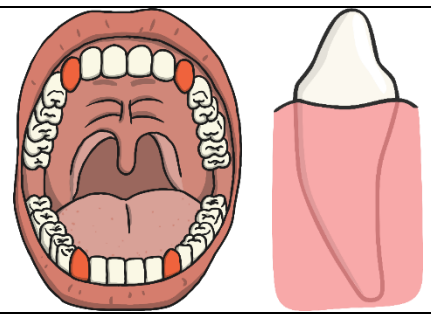
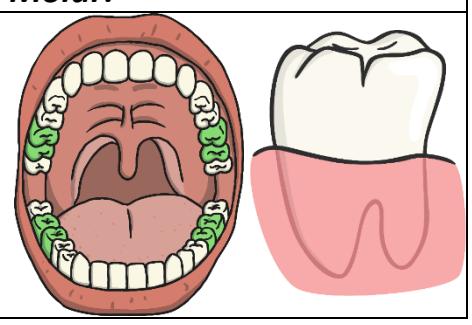
To identify the different types of teeth in humans and describe their simple functions

Learning links:
Science
Year 4: Digestive System

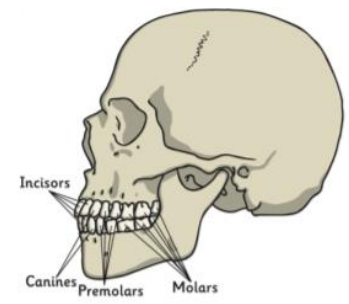
Teeth	*Digestive system*	*Incisor*	*Canine*	*Premolar*	*Molar*	*Wisdom*	*Mouth*

Human Teeth:

Within the ***mouth***, humans have a ***set of teeth*** to ***support*** the ***digestive system***. Their ***primary function*** is to ***chew*** and ***grind*** up ***food*** so that it is ***easier*** to ***pass*** down the ***oesophagus*** and in to the ***stomach***.

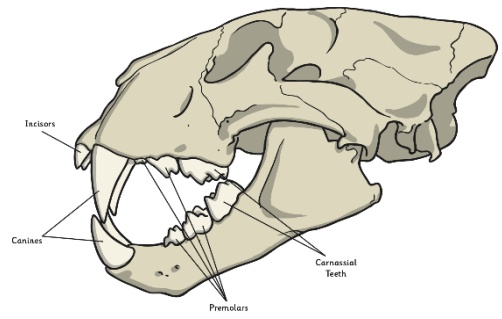
Incisor:	***Premolar:***
Humans have 8 incisors altogether; 4 in the upper jaw and 4 in the lower jaw. They are shovel shaped and are used for biting in to and cutting off pieces of food. 	Humans have 8 premolars, two in each quarter of the mouth. They are between the canine tooth and the molars. They are used for holding and crushing food in to smaller pieces. 
Canine:	***Molar:***
Humans have 4 canine teeth, one in each quarter of the mouth, on either side of the incisors. They are pointy and used for tearing and ripping food. 	Humans have 8 molars, two in each quarter of the mouth. They are at the back of the mouth behind the premolars. They are large and flat and used for grinding food. 

Different animals have varying sets of teeth based on their diet.



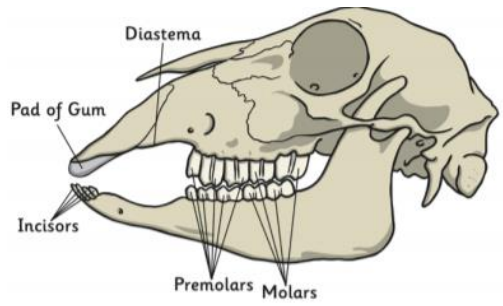
Human:

This is the skull of a ***human***. A ***human*** is an ***omnivore*** and eats a ***varied diet*** of ***meat and vegetation***.



Lion:

This is the skull of a ***lion***. A ***lion*** is a ***carnivore*** and only ***eats meat***.
Notice that, ***similar to humans***, the lion has a ***similar set up*** of teeth with ***incisors*** and ***canines*** at the ***front*** of the mouth.
However, because of a ***lion's hunting lifestyle*** and ***diet of only meat***, they require much ***sharper incisors and canines***.



Sheep:

This is the skull of a sheep. A sheep is a herbivore and only eats vegetation like grass.
Again, similar to humans, the sheep has incisors at the front of the mouth and premolars and molars at the back.
However, because of the sheep's lifestyle and diet of only vegetation, they do not require any canine teeth. They also do not have any incisors on the top of their mouth. Instead, they have a pad of gum. Consider how this might be of advantage for eating grass.

EXPLORE AND INVESTIGATE:

HYPOTHESISE
ENQUIRE
TEST
RECORD
REPORT
CONCLUDE

KEY ASSESSMENT AND APPLICATION OPPORTUNITIES:

EXS:

- Are all our teeth the same shape? Why not?
- What are the names of the different types of teeth? Do they do different things?
- Do all animals have the same types of teeth?
- What sort of teeth do hunting carnivores need? Why?
- Do all animals need teeth?

GDS:

- Using your knowledge of teeth, make an educated guess of what the teeth of a _____ would be like and explain your choices.
- Why are the teeth of a carnivore, omnivore and herbivore different?

UNDERSTAND, DESCRIBE AND EXPLAIN:

To construct and interpret a variety of food chains, identifying producers, predators and prey.

Learning links:
Science
Year 3: Plants - photosynthesis
Year 3: Animals inc. humans - nutrition

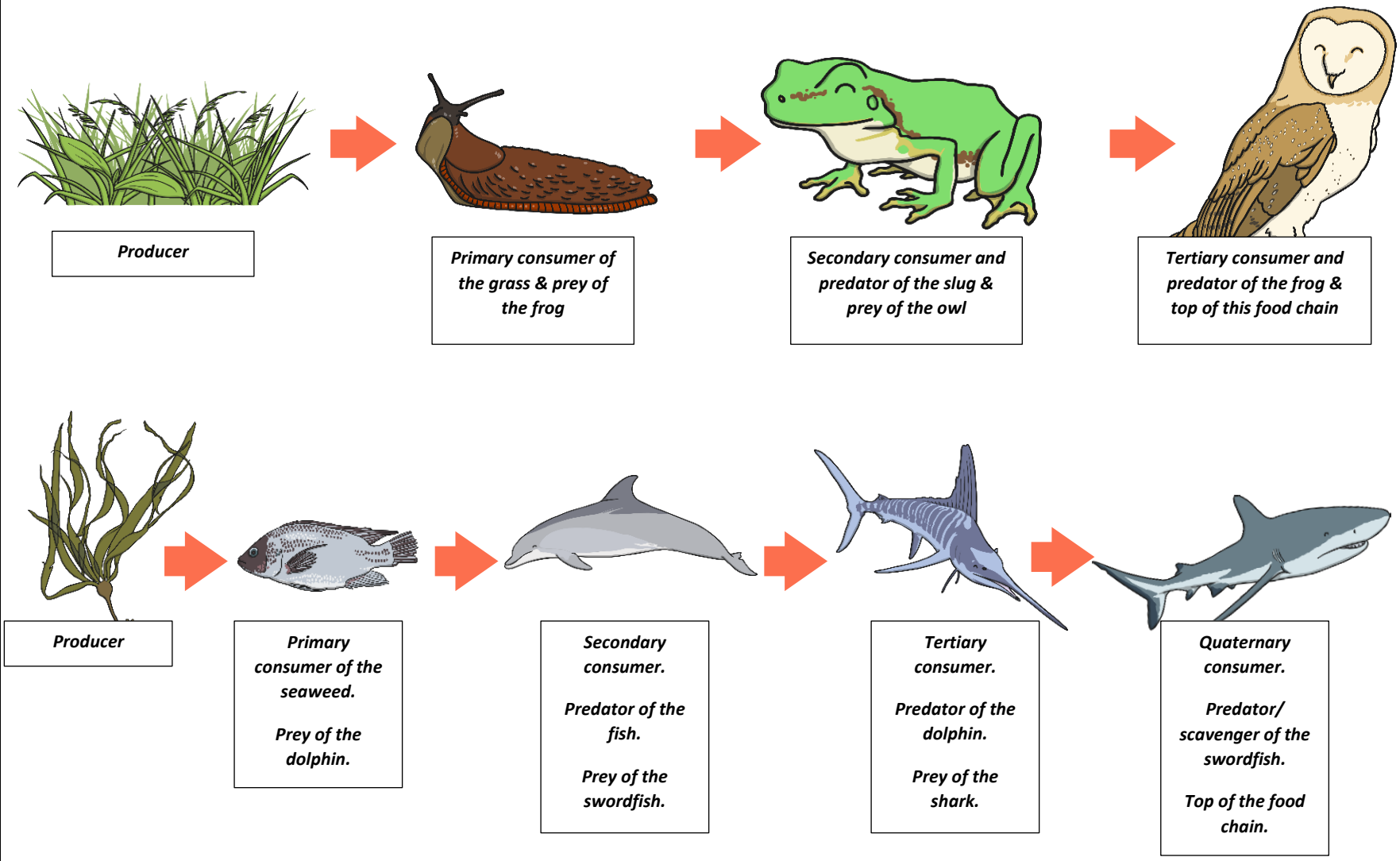
Food chain	***Organisms***	***Energy***	***Plants***	***Animals***	***Photosynthesis***	***Eaten***	***Consumed***
Producer	***Consumer***	***Predator***	***Prey***	***Primary***	***Secondary***	***Tertiary***	***Quaternary***

Understanding Food Chains:

A ***food chain*** shows how ***plants and animals*** get their ***energy***.

Producers and consumers:
A ***food chain*** always ***starts*** with a ***producer***. This is an ***organism*** that ***makes its own food***. ***Most*** food chains start with a ***green plant***, because plants can ***make their food*** by ***photosynthesis***. This ***producer*** is then ***eaten*** (consumed) by a ***consumer***.
A ***living thing*** that ***eats other plants*** and ***animals*** is called a ***consumer***.

Predators and prey:
A ***predator*** is an ***animal*** that ***eats*** other ***animals***. The ***animals*** that ***predators eat*** are called ***prey***. ***Predators*** are found at the ***top of a food chain***.



EXPLORE AND INVESTIGATE:

HYPOTHESISE
ENQUIRE
TEST
RECORD
REPORT
CONCLUDE

KEY ASSESSMENT AND APPLICATION OPPORTUNITIES:

EXS:

- Where does our food come from?
- Create a food chain where humans are at the top.
- What do food chains start with? What do they end with?
- What are a producers/primary consumers/secondary consumers? Can you give me examples?
- Can some animals be both predator and prey? Give an example.

GDS:

- What would happen in a food chain if one of the links became scarce? Could this affect other animals?
- How do the habits of humans impact on natural food chains?
- Governments have had to put limits on fishing to prevent over fishing. Why? How would this impact on the food chains of wildlife?
- Now that you understand food chains, explain the importance of plants and vegetation in our world.

YEAR 5: AUTUMN 2 – TIMECOP

SCIENCE: Animals including humans

UNDERSTAND, DESCRIBE AND EXPLAIN: KEY KNOWLEDGE

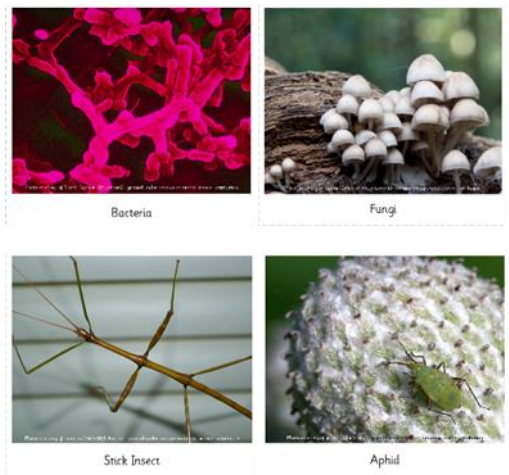
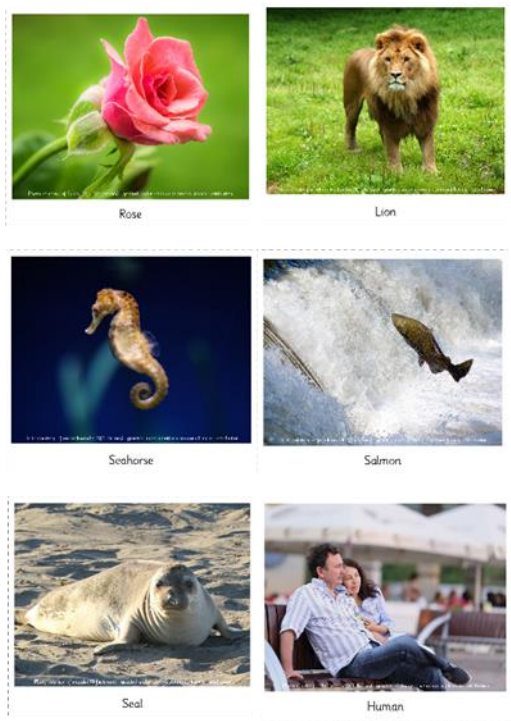
To understand and describe the changes as humans develop to old age.

Learning links:
Science
Year 3: Plants – Sexual and asexual reproduction
Year 5: Living things and habitats – animal reproduction

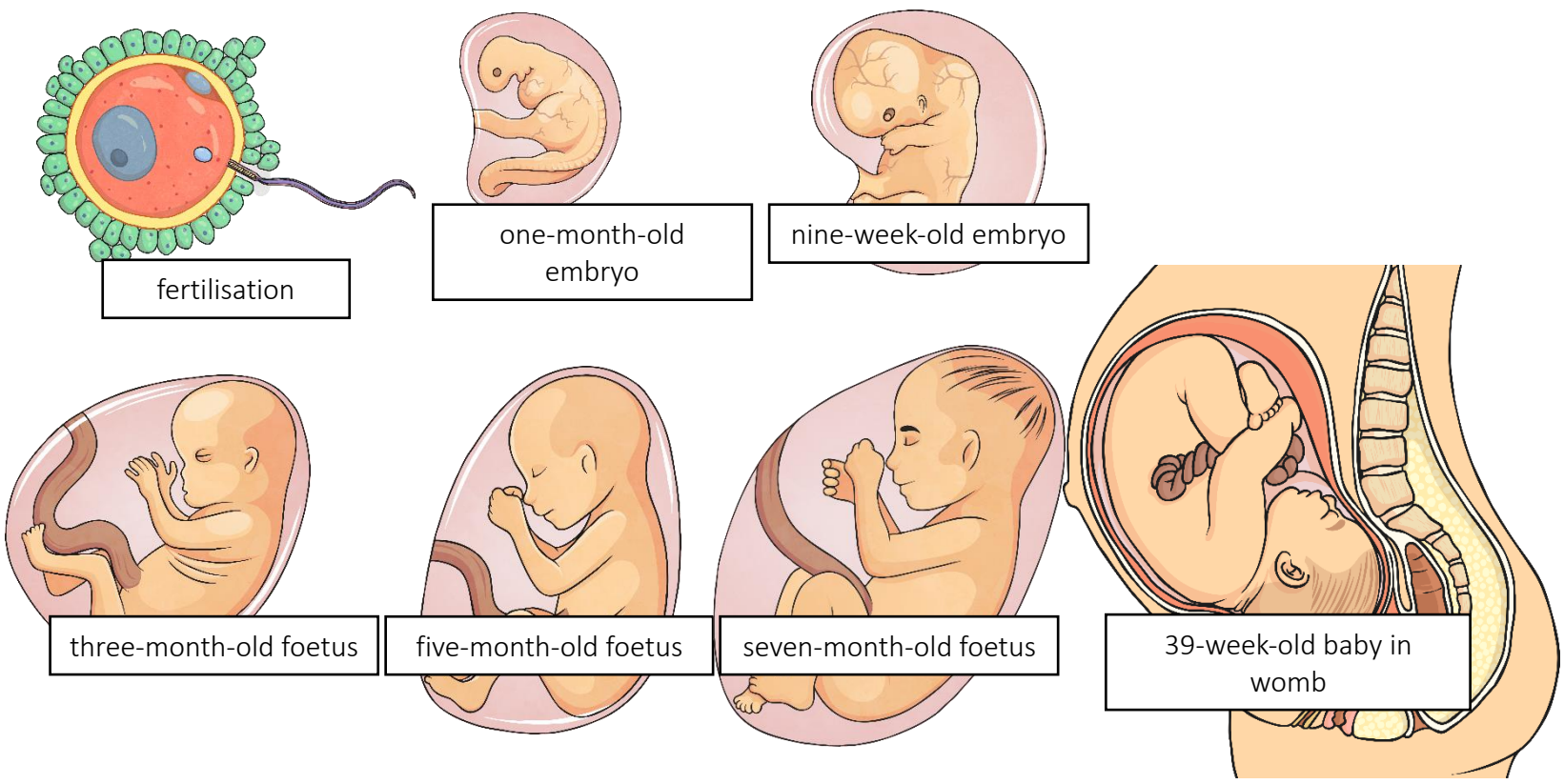
Reproduction	***Sexual***	***Asexual***	***Offspring***	***Sex cells***	***Male***	***Female***	***Fertilise***
Foetus	***Womb***	***Prenatal stage***	***Baby***	***Toddler***	***Childhood***	***Adolescence***	***Adulthood***

How does new life start?

All living things reproduce to ensure that their ***species continues to exist*** beyond their own life span.
Living things can ***reproduce*** in ***two different ways***: ***asexually*** or ***sexually***.

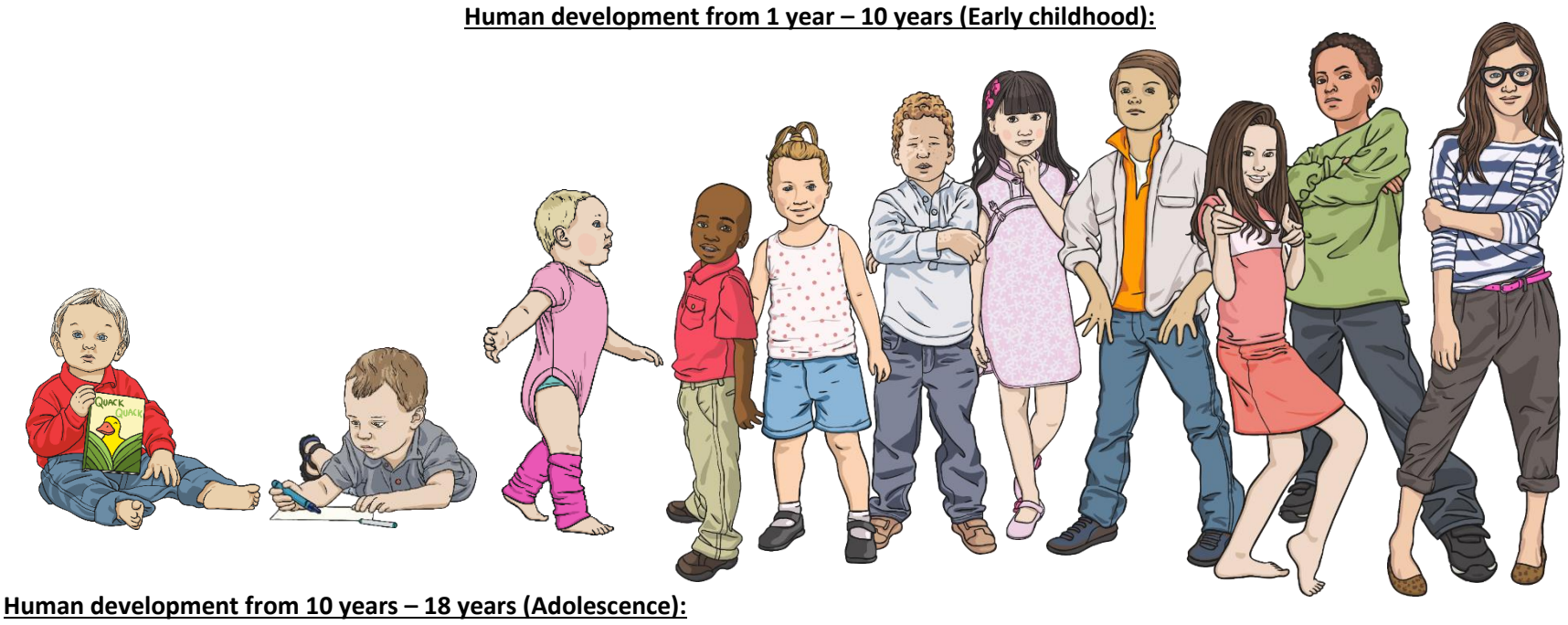
	Asexual Reproduction:	**Sexual Reproduction:**
What is it?	***One parent*** produces new life.	***Two parents*** – one ***male*** and one ***female*** – are required to produce new life.
How does it occur?	One ***cell*** simply starts to ***divide itself***. All ***cells*** of the ***offspring*** are **identical** to the ***parent***. This means that it is a **clone** of the parent.	***Male sex cells*** (sperm/angiosperm/pollen are different versions of male sex cells) ***fertilise female sex cells*** (eggs). This fusion means that the offspring resembles but is ***not identical*** to the parents.
Examples		

Human Reproduction and growth:
Once the ***egg*** is ***fertilised*** inside the ***female's body***, a ***foetus*** begins to ***grow inside the womb*** for approximately ***9 months***.
This is called the ***prenatal stage***. ***Prenatal*** means ***before birth***. This stage of development is from the time of fertilisation (when the male and female sex cells fuse together) to the time of birth.
Prenatal stage of human development:



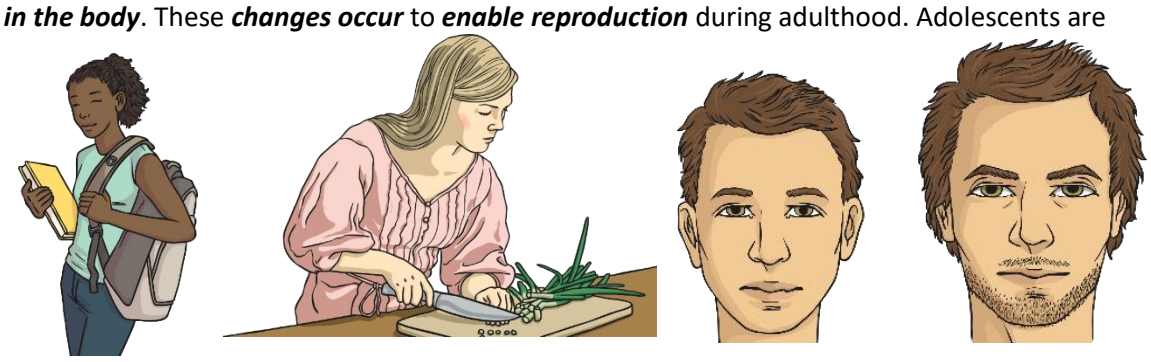
Once the ***foetus*** reaches its ***full term***, it is ready to be ***born***: a ***baby*** is born and the rest of its ***development happens outside***.
Human development from 0months-12months (Baby):

Human development from 1 year – 10 years (Early childhood):



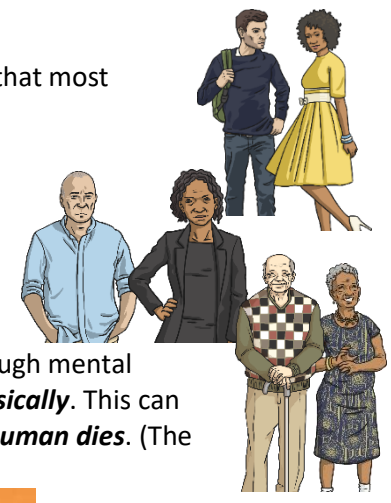
Human development from 10 years – 18 years (Adolescence):

During this stage, ***puberty*** results in ***changes in the body***. These ***changes occur*** to ***enable reproduction*** during adulthood. Adolescents are ***increasingly independent***.



Human development from 18 years – 40 years (Early Adulthood):

The ***human body*** is at its ***peak*** of ***fitness*** and ***strength***. There is ***still some growth*** but ***not*** of ***height***. This is the ***age*** that most ***humans reproduce***. Humans are ***able*** to ***take care*** of their ***physical needs*** completely ***independently***.

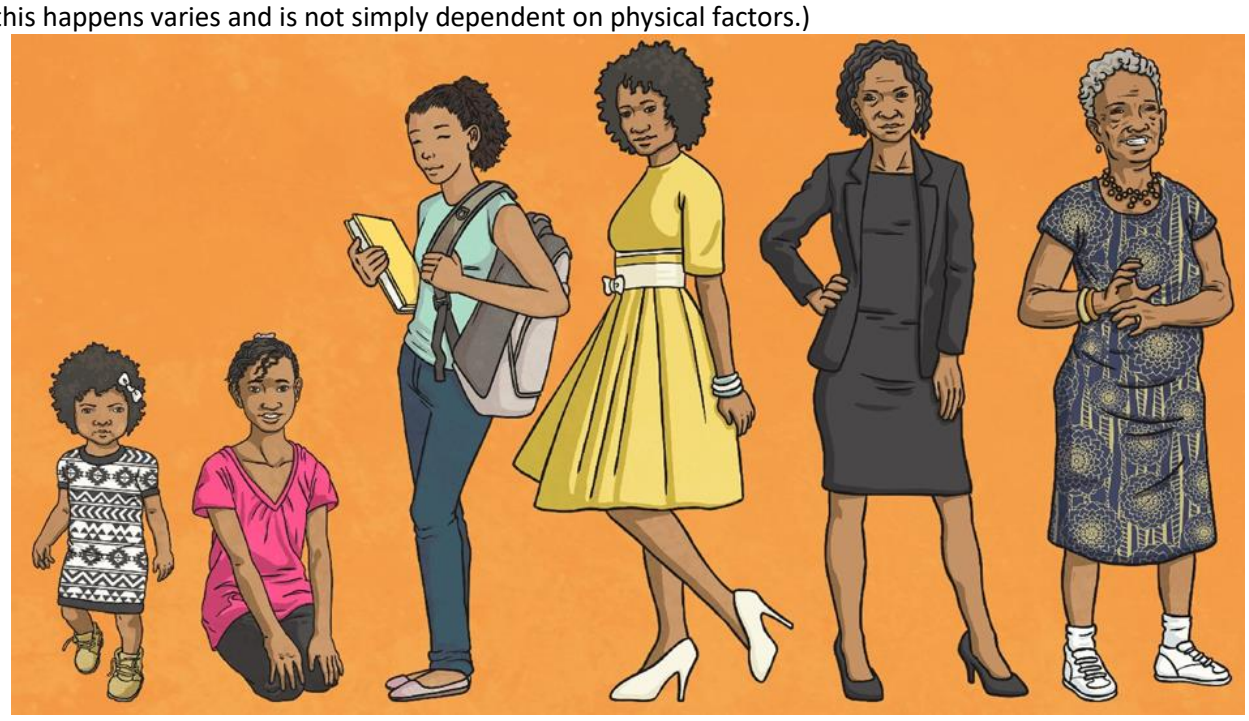


Human development from 40 years – 60 years (Middle Adulthood):

Both male and female ***ability to reproduce declines*** with age. Women experience ***menopause*** in their 40s or 50s when ***they no longer produce eggs***. ***Physical changes*** can include ***loss of hair*** and ***greying hair***.

Human development from 60 years (Late Adulthood):

This is the ***last stage of human development*** and takes place after the ***age of 60***. There is ***no physical growth*** although mental development is possible. The body ***declines in fitness and health***. Some older people can become ***more fragile physically***. This can sometimes result in ***increasing dependency*** on others to care for them. The ***end*** of the ***human life cycle*** is when a ***human dies***. (The age at which this happens varies and is not simply dependent on physical factors.)



EXPLORE AND INVESTIGATE:

HYPOTHESISE
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REPORT
CONCLUDE

Comparing gestation periods and life expectancy of varying animals – is there a link?

Research the average life expectancy and gestation period of various animals and compare these on a graph.
Do animals who live longer have longer gestation periods?
If so, why do you think this is?

KEY ASSESSMENT AND APPLICATION OPPORTUNITIES:

EXS:

- What is the difference between sexual and asexual reproduction?
- Describe the process of human life and how it develops over time.
- How can you tell how old somebody is?
- How have you changed since you were born? What has stayed the same?
- What are the main differences in human development between _____ and _____?

GDS:

- Produce a graph to show human growth over time.
- Compare the gestation periods of various animals. Why would it suit their lifestyle to have such short/long terms?
- Compare the average life expectancy of humans and other animals. Why are they different? Why are some animals expected to live longer or shorter than others?

YEAR 6: AUTUMN 2 – TIMECOP

SCIENCE: Animals including humans

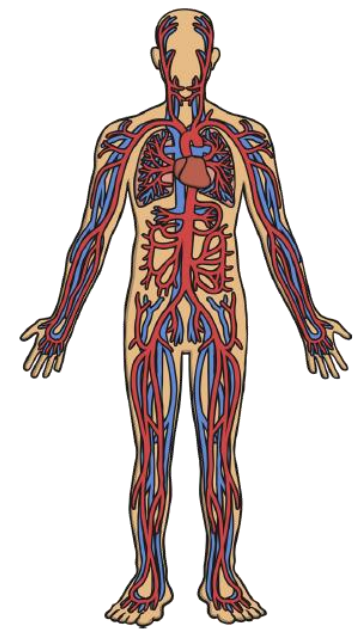
UNDERSTAND, DESCRIBE AND EXPLAIN: KEY KNOWLEDGE

To identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood and describe the ways in which nutrients and water are transported within animals, including humans.

Learning links:
Science
Year 3: Animals inc humans – skeletons and muscles
Year 4: Animals inc humans – digestive system

Circulatory System		***Circulate***	***Blood***	***Nutrients***	***Hormones***	***Oxygen (O_2)***	***Blood cells***
Heart	***Lungs***	***Blood Vessels***	***Arteries***	***Veins***	***Capillaries***	***Oxygenated***	***De-oxygenated***
Diaphragm	***Intercostal muscles***	***Alveoli (air sacs)***	***Atrium***	***Ventricle***	***Aorta***	***Pulmonic valve***	***Pulmonary artery***
Nutrients	***Water***	***Chyme***	***Small intestine***	***Villi***	***Bloodstream***	***Tissue***	***Cells***

The Human Circulatory System:

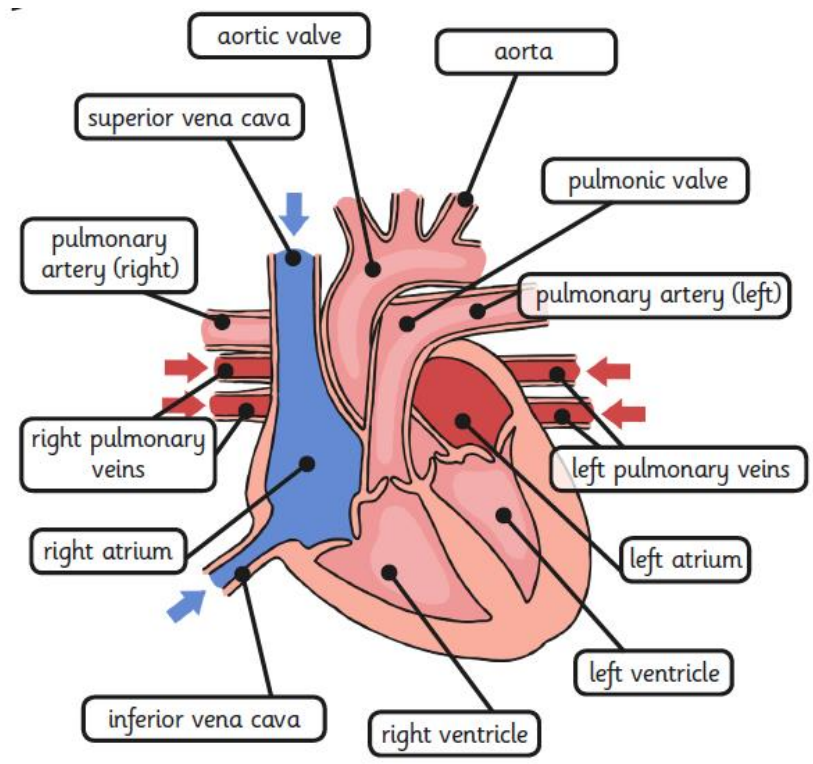


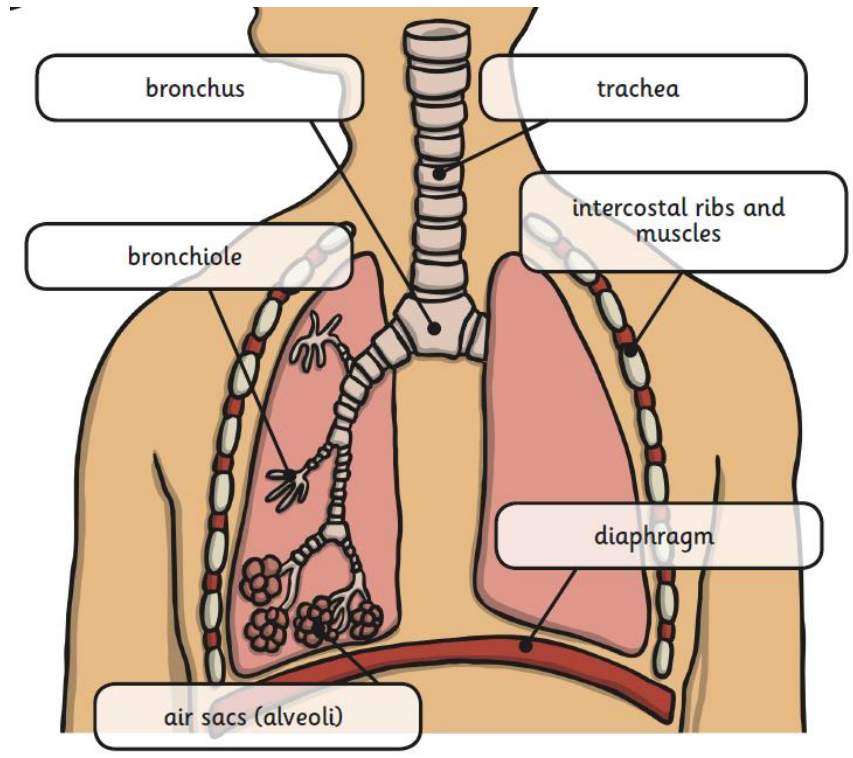
The circulatory system is an essential part of our body. '***Circulatory'*** means something that is going on a ***continuous circuit***. This is exactly what is happening in our bodies all the time.
Blood is ***circulated*** all around your ***body***, and it is playing a ***really important role***. Your ***blood*** takes ***nutrients***, ***hormones*** and ***oxygen*** (O_2) all around the ***body*** to all the places they are ***required***. The ***oxygen*** gets ***collected*** into your body when we ***breathe in***, and it goes ***straight to your lungs***. It is in the ***lungs*** that this ***oxygen*** goes ***into*** our ***blood*** and ***starts*** its ***journey*** around the ***body***. You could think of the blood cells a bit like delivery drivers that drop off the oxygen to where it needs to be. ***Oxygen*** is ***delivered*** all ***around the body*** by ***arteries*** and ***veins*** to the ***capillaries***, which are ***fine blood*** vessels that ***transfer the oxygen*** to all the ***cells in the body***.

The Main Parts of the Circulatory System:

Heart:
The ***heart*** plays an important role because it keeps all the ***blood flowing*** in the ***circulatory system***. The process of ***exercising*** results in the body requiring more ***oxygen***, this means that the ***heart*** has to ***circulate*** more ***oxygenated blood*** through the ***circulatory system***. That is why your ***heart beats faster*** when you ***exercise***.

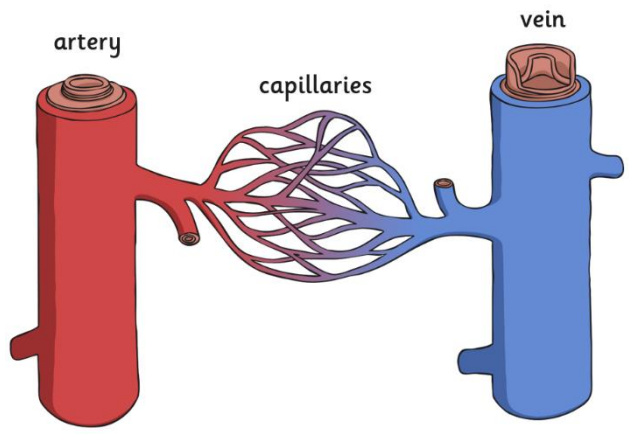
Lungs:
When we ***breathe***, we ***inhale air containing oxygen*** into our ***lungs***. It is in the ***lungs*** that ***blood vessels*** pick up ***oxygen*** and leave ***carbon dioxide*** to be ***released***.





Blood Vessels:
Blood vessels are ***tubes*** that ***carry*** the ***blood*** around the ***body***. There are ***three main types*** of blood vessels:

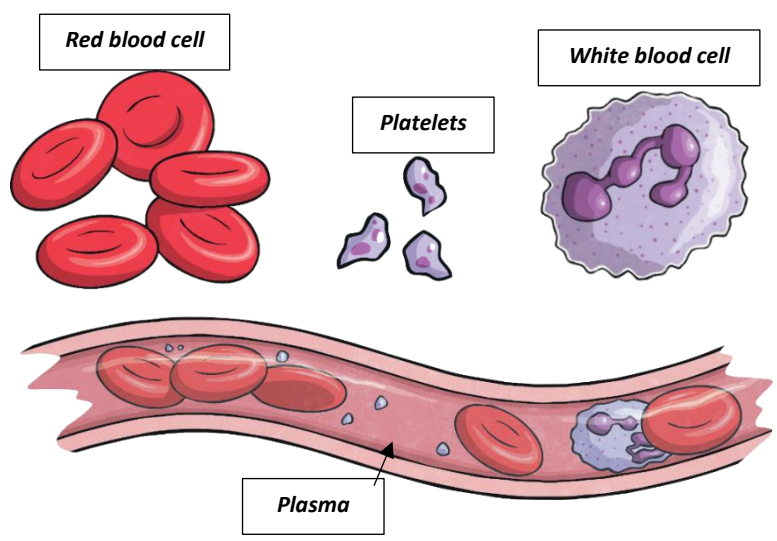
- ***Arteries*** – these carry ***oxygenated blood away*** from the heart ***to*** the rest of the ***body***.
- ***Veins*** – these carry ***deoxygenated blood back*** to the ***heart*** to be pumped to the ***lungs*** to become oxygenated.
- ***Capillaries*** – these are ***blood vessels*** that ***connect*** to both ***arteries*** and ***veins***. They are also connected directly to cells. ***Blood*** with ***nutrients*** and ***oxygen*** passes from the artery, through the ***capillary*** to a ***cell***. Any waste is passed through capillary to the vein.



Blood:
Blood is a red substance made up of ***4 parts***:

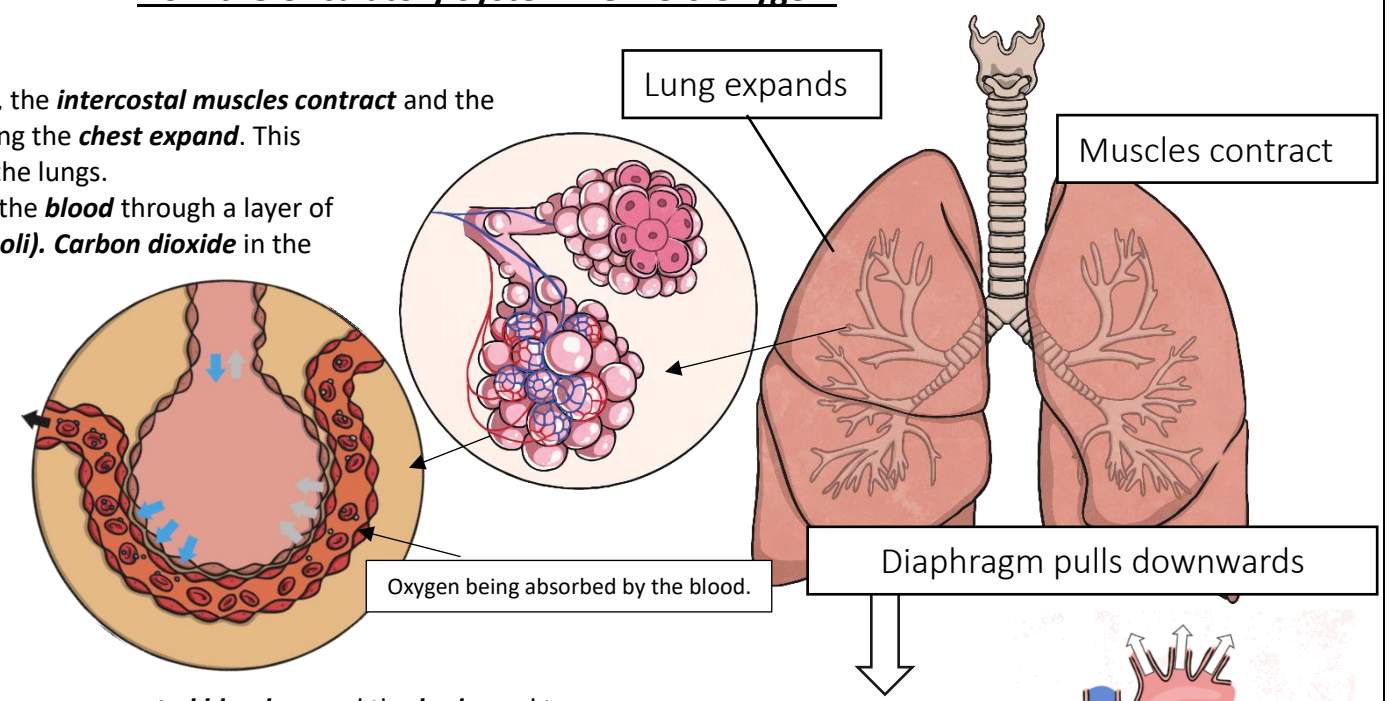
- **Plasma**: the thick liquid which carries the blood cells through the vessels.
- **Red blood cells**: absorb the oxygen from the lungs and transport this to the different parts of your body.
- **White blood cells**: fight infections and illnesses which enter your body.
- **Platelets**: mend broken areas of flesh or skin by 'scabbing'.

The ***job of blood*** is to ***transport oxygen*** to all parts of the body, ***fight infection*** and ***mend broken flesh***.

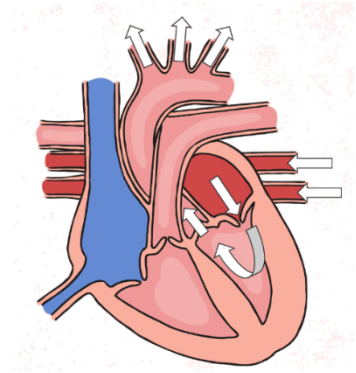


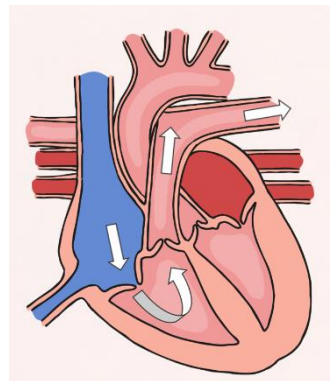
How the Circulatory System Delivers Oxygen:

1. When we ***breathe in*** (inhale), the ***intercostal muscles contract*** and the ***diaphragm*** pulls ***down***, making the ***chest expand***. This causes ***air to be sucked*** into the lungs.
2. The ***oxygen*** is ***absorbed*** into the ***blood*** through a layer of ***moisture*** in the ***air sacs (alveoli). Carbon dioxide*** in the blood is ***transferred*** back into the ***air***, which then ***travels*** back out of the ***lungs***.



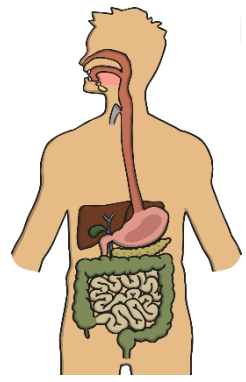
3. The ***heart*** has ***two jobs***: to ***pump oxygenated blood*** around the ***body***; and to ***pump de-oxygenated blood*** to the ***lungs*** to ***collect oxygen***. It is ***continuously pumping*** blood around the entire body. Once the ***blood*** has ***delivered*** its oxygen in the ***arteries***, it ***returns*** as ***deoxygenated blood*** in the ***veins*** and to the ***heart*** to be ***pumped towards the lungs*** to ***collect more blood***.
4. Once ***oxygenated***, the ***blood*** (from the ***lungs***) ***returns*** to the ***heart***. From here, it is ***pumped*** through the ***left atrium*** in to the ***left ventricle*** and then through the ***aorta*** (main artery), in to the ***arteries*** to be ***pumped*** around the ***body***.
5. The ***blood travels*** through the ***arteries*** to ***smaller, thinner*** blood ***vessels*** called ***capillaries***. When here, the ***oxygen*** and ***nutrients*** from the ***blood*** is able to ***travel through the thin walls*** of the ***capillaries*** in to the ***cells*** of the ***tissue***.



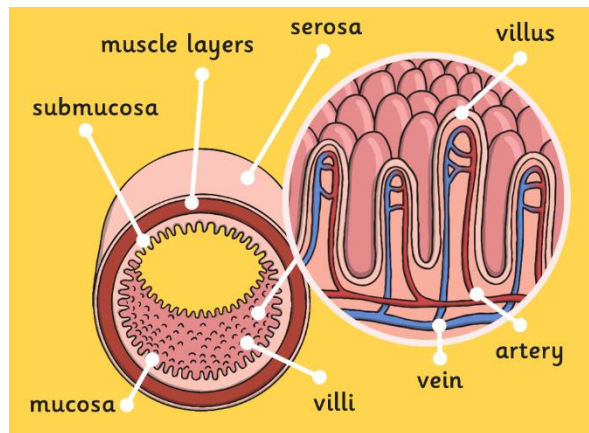


6. Once the ***oxygen*** has been ***delivered*** by the ***blood*** to the different areas of the ***body***, the ***deoxygenated*** blood must ***return*** to the ***heart.*** From the ***heart***, it is ***pumped*** through the ***right atrium*** and in to the ***right ventricle***. The ***deoxygenated blood*** then ***travels*** through the ***pulmonic valve*** in to the ***pulmonary artery*** which ***delivers*** the ***blood*** to ***capillaries*** in the ***lungs*** where it ***absorbs fresh oxygen***.
7. The process ***restarts and is continuous***.

How the Circulatory System Delivers Nutrients and Water:



1. Remember what we learned about ***digestion*** in ***Year 4***? ***Revise*** and ***re-read*** that Learning Journey Map!
2. After the ***food and liquids*** have been ***broken down*** in the ***mouth, oesophagus and stomach***, they can then ***pass through*** to the ***small intestine***. By this point, the food is in the form of ***chyme*** – a ***pulpy, acidic fluid*** made of ***stomach acid*** and small ***bits of food***. It is ***here***, in the ***small intestine***, where the ***nutrients*** are ***absorbed*** into the ***blood stream***.



3. The ***small intestine*** is a ***muscular tube*** with ***several layers*** and ***lined with tiny hair like villi*** which are ***attached*** to ***arteries and veins.***
4. The ***chyme*** is ***moved*** back and forth in the ***small intestine***. The ***nutrients pass through*** the ***villi*** and are ***absorbed*** into the ***blood vessels***.
5. ***Water*** is ***absorbed*** in the ***small intestine*** in the ***exact same way*** as other nutrients are absorbed – through the ***villi*** into ***bloodstream*** via the ***blood vessels***.
6. The ***nutrients and water***, now in the ***bloodstream***, travel around the ***body*** in the ***blood vessels*** and are ***absorbed*** by the ***cells*** which need them.

EXPLORE AND INVESTIGATE:

HYPOTHESISE
ENQUIRE
TEST
RECORD
REPORT
CONCLUDE

KEY ASSESSMENT AND APPLICATION OPPORTUNITIES:

EXS:
•

GDS:
•

UNDERSTAND, DESCRIBE AND EXPLAIN: KEY KNOWLEDGE

To recognise and understand the impact of diet, exercise, drugs and lifestyle on the way human bodies function

Learning links:
Science

Lifestyle	***Diet***	***Exercise***	***Drugs***	***Impact***	***Vitamins***	***Minerals***	***Nutrients***
Carbohydrates	***Proteins***	***Fruit & vegetables***	***Dairy***	***Oils***	***Sugar***	***Fat***	***Excessive***
Exercise	***Heart rate***	***Stamina***	***Drug/Substance***	***Legal***	***Illegal***	***Prescribed***	***Harmful***

The impact of lifestyle on the human body:

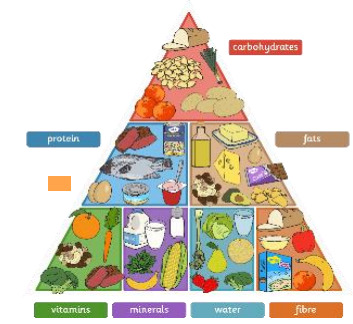
It's obvious, if you don't look after a car and don't put in the right petrol, it's not going to work properly. What many people do not realise is that our body is the same and what it becomes depends on how we choose to treat it. We need to think carefully about the areas of ***diet***, ***exercise***, ***drugs*** and ***lifestyle***, as these are the things that can have an ***impact*** on your ***body***.

Lifestyle means the way you live your life and this could be anything from your hobbies to what you enjoy doing as a family, understanding of portion sizes or what you tend to eat at mealtimes. People can forget that just a few simple changes to lifestyle can make changes to your body. Remember, a healthy lifestyle is about keeping a good balance!

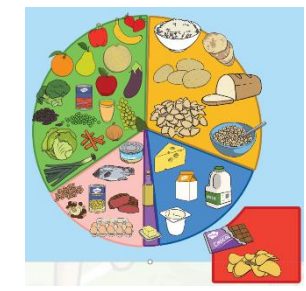
The impact of diet on the human body:

The word '***diet'*** simply means all the ***food*** and ***drink*** you choose to put into your body.

The standard ***healthy diet*** for a person with no medical needs (such as diabetes) contains a ***balanced mix*** of different types of ***food*** and ***drink*** highlighted in ***the Eat-well Plate***.



- **Fruit and Vegetables:** are good sources of vitamins and minerals and fibre. Aim to eat 5 portions a day! Choose from fresh, frozen, tinned, dried or juiced. Fruit juice and/or smoothies should be limited to 110 more than a combined total of 150ml per day.
- **Carbohydrates:** are starchy foods such as potatoes, bread, rice, pasta and cereals should make up just over a third of the food you eat. These are important for giving us energy. Choose higher-fibre, wholegrain varieties, such as wholewheat pasta and brown rice, or simply leave skins on potatoes.
- **Dairy and Alternatives:** are a source of calcium which is important for strong teeth and bones. Choose lower fat and sugar options.
- **Food and Drinks High in Fat and/or Sugar:** eat less often and in small amounts.
- **Oil and Spreads:** Choose unsaturated oils and spreads and use in small amounts. Eat sparingly.
- **Proteins:** such as beans, pulses, fish, eggs, meat are very important for helping us grow and build muscles. Beans and pulses are a good alternative to meat as they contain less fat and are higher in fibre and protein. Try to eat 2 portions of fish a week, and try to reduce intake of red and processed meat.



By ensuring that you eat a ***well-balanced, healthy diet***, your body will ***consume all of the right nutrients*** and ***vitamins*** that it needs to ***thrive***. You will ***feel good***, be able to ***complete challenging tasks***, have lots of ***energy*** and ***rarely get ill***. On the other hand, if you eat ***unhealthily*** and eat one food group ***excessively***, this will have a ***negative impact*** on your ***body*** and ***health:***

- By eating ***too much fat, oils, sugars or carbohydrates***, your body will ***store this as fat*** on and inside your body which can lead to ***serious health problems***.
- If you eat ***insufficient fruit and vegetables***, you may be ***missing key vitamins and minerals*** in your diet which can also ***lead to health problems***.
- By ***not*** eating ***enough carbohydrates***, you will ***lack energy*** and be ***unable to complete exercise*** or ***challenging tasks*** as well.
- A ***lack of protein*** in your ***diet*** will mean that your ***body struggles to repair*** itself after exercise.

The impact of exercise on the human body:

Exercise is ***physical activity*** that requires ***effort***, raises your ***heart rate*** and ***works your muscles***.

Doing ***one hour*** of exercise ***per day*** has a ***huge positive effect*** on your body. ***Regular exercise*** results in ***better blood circulation***, better ***stamina*** and ***fitness***, ***stronger bones*** and a whole host of other benefits:

- Helps you ***fall asleep faster*** and deeper so you are ***better rested***.
- ***Stimulates*** and releases ***brain chemicals*** – for example endorphins leave you ***feeling happier*** and serotonin helps keep your ***mood calm*** and leaves you ***feeling relaxed***.
- ***Increases*** the number of ***air sacs (alveoli***) in your lungs.
- ***Increases*** the amount of ***oxygen delivered*** to and carbon dioxide removed from the body.
- ***Bones*** increase in width and ***density*** (The denser the bone; the ***stronger*** it is).
- ***Increases*** the number of ***capillaries*** in the muscles.
- ***Strengthens all muscles***.
- ***Increases*** the ***circulation*** of blood – this means that nutrients are delivered and waste taken away faster which improves parts of the body like skin.
- ***Increases*** the ***volume*** of blood and ***red blood cells***.

The impact of drugs on the human body:

A ***drug*** is any ***substance*** that has an effect on your body when it ***enters your system***. This effect can be ***good or bad***. ***Drugs contain chemicals*** which can come from ***natural*** sources or are ***man-made***. It is important that you follow the ***advice of doctors*** and responsible adults when taking a drug as even medicines have to be taken in a particular way to keep them ***safe***.

Drugs can be ***medicines*** that are ***helping your body*** but they can also be ***substances***, such as ***alcohol*** or ***chemicals*** found in cigarettes that have a very ***bad effect on your body.***

Drugs that have a ***bad effect*** on someone's ***body*** can also make people ***think*** that it is having a ***good effect***. On top of this, they can also make someone's body ***want more of that drug*** and this is where someone can become ***addicted***.

Legal, non-harmful drugs:

Legal drugs include medicines like ***cough syrup*** and substances like ***tea or coffee***. These can be bought ***over the counter in shops***. If used properly, these are ***not substances that are considered harmful*** or have ***serious side effects***.

Legal, harmful drugs:

- ***Alcohol*** is a ***legal drug*** but there are ***restrictions*** and recommended ***limits*** on its use because, drunk in ***excess***, it can ***seriously damage health*** and can ***increase chances*** of: ***High blood pressure***, ***stomach cancer***, ***liver damage*** or ***addiction***.
- ***Tobacco smoking*** is a ***legal drug*** but there are ***restrictions*** and recommended ***limits*** on its use because it poses a ***serious threat to health***. ***Excessive*** tobacco smoking can ***increase*** chances of: ***lung cancer***, ***heart disease***, ***throat cancer***, ***heart attacks and strokes***.

Prescribed drugs:

These ***drugs*** are ***legal*** but only if you have been ***prescribed*** them. Only a ***doctor*** can write a ***prescription*** and this appears on your ***medical record***. This is due to several factors:

- These drugs can have ***serious side effects***.
- These drugs may ***not be suitable*** for some people, such as children or pregnant women.
- Medicines may not work or may ***cause harm*** if they are ***not taken at the correct dose***.
- Some medicines, for example, sleeping tablets, contain ***substances*** which could ***become addictive***.

Illegal drugs:

Unlike medicines, which are used to treat illness or disease, these ***drugs are taken by choice***. They are ***illegal to buy, take or sell***. These drugs are ***very harmful to the human body*** and are ***illegal*** because of the ***dangers associated*** with taking them. Some examples include:

- Cannabis
- Heroin
- Cocaine
- Ecstasy