Contents

Cell Structure

Organisms can be multicellular or _____ . Every type of cell has a _____ on the outside. The jelly like substance inside cells which is around 70% water is called the _____ . Small structures which do a particular job inside cells like chloroplasts and mitochondria are called _____ . Plant cells contain a cell wall made of _____ which is very strong and stops the cell from _____ . Also, in plants cells there is cell sap which can be found inside a _____ . In plant cells, the _____ contain a coloured pigment called _____ which traps sunlight for photosynthesis. The chloroplasts can contain _____ grains. The genetic information is stored in the _____ which contains lots of strands of DNA which forms _____ .

BIZARRE BIOLOGY: There are 10 times more bacterial cells in your body than human cells.

Questions

1. Describe 3 features that are found in plant cells but not animal cells. (3)

2. Suggest a reason plants cells have cell walls. (1)

Extension

score / 16

What type of organelle (structure) would you see a lot of in a palisade cell of a leaf and why?

Knowledge Boss

Why is chlorophyll green? Use your physics knowledge for this answer.

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cellulose	cytoplasm	vacuole	chromosomes	chloroplasts	starch
membrane	unicellular	nucleus	organelles	bursting	chlorophyll

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Cell Structure

Unicellular

Membrane

Cytoplasm

Organelles

Cellulose

Bursting

Vacuole

Chloroplasts

Chlorophyll

Starch

Nucleus

Chromosomes

1.
- (large) vacuole
- cell wall
- chloroplasts

2. Provide strength/structure/ to prevent bursting

Extension: Chloroplasts as it is the part of the leaf which carries out the most photosynthesis

Knowledge Boss:
Sunlight contains all colours of light. Each colour has a different wavelength. Chlorophyll is green because it reflects the green wavelength light and absorbs the other colours

Diffusion and Osmosis

Gases enter and leave cells by _____ because the molecules are small enough to pass through the _____. Diffusion always goes down a concentration _____ . Osmosis is the movement of water molecules through a partially _____ membrane. Water will move from a high water _____ to a low _____ potential. A high water potential means a _____ concentration of sugar/salt or other dissolved substances. A plant cell which has absorbed lots of water is said to be _____ . The outward pressure of the full cytoplasm exerts a high _____ pressure. A plant cell which has lost a lot of water is said to be _____ and the plant becomes floppy and _____ . If the cytoplasm shrinks so much and pulls apart from the cell wall the cell becomes _____ .

BIZARRE BIOLOGY : Fish need to excrete large quantities of salt to prevent their cells becoming too salty.

Questions

1. Define diffusion (1)

2. Define Osmosis. (2)

score /15

Extension

Why can some particles diffuse through membranes but others can´t?

Knowledge Boss

Explain why the rate of diffusion of carbon dioxide into a leaf is higher on a warm day.

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turgid	permeable	wilts	water	membrane	plasmolysed
turgor	low	gradient	diffusion	potential	flaccid

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Diffusion and Osmosis

Diffusion

Membrane

Gradient

Permeable

Potential

Water

Low

Turgid

Turgor

Flaccid

Wilts

Plasmolysed

1.
The movement of molecules from an area of higher concentration to an area of lower concentration

2.
- The diffusion of water molecules from a high water potential/dilute solution to a low water potential/concentrated solution
- Through a partially permeable membrane

Extension:
Only particles which are small enough can pass through the cell surface membrane.

Knowledge Boss:

The molecules of carbon dioxide have more kinetic energy and therefore move faster with more random collisions and more enters the leaf.

Carbohydrates

Carbohydrates are made of _____. These contain carbon, hydrogen and oxygen. The most common type is glucose. Glucose has the chemical formula is $C_6H_{12}O_6$. Sugars are _____ in water and taste sweet. A single sugar is called a _____, two bonded together make a _____ and many bonded together is called a _____ . Sucrose is the common sugar in your kitchen and is made of fructose and _____ bonded together (disaccharide).

The three types of carbohydrate are glycogen, starch and cellulose. _____ is the storage of energy in plant cells. _____ is the storage of energy in animal cells and _____ makes the plant cell walls and is for structure and strength. The test for a reducing sugar (glucose/maltose) uses _____ solution. It is a _____ colour and then changes to _____ when heated if a reducing sugar is present.

BIZARRE BIOLOGY : Cellulose is the most abundant biological molecule on Earth.

Questions

1. What is the test for starch and what are the colour changes? (2)

2. How would you prove a substance is not a reducing sugar? (2)

score /16

Extension

What is the ratio of the elements C, H, O in glucose?

Knowledge Boss

In what form do animals transport carbohydrate in their blood and why?

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glucose Benedict's monosaccharide orange glycogen
cellulose starch polysaccharide soluble disaccharide blue sugars

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Knowledge Boss

In what form do animals transport carbohydrate in their blood and why?

Carbohydrates

Sugars

Soluble

Monosaccharide

Disaccharide

Polysaccharide

Glucose

Starch

Glycogen

Cellulose

Benedict´s

Blue

orange

Questions

1.

- Iodine solution
- Goes from yellow to dark blue/black

2.

- Test is with Benedict´s solution
- It will stay blue colour

Extension

C,H,O = 1:2:1

Knowledge boss

- Sugar
- Small/soluble

Lipids and Proteins

Lipids (fats), like carbohydrates, also contain just carbon, hydrogen and oxygen. A molecule of _____ is bonded to three _____ . Fats are _____ in water. Fats which are liquid at room temperature are called _____ . Fats release more _____ per gram than carbohydrate (about double) but are only used when carbohydrate has been used up first. Fats are used for energy storage and _____ .

Proteins contain carbon, hydrogen and oxygen but also _____ . These elements form molecules called _____ which join together to form a _____. There are 20 different ones and they bond together in different combinations to forms a particular type of protein. Proteins are not normally used for _____ but for producing _____ cells and repair. Proteins can be _____ like keratin in hair or be used in metabolism like

BIZARRE BIOLOGY : We have around 100,000 different proteins in our body and they normally last less than two days.

Questions

1. Bullet point the procedure for testing lipids and state what colour is observed? (4)

2. What is the test for protein and what are the colour changes? (2)

score /19

Extension

Compare how the structure of proteins (polypeptides) are similar to carbohydrates (polysaccharides).

Knowledge Boss

Why is it beneficial to have 20 different amino acids? Remember that there are three carbohydrates which are all made of just the same molecule, glucose.

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oils	polypeptide	insulation	energy (x2)	enzymes	amino acids
glycerol	new	nitrogen	fatty acids	structural	insoluble

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Lipids and Proteins

Glycerol

Fatty acids

Insoluble

Oils

Energy

Insulation

Nitrogen

Amino acids

Polypeptide

Energy

New

Structural

Enzymes

1.
- Emulsion test
- Add lipid to ethanol
- Then add water
- Goes cloudy/milky

2.
•Biuret test
•From blue to purple/lilac

Extension:
•They are made of repeating units/monomers
•Form long chains
•contain C,H,O

Knowledge Boss:

It allows virtually unlimited sequences of amino acids which means there are millions of

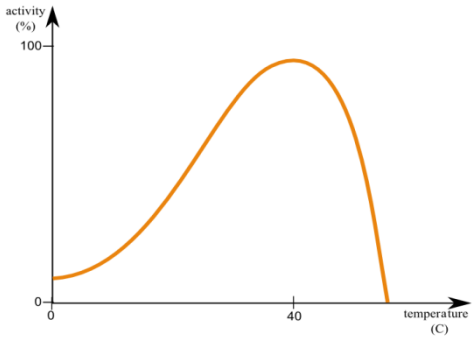
Enzymes

Enzymes are _____ because they speed up reactions. All enzymes are _____ and help with _____ . Substrate molecules fit into the _____ of the enzyme in a lock a key model. The substrate is _____ to the active site because only that substrate will enter and bond to the active site which forms an enzyme-substrate _____ . When the substrate has been converted into _____ the enzyme is able to accept another substrate as it does not get used up. Enzymes are sensitive to changes to _____ and _____ and work best when these are at their optimum level. If these conditions are too high or low then enzymes can become _____ which means the _____ holding the active site in its precise 3D shape break and the enzyme unravels and stops working. The majority of enzymes in _____ cells have around 37°C and pH7 as their optimum.

BIZARRE BIOLOGY : The enzyme catalase can break down around 40 million molecules of substrate in one second.

Questions

1. Why does activity increase from 0-40°C (3)



2. Explain what happens to the enzyme after 45 °C (2)

Extension

What is meant by optimum temperature?

score /17

Knowledge Boss

Enzymes become denatured when they become too hot. What do you think happens when they become too cold? (think of bonds, active site and kinetic energy)

Enzymes

Enzymes are _____ because they speed up reactions. All enzymes are _____ and help with _____ . Substrate molecules fit into the _____ of the enzyme in a lock a key model. The substrate is _____ to the active site because only that substrate will enter and bond to the active site which forms an enzyme-substrate _____ . When the substrate has been converted into _____ the enzyme is able to accept another substrate as it does not get used up. Enzymes are sensitive to changes to _____ and _____ and work best when these are at their optimum level. If these conditions are too high or low then enzymes can become _____ which means the _____ holding the active site in its precise 3D shape break and the enzyme unravels and stops working. The majority of enzymes in _____ cells have around 37°C and pH7 as their optimum.

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product proteins bonds complementary catalysts human temperature complex active site metabolism denatured pH

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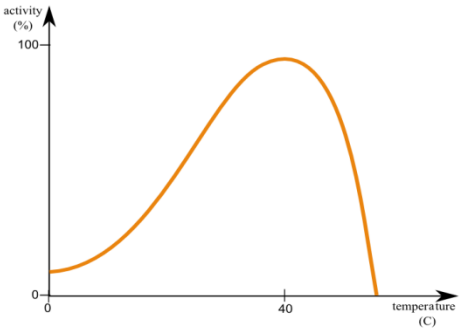

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Enzymes

Catalysts

Proteins

Metabolism

Active site

Complementary

Complex

Product

pH/temperature

pH/temperature

Denatured

Bonds

Human

1.

- As temperature increases the substrate and enzymes have more kinetic energy
- So there are more successful collisions between substrate and active site
- And therefore product is made faster

2.

- the high temperature breaks the bonds holding the active site in shape
- The enzyme becomes denatured

Extension

The best temperature at which the enzyme is able to convert the most substrate into product (per unit of time)

Knowledge Boss

The bonds stays intact/unbroken as low temperature do not disrupt them but the kinetic energy is so low that the substrate does not enter the active site and no product is made.

Photosynthesis

Plant cells trap the energy from the sun inside a pigment which it makes called _____ . The sun´s energy is used to make water and carbon dioxide _____ together. What is produced is _____ which is used for its energy and _____ which is released as a waste product. _____ energy is eventually converted to _____ energy. The glucose can be used directly in _____ or converted and stored as _____ for energy storage or made into _____ for transport. The starch can be stored inside granules inside the _____ . The glucose can also be made into the structural polysaccharide _____ . Sucrose is better to transport around the plant than glucose because it is less _____ but still quite soluble. When inside the cell, the sucrose can be broken and converted into _____ .

BIZARRE BIOLOGY : There is a cool animal which can also photosynthesise. Ask your teacher to show you a photo.

Questions

1. Write the word equation and below it the balanced symbol equation for photosynthesis. (4)

2. Which inorganic substances does a plant use to make carbohydrate? (2)

Score /19

Extension

Explain why the transfer of energy from light to chemical energy in plant cells is essential for life on Earth.

Knowledge Boss

There is an old saying that talking to your plants helps them grow. Do you think this could be correct and why or why not correct?

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respiration	cellulose	react	reactive	starch (2x)	chlorophyll
glucose	chloroplasts	light	sucrose	chemical	oxygen

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Photosynthesis

Chlorophyll
React
Glucose
Oxygen
Sunlight
Chemical
Respiration
Starch
Sucrose
Chloroplasts
Cellulose
Reactive
Starch

(1 mark) (1 mark)

1. carbon dioxide + water (light) glucose + oxygen

$$6CO_2 + 6H_2O \xrightarrow{light} C_6H_{12}O_6 + 6O_2$$

(1 mark) (1 mark)

2.
Water
Carbon dioxide

Knowledge Boss: google a photo of the green sea slug.

Extension:
Plants start food chains on land because they capture the sunlight energy and convert it into carbohydrate/sugar/food

Knowledge Boss:
Students who give a reason may say yes because of the extra CO_2 it is receiving from the person which is logical thinking but there is enough CO_2 in the air for this not have an affect.

However:
In a study performed by the Royal Horticultural Society, researchers discovered that talking to your plants really can help them grow faster. As they respond to the vibrations. They also found that plants grow faster to the sound of a female voice than to the sound of a male voice
(March 2021)

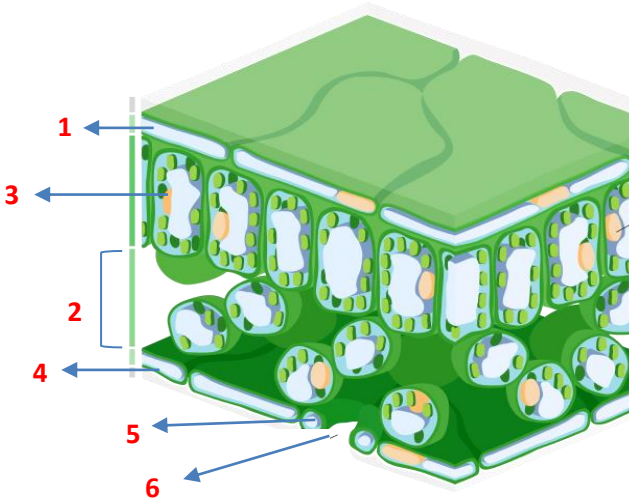
Leaves

Leaves have a large _____ and are _____ to maximise light absorption. They have a top and bottom layer called the _____ which do not contain _____ and function as protection for the inner cells. The wax cuticle on the surface of the _____ epidermis helps to prevent _____ of water. On the lower epidermis there are small openings called _____ . The middle layers are called the _____ and contain lots of _____. The _____ mesophyll cells are packed together in rectangular arrangements and the _____ mesophyll are loosly packed and are rounder. This allows air spaces which help the _____ of gases. Running through the mesophyll are _____ vessels for water transport and _____ tubes for sucrose transport away from the leaf.

BIZARRE BIOLOGY : Lettuce leaves are the worlds most popular salad ingredient.

Questions

1. Label the structures of the leaf. (7)



2. What are stomata (stoma) and guard cells and what do they do? (2)

Score /23

Extension

Explain why a transparent epidermis is an adaptation for photosynthesis.

Knowledge Boss

Explain why the leaves on some trees in autumn go a brown colour.

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Leaves have a large _____ and are _____ to maximise light absorption. They have a top and bottom layer called the _____ which do not contain _____ and function as protection for the inner cells. The wax cuticle on the surface of the _____ epidermis helps to prevent _____ of water. On the lower epidermis there are small openings called _____ . The middle layers are called the _____ and contain lots of _____. The _____ mesophyll cells are packed together in rectangular arrangements and the _____ mesophyll are loosly packed and are rounder. This allows air spaces which help the _____ of gases. Running through the mesophyll are _____ vessels for water transport and _____ tubes for sucrose transport away from the leaf.

xylem upper chloroplasts (2x) diffusion evaporation palisade mesophyll surface area phloem thin stomata epidermis spongy

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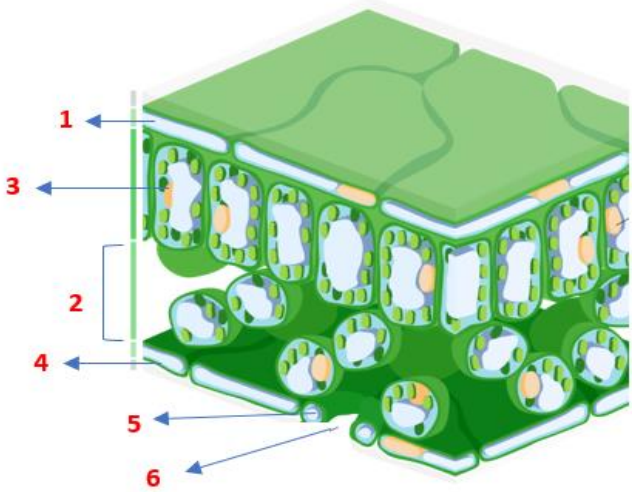

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Leaves

Surface area

Thin

Epidermis

Chloroplasts

Upper

Evaporation

Stomata

Mesophyll

Chloroplasts

Palisade

Spongy

Diffusion

Xylem

Phloem

1. Upper epidermis
2. Spongy mesophyll
3. palisade mesophyll
4. lower epidermis
5. Guard cells
6. Stomata (stoma)

2.

- Stomata are the holes which are created by the guard cells which allow diffusion of gases/CO_2, O_2.
- Guards cells open and close to create the stomata

Extension:

- Allows as much light as possible to pass through the epidermal layer/cells
- To the palisade layer/cells below

Knowledge Boss:

They absorb their chlorophyll back into the inner tree parts to conserve it. The leaves lose their chlorophyll and turn brown

Diet

Animals need to eat to get energy. There are 7 nutrients which animals need and if they get it in the correct quantities then it is a _____ diet. The 3 nutrients needed in the largest quantity are carbohydrates, _____ and _____ . _____ are organic substances and _____ are inorganic. Organic means it contains carbon and hydrogen. These are needed in small amounts. A _____ disease is when you do not eat enough of a particular nutrient. If you lack _____ which is found in _____ then you can get scurvy. If you lack _____ found in animal foods then you can get _____ which means you have soft bones. A lack of _____ means you could get anaemia which affects your _____ and your ability to transport oxygen. When people take in way more energy than they consume then they can become _____ . _____ is caused by not eating a balanced diet. Two extremes examples of malnutrition are _____ and _____.

BIZARRE BIOLOGY : Negative calorie foods do not exist. Even celery gives a little energy to your body.

Questions

1. Why is fibre important in your diet? (1)

2. List the three nutrients in the order of energy that they contain. (1)

Score /18

Extension

Why can we not digest cellulose which makes up fibre?

Knowledge Boss

Consider how you could calculate how much energy is in a type of food.

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vitamin C haemoglobin vitamins obese iron malnutrition vitamin D balanced fats rickets marasmus citrus fruits proteins kwashiorkor deficiency minerals

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Diet

Balanced

Fats

Proteins

Vitamins

Minerals

Deficiency

Vitamin C

Citrus fruits

Vitamin D

Rickets

Iron

Haemoglobin

Obese

Malnutrition

Kwashiorkor

marasmus

1.
- Helps food move along alimentary canal/small/large intestine
- Helps prevent constipation

2.
Most first:
fats
carbohydrates
proteins

Extension:
Humans do not have the enzyme cellulase to break down cellulose

Knowledge Boss:

Dry the food. Get a standard quantity like 1g and burn it in something surrounded by a certain volume of water. Measure how much the temperature of the water increases.

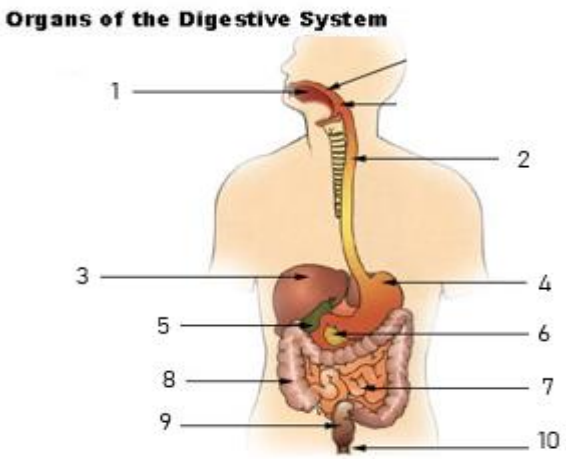
Digestion Part 1

_____ is taking in food into the alimentary canal. Breaking down large _____ molecules into small _____ molecules is called _____ . Those small molecules passing into the blood is called _____. The undigested food material which is removed from the body is called _____. This process is called _____which is not to be confused with _____ which is the removal of metabolic waste (made by cells) from the body. There are two types of digestion: _____ which is done by the teeth and _____ which churns up the food but there is no _____ change. And chemical digestion which is done by _____ and involves a chemical change.

BIZARRE BIOLOGY Our large brains use so much energy it means our intestinal tract which also uses lots of energy has been reduced in length through evolution. This is the Expensive Tissue hypothesis.

Questions

1. Label the structures.



2. What is chemical digestion? (2)

Score _/24

Extension

Consider why proteins, fats and carbohydrates need to be broken down?

Knowledge Boss

Why if you chew bread in your mouth for a while it will start to taste sweet?

Digestion Part 1

_____ is taking in food into the alimentary canal. Breaking down large _____ molecules into small _____ molecules is called _____ . Those small molecules passing into the blood is called _____.

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mechanical	egestion	enzymes	insoluble	absorption	faeces
chemical	stomach	soluble	ingestion	excretion	digestion

BIZARRE BIOLOGY : Our large brains use so much energy it means our intestinal tract which also uses lots of energy has been reduced in length through evolution. This is the Expensive Tissue hypothesis.

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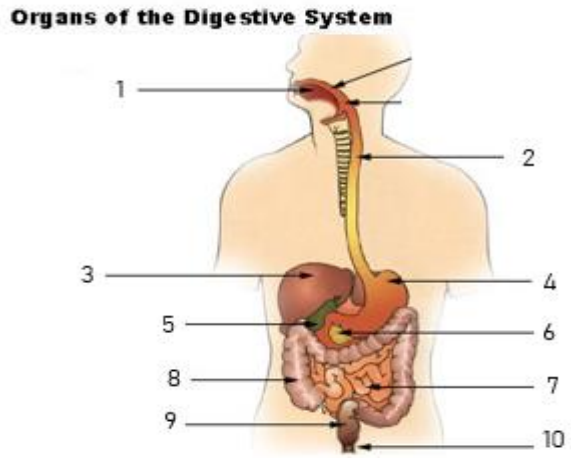

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Digestion Part 1

Ingestion	Egestion
Insoluble	Excretion
Soluble	Mechanical
Digestion	Stomach
Absorption	Chemical
Faeces	enzymes

1.
1. mouth
2. oesophagus
3. liver
4. stomach
5. gall bladder
6. pancreas
7. small intestine
8. large intestine
9. rectum
10. anus

2.
- Large molecules are broken down into smaller
- via chemical reactions
- enzymes are involved

Extension:
They are too large biological molecules to pass though the walls of the small intestine into the blood and are also insoluble. They must be broken down into smaller, soluble molecules.

Knowledge Boss:
Yes. Bread contains starch because the flour comes from plant cells. Amylase in the saliva breaks down the starch into glucose which tastes sweet.

Digestion Part 2

Chemical digestion is carried out by _____ made in the mouth, stomach and pancreas. The enzymes from the _____ are released into the small intestine and break down large insoluble food molecules into small soluble molecules to be absorbed into the _____. The stomach produces _____ which lowers the pH to around pH 1-2. This is to kill any harmful microorganisms which may be in the food. The small intestine absorbs _____ and water and the large intestine just absorbs _____. The undigested food is stored in the rectum as _____ and is egested.

The liver produces _____ which is stored in the _____ and released into the small intestine. It _____ fats making them soluble so the enzyme _____ can break them down. The pancreas produces all three enzymes and pacreatic juice which is _____ into the duodenum part of the small intestine. The small intestine are covered in _____ to increase surface area and the _____ increase it even more.

BIZARRE BIOLOGY : Our digestive system is around 8 metres long and 6m is the small intestine.

Questions

1.

Enzyme	Where produced	Substrate	Final product
	salivary gland pancreas		
protease			amino acids
		fats and oils (lipids)	

2. What adaptations does a villus have for efficient absorption? (3)

Extension

Why is the pancreatic juice alkaline?

Score /25

Knowledge Boss

Consider what would be the consequences if our digestive system were shorter.

Digestion Part 2

Chemical digestion is carried out by _____ made in the mouth, stomach and pancreas. The enzymes from the _____ are released into the small intestine and break down large insoluble food molecules into small soluble molecules to be absorbed into the _____. The stomach produces _____ which lowers the pH to around pH 1-2. This is to kill any harmful microorganisms which may be in the food. The small intestine absorbs _____ and water and the large intestine just absorbs _____. The undigested food is stored in the rectum as _____ and is egested.

The liver produces _____ which is stored in the _____ and released into the small intestine. It _____ fats making them soluble so the enzyme _____ can break them down. The pancreas produces all three enzymes and pacreatic juice which is _____ into the duodenum part of the small intestine. The small intestine are covered in _____ to increase surface area and the _____ increase it even more.

lipase water pancreas villi gall bladder enzymes hydrochloric acid
microvilli faeces blood alkaline bile food emulsifies

BIZARRE BIOLOGY : Our digestive system is around 8 metres long and 6m is the small intestine.

Questions

1.

Enzyme	Where produced	Substrate	Final product
	salivary gland pancreas		
protease			amino acids
		fats and oils (lipids)	

2. What adaptations does a villus have for efficient absorption? (3)

Score /25

Extension

Why is the pancreatic juice alkaline?

Knowledge Boss

Consider what would be the consequences if our digestive system were shorter.

Digestion Part 2

Enzymes	Bile
Pancreas	Gall bladder
Blood	Emulsifies
Hydrochloric acid	Lipase
Food	Alkaline
Water	Villi
Faeces	Microvilli

(1 mark per box)

Enzyme	Where produced	Substrate	Final product
amylase	salivary gland pancreas	starch	glucose
protease	Stomach pancreas	protein	amino acids
lipase	pancreas	fats and oils (lipids)	Fatty acids and glycerol

2.

- Large surface area
- Good blood supply/large network of capillaries
- Lacteal to absorb lipid molecules

Extension

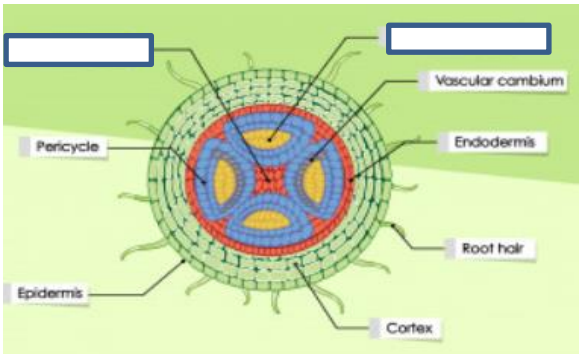
To neutralise the acidic food from the stomach. If not the low pH through the small intestine would destroy the tissues.

Transport in Plants

There are two types of transport vessel in plants, the _____ which transports _____ and dissolved mineral ions and the _____ which transport dissolved food materials like _____ and amino acids. The xylem form long, hollow tubes and are made from _____ cells. The substances in the xylem always tavel _____ from roots to leaves. Phloem cells are living and transport substances in both directions. The transport of these substances in the phloem is called _____ and occurs in _____ directions. The leaves which carry out photosynthesis and therefore translocating the sucrose and amino acids is called a _____. The part of the plant to which these are being translocated to is called a _____ which is often the roots as they grow a lot and can not carry out photosynthesis. The phloem and xylem tissue when found close to each other is called the _____ bundle.

BIZARRE BIOLOGY : The Mesquite tree which survive in very arid (dry) places can have roots which go 60m into the ground.

Questions



1. Label the xylem and phloem on the diagram. (2)

2. List 2 similarities and two differences between xylem and phloem vessels. (4)

Score /17

Extension

Explain why xylem tubes are hollow.

Knowledge Boss

Consider the advantages of xylem tubes being made of dead cells.

Transport in Plants

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translocation phloem sink vascular sucrose xylem
dead source water upwards both

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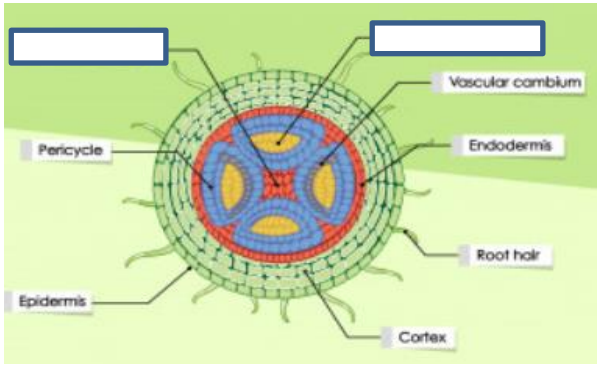

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Knowledge Boss

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Transport in Plants

Xylem

Water

Phloem

Sucrose

Dead

Upwards

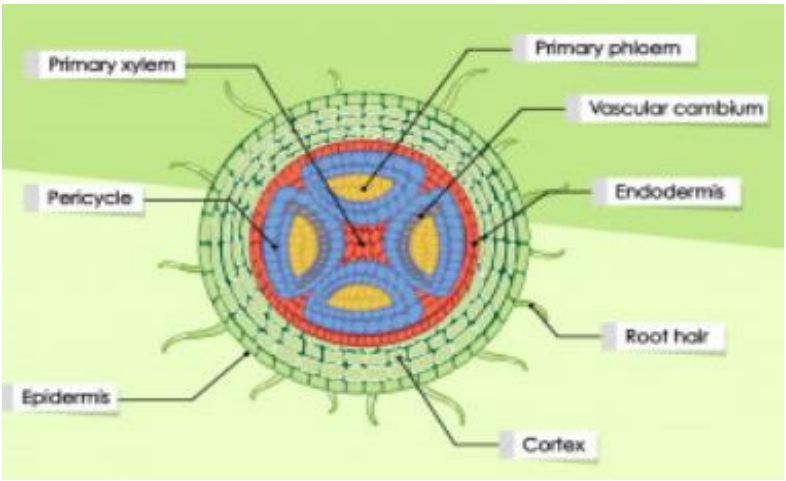
Translocation

Both

Source

Sink

Vascular



2.

Similarities

- Tubes
- Transport substances around a plant

Differences

- Xylem one direction, phloem both directions
- Xylem has some dead cells, phloem has living cells
- Xylem transports water and ions, phloem food substances
- Xylem tubes are hollow, phloem is not hollow

Extension:

To allow the water and ions to travel easily through the tubes with being restricted by the cell contents like cytoplasm and organelles.

Knowledge Boss:

- If they were living they would require water and there would be less transported to the leaves.
- Living cells require energy to maintain.
- They are dead because they can be strengthened with lignin which is a structural polysaccharide to provide plant support

Water Uptake and Transpiration

Plants absorb water through the _____ cells which are adapted for efficient water uptake because they have a high _____ . Water enters by _____ due to there being a higher _____ in the _____ than inside the cells. Mineral ions like nitrates enter by _____ because normally their concentration is higher inside cells than in the soil.

The loss of water vapour which mostly occur in the leaves is called _____ . Water _____ out of the cells in the leaves and _____ out of the air spaces inside the leaves into the atmosphere through the holes called_____ . The movement of water from roots, xylem, mesophyll and out the stomata is known as the _____ . Humidity and _____ can affect the _____ of transpiration.

temperature active transport root hair evaporates rate surface area diffuses soil transpiration stream water potential transpiration stomata osmosis

BIZARRE BIOLOGY Plants can grow without soil as long as their roots are placed in a nutrient solution. This type of plant cultivation is known as Hydroponics.

Questions

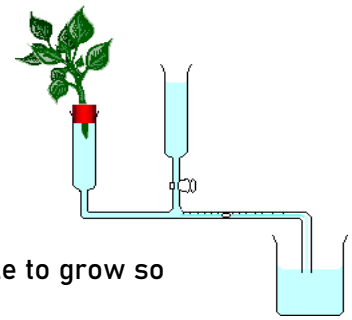
1. Why would the stomata in plants close at night? (3)

2. List some points as to why a plant needs to carry out transpiration (3)

Score /19

Extension

What effect will placing a plastic bag over a plant have and why?



Knowledge Boss

Consider why this branch with leaves in this potometer would not be able to grow so well even when placed in sunlight.

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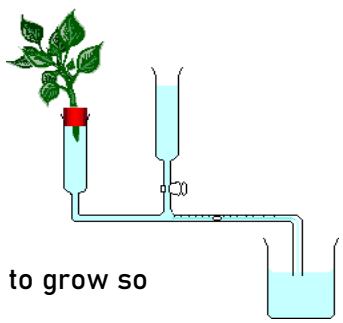

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Water Uptake and Transpiration

root hair
surface area
osmosis
water potential
soil
active transport
Transpiration
Evaporates
Diffuses
Stomata
Transpiration stream
Temperature
rate

1.

- No photosynthesis
- So does not need carbon dioxide from the air
- Closes to reduce water loss

2.

- transporting mineral ions
- providing water to keep cells turgid in order to support the structure of the plant
- providing water to leaf cells for photosynthesis
- keeping the leaves cool (the conversion of water (liquid) into water vapour (gas) as it leaves the cells and enters the airspace requires heat energy.

Extension:

Transpiration will decrease because there is a lower water potential gradient between leaves and atmosphere as the atmosphere has more water vapour due to the water vapour leaving the leaves and being trapped inside the bag.

Knowledge Boss:

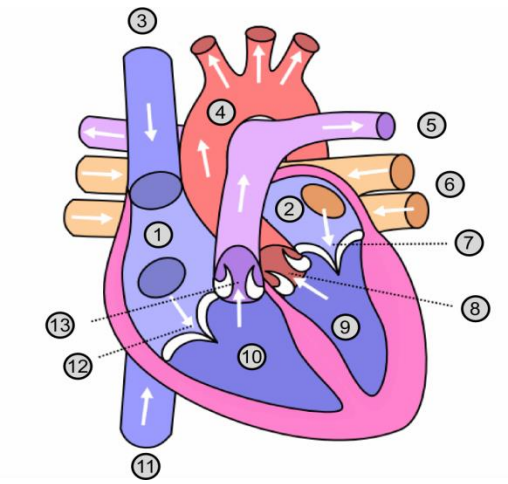
- It is only receiving water but not minerals such as nitrate which it needs to make amino acids and grow.
- It may have been distressed from being cut from the plant.

The Heart

The circulatory system in mammals contain blood vessels acting as the _____ and the heart acting as the _____ . Making blood always travel in one direction is the _____ and the _____ . It is a _____ circulatory system because blood goes to the heart and then to the _____ and then back to the heart before going to the rest of the _____ . The left side of the heart pumps _____ blood and the right side pumps _____ blood. The heart rhythmically contracts in a _____ way. The two atria contract at the same time and push blood into the _____. Then the ventricles contract pushing blood _____ of the heart while the atria _____ .

BIZARRE BIOLOGY: If your heart was out of your body and able to contract with its normal force it could spurt blood 11 metres out of the aorta.

Questions



Q1. Label the numbers with the structures (10)

1.

2.

3+11.

4.

5.

6.

7+12.

8+13.

9.

10.

Q2. What is the advantage of a double circulatory system (1)

Extension

Why is the left side of the heart thicker than the right side?

Score /24

Knowledge Boss

The left and right side of the heart is separated by the septum. Why is this important?

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body valves pump tubes coordinated pressure relax
double lungs out oxygenated ventricles deoxygenated

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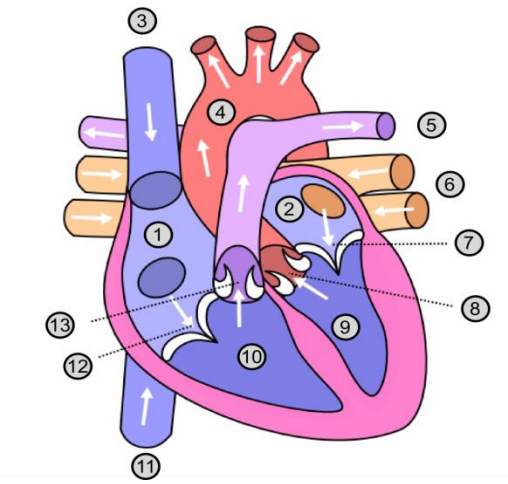

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The Heart

Tubes	Oxygenated
Pump	Deoxygenated
Pressure	Coordinated
Valves	Ventricles
Double	Out
Lungs	Relax
Body	

Q1.

1. Right atrium
2. Left atrium
3+11. vena cava
4. Aorta
5. Pulmonary artery
6. Pulmonary vein
7+12. Atrio ventricular valves or mitral valve (7) and tricuspid valve (12)
8+13. Semilunar valves or aortic valve (8) and pulmonary valve (13)
9. Left ventricle
10. Right ventricle

Q2.

- Produce higher pressure from the heart (rather from the lungs) to go around the body
- Less pressure in the capillaries of the lungs which could get damaged by high pressure

Extension

To contract with more force to generate a higher pressure so blood leaving the aorta has enough pressure/push to go around the body.

Knowledge Boss

The right and left sides of the heart are separated to prevent blood without oxygen from mixing with blood that has oxygen.

Blood vessels and blood

Blood Vessels

_____ are the largest blood vessels and carry blood away from the _____ . As these divide further into smaller ones they become _____ which connect into even smaller vessels called _____ . These form an extensive network supplying _____ blood to the cells and _____ . The capillaries connect up to _____ and then to _____ which all eventually join towards the vena cava. Veins are unique in that they have _____ which prevents the backflow of blood.

Blood Composition

Around 55% of blood is the liquid component called _____ which mostly contains _____ . The most common cell type are the red blood cells which carry oxygen because of their _____ . The white blood cells fight _____ and help control the immune response . _____ are fragments of cells which are involved with blood clotting when blood vessels are damaged.

BIZARRE BIOLOGY : If it was possible to put all your blood vessels in your body in a line it would wrap around the world 4 times. There are 4-6 million red blood cells in 1ml of blood.

Questions

1. Name 3 substances transported in the blood plasma. (3)

2. Explain two adaptations of red blood cells which make them efficient for carrying oxygen. (2)

Score / 19

Extension

Why do veins have large lumens?

Knowledge Boss

What problem would arise if a person had insufficient platelets in their blood?

Blood vessels and blood

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haemoglobin tissues plasma arteries platelets venules capillaries heart infections veins arterioles water oxygenated valves

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Extension

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Score / 19

Knowledge Boss

What problem would arise if a person had insufficient platelets in their blood?

Blood vessels and blood

Arteries

Heart

Arterioles

Capillaries

Oxygenated

Tissues

Venules

Veins

Valves

Plasma

Water

Haemoglobin

Infections

platelets

1.

Water, salts, ions, carbon dioxide, urea, hormones, food molecules, antibodies

2.

- Bi-concave shape increase surface area to volume ratio
- No nucleus so cell has more room to fit more haemoglobin molecules

Extension

As there is less pressure in the veins, having a larger lumen means it does not restrict the flow of blood as much/allows blood to pass through more easily.

Knowledge Boss

If a person cuts them self then the blood clot will not work so well and they may continue to bleed.

Respiration

Respiration is one of the 7 _____ processes. It is a process which happens inside all cells and specifically inside the _____ of human cells. Respiration releases energy from the chemical bonds in food molecules such as _____ . A cell needs energy to be able to make _____ cells, create new chemical bonds in protein synthesis, contracting muscles, active transport of _____ across cell membranes and producing heat to keep body temperature constant. Aerobic respiration requires _____ and anaerobic respiration does not. Most of the time in plant and animal cells aerobic respiration is sufficient but when a person _____ they do not have enough oxygen for the _____ and begin anaerobic respiration. Anaerobic respiration produces _____ which builds up inside the cells and the blood. This is harmful to cells and is transported to the _____ to be broken down as well as inside the muscle cells. When enough oxygen is present the lactic acid is converted back into _____ . The additional oxygen needed to do this is called the _____ and is the reason a person continues to breathe heavily for a while after exercise.

BIZARRE BIOLOGY: The record for holding breath under water for a human is 11.5 minutes. Sperm whales are able to hold their breath for 90 minutes.

Questions

1. Write the word equation for aerobic respiration (1)

2. Write balanced chemical equation for aerobic respiration (1)

3. Write the word equation for anaerobic respiration in humans (you do not need to know the chemical equation) (1)

Extension

Write the word equation for anaerobic respiration in yeast cells.

Score /15

Knowledge Boss

Explain why bread dough rises and also why baked bread does not contain ethanol (alcohol).

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muscles new oxygen debt life liver molecules glucose (2X) lactic acid mitochondria oxygen exercises

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Score /

Respiration

Life

Mitochondria

Glucose

New

Molecules

Oxygen

Exercises

Muscles

Lactic acid

Liver

Glucose

Oxygen debt

1.

oxygen + glucose → water + carbon dioxide (+ energy)

2.

$6O_2 + C_6H_{12}O_6 \rightarrow 6H_2O + 6CO_2$ (+ energy)

3.

glucose → lactic acid (+ some energy)

Extension

Glucose → carbon dioxide + ethanol (+ energy)

Knowledge Boss

Bread rises because of the carbon dioxide produced. It does not contain ethanol when baked because the ethanol evaporates with the heat of the oven. So dough is a little bit alcoholic