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- Cell Structure
- Diffusion & Osmosis
- Carbohydrates
- Lipids and Proteins
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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)

Extension

score /15



Why can some particles diffuse through membranes but others can't?

Knowledge Boss

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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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1. Define diffusion (1)

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Extension

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score /15





Knowledge Boss

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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

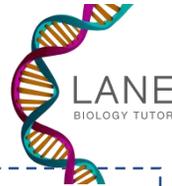
Extension:

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)

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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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 form 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)

Extension

score /19



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

Knowledge Boss

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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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- Bullet point the procedure for testing lipids and state what colour is observed? (4)
- What is the test for protein and what are the colour changes? (2)

score /19



Extension

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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 possible proteins which can be made.

Enzymes

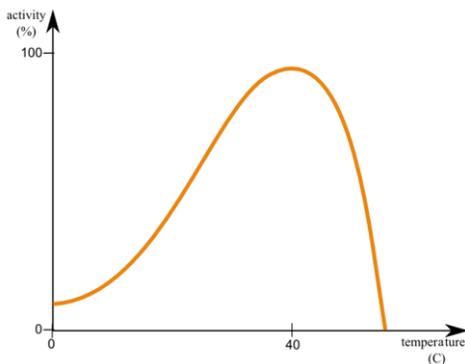


Enzymes are _____ because they speed up reactions. All enzymes are _____ and help with _____. Substrate molecules fit into the _____ of the enzyme in a lock a key model. The substrate is _____ to the active site because only that substrate will enter and bond to the active site which forms an enzyme-substrate _____. 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



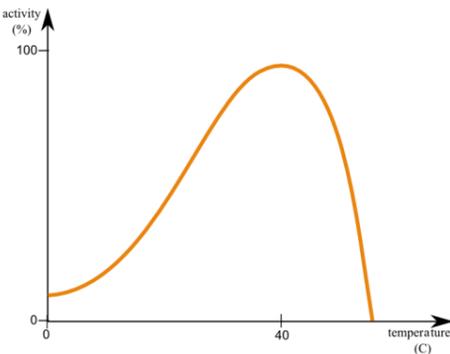
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product	proteins	bonds	complementary	catalysts	human
temperature	complex	active site	metabolism	denatured	pH

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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.

They do not denature and will work again if the temperature is increased.

Sourced Images

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File:Enzyme-temperature.png

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