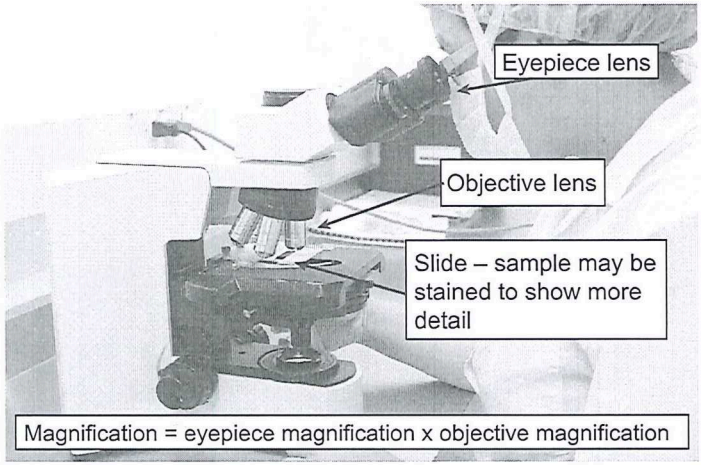
Year 10
Biology revision
Key questions

1.1 Cells, organisation and movement of substances

Name : _____

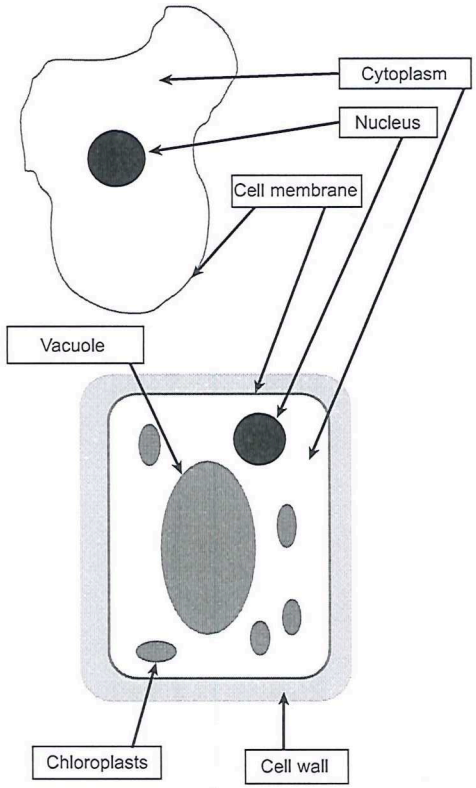
GCSE Biology 1.1 Cells Knowledge organiser



Magnification

A light microscope can only be used up to a magnification of x2000. To look at things at a higher magnification and in more detail an electron microscope can be used. However, an electron microscope can only view dead material.

Animal cells and plant cells



Specialised Cells

Cells can **differentiate** into **specialised** cells.

Specialised cells are **adapted** to specific functions and so are more **efficient** in carrying them out.

Red blood cells contain haemoglobin and are biconcave in shape to maximise efficiency in carrying oxygen.

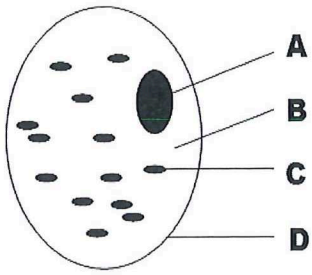
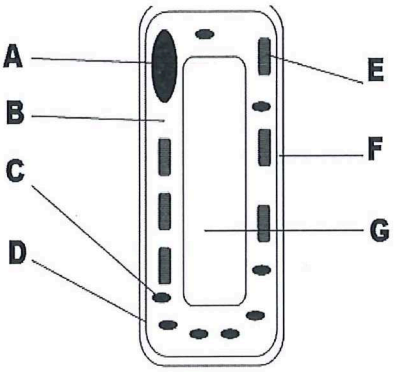
Sperm cells have tails so they can swim to the egg cell.

Cell Structure	Function	Animal cells contain:	Plant cells contain:
Nucleus	Contains chromosomes which carry genetic information and controls actions of the cell.		
Cell membrane	Controls the entry and exit of substances		
Cytoplasm	Site of most cell reactions.		
Vacuole	Contains a watery sugar solution called sap. When full the vacuole pushes the cytoplasm against the cell wall.		
Chloroplasts	Site of photosynthesis.		
Cell wall	Contains cellulose and provides structural support for cells.		
Mitochondria	Site of aerobic respiration.		

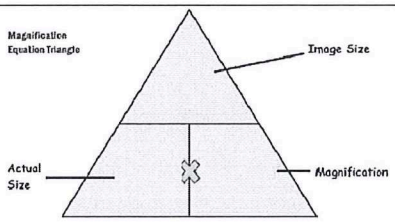
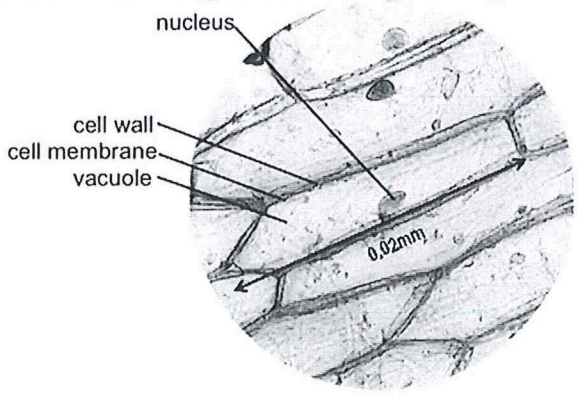
Organisation

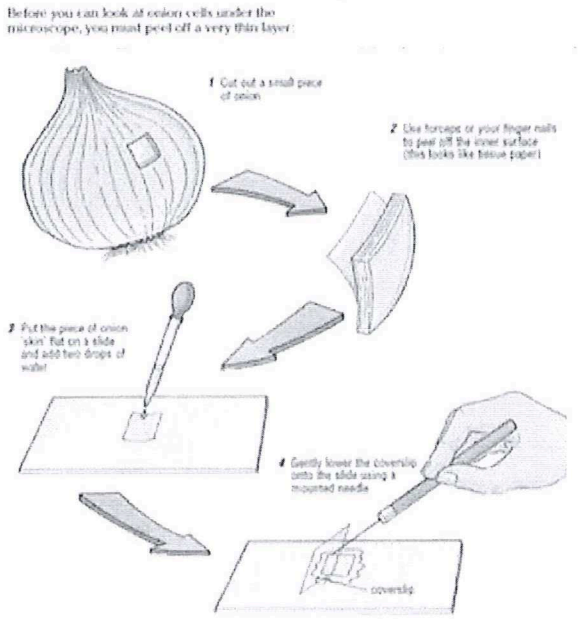
Level	Description
Cells	Smallest unit of life
Tissues	A group of similar cells performing a specific function
Organs	Different tissues working together for a specific function
Organ system	Organs working together
Organism	A living thing

1.1 Cells and transport

Cells tissue and organs	
Label the animal cell  	A= B= C= D=
Label the plant cell  	A= B= C= D= E = F = G =
What is the function of the nucleus?	
What is the function of the cell membrane?	
What id the function of the cytoplasm?	
What is the function of mitochondria?	
What is the function of the Chloroplast?	
What is the function of the cell wall?	

What is the function of the vacuole?	
What are the cell structures that plant and animal cells have in common?	
What additional cell structures does a plant have compared to an animal cell?	
Give an example of a specialised plant cell.	
Give an example of a specialised animal cell.	
What is the name of the process of a stem or undifferentiated cell turning into a specialised cell called?	
What are groups of **similar cells** with a similar function and working together called?	
What is an organ?	
What is an organ system? Give an example.	

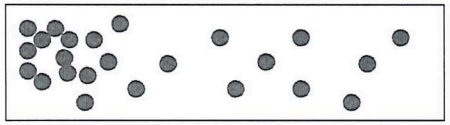
Microscopes	
Which part of a microscope magnifies?	
What are the two lenses called?	
Which part do you turn to focus the image?	
What's the function of a lens?	
What is the function of the focussing wheel?	
How do you calculate the total magnification using two lenses?	
If Sarah used a x10 eye piece lens and a x40 objective lens what would the total magnification be?	
What is the calculation triangle for calculating magnification? Add I AM to each part of the triangle.	 Magnification =
What is the magnification of this diagram 	1. Measure the line in mm. 2. Divide your measurement (the image) by the actual length

The diagram above was an onion cell Why did the tissue have to be thin?	
Why did we add iodine to it?	
Why can't we see mitochondria?	
Why cant we see chloroplasts?	
Describe how you would prepare a slide to view under the microscope.  	

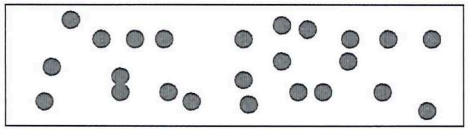
GCSE Biology 1.1 Movement across cell membranes knowledge organiser

Diffusion

Constantly moving liquid and gas molecules tend to move from an area of **high concentration to an area of lower concentration:**

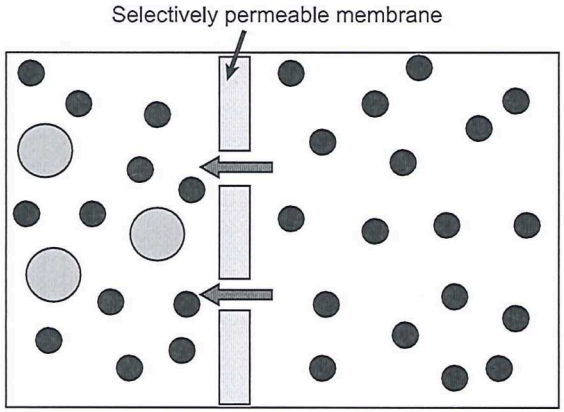


until evenly distributed :



- This is a **passive** process – it does not require energy.
- Molecules move **down a concentration gradient**.
- This process is called **diffusion**.

Factors that affect diffusion include:	
Concentration	The greater the concentration gradient the greater the diffusion rate.
Temperature	At higher temperatures molecules have more kinetic energy and so move and diffuse faster.
Pressure	Molecules move quickly from an area of higher to lower pressure.

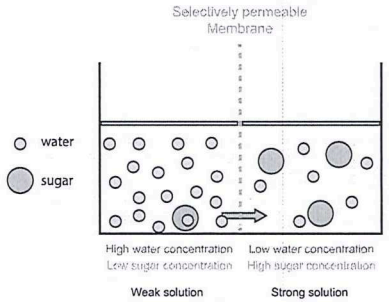


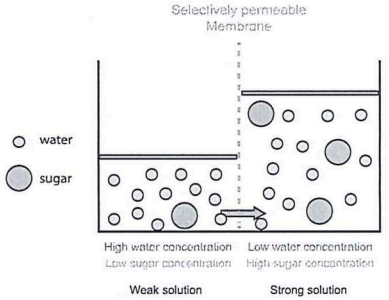
Visking tubing can be used to model a cell membrane as it is selectively permeable.

Only molecules small enough can diffuse through the pores.

Osmosis

Osmosis is the diffusion of water from **high water concentration** (dilute solute solution) to **low water concentration** (concentrated solute solution) across a **selectively permeable membrane**.





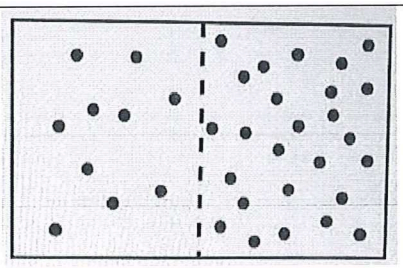
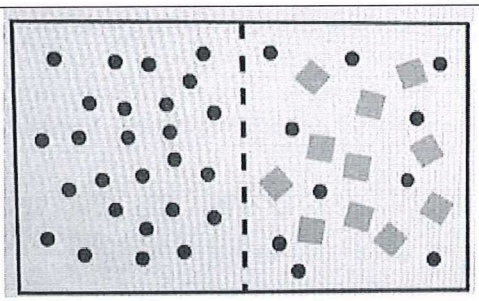
When answering exam questions on osmosis consider the data given and describe using the following statements:

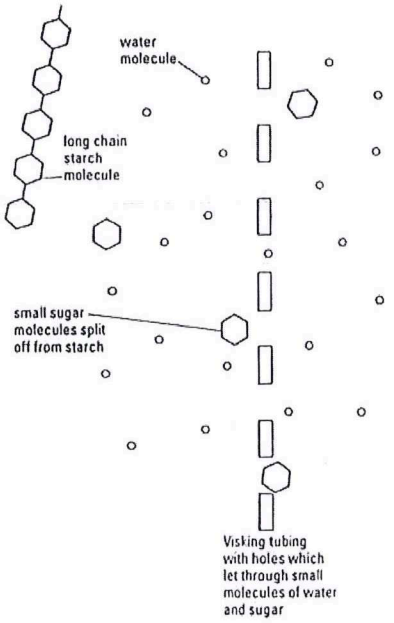
Do	Do not
Do state in which direction the water is moving in the example.	Do NOT talk about the solution moving. Large solute molecules do not cross the membrane, only water does.
Do state that water moves from a high to low water concentration.	Do not suggest salt or sugar can cross cell membranes, they cannot.
Do state that water is moving by osmosis and that the net movement is in the direction stated.	Do not suggest molecules only move in one direction, they will cross the membrane in both directions but the NET movement will be in one direction if osmosis is occurring.
Do state that water moves across a semi-permeable membrane.	Do not call the membrane permeable, if it were osmosis would not occur.
Then give the result e.g. animal cells burst if too much water goes in but plant cells become turgid, they are held together by the cell wall. Plants will wilt if their cells become flaccid (lose too much water) and animal cells will shrink.	Do not describe animal cells as turgid and flaccid, these terms apply to plant cells.

Active Transport- Higher tier only

Active transport moves molecules **against a concentration gradient.**

This process **uses energy in the form of ATP** provided by **respiration. Glucose and oxygen** are required for respiration.

Movement across membranes	
What is diffusion?	
How do particles move in diffusion?	
What three factors increase the rate of diffusion and explin how?	
Which way will the particles diffuse in this diagram? Draw an arrow to show the direction What are the gaps in the membrane called?	
Which particles will diffuse in this diagram? (Round or square) Explain your answer Which way will they diffuse draw an arrow to show your answer.	
What molecules will diffuse into a cell for aerobic respiration?	
Which molecule will diffuse from the alveoli into the blood in the lungs?	
Which Molecule will diffuse out of the blood into the alveoli?	
What factors affect the rate of diffusion?	

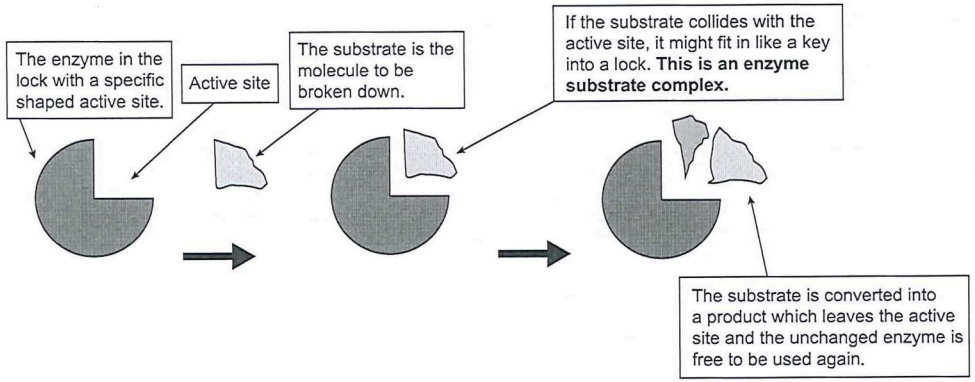
Explain why temperature affects the rate of diffusion	
What is the function of the cell membrane in a cell?	
 How do you test for Starch? What will a positive result be?	Which two molecules can pass through the Selectively permeable membrane. Why can't starch pass through the slectively permeable membrane?
What will a negative result for starch be?	
What is the movement of water called?	
Describe how water moves by osmosis	Water moves by _____ from a _____ solution to a _____ solution, through a _____ _____ membrane.
What does it mean that a membrane is selectively permeable?	

Higher ONLY Describe Active transport	
Why does a cell need lots of mitochondria to carry out active transport?	
What soil nutrient is actively transported into the root hair cell?	
Which Nutrient is actively transported into the blood in the small intestine?	

GCSE Biology 1.1 Enzymes Knowledge organiser

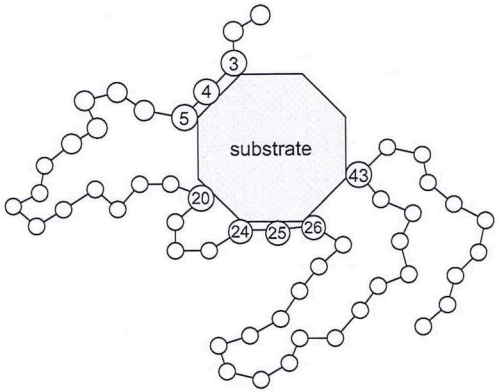
Enzymes - Lock and key Theory

- An enzyme made of protein.
- It catalyses/ speeds up reactions in cells.
- Enzymes can help break down molecules (digestion/ respiration).
- Enzymes can help build up molecules (Protein synthesis).
- Enzymes rely on collisions of molecules with a specific region of the enzyme called the active site to work.

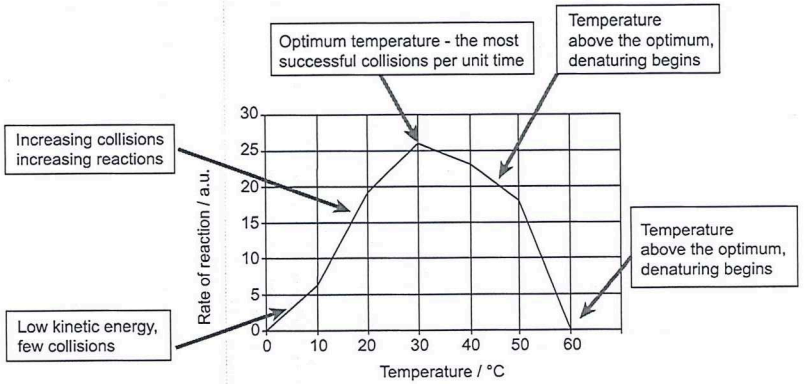


How to make an enzyme - Higher tier only

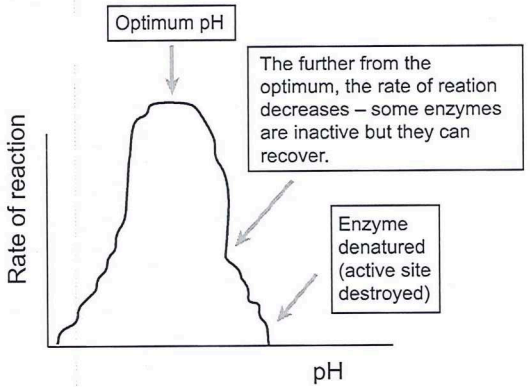
- The instructions to make enzymes are written in the DNA.
- Genes are sections of DNA made of many bases, every 3 DNA bases codes for an amino acid.
- Amino acids are linked in chains and interact to fold into enzymes with specific active sites.
- So different genes code different order of amino acids which fold differently to form active sites specific to each substrate.



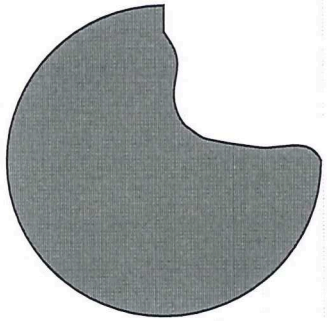
Enzymes and temperature



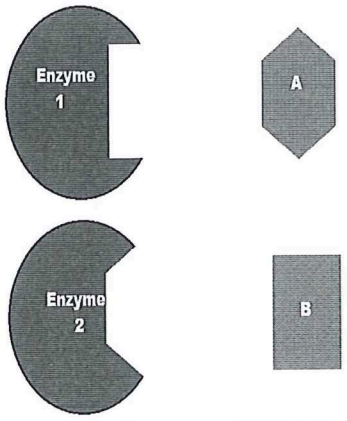
Enzymes and pH

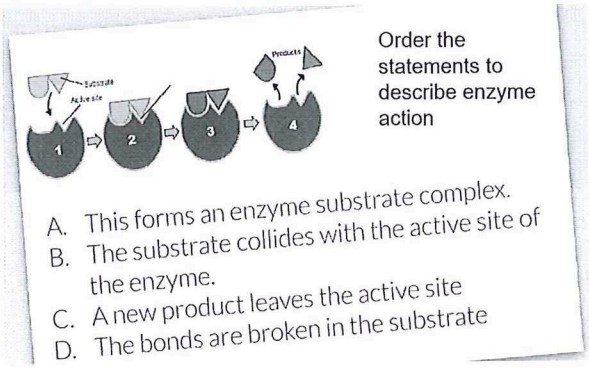
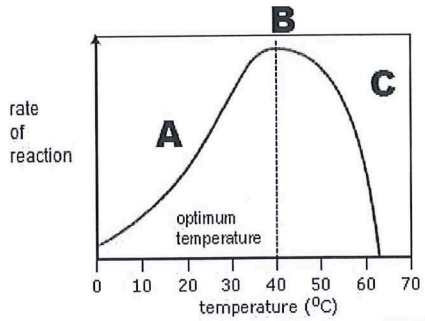


Denatured



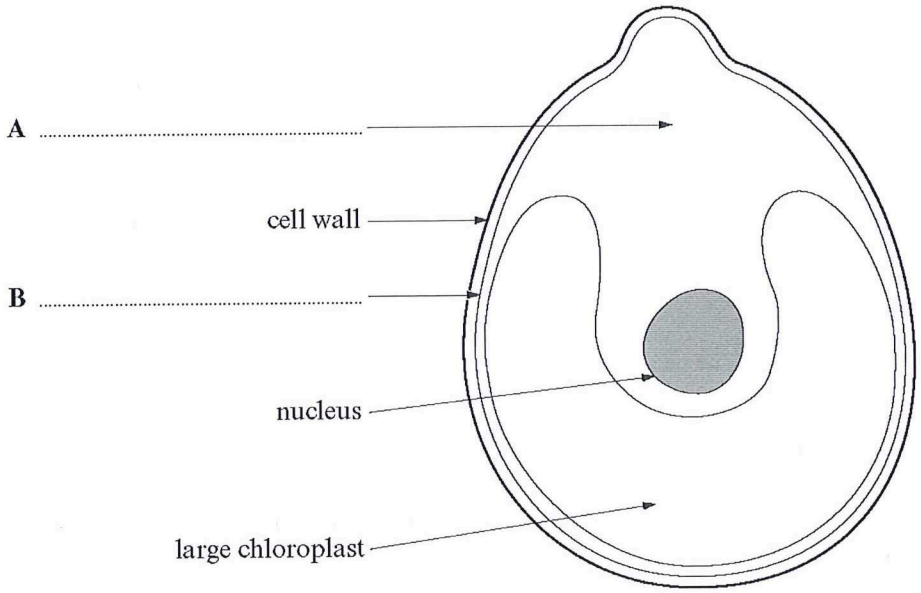
High temperatures or extremes of pH change the shape of the active site of the enzyme. The substrate can no longer fit into the active site and so no reaction occurs.

Enzymes	
What are enzymes?	
What are enzymes made from?	
What do enzymes do?	
Label the active site on the diagram?	
What does substrate mean?	
What does product mean?	
Which enzyme will break down substrate A? Explain your answer. 	
Why won't enzyme 1 break down substrate A?	
Describe how are enzyme 1 and 2 different?	
Explain why enzyme 1 and 2 are different?	

Order the statements to describe enzyme action.  	
What is this model of enzyme action called?	
What three factors affect how quickly enzymes work?	
Describe how temperature affects enzyme action. Describe part A, B and C on the graph.  	A B C
Explain why the rate of reaction increases in part A of the graph.	
Explain why the rate of reaction decreases in part C of the graph?	
What does denature mean?	
Why does denaturing affect the rate of reaction of an enzyme?	
What two factors can denature an enzyme?	

1.

The diagram below shows an algal cell.



(a) Complete labels **A** and **B** on the diagram above. [2]

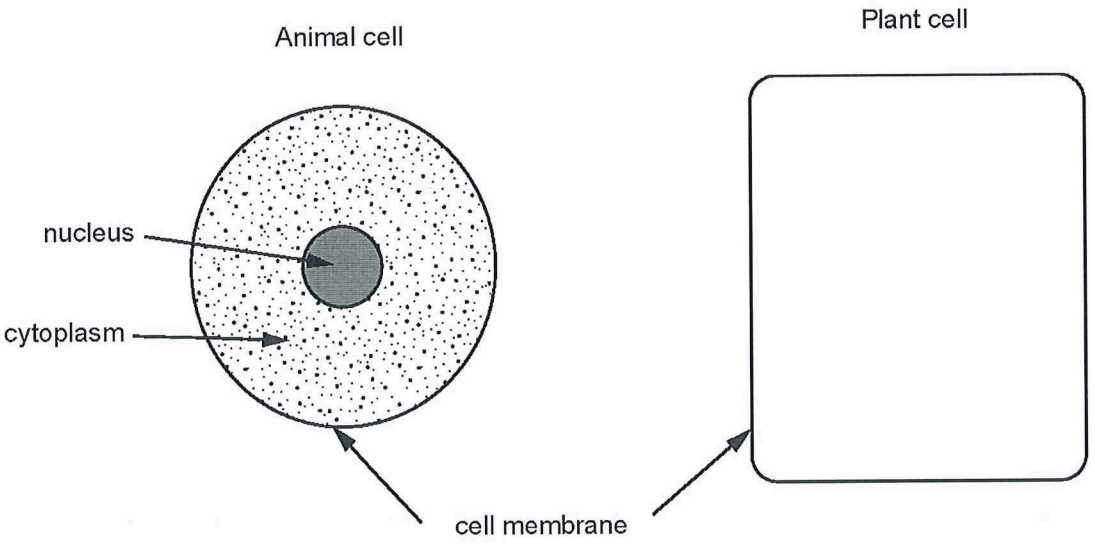
(b) (i) Complete the table. [3]

Part of algal cell	Function
nucleus	.....
.....	photosynthesis
cell wall	.....

(ii) I. Name **one** part of the algal cell, shown in the diagram above which is **not** present in an animal cell. [1]

2.

(a) (i) The diagrams below show an animal cell and the **cell membrane** of a plant cell. Complete the drawing of the plant cell. *No labels are required.* [2]

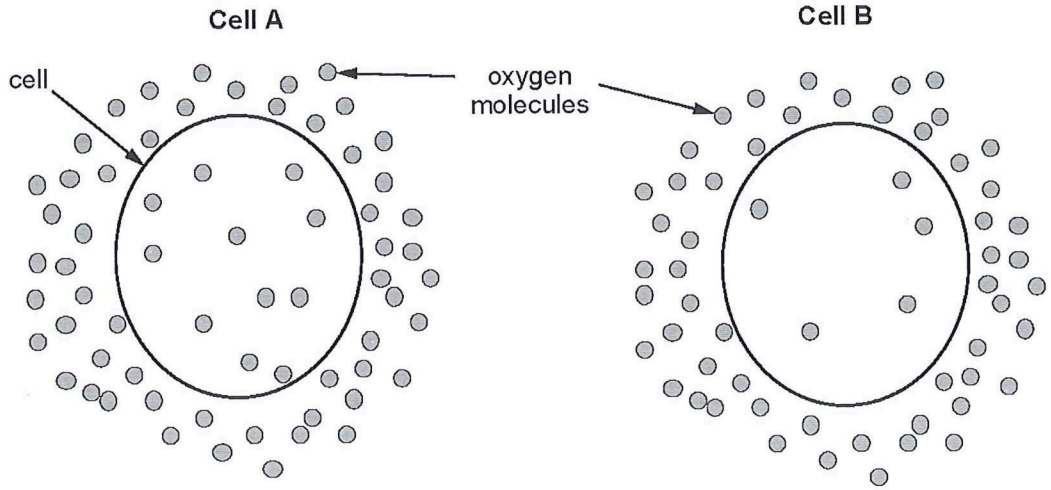


(ii) State the function of the cell membrane. [1]

.....

.....

(b) The diagrams below show two cells which are carrying out respiration. Oxygen molecules are shown inside and outside both cells.



(i) Answer the following questions by placing a tick [✓] in the correct box. [3]

I. In cell **A** the oxygen molecules move:

into the cell ☐

out of the cell ☐

no net movement. ☐

II. In cell **B** the oxygen molecules move:

into the cell ☐

out of the cell ☐

no net movement. ☐

III. Into which cell could there be the greater net movement of oxygen:

cell **A** ☐

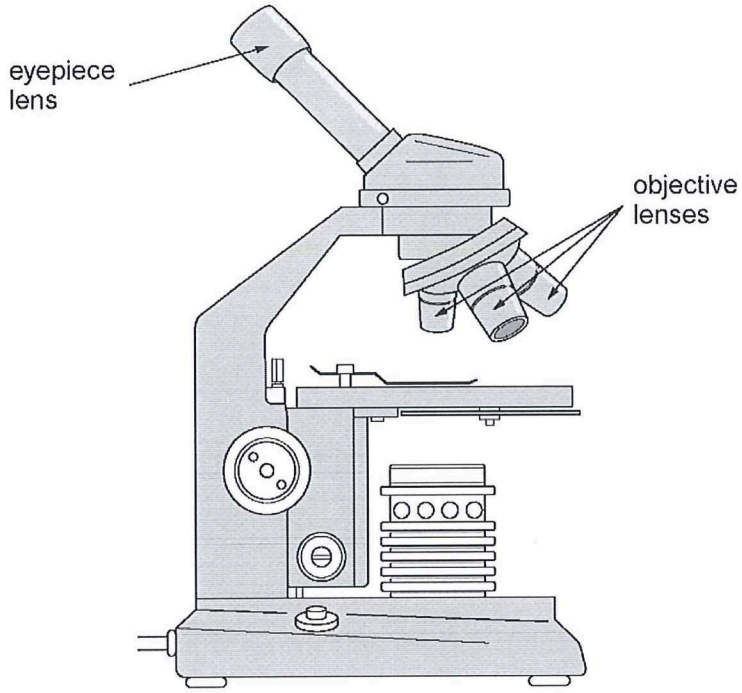
cell **B**? ☐

(ii) Name the process by which the oxygen molecules are moving. [1]

.....

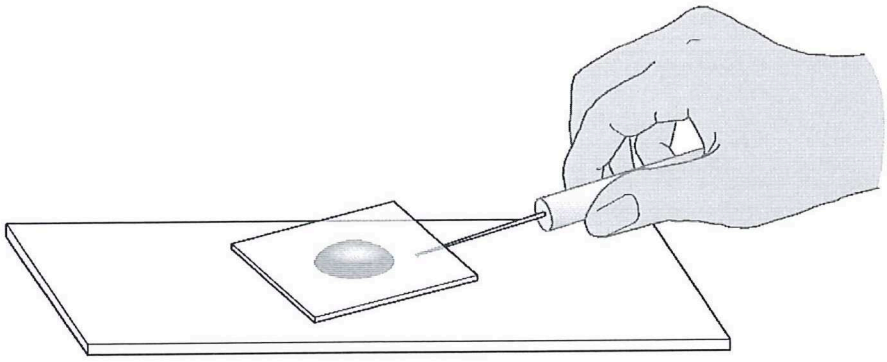
7

3. Rhys studies some plant tissue using the instrument shown below.

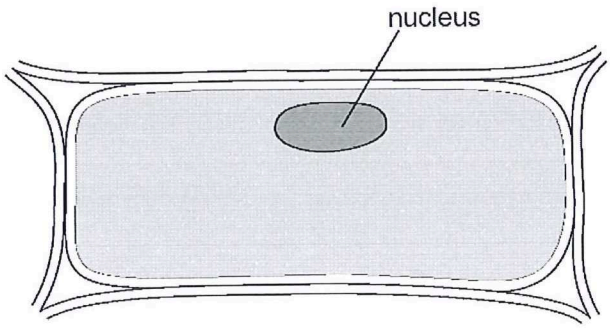


(a) State the name of the instrument shown in the diagram. [1]

Rhys places some of the plant tissue in water on a slide and lowers a cover slip on top as shown below.



He draws one cell from the tissue as seen under the maximum magnification.
His drawing is shown below.

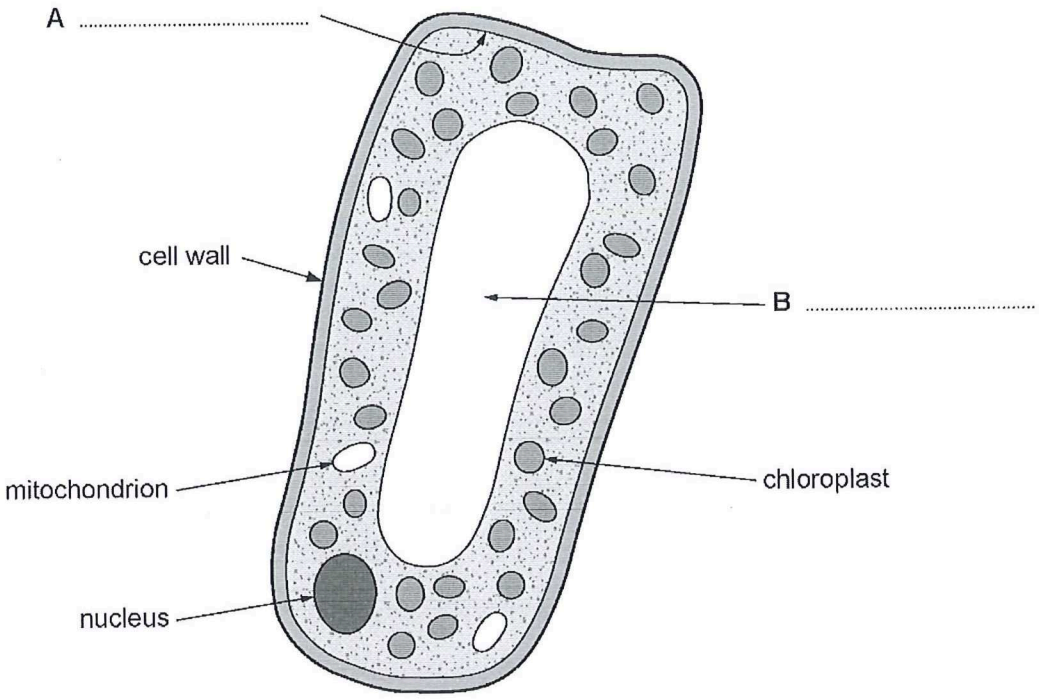


(d) State the function of the nucleus. [1]

.....

.....

4. The diagram below shows a section through a plant cell as seen with a light microscope.



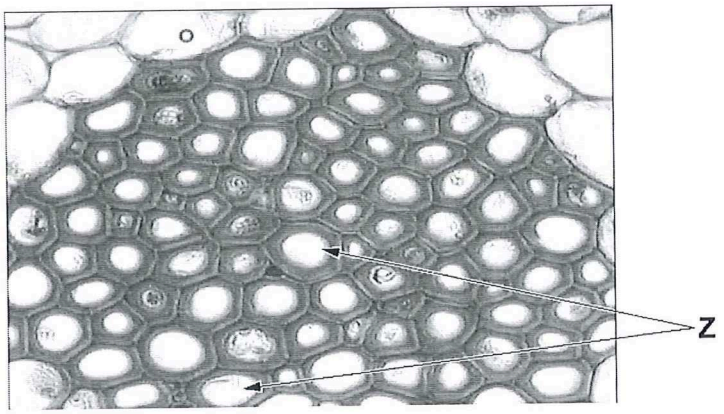
(a) (i) Label parts **A** and **B** on the diagram. [2]

(ii) Complete the table below. [3]

Part of cell	Function	Cell part present (✓) or absent (×) in animal cell
.....	photosynthesis	.....
mitochondrion	.....	✓
.....	contains the chromosomes	.....

(b) The photograph below shows some plant cells as seen under a light microscope.

The group of cells labelled **Z** has been treated using a procedure to make their cell walls more clearly visible.



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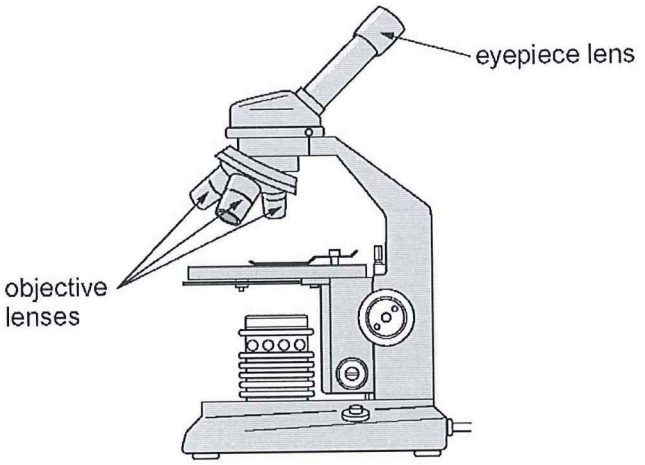
(ii) When the microscope was used to view these plant cells the magnification of the eyepiece lens was ×10 and the magnification of the objective lens used was ×10.



Using this information, calculate the total magnification of the image. [1]

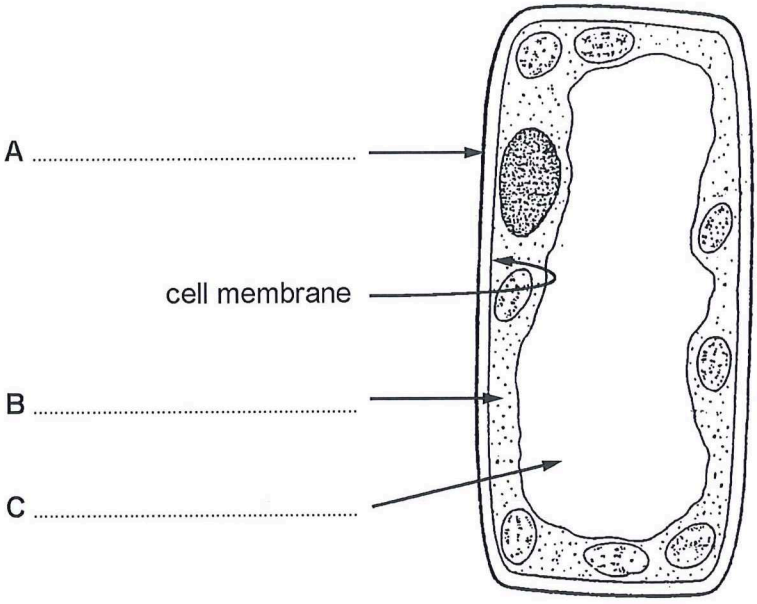
Magnification = × .....

7

Turn over.

5.

(a) (i) Complete the labels **A**, **B** and **C** on the diagram of a plant cell below. [3]



(ii) State the function of the cell membrane. [1]

.....

(b) (i) Which two structures shown on the diagram would **not** be present in an animal cell? Underline your answer. [1]

A and B **A and C** **B and C**

(ii) Name a structure shown in the diagram which would be present in both an animal cell and a yeast cell. [1]

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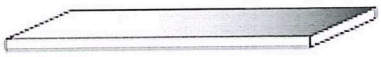
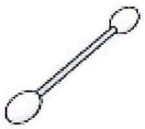
6. 6. *(a)* Describe the method you would use to make a slide of your own cheek cells using the apparatus below. [6 QER]

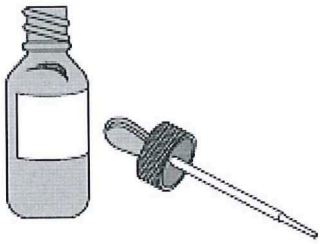


glass slide

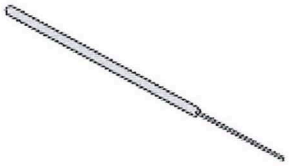
cover slip



cotton wool bud



methylene blue stain



mounted needle

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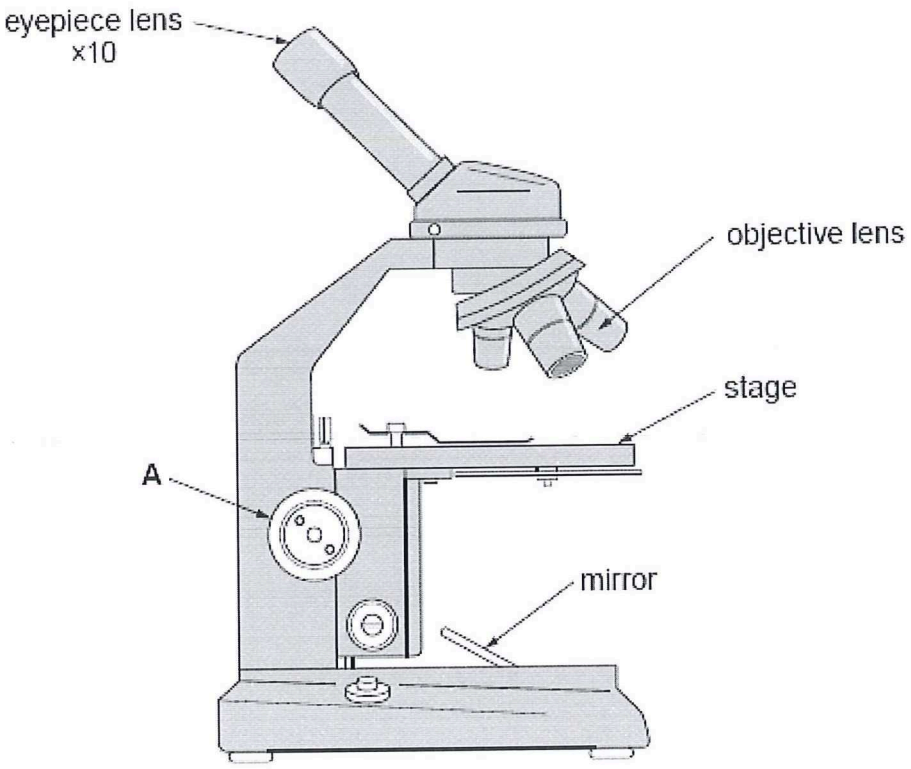
7. 7. Rhys was asked by his teacher to set up a light microscope so that he could view some cells at a magnification of ×100. The microscope had three objective lenses of ×4, ×10 and ×40 magnifications. Rhys was also given a prepared slide of muscle cells.



(a) Explain how Rhys could view the muscle cells at a magnification of ×100. [2]

.....

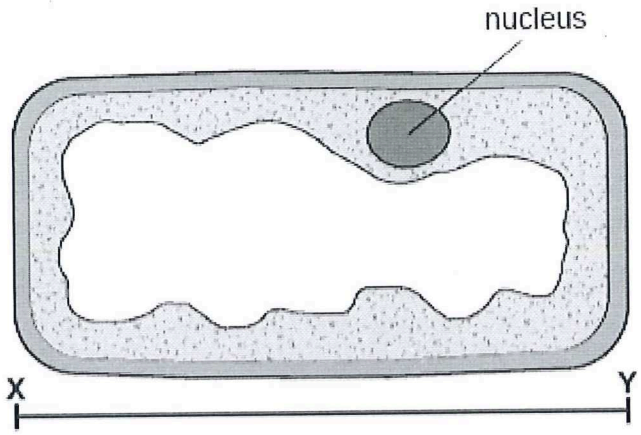
.....

.....

(b) State the function of structure **A** on the diagram. [1]

.....

(c) Rheinallt made a large drawing of one of the cells he observed.



(i) I. Measure the length of the cell in Rheinallt's drawing along line **X–Y**. [1]

Length of cell in drawing = ... mm

II. The actual length of cells of this type is usually 0.02 mm.
Use your answer to part I. to calculate the magnification of Rheinallt's drawing. [2]

Magnification of drawing = × .....

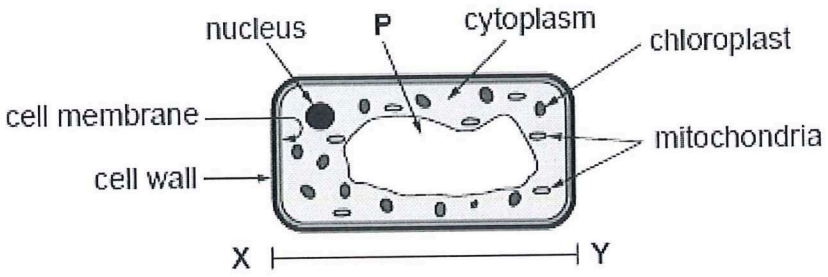
(ii) From the drawing, give **one** feature of the cell which shows that it is a plant cell. [1]

.....

(d) Rheinallt compared his drawing with an image obtained from an electron microscope. Why would the electron microscope image give more information about the structure of an onion cell? [1]

.....

10. The diagram shows a plant cell. Some structures have been labelled.



(a) (i) Use a ruler to measure the length of the cell at **X – Y** in mm. [1]

length at **X – Y** = ... mm

(ii) The diagram is magnified ×400.

Use your answer to part (i) to calculate the actual length of the cell. [1]

actual length = ... mm

(b) State the name of structure **P**. [1]

.....

(c) Complete the following table about plant cells. [4]

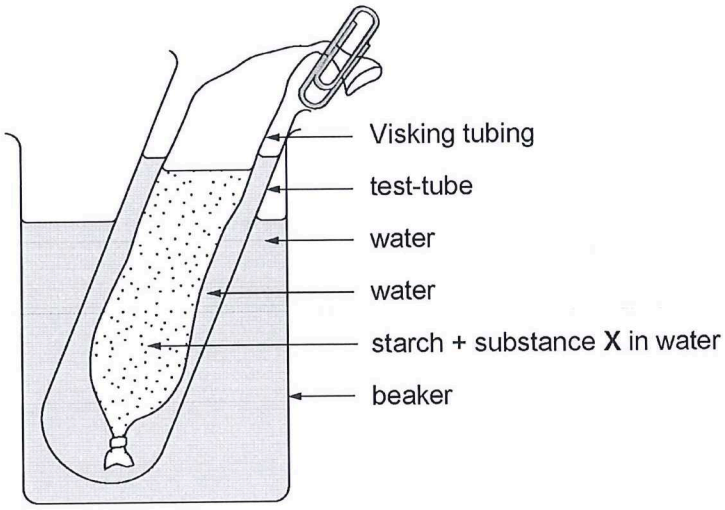
Name of structure	Function
.....	respiration
.....	controls entry and exit of materials
chloroplasts	.....
.....	contains chromosomes

11. *(a)* State the meaning of the term diffusion. [1]

.....

.....

(b) The diagram below shows a piece of Visking tubing that has been set up to represent the way molecules pass through the wall of the small intestine into the bloodstream.



Every 30 minutes for the next two hours the water in the test tube was tested for the presence of both starch and glucose.

The results are shown in the table below.

	time (minutes)				
	0 (at start)	30	60	90	120
starch	-	-	-	-	-
glucose	-	+	++	+++	++++

\- substance not present
\+ substance present
+++ increasing concentration of substance

(i) State why starch does not appear in the water in the test tube. [1]

.....

.....

(c) Suggest the temperature at which the reaction would work at its fastest rate by circling **one** answer below. [1]

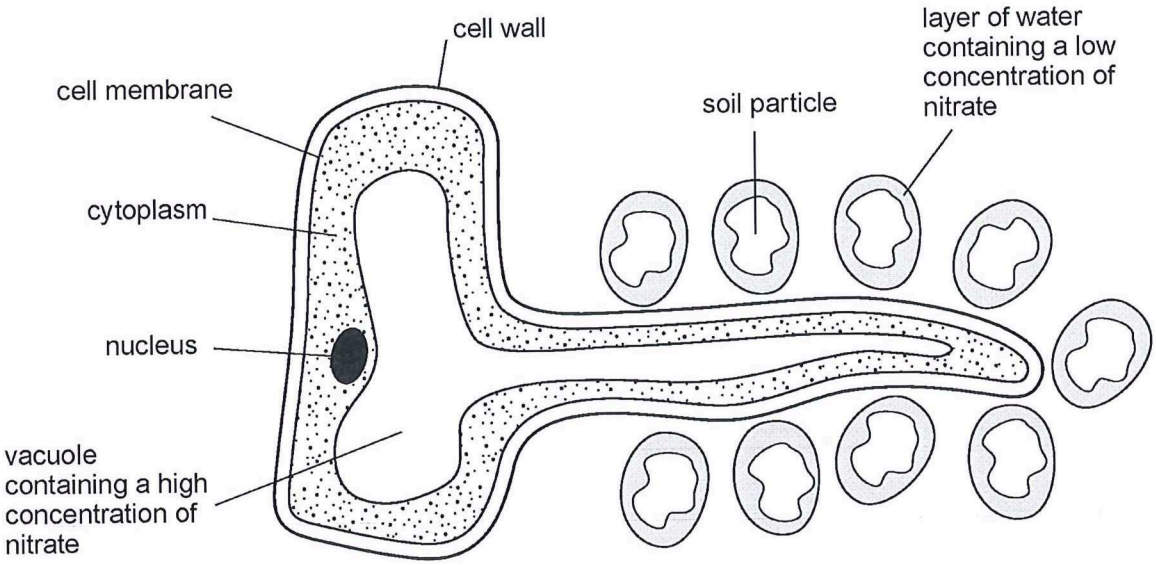
0 °C

10 °C

35 °C

100 °C

13. The diagram below shows a **section** through a root hair cell in well-watered soil.



(a) State the method used by the root hair cell to take up nitrate from the soil. [1]

(c) Describe how the root hair cell takes up water by osmosis. [3]

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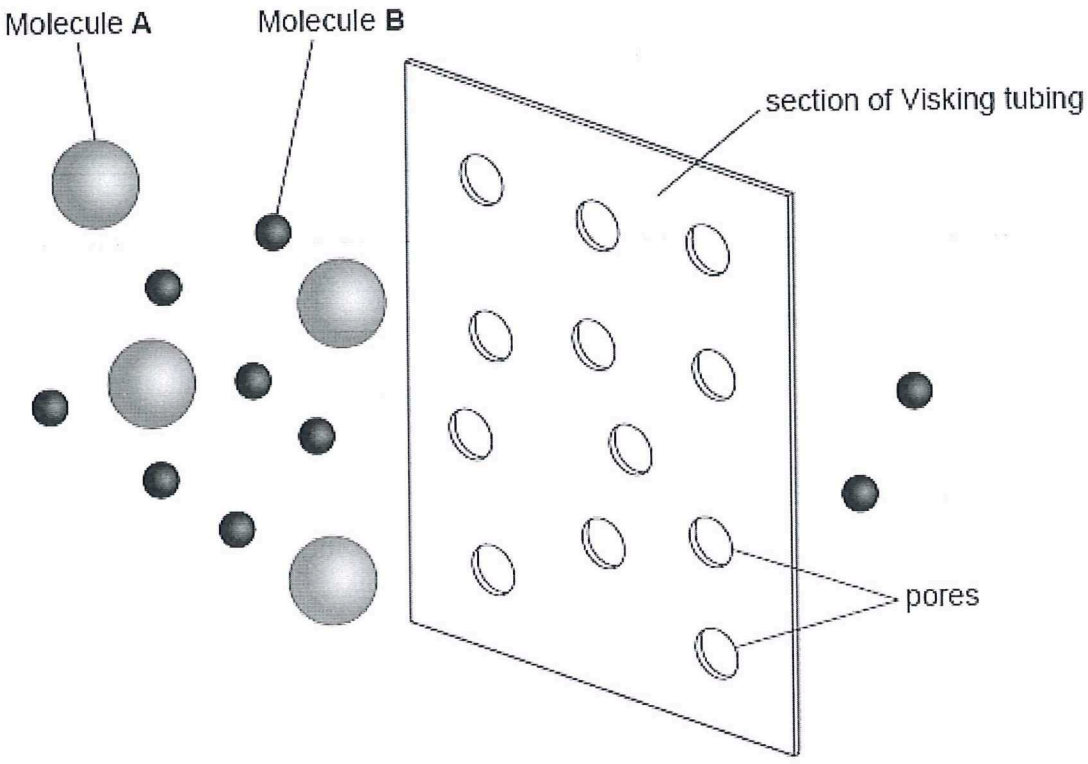
15. *(a)* What is meant by the term selectively permeable membrane? [1]

.....

.....

Visking tubing can be used as a model of the cell membrane.

The diagram below shows a section of Visking tubing working in the same way as a selectively permeable membrane.



Use the diagram above and your own knowledge to answer the following:

(b) (i) State the process by which molecules could pass through the Visking tubing. [1]

.....

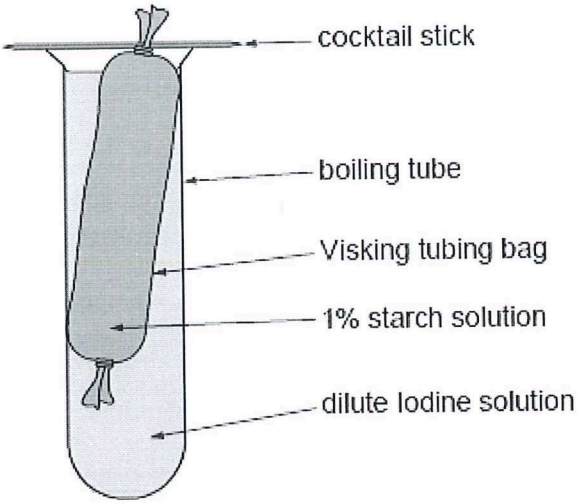
(ii) Identify which molecules pass through the Visking tubing. Explain your answer. [2]

.....

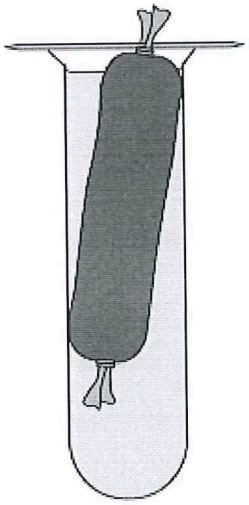
.....

.....

(c) Students were instructed to set up the following apparatus.



The appearance of the apparatus after 15 minutes is shown below.



(i) Explain why the colour of the contents inside the Visking tubing turned blue black. [3]

.....

.....

.....

(ii) Explain why the colour of the Iodine solution in the boiling tube did not change. [2]

.....

.....

.....

(d) Name **one** substance required for respiration that would pass into a cell. [1]

22.

(a) Complete the sentence below. [2]

Enzymes, which are made of ..... , control the rate of

..... reactions in living cells.

(b) Students investigated the activity of the enzyme amylase, at different pH values. They used the same volumes of solutions and the same time at each pH.

Results of investigation

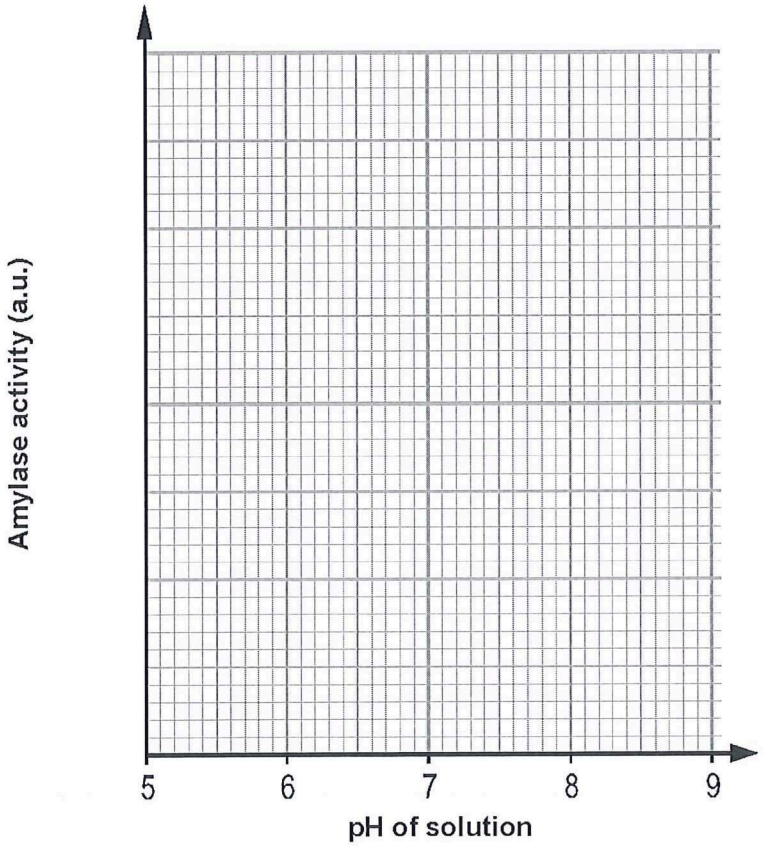
pH of solution	amylase activity (a.u.)
6.0	18
6.5	27
7.0	52
7.5	66
8.0	50
8.5	21

(i) Draw a line graph of the results of the investigation on the grid below by [4]

I. choosing a suitable scale for the amylase activity;

II. plotting the results onto the grid;

III. joining your plots with a ruler.



(ii) I. From the graph opposite, describe in detail the effect of pH on the activity of amylase. [2]

.....

.....

.....

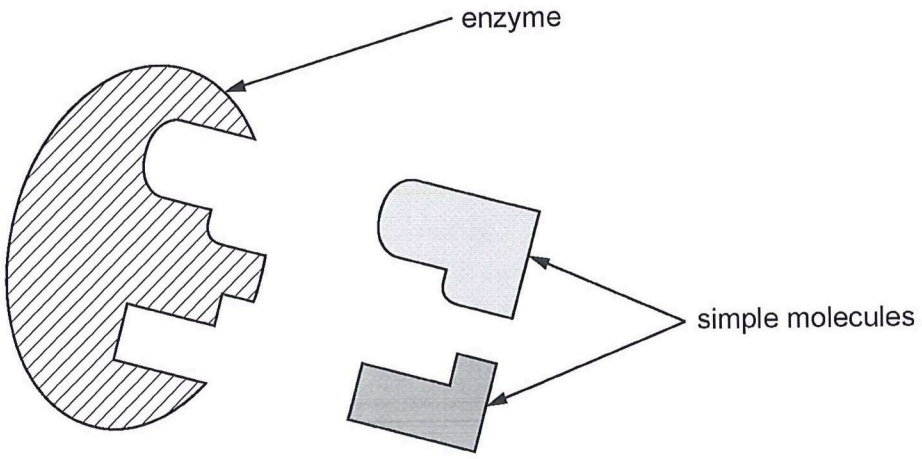
II. Calculate the difference in activity of amylase between pH 6.2 and pH 7. Show your working. [2]

Answer ..... a.u.

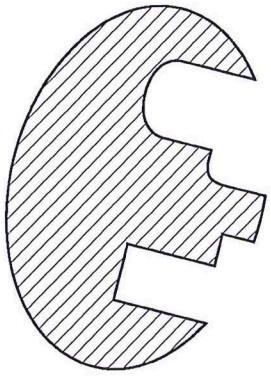
(iii) The students did not keep the temperature constant during their investigation. Why did this prevent their investigation from being a fair test? [1]

.....

23. *(a)* (i) The diagram shows an enzyme which builds up complex molecules from simple molecules.



Complete the diagram below to show the next stage in the reaction between this enzyme and the two simple molecules shown above. [2]



(ii) What name is given to this **model** of enzyme action? [1]

.....

(iii) Explain how boiling would affect the action of the enzyme shown in the diagrams above. [2]

.....

.....

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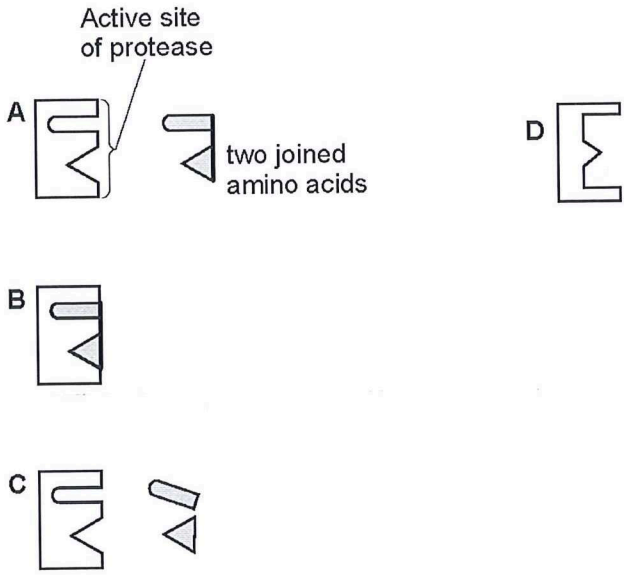
29. Diagrams **A** - **C** illustrate the 'lock and key' theory of enzyme action. It shows how a protease is able to catalyse the separation of two joined amino acids. Diagram **D** shows the protease after it has been denatured.

The "lock and key" theory of enzyme action



(a) What name is given to the structure represented by diagram **B**? [1]

.....

(b) Explain why the denatured protease **D**, is unable to catalyse the separation of the two amino acids. [2]

.....

.....

.....

(c) State **two** factors which affect the rate of enzyme controlled reactions. [2]

I. .....

II. .....

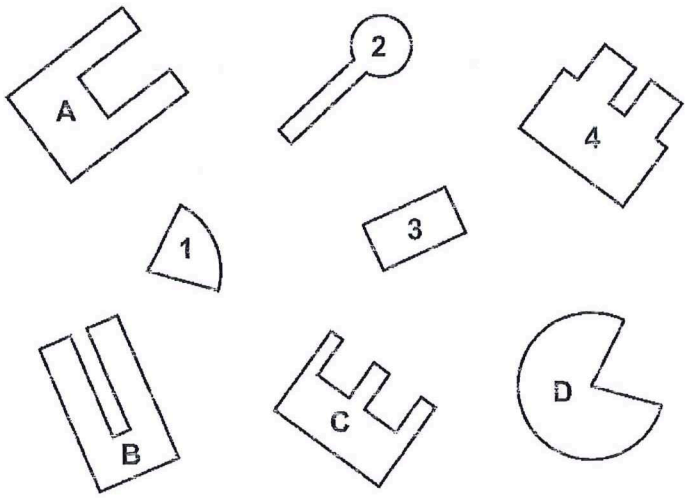
5

30. *(a)* Use some of the following words to complete the table about enzymes. [3]

fatty acids **lipids** **amino acids** **glucose** **glycerol**

Enzyme	Substrate	Products
protease	protein	.....
lipase	.....	..... and .....

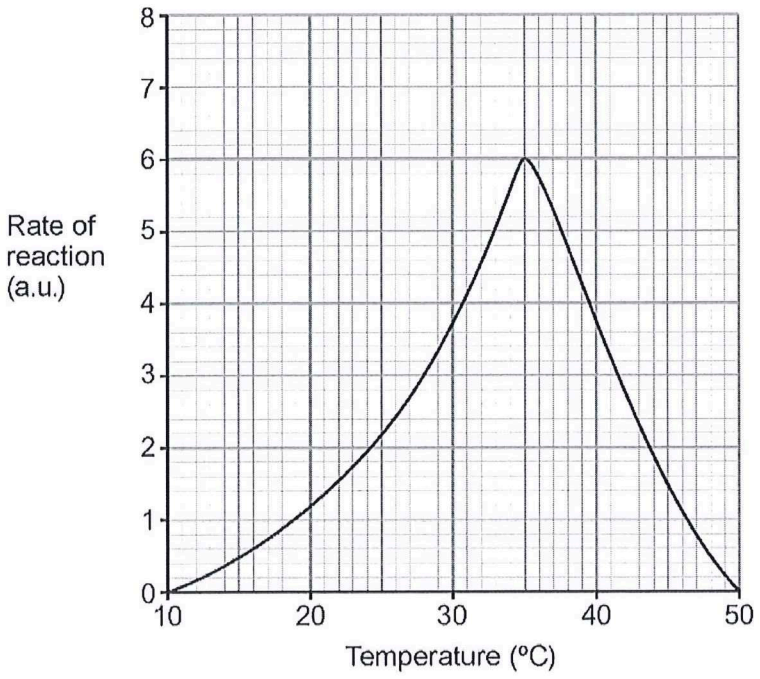
(b) The diagram shows four enzymes A – D and four substrates 1 – 4.



Use your knowledge of the lock and key theory to complete the table below by matching each enzyme to its substrate. [1]

Enzyme	Substrate
A	.....
B	.....
C	.....
D	.....

(c) The graph shows the effect of temperature on the rate of an enzyme controlled reaction between 10 °C and 50 °C.



(i) From the graph, describe the effect of temperature on the rate of the reaction between 10 °C and 50 °C. [3]

.....

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.....

.....

(ii) Most enzymes are denatured by boiling.
Use your answer to part *(b)* to help explain why a denatured enzyme can no longer work. [2]

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