REDSPOT New Solutions . New Minds

About O Level

(PURE) BIOLOGY

(YEARLY)

About Thinking Process

When solving problems, we first analyse the questions and then gather relevant information until we are able to determine the answers. But for presentation reason, we need to organise, rearrange and then present ONLY the required workings and solutions.

Thinking process reveals the extra but relevant information which is not required as part of the solutions.

About MCQ with HELPs

Explanations are given so that students know exactly why the answer is the right one.

period	2009 to 2022
contents	June & November, Paper 1 & 2, Worked Solutions
form	Year By Year
compiled for	O Levels
special features	Thinking Process, MCQ with HELPs

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'O' Level Biology 5090 (Yearly)

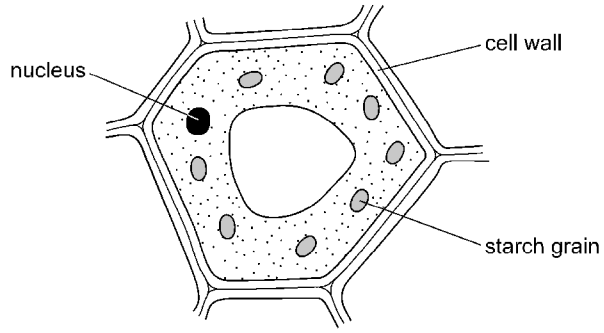
CONTENTS

Revised Syllabus

JUNE 2022 PAPER 1

MCQ Section

1. The diagram shows a plant cell. The cell is stained with iodine solution.



After staining with iodine solution, what are the colours of the cell wall and the starch grain?

	cell wall	starch grain
A	blue-black	blue-black
B	blue-black	orange-brown
C	orange-brown	blue-black
D	orange-brown	orange-brown

[Unit 1]

2. Xylem vessels are cells that have become adapted for conduction and support.

Which two adaptations assist them in these functions?

A presence of a nucleus and cytoplasm

B lack of cytoplasm and woody cell walls

C lack of a nucleus and presence of cytoplasm

D presence of cytoplasm and woody cell walls

[Unit 2]

3. What is diffusion?

A movement of particles by the air

B movement of molecules down a concentration gradient

C movement of molecules in a heated liquid

D movement of particles up a concentration gradient

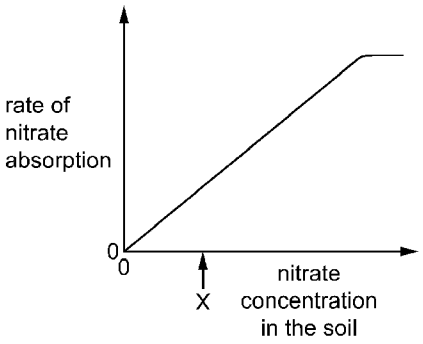
[Unit 3]

4. The rate of nitrate ion absorption by a root hair cell was measured at different soil nitrate concentrations.

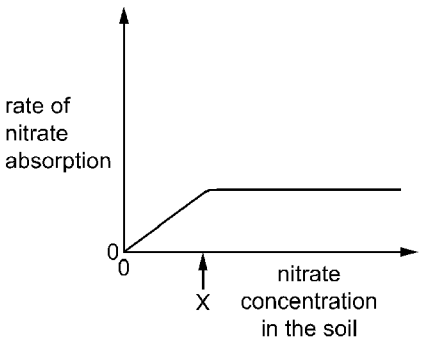
At X, the concentration of nitrate in the soil is the same as in the cell.

Which graph shows how the rate of absorption varies with nitrate concentration in the soil?

A



B



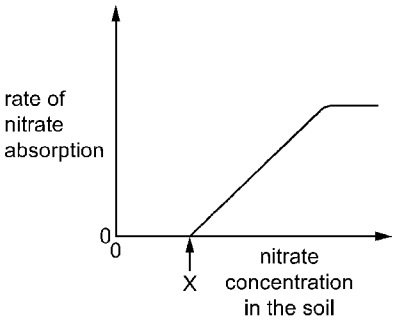
1. **C** Starch turns blue-black with iodine solution while cell wall has no starch, so its cellulose does not react with iodine solution and retains its original colour which is orange-brown.

2. **B** Due to no cytoplasm, its lumen is hollow and it can transport water easily while woody cell walls due to lignification give support.

3. **B** Diffusion occurs when molecules move from higher to lower concentration. i.e. down a concentration gradient.

4. **A** Only graph **A** shows that by increasing nitrate concentration in soil, uptake or absorption of nitrate ions increases. Before point X, root hair cell is also absorbing nitrates and at X, it reaches to isotonic concentration.

C



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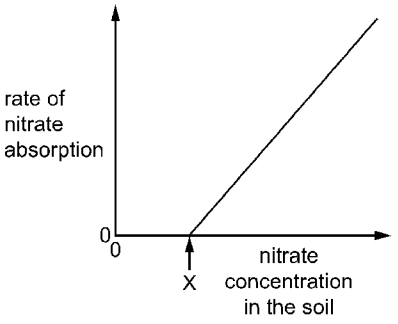
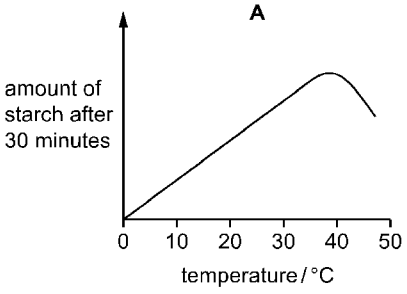


[Unit 3]

5. Amylase is an enzyme that breaks down starch to maltose.
Students set up an experiment to investigate the effect of different temperatures on the action of amylase on starch solution.
They measured the amount of starch remaining after 30 minutes at different temperatures.
Which graph would you expect the students to draw from their results?

A



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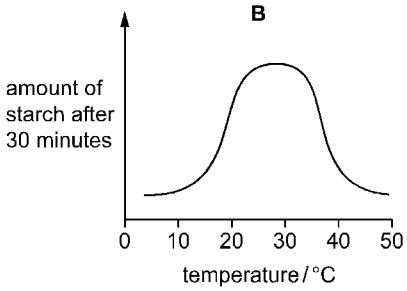

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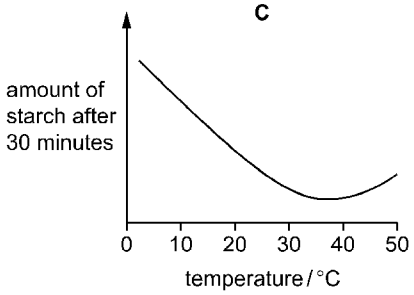

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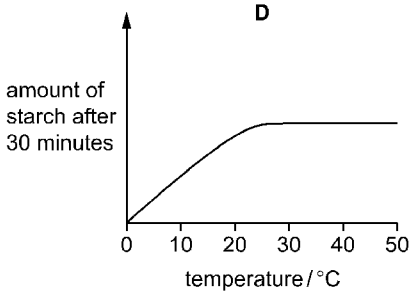


[Unit 4]

6. Which statement identifies the optimum (best) temperature for enzyme activity?

A It is the highest temperature at which any enzyme activity happens.

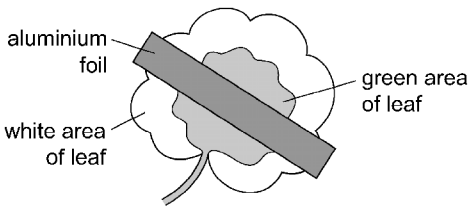
B It is the highest temperature that does not destroy an enzyme.

C It is the lowest temperature that denatures an enzyme.

D It is the temperature that produces the highest rate of enzyme activity.

[Unit 4]

7. A plant has leaves with both green and white areas. One of its leaves is partly covered with aluminium foil which blocks light.

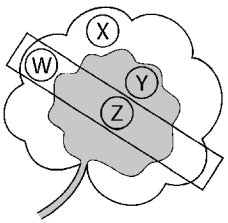


The plant is then placed under a lamp for 24 hours. After this time, discs are cut from the areas of the leaf shown, and tested with iodine solution.

5. C Till optimum temperature, i.e., 40 °C, activity of amylase is maximum, so most of the substrate or starch is broken down to maltose and lesser is the remaining starch. After 40 °C, enzyme becomes less active, so amount of remaining starch also increases.

6. D At optimum temperature, activity of enzyme is maximum.

7. D At Z, chlorophyll containing part of leaf is covered with aluminium foil, so light can't activate it for photosynthesis. Y is exposed to light and starch is made which gives blue-black colour with iodine solution. X and W areas do not have chlorophyll, so no photosynthesis occurs and no starch is made.



Which leaf discs will give a blue-black colour when tested with iodine solution?

A W and X **B** X only
C Y and Z **D** Y only

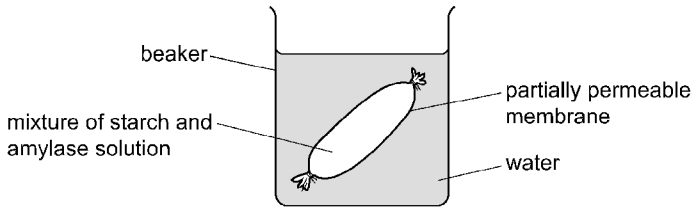
[Unit 5]

8. Which row shows the effect of nitrate ions on plant growth and the reason for this effect?

	effect of nitrate ions on plant growth	reason for effect
A	no effect	fewer proteins made
B	increases	less chlorophyll made
C	decreases	more chlorophyll made
D	increases	more proteins made

[Unit 5]

9. The experiment shown was set up and left for 30 minutes.



The membrane is permeable to sugar and water but not permeable to starch or protein. After 30 minutes, samples of the water in the beaker were tested with Benedict's reagent, biuret reagent and iodine solution.

Which colours were obtained with these tests?

	Benedict's test	biuret test	iodine test
A	blue	violet	blue-black
B	red	blue	brown
C	red	blue	blue-black
D	red	violet	brown

[Unit 7]

10. Sometimes gall bladders become infected and have to be surgically removed.

How will this affect the functioning of the body?

A reduce the digestion of carbohydrates
B reduce the liver's ability to convert glucose to glycogen
C reduce the amount of glycerol absorbed from the alimentary canal
D reduce the volume of stored urine

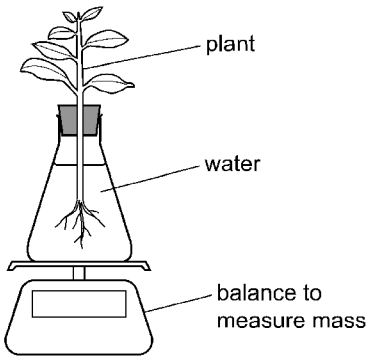
[Unit 8]

11. What is an example of assimilation?

A absorption of glycerol into lacteals
B breakdown of glycogen to glucose in the liver
C building of proteins from amino acids
D release of a hormone from a gland

[Unit 8]

12. A student set up an experiment to investigate the rate of transpiration in a plant.



MCQ Answers

8. **D** Nitrate ions provide nitrogen for synthesis of amino acids, which later make proteins. So increasing nitrate concentration, causes synthesis of more proteins.

9. **B** Inside dialysis tubing, amylase breaks down starch to maltose, which diffuses out of partially permeable membrane, into surrounding water. So Benedict's test performed produces red colour. As there are no proteins, so biuret reagent remains blue. No starch comes out, so iodine solution remains brown.

10. **C** Gall bladder provides salts for emulsification of lipids. Due to its removal lesser lipids are emulsified and lipase cannot digest fats easily. Hence, lesser glycerol and fatty acids are produced.

11. **C** In assimilation process, larger molecules of food are formed from their components. So making proteins from their component amino acids is called assimilation.

12. **A** In bright light, stomata are opened and more water is lost by transpiration, so mass decreases at faster rate. In dark, few or no stomata open, so rate of transpiration is very low.

NOVEMBER 2022 PAPER 2

THEORY Section

Section A

Answer **all** the questions in this section.

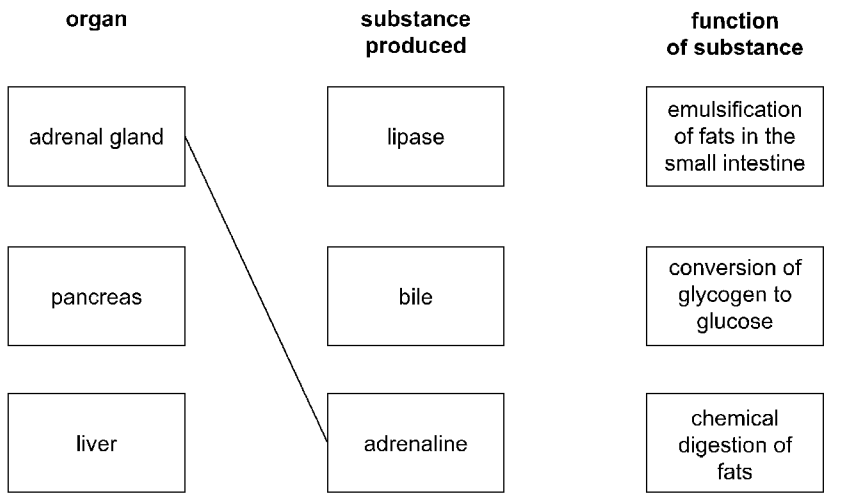
Question 1

Organs in the human body produce substances which have specific functions.

Draw lines to link each organ with the substance it produces **and** to link each substance with the description of its function.

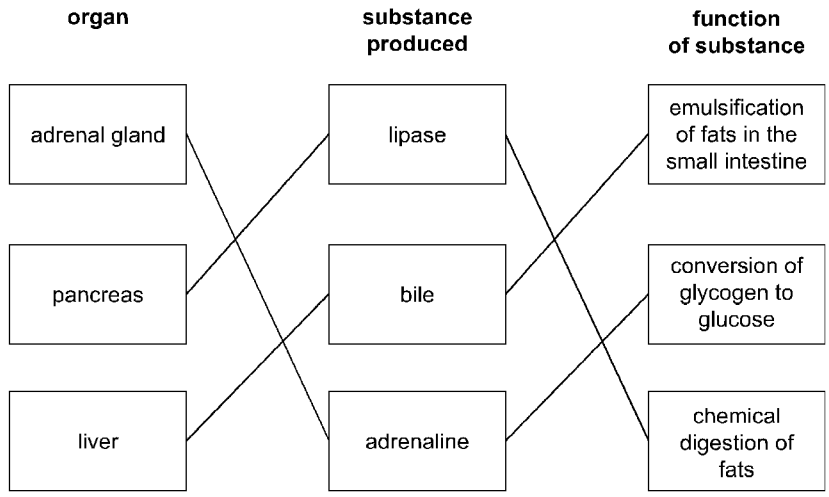
One line has been drawn for you.

Draw **five more** lines. [5]



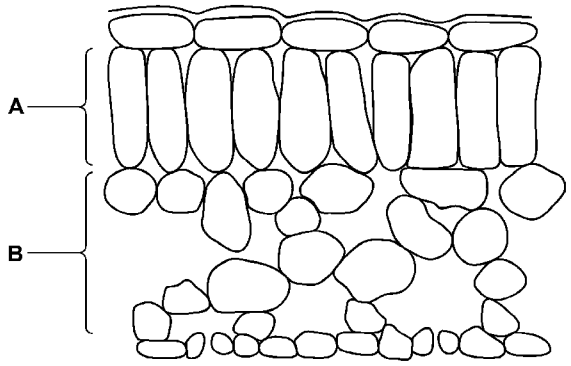
[Total: 5] [Unit 8]

Solution



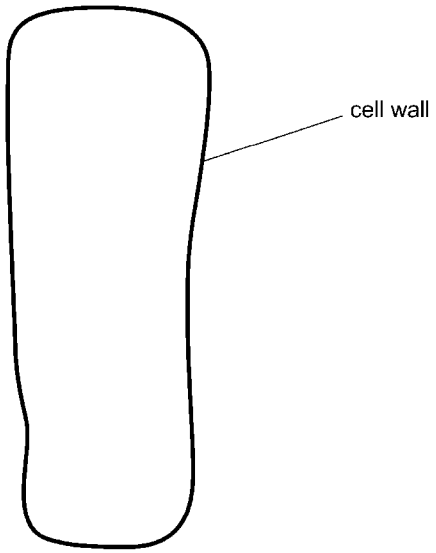
Question 2

The diagram shows a cross-section through a leaf when viewed using a light microscope.



(a) (i) State the term used to describe a group of cells, such as those in part **A** or part **B** of the leaf cross-section. [1]

(ii) The diagram shows an enlargement of one cell from part **A** of the leaf cross-section.



Complete the diagram of the cell by drawing and labelling to show the position of

- **one** chloroplast
- **three** other types of **named** cell component that will be visible.

[4]

(iii) Use a label line on the diagram of the cross-section through a leaf to name and label **one** cell in the lower epidermis that would also contain chloroplasts. [1]

(b) The cell wall of a plant cell can be removed by treating the cell with a digestive enzyme.

(i) Name the substrate for this enzyme. [1]

(ii) Some plant cells from part **B** of the leaf cross-section were treated with this enzyme and then placed in distilled water on a microscope slide for one hour.

The cells were clearly visible using a light microscope at the start of the hour.

The cells were **not** clearly visible using the same light microscope at the end of the hour.

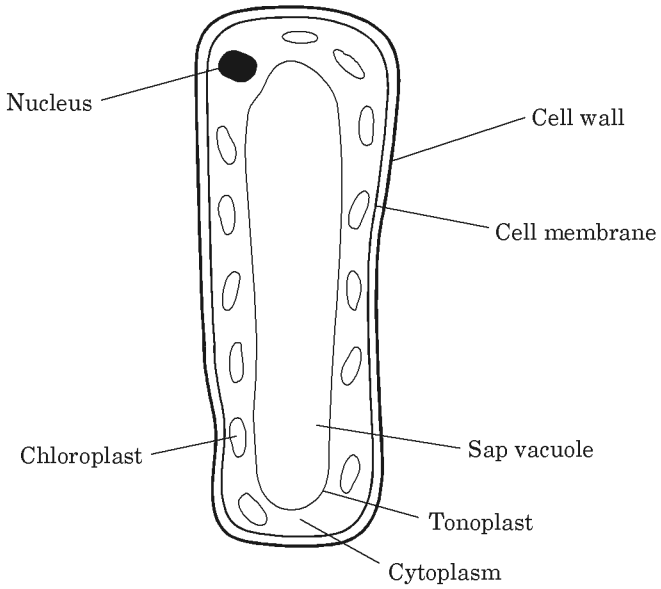
Explain changes to the structure of the cells that took place between these two observations. [4]

[Total: 11] [Unit 5]

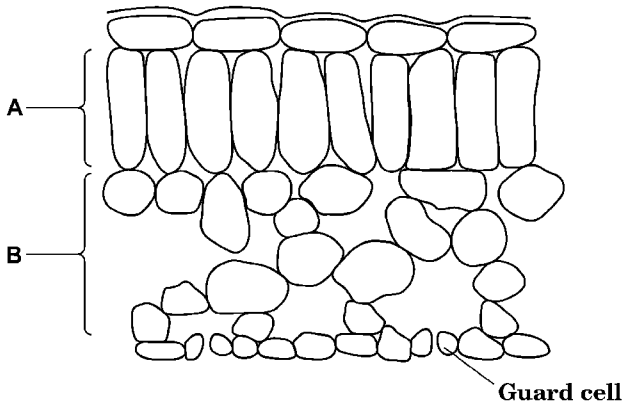
Solution

(a) (i) Tissue / mesophyll.

(ii)



(iii)



(b) (i) Cellulose.

(ii) Due to cellulase enzyme, cell wall of the cells was removed, so cells contained only cell membrane outside. Due to water potential gradient, water entered the cells by osmosis which increased their size as the turgor pressure increased. Cell membrane was unable to withstand the pressure, so cells burst or ruptured.

COMMENT on **ANSWER**

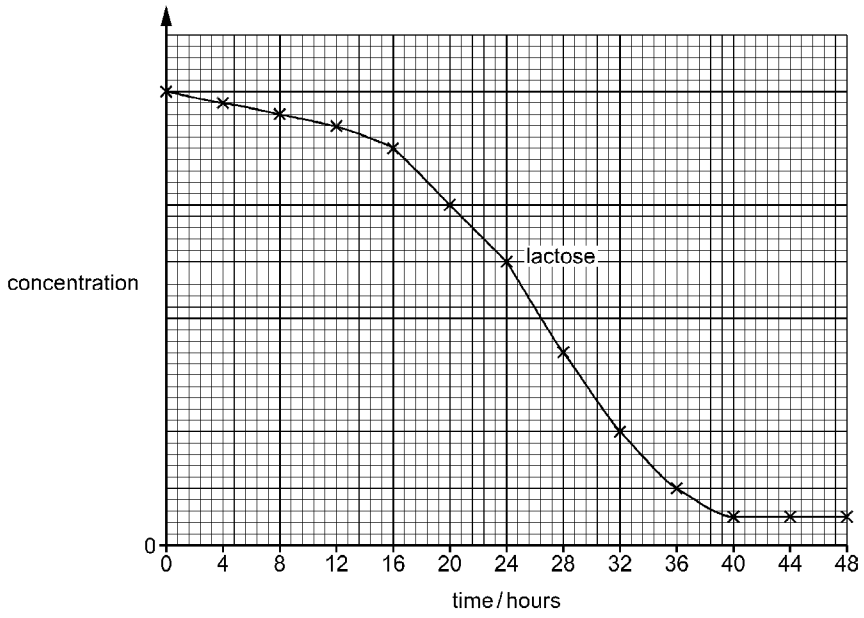
"**(a)** **(iii)** Lower epidermis contains stomata and each stoma or pore is surrounded by two guard cells having different shape than epidermal cells.

(b) **(i)** Cellulase is the digestive enzyme which breaks down cellulose in cell wall.

(ii) Cell wall is thicker and strong enough to withstand turgor pressure, so it maintains the shape of plant cell. Without it, a protoplast is like an animal cell, which can rupture by entry of excess water. "

Question 3

The graph shows how the concentration of lactose sugar changes during the formation of yoghurt from milk over a period of 48 hours.



(a) (i) Name the type of microorganism used in the production of yoghurt. [1]

(ii) Name the type of cell division that causes the population of this microorganism to increase over the 48-hour period. [1]

(iii) Name the acid produced by this type of microorganism in the formation of yoghurt. [1]

(iv) Draw a line on the graph to show how the concentration of this acid will change during the 48-hour period. [2]

(b) Lactose intolerance is a medical condition that results from a genetic change. A person with the condition is unable to produce molecules of the correct enzyme to digest lactose sugar.

(i) Name this type of genetic change and explain how it can result in a person being unable to produce molecules of the correct enzyme. [3]

(ii) The low concentration of lactose sugar in yoghurt makes it a better food than milk for a person with lactose intolerance.

Outline the health benefits to some people with lactose intolerance of continuing to include a dairy product such as yoghurt in the diet. [2]

[Total: 10] [Unit 16]

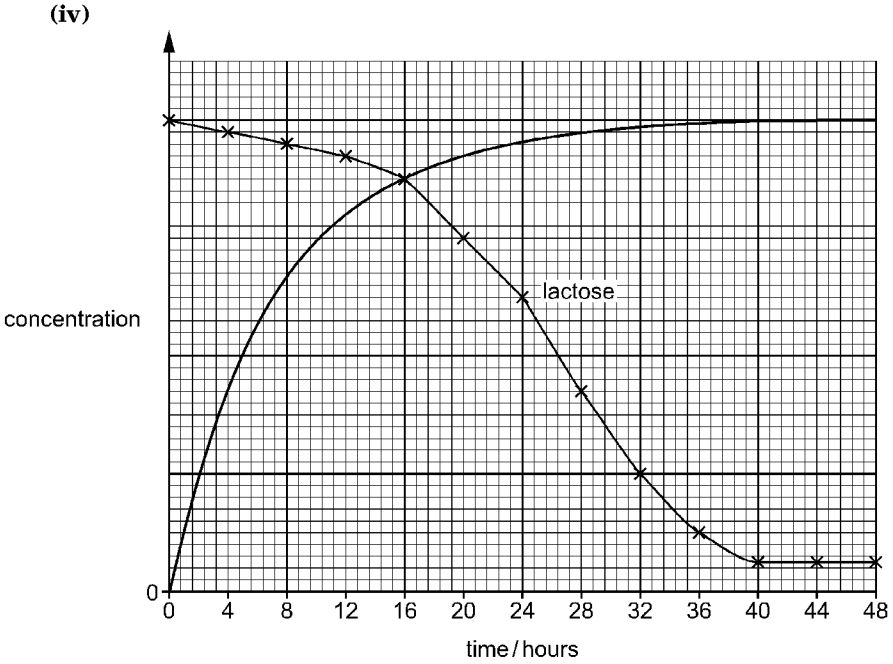
Solution

(a) (i) Bacterium / bacteria.

(ii) Binary fission.

(iii) Lactic acid / lactate.

(iv)



(b) (i) Lactose intolerance occurs due to a mutation, by which base sequence of DNA in an allele or gene is changed. Gene for lactase codes for enzyme or protein synthesis, which changes its shape of active site due to this mutation. Hence, its substrate or lactose can't fit into the active site.

(ii) Yoghurt provides calcium to bones which is absorbed by bones due to vitamin D. So it prevents rickets or weakening of bones and teeth. It also provides proteins and fats which are needed for growth and provide energy.

COMMENT on **ANSWER**

"(b) (i) When there is a change in nucleotide or base sequence of DNA of a gene, a different or mutant allele is produced. Due to this allele, a different amino acid is incorporated in protein structure of enzyme. It may change the shape of its active site and it may become non-functional."

Question 4

The diagram shows the internal structure of the human heart and associated blood vessels.