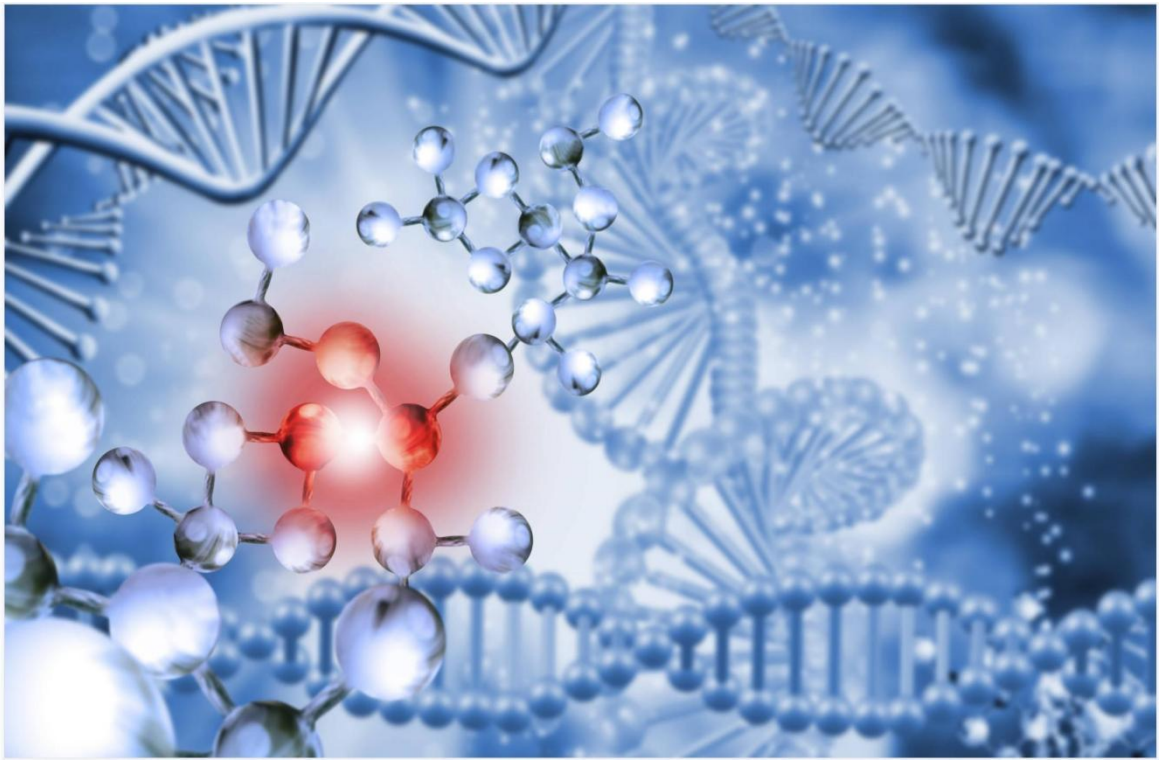
上海赫贤学校
HD SHANGHAI SCHOOL

HDSH Winter Biology Homework

2025-2026



Name：_____

Class: _____

Content

1 Characteristics of living organisms

Part 1: Multiple choice questions

1. One characteristic of all living organisms is that they carry out respiration.

   What does this mean?

   A They break down food to release energy.

   B They breathe, exchanging gases with the environment.

   C They release waste into the environment.

   D They take in food from their surroundings.

2. Which characteristics help to define a living organism?

   A diffusion, movement, respiration

   B excretion, nutrition, sensitivity

   C excretion, reproduction, transpiration

   D growth, inspiration, nutrition

3. Which is a characteristic of all living organisms?

   A breathing

   B eating

   C egestion

   D movement

4. Movement is a characteristic of all living organisms.

   Which two other characteristics of living organisms provide the energy for movement?

   A excretion and nutrition

   B growth and sensitivity

   C nutrition and respiration

   D respiration and growth

5. A car enters a garage, is filled with fuel and is driven away.

   Which characteristic of living organisms is not matched by a similar process in the car?

   A excretion

   B growth

   C movement

   D respiration

6. A biologist keeps a potted plant in a laboratory.

   Which feature of the potted plant shows that it is a living organism?

   A It grows larger over time.

   B It has green leaves.

   C The compost in the pot dries after he waters it.

   D The stems contain xylem.

7. A person moves their hand away from a hot object.

   Which characteristic of living organisms is this?

   A growth

   B nutrition

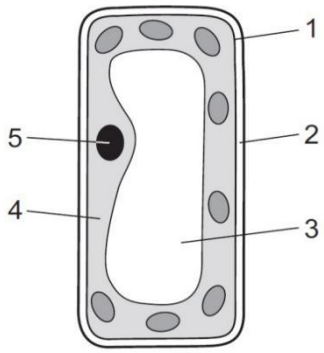
   C reproduction

   D sensitivity

2 Cell structure

Part 1: Multiple choice questions

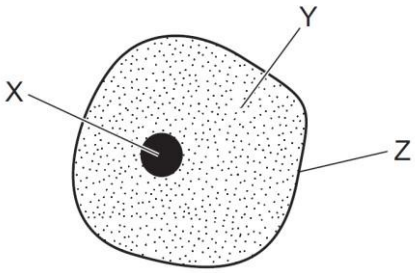
1. The diagram shows a plant cell.



Which two parts are found in plant cells but not in animal cells?

A 1 and 5 B 2 and 3 C 2 and 4 D 3 and 5

2. The diagram shows a typical animal cell.

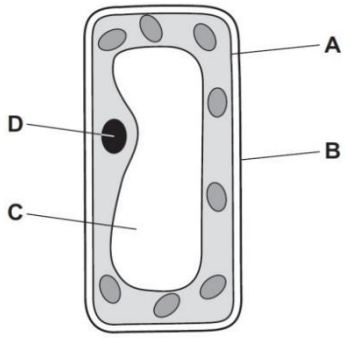


What are the functions of structures X, Y and Z?

	X	Y	Z
A	traps light	contains genetic material	controls entry and exit of materials
B	traps light	site of chemical reactions	provides support
C	contains genetic material	site of chemical reactions	controls entry and exit of materials
D	contains genetic material	controls entry and exit of materials	provides support

3. The diagram shows a typical plant cell.

Which part of the cell controls the movement of materials into and out of the cell?



4. In a plant, what is formed by a group of xylem vessels?

   A a cell

   B a tissue

   C an organ

   D an organ system

Part 2: Structured questions

1. (a) The boxes in Fig. 1.1 contain the names of cells, diagrams of these cells, and their functions.

   Draw straight lines to connect each named cell with its correct diagram and function.

   One is done for you.

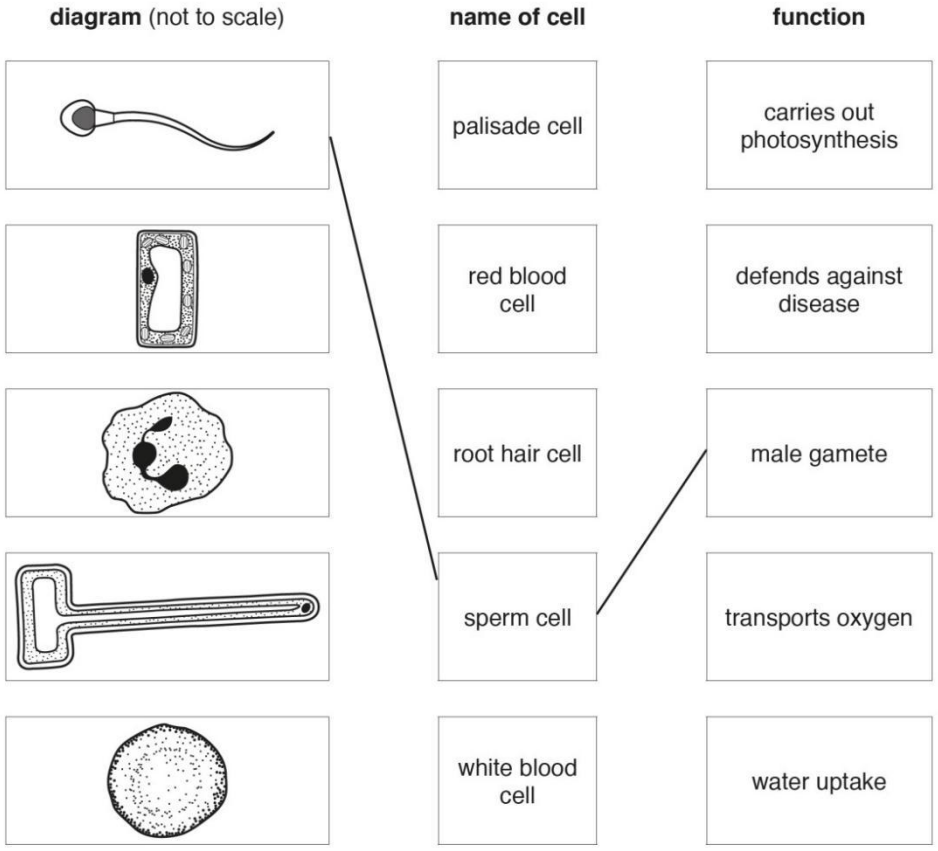


Fig. 1.1

[4]

(b) One of the cells is shown in Fig. 1.2.

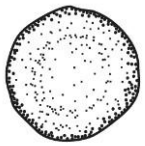


Fig. 1.2

The actual diameter of the cell is 0.0070 mm.

Calculate the magnification shown by the diagram.

magnification = ...[2]

2. Fig. 1.1 shows two cells.

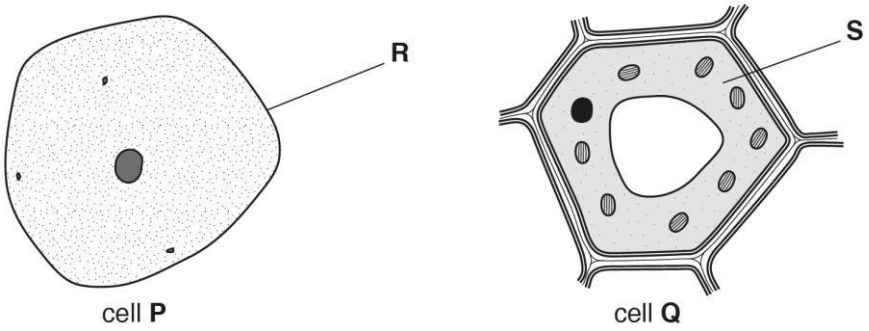


Fig. 1.1 (not to scale)

(a) Identify structures R and S, as shown on Fig. 1.1.

R .....

S .....

[2] (b) Cell Q is a plant cell.

State two pieces of evidence from Fig. 1.1 that support this statement.

1. .....

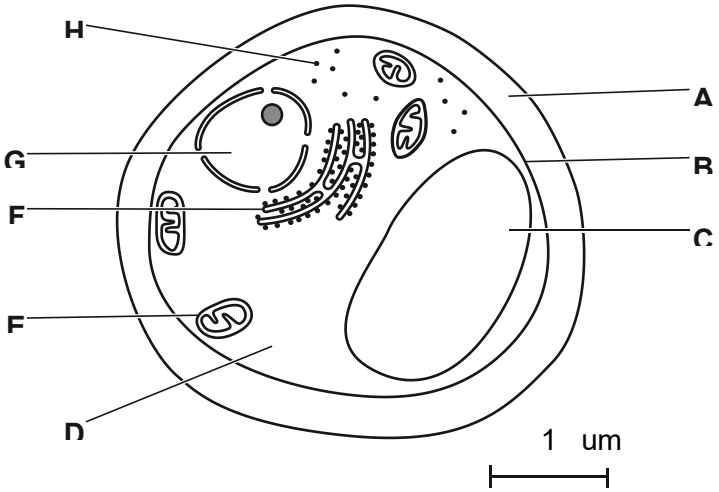
2. .....

[2]

3. Baker's yeast, *Saccharomyces cerevisiae*, is a single-celled organism that is classified in the kingdom Fungi.

Diagram **A** is a drawing of a section through a yeast cell.

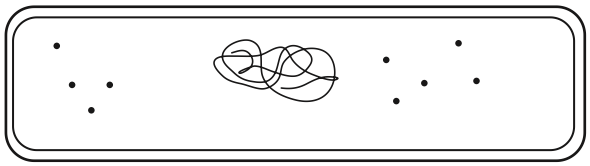
diagram A



A student made a drawing of one *Escherichia coli* bacterium.

Diagram **B** shows the students drawing.

Diagram B



Describe the similarities **and** differences between the structure of the yeast cell and the structure of the bacterial cell.

Use the information in diagram **A** and diagram **B** in your answer.

.....

.....

.....

.....

.....

.....

.....

.....[6]

[Total

3 Movement in and out of cells

Part 1: Multiple choice questions

1. What is the correct description of diffusion?

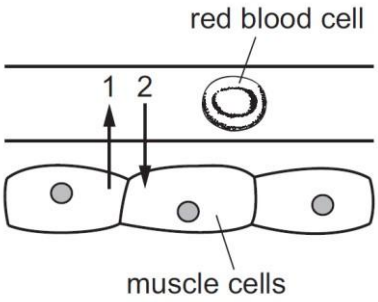
   A a controlled movement of molecules against a concentration gradient

   B a controlled movement of molecules down a concentration gradient

   C a random movement of molecules against a concentration gradient

   D a random movement of molecules down a concentration gradient

2. The diagram shows a blood capillary and a red blood cell, next to three respiring muscle cells.



   Which arrows show the net movement of carbon dioxide?

   A 1 only

   B 2 only

   C 1 and 2

   D neither arrow

3. Which process depends on diffusion?

   A circulation

   B digestion

   C gaseous exchange

   D phagocytosis

4. What is osmosis?

   A the movement of salt across a cell wall

   B the movement of salt across a partially permeable membrane

   C the movement of water across a cell wall

   D the movement of water across a partially permeable membrane

Part 2: Structured questions

1. (a) Fig. 7.1 shows a longitudinal section of a capillary next to some tissue cells.

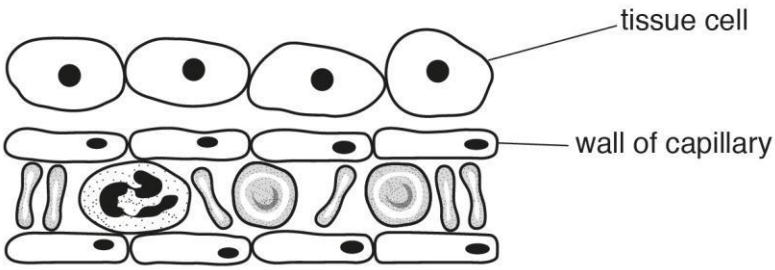


Fig. 7.1

(i) On Fig. 7.1 draw an arrow to show the direction of the net movement of oxygen molecules by diffusion.

[1] (ii) Explain your answer to (i).

.....

…….....[1]

(b) Fig. 7.2 shows a diagram of a root hair cell. It absorbs water by diffusion.

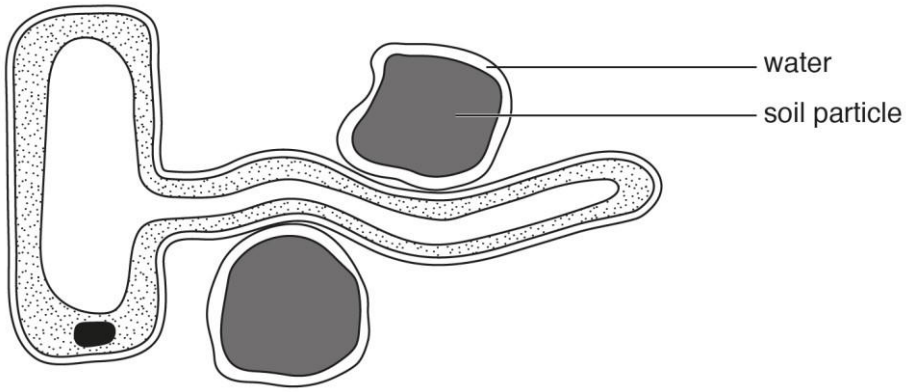


Fig. 7.2

(i) Describe how the structure of the root hair cell is adapted for its function.

.....

.....

…….....[2]

(ii) A large amount of salt is added to the soil. The salt dissolves in the water in the soil.

Suggest what happens to the rate of diffusion of water into the root hair cell.

Explain your answer.

.....

.....

…….....[2]

(c) Some fertiliser is washed by rain into a pond.

The fertiliser causes the algae on the surface of the pond to reproduce rapidly and cover the surface of the pond. Many algae and plants beneath the surface die due to lack of light.

Describe the changes that follow in the pond which can cause fish in the pond to die.

.....

.....

.....

…….....[3]

2. A student investigates diffusion in large and small organisms by observing the movement of acid into two different sized cubes of jelly.

The jelly used to make the cubes is neutral and colourless. When the student makes the jelly cubes she adds an indicator and also chemical C to make the jelly pink. The indicator is pink in alkali and colourless in acid.

(a) (i) Explain why the jelly is pink at the start of the investigation.

…….....[1]

(ii) Suggest the identity of chemical C.

…….....[1]

(b) The student cuts one small cube and one large cube from the jelly. She places the small cube of jelly in a beaker and covers the cube with acid.

Complete Fig. 4.1 to show how she sets up the apparatus. Label your diagram fully. The jelly cube has been drawn for you.

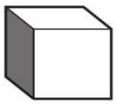


Fig. 4.1

[2]

(c) As the acid moves into the jelly cube, the colour changes from pink to colourless.

She times how long it takes for the small cube to become completely colourless.

She repeats this procedure with the large jelly cube.

The dimensions of the cubes are shown in Table 4.1.

Table 4.1

cube	length of each side / mm	minimum distance moved by the acid / mm	time / seconds
small cube	10		
large cube	20		

Calculate the minimum distance the acid has to move in each cube to decolourise the cube completely. Record these values in Table 4.1.

[1]

(d) The stopclocks in Fig. 4.2 show the times taken for the two cubes to become completely colourless. Read and record these values in Table 4.1. [2]

small cube large cube

Fig. 4.2

(e) (i) Use the data in Table 4.1 to explain the difference in the time taken for each cube to become completely colourless.

.....

…….....[1]

(ii) The teacher suggests that one of the cubes should take twice as long as the other to become completely colourless.

State and explain if the results support this suggestion.

.....

…….....[1]

(iii) Describe one source of error in the

experiment. .....

……[1]

3. A student cuts a potato into cylinders as shown in Fig. 2.1.

Fig. 2.1

The student states:

When the potato cylinders are put into salt solution, the concentration of salt solution will affect the length of the potato cylinder but not the mass.

Plan an investigation to test whether this statement is correct.

In your plan, include:

- the apparatus needed, including a labelled diagram if you wish
- a brief description of the method, including how you will treat variables and any safety precautions
- the measurements you will make
- how you will process your results to draw a conclusion.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

……[7]

4 Biological molecules

Part 1: Multiple choice questions

1. What are enzymes made from?

A fat

B hormones

C protein

D starch

2. Tests were performed on four samples of food. The results are shown in the table.

Which food contains protein only?

	results of food tests		
	Benedict's test	biuret test	iodine test
A	blue	blue	blue/black
B	blue	purple	brown
C	red	blue	blue/black
D	red	purple	brown

3. 1 cm ³of substance X is added to 10 cm ³starch suspension and mixed. Food tests are carried out immediately after mixing and again after an hour.

The results of the tests are shown in the table.

test reagent	colour of solution after mixing	colour of solution after one hour
Benedict's solution	blue	orange
iodine solution	blue / black	brown

What is substance X?

A amylase

B protease

C lipase

D sugar

Part 2: Structured questions

1. A student investigates the nutrient content of two solutions, A and B.

- He pours some of solution A into each of three test-tubes.

- He adds Benedict's solution to one test-tube, mixes well and places it in a hot water-bath for a few minutes.
- He adds biuret solution to another test-tube and mixes well.
- He adds a few drops of iodine solution to the other test-tube and mixes well.

He repeats the procedure above for solution B.

(a) Complete the second row of Table 1.1 to show which nutrient each test identifies. [3]

(b) Solution A gives a positive result with Benedict's solution and iodine solution.

Solution B gives a positive result with biuret solution and iodine solution.

All other observations are negative.

Complete the third and fourth rows of Table 1.1 to show the student's observations for solutions A and B.

[3]

Table 1.1

reagent	Benedict's solution	biuret solution	iodine solution
nutrient tested for			
colour obtained with solution **A**			
colour obtained with solution **B**			

(c) State and explain a safety precaution the student should have taken when carrying out his experiment.

……[1]

(d) Describe how you would test for the presence of fat in cooking oil.

You should include the following in your answer:

- what you would do
- the reagents you would use
- any safety precautions you would take
- the observations you would make that indicate the presence of fat.

.....

.....

.....

.....

.....

……[3]

2. A student investigates the nutrient content of three solutions, A, B and C.

He tests A, B and C separately with Benedict's solution, biuret solution and iodine solution.

(a) Name the test solution which requires him to use a hot water-bath.

……[1]

(b) His results are shown in Table 1.1.

Table 1.1

solution	observation with Benedict's solution	observation with biuret solution	observation with iodine solution
A	blue	purple	blue-black
B	green	blue	brown
C	blue	blue	blue-black

Use Table 1.1 to state the nutrients present in each of solutions A, B and C. solution A

contains ..... solution B

contains .....

solution C contains .....

[3]

(c) State and explain one safety precaution that the student should use when carrying out these tests.

safety precaution .....

explanation .....

[1]

(d) Describe a method used to test a liquid for the presence of fats. Include the observation for a positive result.

method

.....

.....

observation for a positive result

.....

[2]

(e) Another student carries out an experiment on two different solutions using Benedict's solution.

This allows her to compare the concentration of the nutrient tested for in each solution.

(i) State two variables which need to be controlled in this experiment.

variable 1 .....

variable 2 .....

[2]

(ii) Explain how the results will allow the concentrations of the nutrient in the two solutions to be compared.

.....

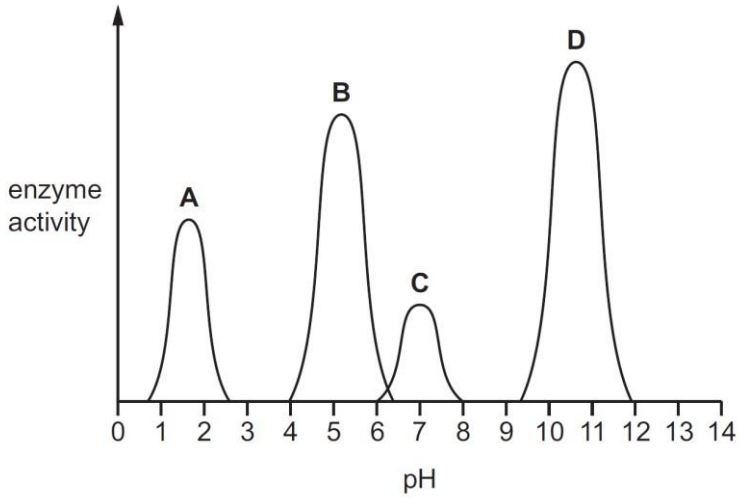
……[1]

5 Enzymes

Part 1: Multiple choice questions

1. The graph shows the effect of pH on the activity of four different enzymes.

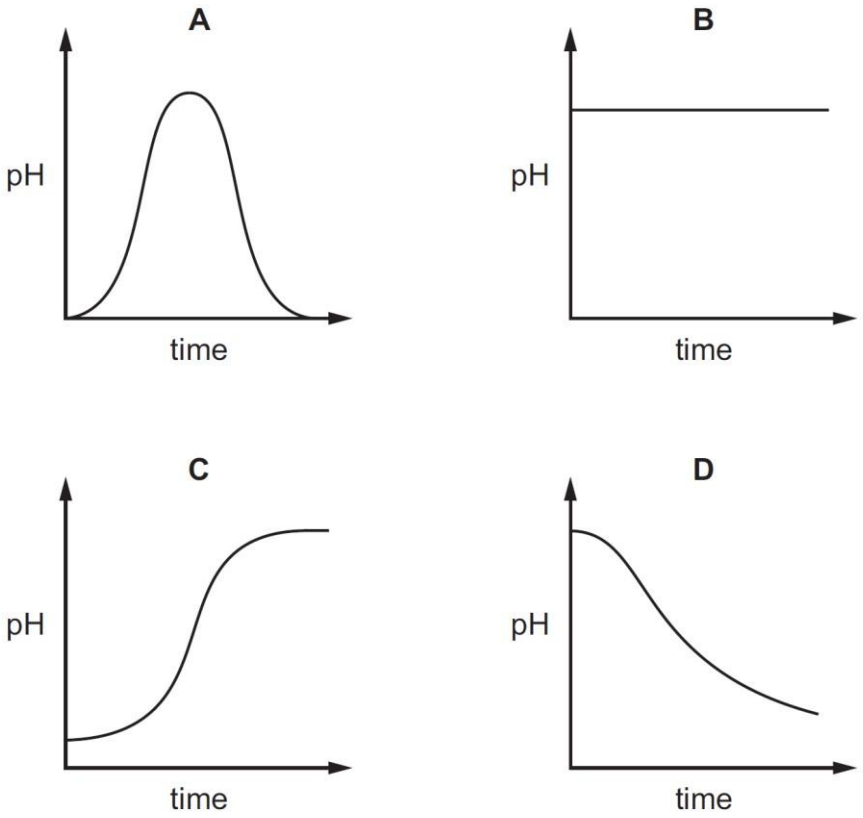
   Which enzyme is most active in the stomach?



2. Microorganisms are used to convert milk into yoghurt.

   The pH of the milk is regularly recorded as it turns into yoghurt.

   Which graph shows the change in pH as the yoghurt is made?



3. Which statement about enzymes is correct?

   A All enzymes work best at pH 7.

   B All proteins are enzymes.

   C Enzymes are biological catalysts.

   D Low temperatures denature enzymes

4. The statements explain the activity of a human enzyme as the temperature increases from 20 °C to 50 °C. The statements are in the wrong order.

   1 The enzyme is working at its optimum rate.

   2 The kinetic energy of the enzyme molecules begins to increase.

   3 The enzyme begins to change shape.

   4 The enzyme is completely denatured.

   What is the correct order of the statements?

   A $1 \rightarrow 3 \rightarrow 2 \rightarrow 4$

   B $1 \rightarrow 4 \rightarrow 3 \rightarrow 2$

   C $2 \rightarrow 1 \rightarrow 3 \rightarrow 4$

   D $3 \rightarrow 2 \rightarrow 4 \rightarrow 1$

5. Enzymes are used in digestion to break down larger molecules into smaller molecules.

   Which row matches the large molecules with the small molecules they are broken down into?

	large molecules	small molecules
A	fat	glycerol and fatty acids
B	glycogen	glycerol and amino acids
C	protein	simple sugars
D	starch	amino acids

6. In an experiment, an enzyme from the human alimentary canal is found to work slowly at 20 °C.

   What is the optimum temperature for enzymes working in the human alimentary canal?

   A 17 °C B 27 °C C 37 °C D 77 °C

Part 2: Structured questions

1. Fig. 1.2 shows a graph of how the activity of three different enzymes varies with temperature.

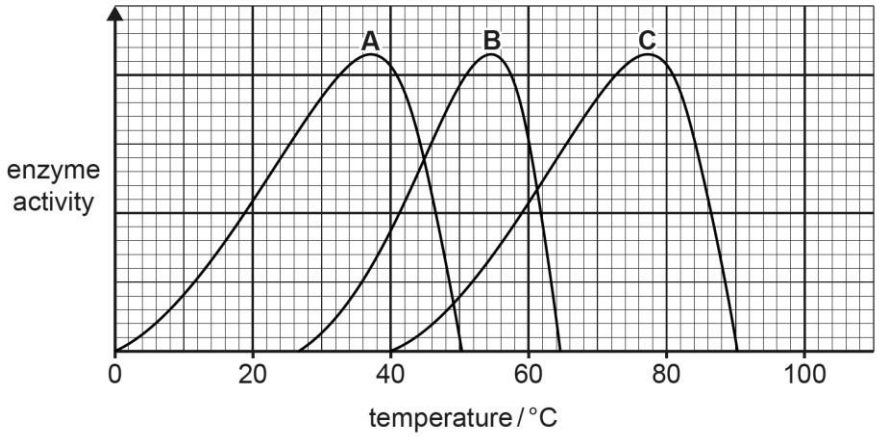


Fig. 1.2

(a) Use information from Fig. 1.2 to decide which curve shows the activity of an enzyme in the duodenum.

Complete the sentences.

Curve ..... is from the duodenum because

……...

……[1]

(b) Fig. 1.3 shows a graph of how the activity of three different enzymes varies with pH.

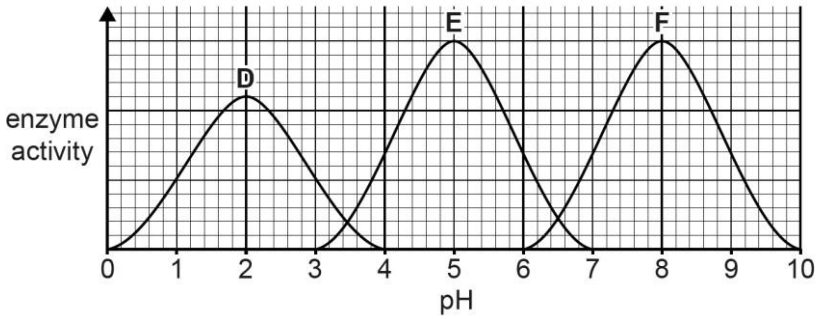


Fig. 1.3

Use information from Fig. 1.1 to decide which curve in Fig. 1.3 shows the activity of an enzyme in the duodenum of the alimentary canal.

Complete the sentences.

Curve ..... is from the duodenum because

.....

.....[1]

(c) Explain why there is no activity shown by any of the enzymes in Fig. 1.2 at the following temperatures.

0 °C

.....

.....

100 °C

.....

.....

[2]

2. (a) Method

Step 1 The student labels two spotting tiles A and B.

Step 2 She adds two drops of iodine solution to six wells in each of the two spotting tiles, as shown in Fig. 1.1.

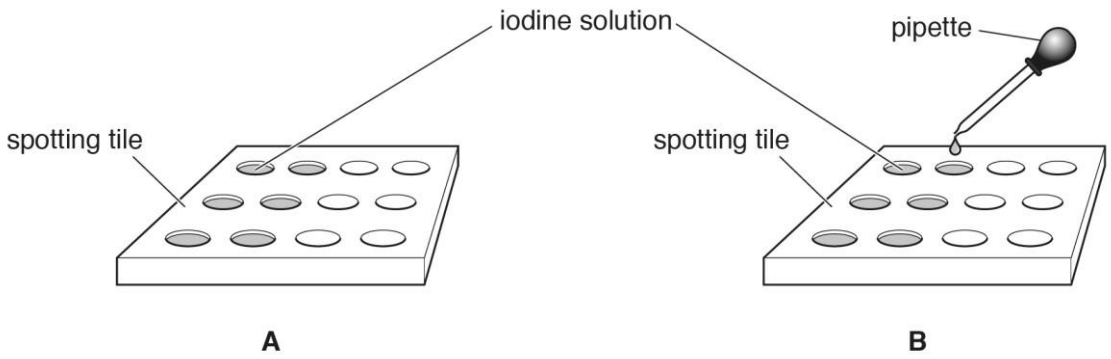


Fig. 1.1

Step 3 She labels two test-tubes A and B.

Step 4 She measures 5 cm3 starch solution into each of the test-tubes A and B.

Step 5 She adds 1 cm3 enzyme solution to test-tube A and mixes.

Step 6 She adds 1 cm3 water to test-tube B and mixes.

Step 7 She places two drops from test-tube A into one of the wells in spotting tile A containing iodine solution and records in Table 1.1 the colour obtained.

Step 8 She then places two drops from test-tube B into one of the wells in spotting tile B containing iodine solution and records in Table 1.1 the colour obtained.

Step 9 She repeats steps 7 and 8 using a different well each time at 1 minute intervals for a further 5 minutes.

Table 1.1

time / minutes	colour in spotting tile	
	test-tube **A** (with enzyme)	test-tube **B** (without enzyme)
0	blue-black	blue-black
1	blue-black	blue-black
2	blue-black	blue-black
3	dark brown	blue-black
4	dark brown	blue-black
5	brown	blue-black

(i) Describe and explain the results for test-tube A and test-tube B.

test-tube A

.....

.....

test-tube B

.....

.....

[3]

(ii) Predict the results for test-tube A if the method had been carried out at 35 °C rather than at 20 °C.

.....[1]