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About 

(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	2013 to 2024
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 2023 PAPER 1

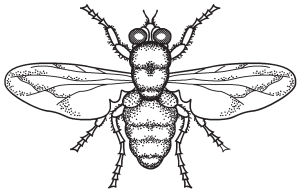
MCQ Section

1. How permeable are the cell wall and the cell membrane in a plant cell?

	cell wall	cell membrane
A	fully	fully
B	fully	partially
C	partially	fully
D	partially	partially

[Unit 1]

2. The diagram shows an arthropod.



Using the key, what correctly identifies the arthropod in the picture?

1 has wings ..... go to 2
does not have wings ..... **A**

2 has 2 body parts ..... **B**
has 3 body parts ..... go to 3

3 has 6 legs ..... **C**
has 8 legs ..... **D**

[Unit 2]

3. Which statements about diffusion are correct?

	molecules move from a higher to a lower concentration	only occurs within living systems	rate slows down as the temperature increases
A	✓	✓	×
B	✓	×	×
C	×	✓	✓
D	×	×	✓

key
✓ = yes
× = no

[Unit 3]

4. Some ways in which molecules may move into and out of cells are listed.

1 Molecules move from a higher concentration to a lower concentration.
2 Molecules move from a lower concentration to a higher concentration.
3 Molecules move from a higher concentration to a lower concentration across a partially permeable membrane.

Which statement is correct?

A 1 describes osmosis and 3 describes active transport.
B 2 describes osmosis and 3 describes diffusion.
C 1 describes active transport and 2 describes osmosis.
D 2 describes active transport and 3 describes osmosis.

[Unit 3]

5. Food tests were carried out on a solution containing biological molecules.

The table shows the results of the tests.

name of test	result of test
biuret test	purple solution
Benedict's test	blue solution

Which conclusion can be drawn from these results?

A The solution contains protein but no glucose.
B The solution contains protein and glucose.
C The solution contains glucose but no protein.
D The solution does not contain glucose or protein.

[Unit 7]

1. B Cell wall has quite large pores, so it is fully permeable, while cell membrane has tiny pores which restrict large sized molecules, hence it is partially permeable.

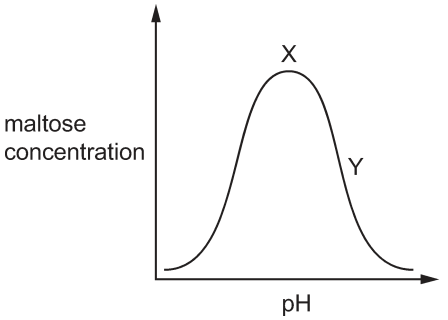
2. C The insect shown has two wings, three body parts, i.e., mouth, trunk, abdomen and six legs, so only **C** is correct.

3. B Diffusion occurs down the concentration gradient in living as well as nonliving system and rate of diffusion increases as the temperature increases.

4. D Active transport occurs against the concentration gradient by using energy and osmosis occurs down the concentration gradient for water molecules moving across a partially permeable membrane. Active transport requires a living membrane.

5. A In biuret test, solution turns purple / violet / lilac if proteins are present. In Benedict's test, after heating colour changes from blue to green, brown, yellow, orange or red.

6. The graph shows the concentration of maltose produced when amylase digests starch at different pH values.



What explains the shape of the graph between point X and point Y?

A The enzyme is completely denatured and does not work at all.

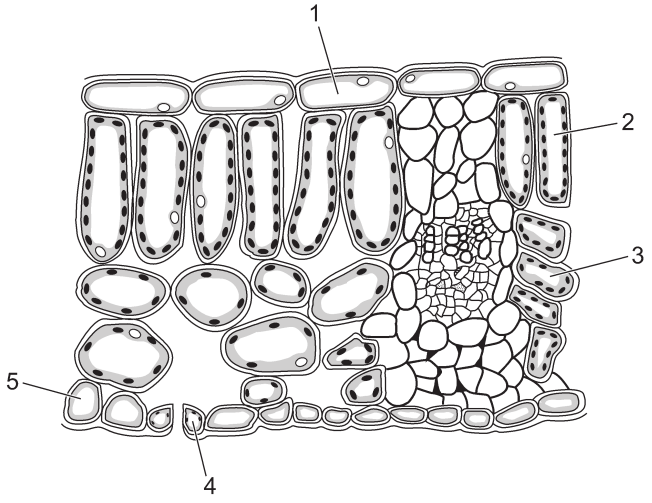
B The enzyme molecules have less kinetic energy.

C The shape of the enzyme active site is changing and does not fit the substrate so well.

D The substrate molecules have more kinetic energy.

[Unit 4]

7. The diagram shows a section through part of a leaf from a dicotyledonous plant.



Which cells carry out photosynthesis?

A 1, 2 and 3

B 1, 4 and 5

C 2, 3 and 4

D 3, 4 and 5

[Unit 5]

8. Root hairs take in water and ions from the soil.

Which table shows the correct concentrations of water and ions in the root hair?

A

substance	concentration in root hair
water	lower than the soil
ions	higher than the soil

B

substance	concentration in root hair
water	higher than the soil
ions	higher than the soil

C

substance	concentration in root hair
water	higher than the soil
ions	lower than the soil

D

substance	concentration in root hair
water	lower than the soil
ions	lower than the soil

[Unit 5]

6. C At X, enzyme shows maximum activity but after that with increasing pH, its activity decreases, as bonds like Hydrogen or ionic are breaking, so shape of its active site changes and less substrates are able to fit into it.

7. C Cells having chloroplasts are able to photosynthesise, so only palisade mesophyll cells (2), spongy mesophyll cells (3) and guard cells (4) have chloroplasts and can carry out photosynthesis.

8. A Root hair has lower concentration of water than soil, so water moves by osmosis from soil into root hair. Concentration of mineral ions is higher in root hair than the soil, so ions are taken up by active transport from soil into root hair.

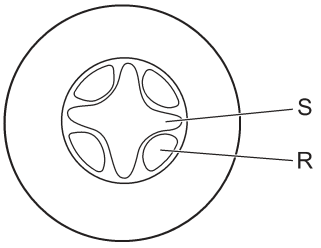
9. Which row shows why plants need magnesium ions and nitrate ions?

	magnesium ions	nitrate ions
A	to make fatty acids	to make proteins
B	to make amino acids	to make chlorophyll
C	to make chlorophyll	to make cellulose
D	to make chlorophyll	to make amino acids

[Unit 5]

10. A herbaceous plant, growing in a nutrient solution, is placed in a well-lit container. Humid air is passed through the container.

The diagram shows a section through a part of the plant.



The speeds of movement of the fluids in tissues R and S are measured. The humid air is then replaced by dry air and the speeds of movement of the fluids are measured again.

Which effect does the change to dry air have on the measurements?

	tissue R	tissue S
A	greatly increased upward movement	greatly increased downward movement
B	greatly increased downward movement	little change
C	little change	greatly increased downward movement
D	little change	greatly increased upward movement

[Unit 6]

11. Some of the nutrients in sweet potatoes are listed.

1 calcium
2 fibre
3 iron
4 vitamin C

Which nutrient will help to prevent each disease?

	anaemia	rickets	scurvy
A	3	1	4
B	3	4	4
C	4	1	3
D	4	2	3

[Unit 7]

12. Four of the organs of the alimentary canal are listed.

J colon
K duodenum
L oesophagus
M stomach

Which sequence shows the order in which food passes through these organs?

A K → J → L → M
B L → K → M → J
C L → M → K → J
D M → L → J → K

[Unit 8]

13. A person who has coeliac disease has flattened villi in their ileum. If a person with coeliac disease eats the same quantity and types of food as a disease-free person, they will have lower levels of glucose in their hepatic portal vein.

Which row explains this?

	capillaries do not absorb the glucose molecules	the surface area of the ileum is reduced
A	✓	✓
B	✓	×
C	×	✓
D	×	×

key
✓ = yes
× = no

[Unit 8]

MCQ Answers

9. D Magnesium ions are integral part of chlorophyll molecule, so without these ions, chlorophyll cannot be synthesised. Similarly nitrate ions provide nitrogen to make amino acids which are then used to make proteins.

10. D Tissue R is phloem while tissue S is xylem as shown in transverse section of root. Due to transpiration from leaves, greater water loss occurs, so to compensate it, more water is taken up by xylem from the container, hence movement of water and ions increases upward.

11. A Iron is needed to make haemoglobin. Calcium causes strong bones and vitamin C prevents gum bleeding.

12. C Food passes from oesophagus to stomach and then to duodenum. Finally it reaches colon and then egested.

13. C Due to flattened villi, surface area of ileum reduces, so lesser glucose from digested food is absorbed by blood capillaries.

JUNE 2024 PAPER 2

THEORY Section

Answer **all** questions

Question 1

Fig. 1.1 shows two cells from the leaf of a plant observed using a light microscope.

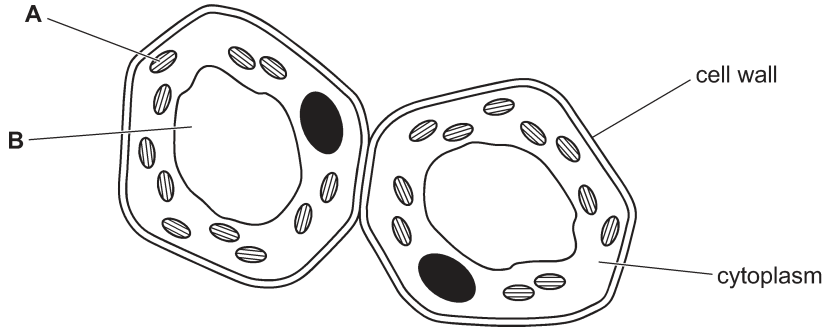


Fig. 1.1

(a) Complete Table 1.1 to identify the structures labelled **A** and **B** and to describe the function of each structure.

Table 1.1

structure	name of structure	description of function
A	.....	....
B	.....	....

[4]

(b) State **one** structure that is **not** visible in Fig. 1.1 but would be visible in the cytoplasm in an electron micrograph of the same two cells. [1]

[Total: 5] [Unit 1]

Solution

(a)

structure	name of structure	description of function
A	chloroplast	Photosynthesis by which light energy ..... is converted to chemical energy. .....
B	sap vacuole	Storage of mineral solution or other ..... molecules. .....

(b) Mitochondria.

COMMENT on **ANSWER**

❝ **(a)** In photosynthesis glucose is made which converts it to starch. Sap vacuole helps maintain turgor for support.

(b) Some other structures are ribosomes, Golgi bodies, ER channels etc. ❞

Question 2

Organisms can be classified into groups using the features they share.

(a) Fish are one of the main groups of vertebrates.

(i) State **three** main features used to classify an organism as a fish. [3]

(ii) State **two** main groups of vertebrates other than fish. [2]

(b) Swordfish are large fish that live in the ocean.

They have a long, bony extension to the skull, called a sword.

Fig. 2.1 is a diagram of a swordfish.

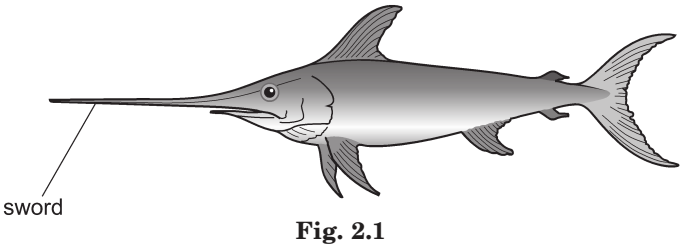


Fig. 2.1

The binomial name of the swordfish is *Xiphias gladius*.

(i) Define the term species. [2]

(ii) State the species name of the organism shown in Fig. 2.1. [1]

(c) Swordfish swim near the surface of the ocean where the water temperature is low.

During evolution, swordfish developed a muscle behind each eye that warms the eyes and the brain to a temperature above that of the ocean.

This feature gives swordfish improved vision.

(i) Name the process that led to the evolution of the muscle behind each eye of the swordfish. [1]

(ii) Suggest reasons why the evolution of this feature has adapted swordfish to survive in the ocean. [4]

[Total: 13] [Unit 2, 17]

Solution

(a) (i) 1. Gills
2. Scaly skin
3. Fins

(ii) 1. Mammals
2. Birds (or Aves)

(b) (i) Species is the group of organisms that are quite identical in morphology and physiology. Members of same species can interbreed and produce fertile offsprings.

(ii) Gladius.

(c) (i) Natural selection.

(ii) Due to improved vision these fish can see to hunt prey for food. It provides them more food energy. Due to more food, these fish survive and out-compete other animals. They can see predators and avoid being eaten or attacked by hunters. Also they can see their mates, so can reproduce more and produce more offsprings which increases their population.

COMMENT on **ANSWER**

"**(a)** **(i)** Eggs have no shell and these are surrounded by jelly. Fish are cold blooded and have external fertilisation.

(ii) Other groups are reptiles and amphibians.

(b) **(i)** Members of same species have similar biochemistry and behaviour as well. They can mate among themselves to reproduce. "

Question 3

(a) Complete Table 3.1, using terms from the list below to match each description to a term.

phenotype **dominant** **gene** **genotype**
heterozygous **homozygous** **allele** **recessive**

Table 3.1

description	term
a form of a gene that codes for one of a pair of contrasting features	.....
a form of a gene that always has an effect when it is present	.....
having two different forms of a gene for a particular feature	.....
having two of the same form of a gene for a particular feature	.....
the combination of alleles that an organism has in its chromosomes	.....

[5]

(b) Fig. 3.1 is a diagram of part of a molecule of DNA taken from a bacterial cell.

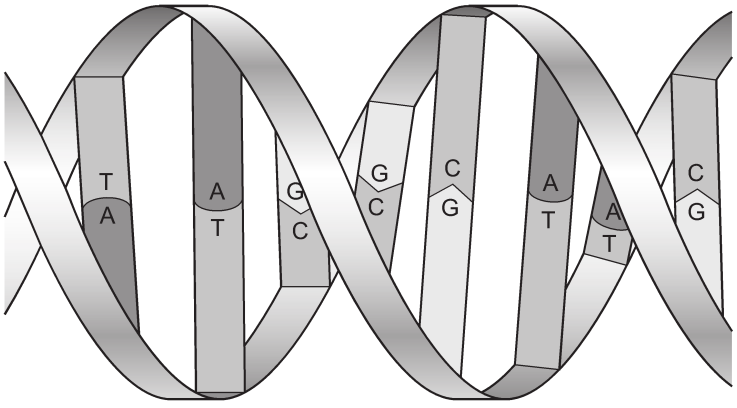


Fig. 3.1

(i) State the term which describes the shape of the DNA molecule. [1]

(ii) Most of the DNA in bacterial cells is found in one large loop in the cytoplasm.

Name another structure in bacterial cells which contains DNA. [1]

(iii) State the name of the **type** of molecule that is represented by the letters A, T, G and C in Fig. 3.1. [1]

(iv) Outline the importance of the sequence of A, T, G and C in DNA. [2]

[Total: 10] [Unit 17]

Solution

(a)

description	term
a form of a gene that codes for one of a pair of contrasting features	**Allele**
a form of a gene that always has an effect when it is present	**Dominant**
having two different forms of a gene for a particular feature	**Heterozygous**
having two of the same form of a gene for a particular feature	**Homozygous**
the combination of alleles that an organism has in its chromosomes	**Genotype**

(b) (i) Double helix.

(ii) Plasmid.

(iii) Organic or nitrogenous bases.

(iv) Sequence of A, T, G and C codes for proteins, e.g., Collagen, Myoglobin etc. This code also determines the sequence of amino acids in a protein.

COMMENT on **ANSWER**

"**(b)** **(i)** DNA has two spiral strands, so it contains two helices.

(ii) Plasmid is circular DNA molecule which is present as extrachromosomal DNA.

(iv) It also determines shape, structure and function of a protein."

Question 4

Fig. 4.1 is a simplified diagram of a nephron.

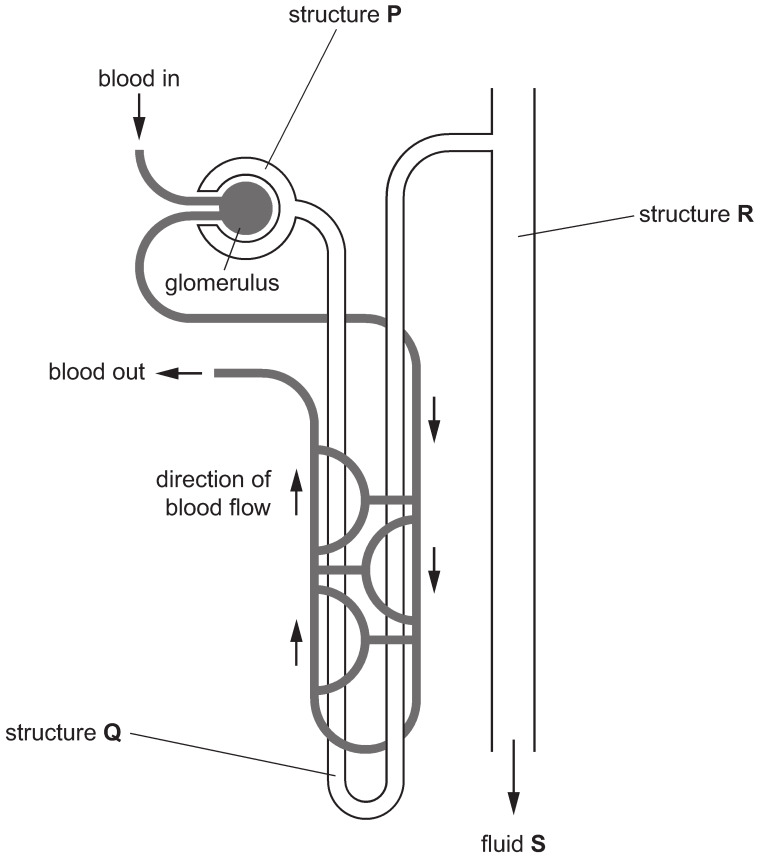


Fig. 4.1

(a) (i) Identify each of the structures labelled **P**, **Q** and **R** in Fig. 4.1. [3]

(ii) Name the organ which contains many nephrons. [1]

(iii) Name the organ that stores fluid **S** before it is released from the body. [1]

(b) Table 4.1 shows the composition of a sample of fluid **S** from a healthy person.

The person that provided the sample of fluid **S** eats a balanced diet.

Table 4.1

component	concentration/arbitrary units
glucose	0.00
protein	0.00
ions	1.50
urea	2.00

(i) State why it is important that urea is removed from the blood in fluid **S**. [1]

(ii) Use your knowledge of the function of a nephron to explain the concentration of each of the following components of fluid **S**.

glucose

protein [5]

(iii) Explain what would happen to the concentration of ions in fluid **S** if the person drank a large volume of water several hours before the sample was collected. [3]

[Total: 14] [Unit 13]

Solution

(a) (i) **P:** Bowman's capsule.

Q: Loop of Henle.

R: Collecting duct.

(ii) Kidney.

(iii) Urinary bladder.

(b) (i) Urea is toxic for body.

(ii) **Glucose:** From blood glucose enters Bowman's capsule of nephron by ultrafiltration process. It is then reabsorbed and moves back in blood through capillaries of renal vein surrounding the nephron.

Protein: It doesn't enter Bowman's capsule, so can't go into nephron as it is not filtered from blood being a large molecule.

(iii) Concentration of ions will decrease due to more volume of water in fluid **S** or urine. Excretion of more water is needed due to homeostasis to keep the concentration constant in blood.

COMMENT on **ANSWER**

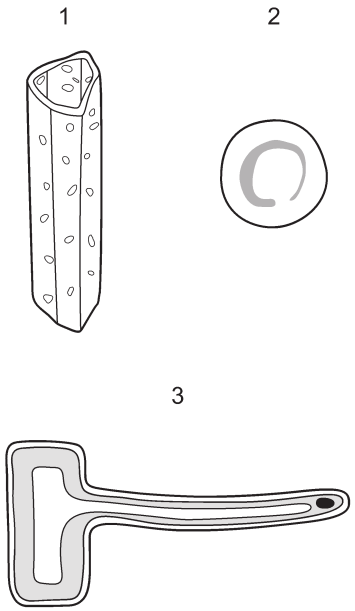
"**(b)** **(ii)** Glomerular capillaries of renal artery carry blood through which ultrafiltration occurs into space of Bowman's capsule.

(iii) From collecting duct some water is reabsorbed into blood to keep the volume of water constant in blood."

NOVEMBER 2024 PAPER 1

MCQ Section

1. The diagram shows three different types of microscopic structure.



What are these structures?

	1	2	3
A	xylem vessel	root hair cell	red blood cell
B	red blood cell	xylem vessel	root hair cell
C	root hair cell	red blood cell	xylem vessel
D	xylem vessel	red blood cell	root hair cell

[Unit 1]

2. Species of organisms have scientific names made up of two parts.

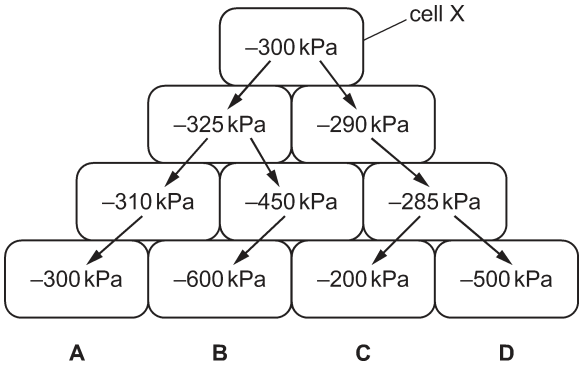
What is the system used to name species?

A the classification system
B the genus system
C the binomial system
D the dichotomous key system

[Unit 2]

3. The diagram shows the water potentials measured in units of kPa in a group of plant cells. A larger negative number indicates a lower water potential.

Which sequence of arrows shows the net movement of water from cell X?



[Unit 3]

4. Which statements about active transport are correct?

1 Ions move from a region of high concentration to a region of low concentration.
2 Ions move across the cell membrane.
3 Energy released during respiration is used to move ions into or out of a cell.

A 1, 2 and 3
B 1 and 2 only
C 1 and 3 only
D 2 and 3 only

[Unit 3]

5. Which biological molecule contains the chemical elements carbon, hydrogen, nitrogen and phosphorus?

A DNA **B** cellulose
C lipid **D** starch

[Unit 4]

1. D Root hair cell is elongated, RBC is spherical while xylem vessel is cylindrical.

2. C Binomial means, an organism has two names, one of its genus and other of its species.

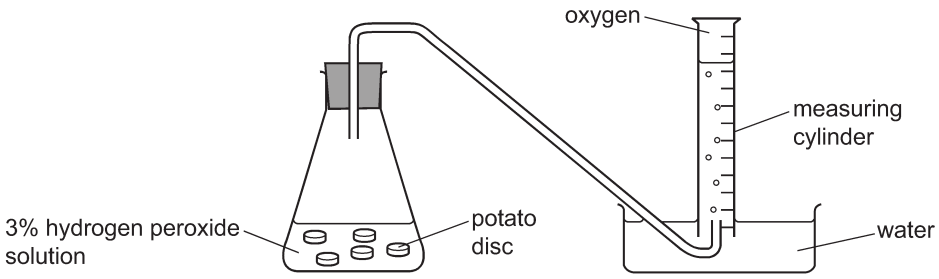
3. B Water moves from a cell having higher water potential to a cell with lower water potential. Cell with less negative value has higher water potential than cell with more negative water potential.

4. D In active transport ions move from lower to higher concentration across a living cell membrane by getting energy from respiration.

6. Catalase is an enzyme found in potato tissue. It catalyses the breakdown of hydrogen peroxide into water and oxygen.

$$\text{hydrogen peroxide} \xrightarrow{\text{catalase}} \text{water + oxygen}$$

The apparatus shown was used to investigate the activity of catalase.

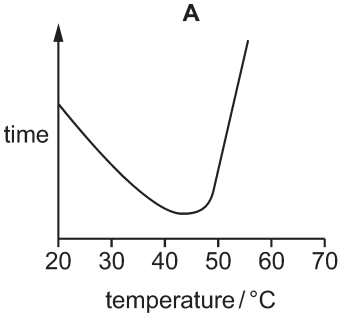


Five identical potato discs were dropped into 15 cm^3 of a 3% hydrogen peroxide solution at a temperature of 20 °C. The time taken for 5 cm^3 of oxygen to be produced was recorded.

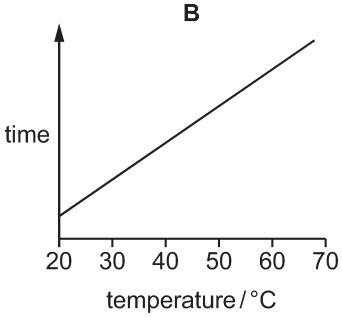
This procedure was repeated at each of the following temperatures: 30 °C, 40 °C, 50 °C, 60 °C and 70 °C.

Which graph shows the results of the investigation?

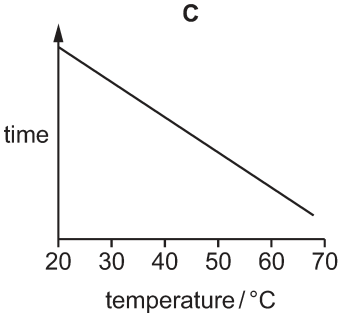
A



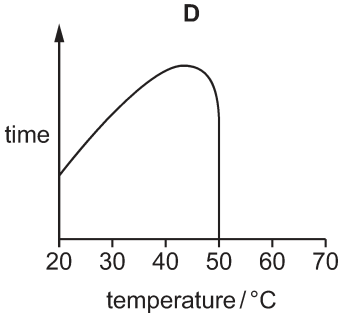
B



C



D

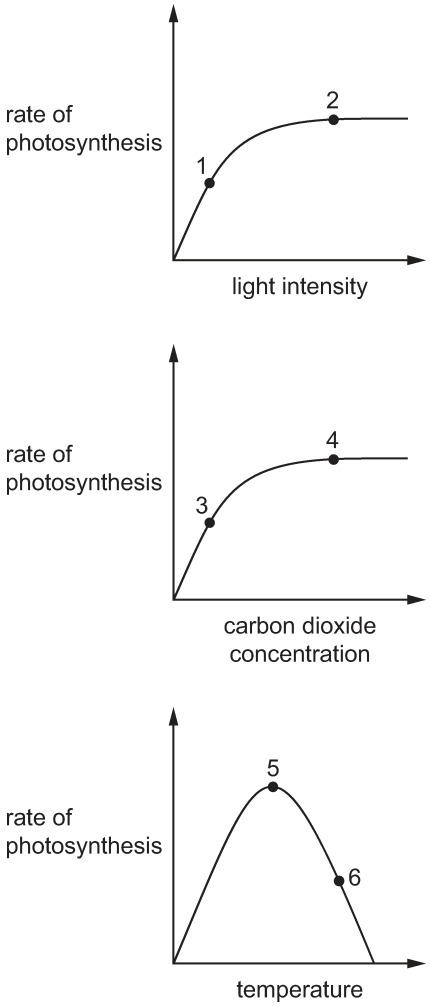


[Unit 5]

5. A C, H & O are present in starch and lipids as well as cellulose. But nitrogen and phosphorus both are additional elements found in DNA and RNA.

6. A By increasing temperature till 40 °C or optimum temperature, enzyme activity increases, so products are formed in lesser time. After optimum, higher temperature denatures the enzyme and its activity decreases.

7. The graphs show factors affecting the rate of photosynthesis.

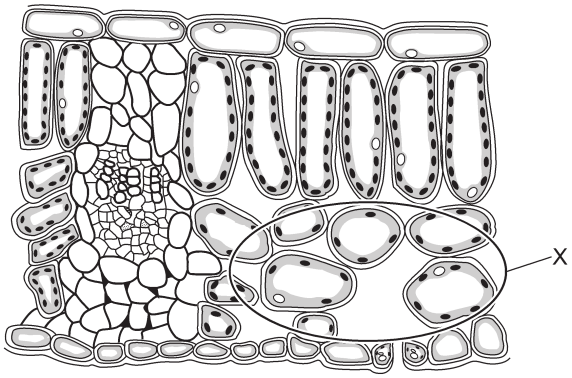


At which points on the graphs could the rate of photosynthesis be limited by the carbon dioxide concentration?

A 1, 3 and 5
B 1, 4 and 6
C 2, 3 and 5
D 2, 4 and 6

[Unit 6]

8. The diagram shows a section through a leaf.



What is the main function of the region labelled X?

A conduction and support
B gaseous exchange
C photosynthesis
D prevention of water loss

[Unit 7]

9. Root hair cells take in water and ions from the soil.

Which row shows how water and ions are taken into root hair cells?

	water	ions
A	active transport	active transport
B	active transport	osmosis
C	osmosis	osmosis
D	osmosis	active transport

[Unit 7]

10. Four leafy shoots cut from the same plant were put into beakers of coloured water and left in rooms with different temperatures. In two rooms, electric fans were set up to blow air over the stems.

The time taken for the coloured water to reach the leaves was measured for each stem.

In which stem will the coloured water reach the leaves the fastest?

	room conditions
A	10 °C
B	10 °C with a fan
C	30 °C
D	30 °C with a fan

[Unit 7]

7. C As graphs show light intensity, temperature and CO_2 concentration, so for light intensity graph CO_2 is limiting at point 2, for temperature graph it is limiting at point 5 and for CO_2 graph it is limiting at point 4, as rate of photosynthesis decreases or becomes constant at these points.

8. B There is large air space near stoma, where gas exchange occurs between leaf and outside air. CO_2 enters and O_2 plus water vapours move out.

9. D Water always moves through osmosis from higher to lower water potential. Ions from soil are absorbed by active transport against the concentration gradient.

10. D Due to higher temperature and wind velocity, water evaporates from leaves at fast speed, so uptake of water also increases from beakers of water, reaching leaves rapidly.

11. Cubes of boiled egg white are placed in test-tubes containing 5 cm^3 of water. Boiled egg white contains protein. Other substances are added to each test-tube as shown in the table. The test-tubes are left for eight hours and then tested for amino acids.

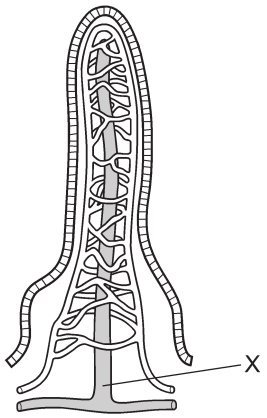
test-tube	solution added	results of test for amino acids
1	pepsin	absent
2	pepsin + alkali	absent
3	none	absent
4	pepsin + acid	large amounts
5	boiled pepsin + acid	traces
6	acid	traces
7	alkali	absent

Which test-tubes show that pepsin is an enzyme?

A 1 and 4 **B** 2 and 7
C 4 and 5 **D** 5 and 6

[Unit 8]

12. The diagram shows a section through a villus.

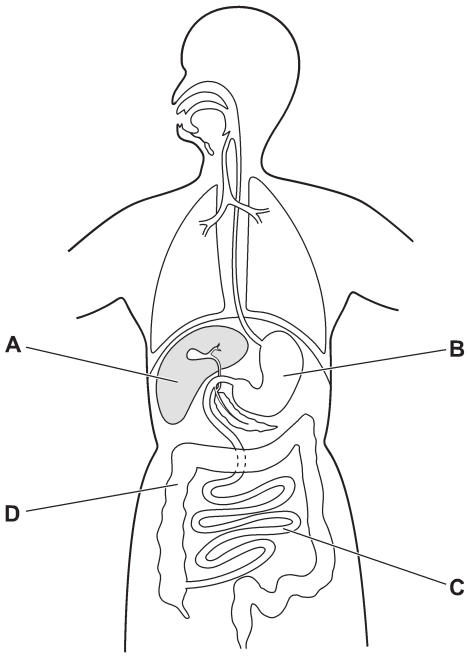


What is the main role of vessel X?

A to carry amino acids to the liver for protein formation
B to deliver deoxygenated blood to the heart
C to supply oxygen to the cells of the villus
D to transfer fatty acids and glycerol to the lymph system

[Unit 8]

13. Which part of the human digestive system is a major region for assimilation of amino acids?



[Unit 8]

14. When the volume of the thorax increases, the pressure in the thorax is lowered. This results in air being taken into the body.

How is the volume of the thorax increased so that air is breathed in?

A by the diaphragm and the external intercostal muscles contracting
B by the diaphragm relaxing and the external intercostal muscles contracting
C by the diaphragm and the internal intercostal muscles contracting
D by the diaphragm relaxing and the internal intercostal muscles contracting

[Unit 9]

11. C Pepsin breaks down egg proteins at higher rate in the presence of acid (HC*l*), so amino acids are made in large amounts as product. In tube 5, boiled pepsin is denatured but few amino acids are still produced due to HC*l*.

12. D Vessel X is called lacteal or lymphatic vessel, which is used for absorption of lipids digested into fatty acids and glycerol.

13. A Assimilation means usage of chemicals in metabolic reactions. In liver, amino acids are used to make proteins and excess are converted to urea.

14. A Diaphragm goes down and flattens while rib cage is raised during inhalation by contraction of muscles.

15. C As oxygen is used from capillary tube by germinating seeds, so oil drop moves towards the test-tube along with further oxygen moving down.

NOVEMBER 2024 PAPER 2

THEORY Section

Answer **all** questions

Question 1

Use the dichotomous key in Fig. 1.1 to identify the five main vertebrate groups, **A**, **B**, **C**, **D** and **E**.

Complete Table 1.1.

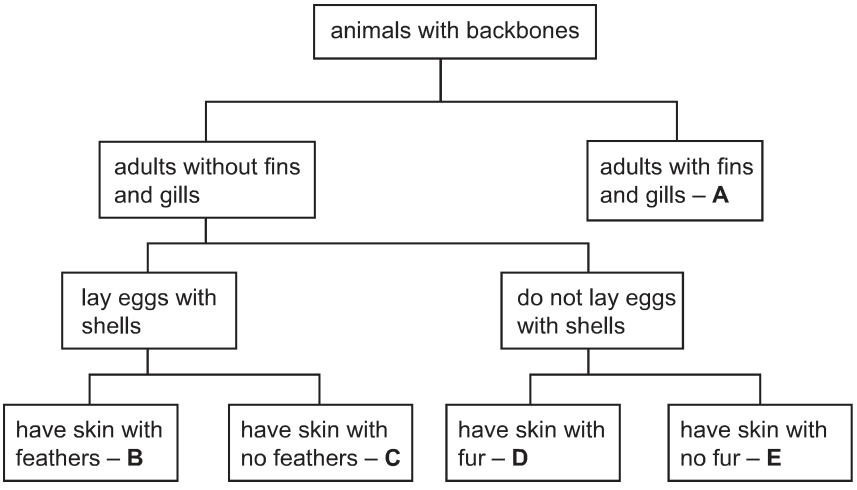


Fig. 1.1

Table 1.1

letter in key	name of vertebrate group
A	.....
B	.....
C	.....
D	.....
E	.....

[5]

[Total: 5] [Unit 2]

Solution

letter in key	name of vertebrate group
A	Fish
B	Birds
C	Reptiles
D	Mammals
E	Amphibians

Question 2

A virus is a type of pathogen.

Fig. 2.1 shows the external structure of a virus.

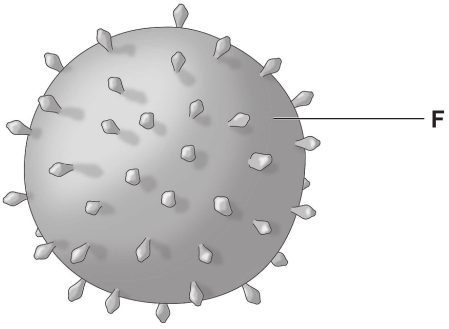


Fig. 2.1

(a) (i) Identify component **F**. [1]

(ii) Identify one component of a virus **not** shown in Fig. 2.1. [1]

(b) Pathogens may be transmitted to humans either by direct contact or indirectly.

List **two** of the human body's barriers to the entry of pathogens. [2]

(c) If a virus is able to pass through the body's barriers, an immune response takes place.

Antibodies are produced during this immune response.

(i) Name **four** chemical elements that will always be present in an antibody molecule. [2]

(ii) Explain how the structure and function of an antibody molecule are important in an immune response. [5]

(d) The average length of pregnancy in an adult human is 40 weeks.

A human mother may give birth to her baby before the end of the usual length of pregnancy. This is known as a premature birth.

(i) Suggest why babies born prematurely are at higher risk of developing some infectious diseases than babies born **after** 40 weeks of pregnancy. [2]

(ii) Suggest **one** action that a mother can take to protect her premature baby from infection in the weeks after birth. [1]

[Total: 14] [Unit 12]

Solution

(a) (i) Protein coat

(ii) DNA or RNA

(b) 1. Skin or epithelium. 2. Hairs in nose or nostrils.

(c) (i) Carbon, hydrogen, oxygen, nitrogen & sulfur.

(ii) A pathogen has antigens which are of specific shape or structure complementary to antibody. These antigens fit into specific site of antibody making an antibody-antigen complex. Thus antibody causes destruction of pathogen, i.e., virus or bacteria. Antibody also marks or points out pathogens for action by other cells of immune system. It may clump or immobilise pathogens.

(d) (i) Immune system of such premature babies is not yet fully developed, so they depend upon antibodies received from mother across placenta. Due to lesser period of pregnancy, they get fewer antibodies.

(ii) Breast feeding as mother's milk has ample antibodies to protect baby against diseases.

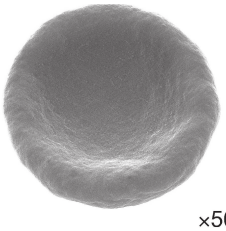
Question 3

(a) Use words from the list to complete the paragraph.

platelets glucagon pancreas plasma liver sucrose endocrine pituitary insulin glycogen

Glucose is transported in solution by the component of blood called ..... . If the concentration of glucose in the blood increases above normal, the hormone ..... is released into the blood by an ..... gland called the ..... . This hormone promotes the removal of glucose from the blood and its conversion into the chemical ..... . [5]

(b) Fig. 3.1 is a photomicrograph of a type of blood cell.



×5000

Fig. 3.1

(i) Identify the type of blood cell shown in Fig. 3.1. [1]

(ii) If the concentration of glucose in the blood increases above normal and is **not** controlled, this can result in changes to some cells of this type. They may:

- lose their specialised shape
- become less flexible
- stick together with many other cells of the same type.

Suggest and explain how these changes will affect the body. [5]

[Total: 11] [Unit 11]

COMMENT on **ANSWER**

"**(a) (ii)** Some viruses have DNA, while others have RNA as genetic material.

(b) Mucus and acid in stomach also act as part of general immunity against pathogens.

(c) (ii) Pathogens on which antibodies are attached are detected by phagocytes, which engulf them and destroy by process of phagocytosis. Antibodies also stick to flagella of bacteria and immobilise it.

(d) (ii) Child may also be vaccinated. "

Solution

(a) Glucose is transported in solution by the component of blood called **plasma**. If the concentration of glucose in the blood increases above normal, the hormone **insulin** is released into the blood by an **endocrine** gland called the **pancreas**. This hormone promotes the removal of glucose from the blood and its conversion into the chemical **glycogen**.

(b) (i) Red blood cell or erythrocyte.

(ii) Due to stuck cells, surface area is reduced. Such cells due to different shape and less flexibility, are less able to fit into or pass through capillaries, such cells due to sticking together may cause blood clotting. Oxygen is less absorbed from lungs and less transported or supplied to body tissues. Their haemoglobin may absorb less oxygen. Due to clumping in arteries, blood pressure also increases.

Question 4

Fig. 4.1 shows changes in the curved shape of the lens of a person's eye over time.

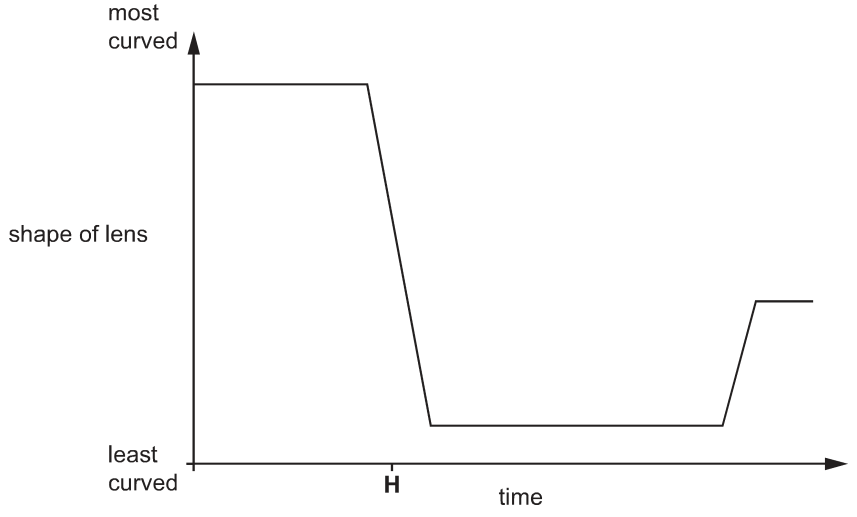


Fig. 4.1

(a) (i) During the period of time shown in Fig. 4.1, the person carried out each of the following actions:

P read the words in a book
Q read the time on a wall clock
R looked out of a window at a bird high in the sky.

Identify in what order the person carried out actions **P**, **Q** and **R**.

Place the letters **P**, **Q** and **R** in the correct order below.

..... → ..... → .....

[1]

(ii) At the time labelled **H** on Fig. 4.1, the shape of the lens is changing. Outline, with reference to **named** structures in the eye, how this change happens. [4]

COMMENT on **ANSWER**

"**(a)** In pancreas, there are alpha and beta cells of islets of langerhans. Alpha cells produce glucagon while beta cells produce insulin hormone.

(b) (ii) Due to less transport of oxygen, there is lesser aerobic respiration and less ATP or energy is made available, which causes weakness of body. "