Cambridge Assessment International Education

Cambridge O Level

BIOLOGY **5090/12**

Paper 1 Multiple Choice **May/June 2025**

1 hour

You must answer on the multiple choice answer sheet.

You will need: Multiple choice answer sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

INSTRUCTIONS

- There are **forty** questions on this paper. Answer **all** questions.
- For each question there are four possible answers **A**, **B**, **C** and **D**. Choose the **one** you consider correct and record your choice in soft pencil on the multiple choice answer sheet.
- Follow the instructions on the multiple choice answer sheet.
- Write in soft pencil.
- Write your name, centre number and candidate number on the multiple choice answer sheet in the spaces provided unless this has been done for you.
- Do **not** use correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.

INFORMATION

- The total mark for this paper is 40.
- Each correct answer will score one mark.
- Any rough working should be done on this question paper.

This document has **16** pages. Any blank pages are indicated.

1 A student observes a human egg cell through a light microscope.

The cell is 0.12 mm in diameter.

The student draws a diagram of this egg cell.

The diagram has a diameter of 4.2 cm.

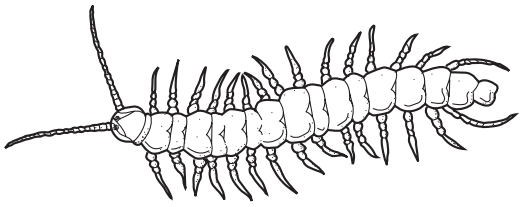
What is the magnification of the drawing to the nearest whole number?

A ×5 **B** ×35 **C** ×50 **D** ×350

2 Which row correctly identifies a cell, a tissue, an organ and an organ system?

	cell	tissue	organ	organ system
A	chloroplast	mesophyll	liver	digestive
B	sap vacuole	red blood cell	blood	nervous
C	red blood cell	sap vacuole	stomach	liver
D	neurone	muscle	leaf	urinary

3 The diagram shows a species of arthropod.



Which group of arthropods does this species belong to?

A arachnids

B crustaceans

C insects

D myriapods

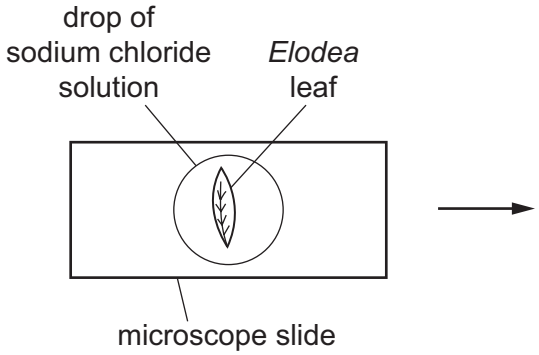
4 Which combination of factors will result in the fastest rate of diffusion across a membrane?

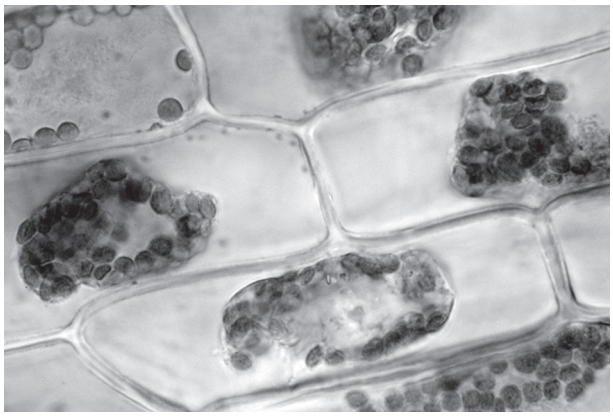
	surface area of the membrane	temperature
A	small	low
B	small	high
C	large	high
D	large	low

5 A leaf is taken from some pondweed (*Elodea*) and placed on a microscope slide.

A drop of sodium chloride solution is added.

The cells of the leaf are then viewed through a light microscope.





view through the microscope

Which statement describes the cells viewed through the microscope?

A The cells are plasmolysed because water has moved in by osmosis.

B The cells are plasmolysed because water has moved out by osmosis.

C The cells are turgid because water has moved in by osmosis.

D The cells are turgid because water has moved out by osmosis.

6 What is an example of a biological catalyst?

A bile

B DNA

C insulin

D maltase

7 What will be the result if the active site of an enzyme is damaged?

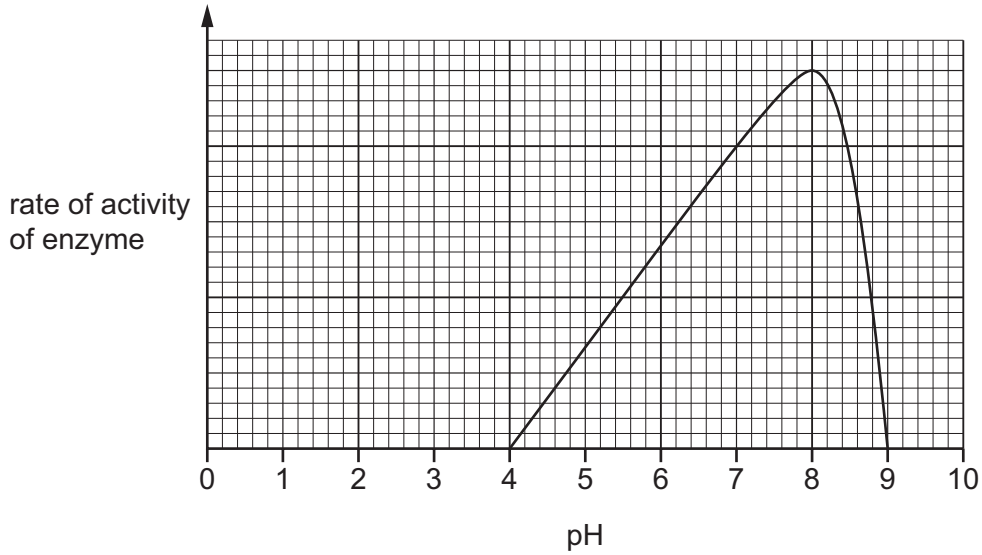
A A different product is produced from the substrate.

B The enzyme **cannot** carry out its specific reaction.

C The enzyme can no longer collide with a substrate molecule.

D Enzyme–substrate complexes will form faster.

8 The graph shows the rate of activity of enzyme X at different pH values. All other conditions are kept constant.



Using the data shown in the graph, which statement is correct?

A Enzyme X is denatured in weak acid and alkali conditions.

B The kinetic energy of the substrate increases between pH 6 and 8.

C The kinetic energy of enzyme X is lowest at pH 4.

D The frequency of effective collisions between the enzyme and substrate is greatest at pH 8.

9 Students investigated the rate of photosynthesis at different light intensities. They counted the number of oxygen bubbles released per minute by a submerged aquatic plant placed at different distances from a light source.

Which results would be expected from this investigation?

		distance from light source / cm					
		20	40	60	80	100	120
A	number of bubbles / minute	8	18	37	51	62	65
B		8	18	37	25	19	6
C		65	62	51	45	14	4
D		37	18	8	19	25	45

10 What is the balanced equation for photosynthesis?

A $3CO_2 + 3H_2O \rightarrow C_6H_{12}O_6 + 3O_2$

B $6CO_2 + 12H_2O \rightarrow 2C_6H_{12}O_6 + 3O_2$

C $6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$

D $CO_2 + H_2O \rightarrow C_6H_{12}O_6 + O_2$

11 Glucose produced by photosynthesis can be converted into other carbohydrates or used immediately as glucose.

What is an immediate use of glucose in plants?

A building cell walls

B providing energy in respiration

C storing energy

D transporting energy in the phloem

12 Which enzyme catalyses the breakdown of its substrate at an optimum rate in a low pH?

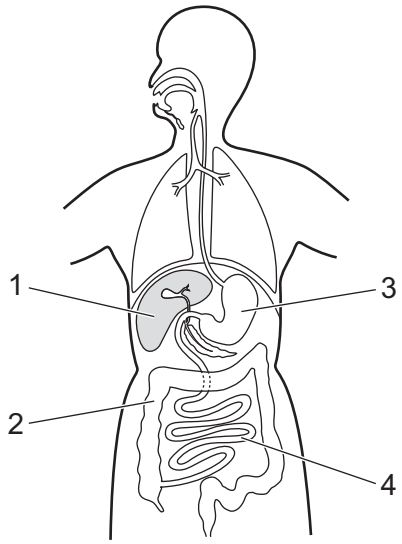
A amylase

B lipase

C maltose

D pepsin

13 The diagram shows the human digestive system.



Which row shows the functions for the parts labelled in the diagram?

	absorption of water and storage of waste food material	completion of chemical digestion and absorption
A	1	3
B	1	4
C	2	3
D	2	4

14 Which substances are involved in the emulsification and digestion of vegetable oil in the digestive system?

	emulsification of vegetable oil	digestion of vegetable oil
A	bile	lipase
B	hydrochloric acid	lipase
C	bile	protease
D	hydrochloric acid	protease

15 What is **not** an example of the assimilation of absorbed food molecules?

A the use of amino acids to produce antibodies

B the use of fatty acids to produce lipids

C the use of glucose to produce glycogen

D the use of proteins to produce amino acids

16 What is a feature of anaerobic respiration in humans?

A It requires oxygen.

B It produces carbon dioxide.

C It produces lactic acid.

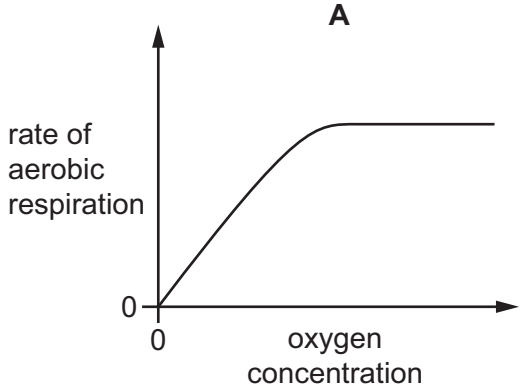
D It releases more energy than aerobic respiration.

17 Yeast can respire aerobically or anaerobically.

A student investigates the rate of aerobic respiration in yeast. The temperature is maintained at 35 °C and the oxygen concentration is varied.

Which graph would the student draw from their results?

A



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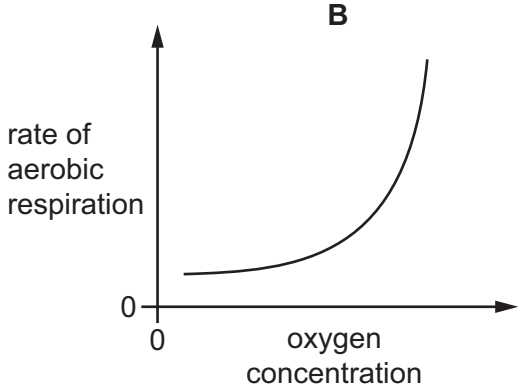

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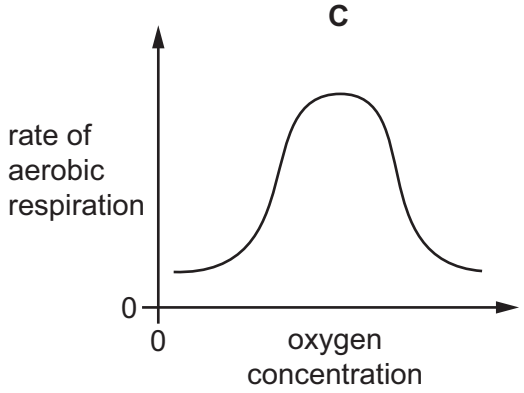
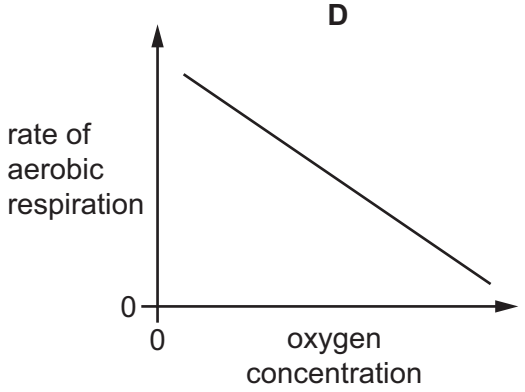


D



18 Mammals have a double circulatory system.

What is meant by a double circulatory system?

A The blood is always enclosed in vessels or in the heart chambers.

B The blood passes through the heart twice for each complete circuit of the body.

C The circulatory system consists of two types of blood vessel.

D The heart consists of two chambers.

19 Pulmonary stenosis is a condition caused by the narrowing of the entrance to the blood vessel leaving the right ventricle.

Where in the body will blood flow be reduced first as a result of pulmonary stenosis?

A reduced blood flow to the brain

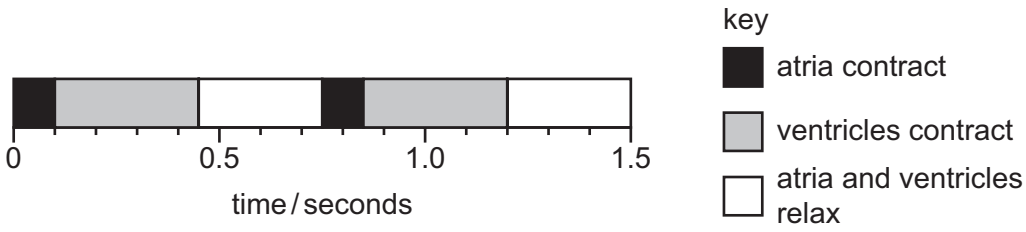
B reduced blood flow to the left ventricle

C reduced blood flow to the lungs

D reduced blood flow to the right atrium

20 In one beat of the heart, the muscles in the atria and ventricles contract and relax, pushing blood out of the heart and into the circulatory system.

The diagram shows how long it takes for a heart to beat twice.



What is the heartbeat rate?

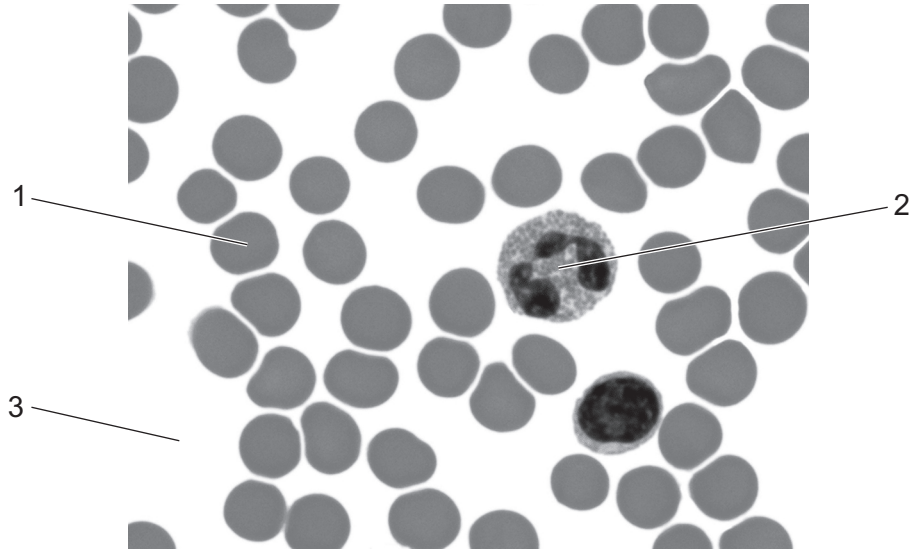
A 60 beats per minute

B 80 beats per minute

C 100 beats per minute

D 120 beats per minute

21 The photomicrograph shows a sample of blood viewed through a light microscope.



Which row shows the functions of the labelled parts of the blood?

	oxygen transport	hormone transport	engulfing pathogens
A	1	3	2
B	2	3	1
C	1	2	3
D	3	2	1

22 Which row shows the type of pathogen that causes malaria and its method of transmission?

	pathogen	transmission by
A	protozoan	insect
B	protozoan	stagnant water
C	virus	blood
D	virus	moist air

23 A disease is caused by a bacterium that infects the small intestine, producing a toxin.

The toxin causes osmotic movement of water from the cells into the small intestine, producing diarrhoea and extreme dehydration.

Which disease is being described?

A AIDS

B cholera

C malaria

D sickle cell anaemia

24 Which statements about immunity are correct?

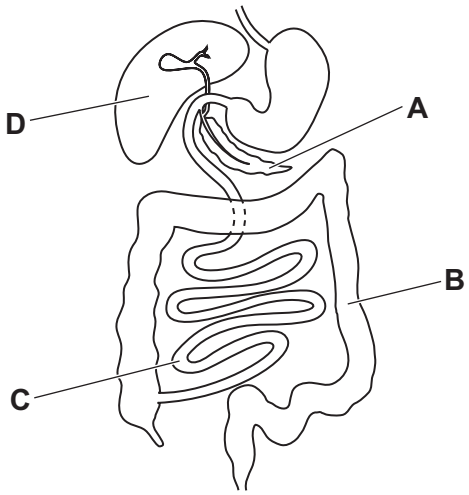
1 Memory cells are produced as a result of both active and passive immunity.

2 Antibodies are made in response to antigens on the surface of pathogens or in vaccines.

3 Each type of antibody has a chemical shape that is identical to that of the antigen to which it binds.

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

25 Which letter shows where urea is produced?



26 Which substance would **not** be present in the urine of a healthy person with a normal diet?

A glucose

B salts

C urea

D water

27 Which part of the eye contains the greatest density of light receptors?

A cornea

B optic nerve

C iris

D fovea

28 The diagrams show the front of an eye as seen in cross-section from above.

Which diagram shows the eye observing an object in the distance in dim light?

A

B

C

D

29 Different studies have shown that the movement of electrical nerve impulses travelling along neurones slows down with age. Studies **A**, **B**, **C** and **D** have published different results.

The average speed of a nerve impulse in people who are 40 years old is 55 m / s.

Which study showed the **least** reduction in transmission speed between the ages of 40 and 60?

A The speed reduced by an average of 0.14 m / s per year.

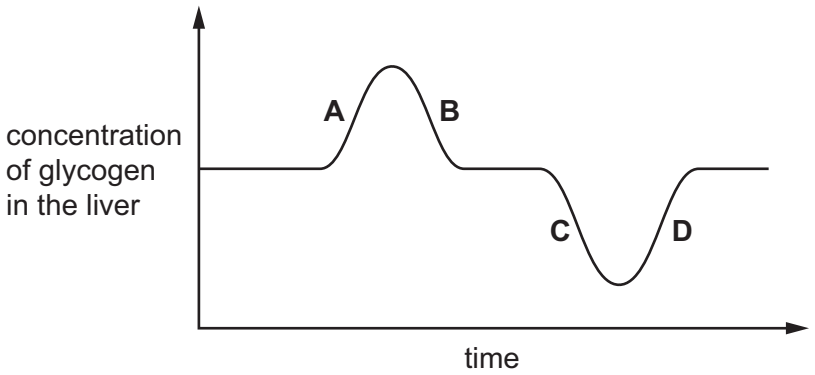
B The speed reduced by 8.2 m / s.

C The speed reduced by 10%.

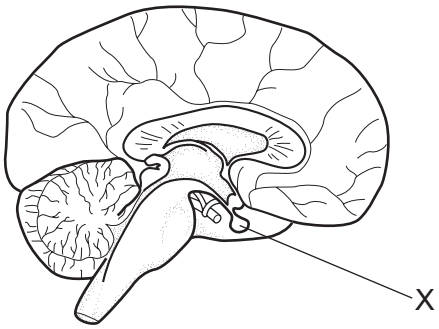
D The speed reduced by 10 m / s.

30 The graph shows the concentration of glycogen stored in the liver of a human.

During which period of time is the secretion of adrenaline causing the blood glucose concentration to move towards its set point?



31 The diagram shows one of the endocrine glands in the human body, labelled X.



Which hormone is produced by endocrine gland X?

A adrenaline

B glucagon

C luteinising hormone

D progesterone

32 A muscle cell from a horse contains 64 chromosomes.

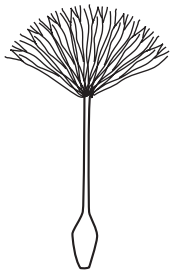
How many chromosomes are there in a sperm cell from a horse?

A 23 **B** 32 **C** 64 **D** 128

33 The diagrams show the fruits of some plants.

Which fruit uses wind to disperse its seeds?

A



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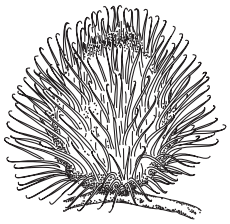
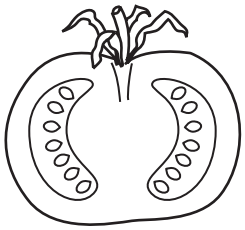


C

D



34 Sperm cells are stored in a laboratory before they can be used in artificial insemination.

Substances added to the sperm cells for storage have been shown to damage the acrosomes. This leads to reduction in fertility.

Which statement describes why reduction in fertility may happen?

A The sperm cells are rejected by the egg cells.

B The sperm cells **cannot** penetrate the egg cells.

C The sperm cells **cannot** swim to the egg cells.

D The sperm cells **cannot** detect the egg cells.

35 The hormones that control the menstrual cycle are released in varying amounts during the cycle.

During pregnancy, menstruation is prevented and there are no eggs developed or released.

What would be the levels of hormones FSH, LH and progesterone during pregnancy?

	FSH	LH	progesterone
A	high	low	low
B	low	low	high
C	high	high	high
D	low	high	low

36 Sickle cell anaemia is caused by a recessive allele.

A couple have two children.

One of the children has sickle cell anaemia.

The parents and the other child do **not** have sickle cell anaemia.

The couple are expecting their third child.

What is the probability that this third child will be male with sickle cell anaemia?

A 0% **B** 12.5% **C** 25% **D** 50%

37 Each human gamete has one sex chromosome.

Which statement is correct?

A All egg cells have an X chromosome.

B All egg cells have a Y chromosome.

C All sperm cells have an X chromosome.

D All sperm cells have a Y chromosome.

38 What is a food chain?

A a diagram showing an organism getting its energy by feeding on other organisms

B a diagram showing an organism's diet

C a diagram showing the flow of energy through a chain of organisms

D a diagram showing the names of trophic levels

39 Soil that contains more water allows denitrifying bacteria to grow well.

Which effects will be seen on the growth of plants in this soil?

A More nitrate ions are taken up by plants, so plants grow less well.

B More nitrogen fixation takes place, so plants grow taller.

C Denitrification results in nitrogen gas being taken up by plants and they grow taller.

D There are fewer nitrate ions in the soil, so plants grow less well.

40 The statements describe the process of eutrophication which may happen after excess nitrogen fertiliser runs from fields into streams.

They are **not** in the correct order.

1 Bacteria decay dead plants and use up oxygen.

2 Animals die or leave the area.

3 Light **cannot** reach aquatic plants.

4 The growth rate of algae increases.

5 Aquatic plants die.

What is the correct order for these statements?

A $1 \rightarrow 2 \rightarrow 4 \rightarrow 3 \rightarrow 5$

B $3 \rightarrow 5 \rightarrow 1 \rightarrow 4 \rightarrow 2$

C $4 \rightarrow 3 \rightarrow 5 \rightarrow 1 \rightarrow 2$

D $5 \rightarrow 1 \rightarrow 2 \rightarrow 3 \rightarrow 4$

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