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**SERANGOON SECONDARY SCHOOL
PRELIMINARY EXAMINATION
SECONDARY 4 EXPRESS**

CANDIDATE
NAME

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CLASS

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SCIENCE (CHEMISTRY, BIOLOGY)

Paper 1 Multiple Choice

5088/01

28 August 2024

1 hour

Additional Materials: Multiple Choice Answer Sheet

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

Do not use staples, paper clips, glue or correction fluid.

Write your name, class and index number on the Answer Sheet in the spaces provided unless this has been done for you.

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 separate Answer Sheet.

Read the instructions on the Answer Sheet very carefully.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.

A copy of the Data Sheet is printed on page **17**.

A copy of the Periodic Table is printed on page **18**.

The use of an approved scientific calculator is expected, where appropriate

- 21** An amoeba is a unicellular organism. An amoeba had its nucleus removed by means of a fine glass tube but was not otherwise damaged. For several days, it continued to move and feed, but it did not reproduce.

Another amoeba with no parts of the cell removed, used as a control experiment, reproduced twice in that time.

What can be concluded about the role of the nucleus in amoeba from this experiment?

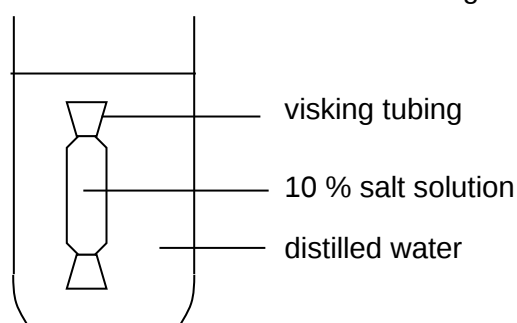
- A** The nucleus is essential for life.
- B** The nucleus is essential for cell division.
- C** The nucleus controls the normal activity of the cell.
- D** The nucleus is the only part of the cell to contain DNA.

- 22** Which feature(s) of a red blood cell correctly relate(s) to its function?

	absence of nucleus to maximise volume for haemoglobin	biconcave disc shape to squeeze through narrow blood capillaries	high surface area to volume ratio to increase rate of diffusion of carbon monoxide
A	✓	x	x
B	✓	✓	✓
C	x	x	✓
D	x	✓	x

key:
✓ correct
x incorrect

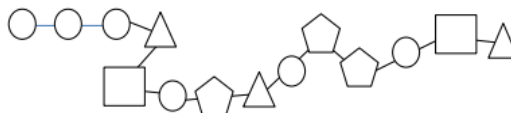
- 23** Some 10 % salt solution was added into a visking tubing. The tubing was then rinsed with distilled water and immersed into a beaker containing distilled water.



What is the percentage of salt in the visking tubing after 3 hours?

- A** 0 %
- B** 5 %
- C** 10 %
- D** 15 %

- 24 The diagram represents a large molecule.



Which row correctly identifies the large molecule and its component?

	large molecule	components			
		amino acid	fatty acid	glucose	glycerol
A	glycogen	x	x	✓	x
B	lipid	x	✓	x	✓
C	polypeptide	✓	x	x	x
D	starch	x	x	✓	✓

key:
✓ correct
x incorrect

- 25 The table shows the observations of food tests on a sample that contains one or more nutrients.

test	initial colour	final colour
Benedict's test	blue	blue
biuret test	blue	purple
ethanol-emulsion test	colourless	white emulsion
iodine solution test	brown	brown

What are the nutrients present in the food sample?

- A** fat only
- B** fat and protein only
- C** protein and reducing sugar only
- D** starch, protein and reducing sugar

26 Four statements about the active site of a human enzyme are given.

- 1 The specificity of the enzyme depends on the shape of the active site.
- 2 The active site of the enzyme is the same shape as the substrate molecule.
- 3 The shape of the active site changes when the temperature falls to 10 °C and does not return to normal when the temperature returns to 37 °C.
- 4 The shape of the active site changes when the enzyme is heated to 75 °C and does not return to normal when the temperature returns to 37 °C.

Which statements are correct?

- A** 1 and 4 only
- B** 2 and 3 only
- C** 1, 2 and 3
- D** 1, 2 and 4

27 Which is an example of assimilation?

- A** large fat droplet becomes smaller fat droplet
- B** protein becomes amino acids
- C** excess glucose becomes glycogen
- D** glucose enters the bloodstream by diffusion

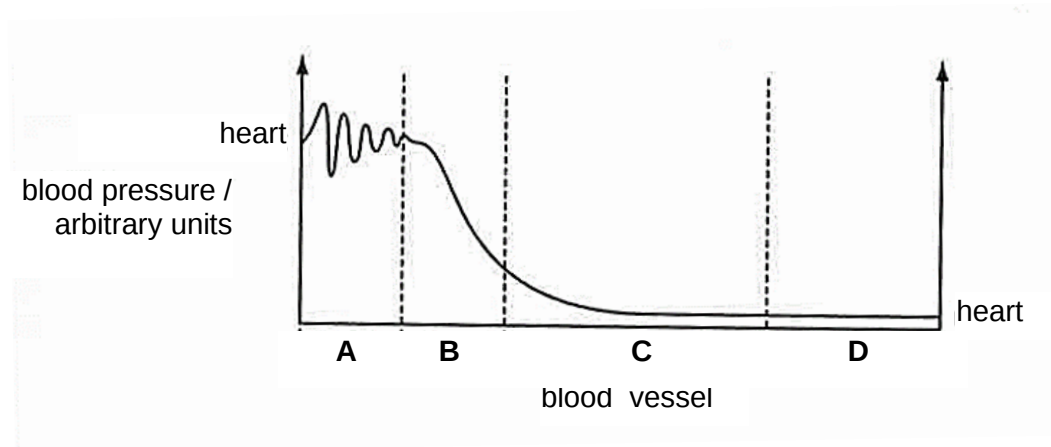
28 A person who has a diseased small intestine had about 30% of the small intestine near the large intestine removed.

What would be a likely consequence of this surgery?

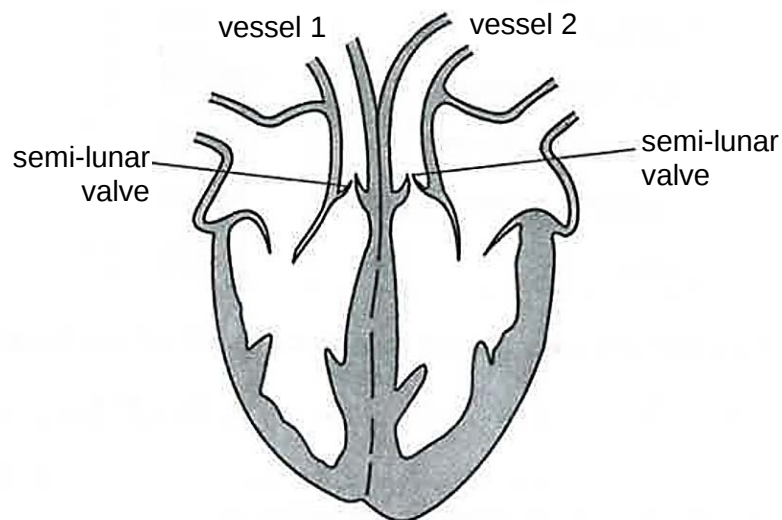
- A** He does not produce faeces.
- B** He is unable to digest fats.
- C** He loses his appetite.
- D** He loses weight.

- 29** The graph shows changes in blood pressure as blood flows through the blood vessels of the human circulatory system.

Which blood vessel has the thinnest wall?



- 30** The diagram shows a section through the human heart.



What happens as blood is pumped out of the heart?

	semi-lunar valves	blood passes to the stomach through vessel
A	close	1
B	close	2
C	open	1
D	open	2

- 31** In one year, smoking contributed to approximately 470 900 hospital admissions.

The table shows the causes of these admissions.

cause	number of admissions
cancer	160 300
circulatory disease	135 400
respiratory disease	137 200
digestive system disease	18 100
others	19 900

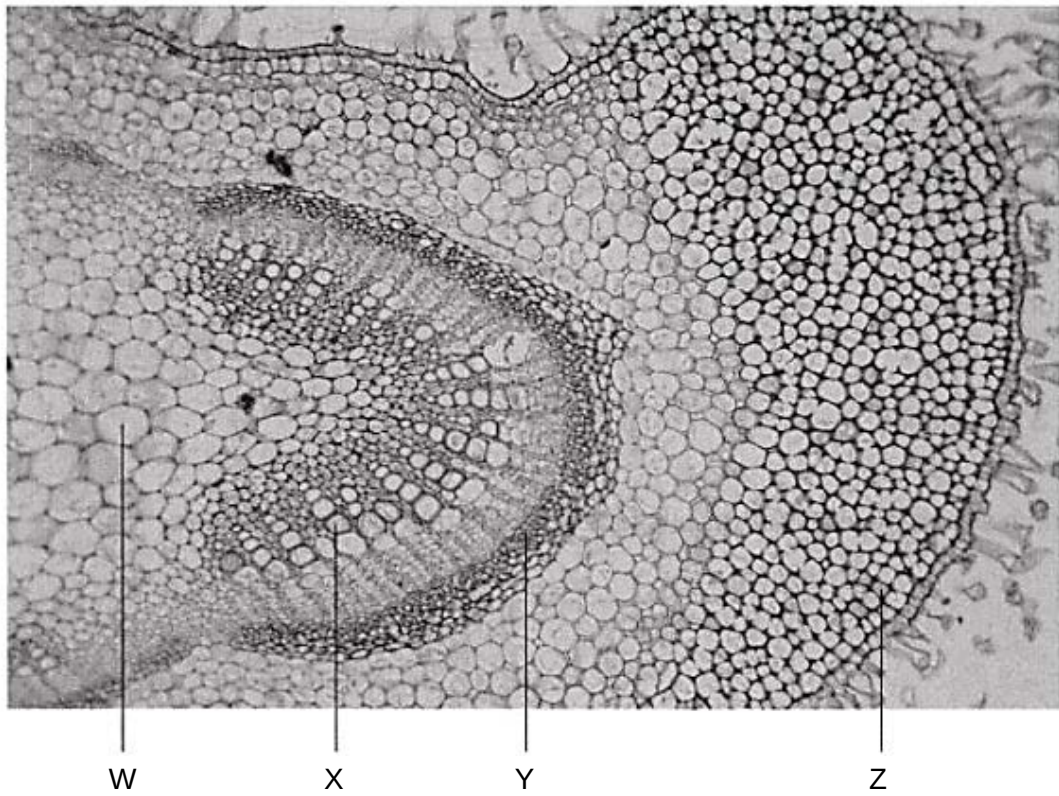
What percentage of admissions were related to emphysema?

- A** 4%
- B** 29%
- C** 35%
- D** 63%
- 32** Vaccines contain an agent that resembles a pathogen and prevent infectious diseases by stimulating J to quickly produce K when the pathogen invades.

Which row contains the correct words to fill the gaps J and K?

	J	K
A	red blood cells	antibiotics
B	red blood cells	antibodies
C	white blood cells	antibiotics
D	white blood cells	antibodies

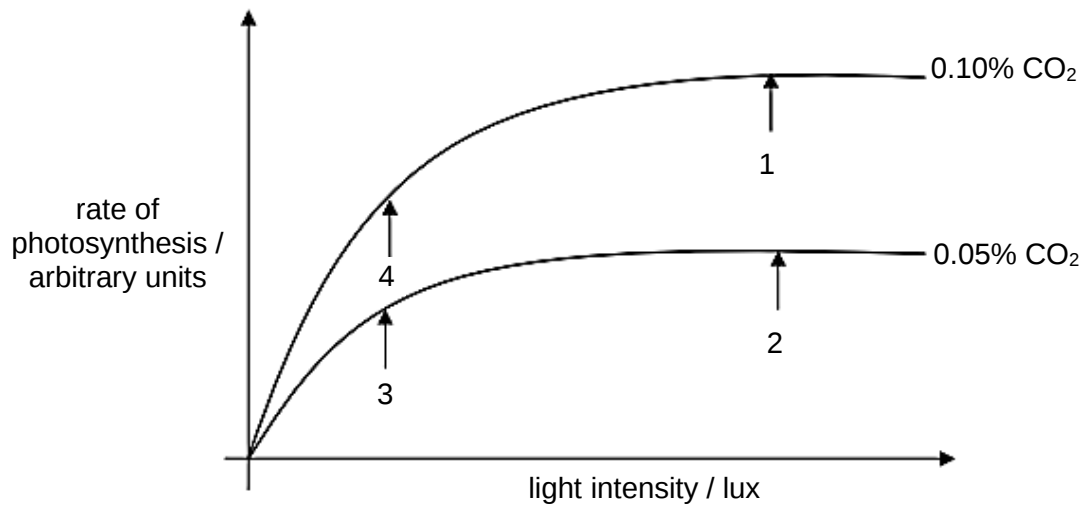
- 33 The photomicrograph shows part of a plant stem in transverse section.



Which tissue transports water and mineral salts and which tissue transports sucrose?

	water and mineral salts	sucrose
A	W	Z
B	X	Y
C	Y	X
D	Z	W

- 34** The graph shows the rate of photosynthesis of a plant, at two different carbon dioxide concentration and at varying light intensities. The temperature provided was optimum for the plant.



Which row correctly matches the points on the graph to the factors limiting the rate of photosynthesis?

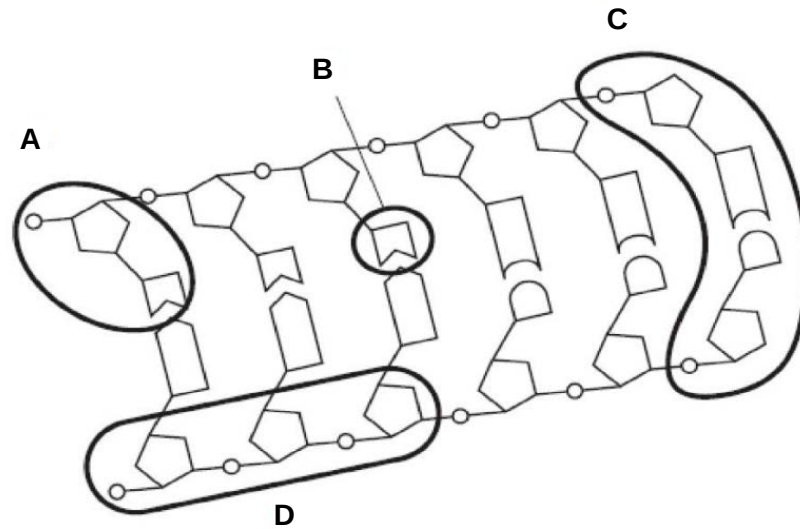
	light intensity	carbon dioxide concentration
A	1	2
B	3	4
C	1 and 2	3 and 4
D	3 and 4	1 and 2

- 35** Which statement involves the long-term storage of carbon in carbon sinks?

- A** decomposition of dead organisms
- B** fossil fuels under the ground
- C** passing down of carbon molecules from grass to the herbivores
- D** release of carbon dioxide gas to the environment via respiration

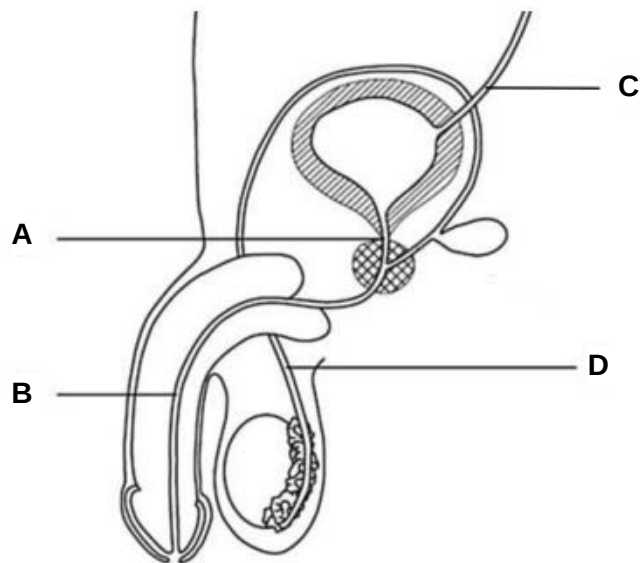
- 36** The diagram shows part of a DNA molecule.

Which part of the DNA molecule shows a nucleotide?

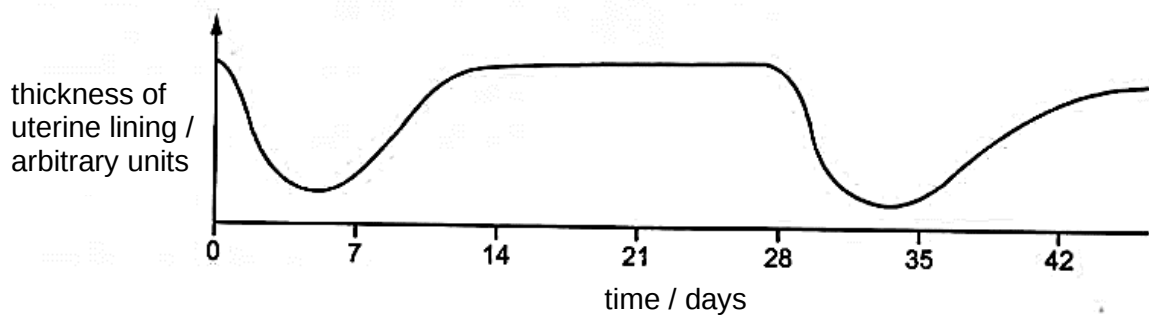


- 37** Vasectomy is a method of birth control which prevents sperm from being ejaculated. It involves the cutting and tying of a tube in the male reproductive system.

During this surgical procedure, which tube in the diagram is most likely to be cut and tied?

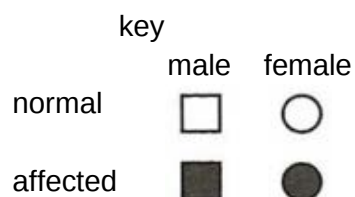
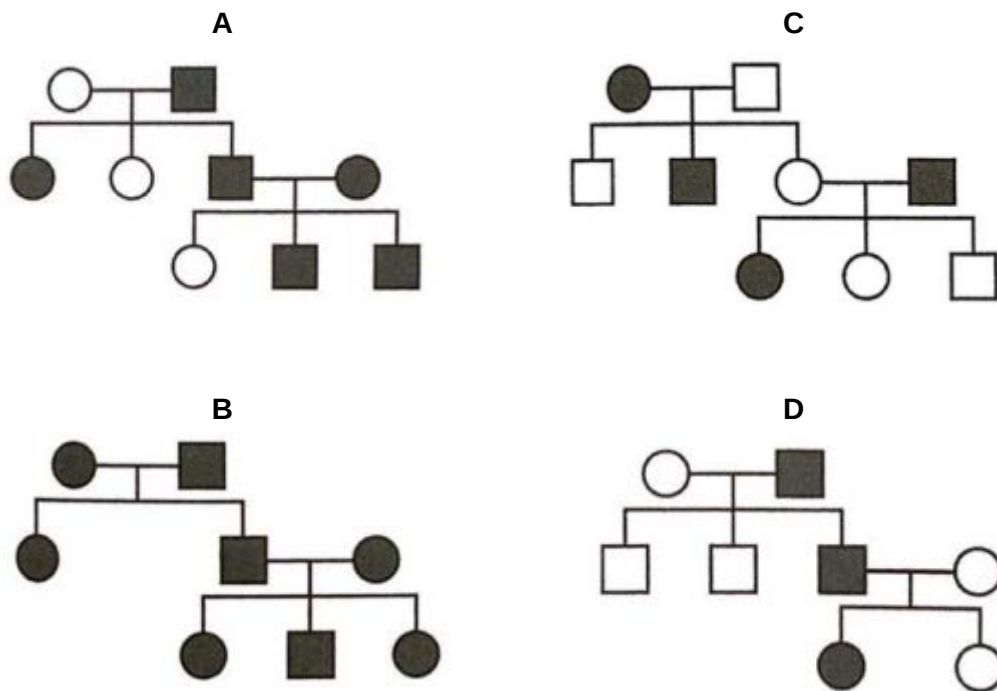


- 38 The diagram shows changes in the lining of the uterus for a woman with a regular menstrual cycle.

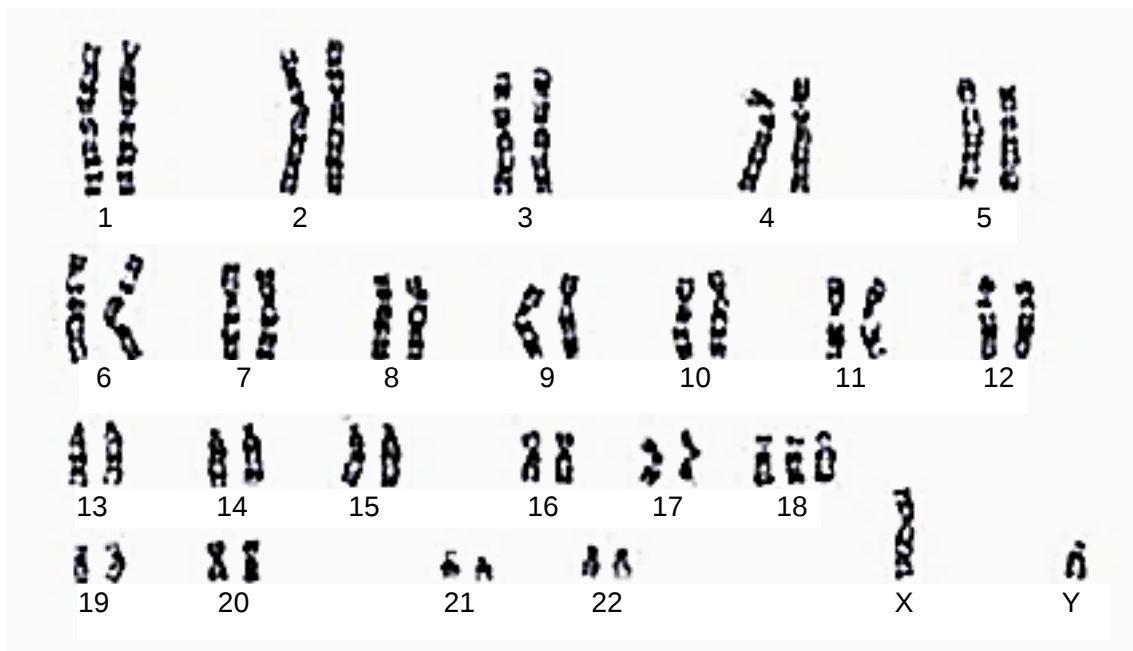


On which day is the level of progesterone likely to be the highest?

- A day 7
 - B day 14
 - C day 28
 - D day 35
- 39 The inheritance pattern of an abnormal condition in four families is shown.
- Which pedigree chart shows that the condition **cannot** be caused by a recessive allele?



- 40 The diagram shows the chromosomes taken from a particular individual's body cell.



Which fertilisation resulted in the above individual?

	chromosome in sperm	chromosome in ovum
A	22 + 1X	23 + 1Y
B	22 + 1Y	22 + 1X
C	23 + 1X	23 + 1Y
D	23 + 1Y	22 + 1X



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SCIENCE BIOLOGY

Paper 4 (Section A)

5088/04

26 August 2024

1 hour 15 minutes

Candidates answer on the Question Paper.
No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your class, index number and name on all the work you hand in.
You may use an HB pencil for any diagrams, graphs, or rough working.
Write in dark blue or black pen.
Do not use staplers, paper clips, glue or correction fluid.

The use of an approved scientific calculator is expected, where appropriate.
You may lose marks if you do not show your working or if you do not use appropriate units.

Section A

Answer **all** questions.

Write your answers in the spaces provided on the question paper.

The number of marks is given in brackets [] at the end of each question or part question.

For Examiner's Use	
Section A	55

Section A

Answer **all** questions in the spaces provided.

- 1** Fig. 1.1 shows a section of an alveolus and a capillary in the lung.



Fig. 1.1

- (a)** Describe and explain how the alveolus is adapted for the exchange of gases.

.....

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.....

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..... [3]

- (b)** During vigorous exercise, lactic acid is produced in muscles.

- (i)** Write the word equation for anaerobic respiration.

..... [1]

- (ii)** Explain why lactic acid is produced only during vigorous activity.

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..... [2]

- (iii) Muscle damage can occur during vigorous exercise. This can cause an increase in amino acids in the blood.

Describe how the body metabolises excess amino acids

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..... [3]

[Total: 9]

2 Blood clotting helps to prevent foreign particles from entering the bloodstream.

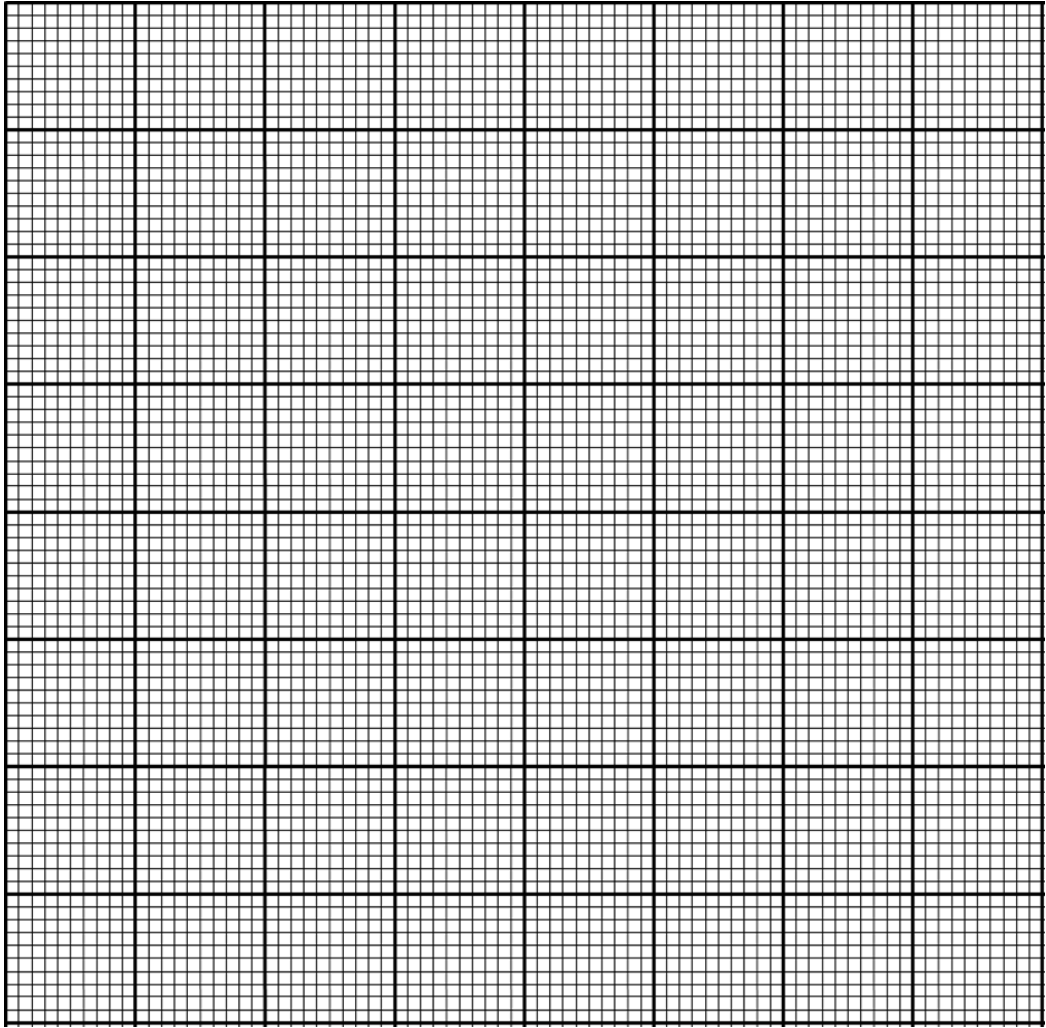
- (a)** The paragraph describes the process of blood clotting. Complete the blanks with appropriate words or phrases.

Blood clotting can occur when blood vessels are broken.
 are activated to cause a series of reactions. With the aid of enzymes,
 is converted to and a mesh
 is formed. This mesh helps to entangle to form a clot. The
 clot will then seal the wound. [2]

Blood clotting is enzyme-dependent. An experiment was conducted to investigate the effects of temperature on the clotting of human blood. The results are as shown.

temperature / °C	time taken for blood to clot / s
5	46
10	39
15	34
20	28
25	24
30	19
35	20
40	29

- (b)** Plot a graph to show the relationship between temperature and time taken for blood to clot.



[4]

- (c)** Explain what is shown in the graph in **(b)**.

.....

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..... [4]

[Total: 10]

- 3 Fig. 3.1 shows the number of cases of pneumococcal disease in children in a country between 1998 and 2008. A vaccine was introduced in the year 2000.

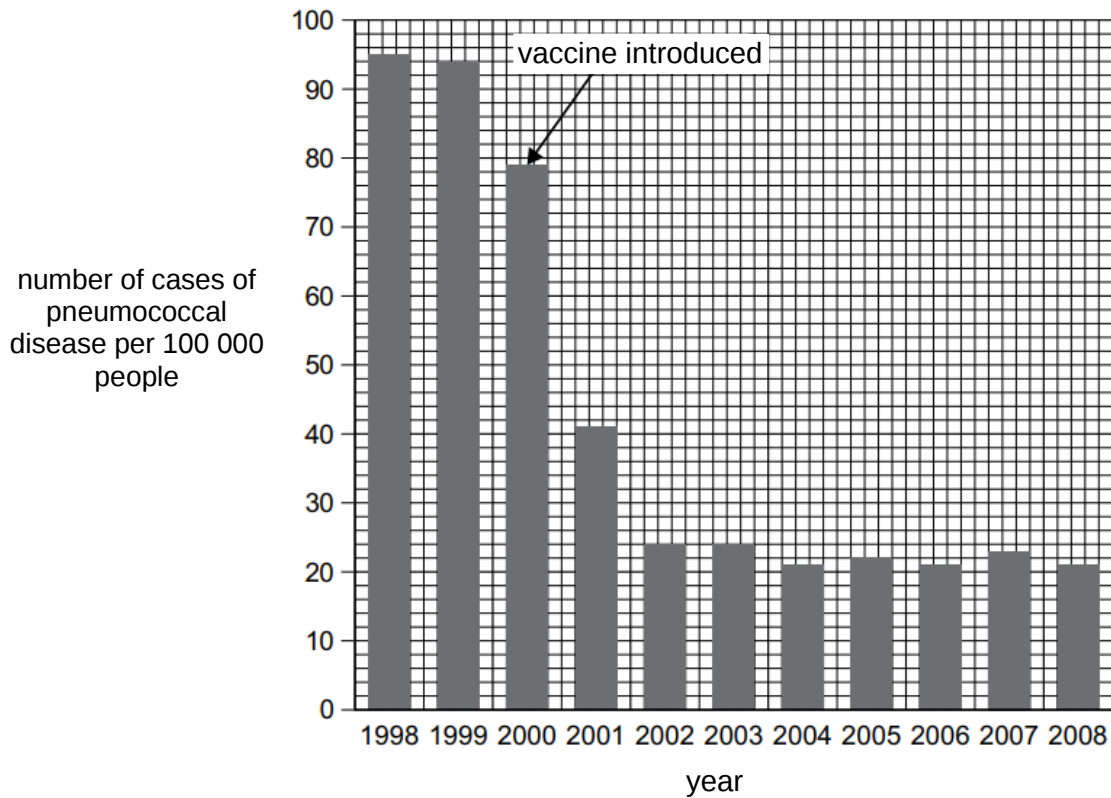


Fig. 3.1

- (a) (i) Calculate the percentage decrease in cases between 2000 and 2008. Give your answer to 1 decimal place.

.....% [2]

- (ii) Explain how the introduction of vaccines caused the percentage decrease in cases in (a)(i).

.....

.....

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.....

..... [3]

- (b) State the type of organism that causes pneumococcal disease and the treatment for the disease.

type of organism

treatment for pneumococcal disease [2]

- (c) Suggest **two** reasons why there are still cases of pneumococcal disease even after the introduction of the vaccine.

.....

.....

.....

..... [2]

[Total: 9]

- 4 Fig. 4.1 shows some guinea pigs, which are small mammals. In some countries they are produced for food and in others they are bred as pets.



Fig. 4.1

- (a) Guinea pigs can have either straight hair or curly hair. The alleles for straight hair is dominant while the allele for curly hair is recessive.

- (i) Define allele.

.....

..... [1]

- (ii) Two straight-haired guinea pigs were bred and one of the offspring has curly hair.

Draw the genetic diagram to show how this is possible.

Use **T** and **t** to represent the alleles.

- (b) Fig. 4.2 shows a Baldwin guinea pig which has a genetic mutation.

Baldwin guinea pigs begin to lose their hair at two to five days of age and will be entirely hairless by about two months of age.



Fig. 4.2

- (i) Define mutation.

.....
 [1]

Fig. 4.3 shows how some nucleotides are deleted from a polynucleotide chain due to a genetic mutation, and the strand that result from it.

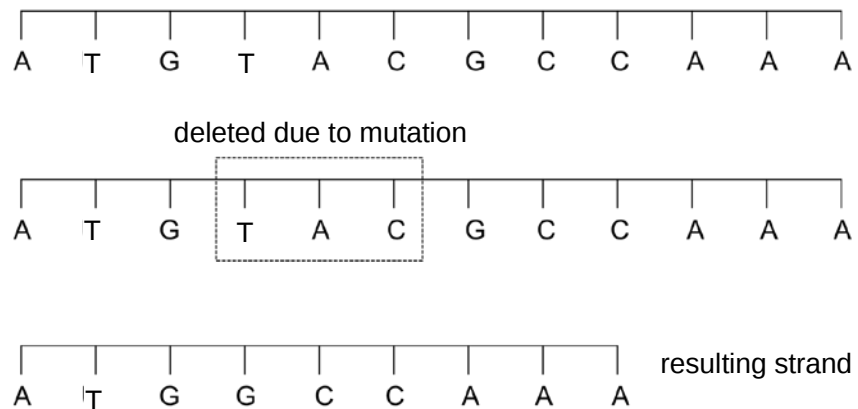


Fig. 4.3

- (ii) Name the site of protein synthesis in the cell.

..... [1]

- (iii) Suggest what will happen to the product made using the resulting mutated strand.

.....
 [1]

[Total: 8]

- 5 Fig. 5.1 shows a section of a green leaf.

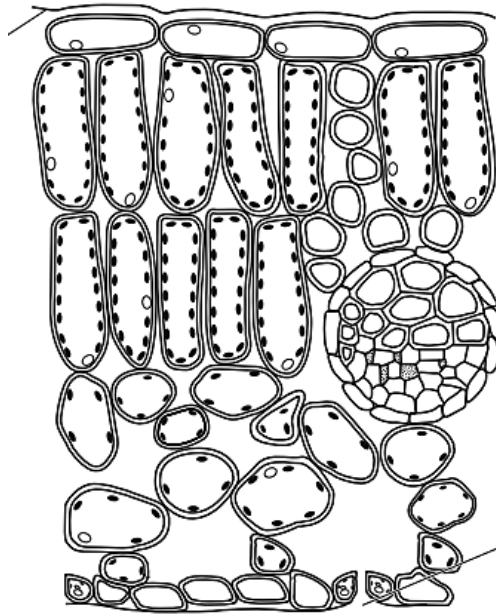


Fig. 5.1

- (a)** On Fig. 5.1, label and name the following structures:

- (i)** palisade mesophyll cell
- (ii)** upper epidermal cell
- (iii)** guard cell

[2]

- (b)** On Fig. 5.1, draw arrows to show the path of carbon dioxide between the mesophyll tissue and atmospheric air on a bright sunny day. [1]

- (c)** Describe two ways in which glucose made during photosynthesis is used by the plant itself.

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..... [2]

- (d) With reference to Fig. 5.1, describe the process of movement of water and water vapour during transpiration.

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..... [4]

[Total: 9]

6 Fig. 6.1 shows the carbon cycle.

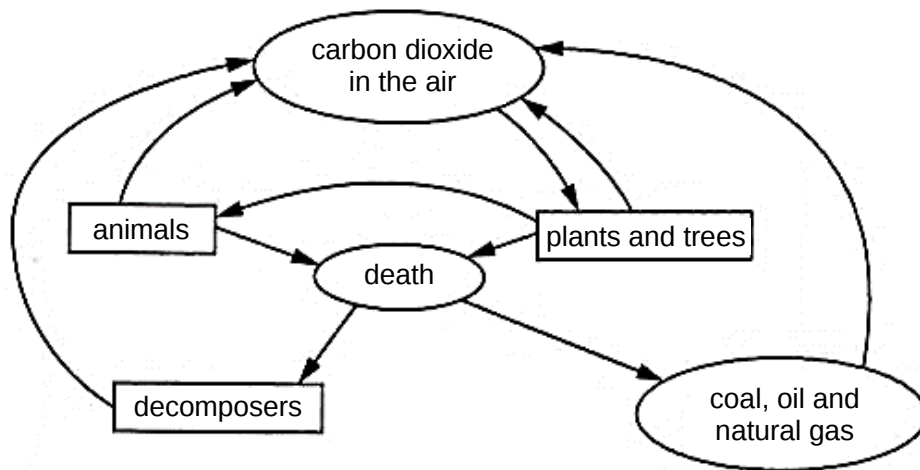


Fig. 6.1

- (a) Outline the role of photosynthesis in the carbon cycle and the transfer of energy in forest ecosystems **and** explain its importance.

carbon cycle

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energy transfer

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..... [6]

(b) Describe how **two** human activities have led to global warming.

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..... [4]

[Total: 10]

End of Section A



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SCIENCE BIOLOGY

Paper 4 (Section B)

5088/04

26 August 2024

1 hour 15 minutes

Candidates answer on the Question Paper.
No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your class, index number and name on all the work you hand in.
You may use an HB pencil for any diagrams, graphs, or rough working.
Write in dark blue or black pen.
Do not use staplers, paper clips, glue or correction fluid.

The use of an approved scientific calculator is expected, where appropriate.
You may lose marks if you do not show your working or if you do not use appropriate units.

Section B

Answer **one** question.

Write your answers in the spaces provided on the question paper.

The number of marks is given in brackets [] at the end of each question or part question.

For Examiner's Use	
Section B	10

Section B

Answer **one** question from this section.

- 7 Wetlands are important ecosystems. Researchers studied the feeding relationships between the organisms in an area of wetland on the coast of Texas.

Fig. 7.1 shows part of the food web that they studied.

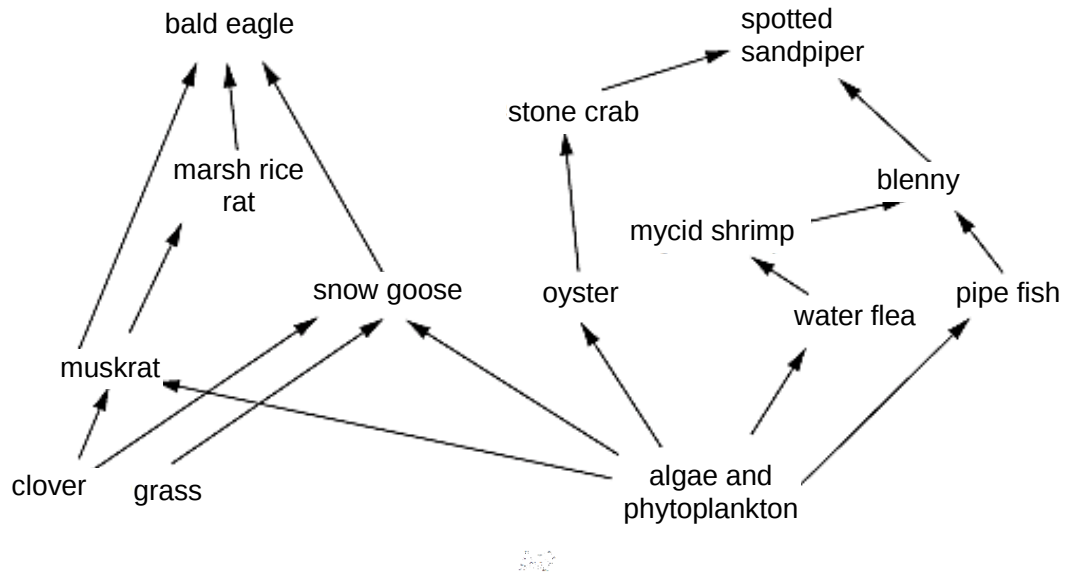


Fig. 7.1

- (a) Complete Table 7.1 by giving the name of **one** organism from the food web in Fig. 7.1 for each row.

Table 7.1

	name of one organism from Fig. 7.1
at trophic level 2	
a secondary consumer	
an animal that feeds at two trophic levels	

- (b)** A pyramid of numbers for the wetland ecosystem showed that there were very large numbers of organisms at the base of the pyramid and very few at the top.

Explain why.

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.....

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..... [3]

- (c)** Explain the advantages of presenting information about food webs as a pyramid of biomass and not as a pyramid of numbers.

.....

.....

.....

..... [2]

- (d)** Some crop farmers use herbicides on their fields to kill weeds. An environmental researcher measured the concentration of herbicides and found at least 0.12 mg per kg of herbicides in the water samples.

Suggest how herbicides damage ecosystems in the wetland.

.....

.....

..... [2]

[Total: 10]

- 8 (a) A student measures the percentage gain or loss in the mass of onion pieces in different concentrations of sodium chloride solution.

Fig. 8.1 shows the results obtained by the student.

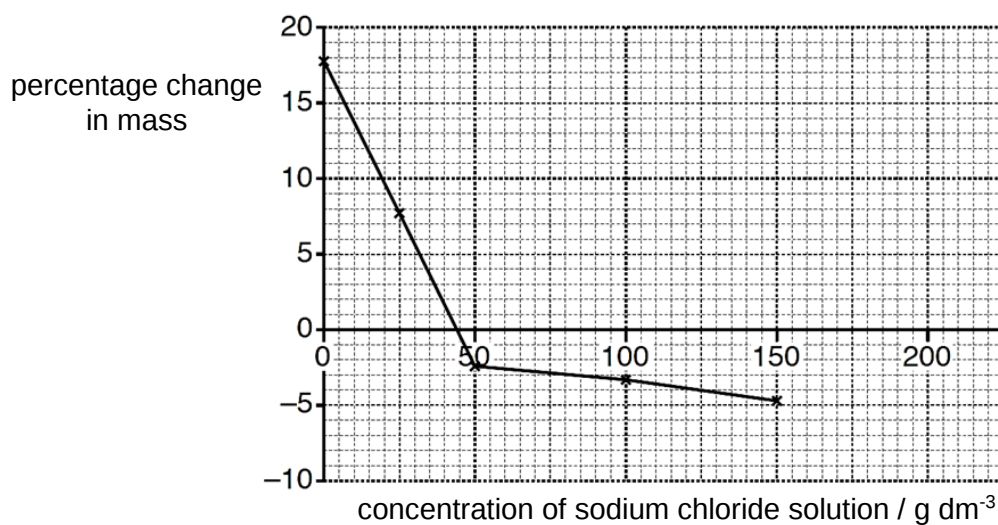


Fig. 8.1

- (i) Explain the trend shown by the graph in Fig. 8.1.

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..... [4]

- (ii) Use Fig. 8.1 to work out the concentration of sodium chloride in onion cell sap. Explain how you used the graph to work out this value.

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..... [2]

- (b) Fig. 8.2 shows the blood glucose concentrations of three different persons, D, E and F, over a 48-hour period.

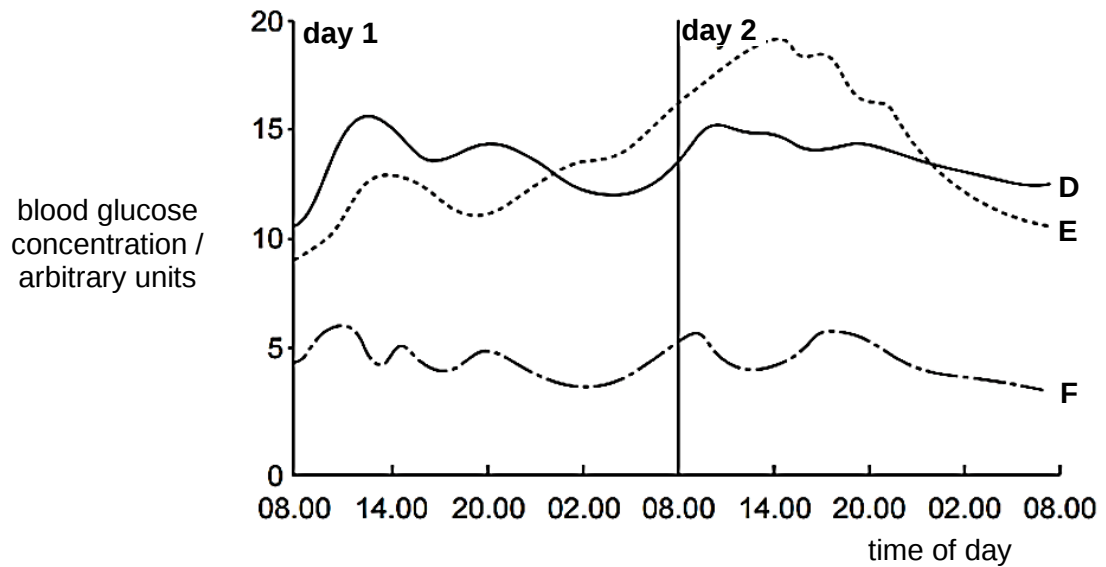


Fig. 8.2

Two of the persons are diabetic. The pancreas of one of these two persons produces small quantities of insulin. For the other person, the pancreas does not produce any insulin. The third person is not diabetic.

- (i) Using the information in Fig. 8.2, identify the person who does not have diabetes. Give reason for your answer.

.....

 [2]

- (ii) Using the information in Fig. 8.2, identify the person who does **not** produce insulin. Give reason for your answer.

.....

 [2]

[Total: 10]

End of Section B

For Answer please email :
LAPOOPOO555@GMAIL.COM
to share with you.