

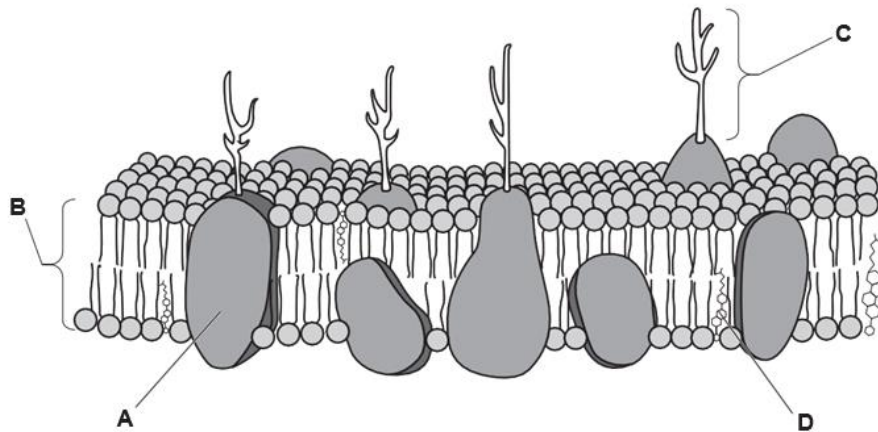
AS Level Biology B

H022/01 Foundations of biology (Foundation Tier)

Multiple Choice Questions

Question Set 17

1 The diagram below shows the structure of a cell surface (plasma) membrane.



Which of the components, labelled **A** to **D**, regulates the fluidity of the membrane?

Your answer

[1]

2 Transpiration in plants is affected by environmental factors.

Which of the environmental factors, **A** to **D**, will affect transpiration by changing the kinetic energy of water molecules?

- A** humidity
- B** temperature
- C** light intensity
- D** carbon dioxide concentration

Your answer

[1]

3

The table below shows the mean blood pressure measurements for four patients.

	Mean blood pressures (mm Hg)	
	Systolic	Diastolic
Patient A	80	120
Patient B	100	190
Patient C	190	100
Patient D	80	50

Which of the patients, A to D, would be diagnosed with hypotension?

A Patient A

B Patient B

C Patient C

D Patient D

Your answer

[1]

4

The blood clotting process is a series of enzyme-controlled reactions.

Which of the reactions, **A** to **D**, occurs in the blood clotting process?

A Fibrinogen is converted to fibrin by the enzyme thromboplastin.

B Thrombin is converted to prothrombin by the enzyme thromboplastin.

C Prothrombin is converted to thrombin by the enzyme thromboplastin.

D Prothrombin is converted to thromboplastin by the enzyme thrombin.

Your answer

[1]

5

The photomicrograph below is a transverse section through a dicotyledonous stem showing two types of cell in phloem tissue.



structure X

The structure labelled X allows exchange of materials between the two types of cells.

Which of the options, A to D, identifies structure X?

- A plasmodesma
- B stoma
- C lenticel
- D casparian strip

Your answer

[1]

6

The table below shows features of the blood types of four patients, 1, 2, 3 and 4.

	Antigens on erythrocytes	Antibodies in blood plasma
Patient 1	A and B	none
Patient 2	none	anti-A and anti-B
Patient 3	A	anti-B
Patient 4	B	anti-A

Which of the options, **A** to **D**, shows the patient with the correct blood type for receiving blood from a donor with blood group AB?

- A** Patient 1
- B** Patient 2
- C** Patient 3
- D** Patient 4

Your answer

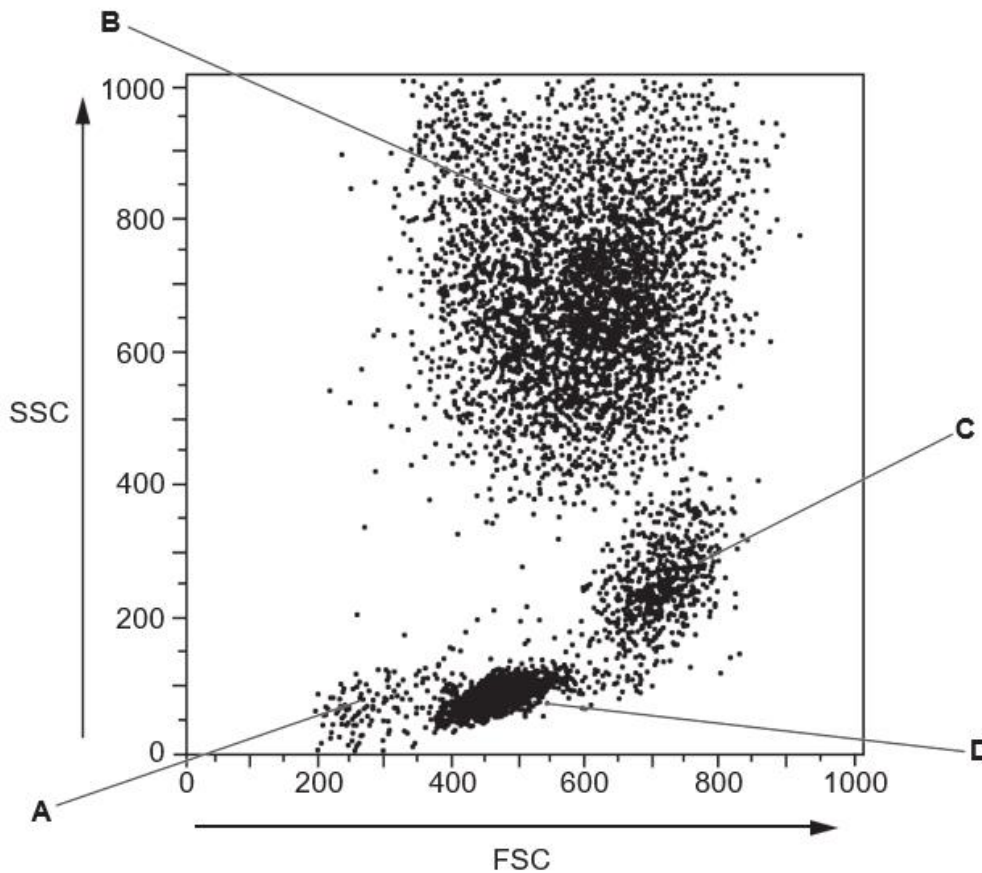
[1]

7

Flow cytometry can be used to distinguish types of leucocyte depending on the size of the cell and the granularity of the cytoplasm.

The diagram below shows the analysis of a blood sample using flow cytometry.

- Each dot represents a single cell
- The greater the forward scatter of light (FSC) the larger the cell
- The greater the side scatter of light (SSC) the more granular the cell



Which of the areas on the diagram, labelled **A** to **D**, shows the position of neutrophils?

Your answer

[1]

8

A patient was admitted to hospital with a resting heart rate of 40 bpm. Their electrocardiogram (ECG) trace showed that the distance between the QRS peaks was longer than that of a normal trace.

Which of the options, **A** to **D**, is the heart condition being described?

A tachycardia

B bradycardia

C myocardial infarction

D ventricular fibrillation

Your answer

[1]

9

The structure of blood vessels is related to their function.

Which of the blood vessels, **A** to **D**, has a wall consisting of only endothelial cells?

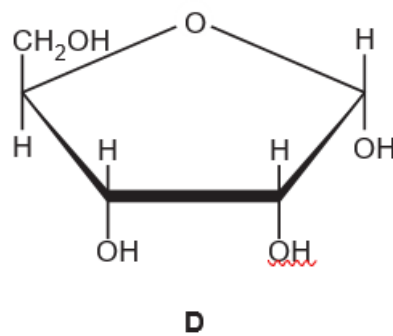
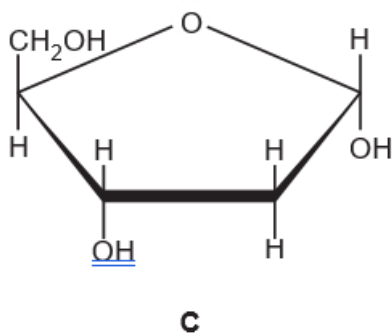
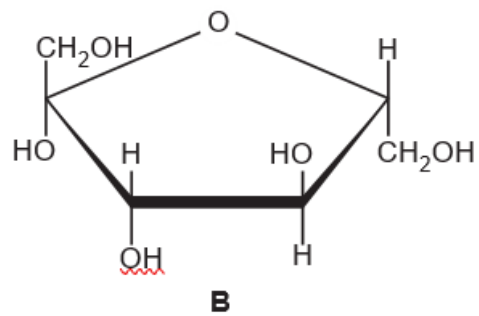
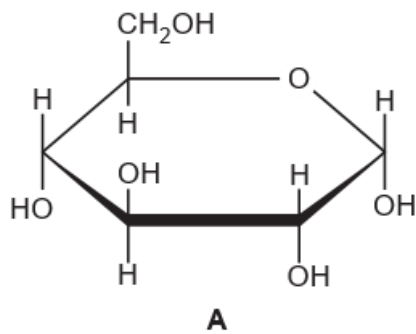
- A** venule
- B** vein
- C** capillary
- D** arteriole

Your answer

[1]

10

Which of the molecules, **A** to **D**, can be described as a pentose monosaccharide with a general formula of $C_x(H_2O)_y$?



Your answer

[1]

11

Which of the options, **A** to **D**, is an **intracellular** biofluid?

A blood plasma

B cytoplasm

C tissue fluid

D serum

Your answer

[1]

12

A plant cell with a water potential of -500KPa was placed in a solution which caused the cell membrane to completely pull away from the cell wall.

Which of the options, **A** to **D**, is the water potential of this solution?

A -500KPa

B 0KPa

C -1000KPa

D -150KPa

Your answer

[1]

13

A student was using an eyepiece graticule and a stage micrometer to calculate the length of a human cheek epithelial cell.

The following calibration and measurements were recorded:

- magnification of eyepiece lens = $\times 10$
- magnification of objective lens = $\times 10$
- 20 eyepiece divisions = 25 micrometer divisions
- each micrometer division = $10\ \mu\text{m}$
- length of epithelial cell observed = 6 eyepiece divisions.

Which of the rows, **A** to **D**, is correct?

	Total magnification	Length of one eyepiece division(μm)	Length of human cheek epithelial cell(μm)
A	20	12.5	75
B	100	50.0	300
C	100	12.5	75
D	20	50.0	300

Your answer

[1]

14

During the semi-conservative replication of DNA, which of the enzymes, **A** to **D**, is required to break hydrogen bonds between the nitrogen-containing bases?

- A** DNA polymerase
- B** DNA primase
- C** DNA ligase
- D** DNA helicase

Your answer

[1]

15

The rate of transpiration can be affected by changing certain environmental factors.

Which of the options, **A** to **D**, are changes that would result in an **increased** rate of transpiration?

- A lower humidity and greater air movement
- B lower humidity and less air movement
- C higher humidity and greater air movement
- D higher humidity and less air movement

Your answer

[1]

16

A group of students investigated the effects of ethanol on the heart rate of the water flea, *Daphniapulex*, and then analysed their results using a paired Student's *t*-test.

- Ten water fleas were used in the investigation.
- A value for *t* was calculated as 25.8.
- The critical value for a significance level of 5% is 2.23.

Which of the following statements, **A** to **D**, is correct?

- A The number of degrees of freedom is 10 and the null hypothesis can be rejected.
- B The number of degrees of freedom is 9 and the null hypothesis can be accepted.
- C The number of degrees of freedom is 9 and the null hypothesis can be rejected.
- D The number of degrees of freedom is 1 and the null hypothesis can be accepted.

Your answer

[1]

17

Which of the structures, **A** to **D**, does **not** have smooth muscle tissue in its walls?

- A trachea
- B capillary
- C bronchiole
- D arteriole

Your answer

[1]

18 Phloem loading is the process whereby plants move sucrose from a source into phloem sieve tubes.

- During phloem loading, sucrose must be transported across the cell surface membranes of companion cells.
- Which of the statements, **A** to **D**, about the transport of sucrose across the cell surface membrane of a companion cell is correct?

- A** Hydrogen ions are used to pump sucrose molecules through a carrier protein down a concentration gradient.
- B** Hydrogen ions are used to pump sucrose molecules through a carrier protein against a concentration gradient.
- C** Hydrogen ions and sucrose molecules are co-transported through a carrier protein as hydrogen ions move against their concentration gradient.
- D** Hydrogen ions and sucrose molecules are co-transported through a carrier protein as hydrogen ions move down their concentration gradient.

Your answer

[1]

19 The table shows the type of bond present in the different levels of structure for a protein molecule.

Which of the rows, **A** to **D**, is correct?

	Primary structure	Secondary structure	Tertiary structure
A	peptide	hydrogen	disulfide
B	hydrogen	peptide	ionic
C	peptide	disulfide	ionic
D	peptide	disulfide	hydrogen

Your answer

[1]

20

The table shows some of the properties of four types of blood vessel found in the human body.

Which of the blood vessels, **A** to **D**, is a vein?

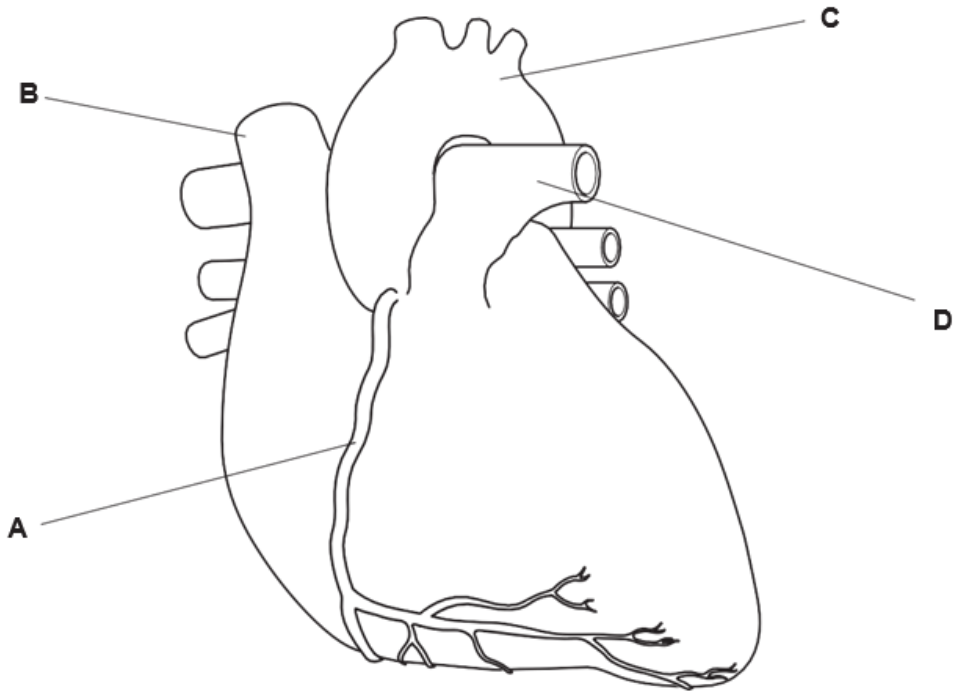
Blood vessel	Lumen diameter (mm)	Wall thickness (μm)	Vascular blood pressure (mmHg)
A	0.02	1.0	50
B	0.008	0.5	20
C	5.0	500	5
D	4.0	1000	90

Your answer

[1]

21

The diagram shows the external structure of the mammalian heart.



Which of the blood vessels, **A** to **D**, carry oxygenated blood to the heart muscle?

Your answer

[1]

22

Donated blood is processed into different products which can be used to treat patients with specific conditions.

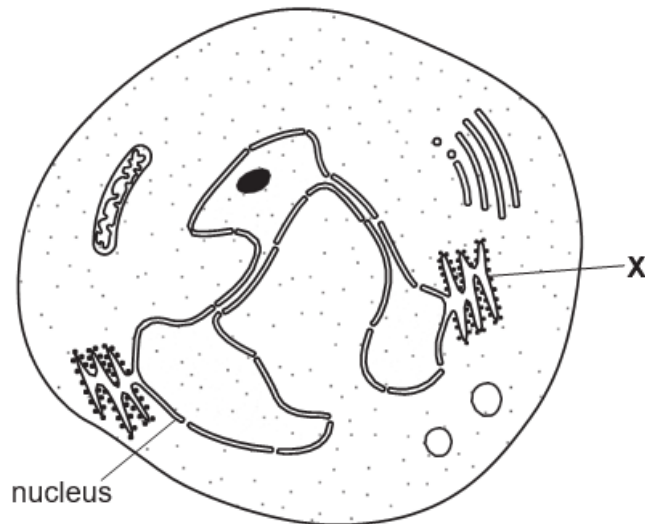
Which of the patients, **A** to **D**, would be treated by using a transfusion of **platelets**?

- A** receiving regular blood transfusions
- B** has bone marrow failure
- C** has low concentration of clotting factors
- D** undergoing cardiac surgery

Your answer

[1]

The diagram below shows a cell found in the bloodstream of a mammal.



Which of the statements, **A** to **D**, correctly identifies the cell and structure **X**?

- A** The cell is a neutrophil and structure **X** is rough endoplasmic reticulum.
- B** The cell is a monocyte and structure **X** is rough endoplasmic reticulum.
- C** The cell is a lymphocyte and structure **X** is a ribosome.
- D** The cell is a neutrophil and structure **X** is the Golgi apparatus.

Your answer

[1]

A scientist was observing electron micrographs of eukaryotic cells and writing descriptions for the organelles observed. One of the organelles was described as:

Two groups of microtubules usually arranged at right angles to each other.

Which of the options, **A** to **D**, is the organelle being described by the scientist?

- A** centriole
- B** lysosome
- C** endoplasmic reticulum
- D** Golgi apparatus

Your answer

[1]

25

Haladaptatus cibarius is a photosynthetic organism found in salt lakes.

The cells of *H. cibarius* do not have nuclei or membrane-bound organelles.

Which of the options, A to D, describes the cells of *H. cibarius*?

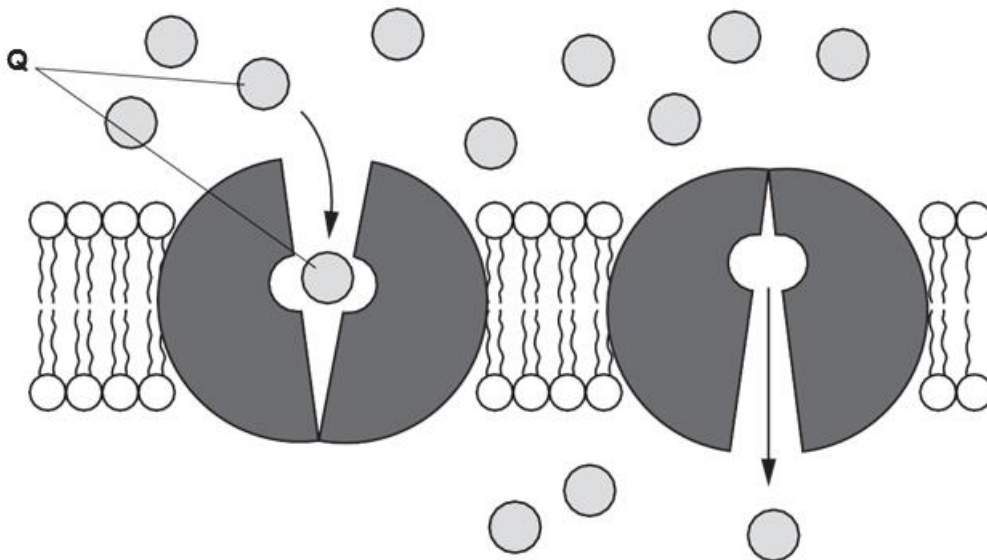
- A eukaryotic animal
- B eukaryotic plant
- C prokaryotic
- D viral

Your answer

[1]

26

The diagram below shows the transport of solute **Q** through a cell surface membrane.



Which of the statements, **A** to **D**, describes the transport of solute **Q**?

- A Solute **Q** is glucose being transported by active transport through a carrier protein.
- B Solute **Q** is oxygen being transported by active transport through a channel protein.
- C Solute **Q** is glucose being transported by facilitated diffusion through a carrier protein.
- D Solute **Q** is oxygen being transported by facilitated diffusion through a channel protein.

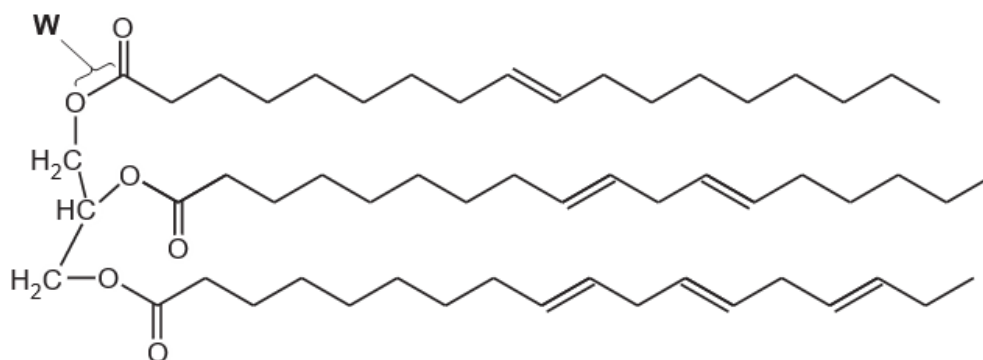
Your answer

[1]

27

Linseed oil is a polyunsaturated triglyceride that can be extracted from the seeds of the flax plant, *Linum usitatissimum*.

A diagram of a linseed oil molecule is shown below.



Which of the options, **A** to **D**, identifies the bond labelled **W**?

- A** glycosidic
- B** phosphodiester
- C** peptide
- D** ester

Your answer

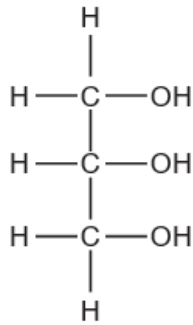
[1]

28

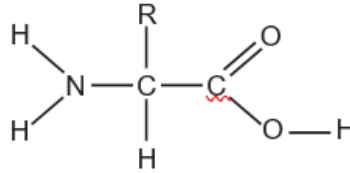
Lactase is an enzyme found in mammals that breaks down lactose.

Which of the molecules, **A** to **D**, would be found in a solution following the complete hydrolysis of the enzyme lactase?

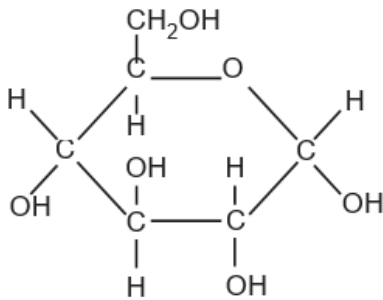
A



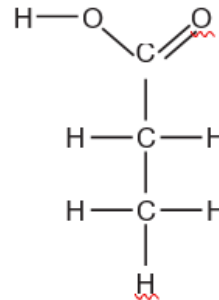
B



C



D



Your answer

[1]

29

During a clinical trial, two groups of patients that had received blood transfusions were compared.

Some of the results are shown below.

Patient group	Number of patients	Number of deaths during the hospitalisation period	Mortality rate (%)
Group 1	420	118	28.1
Group 2	418	93	

Which of the options, **A** to **D**, is the correctly calculated difference in mortality rate between the two groups?

- A** 22.2%
- B** 50.3%
- C** 71.9%
- D** 5.9%

Your answer

[1]

30

A student was investigating the effect of exercise on heart function. Some of the results are shown in the table below.

	Heart rate (bpm)	Cardiac output (cm³ min⁻¹)
At rest	75	5625
During exercise	120	12600

Which of the options, **A** to **D**, is the correctly calculated **stroke volume** for this heart at rest?

- A** 0.01 cm³
- B** 75 cm³
- C** 105 cm³
- D** 421 875 cm³

Your answer

[1]

Some students are preparing for a lecture on the mammalian transport system.

student A

I'd say that valves in veins help to maintain pressure and keep blood moving so that it doesn't agglutinate.

student B

I think closed double circulations only maintain useful pressure in the systemic system.

student C

A double circulatory system saves the heart from having to deal with deoxygenated blood.

student D

I think that respiratory gases are transferred between body cells and circulating blood via tissue fluid.

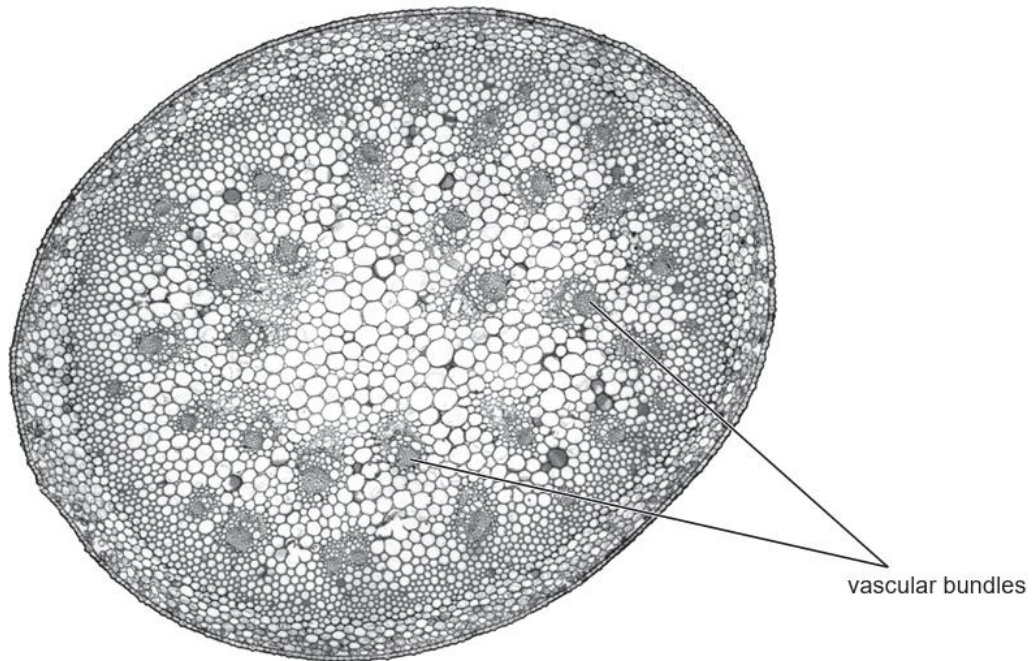
Which of the students, **A** to **D**, has the correct idea about the mammalian transport system?

- A** student A
- B** student B
- C** student C
- D** student D

Your answer

[1]

The photomicrograph below shows a transverse section of a plant organ.



Which of the plant organs, **A** to **D**, is shown in the photomicrograph?

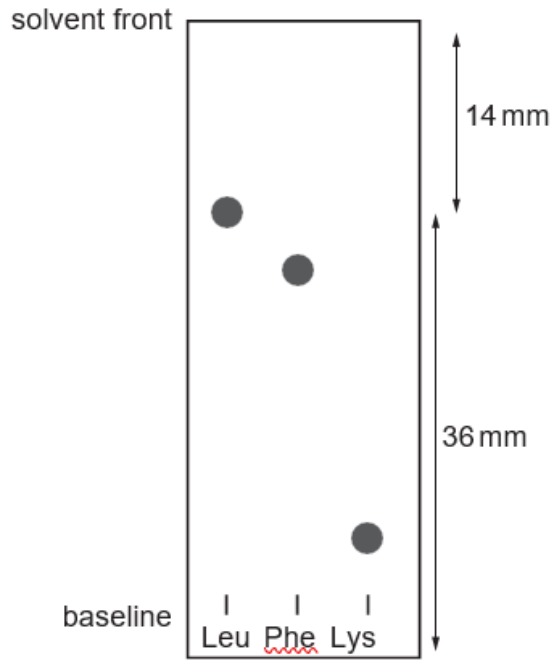
- A** stem of a dicotyledon
- B** stem of a monocotyledon
- C** root of a dicotyledon
- D** root of a monocotyledon

Your answer

[1]

33

The diagram below is a chromatogram of three different amino acids. The distance travelled by the solvent from the baseline is 50 mm.



Using the information in the chromatogram, which of the options, **A** to **D**, is the R_f value for the amino acid leucine (Leu)?

- A 0.39
- B 0.28
- C 0.72
- D 1.39

Your answer

[1]

34 Haemoglobin is a protein molecule found in mammalian erythrocytes.

Which of the statements, **A** to **D**, about the structure of haemoglobin is correct?

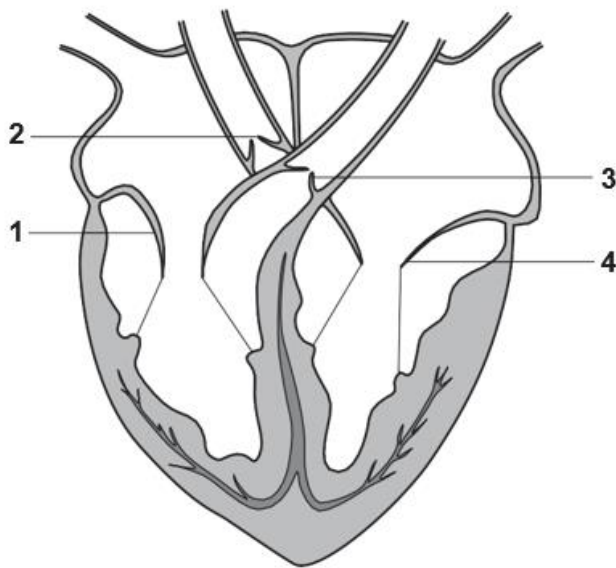
- A** Primary structure does not contain any oxygen-carrying haem groups.
- B** Secondary structure is stabilised by hydrogen bonds between different polypeptide chains.
- C** Tertiary structure has two alpha and two beta polypeptide chains.
- D** Quaternary structure is stabilised by peptide bonds between the polypeptide chains.

Your answer

[1]

35 The diagram below shows the internal structure of a mammalian heart.

Valves have been labelled **1**, **2**, **3** and **4**.



Which of the rows, **A** to **D**, describes the positions of these valves during ventricular systole?

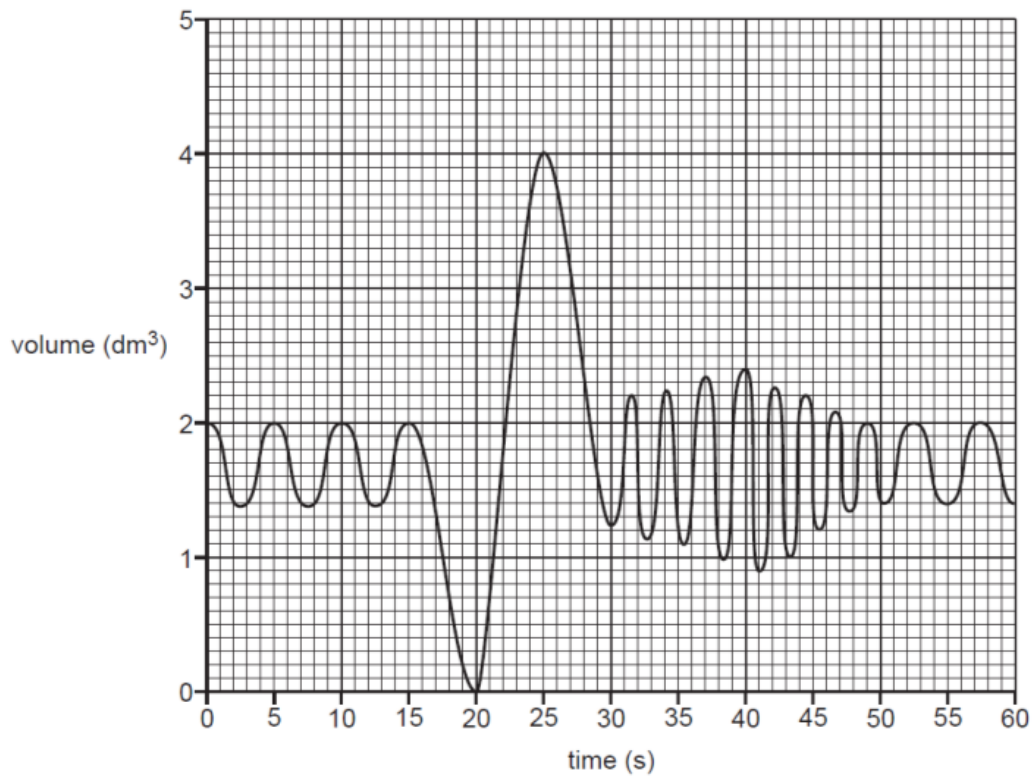
	1	2	3	4
A	open	closed	open	open
B	open	closed	closed	open
C	closed	open	open	closed
D	closed	open	open	open

Your answer

[1]

36

A spirometer was used to monitor the breathing of a student during periods of rest and exercise. The resulting spirometer trace is shown below.



Using the spirometer trace, which of the options, **A** to **D**, is the value for the resting tidal volume?

- A 2.0 dm³
- B 2.6 dm³
- C 0.6 dm³
- D 4.0 dm³

Your answer

[1]

Total Marks for Question Set 2: 36

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