OCR
Oxford Cambridge and RSA

A Level Biology B

H422/01 Fundamentals of biology

Question Set 22

Module 2 Cells, chemicals for life, transport and gas exchange

Multiple Choice Questions

1 Which of the options, **A** to **D**, is a property of the phosphate group in phospholipids?

A hydrophilic

B hydrophobic

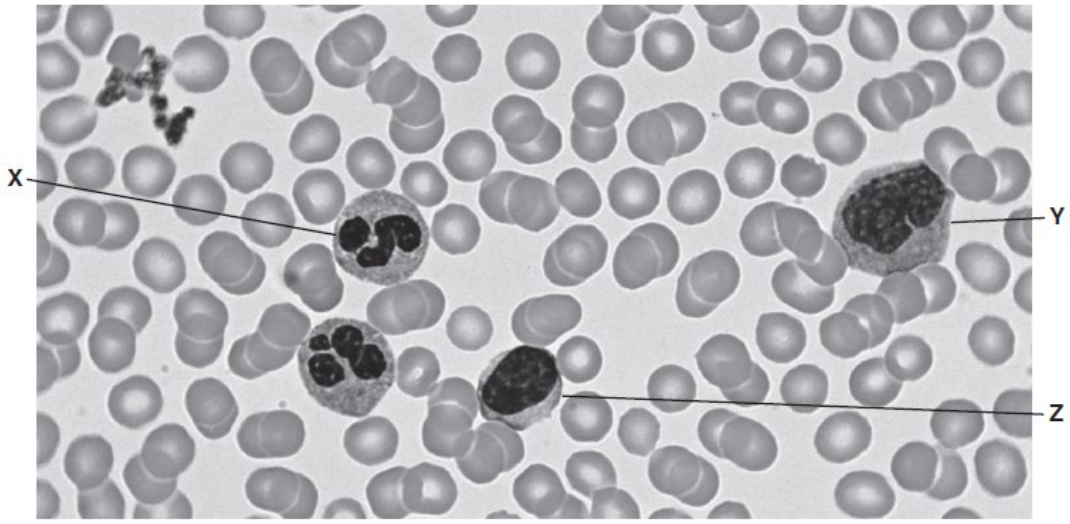
C non-polar

D saturated

Your answer ☐

[1]

2 The image below is a photomicrograph of a human blood smear. Three cells are labelled **X**, **Y** and **Z**.



Which of the rows, **A** to **D**, in the table below correctly identifies cells **X**, **Y** and **Z**?

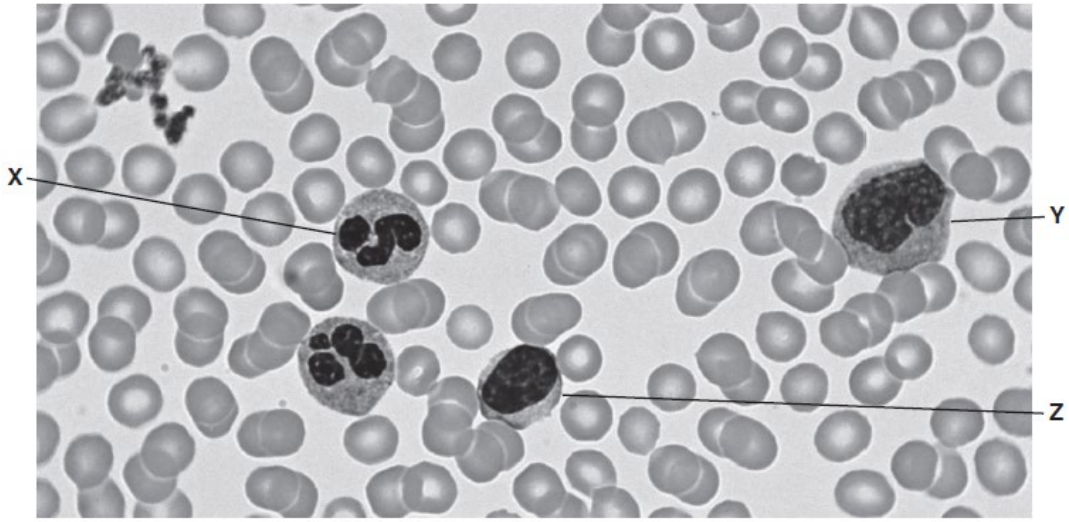
	Monocyte	**Neutrophil**	**Lymphocyte**
A	X	Y	Z
B	Z	X	Y
C	Y	X	Z
D	Y	Z	X

Your answer ☐

[1]

3 The image below is a photomicrograph of a human blood smear. Three cells are labelled **X**, **Y** and **Z**.

[1]



The diameter of cell **X** in the image is 15.5 mm and its actual diameter is 12.4 µm.

Which of the options, **A** to **D**, is the magnification of the image?

A ×125

B ×800

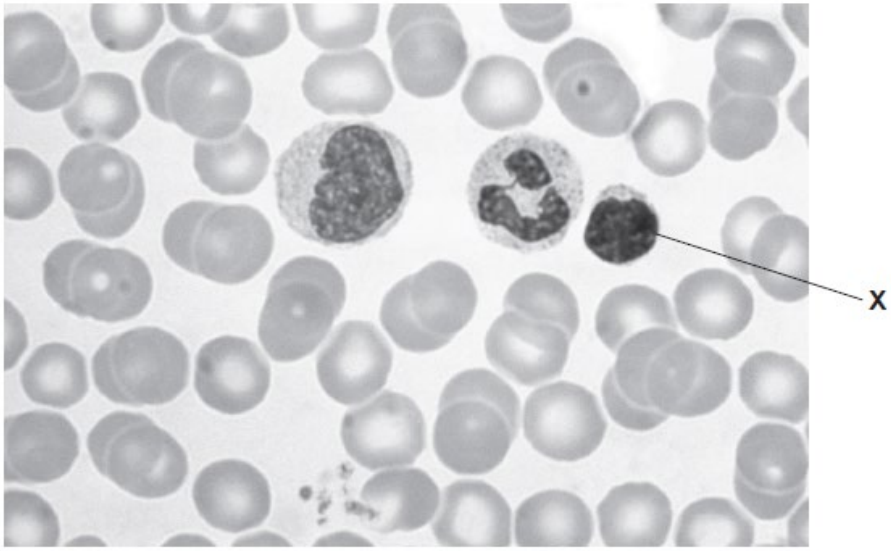
C ×1250

D ×8000

Your answer

4 A magnified section of a human blood smear is shown in the light micrograph below.

The diameter of cell **X** in this image is 11 mm.



Magnification x750

Which of the options, **A** to **D**, is the actual diameter of cell **X**?

A 1.5×10^{-5} m

B 1.5×10^{-6} m

C 6.8×10^{-5} m

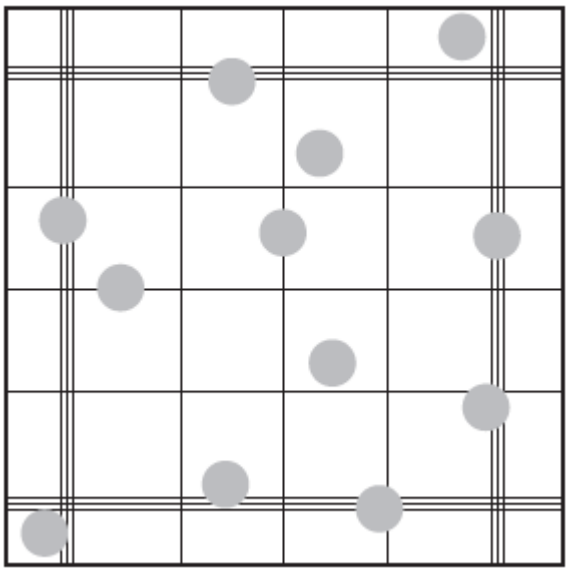
D 6.8×10^{-6} m

Your answer ☐

[1]

5 The diagram below represents a microscopic view of a haemocytometer.

A triple-ruled square is further divided into 16 smaller squares.



Which of the options, **A** to **D**, is the correct cell count for the triple-ruled square?

A 4

B 6

C 8

D 10

Your answer ☐

[1]

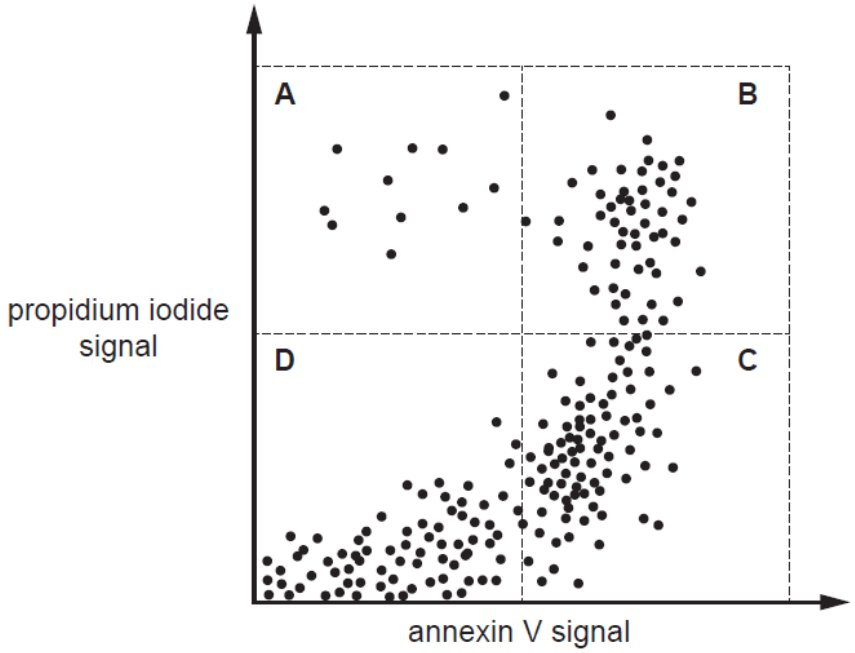
6 Cells undergoing apoptosis can be distinguished from living cells by staining with two reagents:

- annexin V, which binds to phosphatidylserine
- propidium iodide, which binds to DNA.

After staining, a flow cytometer is used to measure the fluorescent signal from each cell.

Neither reagent can diffuse across biological membranes.

The graph below shows the result of a flow cytometry experiment in a population of cells using annexin V and propidium iodide. Four regions are labelled **A** to **D**.



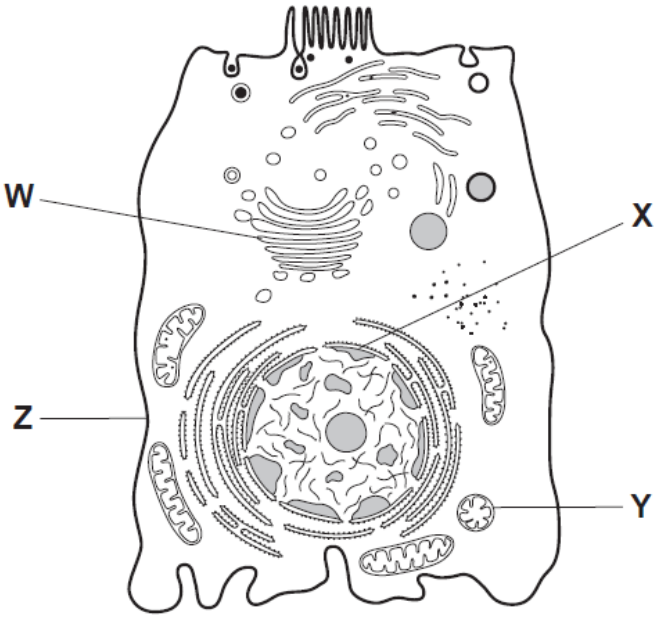
Which of the regions from the graph, **A** to **D**, identifies cells in **late** apoptosis?

Your answer ☐

[1]

7 The diagram below shows the ultrastructure of an animal cell.

Four structures are labelled **W** to **Z**.



Which of the rows in the table below correctly identifies the structures that can (✓) and can **not** (×) be visualised under a light microscope?

Row	W	X	Y	Z
A	×	×	×	✓
B	×	✓	✓	×
C	✓	✓	✓	×
D	✓	×	×	✓

Your answer ☐

[1]

8 Which of the biological processes, **A** to **D**, is an example of facilitated diffusion?

A influx of sodium ions into a neurone during an action potential

B loading of sucrose into a companion cell

C movement of protons into the mitochondrial intermembrane space

D movement of acetylcholine across the synaptic cleft

Your answer ☐

[1]

9 Three diagnostic tests were performed on a solution containing a biological molecule.

The results of the tests are shown in the table below.

	Colour of test reagent	
	Before	**After**
Benedict's test (with hydrolysis)	blue	green
Biuret test	blue	purple
Iodine test	yellow-brown	yellow-brown

Which of the options, **A** to **D**, is the biological molecule that was tested?

A glucose

B glycoprotein

C glycolipid

D starch

Your answer ☐

[1]

10 Which of the options, **A** to **D**, is a type of reaction involved in the breakdown of a phospholipid?

A condensation

B dehydrogenation

C hydrolysis

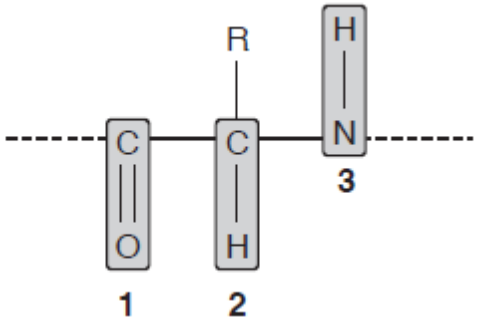
D phosphorylation

Your answer ☐

[1]

11 The diagram below represents an amino acid within a polypeptide sequence.

Three regions of the amino acid are labelled **1** to **3**.



Which of the options, **A** to **D**, gives the regions that form bonds in the secondary structure of a protein?

A 1 and 2

B 1 and 3

C 2 and 3

D 1, 2 and 3

Your answer ☐

[1]

12 Which of the rows, **A** to **D**, from the table below indicates the type of bond present (✓) or absent (×) in the secondary structure of a protein?

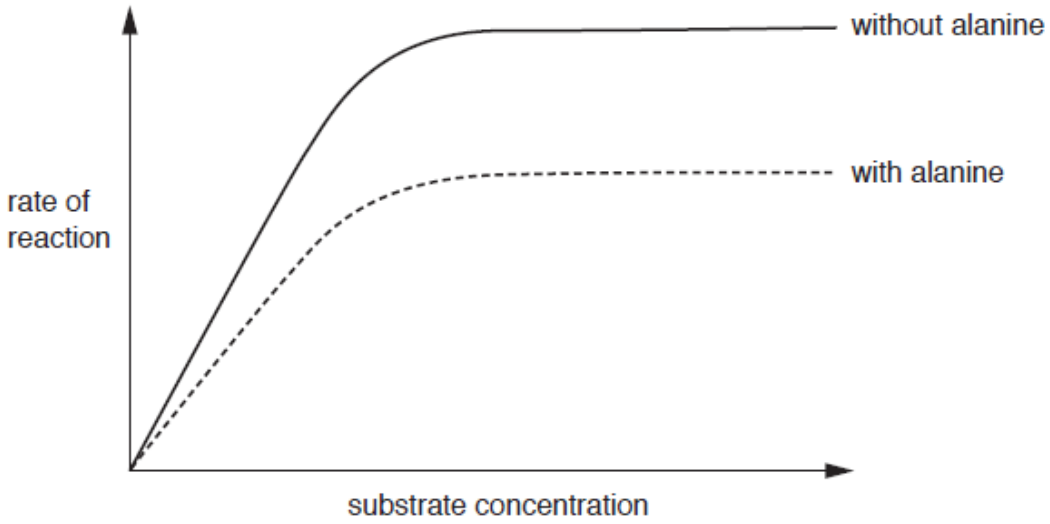
	Disulfide	Hydrogen	Hydrophobic	Ionic	Peptide
A	✘	✓	✘	✘	✓
B	✘	✓	✘	✓	✓
C	✓	✓	✘	✘	✓
D	✓	✘	✓	✓	✓

Your answer ☐

[1]

[1]

13 The graph below shows the effect of alanine on the rate of a reaction catalyzed by the enzyme, pyruvate kinase.



Which of the following statements is/are correct?

1 Alanine binds to an allosteric site of pyruvate kinase.

2 Pyruvate kinase is inactive when alanine is bound.

3 A change in pH could affect the rate of reaction both with and without alanine present.

A 1, 2 and 3 are correct

B only 1 and 2 are correct

C only 2 and 3 are correct

D only 1 is correct

Your answer ☐

[1]

14 Trisodium citrate is a compound used for the long-term preservation of whole blood. The compound prevents blood clotting by reacting with an ion.

Which of the options, **A** to **D**, is the ion with which trisodium citrate reacts to prevent blood clotting?

A calcium (Ca^{2+})

B chloride (Cl^{-})

C magnesium (Mg^{2+})

D potassium (K^{+})

Your answer ☐

[1]

15 Fibrin is involved in the blood clotting cascade.

Which of the options, **A** to **D**, identifies the factors required for the conversion of fibrinogen tofibrin?

A phospholipids and Ca^{2+} ions

B platelets and K^+ ions

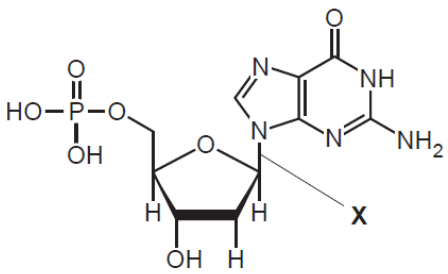
C thrombin and Ca^{2+} ions

D thromboplastin and K^+ ions

Your answer ☐

[1]

16 The diagram below shows the structure of a nucleotide. A bond is labelled **X**.



Which of the following statements is/are correct?

1 **X** is a phosphodiester bond.

2 The sugar is deoxyribose.

3 The base is a purine.

A 1, 2 and 3 are correct

B only 1 and 2 are correct

C only 2 and 3 are correct

D only 1 is correct

Your answer ☐

[1]

17 A student is purifying DNA from a bacterial culture.

Which of the molecules, **A** to **D**, is required for the precipitation of DNA during the purification process?

A ethanol

B glucose

C lysozyme

D water

Your answer ☐ **[1]**

18 Which of the following statements about DNA replication in eukaryotes is/are correct?

1 Helicase exposes the templates required by DNA polymerase.

2 Free nucleotides are polymerised in the 3' to 5' direction.

3 Polymerisation of free nucleotides is continuous on both templates.

A 1, 2 and 3 are correct

B only 1 and 2 are correct

C only 2 and 3 are correct

D only 1 is correct

Your answer ☐ **[1]**

19 A gene mutation causes part of a DNA sequence to change from TAC to TAA.

TAA is a stop codon.

Which of the statements, **A** to **D**, is a correct explanation of why the stop codon may **not** affect translation of the mRNA sequence?

A TAA also codes for an amino acid

B TAA stops transcription, not translation

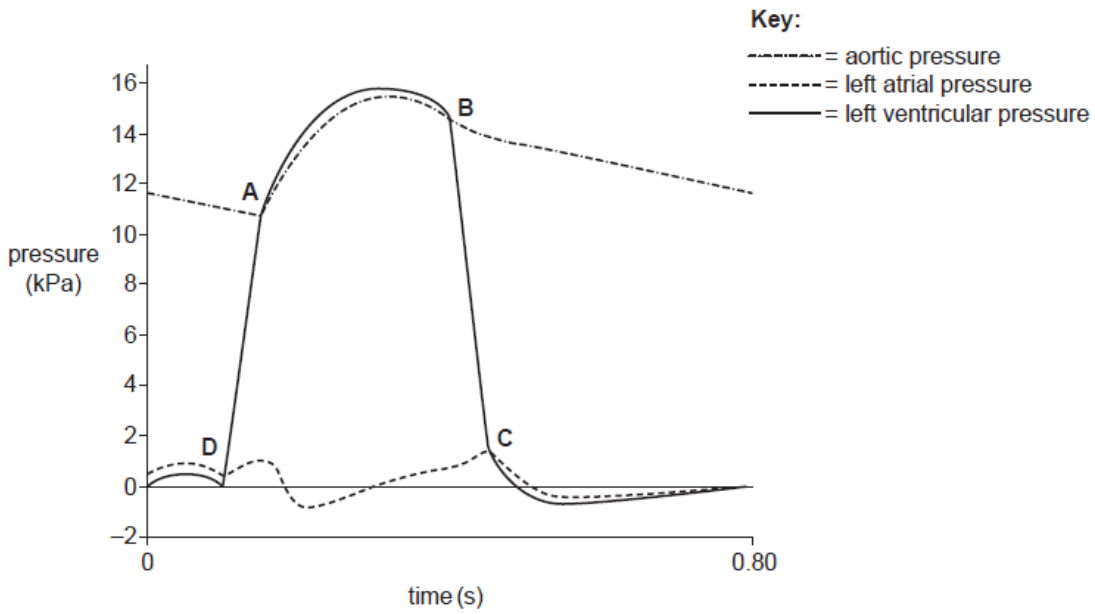
C the mutation in the mRNA sequence may be repaired

D the stop codon may not be present in the mature mRNA sequence

Your answer ☐ **[1]**

20 The graph below shows pressure changes in the left side of the heart during the cardiac cycle.

Four points on the graph are labelled **A** to **D**.



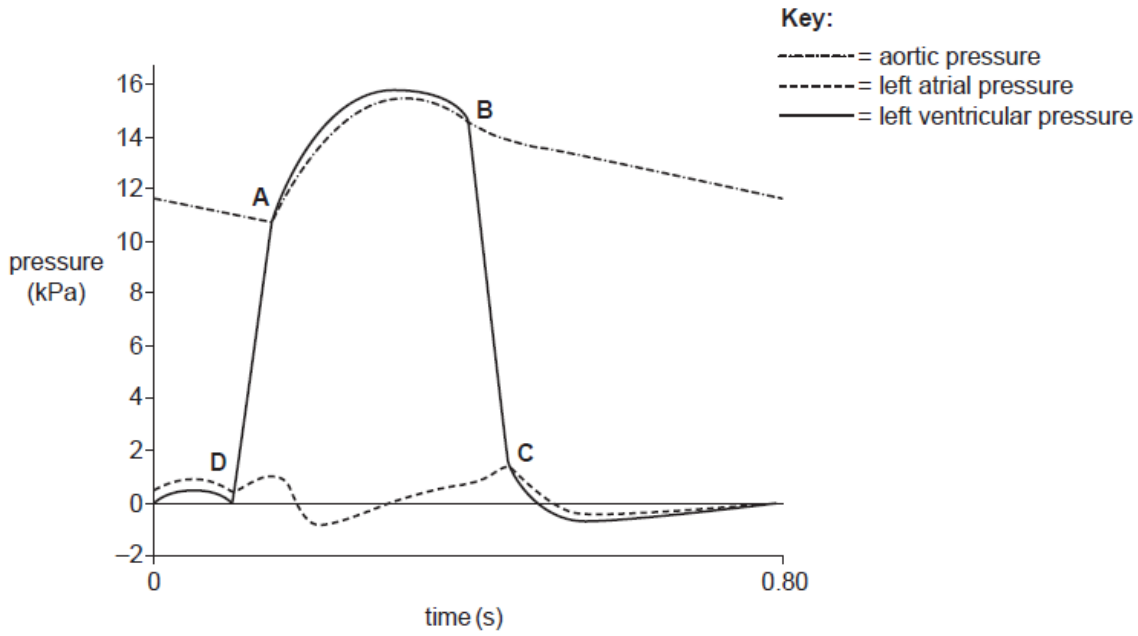
Which of the points, **A** to **D**, corresponds to closing of the semilunar valve?

Your answer ☐

[1]

21 The graph below shows pressure changes in the left side of the heart during the cardiac cycle.

Four points on the graph are labelled **A** to **D**.



Which of the options, **A** to **D**, is the heart chamber in which electrical activity is initiated?

A left atrium

B left ventricle

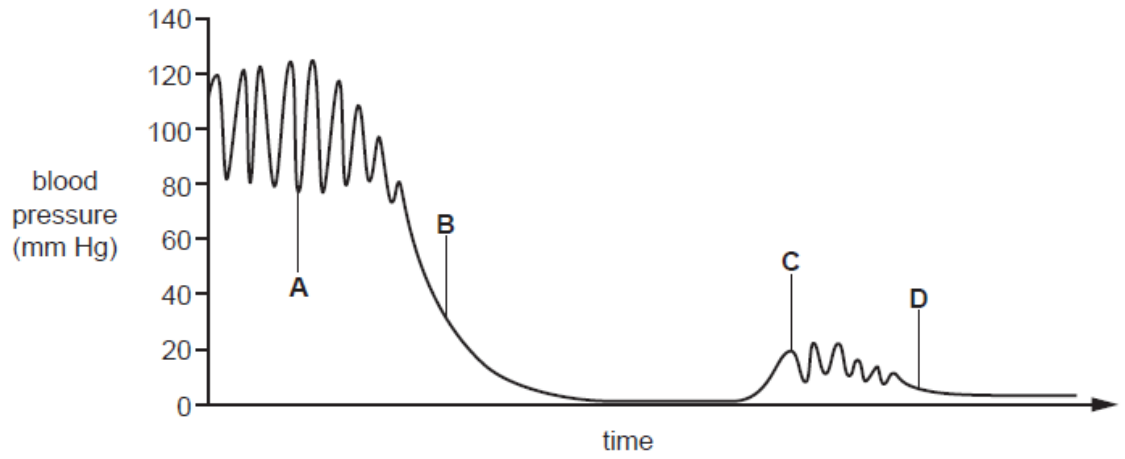
C right atrium

D right ventricle

Your answer ☐

[1]

22 The graph below shows the normal variation in blood pressure across different regions of the human circulatory system. Four regions are labelled **A** to **D**.

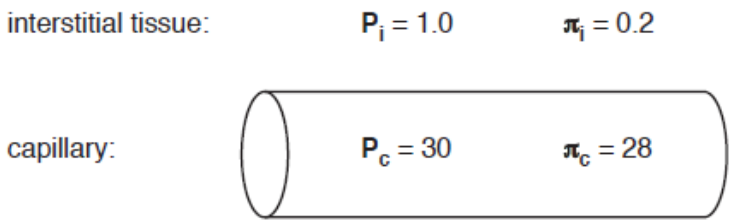


Which of the regions on the graph, **A** to **D**, is the region in which blood becomes oxygenated?

Your answer ☐

[1]

23 The diagram below represents a capillary (**c**) surrounded by interstitial tissue (**i**). Hydrostatic pressures (**P**) and oncotic pressures (π) are shown.



The net movement of fluid between the capillary and interstitial tissue is determined by the net driving force (NDF):

$$NDF = (P_c - P_i) - (\pi_c - \pi_i)$$

When NDF > 0, fluid leaves the capillary.
When NDF < 0, fluid enters the capillary.

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

A NDF = −1.7, favouring the production of tissue fluid

B NDF = −1.7, favouring a loss of tissue fluid

C NDF = 1.2, favouring the production of tissue fluid

D NDF = 1.2, favouring a loss of tissue fluid

Your answer ☐

[1]

24 A doctor takes a blood pressure measurement from a patient using a manual sphygmomanometer.

The result is $\frac{160}{100}$ mm Hg.

Here are three statements about the doctor's examination:

1 The patient has hypertension that requires medical treatment.

2 The greatest pressure exerted on the patient's arterial walls during the cardiac cycle is 260 mm Hg.

3 At cuff pressures below 100 mm Hg, blood flow can be heard using a stethoscope.

Which of the statements is/are correct?

A 1, 2 and 3 are correct

B only 1 and 2 are correct

C only 2 and 3 are correct

D only 1 is correct

Your answer ☐

[1]

25 Which of the statements, **A** to **D**, is a correct description of why plants need transport systems?

A Plants are multicellular.

B Plants have a large surface area:volume ratio.

C The metabolic rate of plants is high.

D The required movement of some molecules cannot be met by diffusion alone.

Your answer ☐

[1]

26 Wind speed influences the rate of transpiration in a plant.

Which of the options, **A** to **D**, would **increase** in windy conditions?

A kinetic energy of water molecules in leaf airspaces

B probability that stomata are open

C relative humidity of the atmosphere

D water potential gradient between airspaces in the leaf and the atmosphere

Your answer ☐

[1]

27 In a plant, sucrose is loaded into a companion cell using a protein carrier that co-transports H^+ions.

Which of the options, **A** to **D**, is a correct description of how H^+ ions are co-transported?

A into the companion cell against the concentration gradient

B into the companion cell down the concentration gradient

C out of the companion cell against the concentration gradient

D out of the companion cell down the concentration gradient

Your answer ☐

[1]

Total Marks for Question Set 2: 27