

SECTION A

You should spend a maximum of 20 minutes on this section.

Answer **all** the questions.

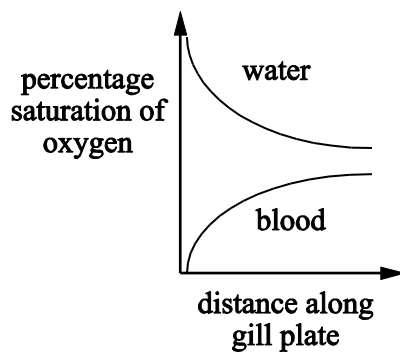
- 1 Which statement explains the significance of mitosis in the development of whole organisms?
- A Mitosis can be controlled at certain points in development, which will change body plans.
- B Sex cells are produced by mitosis, which allows new organisms to be produced.
- C Mitosis limits the total number of cells in an organism, which will change its shape.
- D Budding in yeast is an example of mitosis, producing new multicellular organisms.

Your answer

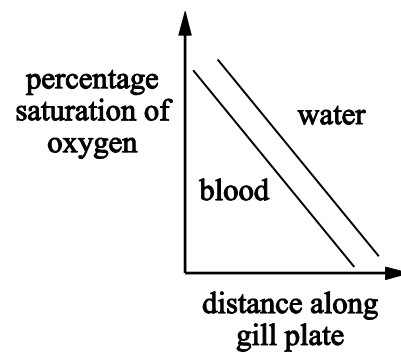
[1]

- 2 Which graph represents the counter-current exchange system in fish gills?

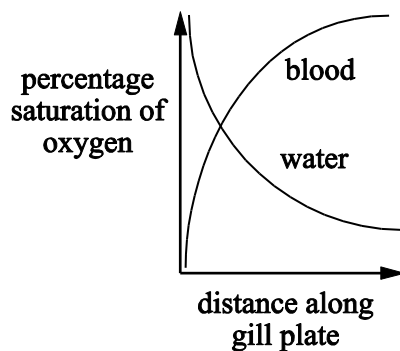
A



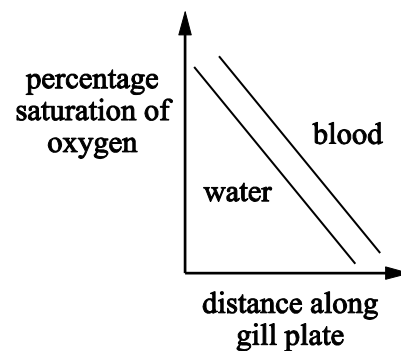
B



C



D



Your answer

[1]

- 3** Cells require vitamins and minerals in order to function correctly. These vitamins and minerals need to cross the plasma membrane.

Vitamins are either fat soluble or water soluble. Vitamins A, D, E and K are fat soluble.

Which of the following combinations enter a cell by facilitated diffusion?

- A** vitamin A and calcium ions
- B** vitamin C and calcium atoms
- C** vitamin C and calcium ions
- D** vitamin A and calcium atoms

Your answer

[1]

- 4** Animals receive different stimuli from their environment. Their synapses can manage multiple stimuli, often resulting in one response (such as a muscle twitching).

This action of the synapse is an example of

- A** spatial summation
- B** all or nothing response
- C** temporal summation
- D** cell signalling

Your answer

[1]

- 5** The kidneys of a healthy individual filter $178 \text{ dm}^3 \text{ day}^{-1}$ of fluid from the glomeruli into the renal capsules. However, only $1.5 \text{ dm}^3 \text{ day}^{-1}$ of urine is produced.

What percentage of the filtrate is reabsorbed back into the blood?

- A** 176.5
- B** 0.8
- C** 11.8
- D** 99.2

Your answer

[1]

6 The following mechanisms are used to move water through plants:

- i) diffusion
- ii) osmosis
- iii) mass flow.

Which row correctly identifies the mechanism used at each point of the transpiration stream?

	Into root cells	Across root via symplast pathway	Up the stem in the xylem	Across leaf via apoplast pathway	Out of leaf via stomata
A	osmosis	osmosis	mass flow	mass flow	diffusion
B	diffusion	osmosis	osmosis	mass flow	diffusion
C	diffusion	osmosis	osmosis	mass flow	osmosis
D	osmosis	osmosis	mass flow	mass flow	osmosis

Your answer

[1]

7 Citrate synthase catalyses the conversion of oxaloacetate into citric acid in the Krebs cycle. It exhibits product inhibition.

Which of the following is the correct description of citrate synthase?

	Type of respiration involved in	Location of enzyme	Inhibitor
A	anaerobic	cytoplasm	citric acid
B	aerobic	mitochondria	citric acid
C	aerobic	mitochondria	oxaloacetate
D	anaerobic	cytoplasm	oxaloacetate

Your answer

[1]

- 8 Which of the following describes the process that happens during **repolarisation** of a neurone during the action potential?

	Sodium channels	Potassium channels	Membrane potential
A	closed	open	decreasing
B	open	closed	decreasing
C	open	closed	increasing
D	closed	open	increasing

Your answer

[1]

- 9 An unknown solution of a single sugar was tested. The results were recorded in **Table 9.1**.

Colours observed after testing	
Benedict's test for reducing sugars	Benedict's test for non-reducing sugars
blue	brick red

Table 9.1

Identify the unknown sugar.

- A** fructose
B lactose
C sucrose
D glucose

Your answer

[1]

- 10 An anticodon sequence of five successive tRNA molecules involved in protein synthesis was analysed and found to have the following percentage base composition.

Adenine 40; Cytosine 27; Guanine 13; Thymine 0; Uracil 20 %

Which row shows the percentage base composition of the template strand of the original DNA molecule?

	Adenine	Cytosine	Guanine	Thymine	Uracil
A	40	27	13	20	0
B	20	13	27	40	0
C	20	13	27	0	40
D	40	27	13	0	20

Your answer

[1]

- 11 **Fig. 11.1** shows the heat flow through the skin of an athlete during vigorous exercise. Exercise starts at 400 seconds.

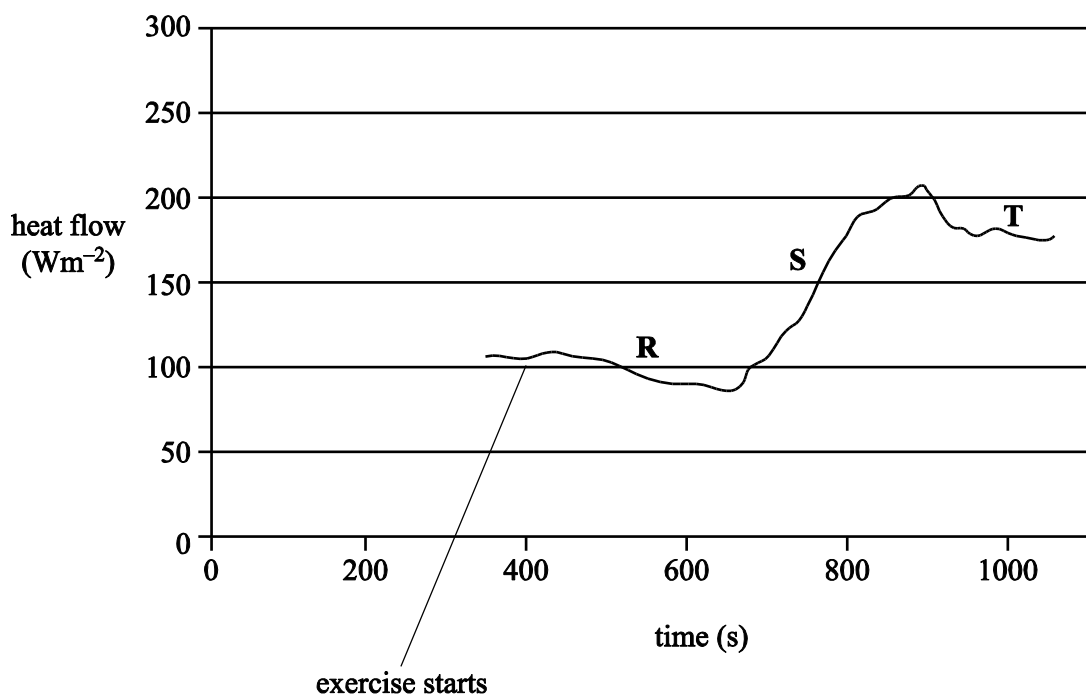


Fig. 11.1

Blood flow can be directed to those parts of the body that make the greatest demands.

Which row gives the best explanation of the stages in **Fig. 11.1**?

	R	S	T
A	Blood directed away from skin to avoid excess heat loss	Blood directed towards skin to release excess heat	Balance achieved between loss of excess heat and the need for oxygen in the muscles
B	Blood directed away from skin and towards the muscles to supply more oxygen for respiration	Blood directed towards skin to release excess heat	Balance achieved between heat loss and excess heat created in the muscles
C	Blood directed away from skin to avoid excess heat loss	Blood directed towards skin to gain heat from the environment	Balance achieved between heat loss and excess heat created in the muscles
D	Blood directed away from skin and towards the muscles to supply more oxygen for respiration	Blood directed towards skin to gain heat from the environment	Balance achieved between loss of excess heat and the need for oxygen in the muscles

Your answer

[1]

12 Which of the following is/are interventions in the control of blood glucose concentration?

Statement 1: Insulin injection.

Statement 2: Regular cardiovascular exercise.

Statement 3: Glucagon injection.

A 1, 2 and 3

B Only 1 and 2

C Only 2 and 3

D Only 1

Your answer

[1]

13 Which of the following statements is/are true?

Statement 1: Microtubules are part of the '9 + 2' formation in bacterial flagella.

Statement 2: Microtubules can be prevented from functioning by a respiratory inhibitor.

Statement 3: Microtubules are involved in moving chromosomes from the equator to the poles of the cell during mitosis.

A 1, 2 and 3

B Only 1 and 2

C Only 2 and 3

D Only 1

Your answer

[1]

14 Blood vessels are adapted for their function.

Which of the following statements is/are true?

Statement 1: The walls of arteries near the heart contain a lot of elastic fibres so that they can stretch and recoil to maintain blood pressure.

Statement 2: The walls of the venules contain little muscle.

Statement 3: The walls of arteries contain a lot of muscle fibres to contract and generate pressure in the blood.

A 1, 2 and 3

B Only 1 and 2

C Only 2 and 3

D Only 1

Your answer

[1]

15 Phospholipid bilayers play crucial roles within plant cells.

Which of the following statements linked to the importance of membranes in plant cells is/are true?

Statement 1: ATP synthase embedded in thylakoid membranes maintains chemiosmotic gradients.

Statement 2: Phospholipid bilayers within the chloroplast are impermeable to protons.

Statement 3: Thylakoid membranes contain electron transport chain proteins.

A 1, 2 and 3

B Only 1 and 2

C Only 2 and 3

D Only 1

Your answer

[1]