

**Section A**

**You should spend a maximum of 25 minutes on this section.**

Answer **all** the questions.

- 1** Young mammals receive antibodies in their mother's milk.

This is an example of which type of immunity?

- A** artificial active immunity
- B** artificial passive immunity
- C** natural active immunity
- D** natural passive immunity

Your answer

[1]

- 2** Which of the following descriptions is correct?

- A** Vaccination gives long-term protection, immunisation gives short-term protection.
- B** Vaccination involves injection of antigenic material and immunisation is the process of developing immunity.
- C** Vaccination involves injection of antigenic material, immunisation is injection of antibodies.
- D** Vaccination and immunisation have the same meaning.

Your answer

[1]

- 3** When you listen to a human heartbeat through a stethoscope you can hear a two stage 'lub-dub' sound.

Which of the following causes the first 'lub' component?

- A** closing of the atrioventricular valves
- B** sound of blood rushing into the atria
- C** sound of blood rushing into the ventricles
- D** closing of semilunar valves

Your answer

[1]

- 4 Zinc ions are necessary for the enzyme carbonic anhydrase to work.

Which statement correctly describes the nature and function of zinc ions in their interaction with carbonic anhydrase?

- A inorganic ions and coenzymes  
 B vitamins and prosthetic groups  
 C inorganic ions and prosthetic groups  
 D vitamins and coenzymes

Your answer

[1]

- 5 Which formula would you use to estimate the volume of a neutrophil?

- A  $4\pi r^2$   
 B  $2\pi r$   
 C  $\pi r^2 h$   
 D  $\frac{4}{3}\pi r^3$

Your answer

[1]

- 6 Three types of microscope are listed below.

Select the row that shows the correct use for each type of microscope.

Type of microscope and what it is used to observe			
	Light microscope	Transmission electron microscope	Laser scanning confocal microscope
A	an object at a certain depth within a cell	cell surfaces	organelles
B	an object at a certain depth within a cell	cell surfaces	whole cells and tissues
C	whole cells and tissues	organelles	cell surfaces
D	whole cells and tissues	organelles	an object at a certain depth within a cell

Your answer

[1]

- 7 Cyanobacteria are photoautotrophs and fossil records confirm their existence 3.5 billion years ago.

Which row describes the structure of cyanobacteria?

	Feature					
	Nucleus	Circular DNA	Mitochondria	Ribosomes	Chloroplast	Cell wall
<b>A</b>	✓		✓		✓	
<b>B</b>			✓		✓	✓
<b>C</b>	✓	✓		✓		
<b>D</b>		✓		✓		✓

Your answer

[1]

- 8 Fig. 8.1 shows an animal cell.

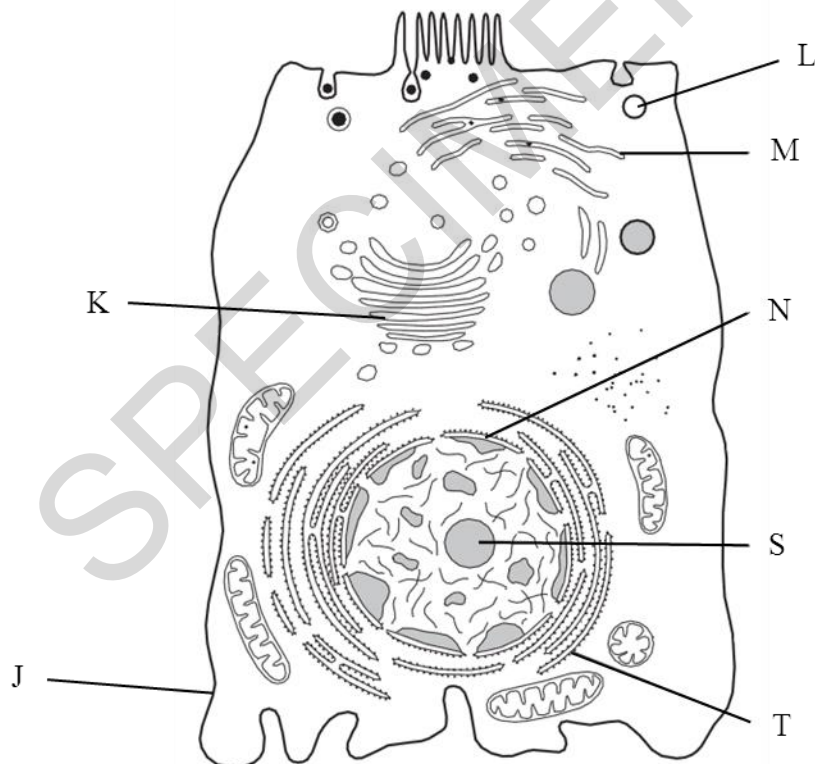


Fig. 8.1

Which option describes the correct sequence of organelles involved during the production and secretion of a protein from this cell?

- A** S, K, L, J      **B** T, K, L, J      **C** T, M, L, J      **D** S, T, K, L

Your answer

[1]

- 9 A length of DNA has the base sequence AATCGCGGTCGCTCA.

Select the row that shows the correct complementary DNA strand and the sequence of mRNA made during transcription of the DNA sequence above.

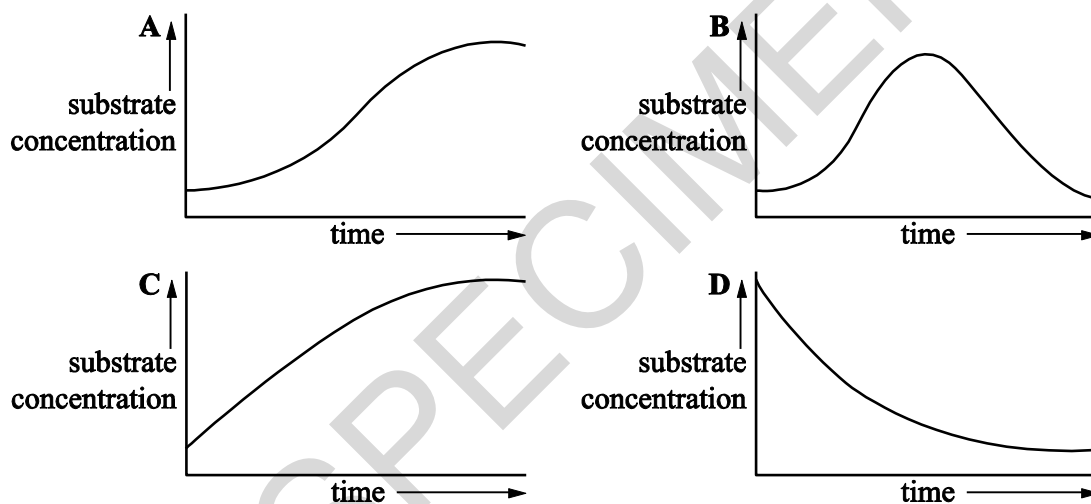
	Complementary DNA sequence	mRNA sequence
A	AATCGCGGTCGCTCA	UUAGCGCCAGCGAGU
B	TTAGCGCCAGCGAGT	UUAGCGCCAGCGAGU
C	TTAGCGCCAGCGAGT	TTAGCGCCAGCGAGT
D	TTAGCGCCAGCGAGT	AAUCGCGGUCGCUCA

Your answer

[1]

- 10 A group of students monitored the **substrate** concentration during an enzyme-controlled reaction.

Select the graph that correctly shows how the substrate concentration changes during the course of the reaction.



Your answer

[1]

- 11 There are two types of nuclear division, mitosis and meiosis. Meiosis incorporates two divisions of the nucleus.

Which table shows the correct results of nuclear division?

A

	Genetic variation	Reduction division
Mitosis	×	×
Meiosis 1	✓	✓
Meiosis 2	×	×

C

	Genetic variation	Reduction division
Mitosis	×	✓
Meiosis 1	✓	×
Meiosis 2	✓	✓

B

	Genetic variation	Reduction division
Mitosis	×	×
Meiosis 1	✓	✓
Meiosis 2	✓	×

D

	Genetic variation	Reduction division
Mitosis	×	×
Meiosis 1	✓	✓
Meiosis 2	×	✓

Your answer

[1]

- 12 The following events occur when carbon dioxide enters an erythrocyte in a capillary.

1. Hydrogencarbonate ions diffuse into the plasma from the erythrocyte.
2. Dissociation of carbonic acid.
3. Carbon dioxide reacts with water forming carbonic acid.
4. Chloride ions diffuse into erythrocyte from plasma.

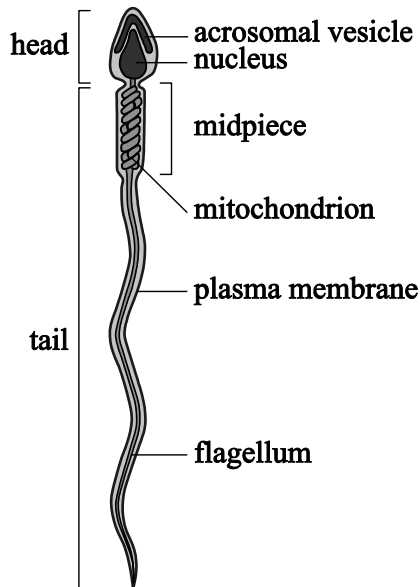
In which sequence do they occur?

	First step $\longrightarrow$ Final step			
A	2	4	1	3
B	3	2	1	4
C	3	1	4	2
D	2	3	4	1

Your answer

[1]

13 Sperm cells are an example of a specialised cell.



Which statement correctly describes one specialisation of a sperm cell?

- A tail contains flagellum which generates ATP
- B head contains chromosomes in homologous pairs
- C acrosome contains enzymes to digest outer portion of egg
- D midpiece contains mitochondria which enter egg

Your answer

[1]

14 Which of the following statements correctly describes the mechanism behind water movement between plasma and tissue fluid at the venule end of a capillary?

- A The hydrostatic pressure is greater than the oncotic pressure so water moves out of the capillary.
- B The hydrostatic pressure is greater than the oncotic pressure so water moves into the capillary.
- C The oncotic pressure is greater than the hydrostatic pressure so water moves out of the capillary.
- D The oncotic pressure is greater than the hydrostatic pressure so water moves into the capillary.

Your answer

[1]

- 15 Emphysema is a chronic respiratory disease where elastase is produced by phagocytes in the lungs, which breaks down lung tissue. This means that a person with emphysema cannot fully exhale.

Fig. 15.1 is a diagram of a small section of a healthy lung.

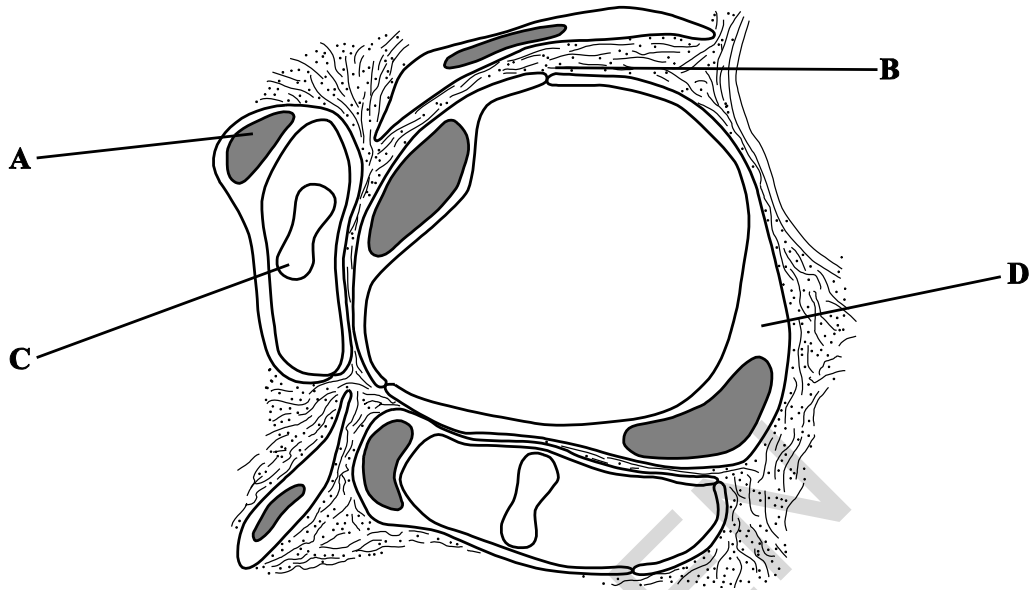


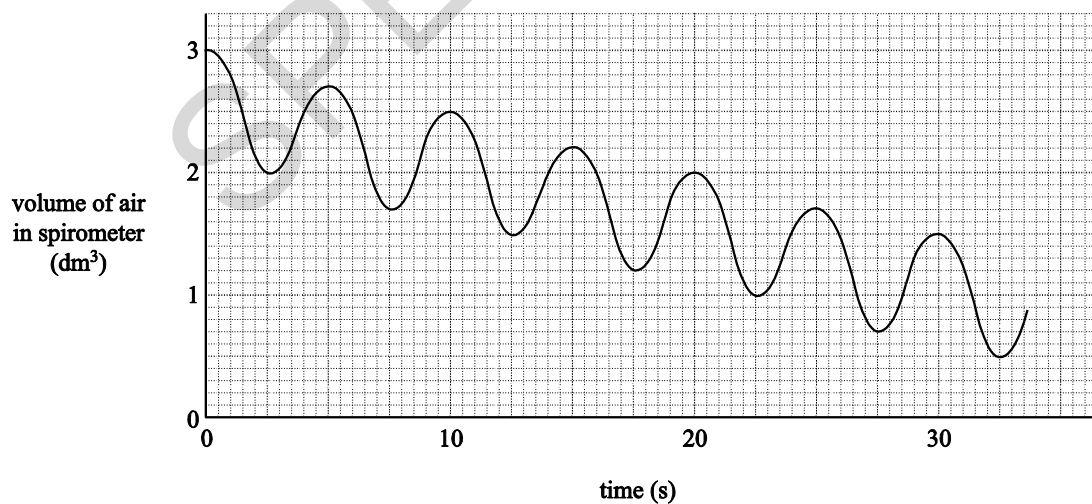
Fig. 15.1

Which label shows the area of lung tissue that is broken down by elastase?

Your answer

[1]

- 16 The following spirometer trace shows the results of an experiment. Soda lime was used to extract carbon dioxide from exhaled air.



What is the rate of oxygen consumption in the experiment?

- A 1.0 dm<sup>3</sup>      B 3.0 dm<sup>3</sup> min<sup>-1</sup>      C 5.0 dm<sup>3</sup> min<sup>-1</sup>      D 12 breaths min<sup>-1</sup>

Your answer

[1]

17 Q, P, R and S are related species of organisms.

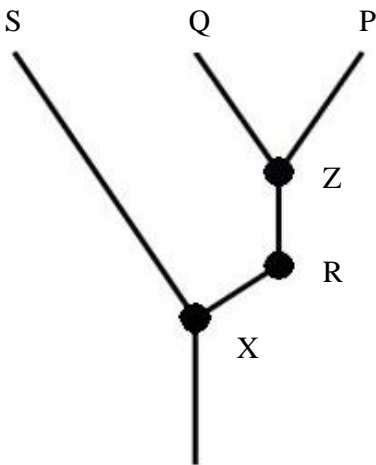
Species X is an extinct recent common ancestor of species Q and R.

X, Q and R all evolved from species P.

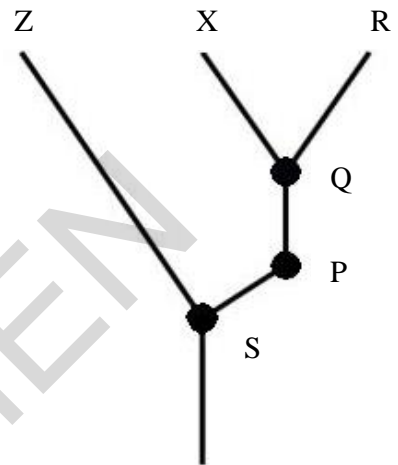
Species S is the least related to the others, with extinct species Z being its most recent phylogenetic link to the other species.

Which of the following phylogenetic trees correctly represents the relationships described above?

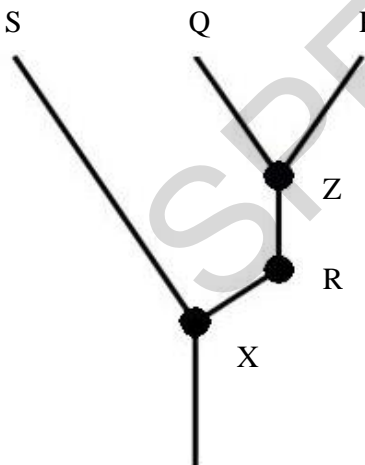
**A**



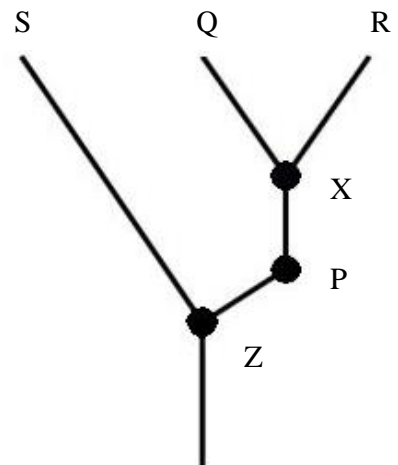
**B**



**C**



**D**



Your answer

[1]



**18** Which of the following formulae of fatty acids represents a saturated fatty acid?

**Statement 1:** Palmitic acid,  $C_{15}H_{31}COOH$

**Statement 2:** Oleic acid,  $C_{17}H_{33}COOH$

**Statement 3:** Linoleic acid,  $C_{17}H_{31}COOH$

**A** 1, 2 and 3

**B** Only 1 and 2

**C** Only 2 and 3

**D** Only 1

Your answer

[1]

**19** A chemical produced by a metabolic pathway binds to the initial enzyme in the pathway. The chemical binds to the enzyme at a site away from the active site and inhibits the enzyme action.

Which of the following statements about the mode of action of the chemical is/are correct?

**Statement 1:** It is an end product inhibitor.

**Statement 2:** It is a competitive inhibitor.

**Statement 3:** It binds to the allosteric site of the enzyme.

**A** 1, 2 and 3

**B** Only 1 and 2

**C** Only 1 and 3

**D** Only 1

Your answer

[1]

**20** The following statements refer to the movement of water from the cortex of the root into the xylem.

Which of the following statements is/are true?

**Statement 1:** Most of the water moves across the root cortex by the apoplast pathway.

**Statement 2:** At the endodermis water has to enter the symplast pathway.

**Statement 3:** Casparian strips in the endodermis contain the chemical lignin.

**A** 1, 2 and 3

**B** Only 1 and 2

**C** Only 1 and 3

**D** Only 1

Your answer

[1]

SPECIMEN

## Section A

Question	Answer	Marks	Guidance
1	D	1	
2	B	1	
3	A	1	
4	C	1	
5	D	1	
6	D	1	
7	D	1	
8	B	1	
9	B	1	
10	D	1	
11	B	1	
12	B	1	
13	C	1	
14	D	1	
15	B	1	
16	B	1	
17	D	1	
18	D	1	
19	C	1	
20	B	1	
	<b>Total</b>	<b>20</b>	