Eukaryotic & Prokaryotic Cell Structure & Function

Question Paper 1

Level	A Level
Subject	Biology
Exam Board	Edexcel
Topic	Cells & Viruses and Reproduction of Living Things
Sub Topic	Eukaryotic & Prokaryotic Cell Structure & Function
Booklet	Question Paper 1

Time Allowed: **57 minutes**

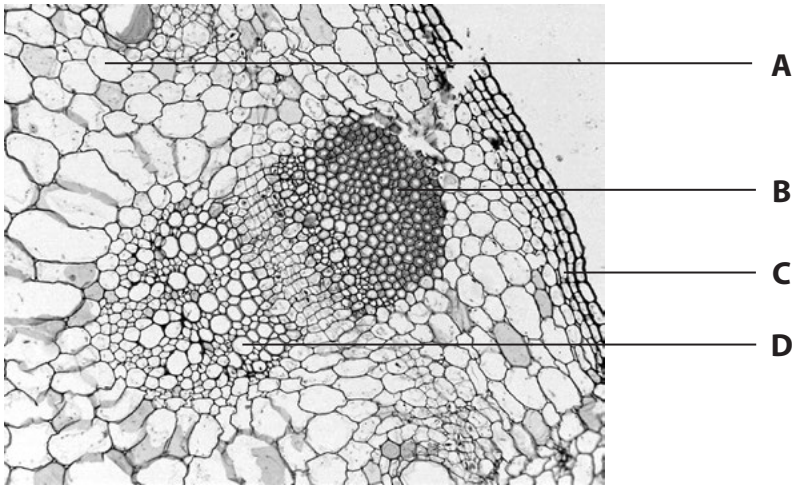
Score: **/ 47**

Percentage: **/100**

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	'77.5%	70%	62.5%	57.5%	45%	<45%

1 The photograph below shows a cross-section through part of the stem of a sunflower (*Helianthus annuus*) as seen using a microscope.



Magnification × 200

(a) Give the letter that correctly identifies the plant tissues shown in the photograph above.

(2)

Sclerenchyma .....

Xylem .....

(b) Statements concerning xylem and sclerenchyma tissue are shown in the table below. Place a cross in the box ☒ to indicate whether each statement is true or false.

(4)

Statement	True	False
Both tissues have a structural function	☒	☒
Both tissues have a transport function	☒	☒
End plates are missing in xylem vessels	☒	☒
Xylem vessels have tapered ends	☒	☒

*(c) Describe the structure of the cell wall of a xylem vessel.

(4)

(Total for Question 1 = 10 marks)

2 The electronmicrograph below shows a Golgi apparatus in part of a cell.

Magnification ×10 000

(a) Using information from the electronmicrograph, explain how this organelle can be identified as a Golgi apparatus.

(3)

(b) Describe the role of the Golgi apparatus.

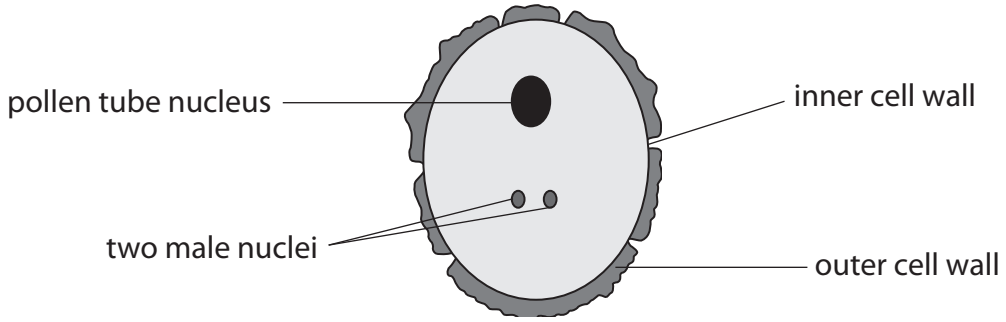
(4)

(Total for Question 2 = 7 marks)

3 Analysis of pollen in peat bogs can provide evidence for global warming.

Peat is acidic and has low levels of oxygen. As a result, pollen is preserved in the peat for many years.

The diagram below shows the structure of a pollen grain.



The inner cell wall contains cellulose and the outer cell wall contains sporopollenin. Sporopollenin is chemically stable and very resistant to decomposition.

(a) Describe the structure of cellulose in cell walls.

(4)

(b) Suggest why pollen in peat bogs is preserved for many years.

(4)

(c) Describe the role of each of the male nuclei in the process of fertilisation in flowering plants.

(4)

(Total for Question 3 = 12 marks)

4 The details of the ultrastructure of a cell can be seen using an electron microscope.

(a) Complete the table below. If the organelle can be present, place a tick (✓) in the box and if the organelle could not be present, place a cross (✗) in the box.

(4)

Organelles	Prokaryotic cell	Eukaryotic cell
centrioles		
flagella		
Golgi apparatus		
ribosomes		

(b) Place a cross ☒ in the box next to the correct word or words to complete each of the following statements.

(i) Plant and animal cells may both contain

(1)

☒ **A** amyloplasts, centrioles and mitochondria

☒ **B** centrioles, mitochondria and rough endoplasmic reticulum

☒ **C** chloroplasts, mitochondria and rough endoplasmic reticulum

☒ **D** mitochondria, rough endoplasmic reticulum and smooth endoplasmic reticulum

(ii) The cytoplasmic connections between one plant cell and another are known as

(1)

☒ **A** middle lamellae

☒ **B** plasmodesmata

☒ **C** pits

☒ **D** tonoplasts

(iii) Prokaryotic cells and plant cells both contain

(1)

☒ **A** a cell membrane and chloroplasts

☒ **B** a cell membrane and mesosomes

☒ **C** a cell wall and chloroplasts

☒ **D** a cell wall and ribosomes

(iv) Woese suggested that there are three domains based on evidence from

(1)

☒ **A** molecular pharmacology

☒ **B** molecular phylogeny

☒ **C** molecular physiology

☒ **D** phenetic taxonomy

(v) The two domains that contain prokaryotic cells are

(1)

☒ **A** Animalia and Bacteria

☒ **B** Archaea and Bacteria

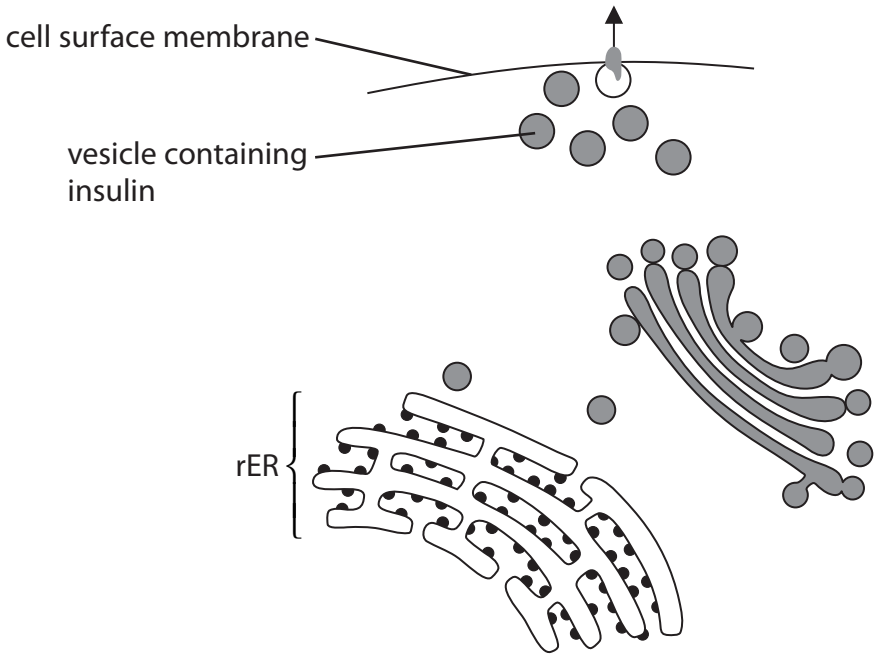
☒ **C** Bacteria and Eukarya

☒ **D** Bacteria and Plantae

(Total for Question 4 = 9 marks)

5 Insulin is a protein produced by beta cells in the pancreas. Insulin is synthesised on ribosomes, then modified and packaged in vesicles. It is stored in these vesicles until it is secreted.

The diagram below shows the organelles involved in this process of modifying and packaging the insulin in vesicles.



*(a) Using the information in the diagram, describe how insulin is modified, packaged and secreted by the cell.

(4)

(b) Type 1 diabetes occurs when beta cells in the pancreas do not produce insulin.

Stem cells produced from skin cells can be used to replace these beta cells in mice. The skin cells can be stimulated to become pluripotent stem cells.

(i) Place a cross ☒ in the box next to the correct definition to complete the following statement.

Pluripotent stem cells are

(1)

☒ **A** specialised cells that can differentiate to give rise to almost any type of cell in the body, including totipotent cells

☒ **B** specialised cells that can differentiate to give rise to any type of cell in the body, excluding totipotent cells

☒ **C** unspecialised cells that can differentiate to give rise to almost any type of cell in the body, excluding totipotent cells

☒ **D** unspecialised cells that can differentiate to give rise to any type of cell in the body, including totipotent cells

(ii) The pluripotent stem cells were injected into the mice. After eight weeks, these cells had developed into insulin-secreting beta cells.

Describe how these pluripotent stem cells became specialised beta cells.

(4)

(Total for Question 5 = 9 marks)