

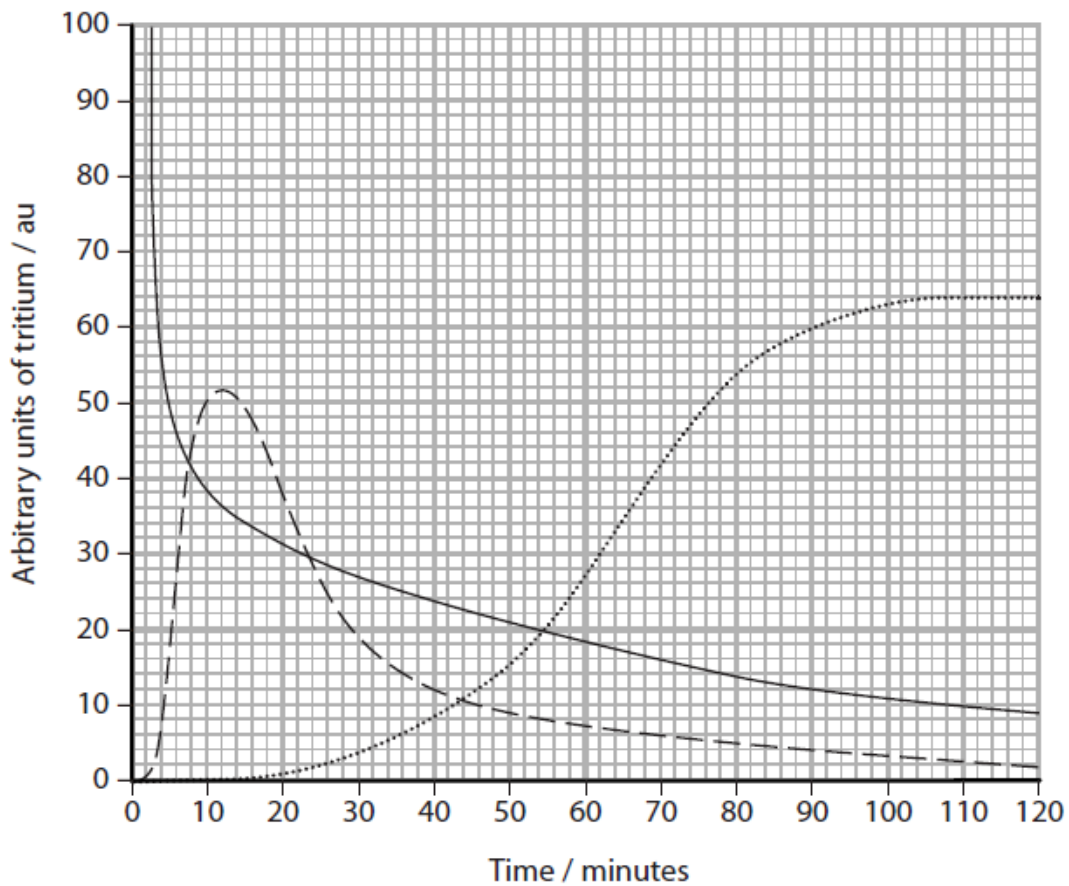
Cell Organelles - Questions by Topic

Q1.

The pancreas is an organ in mammals that secretes enzymes and hormones.

In an experiment, cells of the pancreas were provided with amino acids labelled with a radioactive element called tritium.

The graph below shows the distribution of tritium within different organelles in the cells over a period of 120 minutes.



Key	
— — — —	rER
- - - -	Golgi vesicles
.....	Secretory vesicles

(i) Calculate the rate at which tritium moved out of the Golgi apparatus between 12 and 25 minutes.

(2)

Answer

(ii) Analyse the graph to explain the route taken by these amino acids within the pancreatic cells.

(4)

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Q2.

Prokaryotic and eukaryotic organisms can be classified depending on their cellular structure.

(a) Describe **three** structural differences between prokaryotic and eukaryotic cells.

(3)

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(b) In 1977, Carl Woese suggested that there are three domains of living organisms: the Archaea, the Bacteria and the Eukaryota.

He used molecular phylogeny to classify organisms into different domains.

Explain what is meant by the term **molecular phylogeny**.

(3)

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(c) The table below shows some of the cellular features of organisms belonging to the three different domains.

Feature	Archaea	Bacteria	Eukaryota
Cell membrane	Branched hydrocarbon chains attached to glycerol by ether bonds	Unbranched fatty acid chains attached to glycerol by ester bonds	Unbranched fatty acid chains attached to glycerol by ester bonds
Ribosome size	70S	70S	80S
Number of protein molecules in RNA polymerase	10	5	12
Peptidoglycan in cell wall	No	Yes	No
Type of chromosome	Circular	Circular	Linear

(i) Using information from this table, give evidence that supports Woese's conclusion that Archaea are distinct from **both** the Bacteria and the Eukaryota.

(2)

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(ii) Using information from the table, explain why the Archaea are thought to be more closely related to Eukaryota than to Bacteria.

(2)

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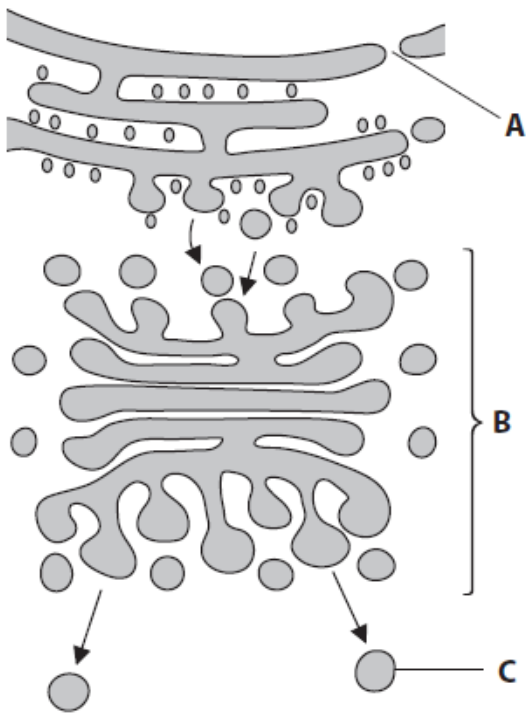
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(Total for question = 10 marks)

Q3.

The diagram shows some of the cell organelles involved in the formation of extracellular enzymes.



Describe the roles of parts **B** and **C** in the formation and transport of extracellular enzymes.

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(Total for question = 4 marks)

Q4. A student studied three different cells: an animal cell, a bacterial cell and a plant cell.

For each of the statements below, put a cross in the box that corresponds to the correct statement.

(a) DNA is located in the nucleus in

(1)

- A** the animal cell only
- B** the bacterial cell only
- C** two of the cells only
- D** all three cells

(b) A cell wall is present in

(1)

- A** the animal cell only
- B** the bacterial cell only
- C** the plant cell only
- D** two of the cells only

(c) Centrioles are present in

(1)

- A** the animal cell only
- B** the plant cell only
- C** two of the cells only
- D** all three cells

(d) A cell surface membrane is found in

(1)

- A** the bacterial cell only
- B** the plant cell only
- C** two of the cells only
- D** all three cells

(e) Mitochondria are found in

(1)

- A** the bacterial cell only
- B** the plant cell only
- C** two of the cells only
- D** all three cells

(f) Ribosomes are found in

(1)

- A** the animal cell only
- B** the bacterial cell only
- C** two of the cells only
- D** all three cells

(g) Smooth endoplasmic reticulum (SER) is present in

(1)

- A** the animal cell only
- B** the bacterial cell only
- C** the plant cell only
- D** two of the cells only

(h) Amyloplasts may be present in

(1)

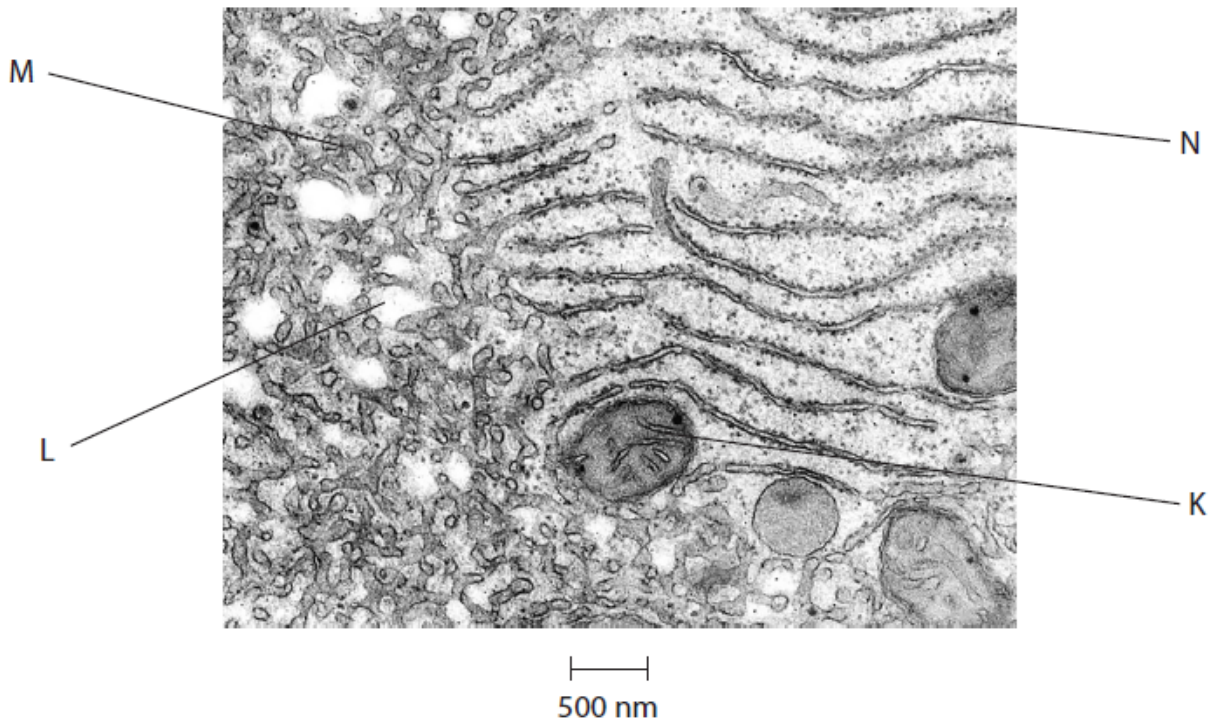
- A** the animal cell only
- B** the bacterial cell only
- C** the plant cell only
- D** all three cells

(Total for Question = 8 marks)

Q5.

Liver cells synthesise and export a variety of proteins.

The image is a transmission electron micrograph of part of a liver cell.



(i) Which of the following structures is involved in respiration?

(1)

- A K
- B L
- C M
- D N

(ii) Which of the following structures is involved in synthesising lipids?

(1)

- A K
- B L
- C M
- D N

(iii) The site of synthesis of proteins to be released by exocytosis is

(1)

- A K
- B L

C M

D N

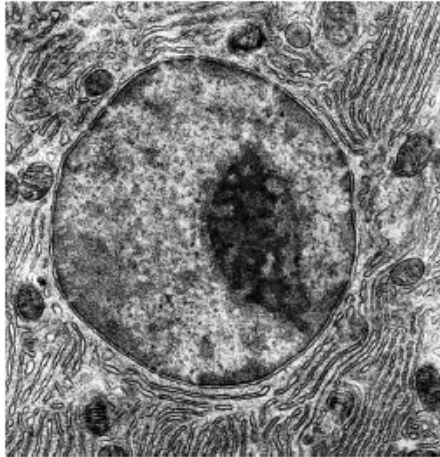
(iv) Calculate the maximum width of the structure labelled **K**.

(2)

Maximum length nm

Q6.

The photograph shows a nucleus found in an animal cell.



Magnification: x 6 000

Describe the features shown in the photograph that allow this structure to be identified as a nucleus.

(3)

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Q7.

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

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		