

1.2 Cells: Origin & Ultrastructure

Question Paper

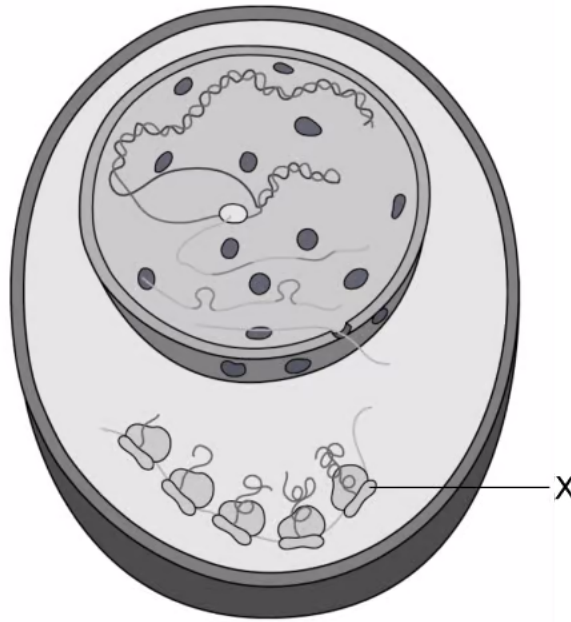
Course	DP IB Biology
Section	1. Cell Biology
Topic	1.2 Cells: Origin & Ultrastructure
Difficulty	Hard

Time allowed: 60
Score: /50
Percentage: /100

Question 1a

a)

The diagram below is a drawing of an electron micrograph of a cell.



Determine, with a reason, whether the cell is a eukaryotic cell.

[2 marks]

[2 marks]

Question 1b

b)

Outline why compartmentalisation is an advantage for this cell.

[2 marks]

[2 marks]

Question 1c

c)

During class, a student was examining structure X in the cell shown in part (a), and suggested that they could clearly see every detail at the highest magnification with their light microscope.

Explain why the student is not correct.

[2 marks]

[2 marks]

Question 1d

d)

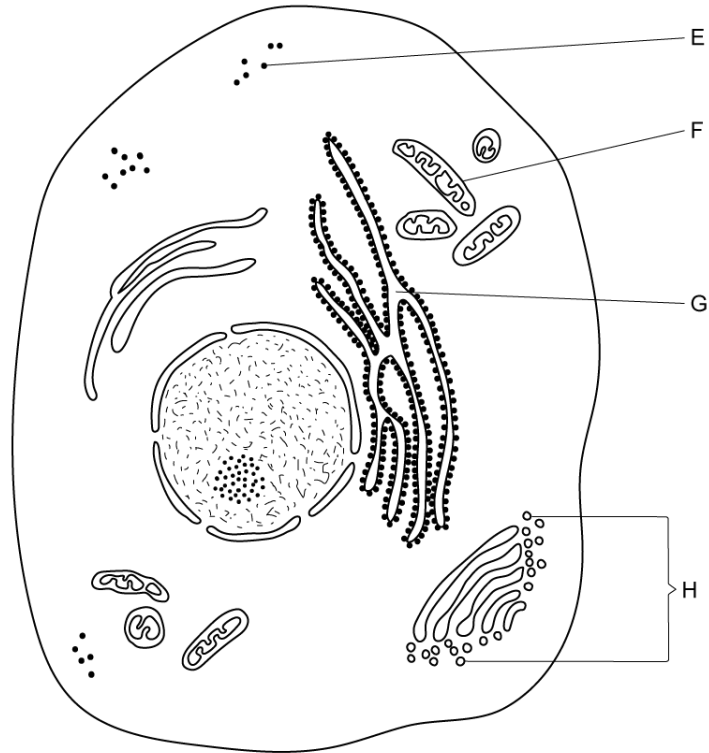
Determine which process cell Y, seen in part (a), is undergoing.

[1 mark]

[1 mark]

Question 2a

a)
A student drew this eukaryotic cell.



Identify the structures **E** and **G**.

[2 marks]

[2 marks]

Question 2b

b)
Distinguish between the function of the structures identified in part (a).

[2 marks]

[2 marks]

Question 2c

c)

Spontaneous generation was once the widely accepted theory explaining the origin of life. It is now universally accepted that cells come from pre-existing cells.

Outline the evidence that has allowed this change in universal acceptance.

[3 marks]

[3 marks]

Question 2d

d)

Miller and Urey's experiments recreated the conditions thought to have existed on Earth prior to life.

Explain how the apparatus they used provided evidence for how the first cells could have formed.

[3 marks]

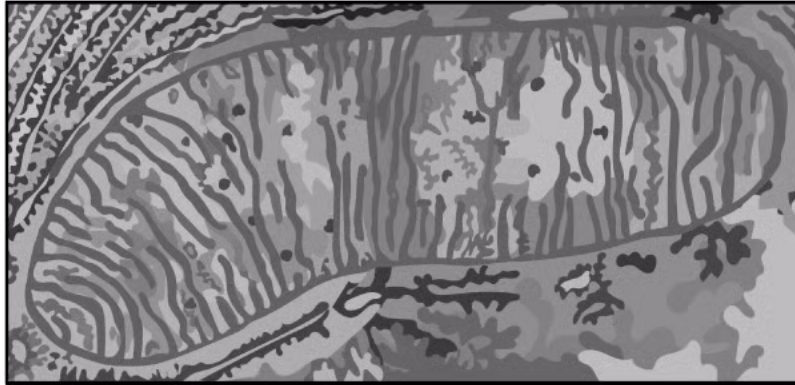
[3 marks]

Question 3a

a)

Below are three electron micrographs showing organelles found within a cell.

J



K



L



i) Identify the organelles J, K, and L.

ii) Suggest how the structure of these organelles enables them to function efficiently.

[4 marks]

[4 marks]

Question 3b

b)

Compare the structure and function of the rough endoplasmic reticulum and golgi apparatus.

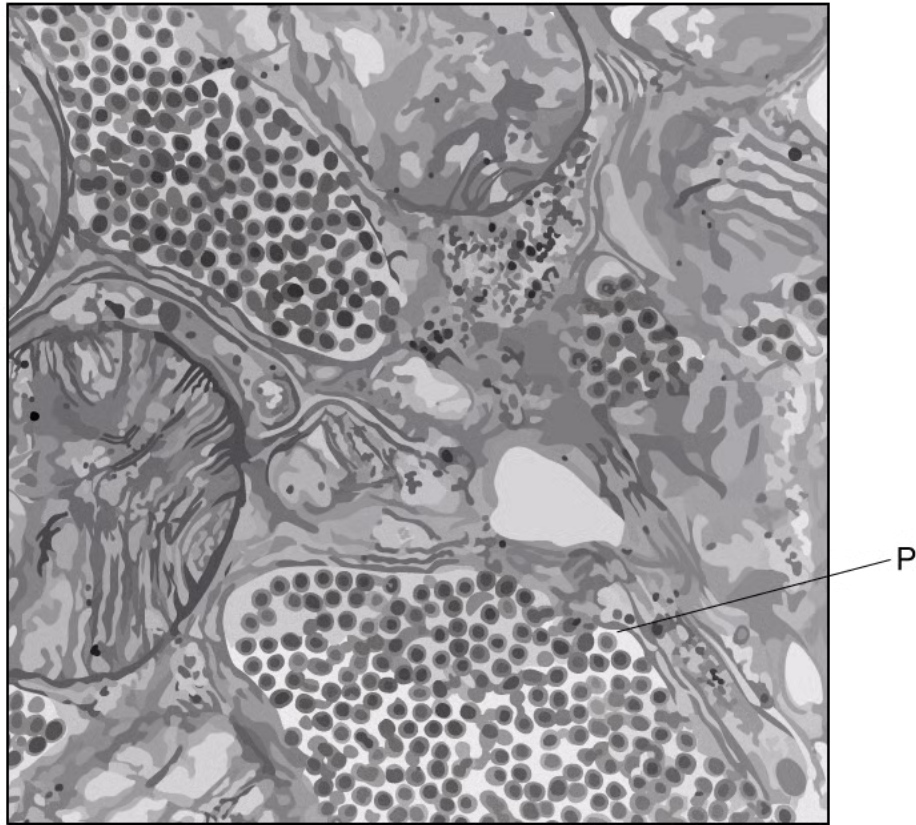
[2 marks]

[2 marks]

Question 3c

c)

The electron micrograph below is of a salivary gland of a mosquito.



Identify the structures labelled **P**.

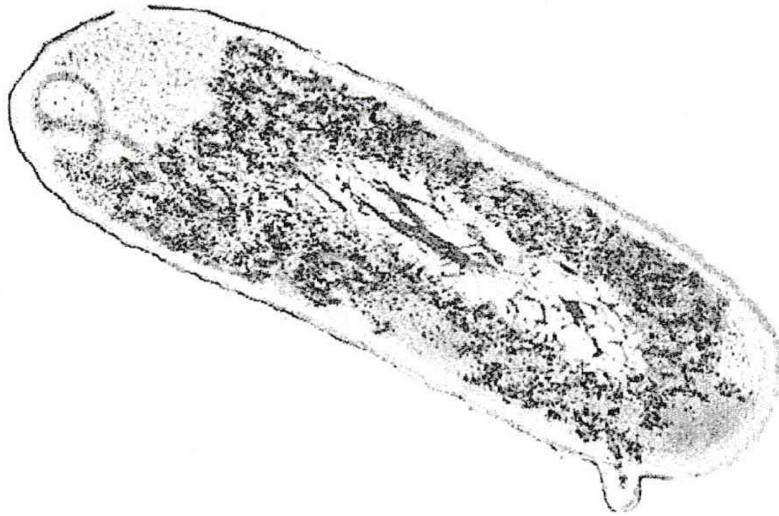
[1 mark]

[1 mark]

Question 4a

a)

Draw a labelled biological diagram of the bacterial cell below.



Pradana Aumars, CCO, via Wikimedia Commons

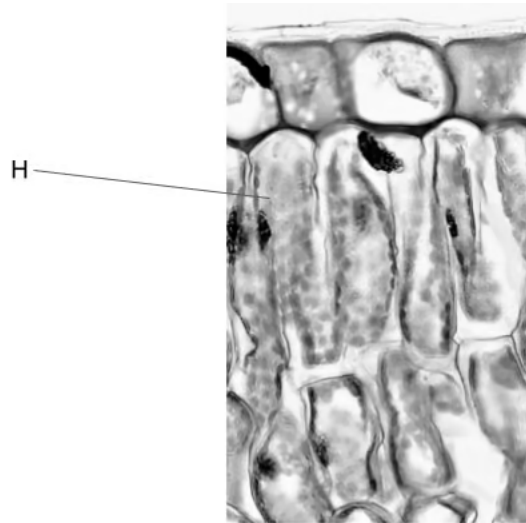
[3 marks]

[3 marks]

Question 4b

b)

The image below is an electron micrograph of some cells.



https://upload.wikimedia.org/wikipedia/commons/thumb/4/4d/Angiosperm_Morphology_Adaxial_Epidermis_in_Ligustrum_%2836845195186%29.jpg/800px-Angiosperm_Morphology_Adaxial_Epidermis_in_Ligustrum_%2836845195186%29.jpg?20180623001402

Deduce, with a reason, the function of cell **H**.

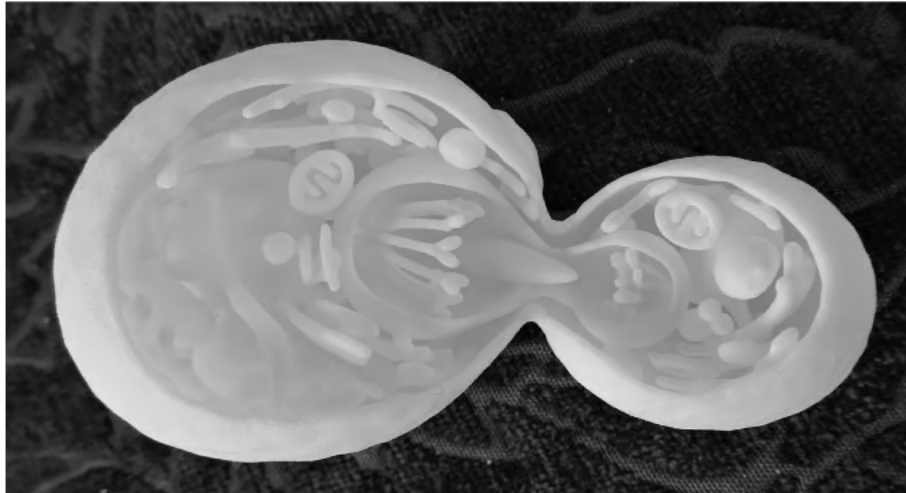
[2 marks]

[2 marks]

Question 4c

c)

The image below is a 3D-printed model of a cell dividing.



Rosser1954, CC BY-SA 4.0 <<https://creativecommons.org/licenses/by-sa/4.0/>>, via Wikimedia Commons

Deduce, with a reason, whether this model represents an animal cell, plant cell or neither.

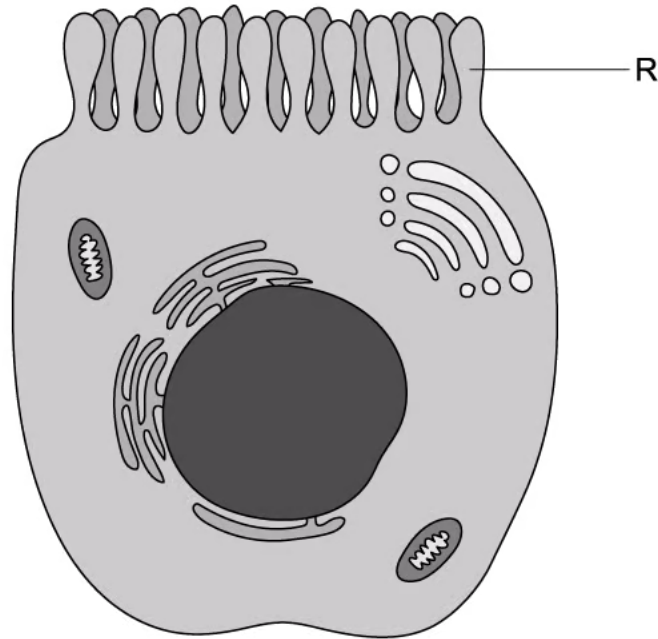
[2 marks]

[2 marks]

Question 4d

d)

This is an electron micrograph of an immune cell, responsible for specific immunity.



i) Identify R

[1 mark]

ii) Deduce, with a reason, the function of this cell.

[3 marks]

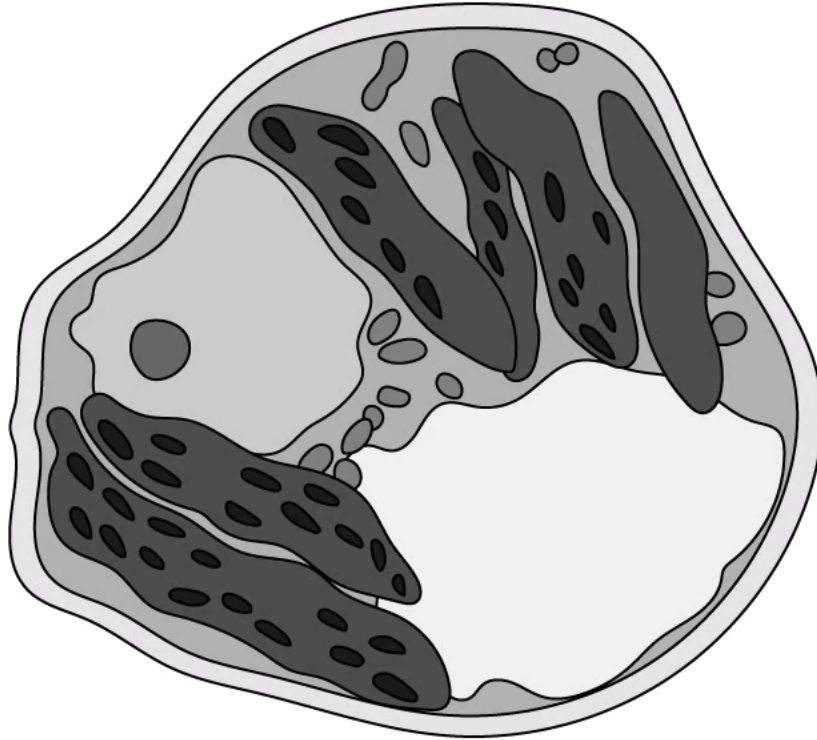
[4 marks]

Question 5a

One mark is available for clarity of communication throughout this question.

a)

A student was examining this electron micrograph of a cell. They identified it as a plant cell.



Evaluate the student's decision to identify this as a plant cell.

[3 marks]

[3 marks]

Question 5b

b)

Explain the Oparin-Haldane hypothesis scientists proposed for the origin of the first cells.

[5 marks]

[5 marks]

Question 5c

c)

Euglena gracilis is a unicellular eukaryotic cell that is both heterotrophic and autotrophic.

Discuss the theory that suggests how an organism could have evolved to be a eukaryotic cell that is both heterotrophic and autotrophic.

[7 marks]

[7 marks]

