Name	Date started	Target end date

GCE AS / A LEVEL — BIOLOGY UNIT 1 QUESTION PACK

1071-01 (Legacy BY1) · New spec Unit 1 Topic 4 · AS unit, first sat 2016, 80 marks, 1h 30min paper

REVISE
.wales

BIOLOGY — UNIT 1 · CELL STRUCTURE & ORGANISATION

BY1.2 Cell structure — organelles, prokaryotic vs eukaryotic, microscopy

Identifying organelles in plant and animal cells, contrasting prokaryotic and eukaryotic architecture, and using light and electron microscopy with magnification calculations.

LEGACY 2008 SPECIFICATION

Estimated time for entire question pack: ~2 h 21 min

Derived from the legacy BY1 paper's pace of ~1.1 min/mark, padded for long-prose answers (88 marks over 10 questions).

*You are advised to **not** attempt to complete all of this in one sitting.*

ABOUT THIS QUESTION PACK

This is a **comprehensive practice question pack**, not a single mock paper. It contains every question from the legacy WJEC BY1 papers (2008 modular spec, 2011–2017) that maps onto new-spec AS Unit 1 Topic 4 (1.2).

Questions are ordered by source paper date.

INSTRUCTIONS

Use black ink or black ball-point pen. Show all working — quality of written communication will affect marks. A calculator is allowed. Diagrams included in answers must be fully annotated.

For Examiner's use only

Q	Source	Max	Mark
1	Jun 11 Q1	5	
2	Jan 12 Q1	6	
3	Jun 13 Q3	7	
4	Jan 13 Q3	9	
5	Jun 14 Q1	11	

Q	Source	Max	Mark
6	Jun 16 Q2	11	
7	Jun 17 Q5	13	
8	Jan 14 Q5	11	
9	Jun 11 Q6	9	
10	Jun 14 Q2	6	
Total		**88**	

Cell Structure & Organisation — what the new spec asks

WJEC GCE AS / A Level Biology (from 2015) · Unit 1: Basic Biochemistry & Cell Organisation · Topic 1.2.

Prokaryotic cells

- No nucleus — DNA free in cytoplasm.
- 70S ribosomes; no membrane-bound organelles.
- Cell wall of peptidoglycan (murein).
- May have plasmids, capsule, flagellum, mesosomes.

Eukaryotic cells

- Nucleus enclosed in nuclear envelope with pores.
- Linear DNA + histones forming chromosomes.
- 80S ribosomes (free + on RER).
- Membrane-bound organelles: mitochondria, ER, Golgi, lysosomes.

Key organelles

- Mitochondrion (cristae) — aerobic respiration / ATP.
- Chloroplast (thylakoids, grana) — photosynthesis (plant only).
- Rough ER + ribosomes — protein synthesis; SER — lipid synthesis.
- Golgi apparatus — modify, package, secrete proteins.

Microscopy

- Light microscope: max magnification ×1500, resolution ~200 nm.
- TEM & SEM: magnify ×500 000; resolution ~0.5 nm; require fixing / staining.
- Magnification = image size / actual size; use scale bars.

Crib sheet »

Cell Structure & Organisation in one page

Quick-reference notes — revisit before each question.

Prokaryotic vs eukaryotic

Pro: no nucleus, 70S ribosomes, peptidoglycan wall.

Eu: nucleus + linear DNA, 80S ribosomes, membrane-bound organelles.

Pro — smaller (1-5 µm); Eu — larger (10-100 µm).

Nucleus

Double envelope with nuclear pores.

Chromatin = DNA + histones.

Nucleolus produces ribosomal RNA.

Mitochondria

Double membrane — inner folded into cristae.

Matrix contains 70S ribosomes + circular DNA.

Aerobic respiration → ATP.

ER & Golgi

RER: ribosomes on outside → protein synthesis.

SER: lipid & steroid synthesis.

Golgi: modifies, packages, secretes (vesicles).

Chloroplast (plant)

Double envelope; stroma + thylakoids stacked into grana.

Site of photosynthesis; has 70S ribosomes + DNA.

Microscopy

Light: max ×1500; can see live cells in colour.

TEM: thin section, electron-dense stains; 2D high-res image.

SEM: surface 3D image; lower resolution than TEM.

1. The table below shows some features of prokaryotic and eukaryotic cells. Complete the table to show the differences between the two types of cell.

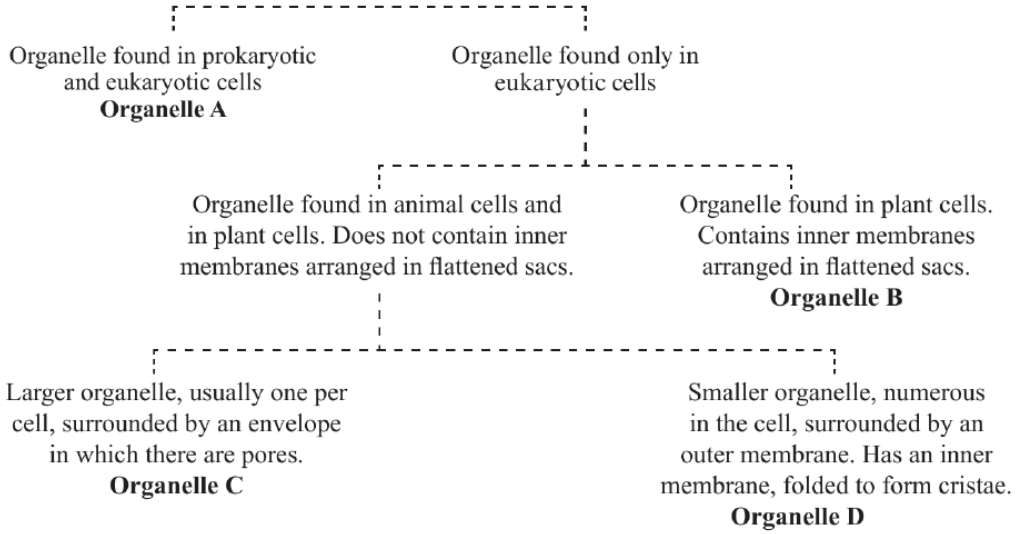
Feature	*Prokaryotic*	*Eukaryotic*
Mitochondria		
Arrangement of DNA		DNA forms chromosomes
Position of DNA	Free in cytoplasm	
Composition of cell wall if present		
Size of ribosomes		

[5]

(Total 5 Marks)

Examiner only

1. The diagram shows how some organelles may be distinguished from each other.



(a) (i) Name organelle **D**. [1]

.....

(ii) Describe the function of organelle **D.** [2]

.....

.....

.....

(iii) Name a cell that contains **large** numbers of organelle **D.** [1]

.....

Examiner only

(b) Which of the organelles **A, B, C** or **D** is a ribosome? [1]

.....

(c) What is the function of the pores in organelle **C**? [1]

.....

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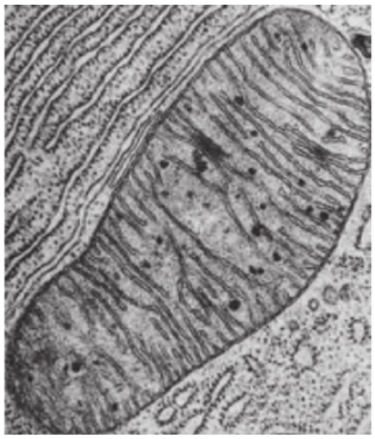
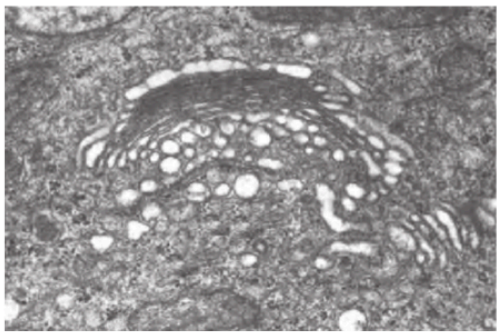
(Total 6 marks)

Examiner only

3 *(a)* The electron micrographs below show organelles in eukaryote cells.



A



B

(i) Identify the organelles in photographs **A** and **B** and state their function. [2]

A .....

Function .....

.....

B .....

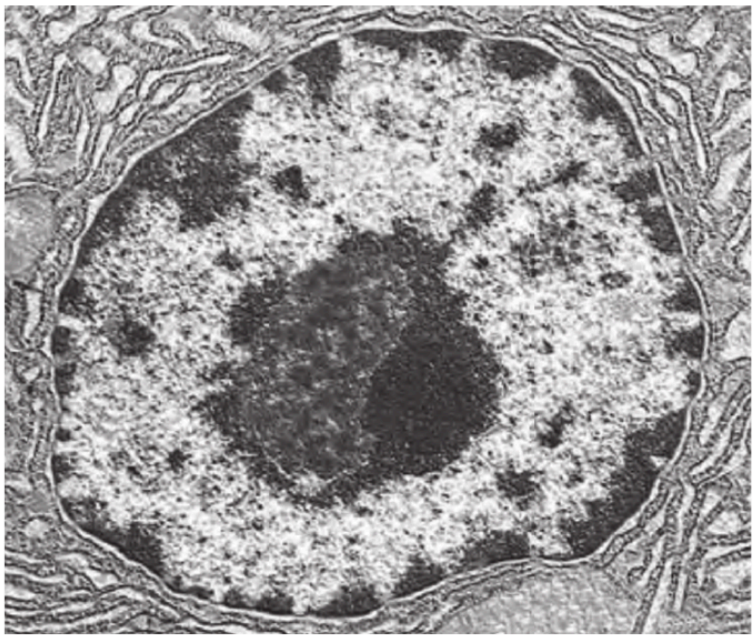
Function .....

.....

(ii) Name a tissue which contains large numbers of the organelle shown in **A**. [1]

.....

Examiner only



C

(b) Photograph **C** above shows a nucleus. State **two** features of a nucleus that can be seen in this electron micrograph and their function. [2]

Feature 1 .....

Function .....

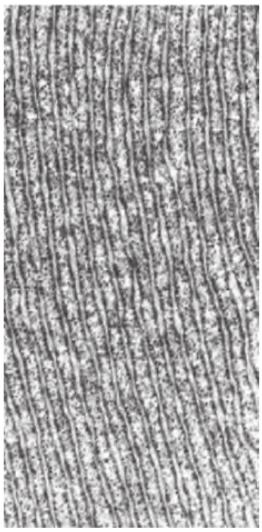
.....

Feature 2 .....

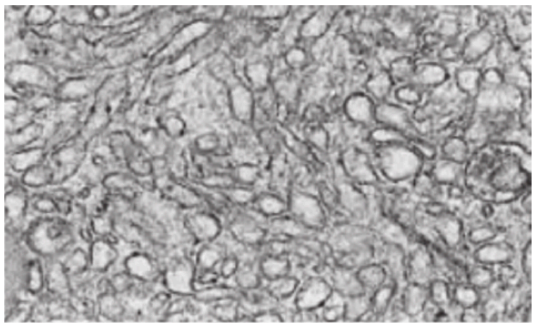
Function .....

.....

Examiner only



D



E

(c) Photographs **D** and **E** above show two different types of endoplasmic reticulum. State **two** visible differences between **D** and **E**. [2]

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(Total 7 marks)

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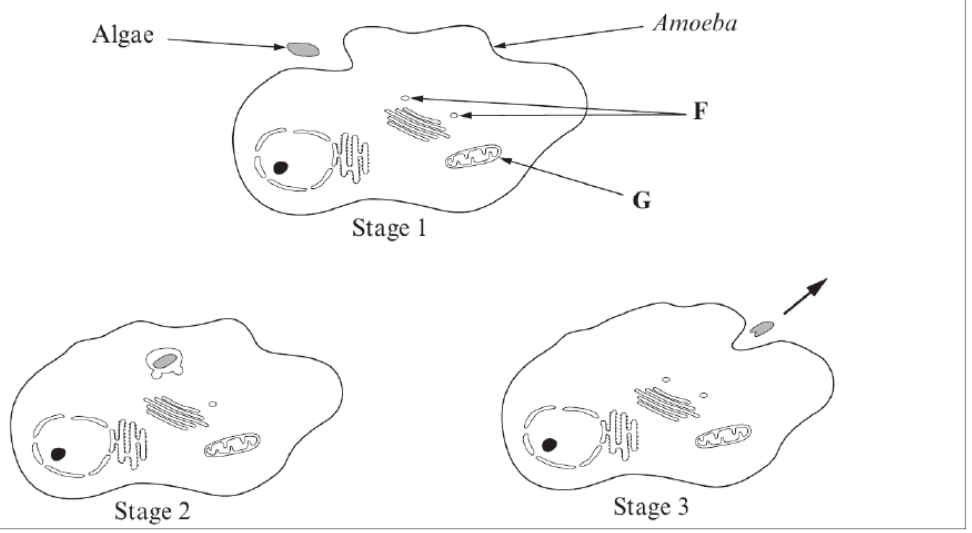
3. *Amoeba proteus* is a single celled eukaryotic organism that can be found living in shallow freshwater ponds and streams. *Amoeba proteus* feeds on algae and other unicellular organisms. The diagrams below show the sequence of events during feeding.



0 4

Examiner only

(a) (i) Name and describe the process that has occurred between stages 1 and 2 on the diagram opposite. [2]

.....

.....

.....

.....

(ii) Structures **F** on the diagram opposite are involved in the digestion of the *Amoeba's* food.
Name the organelle where Structures **F** are formed. [1]

.....

(iii) State the name of the process occurring at stage 3 on the diagram opposite. [1]

.....

(b) (i) What is the function of the organelle on the diagram opposite labelled **G**? [1]

.....

.....

(ii) Suggest a reason why this organelle is required by *Amoeba* during feeding. [1]

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(c) Describe **three** ways in which the structure of a prokaryotic cell would differ from that of *Amoeba*. [3]

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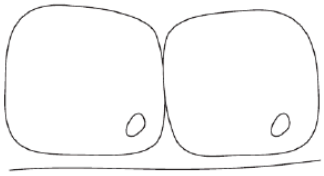
(Total 9 marks)

Examiner only

Answer **all** *questions.*

1. *(a)* Samples of epithelial tissue were examined using a light microscope. Drawings of cells from these tissues are shown below. Identify the type of epithelial tissue shown, and suggest from where in the body the samples were taken.

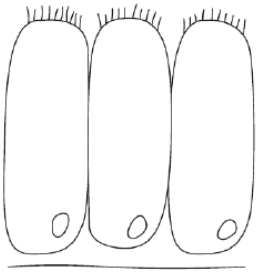
(i) [2]



Tissue type .....

Where found in body .....

(ii) [2]

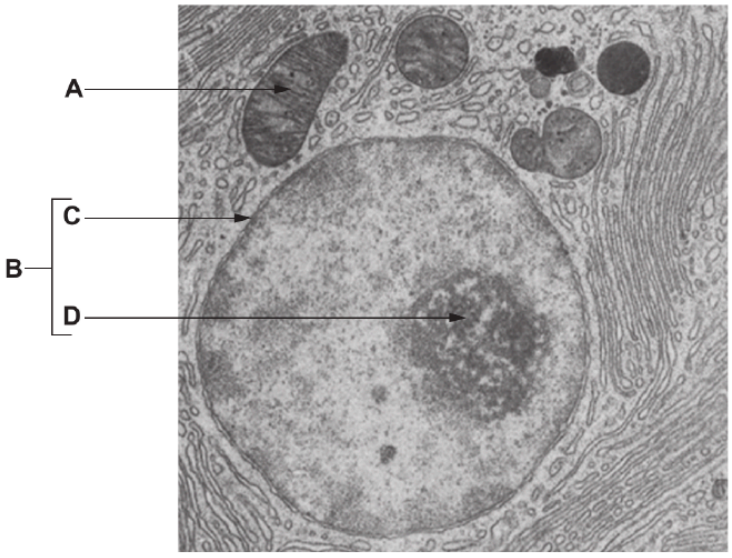


Tissue type .....

Where found in body .....

Examiner only

The electron micrograph below shows part of a typical animal cell.



(b) Complete the table below by naming the structures and organelles shown in the electron micrograph above, and describing their functions. [4]

Letter	Organelle / Structure	Function
B	nucleus	
C	nuclear pores	
D		

Examiner only

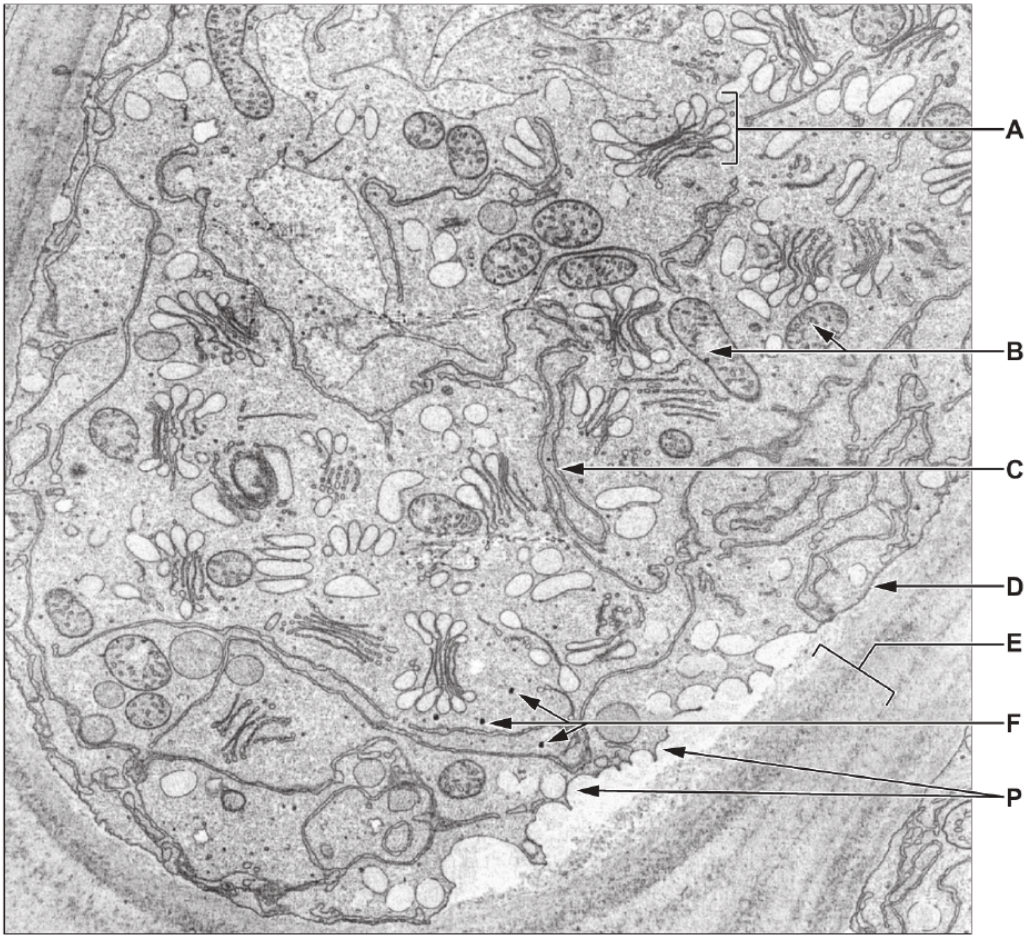
(c) The nucleus has pores in the envelope that surrounds it, whereas organelle **A** does not. Describe **one** *other* difference between the membranes that surround organelle **A** and those that surround the nucleus. [1]

(d) Describe **two** differences between the ribosomes found in animal cells and those found in prokaryotic cells. [2]

11

Examiner only

2. The electron micrograph shows part of a plant cell.



(a) Name the structures labelled **A** to **F**. [6]

A .....

B .....

C .....

D .....

E .....

F .....

Examiner only

(b) Name a structure, not shown on the diagram, which connects the cytoplasm of adjacent plant cells. [1]

.....

(c) (i) Suggest a substance, found at point **P** on the electron micrograph, that was processed in the Golgi bodies. [1]

.....

(ii) Following processing by the Golgi body, describe how this substance was secreted from the cell. [3]

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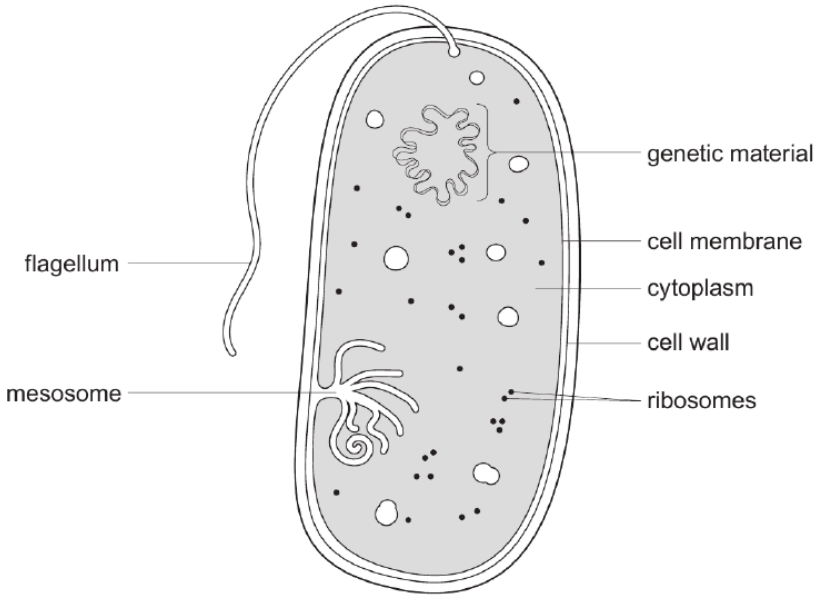
11

Examiner only

5. The diagram below is of a typical prokaryotic cell. Despite not having any membrane bound organelles, they have many features that are similar to eukaryotic cells.



(a) State **three** cell structures visible on the diagram that are similar to those found in animal cells and give a function for each. [3]

Examiner only

Vacuoles can be found in both plant and animal cells. In animal cells they may be referred to as vesicles.

(b) Outline how a vesicle is formed and is used in the secretion of a glycoprotein within an animal cell. [3]

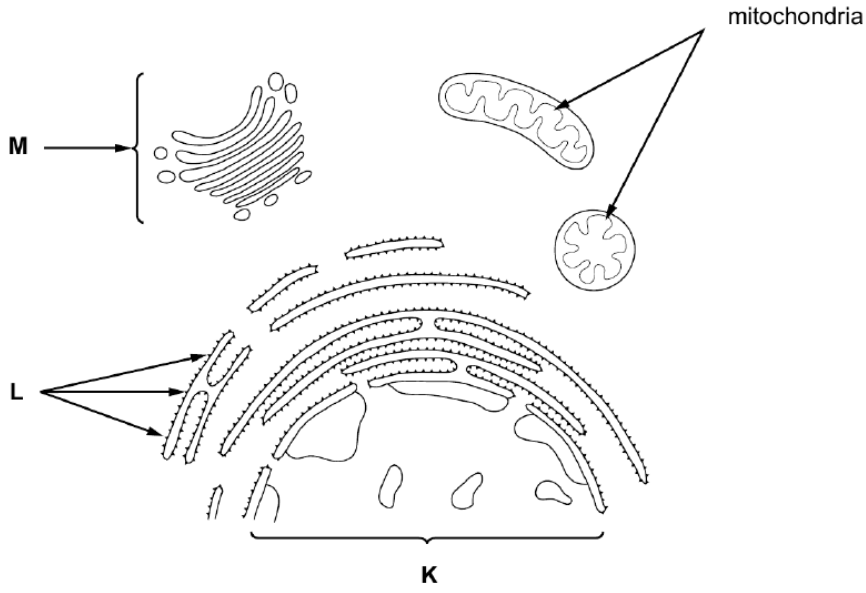
(c) (i) Describe the features of the vacuole found in plant cells. Give **one** function of the vacuole. [3]

(ii) Describe how the appearance of a turgid plant cell, viewed under a microscope, would change if it was placed into a concentrated salt solution. [4]

13

Examiner only

5. The diagram below shows part of a generalised animal cell.



(a) Complete the table below. [6]

Organelle	Name	Function
K		
L		
M		

(b) (i) Explain why the mitochondria labelled in the diagram above appear different from one another. [1]

.....

Examiner only

(ii) Nearly all eukaryotic cells possess mitochondria. Mitochondria are similar in size to prokaryotic cells and have features in common with them. This led to the biologist, Lynn Margulis, proposing that mitochondria evolved from ancient prokaryotes. The theory of endosymbiosis proposes that these ancient prokaryotes were engulfed by other bacterial cells and both benefited from the relationship – this led to the evolution of eukaryotic cells.

Using your knowledge, state which **two** structures found in prokaryotic cells are also found in mitochondria. [2]

.....

.....

(iii) Describe **two** differences between mitochondria and prokaryotic cells such as bacteria. [2]

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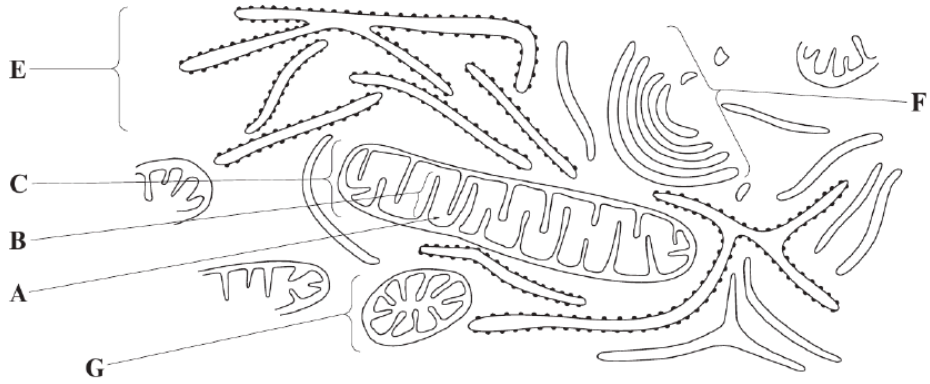
11

Examiner only

6. The diagram below shows part of a cell that secretes a hormone into the bloodstream.



(a) Name structures **A** and **B**. [2]

A .....

B .....

(b) Explain the functions of structures **E** and **F**. [4]

E .....

.....

F .....

.....

(c) Suggest why this type of cell is likely to contain large numbers of structure **C**. [2]

.....

.....

.....

(d) Labels **C** and **G** show the same type of organelle. Explain why they differ in appearance. [1]

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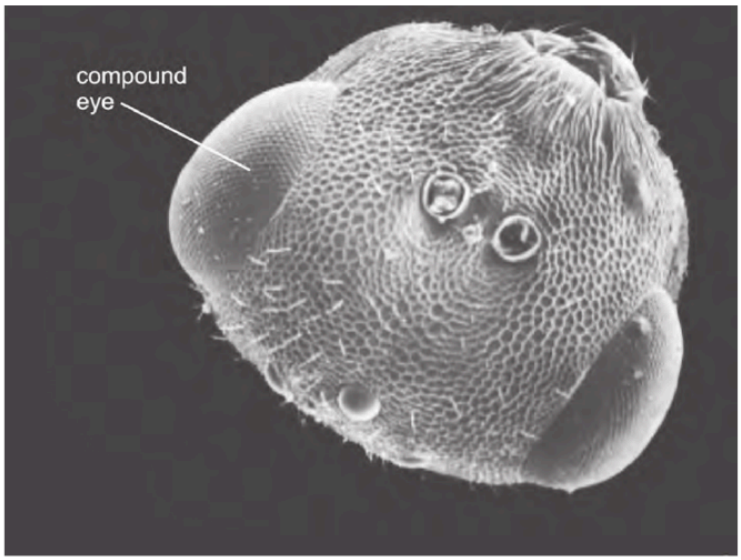
(Total 9 Marks)

Examiner only

2. The photograph below shows the head of a parasitic wasp, *Chlorocytus* species, taken using a scanning electron microscope.



(a) The photograph shows two compound eyes, which are regarded as organs. State what is meant by the term *organ*. [2]

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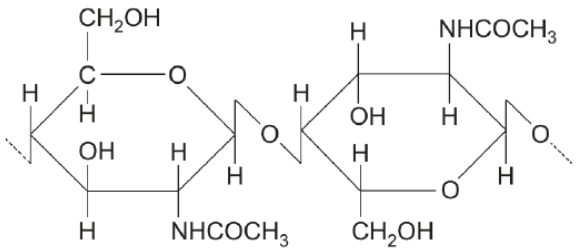
Examiner only

(b) The exoskeleton of insects contains the molecule shown below.



(i) Name the **group** of biological molecules to which the molecule shown above belongs. [1]

.....

(ii) Explain how the molecule shown gives strength to the exoskeleton. [2]

.....

.....

.....

.....

(iii) Some OH groups in the molecule above have been replaced with $NHCOCH_3$ groups. Name **one** *other* group of biological molecules that contain nitrogen. [1]

.....

6

END OF QUESTION PACK

10 questions · 88 marks · ~2 h 21 min
Source: WJEC BY1 (2008 modular spec, 2011–2017)
Curated for WJEC Biology 2015 spec AS Unit 1 — Topic 4 (1.2)