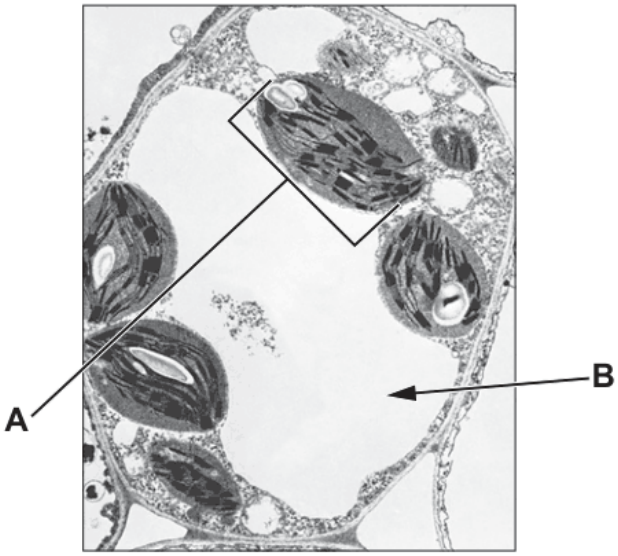
Cell Structure and Organisation (CC2): Eduqas A Level Biology Exam Questions by Topic

20 questions · 39 marks · about 47 minutes. Answer in the spaces, then check the mark schemes at the end.

Question 1 · AS Component 1 · June 2024 · Q2(a)(i) · 1 mark

2. **Image 2.1** shows an electron micrograph of a eukaryotic cell.

Image 2.1



(a) (i) Identify the structures labelled **A** and **B** in **Image 2.1**. [1]

A .....

B .....

Question 2 · AS Component 1 · June 2024 · Q2(a)(iii) · 1 mark

(iii) **Image 2.1** shows some internal features of structure **A**.
Suggest why these would not be visible if the cell had been viewed with a light microscope. [1]

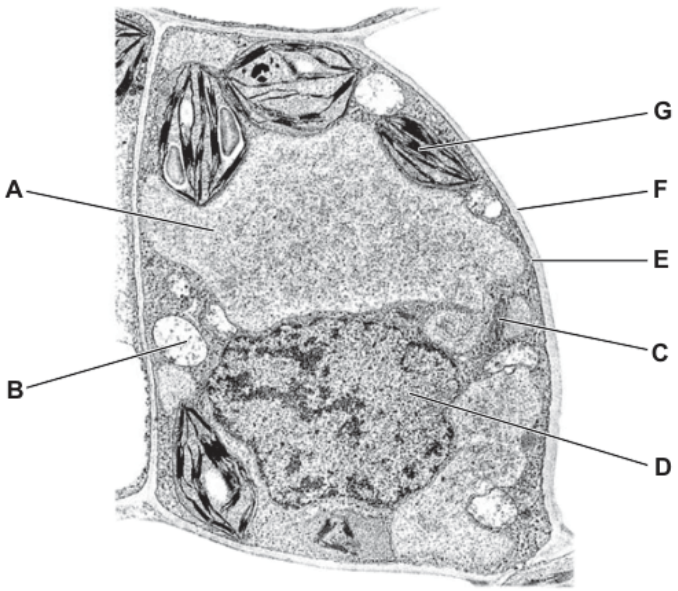
.....

.....

Questions, mark schemes and examiners' report extracts © WJEC CBAC Ltd (Eduqas).

(c) **Image 3.4** is an electron micrograph of a plant cell showing some organelles.

Image 3.4



Using letters **(A–G)** from **Image 3.4**, identify the organelles in **Table 3.5**. [2]

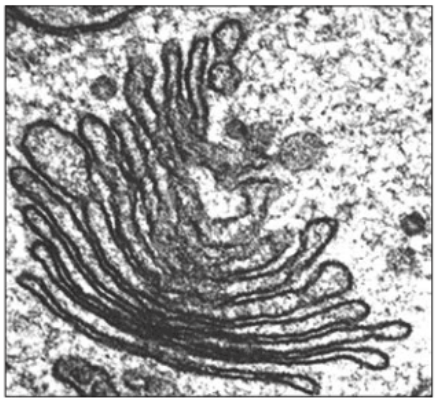
Table 3.5

Organelle	Letter
Chloroplast	.....
Nucleus	.....
Vacuole	.....

Questions, mark schemes and examiners' report extracts © WJEC CBAC Ltd (Eduqas).

Question 4 · A level Component 2 · June 2018 · Q1(a) · 3 marks

1. Lysosomal storage disorders are a group of about 50 diseases that are characterised by an accumulation of waste products in the lysosomes. Two examples are Fabry disease and Tay-Sachs disease. Sufferers of Tay-Sachs disease die in childhood.



(a) The electron micrograph above shows the cell organelle responsible for producing lysosomes. Name the organelle, **draw an arrow labelled L** on the micrograph to identify a lysosome and describe a general function of lysosomes in normal cells. [3]

.....

.....

Question 5 · AS Component 1 · June 2018 · Q3(a)(i) · 1 mark

3. Protein synthesis involves two stages, transcription and translation. Different types of RNA are involved in each stage.

(a) The table below shows the percentages of the different types of RNA present in a rabbit body cell.

RNA	Percentage of total RNA
RNA present in nucleus	11.5
mRNA	3.5
rRNA	69.5
tRNA	15.5

(i) Name the organelle that would contain the greatest percentage of RNA. Explain your answer. [1]

.....

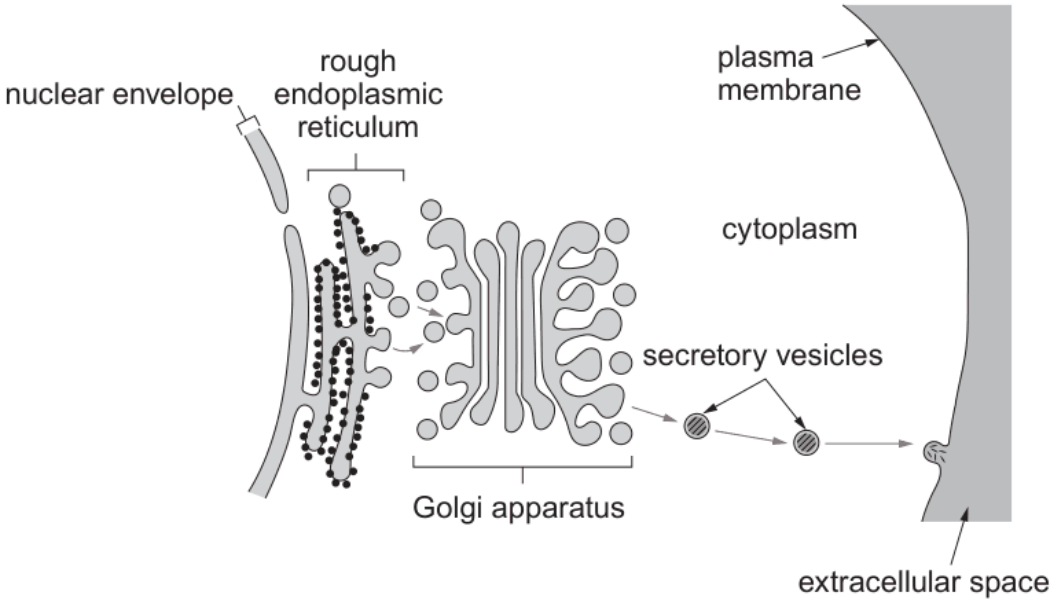
.....

.....

Questions, mark schemes and examiners' report extracts © WJEC CBAC Ltd (Eduqas).

3. A number of organelles are involved in the production and secretion of enzymes by cells. **Image 3.1** shows how different organelles are involved in this process in a eukaryotic cell.

Image 3.1



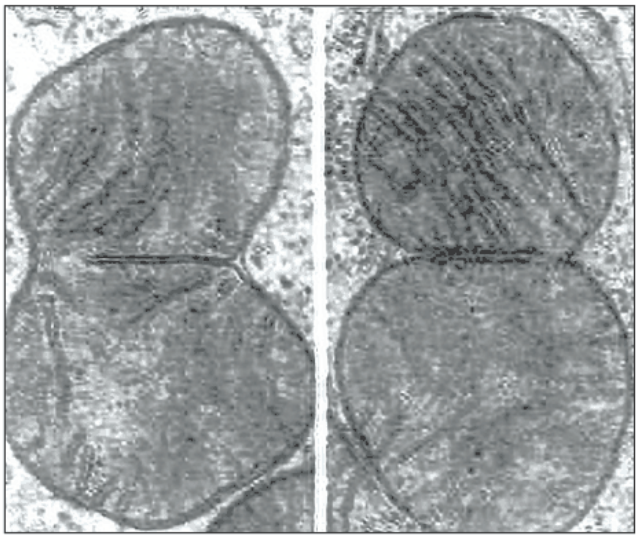
(a) Describe the sequence of events involved in the production and secretion of enzymes as shown in **Image 3.1**. [5]

Questions, mark schemes and examiners' report extracts © WJEC CBAC Ltd (Eduqas).

Question 7 · information from earlier in the question

Image 3.2 shows another organelle which is also involved in the process of enzyme secretion.

Image 3.2



Question 7 · AS Component 1 · June 2022 · Q3(b)(ii) · 3 marks

(ii) Name the organelle shown in **Image 3.2** and suggest its function in enzyme secretion. [3]

.....

.....

.....

.....

.....

Question 8 · AS Component 1 · Autumn 2020 · Q2(b)(iii) · 2 marks

(iii) Suggest why enzyme-secreting cells are observed to contain large numbers of mitochondria. [2]

.....

.....

.....

.....

Questions, mark schemes and examiners' report extracts © WJEC CBAC Ltd (Eduqas).

Question 9 · information from earlier in the question

(b) The size of a DNA fragment can be measured using the kilobase (1 kilobase = 1000 base pairs).

The length of 1 kilobase is 0.34 µm.

The DNA in a nucleus of a cell from a male with DMD is 2.95×10^6 kilobases in total.

Question 9 · A level Component 2 · June 2023 · Q5(b)(ii) · 1 mark

(ii) When the **total length** of DNA from a human male cell with DMD is calculated it is longer than 2.95×10^6 kilobases. Explain why. [1]

.....

.....

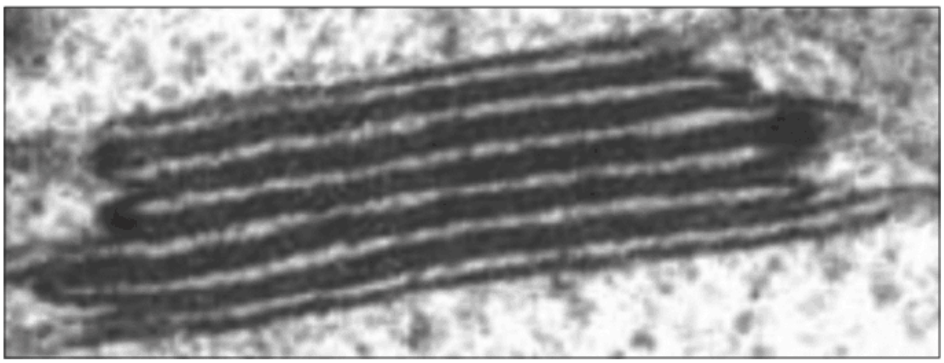
Question 10 · A level Component 2 · June 2025 · Q2(a) · 4 marks

2. Scientists have been investigating a genetic approach that improves food crops.

The scientists studied photosynthesis in tobacco plants (*Nicotiana tabacum*) and wheat plants (*Triticum aestivum*).

Image 2.1 shows a granum from a chloroplast from a tobacco plant.

Image 2.1



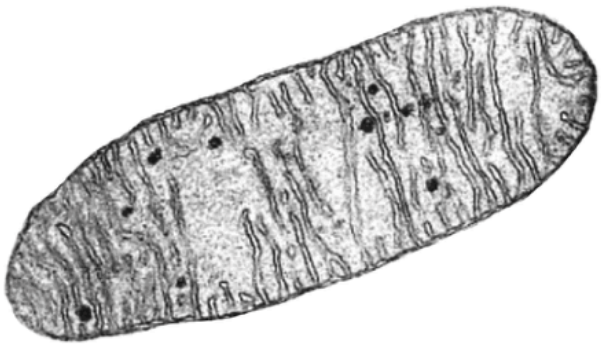
(a) In the box below, produce a scientific drawing of the granum shown in **Image 2.1**.

Label the stroma and thylakoid membrane on your diagram. [4]

Questions, mark schemes and examiners' report extracts © WJEC CBAC Ltd (Eduqas).

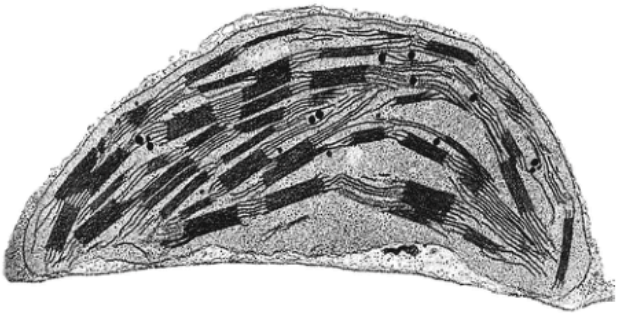
(b) In eukaryotic cells ATP is produced mainly by mitochondria and chloroplasts. Electron micrographs of these organelles are shown in **Images 1.1** and **1.2**.

Image 1.1



a mitochondrion

Image 1.2



a chloroplast

The endosymbiotic theory proposes that both mitochondria and chloroplasts evolved from prokaryotic ancestors.

(i) Identify **two** structural features of mitochondria and chloroplasts that are also found in prokaryotic cells. [2]

I. .....

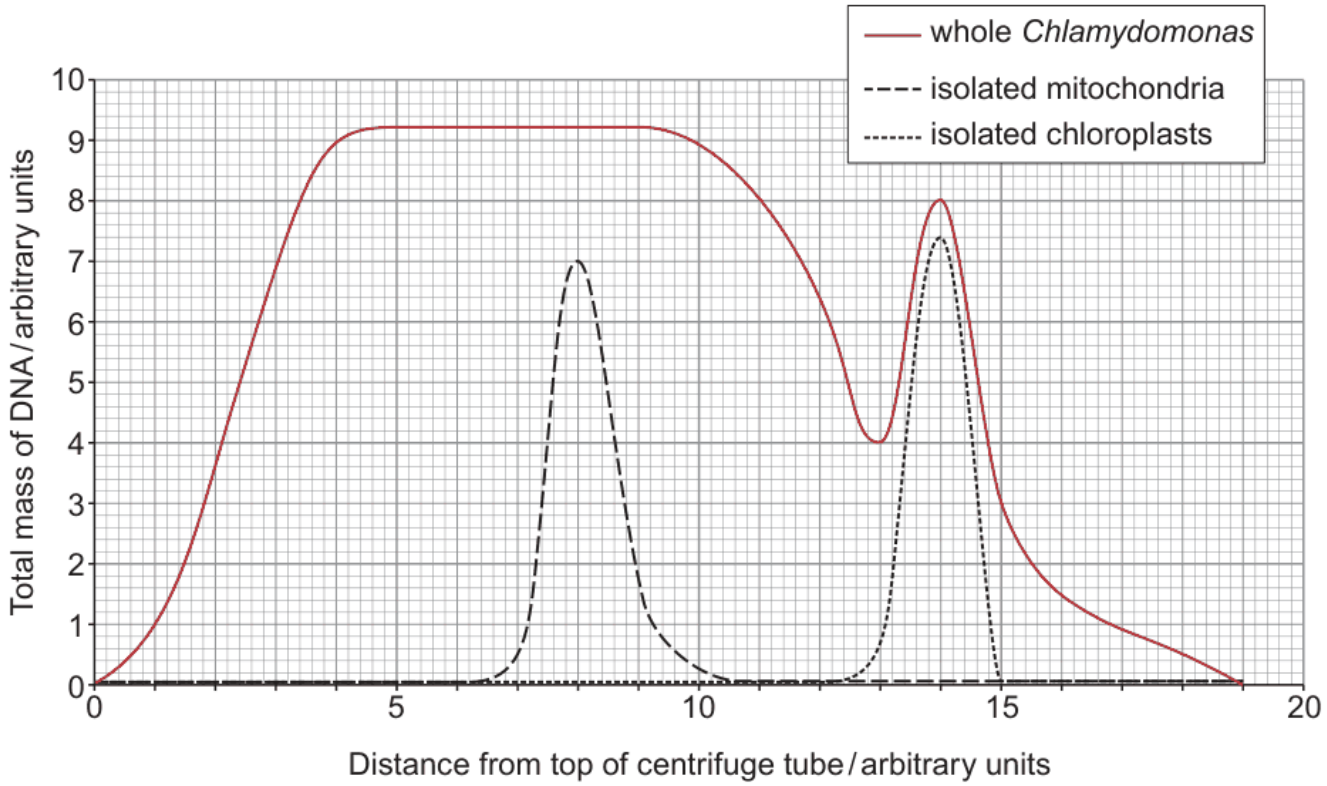
II. .....

Questions, mark schemes and examiners' report extracts © WJEC CBAC Ltd (Eduqas).

Question 12 · information from earlier in the question

(c) The nuclear DNA of *Chlamydomonas reinhardtii* contains approximately 120 million base pairs arranged in 17 chromosomes of varying length. The mitochondrial DNA contains nearly 16 000 base pairs and the chloroplast DNA a further 203 000 base pairs.

DNA was extracted from whole *Chlamydomonas* and also from isolated mitochondria and chloroplasts. The samples were spun separately in an ultracentrifuge. The results are plotted on the graph below.



Question 12 · AS Component 1 · June 2018 · Q5(c)(iv) · 2 marks

(iv) Both mitochondria and chloroplasts are believed to have evolved from prokaryotes. What evidence does the graph provide that could support this hypothesis? Explain your answer. [2]

Questions, mark schemes and examiners' report extracts © WJEC CBAC Ltd (Eduqas).

Question 13 · A level Component 2 · June 2023 · Q1(b)(ii) · 1 mark

(ii) Scientists used to classify cyanobacteria in the Kingdom Protoctista. With reference to their cell structure, suggest why they have been reclassified as bacteria. [1]

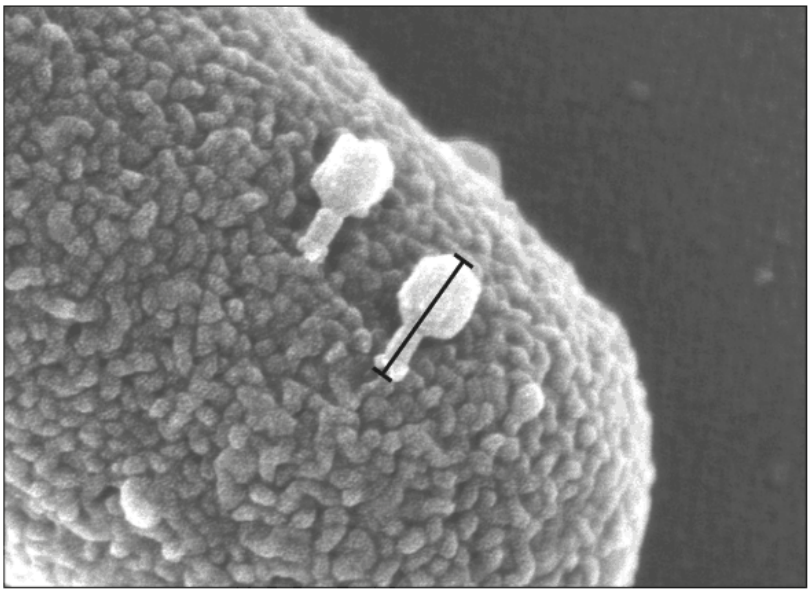
.....

.....

Questions, mark schemes and examiners' report extracts © WJEC CBAC Ltd (Eduqas).

(b) Viruses are similar to other organisms in that they contain nucleic acid and can reproduce, although not on their own. They are not considered to be cells and many scientists believe that they are non-living.

The electron micrograph below shows two bacteriophages (a type of virus) infecting a bacterium.



(magnification × 135 000)

(i) Describe the structure of a virus and explain why it is not considered to be a cell. [2]

Questions, mark schemes and examiners' report extracts © WJEC CBAC Ltd (Eduqas).

Question 15 · A level Component 1 · June 2018 · Q2(a)(i) · 1 mark

2. The Archaea are a domain of single-celled microorganisms. These microbes are prokaryotes. Most Archaea possess a cell wall which is assembled from surface-layer proteins. These form an S-layer which is a rigid array of protein molecules that cover the outside of the cell. This layer provides both chemical and physical protection. Unlike bacteria, most Archaea lack peptidoglycan in their cell walls.

(a) (i) Describe **two** major features of a eukaryote which would allow you to distinguish it from a prokaryote. [1]

.....

.....

.....

Question 16 · A level Component 2 · June 2024 · Q2(e) · 1 mark

(e) When DNA is extracted from plant cells the enzyme cellulase may need to be added. Explain why cellulase is not needed when extracting DNA from human cells. [1]

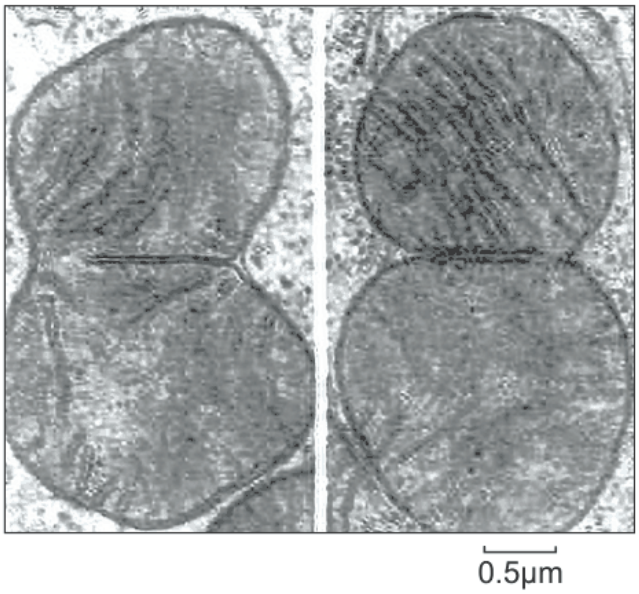
.....

.....

Question 17 · information from earlier in the question

Image 3.2 shows another organelle which is also involved in the process of enzyme secretion.

Image 3.2



Questions, mark schemes and examiners' report extracts © WJEC CBAC Ltd (Eduqas).

Question 17 · AS Component 1 · June 2022 · Q3(b)(iii) · 3 marks

(iii) The organelle shown in **Image 3.2** is in the process of self-replication. This is a similar process to that seen in bacteria.
Suggest and explain how this organelle is able to self-replicate. [3]

Question 18 · AS Component 1 · June 2024 · Q2(b)(i) · 1 mark

(b) Multicellular organisms have specialised cells which aggregate together into tissues, organs and then organ systems.

(i) State the difference between a tissue and an organ. [1]

Questions, mark schemes and examiners' report extracts © WJEC CBAC Ltd (Eduqas).

Question 19 · information from earlier in the question

4. All organisms need certain elements for healthy growth. Plants obtain most of their essential elements by uptake of mineral ions from the soil. The vascular bundles of plants contain xylem vessels that transport water and minerals from the roots to all other parts of the plant.

The photomicrograph below shows a section through the vascular bundle of a plant.



Question 19 · AS Component 1 · June 2018 · Q4(a)(ii) · 2 marks

(ii) **Label a xylem vessel on the photomicrograph above** and explain why a group of xylem vessels form a tissue rather than an organ. [2]

.....

.....

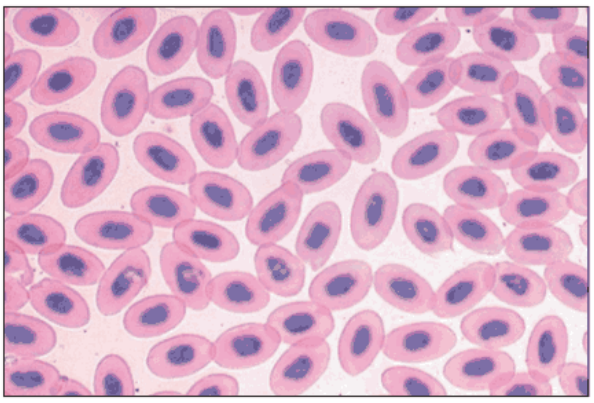
.....

Questions, mark schemes and examiners' report extracts © WJEC CBAC Ltd (Eduqas).

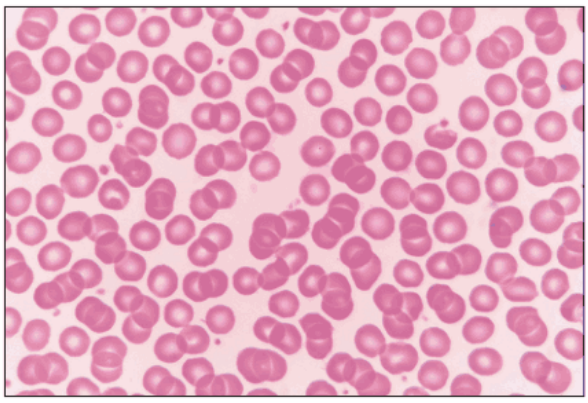
(b) **Image 1.2** shows penguin and human red blood cells.

Image 1.2

Penguin red blood cells



Human red blood cells



(i) Explain why blood is considered to be a tissue. [1]

.....

.....

Questions, mark schemes and examiners' report extracts © WJEC CBAC Ltd (Eduqas).

Mark schemes

Question 1 · AS Component 1 · June 2024 · Q2(a)(i) · 1 mark

2	(a)	(i)	A = Chloroplast and B = Vacuole (1)	1	1	1

Question 2 · AS Component 1 · June 2024 · Q2(a)(iii) · 1 mark

	(iii)	Resolution too low / Not high enough magnification (1)		1	1	1

Question 3 · AS Component 1 · June 2023 · Q3(c) · 2 marks

(c)	G D A All correct = 2 marks 2 correct = 1 mark 0/1 correct = 0 marks	2	2	2

Question 4 · A level Component 2 · June 2018 · Q1(a) · 3 marks

1	(a)	Correctly labelled lysosome (1) Golgi (apparatus/body) (1) Contain {<u>hydrolytic</u>/<u>digestive</u>} enzymes/{Break down/recycle} {organelles/macromolecules/debris}(1) Accept {transport/release} of enzymes <u>within cell</u> Reject disposal of waste unqualified/secrete enzymes	3	3

Question 5 · AS Component 1 · June 2018 · Q3(a)(i) · 1 mark

3	(a)	(i)	ribosome + rRNA is ribosomal RNA/constituent of ribosomes (1) OR Nucleolus + synthesis of RNA	1	1	

Questions, mark schemes and examiners' report extracts © WJEC CBAC Ltd (Eduqas).

Question 6 · AS Component 1 · June 2022 · Q3(a) · 5 marks

3	(a)	**Any five (×1) from:** A. mRNA (produced by transcription) leaves nucleus through nuclear pores B. Protein synthesis on ribosomes / protein in cisternae of rough ER (1) C. Vesicles containing protein pinch off rough ER and fuse with Golgi body / Vesicles from rough ER fuse to form Golgi apparatus (1) D. Protein is modified in Golgi apparatus (1) E. Secretory vesicles pinch off Golgi apparatus and transport enzyme to cell membrane (1) F. Vesicles containing enzyme fuse with the cell membrane and enzyme is released (outside cell) by exocytosis (1) Accept ref to Golgi body in C, D and E.	5	5

Question 7 · AS Component 1 · June 2022 · Q3(b)(ii) · 3 marks

	(ii)		Mitochondria (1) Produces ATP (1) ATP is a source of energy for exocytosis (1)	3	3

Question 8 · AS Component 1 · Autumn 2020 · Q2(b)(iii) · 2 marks

(iii)	To produce large amounts of ATP (1) For protein synthesis / exocytosis (1)	2	2

Question 9 · A level Component 2 · June 2023 · Q5(b)(ii) · 1 mark

(ii)	also DNA in the <u>mitochondria</u>	1	1

Question 10 · A level Component 2 · June 2025 · Q2(a) · 4 marks

2	(a)		2 marks for a drawing that resembles the photo - has six plates and nothing extra 1 mark for a granum drawing /drawing with shading 0 marks if additional structures drawn Ignore ribosomes 1 mark for stroma correctly labelled 1 mark for thylakoid membrane correctly labelled	2	2	4	2

Questions, mark schemes and examiners' report extracts © WJEC CBAC Ltd (Eduqas).

Question 11 · A level Component 1 · June 2024 · Q1(b)(i) · 2 marks

(b)	(i)	**Any two (×1) from:** • 70S / smaller ribosomes (1) **K** • DNA circular / loop of DNA (1) • Ignore plasmids DNA free in stroma / matrix (1)	2	2

Question 12 · AS Component 1 · June 2018 · Q5(c)(iv) · 2 marks

(iv)	**Any two (x1)from:** single peak/spike for DNA from both organelles (1) Therefore there is only one molecule of DNA present (1) could be arranged as plasmids/circular DNA as found in bacteria (1)	2	2	1

Question 13 · A level Component 2 · June 2023 · Q1(b)(ii) · 1 mark

(ii)	No {nucleus/ mitochondria/ golgi/ e.r/ chloroplasts}/ {smaller /70s} ribosomes/ murein cell wall/ peptidoglycan cell wall/ have plasmids Reject no membrane bound organelles	1	1

Question 14 · AS Component 1 · June 2017 · Q2(b)(i) · 2 marks

(b)	(i)	molecule of {nucleic acid / DNA / RNA} surrounded by a {protein coat / capsid} (1) (acellular as) {does not have membranes/ no organelles/ cell membranes/ cytoplasm} (1) Accept labelled diagram	1 1	2

Question 15 · A level Component 1 · June 2018 · Q2(a)(i) · 1 mark

2	(a)	(i)	**Any two for 1 mark from** Have nucleus (1) membrane-bound organelles/ named example(1) 80S ribosomes (1) DNA associated in chromosomes/linear (1)	1	1

Question 16 · A level Component 2 · June 2024 · Q2(e) · 1 mark

(e)		Human cells do not have cell wall (1)	1	1

Questions, mark schemes and examiners' report extracts © WJEC CBAC Ltd (Eduqas).

Question 17 · AS Component 1 · June 2022 · Q3(b)(iii) · 3 marks

	(iii)		Mitochondria contain their own DNA / ref to endosymbiont theory (1) Mitochondria have ribosomes and can synthesise their own proteins (1) DNA can be replicated (so both new organelles have copy of DNA) / accept ref. to binary fission (1)	2	1	3

Question 18 · AS Component 1 · June 2024 · Q2(b)(i) · 1 mark

(b)	(i)	Tissue – one type of cell **and** Organ – many types of cell / many tissues / more than one tissue (1) Accept a tissue is a group of similar cells working together to perform a function whereas an organ is a group of tissues working together to perform a function	1	1	

Question 19 · AS Component 1 · June 2018 · Q4(a)(ii) · 2 marks

(ii)	correct label of a xylem vessel (1) only one type of cell/similar cells aggregated to perform the same function/OWTTE (1)	2		2	1

Question 20 · A level Component 3 · Autumn 2020 · Q1(b)(i) · 1 mark

(b)	(i)	A group of (similar) cells working together to perform a function	1	1

Questions, mark schemes and examiners' report extracts © WJEC CBAC Ltd (Eduqas).