Eukaryotic Cell Structure: AQA A Level Biology Exam Questions by Topi

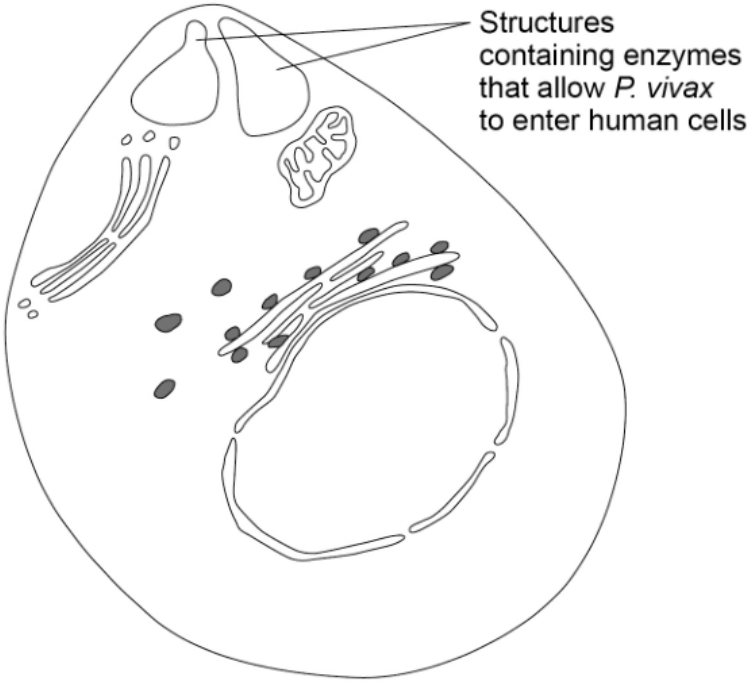
18 questions · 38 marks · about 49 minutes. Answer in the spaces, then check the mark schemes at the end.

Question 1 · A level Paper 1 · June 2023 · Q03.1 · 1 mark

0 3 . 1 The human disease, malaria, is caused by infection with a single-celled eukaryotic organism.

Figure 2 shows a diagram of *Plasmodium vivax*, one of the species that can cause malaria.

Figure 2



Other than the Golgi apparatus, name **one** structure in **Figure 2** which shows that *P. vivax* is a eukaryote.

[1 mark]

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Question 2 · A level Paper 1 · June 2022 · Q01.1 · 4 marks

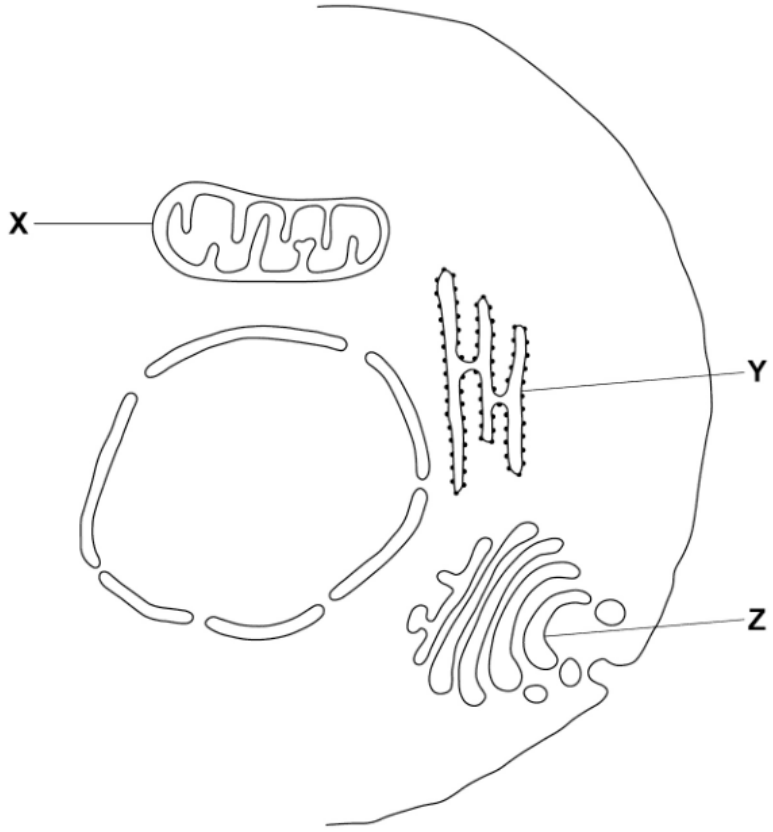
0 1 . 1 Describe the structure and function of the nucleus.

[4 marks]

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0 2 **Figure 3** shows part of a eukaryotic cell.

Figure 3



0 2 . 1 Name the organelle labelled **X** and state its function.

[2 marks]

Name _____

Function _____

_____

_____

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Question 4 · A level Paper 1 · June 2023 · Q03.2 · 2 marks

0 3 . 2 Describe **two** functions of the Golgi apparatus in a eukaryotic cell.

[2 marks]

1 _____

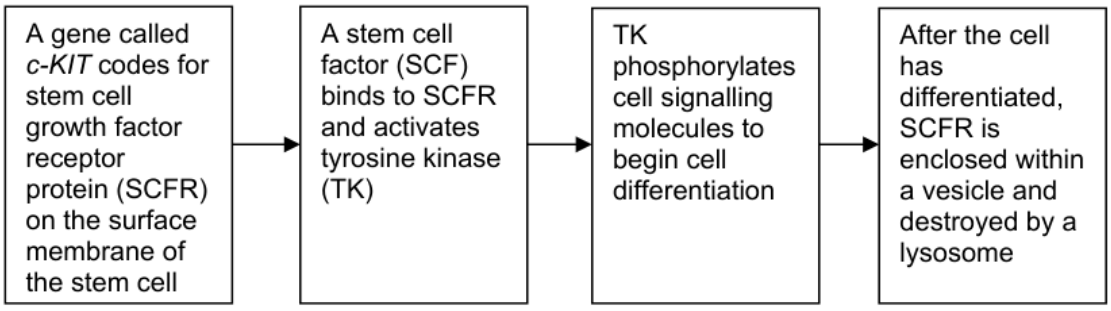
2 _____

Question 5 · A level Paper 3 · June 2023 · Q04.1 · 2 marks

0 4 Following a body injury, bone marrow stem cells move to the site of damage and undergo cell differentiation.

Figure 5 shows how this differentiation occurs.

Figure 5



0 4 . 1 Suggest how SCFR is destroyed by a lysosome.

[2 marks]

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Question 6 · AS Paper 1 · June 2019 · Q05.4 · 1 mark

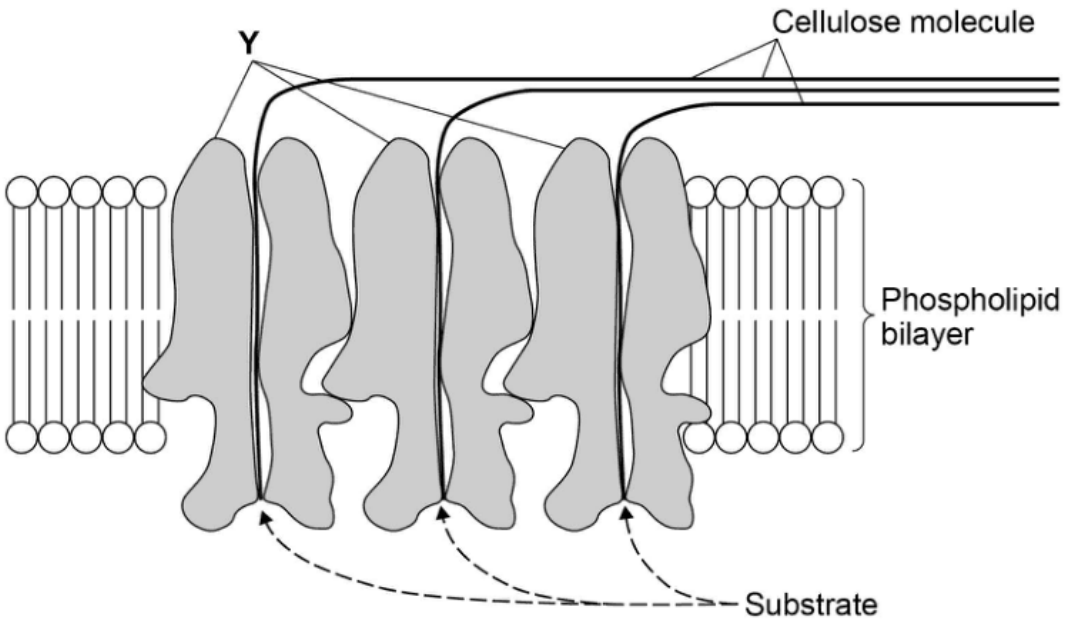
0 5 . 4 Name an organelle found in both a chloroplast and a prokaryotic cell.

[1 mark]

Question 7 · information from earlier in the question

Figure 3 shows how a plant cell produces its cell wall.

Figure 3



Question 7 · AS Paper 1 · June 2016 · Q04.3 · 1 mark

0 4 . 3 What is the evidence in **Figure 3** that the phospholipid bilayer shown is part of the cell-surface membrane?

[1 mark]

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Question 8 · AS Paper 2 · June 2023 · Q10.2 · 4 marks

10.2 Outline the similarities in, and the differences between, the structures of chloroplasts and mitochondria.

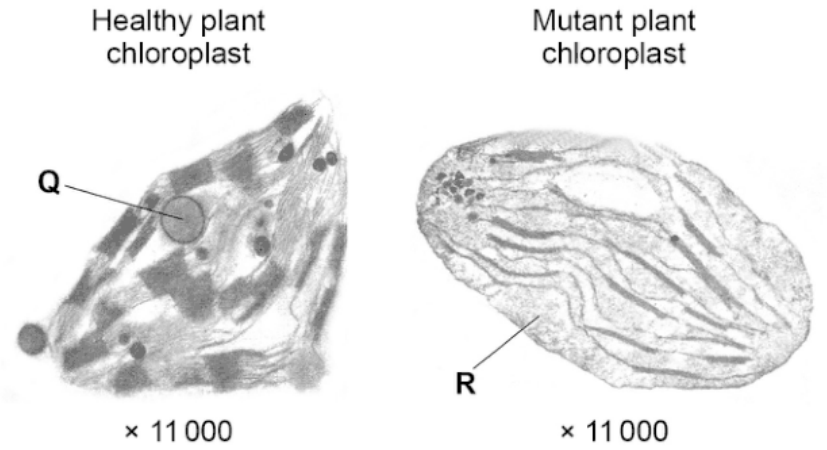
[4 marks]

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Question 9 · A level Paper 1 · June 2025 · Q09.2 · 1 mark

0 9 . 2 **Figure 12** shows images of chloroplasts from *N. tabacum* cells observed with an electron microscope.

Figure 12



Identify the parts labelled **Q** and **R**.

[1 mark]

Q _____

R _____

Question 10 · information from earlier in the question

Figure 3 is a transmission electron micrograph of a plant cell.

Figure 3



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Question 10 · AS Paper 1 · November 2020 · Q04.3 · 1 mark

0 4 . 3 Name the organelles labelled **S** and **T** in **Figure 3**.

[1 mark]

Organelle **S** _____

Organelle **T** _____

Question 11 · A level Paper 1 · June 2022 · Q01.2 · 1 mark

0 1 . 2 Name the main polymer that forms the following cell walls.

[1 mark]

Plant cell wall _____

Fungal cell wall _____

Question 12 · A level Paper 1 · June 2025 · Q09.1 · 1 mark

0 9 . 1 Scientists investigated chloroplasts taken from leaf cells of the species *Nicotiana tabacum*.

The scientists took chloroplasts from leaf cells of a healthy plant and from leaf cells of a mutant plant.

Chloroplasts are contained in several different types of specialised cells in *N. tabacum* leaves.

What terms are used to describe an organisation of specialised cells in an organism when:

- all the cells are of one type
- the cells are of more than one type?

[1 mark]

Cells of one type _____

Cells of more than one type _____

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Question 13 · A level Paper 1 · June 2024 · Q10.2 · 5 marks

1 0 . 2 Describe the role of organelles in the production and release of enzymes by animal cells.

Do **not** include details of transcription in your answer.

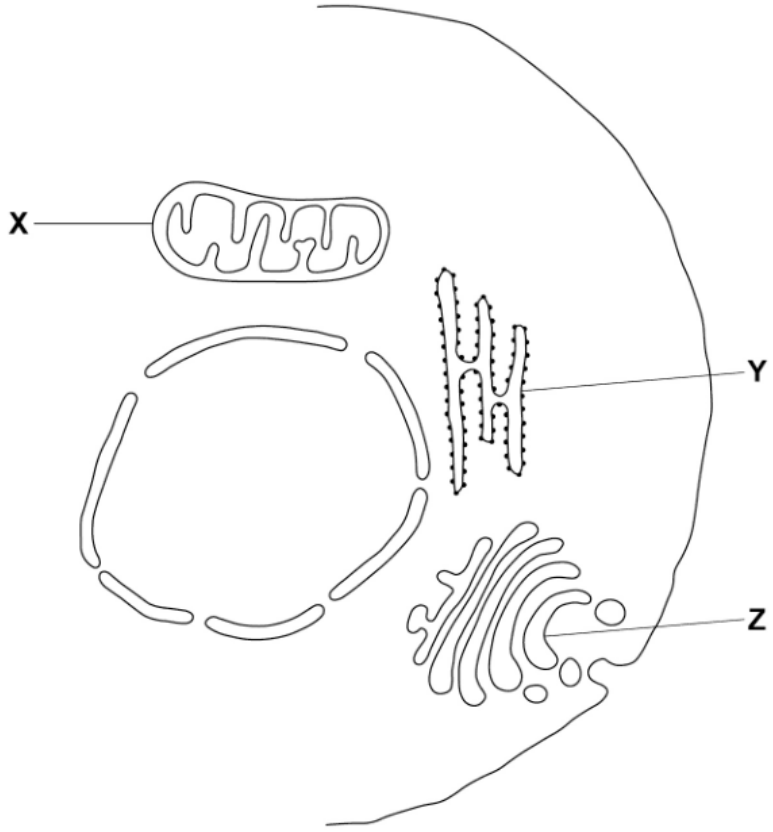
[5 marks]

Questions, mark schemes and examiners' report extracts © AQA.

Question 14 · information from earlier in the question

0 2 **Figure 3** shows part of a eukaryotic cell.

Figure 3



Questions, mark schemes and examiners' report extracts © AQA.

Question 14 · AS Paper 2 · June 2025 · Q02.2 · 4 marks

0 2 . 2 Pancreatic cells produce and secrete digestive enzymes.

Explain why pancreatic cells contain large numbers of organelles **Y** and **Z**.

[4 marks]

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Question 15 · AS Paper 2 · June 2018 · Q01.2 · 2 marks

0 1 . 2 Human breast milk is produced and secreted by gland cells. These gland cells have adaptations that include many mitochondria and many Golgi vesicles. The milk contains a high concentration of protein.

Explain the role of these cell adaptations in the production and secretion of breast milk.

[2 marks]

Questions, mark schemes and examiners' report extracts © AQA.

0 1 . 3 Scientists investigated the structure of the endoplasmic reticulum.

Table 1 shows some of the scientists' results.

Table 1

Type of endoplasmic reticulum	Percentage of endoplasmic reticulum made of phospholipids
Rough	46.8
Smooth	52.5

Use the data in **Table 1** to suggest how the structure of rough endoplasmic reticulum is different from the structure of smooth endoplasmic reticulum **and** how this is related to their functions.

[3 marks]

Questions, mark schemes and examiners' report extracts © AQA.

0 7 . 4 Scientists investigated the effect of an exercise programme on the number and size of mitochondria in skeletal muscle. They took samples of muscle from a large number of volunteers before and after the exercise programme. From each sample, they cut thin sections and used these to determine the mean number of mitochondria per μm^2 and the mean area of inner mitochondrial membranes.

Their results are shown in **Figure 7** and **Figure 8**.

Figure 7

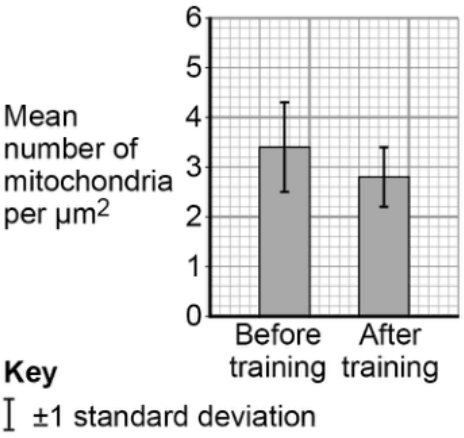
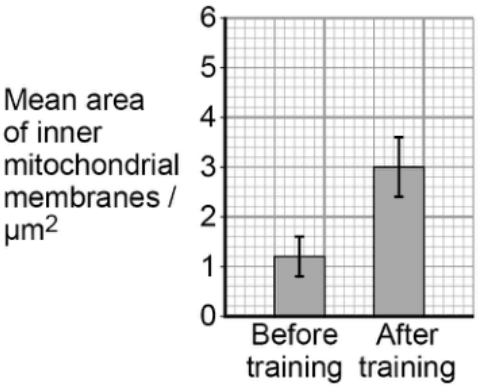


Figure 8



What do the data in **Figure 7** and **Figure 8** suggest about the effect of the exercise programme on mitochondria?

[2 marks]

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Question 18 · information from earlier in the question

0 5 . 2 Scientists grew two groups of plants:

- control plants with all the inorganic ions needed
- iron-deficient plants with all the inorganic ions needed **but** without iron ions.

After 1 week, the scientists measured the mass of protein and the mass of chlorophyll in the chloroplasts isolated from samples of leaves of these two groups of plants.

Table 4 shows the scientists' results.

Table 4

Mass of protein / percentage of control	Mass of chlorophyll / percentage of control
40	10

Some proteins found inside the chloroplast are synthesised inside the chloroplast.

Give **one** feature of the chloroplast that allows protein to be synthesised inside the chloroplast **and** describe **one** difference between this feature in the chloroplast and similar features in the rest of the cell.

[2 marks]

Question 18 · A level Paper 1 · November 2021 · Q05.3 · 1 mark

0 5 . 3 The ratio of protein to chlorophyll in control plants is 9:1

Use the information in **Table 4** to calculate the ratio of protein to chlorophyll in iron-deficient plants.

[1 mark]

Ratio _____

Questions, mark schemes and examiners' report extracts © AQA.

Mark schemes

Question 1 · A level Paper 1 · June 2023 · Q03.1 · 1 mark

03.1	Membrane-bound organelle(s) **OR** Mitochondrion/mitochondria **OR** Vesicle(s)/lysosomes **OR** (Rough) endoplasmic reticulum **OR** Nucleus/(double) nuclear membrane/pore(s)/ nuclear envelope;	1 (AO1)	Ignore rER OR rough ER Accept '80S ribosomes' OR 'large(r) ribosomes' Reject smooth Reject nucleolus Reject cell membrane

Questions, mark schemes and examiners' report extracts © AQA.

Question 2 · A level Paper 1 · June 2022 · Q01.1 · 4 marks

01.1	**Structure** 1. Nuclear envelope **and** pores **OR** Double membrane **and** pores; 2. Chromosomes/chromatin **OR** DNA with histones; 3. Nucleolus/nucleoli; **Function** 4. (Holds/stores) genetic information/material for polypeptides (production) **OR** (Is) code for polypeptides; 5. DNA replication (occurs); 6. Production of mRNA/tRNA **OR** Transcription (occurs); 7. Production of rRNA/ribosomes;	4 max (4 x AO1)

Max 2 for structure or function

1. Ignore porous for pores

2 Ignore genetic material/information

2. Accept nucleoplasm

2. Ignore promoter regions OR genes OR alleles

Accept regulation of gene expression

4. Accept protein OR amino acid sequences

Questions, mark schemes and examiners' report extracts © AQA.

Question 3 · AS Paper 2 · June 2025 · Q02.1 · 2 marks

02.1	1. Mitochondrion; 2. <u>Aerobic</u> respiration;	2 (2 x AO1)	2. Reject produces/makes energy

Question 4 · A level Paper 1 · June 2023 · Q03.2 · 2 marks

03.2	1. Modify/package/transport proteins **OR** Make/transport glycoproteins; 2. Modify/package/transport lipids **OR** Make/transport glycolipids; 3. Forms/releases vesicles/lysosomes;	2 max (2 x AO1)	Accept processes for modify 1. and 2. Accept 'adds carbohydrate to' for modify 1. Accept 'adds lipid to' for modify 1. Accept lipoprotein for glycoprotein 1 or 2. Accept chylomicron for glycoprotein/glycolipid 2. Accept phospholipid for lipid Accept additional marking point, 4. Make/transport polysaccharides, but ignore cellulose

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Question 5 · A level Paper 3 · June 2023 · Q04.1 · 2 marks

04.1	1. (The vesicle) fuses/binds with a lysosome; 2. Lysozyme/s hydrolyses/digests (SCFR) **OR** Hydrolytic enzyme/s breaks down/hydrolyses/ digests (SCFR);	2 (2 x AO2)

2. Accept protease hydrolyses/digests (SCFR);

Question 6 · AS Paper 1 · June 2019 · Q05.4 · 1 mark

05.4	(70S) Ribosome;	1	Reject: (80S) Ribosome

Question 7 · AS Paper 1 · June 2016 · Q04.3 · 1 mark

04.3	Cell wall forms outside cell-surface membrane/has cellulose on it (on the outside);	1

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Question 8 · AS Paper 2 · June 2023 · Q10.2 · 4 marks

10.2	Similarities 1. Double membrane; 2. Both contain (circular) DNA; 3. Both contain ribosomes; Differences 4. Thylakoids/lamellae/grana v cristae; 5. Stroma v matrix; 6. Pigments v no pigments; 7. Starch grains v no starch grains;	4 max (4 x AO1)	Max 3 marks for differences 3. Ignore numbers in front of ribosomes 6. Accept 'chlorophyll v no chlorophyll'

Question 9 · A level Paper 1 · June 2025 · Q09.2 · 1 mark

09.2	(**Q**) starch (grain) **OR** lipid/fat (droplets) **and** (**R**) stroma;	1 (1 x AO1)	Reject stoma

Question 10 · AS Paper 1 · November 2020 · Q04.3 · 1 mark

04.3	**S** = Vacuole **T** = Chloroplast;	1	Reject thylakoid/granum Reject incorrect spelling

Question 11 · A level Paper 1 · June 2022 · Q01.2 · 1 mark

01.2	Cellulose (plants) **and** Chitin (fungi);	1 (AO1)	For fungi, accept N-acetylglucosamine

Question 12 · A level Paper 1 · June 2025 · Q09.1 · 1 mark

09.1	Tissue **and** organ;	1 (1 x AO1)	Answers must be in this order

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10.2	1. DNA in nucleus codes for enzyme/protein (production); 2. Ribosomes/rough endoplasmic reticulum produce enzyme/protein **OR** Translation on ribosomes/rough endoplasmic reticulum; 3. Rough endoplasmic reticulum transports/modifies/processes enzymes/protein; 4. Mitochondria produce ATP; 5. Golgi apparatus modify/process/ package/transport enzymes/protein **OR** Golgi apparatus make/transport glycoprotein **OR** Golgi apparatus forms/releases vesicles; 6. Vesicles move (protein) to cell(-surface) membrane **OR** Vesicles fuse with cell(-surface) membrane;	5 max (5 x AO1)

1. Accept genetic material/code **OR** gene for DNA

Accept polypeptide for protein/enzyme

3. Ignore rER/RER only once

4. Reject produce energy

5. Accept body for

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Question 14 · AS Paper 2 · June 2025 · Q02.2 · 4 marks

02.2	1. (Digestive) enzymes are proteins; 2. Y/rough endoplasmic reticulum produces proteins/enzymes; 3. Z/Golgi apparatus modifies/packages proteins/enzymes; 4. (Golgi) vesicles transport (modified) proteins/enzymes to (cell-surface) membrane;	4 (4 x AO2)

2. Ignore RER/ER

2. Accept ribosomes

3. Accept Golgi body/complex

4. (Golgi) vesicles transport (modified) proteins/enzymes for exocytosis;

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01.2	1. (Many mitochondria) release energy / ATP **for** movement of vesicles / synthesis of protein / active transport; 2. (Many Golgi) vesicles transport protein / glycoprotein / milk **to** cell membrane / **out of** cell;	2

Must include function of organelle **and** use in context of milk production.

Ignore reference to lipid / triglyceride

1. Reject reference to mitochondria undergoing anaerobic respiration
1. Reject “produce energy”.
1. Reject “energy for respiration”
2. Accept exocytosis as transport and release
2. Ignore references to protein synthesis

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01.3	1. Less <u>phospholipids</u> in rough **OR** More protein/glycoprotein in rough **OR** Presence of ribosomes in rough; 2. (More protein/glycoprotein/ribosomes) Rough – production/transport of proteins; 3. (More phospholipid) Smooth – production/modification/packaging/transport of lipids;

3 (2 x AO2, 1 x AO3)	1. Accept references to percentages from Table 1. 2.Accept modifies/packages proteins 3.Accept storage/synthesis of carbohydrates 3. Accept storage of lipds

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Question 17 · AS Paper 1 · June 2017 · Q07.4 · 2 marks

07.4	1. Training made **no** difference to number (of mitochondria per μm^2); 2. Training led to an increase in the area (of inner mitochondrial membrane);	2	1. Accept **Figure 7** as mean number of mitochondria per μm^2 2. Accept **Figure 8** as area of inner mitochondrial membrane

Question 18 · A level Paper 1 · November 2021 · Q05.3 · 1 mark

05.3	Correct answer for 1 mark, 36:1;	1

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