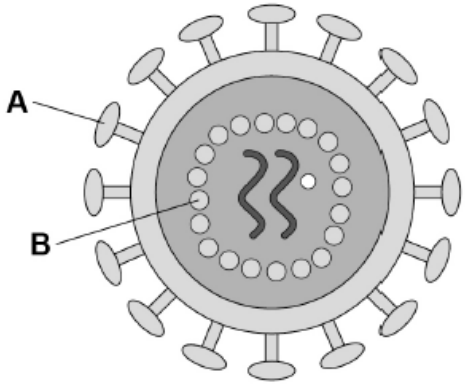
AQA – Cells – AS Biology P1

1. June/2021/Paper_1/No.2

0 2 **Figure 2** shows the structure of the human immunodeficiency virus (HIV).

Figure 2



0 2 . 1 Name structures **A** and **B**.

[2 marks]

A _____

B _____

0 2 . 2 Describe how HIV is replicated.

[4 marks]

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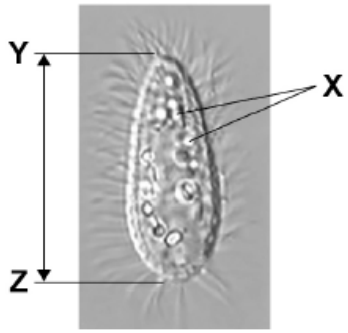
2. June/2021/Paper_1/No.3

0 3 *Uronema marinum* is a single-celled eukaryotic organism. **Figure 3** is a photograph of *U. marinum* taken through an optical microscope.

Figure 3



0 3 . 1 Explain why it is not possible to determine the identity of the structures labelled **X** using an optical microscope.

[2 marks]

0 3 . 2 *U. marinum* cells ingest bacteria and digest them in the cytoplasm.

Describe the role of **one** named organelle in digesting these bacteria.

[3 marks]

0 3 . 3 Calculate the actual length of the cell shown between **Y** and **Z** in **Figure 3**.

The magnification of the image is × 900

Give your answer in µm **and** to **2** significant figures.

Show your working.

[2 marks]

Answer _____ µm

0 3 . 4 In large cells of *U. marinum*, most mitochondria are found close to the cell-surface membrane. In smaller cells, the mitochondria are distributed evenly throughout the cytoplasm. Mitochondria use oxygen during aerobic respiration.

Use this information and your knowledge of surface area to volume ratios to suggest an explanation for the position of mitochondria in **large** *U. marinum* cells.

[2 marks]

3. June/2021/Paper_1/No.8

0 8 An unfertilised chicken egg is a single cell surrounded by a shell.

A student investigated osmosis in chicken eggs. She dissolved the shells of two eggs without damaging the cell contained inside the shells. She then:

- measured the mass of each egg without its shell
- covered one egg with vinegar and covered the other egg with a sugar solution
- kept both eggs covered at 30 °C for 24 hours.

After 24 hours, she measured the mass of each egg.

The student designed **Table 2** and added her results to this table.

Table 2

Initial mass of egg / g	Final mass of egg / g	Name of solution covering egg	Ratio of final mass to initial mass
66	85	Vinegar	1.29:1
60	43	Sugar	0.7:1

0 8 . 1 Suggest **one** improvement to the design of **Table 2** and **one** improvement to the way she presented the data contained in **Table 2**.

[2 marks]

Improvement to design of table _____

_____

_____

Improvement to presentation of data _____

_____

_____

0 8 . 2 Suggest and explain an advantage of carrying out this investigation at 30 °C rather than at 20 °C.

[2 marks]

0 8 . 3 The student concluded from the information in **Table 2** that the water potential of the solution inside the egg is higher than the water potential of the vinegar.

Is the student's conclusion correct? Justify your answer.

[3 marks]

0 8 . 4 The student wanted to determine the water potential of chicken eggs. She:

- produced a dilution series of sugar solution
- followed the procedure described on **page 20**.

She calculated the final mass to initial mass ratio of the egg covered in each sugar solution.

How would you advise the student to use her calculated ratios to determine the water potential of the eggs?

In your answer state the independent variable in the student's investigation.

[4 marks]

4. June/2021/Paper_1/No.9

0 9 Read the following passage.

Kidney cells produce a glycoprotein hormone called erythropoietin (EPO). An EPO molecule contains 165 amino acids and approximately 50% of its mass is carbohydrate.

EPO is transported in the blood and stimulates the bone marrow to produce red blood cells. In this way, enough red blood cells are produced to maintain the blood's oxygen-carrying capacity.

Some athletes choose to increase their blood EPO concentration by injecting synthetic EPO. This practice is called blood boosting and is banned in sport as a form of drug abuse. Athletics' authorities use a programme of drug testing to detect athletes who have injected EPO. In this programme, an ELISA test is performed on urine samples to measure the concentration of EPO in the athlete.

Two types of monoclonal antibody are used in this ELISA test:

- anti-human EPO antibody, prepared by injecting human EPO into mice
- anti-mouse antibody, prepared by injecting anti-human EPO antibody into goats. An enzyme is attached to the anti-mouse antibody.

Use the information in the passage and your own knowledge to answer the following questions.

0 9 . 1 Kidney cells produce a glycoprotein called erythropoietin (EPO) (line 1).

Identify **two** organelles in kidney cells that enable the production of EPO.

[1 mark]

1 _____

2 _____

0 9 . 2 Explain the biological advantage to athletes of injecting synthetic EPO (lines 7–8).

[2 marks]

_____

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0 9 . 3 Describe how mice injected with human EPO produce anti-human EPO antibody (line 14).

[3 marks]

0 9 . 4 Describe the roles of anti-human EPO antibody and anti-mouse antibody with enzyme attached (lines 14–16) in producing a positive result for EPO in the ELISA test.

[3 marks]

Role of anti-human EPO antibody

Role of anti-mouse antibody with enzyme attached

0 9 . 5 Some people object to using monoclonal antibodies in testing programmes.
Use information in the passage to suggest why.

[1 mark]