Cell structure – 2021/20 GCE AS Biology A

1. Nov/2020/Paper_H020/2/No.1

(a) A student was observing onion epithelial cells using a light microscope. They photographed these cells and the image obtained is shown in Fig. 1.1. The student then made a drawing of a few cells from this image. The drawing is shown in Fig. 1.2.

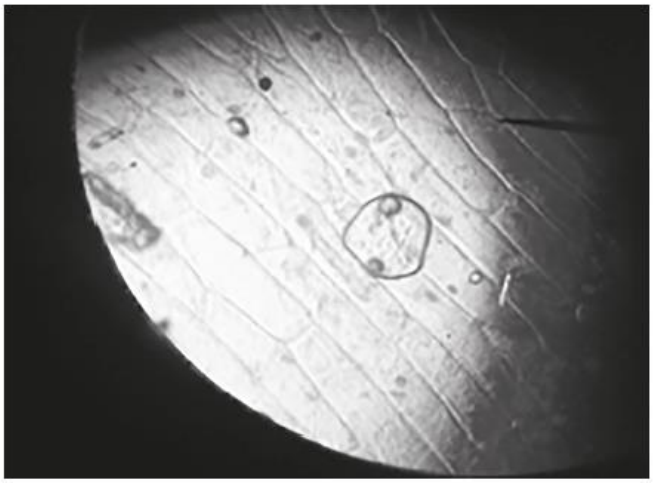

Fig. 1.1

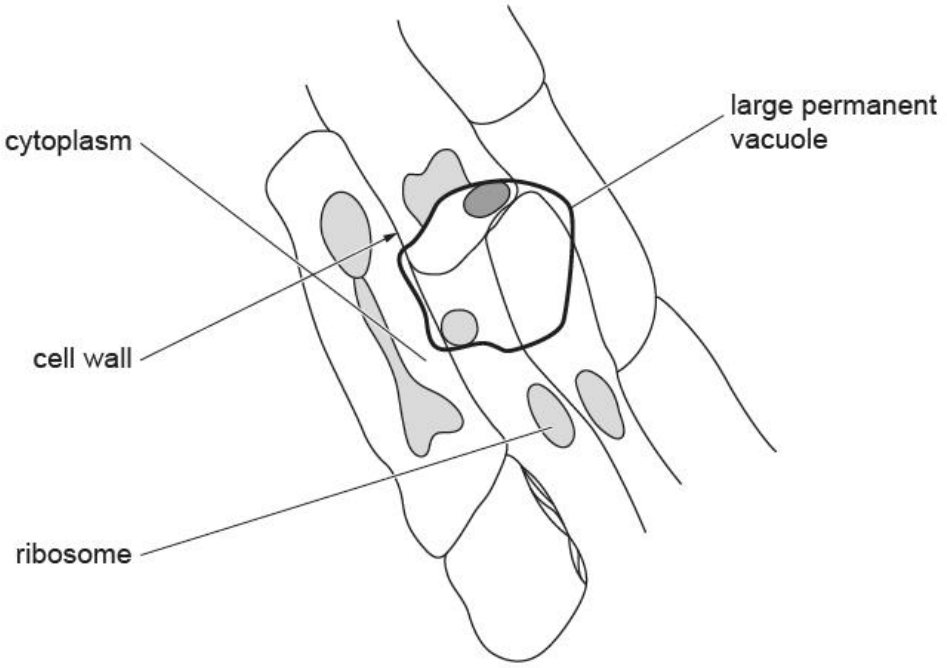

Fig. 1.2

The teacher stated that two of the labels on the drawing Fig. 1.2 were incorrect, and also that it was a poor quality biological drawing.

(i) Identify **one** incorrect label and explain your answer.

Incorrect label .....

Explanation .....

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[3]

(ii) State **three** changes, other than to the labels, to Fig. 1.2 that the student would need to make to improve the biological drawing.

1 .....

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2 .....

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3 .....

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[3]

(b) Both a transmission electron microscope (TEM) and a scanning electron microscope (SEM) can be used to view the same cell. However, the images formed will be different.

Compare the resolutions of these microscopes **and** the images formed by them.

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..... **[4]**

(c) (i) A student wrote the following passage about cells:

'Erythrocytes and neutrophils are formed in the spleen. One of the places ciliated epithelial cells are found is in blood vessels. Sperm cells are the male gametes and contain the haploid number of chromosomes. The cell wall of the guard cell is thicker on the side furthest away from the stoma, so the cell does not change shape symmetrically as its volume changes. Root hair cells increase the surface area for absorption of water and mineral ions from the soil.'

Identify **and** correct the errors in the passage.

Error 1 .....

Correction .....

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Error 2 .....

Correction .....

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Error 3 .....

Correction .....

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[3]

(ii) A man with a body mass of 73 kg was admitted to hospital with an infection. His neutrophil production was measured at approximately 3804 billion cells in a 24h period.

When healthy, the man was producing approximately 1.6 billion neutrophils $kg^{-1}\,h^{-1}$.

Calculate the percentage increase in neutrophil production due to the infection.

percentage increase = ... % **[2]**

(iii)* Erythrocytes and neutrophils are both examples of specialised blood cells.

Squamous and ciliated epithelial cells are also examples of specialised cells.

Describe how each of these **four** cells is specialised for its function.

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..... **[6]**