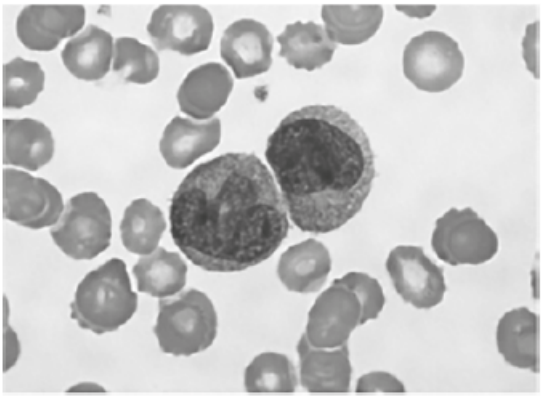
Cell structure – 2021/20 GCE AS Biology A

1. Nov/2021/Paper-H020/01/No.22

The image below shows two white blood cells in a blood sample, seen using a light microscope.



(a) Explain how to measure the diameter of the nucleus of one of the white blood cells, when observing the cells through a light microscope.

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

(b) During a bacterial infection, activated white blood cells multiply by mitosis.

In order to study the behaviour of chromosomes during mitosis, higher resolution images are needed.

(i) Complete the table below about microscopes and their images.

	Laser scanning confocal microscope	**Scanning electron microscope**	**Transmission electron microscope**
Maximum resolution	200 nm	3–10 nm	0.5 nm
Image appearance	2D / 3D	.....	.....
Image colour	.....	.....	black and white

[2]

(ii) A transmission electron microscope image of a white blood cell was studied. It was concluded that the cell had stopped dividing at the G2 checkpoint.

Suggest **two** observations that would have led to this conclusion.

1 .....

2 .....

[2]

(c) DNA can be extracted from a culture of white blood cells and precipitated using the following procedure:

1. Mix a culture of white blood cells with a detergent.
2. Add salt.
3. Add an enzyme.
4. Place in a water bath at 40 °C.
5. Filter the culture.
6. Gently pour ice-cold ethanol onto the filtrate.

(i) Suggest why the cells do not need to be crushed before adding detergent.

..... **[1]**

(ii) Explain why the detergent is used in step 1.

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..... **[1]**

(iii) Suggest the type of enzyme that should be used in step 3 and explain why.

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..... **[2]**

2. Nov/2020/Paper-H020/01/No.23

The rough endoplasmic reticulum is where translation of some proteins takes place in a eukaryotic cell.

(a) Describe the structure of the rough endoplasmic reticulum.

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..... **[3]**

(b) Explain the role of the membrane in the rough endoplasmic reticulum.

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..... **[2]**