

Please check the examination details below before entering your candidate information

Candidate surname

Other names

**Pearson BTEC
Level 3
Nationals
Certificate**

Centre Number

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Learner Registration Number

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Tuesday 15 January 2019

Afternoon (Time: 40 minutes)

Paper Reference **31617H/1B**

**Applied Science / Forensic and Criminal
Investigation**

Unit 1: Principles and Applications of Science I

Biology

SECTION A: STRUCTURES AND FUNCTIONS OF CELLS AND TISSUES

You must have:

A calculator and a ruler.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and learner registration number.
- Answer **all** questions.
- Answer the questions in the spaces provided
– *there may be more space than you need.*

Information

- The exam comprises three papers worth 30 marks each.
Section A: Structures and functions of cells and tissues (Biology).
Section B: Periodicity and properties of elements (Chemistry).
Section C: Waves in communication (Physics).
- The total mark for this exam is 90.
- The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

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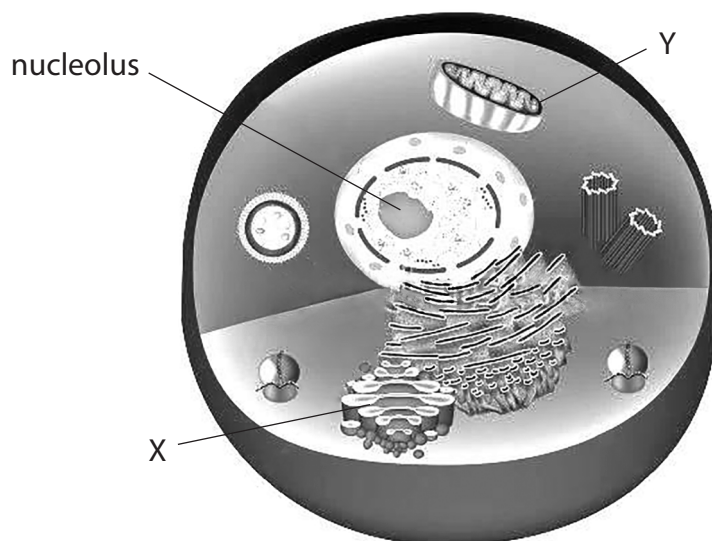


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Answer ALL questions. Write your answers in the spaces provided.

Some questions must be answered with a cross in a box ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

1 Figure 1 shows the ultra-structure of an animal cell.



© Timonina/Shutterstock

Figure 1

(a) (i) Name organelle X in Figure 1.

(1)

(ii) Identify organelle Y in Figure 1.

(1)

- A centriole
- B endoplasmic reticulum
- C mitochondrion
- D vesicle

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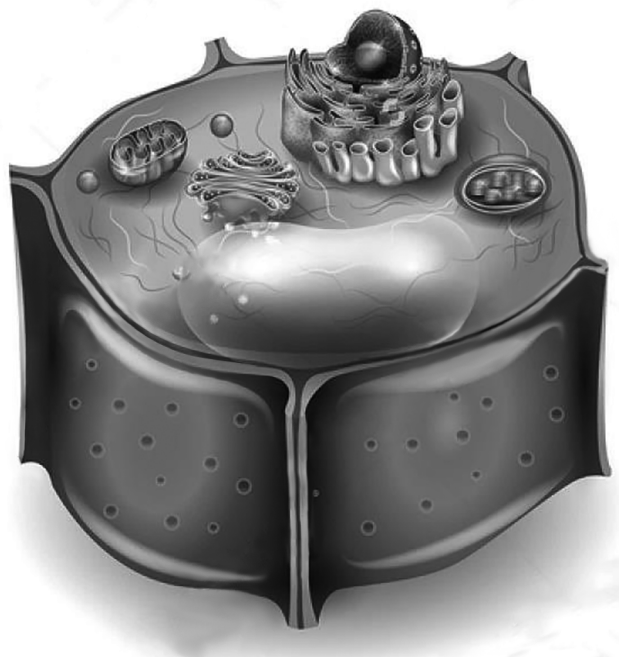


(iii) Identify the function of the nucleolus.

(1)

- A forms spindle fibres during cell division
- B makes RNA and ribosomes
- C regulates cellular activity
- D synthesises and transports lipids and carbohydrates

(b) Figure 2 shows the ultra-structure of a plant leaf cell.



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Figure 2

(i) Name **two** structural features that are found only in plant leaf cells and not in animal cells.

(2)

1

2

(ii) Name **one** structural feature that is found only in animal cells and not in plant leaf cells.

(1)

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(Total for Question 1 = 6 marks)



2 A white blood cell is a specialised cell.

(a) Complete the meaning of the term **specialised cell**.

(2)

A cell becomes specialised when its structure is altered. This enables a cell to have a function. This process is called cellular

(b) A neutrophil is a type of white blood cell.

Figure 3 shows neutrophils in a capillary.

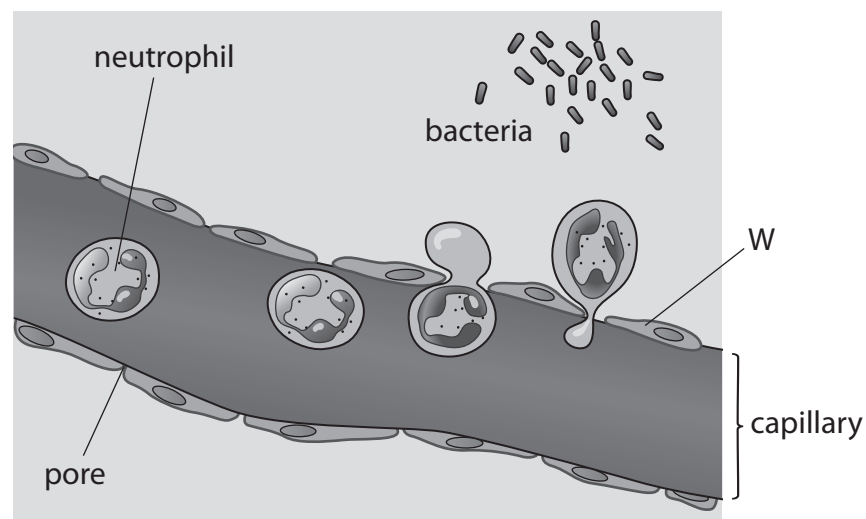


Figure 3

(i) Identify the type of cell labelled W in Figure 3.

(1)

- A ciliated
- B columnar
- C endothelial
- D stratified



Neutrophils travel in the blood. They move through pores in capillary walls to reach the bacteria in surrounding tissue.

- (ii) Explain how the structure of a neutrophil enables it to exit the capillary in order to reach the bacteria.

(2)

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- (iii) Neutrophils contain many lysosomes.

Explain the function of lysosomes in a neutrophil.

(3)

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(c) During a bacterial infection, a person has a higher neutrophil count than before they were infected.

	neutrophil count per dm^3
before infection	3.5×10^9
during infection	6.1×10^{10}

Table 1

Calculate, using information in Table 1, the percentage increase in the neutrophil count during the infection.

Show your working.

(3)

percentage increase in the neutrophil count = %

(Total for Question 2 = 11 marks)

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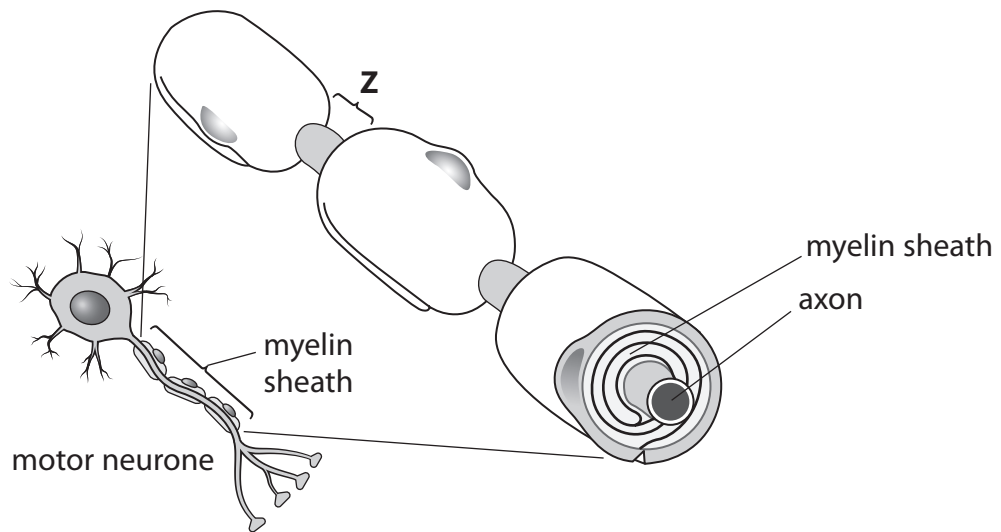
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P 5 3 9 7 9 A 0 7 1 2

3 Figure 4 shows a healthy myelinated motor neurone.

A myelin sheath surrounds the axon of the myelinated motor neurone.



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Figure 4

(a) Name the region labelled Z in Figure 4.

(1)

(b) Describe the structure of the myelin sheath.

(4)

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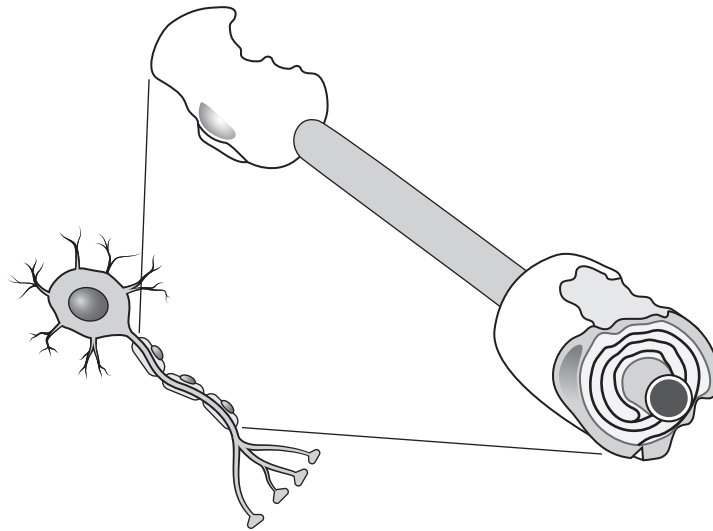
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(c) Multiple sclerosis is a disease where part of the axon becomes non-myelinated.

Figure 5 shows a neurone affected by multiple sclerosis.



© BlueRingMedia/Shutterstock

Figure 5

Explain why the speed of conduction is slower in non-myelinated neurones than in myelinated neurones.

(2)

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(Total for Question 3 = 7 marks)

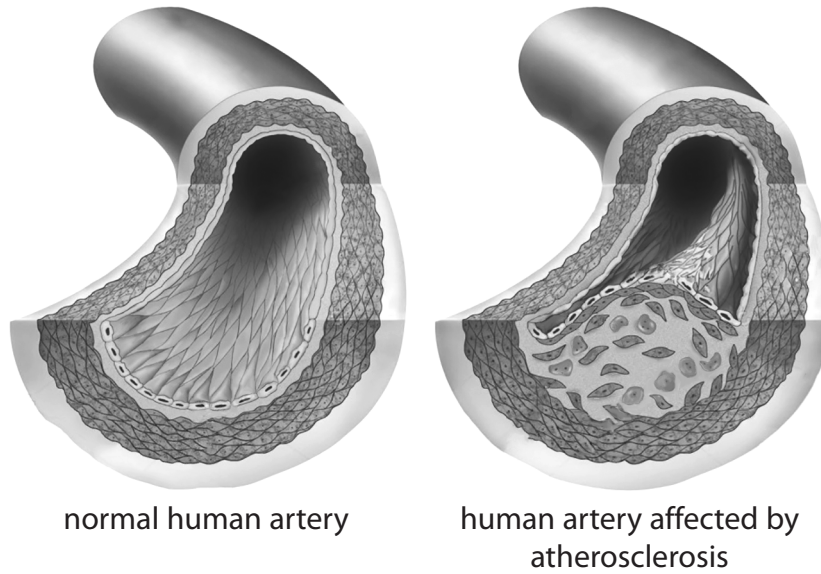


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4 Smoking is a risk factor for the development of the disease atherosclerosis.

Damage to the artery wall may lead to atherosclerosis.

Figure 6 shows a part of a normal human artery and a part of an artery with atherosclerosis.



© Encyclopaedia Britannica/UIG/Getty Images

Figure 6

Discuss how smoking is a risk factor for the development of atherosclerosis.

(6)

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(Total for Question 4 = 6 marks)

TOTAL FOR PAPER = 30 MARKS



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