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Pearson BTEC Centre Number Learner Registration Number
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Applied Science

Unit 1: Principles and Applications of Science I
Biology
SECTION A: STRUCTURES AND FUNCTIONS OF CELLS AND TISSUES

Thursday 24 May 2018 – Afternoon Time: 40 minutes	Paper Reference 31617H/1B
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You must have: A calculator	Total Marks
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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 is comprised of 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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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 put a cross in another box ☒.

1 Pond water contains a variety of plant and animal organisms.

A light microscope can be used to produce a photomicrograph of these organisms.

Figure 1 is a photomicrograph of a eukaryotic organism.

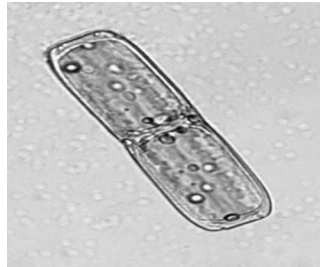


Figure 1

(a) State what is meant by the term **eukaryotic**.

(1)

(b) Identify the cellular structure found in **both** animal and plant cells.

(1)

- A cell wall
- B 70S ribosomes
- C mitochondria
- D tonoplast

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(c) A eukaryotic cell has an actual diameter of 25 μm .

The observed diameter of the eukaryotic cell in a photomicrograph is 1.5 cm.

Calculate the magnification used to view the image.

Show your working.

(3)

Magnification = \times

(Total for Question 1 = 5 marks)

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2 Figure 2 shows an electron micrograph of a bacterium.

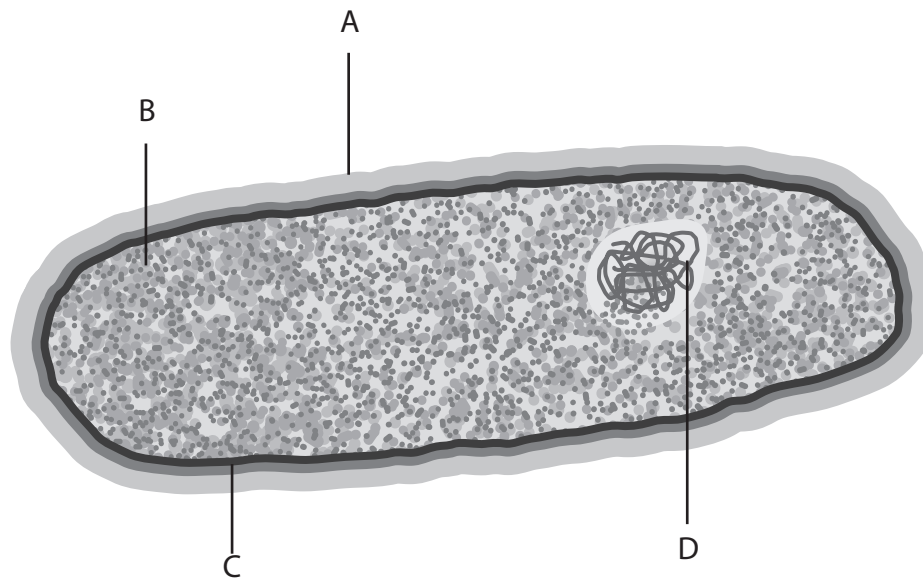


Figure 2

(a) Identify the capsule in Figure 2.

(1)

- A
- B
- C
- D

(b) Give **two** functions of plasmids in bacteria.

(2)

Function one.....

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Function two.....

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(c) Bacteria can be classified as Gram-positive or Gram-negative.

Identify which row in Table 1 shows the correct cell wall structure of Gram-negative bacteria.

(1)

	Peptidoglycan layer thickness	Outer membrane
1	Thick	Present
2	Thin	Present
3	Thick	Absent
4	Thin	Absent

Table 1

- A 1
- B 2
- C 3
- D 4

(Total for Question 2 = 4 marks)



3 Skeletal muscle enables voluntary movement.

Figure 3 shows skeletal muscle, muscle fibres and myofibrils.

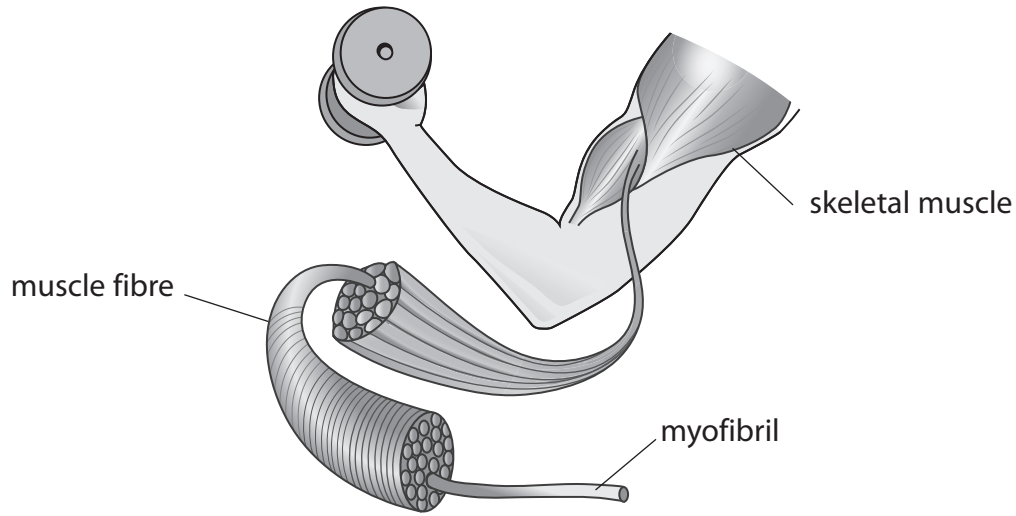


Figure 3

(a) (i) Name the **two** contractile proteins found in a skeletal muscle myofibril.

(2)

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(ii) Name the cell surface membrane of a skeletal muscle cell.

(1)

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(b) Skeletal muscle contains large stores of glycogen.

Explain the function of glycogen in skeletal muscle.

(2)

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(c) There are two main types of skeletal muscle fibre: slow twitch and fast twitch.

Marathon runners have a higher percentage of slow twitch fibres in their skeletal muscles.

There are more mitochondria in slow twitch fibres than in fast twitch fibres.

Marathon runners can run longer distances than sprinters.

Explain how having more mitochondria in their muscle fibres enables marathon runners to run for longer distances than sprinters.

(3)

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(Total for Question 3 = 8 marks)

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4 Serotonin is a neurotransmitter produced by certain neurones in the brain.

Figure 4 shows a synapse in the brain.

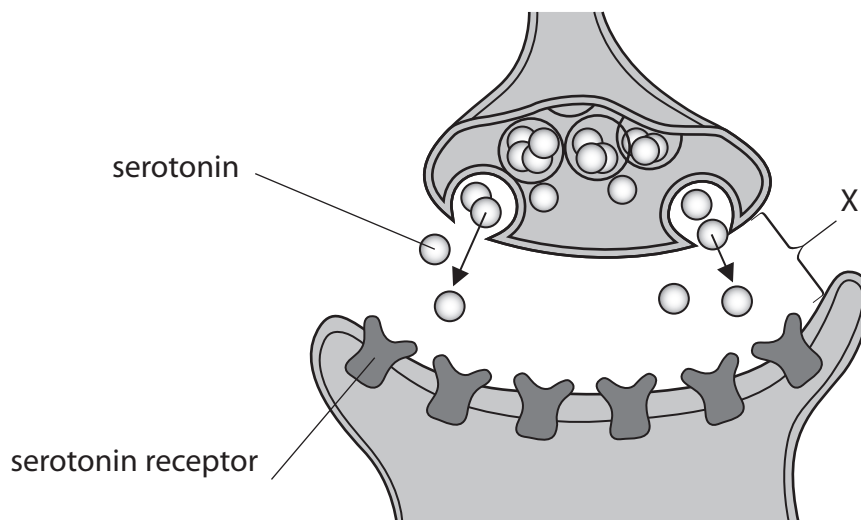


Figure 4

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

(1)

(b) Explain how an impulse can only travel in one direction across region X.

(2)

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(c) Explain how imbalances in serotonin in the brain may affect a person's mood.

(4)

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(Total for Question 4 = 7 marks)

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5 Figure 5 shows red blood cells in a capillary.

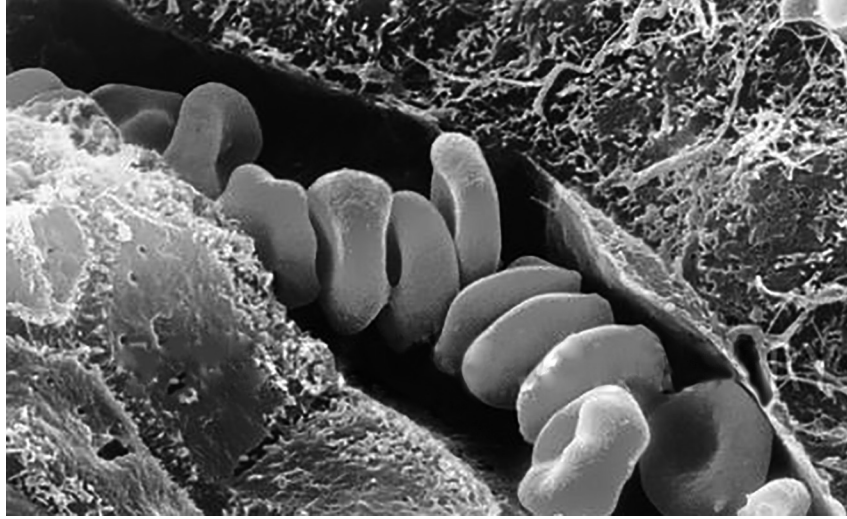


Figure 5

Explain how the structure of red blood cells enables them to transport oxygen around the body.

(6)

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Handwriting practice area with 20 horizontal dotted lines.

(Total for Question 5 = 6 marks)

TOTAL FOR PAPER = 30 MARKS



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