Please check the examination details below before entering your candidate information

Candidate surname	Other names

Pearson BTEC Level 3 Nationals Certificate, Extended Certificate, Foundation Diploma, Diploma, Extended Diploma

Centre Number | Learner Registration Number

Tuesday 12 January 2021

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.

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 ▶

P67503A

1/1/1/1/1/1/1/1/1/1

P 6 7 5 0 3 A 0 1 1 2

Pearson

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 An electrocardiogram (ECG) can be used to monitor electrical activity in the heart.

Figure 1 shows part of an ECG trace.

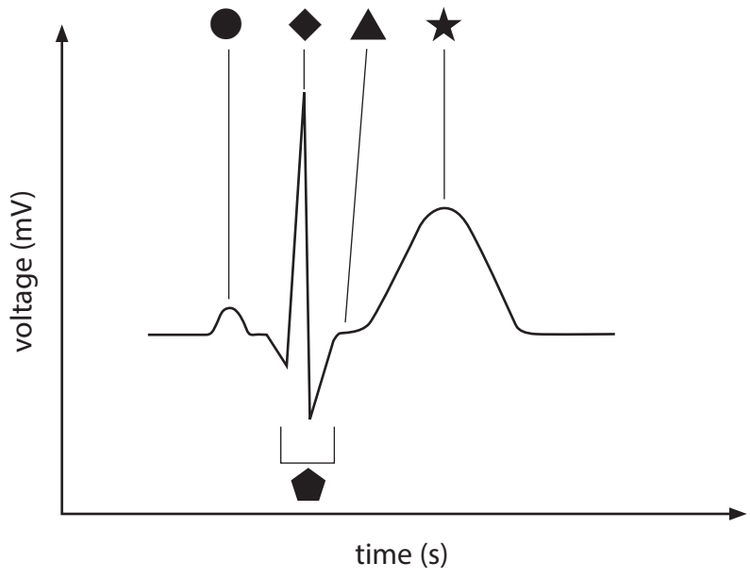

Figure 1

(a) (i) Identify the P-wave in Figure 1.

(1)

☒ **A** ●

☒ **B** ◆

☒ **C** ▲

☒ **D** ★

(ii) Name the ECG complex that ⬟ represents in Figure 1.

(1)

(b) Cardiovascular disease may occur when the lining of arteries becomes damaged.

(i) Identify the type of tissue that forms the lining of the inside of arteries.

(1)

- ☒ **A** connective
- ☒ **B** endothelial
- ☒ **C** muscular
- ☒ **D** nervous

(ii) Figure 2 shows some of the stages of the development of atherosclerosis in arteries.

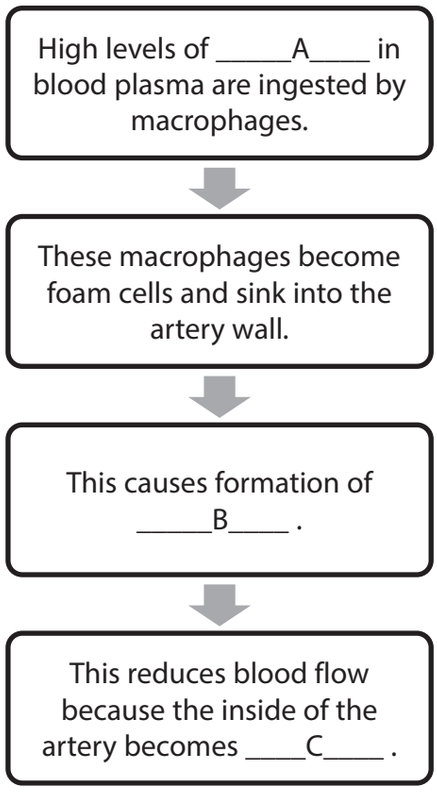

Figure 2

Identify the missing words, A, B and C, in Figure 2.

(3)

A .....

B .....

C .....

(Total for Question 1 = 6 marks)

2 Light microscopes use visible light and several lenses to magnify a specimen.

Figure 3 shows a light microscope used to observe a plant cell.

(Source: © OrangeVector/Shutterstock)

Figure 3

(a) A plant cell viewed with the light microscope has an observed width of 13.2 mm.

The plant cell has an actual width of 33 µm.

Calculate the magnification used to observe the plant cell.

Show your working.

(3)

magnification = ... x

(b) Two advantages of light microscopes compared to electron microscopes are:

- Light microscopes are cheaper.
- Light microscopes are easier to use.

(i) Give **two other** advantages of using a light microscope.

(2)

1 .....

.....

2 .....

.....

(ii) Explain **one** limitation of using a light microscope.

(2)

.....

.....

.....

.....

(Total for Question 2 = 7 marks)

3 (a) A myofibril contains the myofilament actin.

Name the **other** myofilament in a myofibril.

(1)

.....

(b) Muscle fibres are eukaryotic cells.

Some organelles in eukaryotic cells have a double membrane.

Identify the pair of organelles that both have a double membrane.

(1)

- ☒ **A** mitochondrion and lysosome
- ☒ **B** mitochondrion and ribosome
- ☒ **C** nucleus and mitochondrion
- ☒ **D** nucleus and ribosome

(c) The heart is an example of an organ.

Give **two** reasons why the heart is called an organ.

(2)

1 .....

.....

2 .....

.....

(Total for Question 3 = 4 marks)

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4 Action potentials are generated along a neurone.

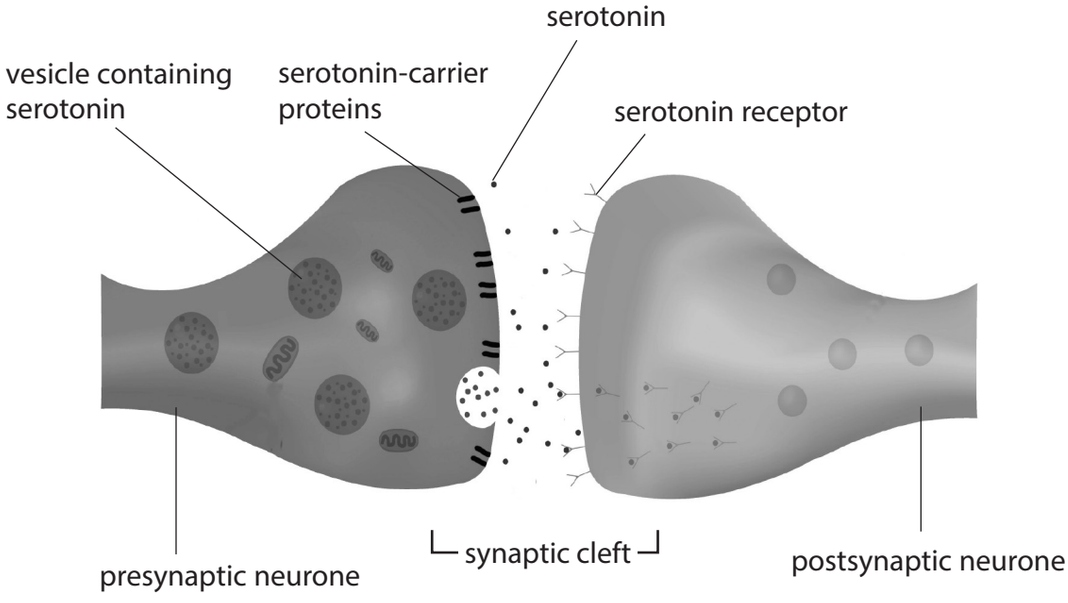
(a) Name the ion that enters a neurone during the depolarisation phase of an action potential.

(1)

.....

(b) In the brain, some neurones produce a neurotransmitter called serotonin.

Figure 4 shows a synapse where serotonin is released.



(Source: © Medical Labeled / Alamy Stock Vector)

Figure 4

After serotonin has completed its function, it is rapidly reabsorbed by carrier proteins on the presynaptic neurone.

Explain why neurotransmitters are reabsorbed.

(2)

.....

.....

.....

.....

(c) A patient with depression visits their doctor.

The doctor prescribes Drug F to improve the patient's mood.

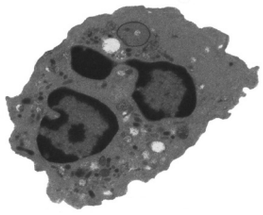
Drug F prevents the reabsorption of serotonin at synapses.

Explain how the action of Drug F may improve the patient's mood.

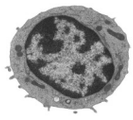
(4)

(Total for Question 4 = 7 marks)

5 Figure 5 shows the ultrastructure of a neutrophil and of a lymphocyte.



neutrophil



lymphocyte

(Source: © Steve Gschmeissner / Science Photo Library)

Figure 5

Compare the structures and functions of neutrophils and lymphocytes.

Your answer should refer to similarities and differences.

(6)

(Total for Question 5 = 6 marks)

TOTAL FOR SECTION A = 30 MARKS

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