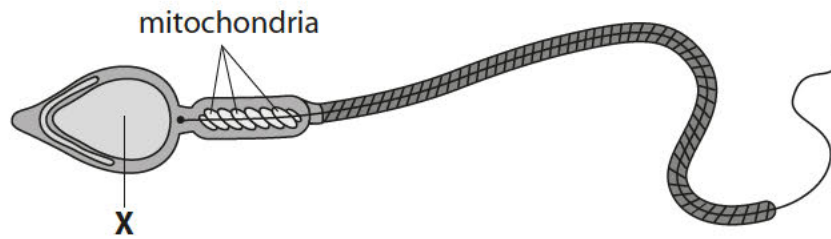


1 The diagram shows a human sperm cell.



(a) (i) Structure **X** on the diagram contains DNA.

Name structure **X**.

(1)

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(ii) Which statement is true for DNA?

Place a cross (☒) in the box next to your answer.

(1)

- A** DNA is made up of amino acids and bases.
- B** DNA is made up of amino acids which give instructions to make proteins.
- C** In DNA, the bases A and T are complementary.
- D** Every gene in a DNA molecule contains only three bases.

(b) Sperm cells are involved in fertilisation.

Define fertilisation.

(2)

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(c) (i) Describe the function of mitochondria.

(2)

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(ii) Gene mutations in DNA can produce abnormal mitochondria.

Explain how a gene mutation can produce a different protein.

(2)

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**(Total for Question 1 = 8 marks)**

2 (a) (i) Complete the sentence by putting a cross (☒) in the box next to your answer.

A person with diabetes cannot control

(1)

- A** the water content of their blood
- B** the glucose content of their blood
- C** their body temperature
- D** their body mass index

(ii) Explain how Type 1 diabetes can be controlled.

(3)

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(b) Adrian is 180 cm tall and has a mass of 120 kg.

A person who has a high Body Mass Index (BMI) is more likely to develop Type 2 diabetes.

Calculate Adrian's BMI using the equation.

$$\text{BMI} = \frac{\text{mass in kilograms}}{(\text{height in metres})^2}$$

(2)

answer = .....

\*(c) Body movement is controlled by nerve impulses.

Explain how impulses are transmitted in a reflex arc to prevent a person from injuring themselves.

(6)

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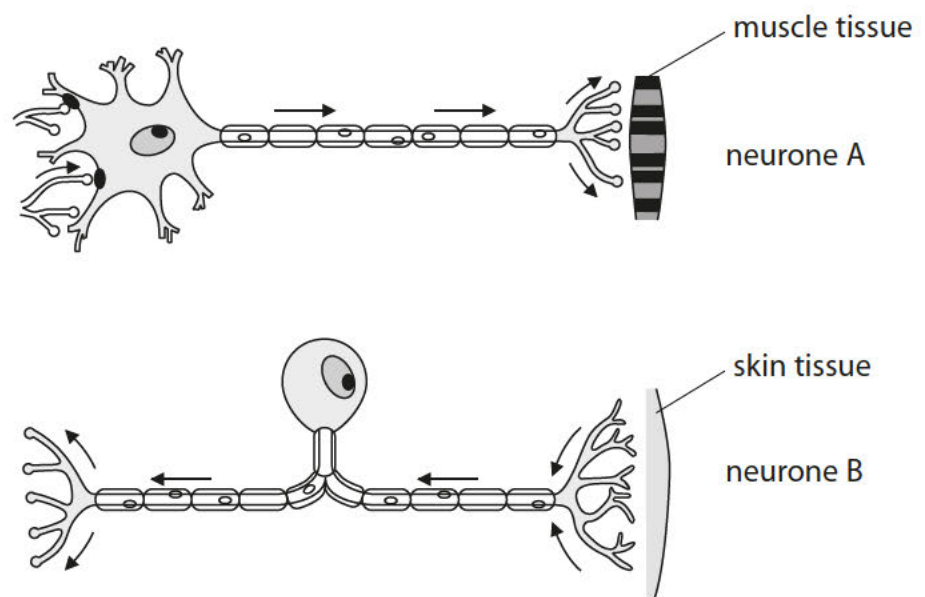
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**(Total for Question 2 = 12 marks)**

3 The diagrams show the structure of two neurones A and B.



(a) Complete the sentences by putting a cross (☒) in the box next to your answer.

(i) Neurone A is a

(1)

- A** motor neurone
- B** reflex neurone
- C** relay neurone
- D** sensory neurone

(ii) Neurone B sends information to the

(1)

- A** brain and spinal cord
- B** hormones which results in a response
- C** muscle tissue
- D** receptor cells in the skin

(b) Explain how information travels along the axon of a sensory neurone.

(2)

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(c) Describe the role of the myelin sheath.

(2)

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(d) Describe the pathway of a nerve impulse through a reflex arc.

(3)

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**(Total for Question 3 = 9 marks)**

4 There are many different types of cell in the human body.

(a) Complete the sentence by putting a cross (☒) in the box next to your answer.

An embryonic stem cell can

(1)

- A** differentiate into any type of cell
- B** differentiate into only one type of cell
- C** only be obtained from embryos
- D** only produce haploid cells

(b) Describe how the structure of a red blood cell is related to its function.

(3)

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(c) Describe the function of platelets.

(2)

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\*d) Mitosis and meiosis are types of cell division.

Compare these two types of cell division.

(6)

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**(Total for Question 4 = 12 marks)**