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**SECTION A**

**Answer THREE questions in this section.**

**If you answer Question 1, put a cross in this box .**

1. (a) When a person's finger touches a very hot plate, a reflex action results in the person pulling the finger away immediately.

(i) State **three** features of reflex actions.

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**(3)**

(ii) Draw a diagram of a spinal reflex arc. On your diagram, label the regions of the spinal cord and the nerve pathway.

**(8)**





If you answer Question 2, put a cross in this box ☒.

2. (a) (i) Explain why the levels of oxygen and carbon dioxide in the blood change as a result of a high demand for energy in the body.

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- (ii) How does oxygen in the blood reach the interior of the muscle cells?

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(b) Describe how the carbon dioxide content of the blood is kept within narrow limits.

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(c) Name the hormone that affects the rate of breathing and describe other effects of this hormone that help prepare the body for vigorous activity.

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**(Total 20 marks)**

**Q2**

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If you answer Question 3, put a cross in this box ☒.

3. Sickle cell anaemia is an inherited condition that can be lethal in the homozygous state. In the heterozygous state, the red blood cells become sickle shaped in low oxygen concentrations. This change in the shape of the red blood cells reduces their ability to carry oxygen and they may now block some capillaries.

(a) (i) What is meant by the term **heterozygous**?

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(ii) The allele that causes sickle cell anaemia is said to be codominant with the normal allele. What is meant by the term **codominant**?

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(b) A boy first showed the symptoms of sickle cell anaemia during a football game. His elder brother had died from the condition as a baby. What are the chances that his younger sister may also show the symptoms? You may draw a genetic diagram to help to explain your answer.

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(c) (i) Explain why a person heterozygous for sickle cell anaemia is most likely to develop sickle-shaped cells when performing vigorous exercise.

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(ii) Suggest why, in some cases, the symptoms of the disease may be reduced by a suitable blood transfusion.

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QUESTION 3 CONTINUES ON PAGE 8



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(iii) Suggest why a severe attack of the condition, if untreated, may result in permanent damage to body organs or even death.

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(d) Inherited disorders can arise as the result of a mutation.

(i) What is a **mutation**?

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(1)

(ii) Name **two** possible causes of mutations and state where a mutation would occur if it is to affect children of the next generation.

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Q3

(Total 20 marks)





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If you answer Question 4, put a cross in this box ☒.

4. (a) (i) Draw a large fully labelled diagram of the renal system.

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(b) (i) In the body, the water content of the blood remains within narrow limits. Why is this important?

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(ii) In cases of severe diarrhoea, too much water is lost. This can be replaced by Oral Rehydration Therapy (ORT). Explain why ORT is both cheap and effective.

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Q4

(Total 20 marks)

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If you answer Question 5, put a cross in this box ☒.

5. Describe the structure of each of the following parts of the skeleton. For each structure, explain how it is adapted for the special functions it carries out.

(a) The skull

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(b) The rib cage

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**QUESTION 5 CONTINUES ON PAGE 14**





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**SECTION B**

**Answer any TWO questions in this section.**

**If you answer Question 6, put a cross in this box .**

6. The parasite that causes the disease malaria is endemic in parts of the world where the climate is suitable for the survival of its vector, the *Anopheles* mosquito.

- (a) (i) Explain the meaning of each of the terms **endemic** and **vector**.

Endemic .....

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Vector .....

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(ii) Describe, with reasons, the conditions that are necessary for the vector of the malarial parasite to complete its life cycle.

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(iii) Suggest, with reasons, **three** measures that the authorities could take to break the life cycle of the mosquito.

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(b) Many people visit regions where malaria occurs. Explain **three** measures that people visiting a region where malaria occurs could take before or during their visit to reduce the risk of contracting malaria.

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Q6

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If you answer Question 7, put a cross in this box ☒.

7. A man cuts his foot on a rusty nail while digging in the garden and it begins to bleed.

(a) (i) Suggest reasons why the wound caused by the nail should be rinsed with cold running water for several minutes.

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(ii) Why should the wound then be covered?

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(b) (i) Describe the events in the body that prevent further blood loss from the wound.

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**QUESTION 7 CONTINUES ON PAGE 20**



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(ii) Describe how the body would deal with any pathogens that had entered the wound.

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(c) If the wound is seen by a doctor, a course of antibiotics may be prescribed. What is an antibiotic and why might it be prescribed?

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Q7

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If you answer Question 8, put a cross in this box ☒.

8. (a) (i) Why should human urine and faeces never be left on the surface of the ground or got rid of into waterways?

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(ii) Some houses use latrines for the safe disposal of urine and faeces. Describe how you would choose a site for a pit latrine and explain the reason for each stage in its construction.

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(b) Some houses rely on the use of a septic tank to make sewage safe. A septic tank usually consists of two chambers containing different types of microorganisms.

Explain the role of these microorganisms in the breakdown of excretory material in the septic tank.

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Q8

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If you answer Question 9, put a cross in this box ☒.

9. Many people think that some of the activities of humans damage the environment for all living things.

Suggest some harmful effects of each of the following.

- (a) Pollution resulting from the increased burning of fossil fuels for energy

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(b) Attempts to increase crop yields from agricultural land, including the use of fertilisers

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**QUESTION 9 CONTINUES ON PAGE 26**



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(c) The rapid rise in human populations in some regions

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Q9

(Total 20 marks)

**TOTAL FOR SECTION B: 40 MARKS**

**TOTAL FOR PAPER: 100 MARKS**

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