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Answer ALL questions in the spaces provided.

1. (a) The table below compares three features of nervous and hormonal coordination. Complete the table to show the differences between the two types of coordination.

Feature	Nervous coordination	Hormonal coordination
Method of transmission		
Speed of transmission		
Duration of the response		

(3)

- (b) Give **one** similarity between the methods of transmission involved in nervous and hormonal coordination.

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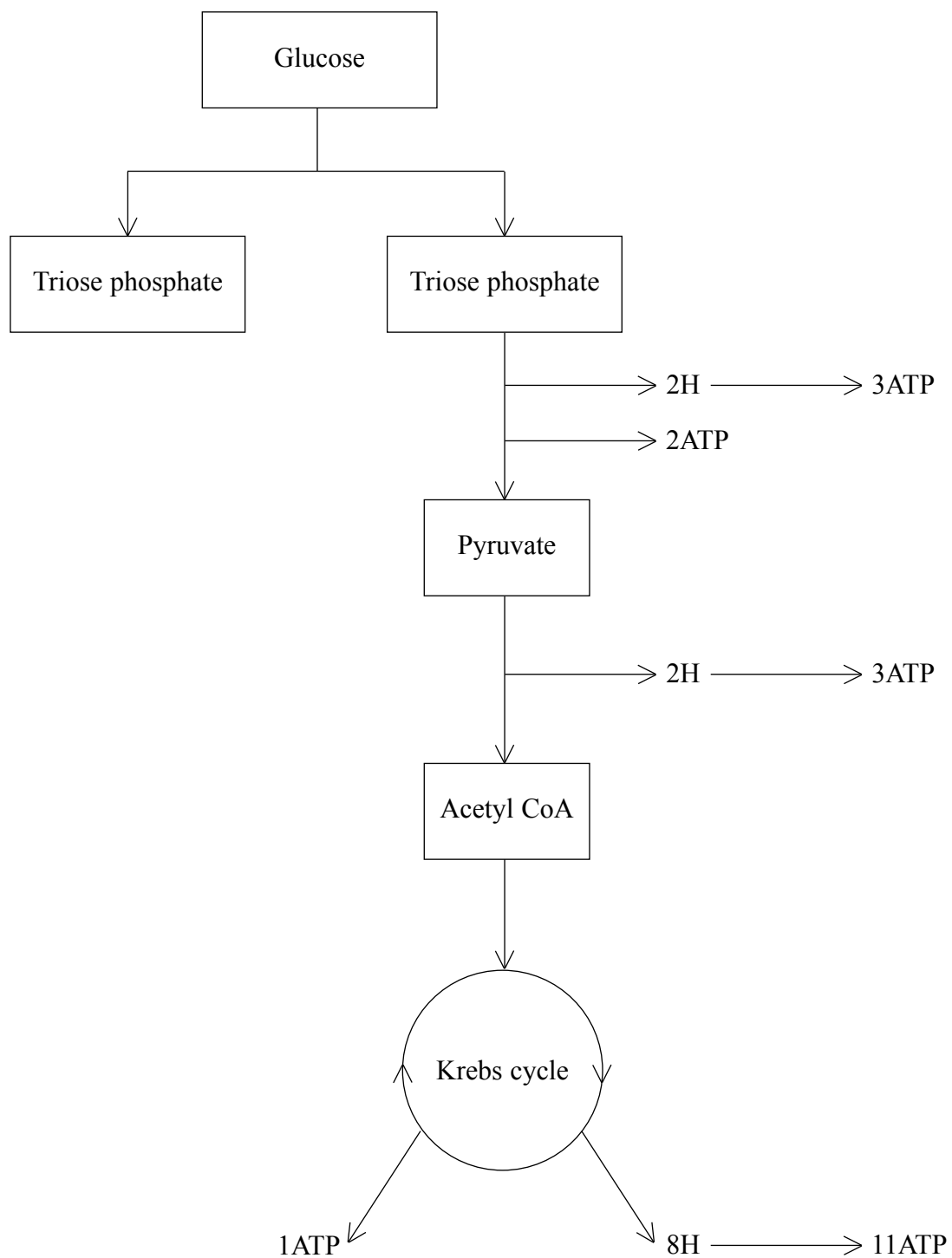
(1)

Q1

(Total 4 marks)



3. The flow diagram below shows some of the steps involved in glycolysis and the Krebs cycle. Some ATP is made directly. Hydrogen is also released and this can result in the production of more ATP.



(a) Describe how the hydrogen released during glycolysis and the Krebs cycle results in the production of ATP.

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(4)

(b) Using the information in the diagram, state the number of ATP molecules produced from **one** triose phosphate molecule.

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(1)

(c) As well as carbohydrates, triglycerides can be respired. The first step is to break down each triglyceride molecule into glycerol and three fatty acids.

Each fatty acid is broken down into acetyl CoA molecules. The acetyl CoA molecules then enter the Krebs cycle.

(i) Using the information in the diagram, state the number of ATP molecules produced from **one** acetyl CoA molecule.

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(1)

(ii) Suggest why fatty acids can only be respired under aerobic conditions.

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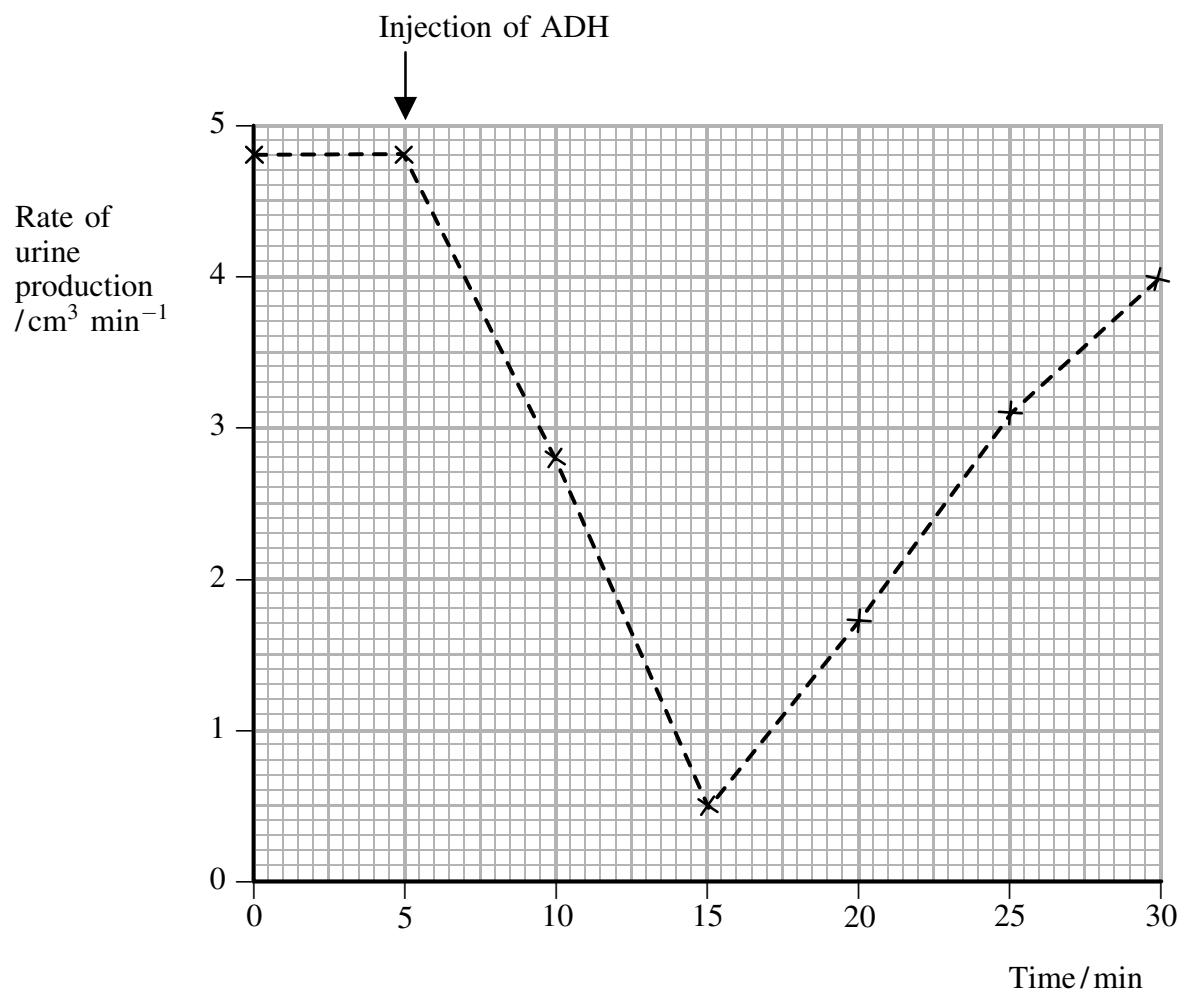
(3)

(Total 9 marks)

Q3



4. An investigation was carried out into the effect of antidiuretic hormone (ADH) on urine production in a mammal. The rate of urine production was measured over a period of 30 minutes. Five minutes after measurements began, ADH was injected into a vein of the mammal. The results are shown in the graph below.



- (a) Name the gland that releases ADH.

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- (b) Describe the effect of the injection of ADH on the rate of urine production in the mammal in this investigation.

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(c) Describe the mechanism by which ADH produces the effect seen in this investigation.

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(d) In a similar investigation, an injection of sodium chloride (salt) solution was given after five minutes instead of ADH. This injection was observed to affect urine production in a similar way to ADH. Suggest how the sodium chloride brought about this effect.

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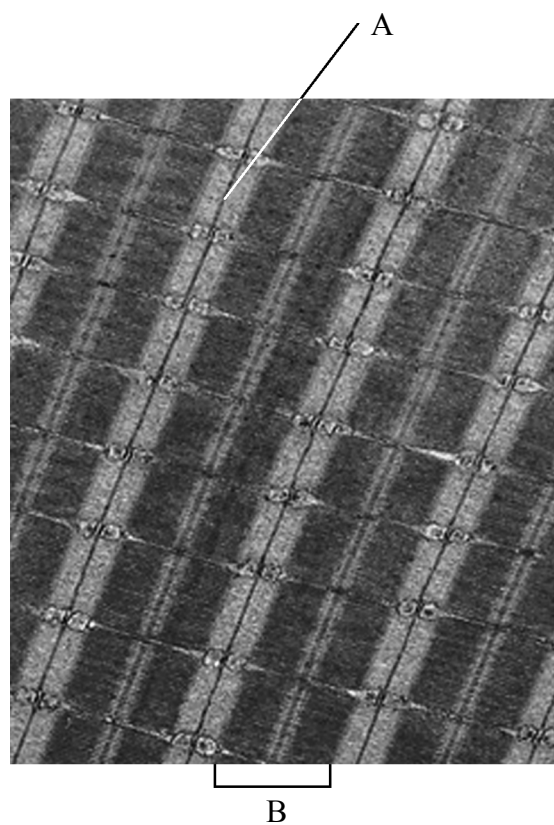
Q4

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Option C: Human health and fitness.

6. The electron micrograph below shows a longitudinal section of a muscle fibre.



Dr Don Fawcett/Science Photo Library

(a) (i) State the number of myofibrils shown in the electron micrograph.

..... (1)

(ii) Name part A.

..... (1)

(b) Calculate the magnification if the section labelled B is actually 1.6 μm wide. Show your working.

Answer (2)



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(c) Describe a practical procedure to demonstrate that ATP causes muscle contraction.

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(3)

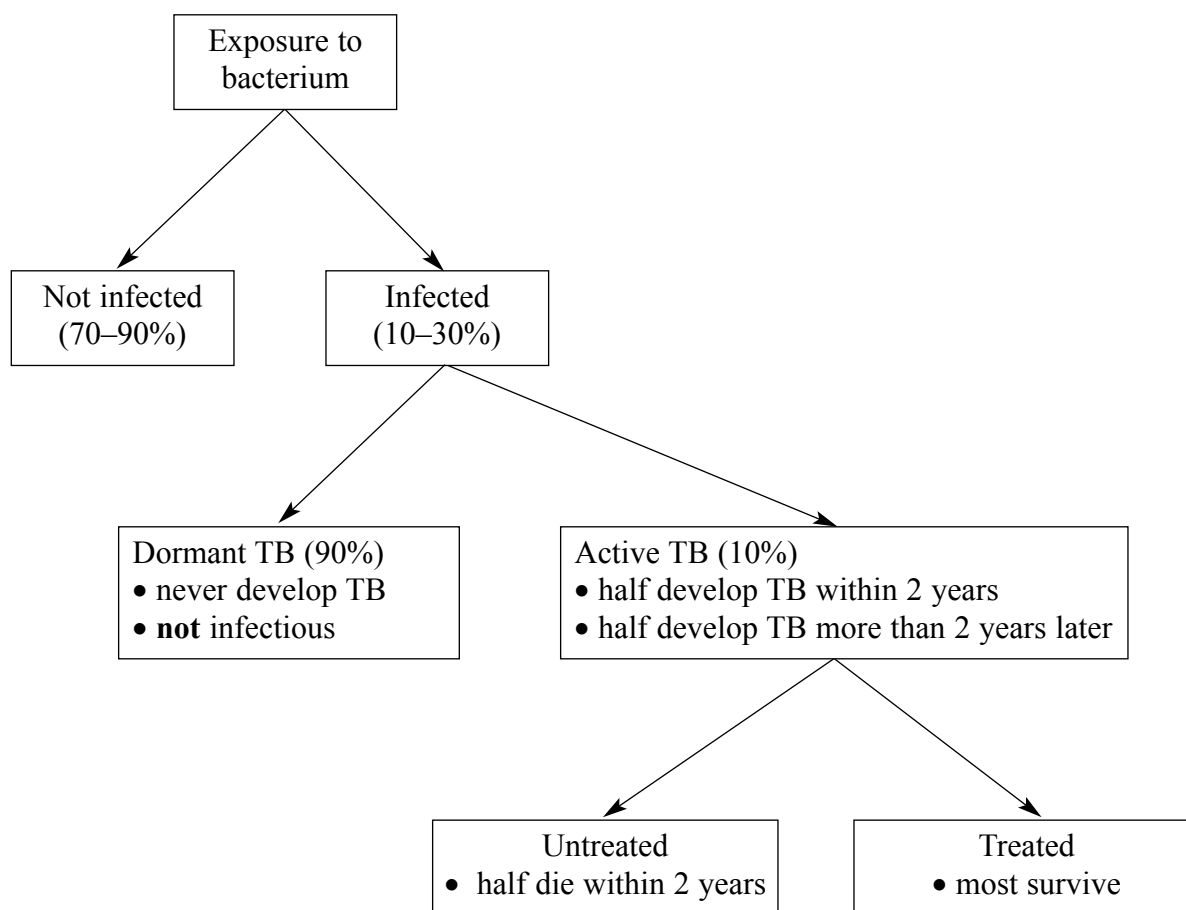
Q6

(Total 7 marks)



N 2 1 4 3 1 A 0 1 1 2 0

7. The diagram below shows the possibility of developing tuberculosis (TB) when people are exposed to the bacterium *Mycobacterium tuberculosis*.



(a) Name the organ which is the most commonly infected by *M. tuberculosis*.

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(1)

(b) Suggest why 90% of people who are infected by *M. tuberculosis* never develop TB.

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(2)



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(c) Outline the treatment for those people with active TB.

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(3)

Q7

(Total 6 marks)



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8. (a) Ventilation rate changes in response to different levels of physical activity. Explain how these changes are brought about.

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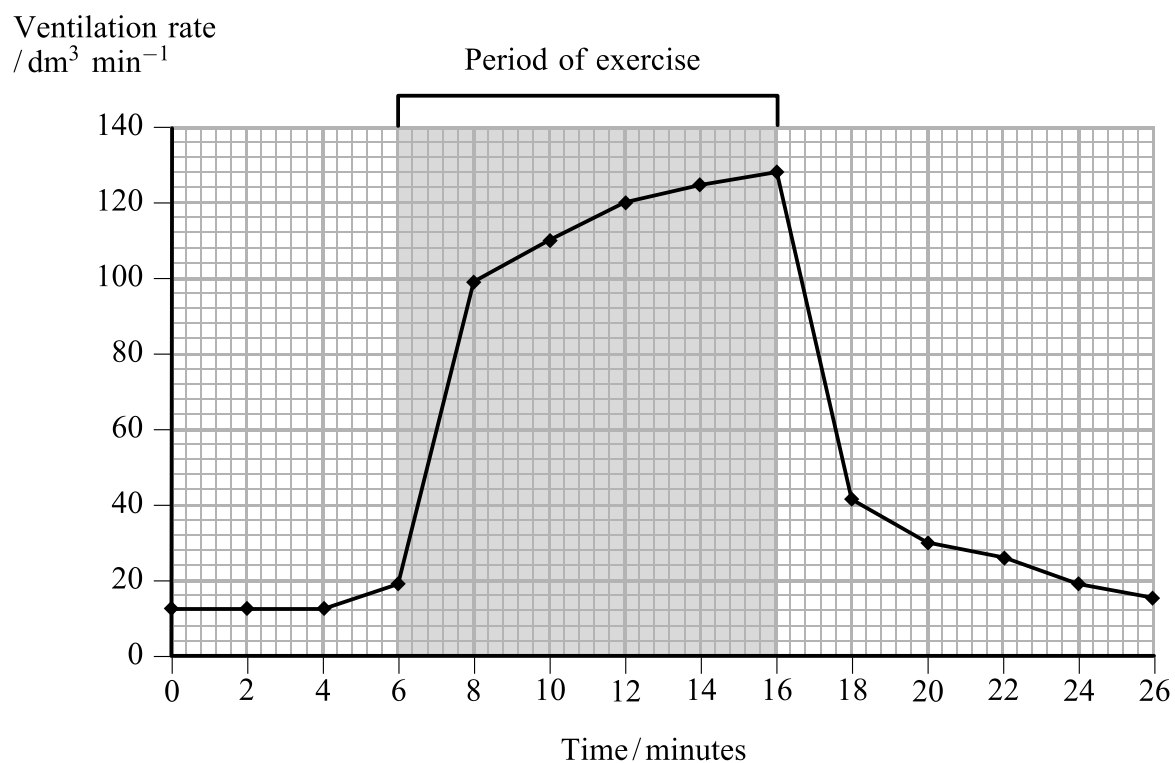
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(4)



(b) The graph below shows changes in the ventilation rate of an athlete before, during and after a 10 minute period of strenuous exercise.



Describe the changes in the ventilation rate in the two minutes before exercise and during the period of exercise.

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(3)

(c) Suggest how the ventilation rate, during and after exercise, would differ in an untrained individual completing the same type of exercise for the same length of time.

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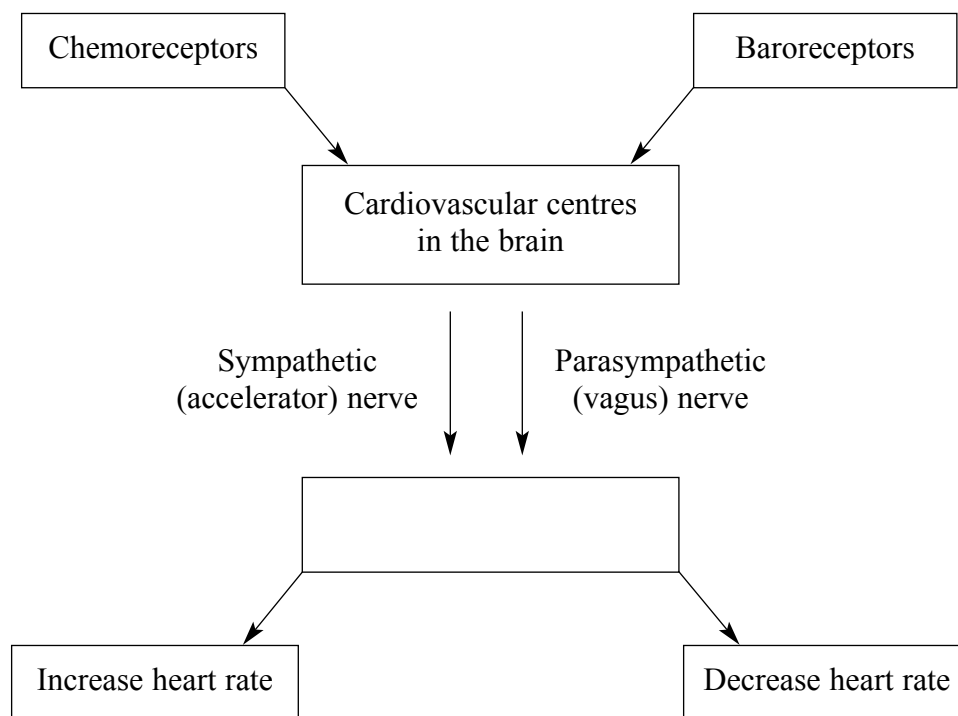
(2)

(Total 9 marks)

Q8



9. The diagram below illustrates some aspects of the regulation of heart rate.



(a) Complete the flow diagram by naming the part of the heart that receives impulses from the two nerves. (1)

(b) Strenuous physical activity will increase the volume of blood flowing through the venae cavae and into the right atrium. This will trigger a reflex action.

(i) Name the reflex that will be initiated.

..... (1)



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(ii) Using your own knowledge and the information provided, explain how this increase in blood volume in the venae cavae and right atrium causes a change in heart rate.

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(3)

(c) The coordination of the heart beat is disrupted when the conducting systems of the heart are damaged. This type of disease is called heart block. Describe how an artificial pacemaker can be used to treat this condition.

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(3)

Q9

(Total 8 marks)

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