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Answer ALL questions in the spaces provided.

1. Read through the passage below on the heart, and then write on the dotted lines the most appropriate word or words to complete the passage.

Contraction of the atria (atrial systole) is stimulated by an impulse generated by
the, situated in the wall of the right atrium.

The impulse reaches the walls of the by means of the
bundle of His and Purkyne (Purkinje) fibres.

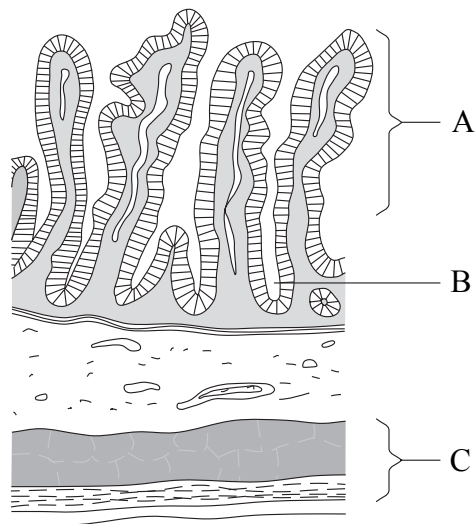
Oxygenated blood is supplied to the heart muscle by the
which branch directly from the aorta. Heart muscle contains a dense network
of, from which oxygen diffuses to the muscle.

(Total 4 marks)

Q1



2. The diagram below shows the structure of part of the ileum wall, as seen using the low magnification of a light microscope.



Magnification $\times 40$

(a) Name the parts labelled **A**, **B** and **C**.

A

B

C

(3)

(b) Explain how the part labelled **A** assists in the absorption of glucose.

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(3)

(Total 6 marks)

Q2



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3. (a) Explain how the properties of a haemoglobin molecule make it an efficient respiratory pigment.

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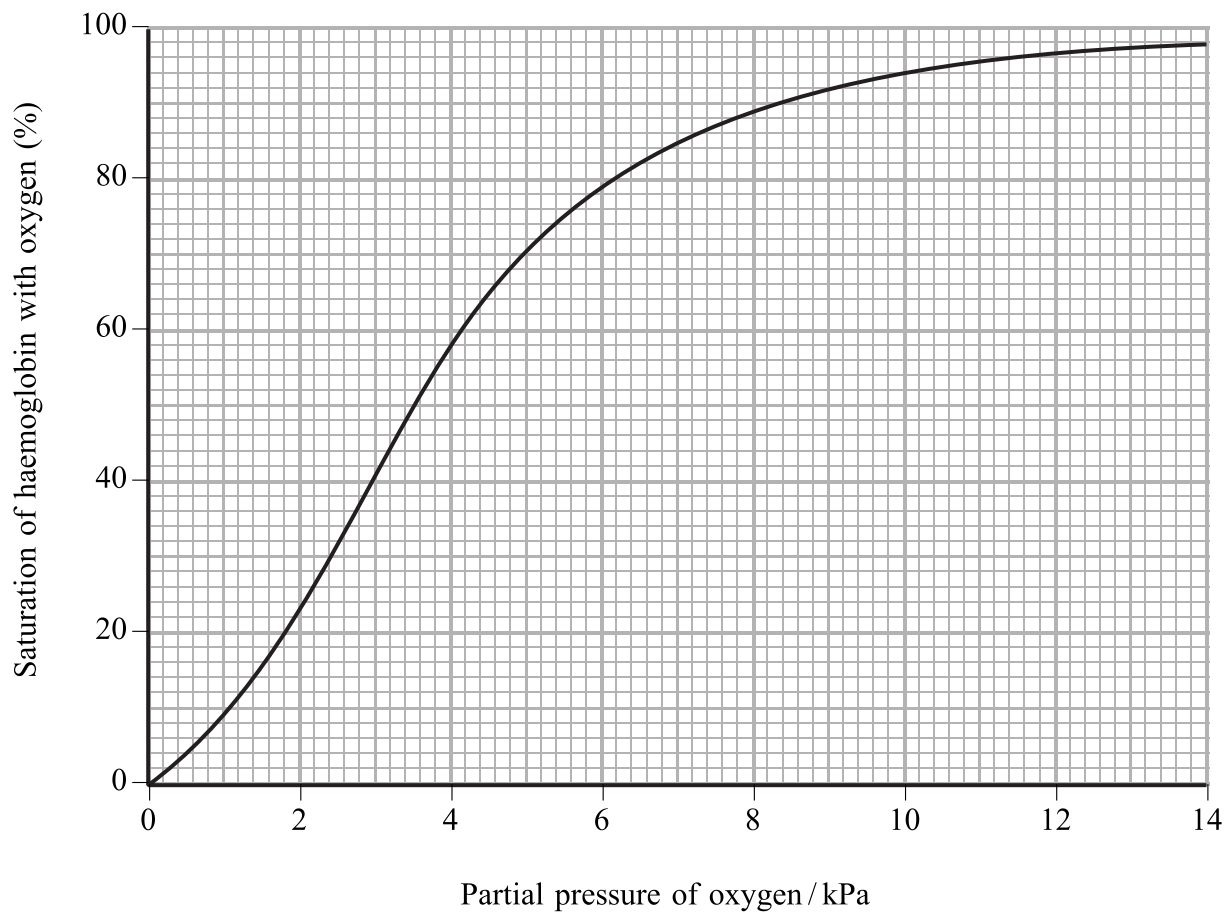
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(3)



(b) The graph below shows an oxygen dissociation curve for adult human haemoglobin.



(i) From the graph, find the partial pressure of oxygen at which the haemoglobin is 50% saturated with oxygen.

.....kPa

(1)

(ii) The dissociation curve for fetal haemoglobin is situated to the left of the dissociation curve for adult haemoglobin. Explain the importance of this to the developing fetus.

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(2)

(Total 6 marks)

Q3



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4. (a) Describe the functions of each of the following hormones.

(i) Oestrogen.....

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(3)

(ii) Oxytocin.....

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(3)



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(b) The table below shows changes in the concentration of progesterone in the blood, during the first 36 weeks of pregnancy.

Time / weeks	0	4	12	20	28	36
Concentration of progesterone / arbitrary units	7	8	10	13	20	55

(i) Describe the changes in the concentration of progesterone as shown in the table.

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(2)

(ii) Give **two** functions of progesterone.

1

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2

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(2)

(Total 10 marks)

Q4

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5. (a) State the effect that an increase in altitude has on the partial pressure of oxygen in the air.

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(1)

- (b) Morococha is a village at an altitude of 4500 m in Peru, South America. The saturation with oxygen of arterial blood of the people living in the village was measured and found to be 73%, compared with 97% in people living at a lower altitude.

The total volume of oxygen in a unit volume of blood from people living in Morococha was found to be the same as that in people living at a lower altitude.

Suggest reasons for each of the following:

- (i) The percentage saturation of haemoglobin with oxygen of people living in Morococha is lower than that of people living at a lower altitude.

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(1)

- (ii) The total volume of oxygen per unit volume of blood in people living in Morococha is the same as in blood from people living at a lower altitude.

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(2)



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(c) Suggest and explain **one** other way, apart from differences in the heart and circulation, that the people of Morocochoa may be adapted or acclimatised to living at 4500 m.

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(3)

Q5

(Total 7 marks)



6. (a) Describe the role of an **artificial pacemaker**.

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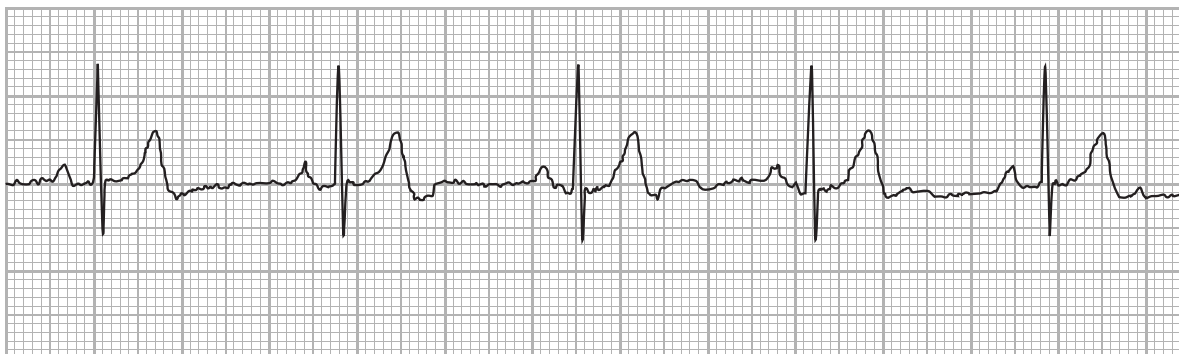
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(3)

(b) The recording below is an electrocardiogram (ECG) from a healthy person.



(i) On the ECG, label a **T wave**.

(1)



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(ii) This ECG was recorded over a period of 5 seconds. Count the number of complete cardiac cycles, and then calculate the heart rate, in beats per minute. Show your working.

Number of complete cardiac cycles =

Heart rate = beats per minute.
(3)

(Total 7 marks)

Q6



7. (a) Explain what is meant by each of the following terms.

(i) Osteoarthritis.....
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(2)

(ii) Menopause.....
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(2)



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(b) The table below shows the incidence of osteoarthritis of the knee in British men and British women aged 40, 50, 60 and 70 years.

Age / years	Incidence of osteoarthritis (%)	
	Men	Women
40	6	4
50	8	15
60	28	40
70	25	48

(i) Describe the changes in the incidence of osteoarthritis in men between the ages of 40 and 70 years.

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(2)

(ii) Compare the incidence of osteoarthritis in men and women between the ages of 40 and 70 years.

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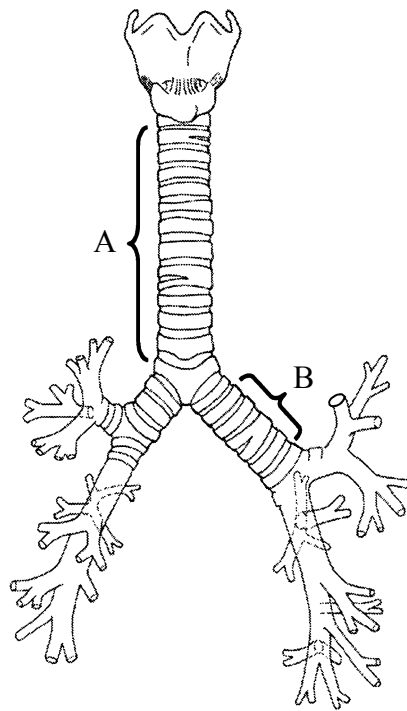
(2)

(Total 8 marks)

Q7



8. (a) The diagram below shows the structure of part of the human breathing system.



Name the parts labelled A and B.

A

B

(2)

(b) Describe how the process of inspiration (breathing in) is brought about.

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(3)



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(c) The table below shows the percentage of oxygen in inspired air and in alveolar air.

Air	Percentage of oxygen (%)
Inspired	20.71
Alveolar	13.20

Suggest an explanation for the difference in the percentage of oxygen in inspired air and in alveolar air.

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(2)

QUESTION 8 CONTINUES ON THE NEXT PAGE



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(d) Describe how **alveoli** are adapted for the function of gas exchange.

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(5)

Q8

(Total 12 marks)

TOTAL FOR PAPER: 60 MARKS

END

