Transport in Animals

Question Paper

Level	IGCSE
Subject	Biology
Exam Board	CIE
Topic	Transport in Animals
Sub-Topic	
Paper Type	Alternative to Practical
Booklet	Question Paper

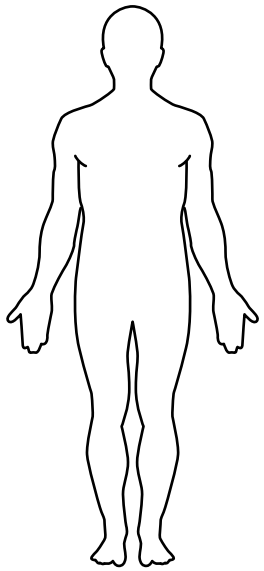
Time Allowed: **64 minutes**

Score: **/53**

Percentage: **/100**

1 The heart pumps blood to the body through the arteries. The rate of blood flow can be determined at certain sites around the body as a pulse. This can be used to estimate the heart rate.

(a) (i) On Fig. 2.1, label **two** sites where you can feel a pulse.



[2]

Fig. 2.1

(ii) Suggest **one** feature of these sites that makes it possible to feel a pulse.

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.....[1]

(b) Describe how you could measure the pulse and use this to estimate the heart rate.

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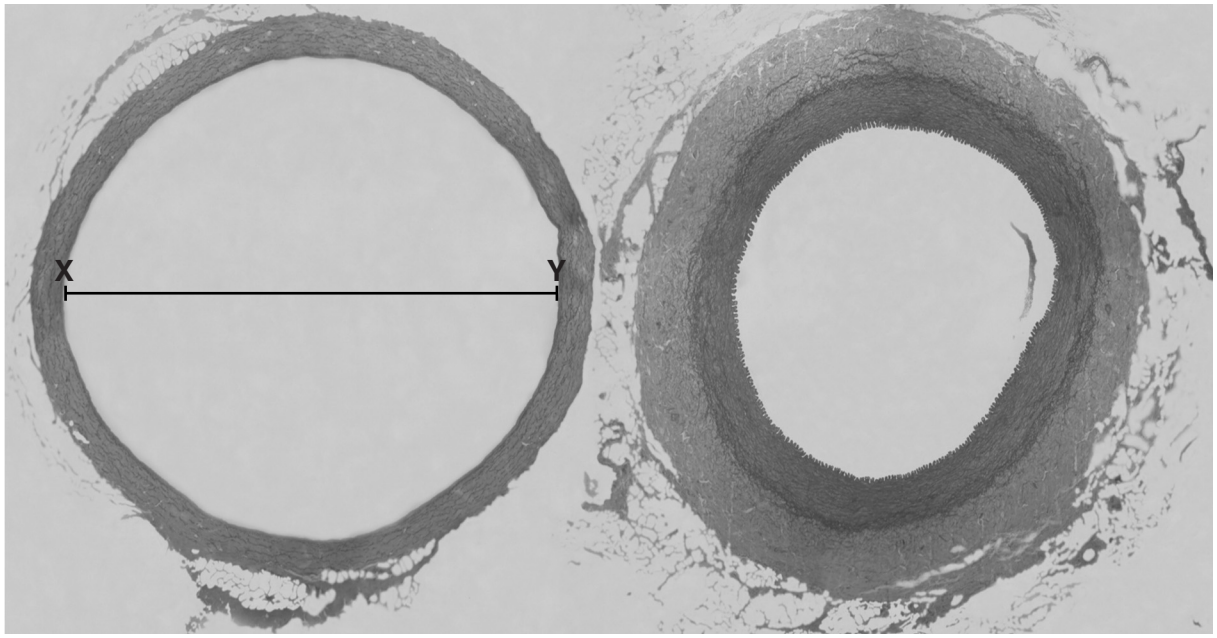
.....[2]

(c) Fig. 2.2 shows a section through two blood vessels, a vein and an artery, as seen on a prepared slide when viewed with the use of a microscope.



× 125

vein **artery**

Fig. 2.2

The diameter of the blood vessel in Fig. 2.2, shown by line **XY**, can be calculated using:

$$\text{diameter} = \frac{\text{measured length of line } \mathbf{XY} \text{ on image}}{\text{magnification}}$$

(i) Measure, in mm, the length of line **XY** on Fig. 2.2.

measured length of **XY** ..... mm [1]

(ii) Use the information above and your answer to **(i)** to calculate the diameter shown by line **XY**, in mm.

Show your working. Give your answer to one decimal place.

diameter ..... mm [1]

(iii) The length of **XY** may not be the most accurate measurement of the diameter of the blood vessel in Fig. 2.2.

Suggest how you could determine a more accurate measurement of the diameter.

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.....[2]

(iv) The vein and artery in Fig. 2.2 have features that are different.

Complete Table 2.1 to name **three** features that are different and describe the differences that you can observe in Fig. 2.2.

Table 2.1

feature	vein	artery
.....	.....	.....
	.....	.....
.....	.....	.....
	.....	.....
.....	.....	.....
	.....	.....

[4]

(d) When running the heart rate increases. After running the heart rate returns to normal.

(i) Plan an investigation to compare the increase in heart rate as a result of exercise for students who take regular exercise with those who do not.

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.....[4]

(ii) Draw a suitable table with headings and units to show how you would record the measurements.

[3]

[Total: 20]

2 Fig. 1.1 shows sections though blood vessels, **X**, **Y** and **Z**.

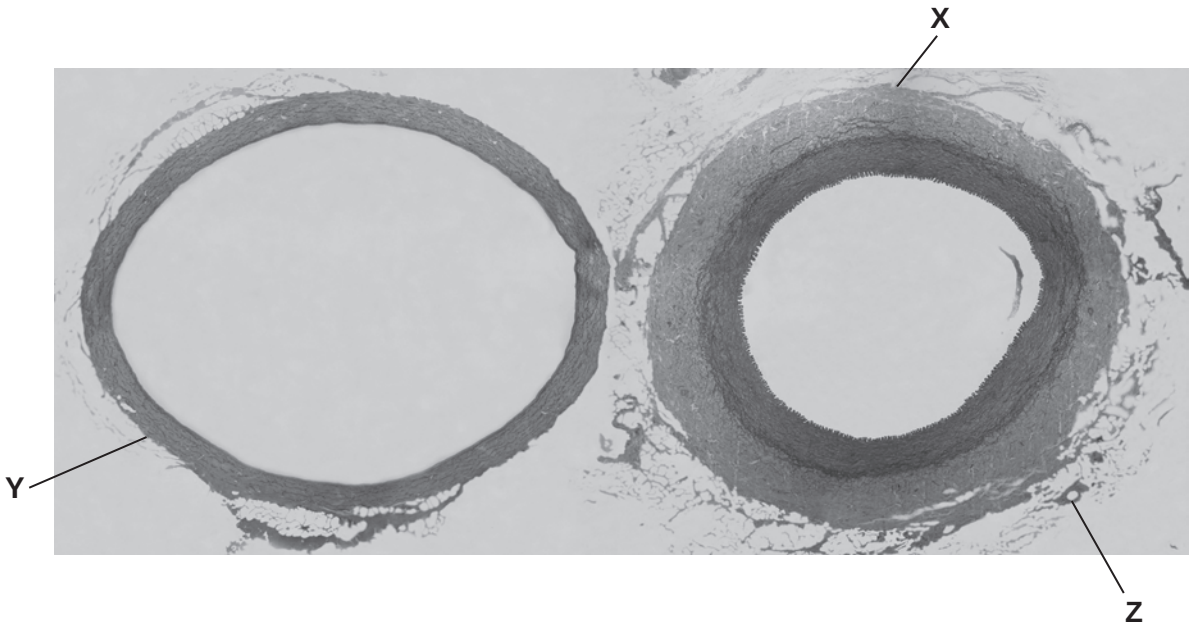

Fig. 1.1

(a) (i) Draw a labelled diagram to show the structures of **X**.

[5]

(ii) Name the type of blood vessel labelled **X**.

.....[1]

(iii) Compare the blood vessels shown in Fig. 1.1 to explain how you reached your identification for **(a)(ii)**.

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.....[2]

A 5 mm length of a blood vessel of the same type as **X** was used to investigate how far it could be stretched using a number of 10 g weights.

The apparatus used is shown in Fig. 1.2.

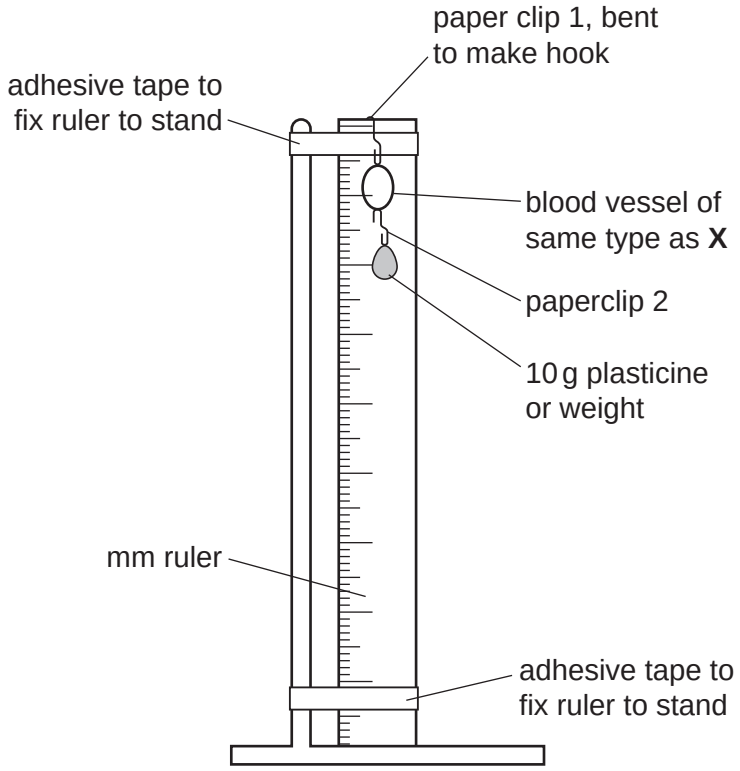


Fig. 1.2

As weights were added, the internal diameter of the blood vessel increased as shown in Table 1.1.

Table 1.1

mass of weights / g	internal diameter / mm	increase in diameter / mm
0	20	0
10	25	5
20	29	9
30	32	12
40	33	13
50	34	
60	35	
70	36	
80	37	
90	37	
100	38	

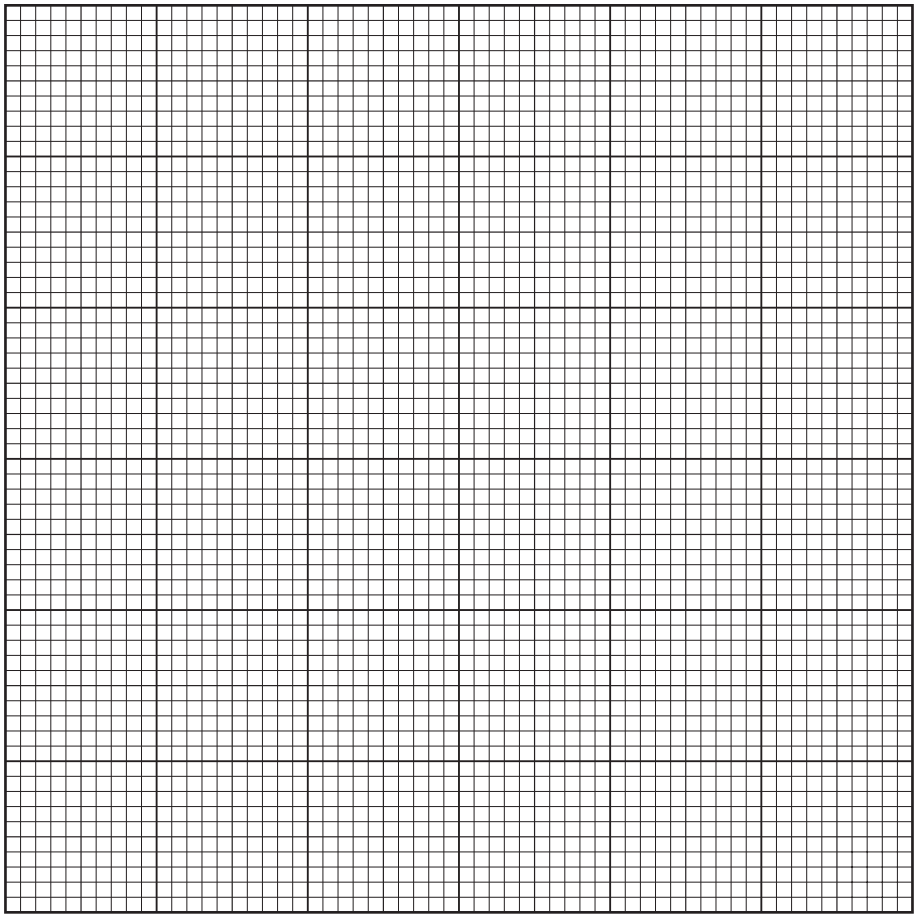
(b) (i) Complete Table 1.1 by calculating the increase in diameter of the blood vessel.

Write your answers in the spaces on Table 1.1.

Show your working in the space below.

[1]

(ii) Plot a graph to show the relationship between the mass of weights attached and the increase in diameter of the blood vessel.



[4]

(iii) Predict and explain what will happen to the diameter of the blood vessel after the weights are removed.

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..... [3]

[Total: 16]

3 As the heart pumps blood around the human body, a pulse may be felt at certain sites, such as the one shown in Fig. 2.1.

(a) (i) Label on Fig. 2.1, **one** other site where a pulse may be felt.

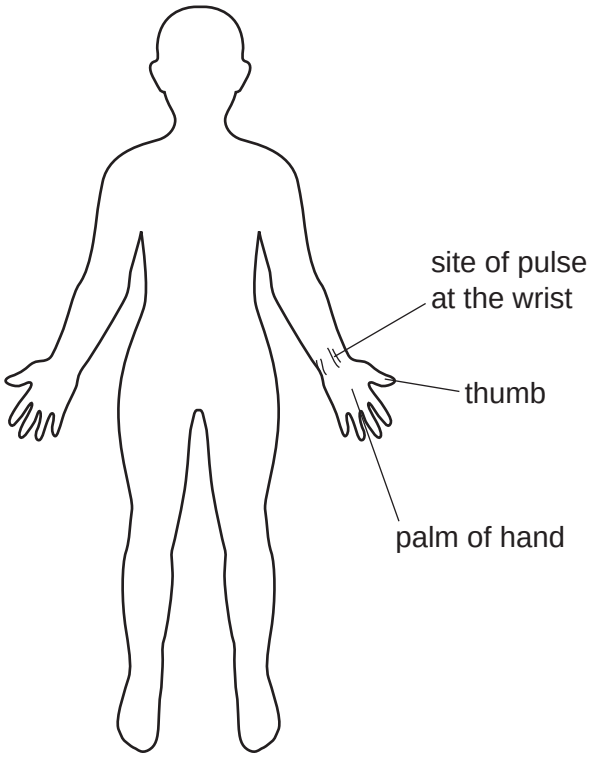

Fig. 2.1

[1]

(ii) Suggest why it is possible to feel the pulse at these sites.

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[2]

(b) A student counted the number of pulses felt in 15 seconds at the site shown on their wrist. The student did this three times.

The results are recorded in Table 2.1.

Table 2.1

	pulses per 15 seconds	pulses per minute
1st count	18	
2nd count	19	
3rd count	17	
mean		

(i) Complete the righthand column in Table 2.1 to show the number of pulses per minute for each count and the mean pulses per minute. [2]

(ii) Explain why it is advisable to repeat readings at least three times.

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..... [1]

(iii) State **two** factors that may affect heart rate. For each factor explain its effect on heart rate.

factor	explanation
1	....
2	....

[4]

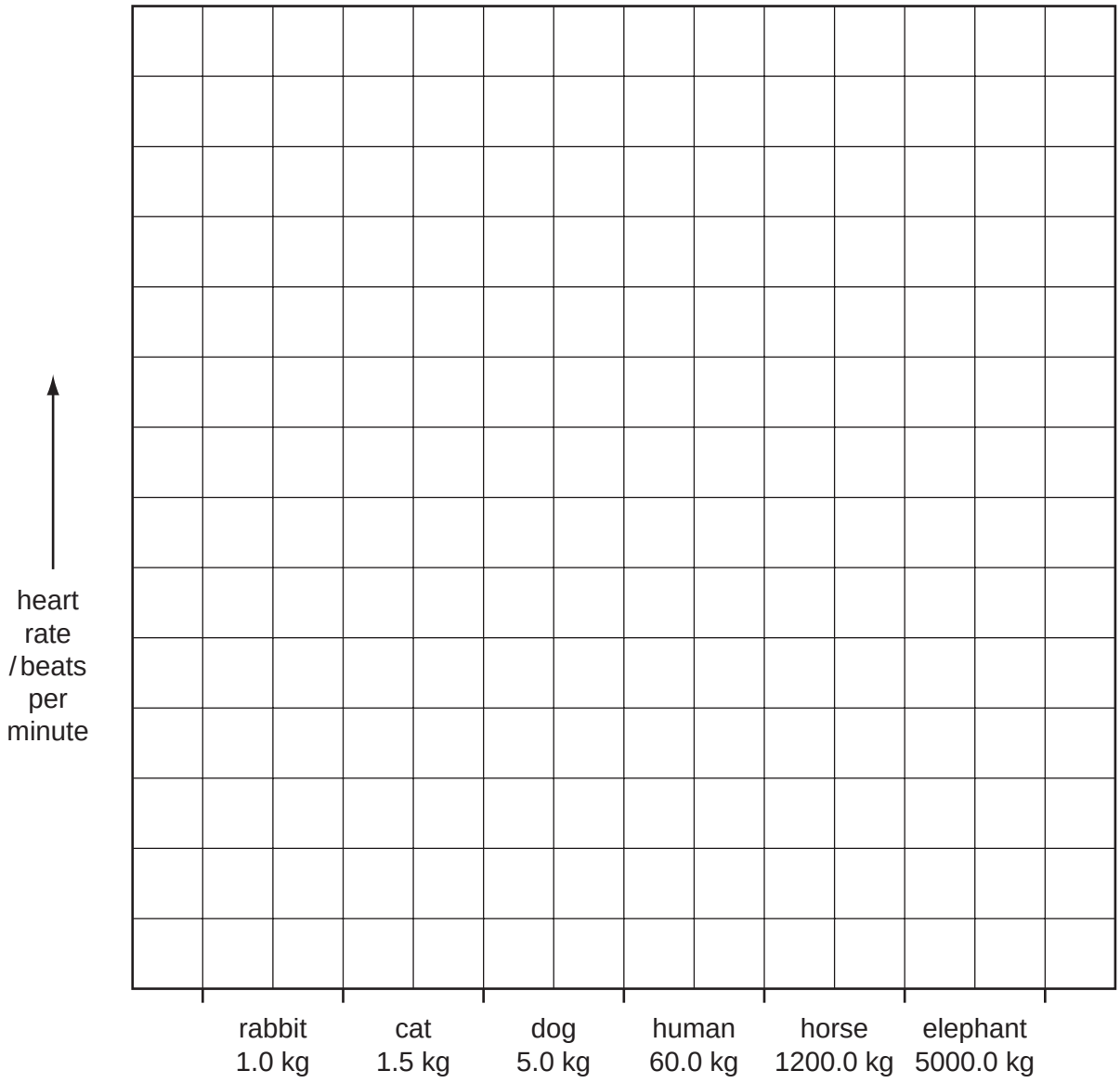
(c) Body mass and heart rates for a number of different mammals are shown in Table 2.2.

Table 2.2

mammal	body mass / kg	heart rate / beats per minute
rabbit	1.0	200
cat	1.5	150
dog	5.0	90
human	60.0	
horse	1200.0	44
elephant	5000.0	30

Copy the mean pulses per minute from Table 2.1 into Table 2.2.

(i) Plot the data in a bar chart to show heart rate for all six mammals.



[5]

(ii) Describe the general trend shown by this data plotted on the bar chart.

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..... [1]

(d) An elephant can live for 70 years, a cat for 15 years and a rabbit for 9 years.

Suggest how heart rate and body mass might affect life expectancy of mammals.

..... [1]

[Total: 17]