

# Transport in Animals

## Question Paper

|                   |                          |
|-------------------|--------------------------|
| <b>Level</b>      | IGCSE                    |
| <b>Subject</b>    | Biology                  |
| <b>Exam Board</b> | CIE                      |
| <b>Topic</b>      | Transport in Animals     |
| <b>Sub-Topic</b>  |                          |
| <b>Paper Type</b> | Alternative to Practical |
| <b>Booklet</b>    | 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.

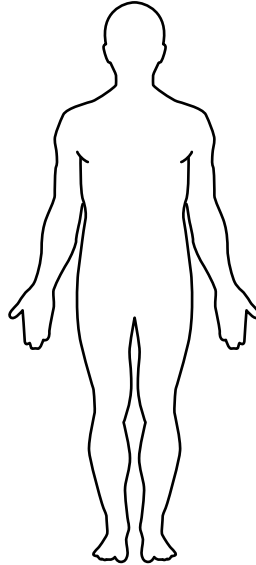


Fig. 2.1

[2]

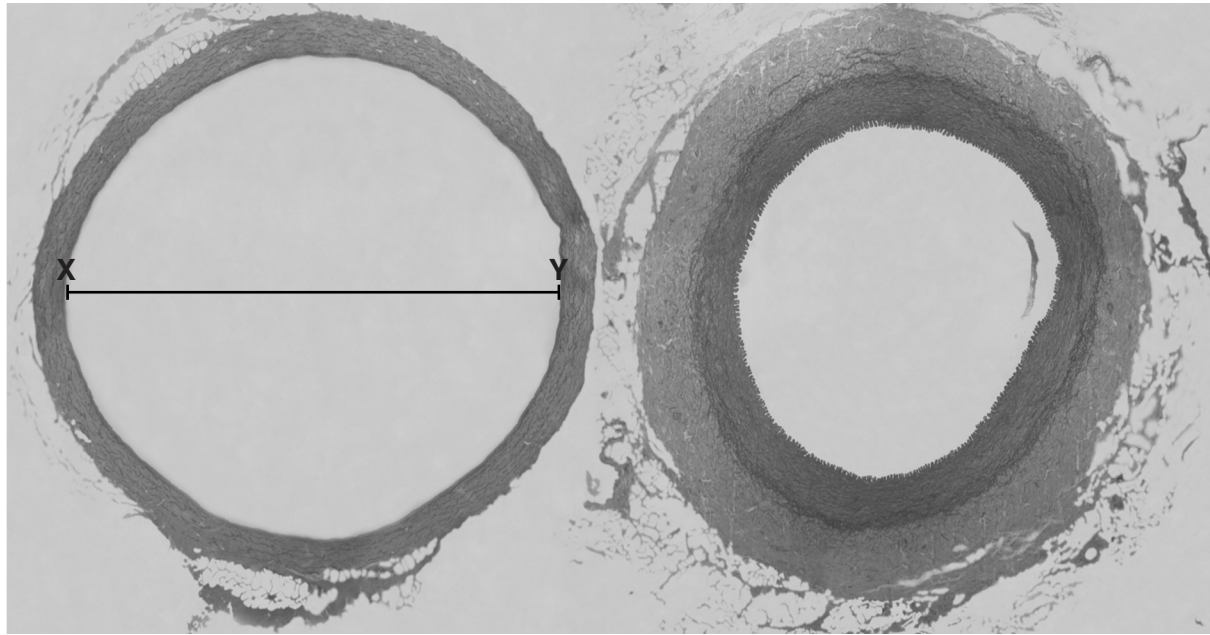
(ii) Suggest **one** feature of these sites that makes it possible to feel a pulse.

.....  
.....[1]

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

.....  
.....  
.....  
.....  
.....[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.



x 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.

.....

.....

.....

.....

..... [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         |
|---------|----------------|----------------|
| .....   | .....<br>..... | .....<br>..... |
| .....   | .....<br>..... | .....<br>..... |
| .....   | .....<br>..... | .....<br>..... |

[4]



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

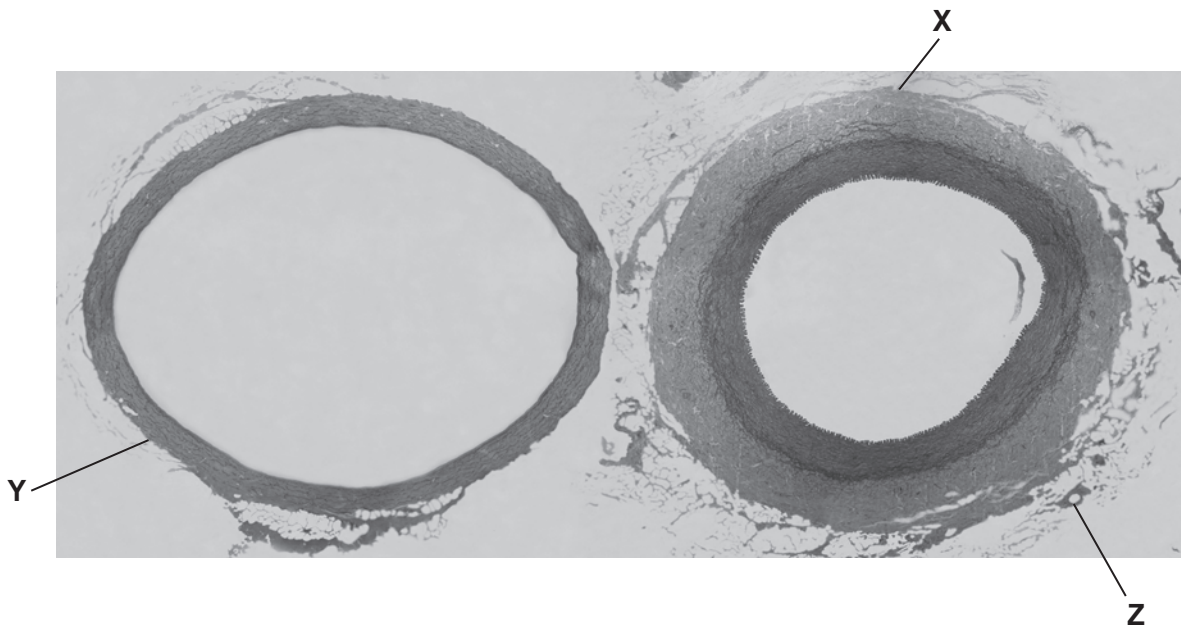


Fig. 1.1

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

(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)**.

.....  
.....  
.....  
..... [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.

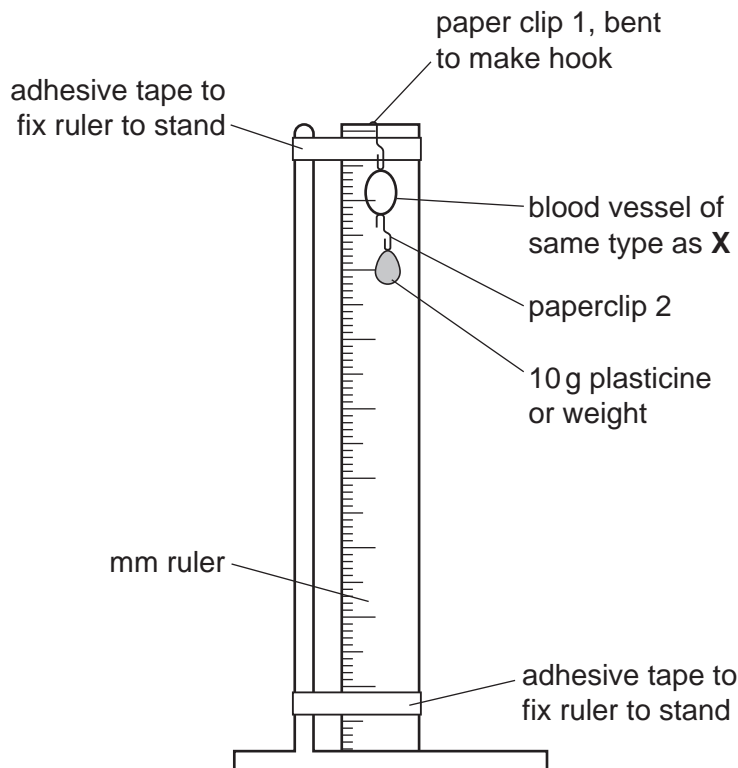


Fig. 1.2

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

**Table 1.1**

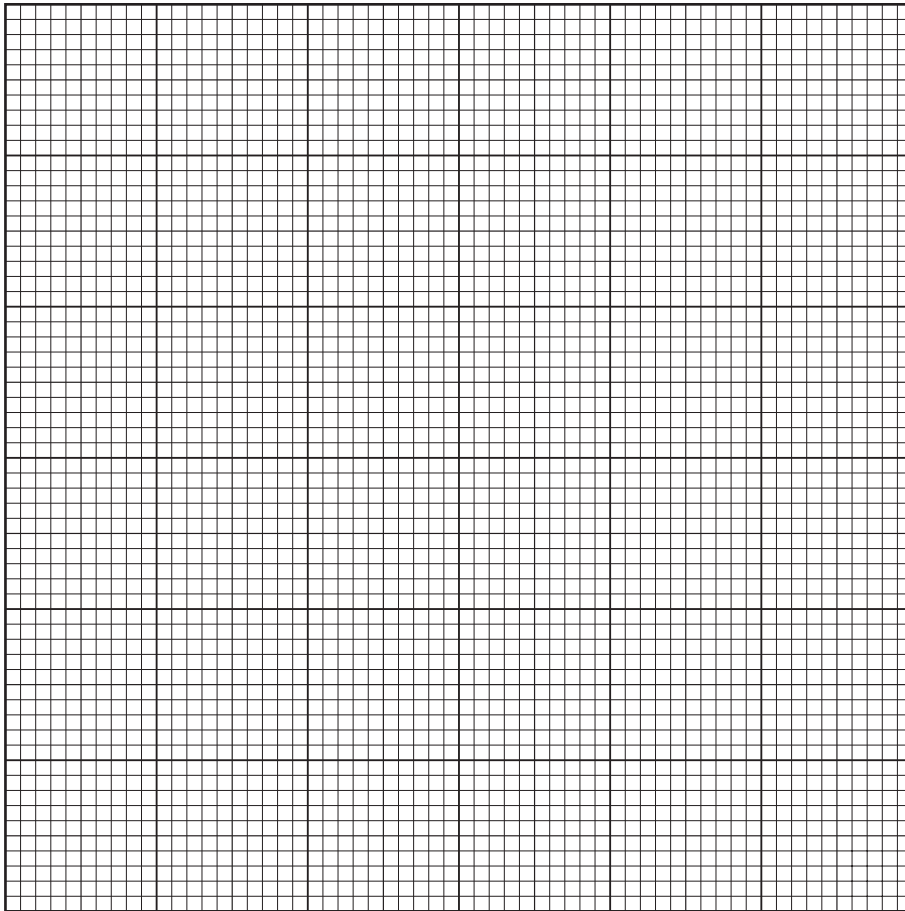
| mass of weights<br>/ g | internal diameter<br>/ mm | increase in diameter<br>/ mm |
|------------------------|---------------------------|------------------------------|
| 0                      | 20                        | 0                            |
| 10                     | 25                        | 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.

- (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.

.....  
.....  
.....  
..... [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.

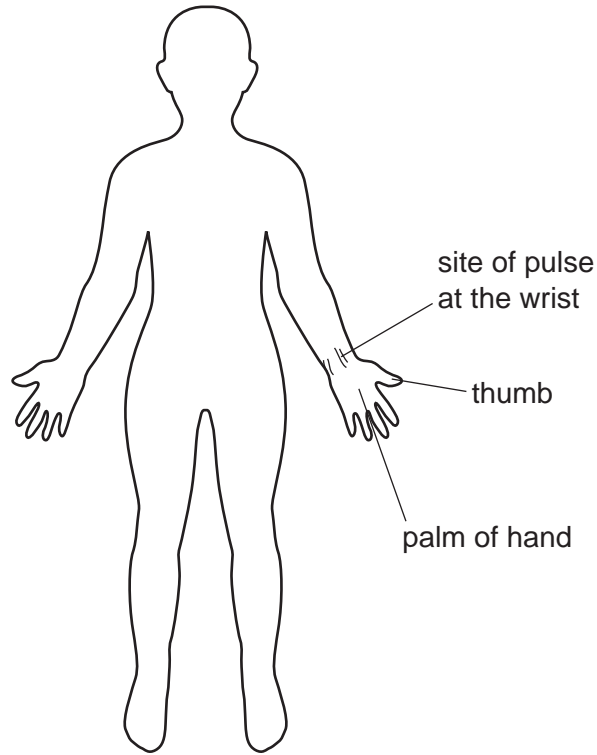


Fig. 2.1

[1]

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

.....

.....

[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 |
|-----------------------|-----------------------|-------------------|
| 1 <sup>st</sup> count | 18                    |                   |
| 2 <sup>nd</sup> count | 19                    |                   |
| 3 <sup>rd</sup> 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.

.....  
 ..... [1]

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

| factor | explanation             |
|--------|-------------------------|
| 1      | .....<br>.....<br>..... |
| 2      | .....<br>.....<br>..... |

[4]

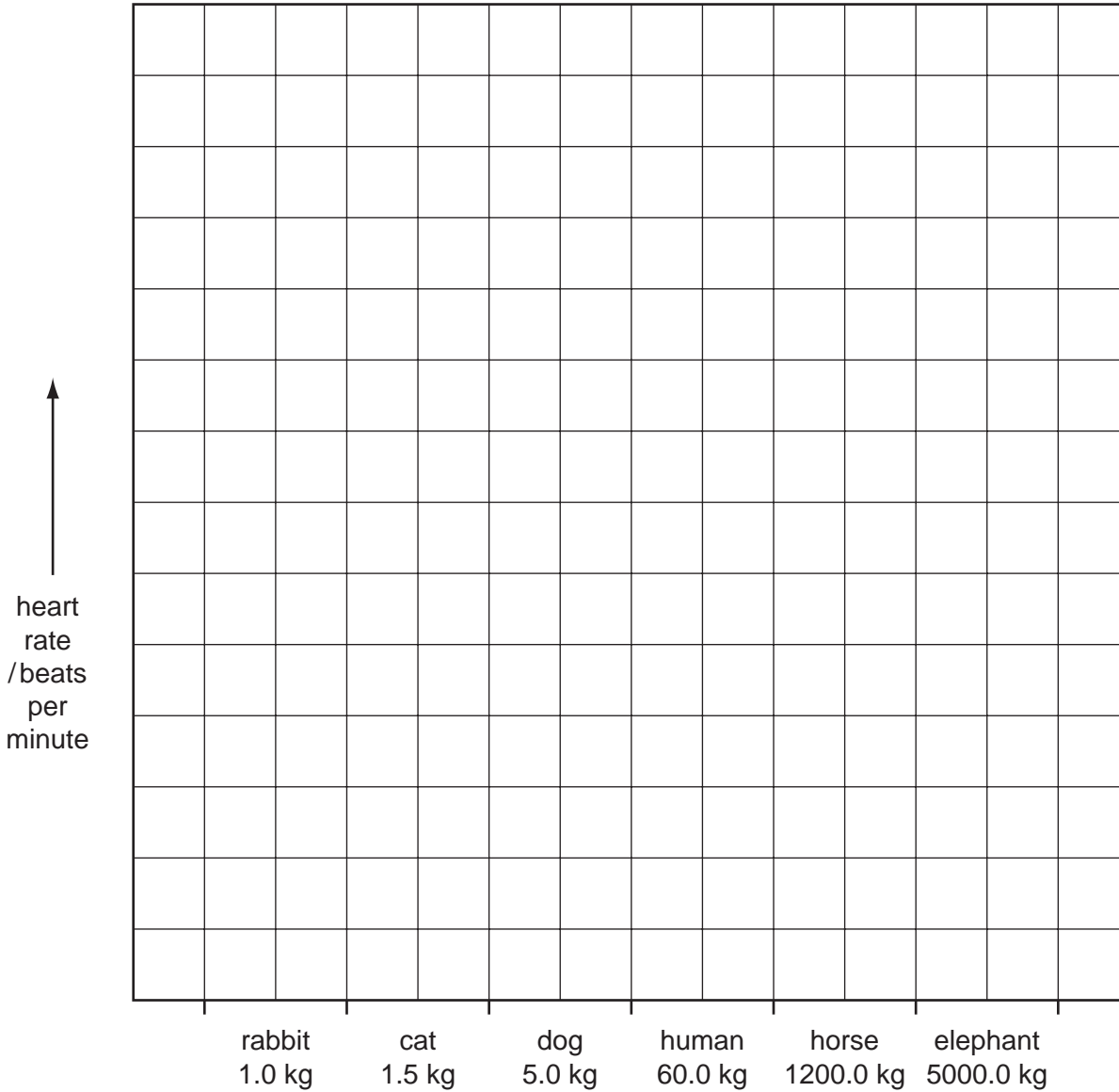
(c) Body mass and heart rates for a number of different mammals are shown in Table 2.2.

**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.

.....  
 .....

[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]