READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use a pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.
DO NOT WRITE IN ANY BARCODES.

Answer all questions.
At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
Fig. 1.1a shows a whole garlic bulb and Fig. 1.1b shows a section with many 'clove's arranged around a central stem.

Fig. 1.2a shows a whole potato and Fig. 1.2b shows a section of the potato stem tuber.
(a) Make a large, labelled drawing of Fig. 1.1b. to show the section of the garlic bulb.

(b) (i) Compare one visible similarity between the garlic bulb and the potato tuber.

(ii) Describe two visible differences between the garlic bulb and the potato tuber.
(c) Describe how you would carry out tests on the garlic and the potato to compare the starch content and the reducing sugar content. Include any necessary safety precautions.

starch .................................................................................................................................

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reducing sugar ....................................................................................................................

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................................................................................................................................. [6]

[Total: 14]
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.

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

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(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>
<thead>
<tr>
<th>pulses per 15 seconds</th>
<th>pulses per minute</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st count</td>
<td>18</td>
</tr>
<tr>
<td>2nd count</td>
<td>19</td>
</tr>
<tr>
<td>3rd count</td>
<td>17</td>
</tr>
<tr>
<td>mean</td>
<td></td>
</tr>
</tbody>
</table>

(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.

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

<table>
<thead>
<tr>
<th>factor</th>
<th>explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>
(c) Body mass and heart rates for a number of different mammals are shown in Table 2.2.

Table 2.2

<table>
<thead>
<tr>
<th>mammal</th>
<th>body mass / kg</th>
<th>heart rate / beats per minute</th>
</tr>
</thead>
<tbody>
<tr>
<td>rabbit</td>
<td>1.0</td>
<td>200</td>
</tr>
<tr>
<td>cat</td>
<td>1.5</td>
<td>150</td>
</tr>
<tr>
<td>dog</td>
<td>5.0</td>
<td>90</td>
</tr>
<tr>
<td>human</td>
<td>60.0</td>
<td></td>
</tr>
<tr>
<td>horse</td>
<td>1200.0</td>
<td>44</td>
</tr>
<tr>
<td>elephant</td>
<td>5000.0</td>
<td>30</td>
</tr>
</tbody>
</table>

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.

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

(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.
3. Fig. 3.1 shows a photomicrograph of a human blood smear.

**Fig. 3.1**

(a) (i) On Fig. 3.1, draw label lines and name **three** different types of blood cell. [3]

(ii) Name **two** parts of the blood that can pass through the capillary walls.

1. ..............................................................................................................
2. .............................................................................................................. [2]

(b) (i) Measure the diameter of the blood cell labelled **A**.

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

(ii) The photomicrograph has been enlarged by x 800, calculate the actual size of cell **A**.

*show your working*

actual size of cell **A** .............................................................. [2]

(iii) State the function of cell **A**.

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

[Total: 9]