INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer all the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Do not write in the bar codes.

INFORMATION FOR CANDIDATES

- Your quality of written communication is assessed in questions marked with a pencil (✍).
- The number of marks is given in brackets [ ] at the end of each question or part question.
- The total number of marks for this paper is 50.
- This document consists of 12 pages. Any blank pages are indicated.
Martin is going to have an operation.

Before the operation, a nurse assesses Martin’s health and fitness.

(a) She measures Martin’s height and body mass (weight).

\[
\begin{array}{c}
\text{height} \ 2 \text{ m} \quad \text{body mass} \ 80 \text{ kg}
\end{array}
\]

(i) Use this formula to calculate Martin’s Body Mass Index (BMI).

\[
\text{BMI} = \frac{\text{body mass (kg)}}{[\text{height (m)}]^2}
\]

(ii) Put a tick (✓) in the box next to the correct description of Martin’s BMI.

- healthy weight
- obese
- underweight
- overweight

(b) The nurse measured Martin’s height and body mass (weight).

Write down four other pieces of information the nurse will need to collect about Martin.

1 .................................................................
2 .................................................................
3 .................................................................
4 .................................................................  [3]

[Total: 6]
2  The heart is an organ that pumps blood around the body.

(a) Complete the labelling of the heart.

Choose from the following labels.

artery  atrium  ventricle  valve  vein

(b) Explain how the structure of arteries, valves and veins are related to the jobs that they do.

artery .......................................................................................................................
..............................................................................................................................

valve ...................................................................................................................
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vein .......................................................................................................................
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(c) Oxygen, glucose, carbon dioxide and lactic acid are substances transported by the blood. Identify which component of the blood transports each of these substances.

Put a tick (✓) in the one correct box in each row.

<table>
<thead>
<tr>
<th></th>
<th>Red blood cells</th>
<th>White blood cells</th>
<th>Plasma</th>
<th>Platelets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxygen</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glucose</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carbon dioxide</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lactic acid</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[4]  
[Total: 10]
This question is about health care.

(a) Write down examples of two local organisations that provide health care for the local community.

Explain what health care services each organisation provides.

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

(b) Describe the role of two different health care practitioners.
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...................................................................................................................................................
...................................................................................................................................................
.............................................................................................................................................. [2]

(c) Suggest two other things that the NHS does.
...................................................................................................................................................
...................................................................................................................................................
...................................................................................................................................................
.............................................................................................................................................. [2]
(d) All surgical and medical treatments carry some risk.

Barry has prostate cancer.

His doctor says he needs an operation.

His doctor also shows Barry some data.

The graph shows how the percentage of patients surviving for 10 years after being diagnosed and treated for different types of cancer changed in the years 1971 to 2007.
His doctor tells him that there is less than a 1% risk of death during the operation.

The operation will not be done on a Friday as there is an 85% increase in risk if the operation is done on a Friday.

Explain why Barry needs to be informed of these risks. Use **all of the information** provided to discuss both the risks and benefits to Barry of either deciding to have or not to have the operation.

> The quality of written communication will be assessed in your answer.

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

[Total: 12]
This question is about the need for scientific evidence.

A Scene Of Crime Officer (SOCO) goes to a crime scene.

There was a violent fight and two people are dead.

There is a lot of blood on the ground.

Describe how the SOCO will collect, prepare and store samples of blood and how these samples could be analysed back in the lab.

Explain the reasons for each stage of the process.

The quality of written communication will be assessed in your answer.
Jason, Jane and Mary collect a sample of river water.

Jason selects one piece of equipment, A, B or C, and measures the volume of the water. He repeats the measurement two more times using the same piece of equipment.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>250 ml</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50 ml</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Volume of water (ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jason</td>
<td>145 144 146</td>
</tr>
<tr>
<td>Jane</td>
<td>142 147 144</td>
</tr>
<tr>
<td>Mary</td>
<td>130 150 150</td>
</tr>
</tbody>
</table>

Jane and Mary repeat the measurements using the same sample of water but each selects a different piece of equipment.

(a) For each student, Jason, Jane and Mary, suggest which piece of equipment each one used.

(i) Write A, B or C next to each name.

<table>
<thead>
<tr>
<th>Jason</th>
<th>Jane</th>
<th>Mary</th>
</tr>
</thead>
</table>

(ii) Justify your answer to part (i).

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(b) Each measurement of the same sample can produce a different result. This is because of random and systematic error.

Explain what is meant by random error and systematic error.

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

[Total: 6]
Reshma sees a drawing of an unidentified pollen grain.

(a) She compares the drawing with an electron micrograph image of a sunflower pollen grain.

Reshma concludes that the unidentified pollen grain was from a sunflower.

Comment on Reshma’s conclusion.

Describe any evidence that supports or contradicts her conclusion.

The quality of written communication will be assessed in your answer.
(b) There are some disadvantages of using an electron microscope to produce images. Describe **two disadvantages** of using an electron microscope to produce an image.

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

(c) Images are also produced when using chromatography.

Which of these statements are differences between electron micrographs and chromatograms? Put a tick (✓) next to the **two correct** answers.

- Electron micrographs do not magnify. Chromatograms do.  
- Electron micrographs do not last very long. Chromatograms do.
- Chromatograms do not produce Rf values. Electron micrographs do.
- Electron micrographs do not separate substances. Chromatograms do.
- Chromatograms do not depend upon colours. Electron micrographs do.
- Chromatograms cannot have a depth of field. Electron micrographs can.
- Chromatograms are always 1-way. Electron micrographs can be 2-way. [2]

[Total: 10]