Candidates answer on the Question Paper.

OCR supplied materials:
None

Other materials required:
• Scientific or graphical calculator
• Geometrical instruments
• Tracing paper (optional)

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.
• Your answers should be supported with appropriate working. Marks may be given for a correct method even if the answer is incorrect.
• 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

• 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 60.
• This document consists of 16 pages. Any blank pages are indicated.
Formulae Sheet: Higher Tier

Area of trapezium = \( \frac{1}{2} (a + b)h \)

Volume of prism = (area of cross-section) \times length

In any triangle \( ABC \)

Sine rule \( \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} \)

Cosine rule \( a^2 = b^2 + c^2 - 2bc \cos A \)

Area of triangle = \( \frac{1}{2} ab \sin C \)

Volume of sphere = \( \frac{4}{3} \pi r^3 \)

Surface area of sphere = \( 4 \pi r^2 \)

Volume of cone = \( \frac{1}{3} \pi r^2 h \)

Curved surface area of cone = \( \pi rl \)

The Quadratic Equation

The solutions of \( ax^2 + bx + c = 0 \), where \( a \neq 0 \), are given by

\[ x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \]
Samira and Joanne share their living costs in the ratio 3 : 2.

(a) The rent for their flat for a month is £700.

Work out how much of this rent they each pay.

(a) Samira £ ..............................................................

Joanne £ .............................................................. [3]

(b) For one gas bill, Joanne pays £84 for her share.

How much was the whole gas bill?

(b) £ .............................................................. [3]
2 Calculate.

(a) \[
\frac{13.72 - 8.96}{8.4 \times 6.4}
\]

Give your answer correct to 3 decimal places.

(a) ....................................................... [2]

(b) \[
\sqrt{80.2^3 + 250}
\]

Give your answer correct to the nearest 100.

(b) ....................................................... [2]
3  (a) When \( a = -5, b = -2 \) and \( c = 6 \), find the value of

(i) \( a^2 \),

(ii) \( 1000b \),

(iii) \( \frac{a + c}{b} \).

(b) Solve these equations.

(i) \( 2(3x - 1) = 10x - 5 \)

(ii) \( x^2 - 4 = 60 \)
This scale drawing shows Colin's garden.

Colin wants to put a bird feeder in his garden. He wants it to be
- up to 3 m from the tree T
- up to 2 m from the bush B
- nearer to the water tap W than to the seat S.

Construct the region where Colin can put the bird feeder. Label the region R.
The \( n \)th term of a sequence is \( 6n - 2 \).

Find the first three terms of this sequence.

\[
\begin{align*}
(a) & & \\
(b) & & \\
\end{align*}
\]

(b) The \( n \)th term of another sequence is \( 5n^2 \).

Is the number 1000 a term in this sequence?
Show how you decide.
6 (a) Form 11T had 30 students. Sasha asked each of the students how many items they had downloaded the previous day. This table summarises their responses.

<table>
<thead>
<tr>
<th>Number of downloads</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>1 – 5</td>
<td>2</td>
</tr>
<tr>
<td>6 – 10</td>
<td>8</td>
</tr>
<tr>
<td>11 – 15</td>
<td>7</td>
</tr>
<tr>
<td>16 – 20</td>
<td>6</td>
</tr>
<tr>
<td>21 – 25</td>
<td>2</td>
</tr>
<tr>
<td>26 – 30</td>
<td>1</td>
</tr>
</tbody>
</table>

(i) Write down the modal class.

(a)(i) ......................................................... [1]

(ii) Calculate an estimate of the mean number of downloads.

(ii) ............................................................. [4]
(b) Sasha decides to ask a random sample from the whole school how many items they had downloaded the previous day. This sample is to be representative of the different year groups. She decides to use a sample size of 50.

Here are the numbers in each year group.

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of students</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>155</td>
</tr>
<tr>
<td>8</td>
<td>170</td>
</tr>
<tr>
<td>9</td>
<td>178</td>
</tr>
<tr>
<td>10</td>
<td>180</td>
</tr>
<tr>
<td>11</td>
<td>165</td>
</tr>
<tr>
<td>12</td>
<td>102</td>
</tr>
<tr>
<td>13</td>
<td>93</td>
</tr>
<tr>
<td>Total</td>
<td>1043</td>
</tr>
</tbody>
</table>

(i) Calculate how many Year 13 students should be in the sample.

(b)(i) .......................................................... [2]

(ii) State one advantage and one disadvantage of Sasha using a larger sample size than 50.

Advantage: ...........................................................................................................................................
...........................................................................................................................................

Disadvantage: ...................................................................................................................................... [2]
Paris, P, is 343 km from London, L. It is 294 km south of London.

(a) Calculate $a$, the distance that Paris is east of London.

\[a\] km [3]

(b) Calculate the bearing of Paris from London.

\[\text{°}\] [4]
In this question, use a ruler and a pair of compasses. Do not rub out your construction lines.

Construct the perpendicular to AB which passes through point C.
A travel agent did a survey about the amount spent per person on a week’s holiday.

(a) This table summarises the amount spent on travel and accommodation.

<table>
<thead>
<tr>
<th>Amount spent (£(a))</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 (\leq a \leq 100)</td>
<td>12</td>
</tr>
<tr>
<td>100 &lt; (a \leq 300)</td>
<td>40</td>
</tr>
<tr>
<td>300 &lt; (a \leq 500)</td>
<td>36</td>
</tr>
<tr>
<td>500 &lt; (a \leq 1000)</td>
<td>86</td>
</tr>
<tr>
<td>1000 &lt; (a \leq 1500)</td>
<td>66</td>
</tr>
<tr>
<td>1500 &lt; (a \leq 2000)</td>
<td>10</td>
</tr>
</tbody>
</table>

Draw a histogram to represent this information.
(b) This histogram represents the amount spent on food, drink and entertainment.

How many people spent from £600 to £900 on food, drink and entertainment?

(b) .......................................................... [1]

(c) The travel agent totalled the amounts spent by each person on travel and accommodation and on food, drink and entertainment to work out their total spending on a holiday. The travel agent said

The person who spent most on their holiday spent £3100 altogether.

Explain how this is possible, given the data in parts (a) and (b).

..............................................................................................................................................
..............................................................................................................................................
.............................................................................................................................................. [1]
10 (a) Rearrange this formula to make $a$ the subject.

$$5(a + b) = 2ab$$

(a) ............................................................................. [4]
(b) You are given that \( f(x) = 2x - 5 \).

(i) Find \( f(3.5) \).

(ii) Express \( f(3x + 4) \) in the form \( ax + b \).