1 Use a calculator to find the value of \( \sqrt{(5.4(5.4 - 4.8)(5.4 - 3.4)(5.4 - 2.6))} \).

(a) Write down all the figures in your calculator display.

\[ \text{Answer (a)} \] ................................................................. [1]

(b) Give your answer correct to 1 decimal place.

\[ \text{Answer (b)} \] ................................................................. [1]

2 Use the formula

\[ P = \frac{V^2}{R} \]

to calculate the value of \( P \) when \( V = 6 \times 10^6 \) and \( R = 7.2 \times 10^8 \).

\[ \text{Answer } P = \] ................................................................. [2]

3 For the diagram, write down

(a) the order of rotational symmetry,

\[ \text{Answer (a)} \] ................................................................. [1]

(b) the number of lines of symmetry.

\[ \text{Answer (b)} \] ................................................................. [1]

4 When \( 0 < x < 0.9 \), write the following in order of size with the smallest first.

\( \cos x^\circ \) \hspace{1cm} \( x^2 \) \hspace{1cm} \( x^{-1} \)

\[ \text{Answer } \] \hspace{1cm} \hspace{1cm} \hspace{1cm} \] ................................................................. [2]
5 \[ \frac{4c}{5} - \frac{3c}{35} = \frac{10}{7} \text{.} \] Find \( c \).

Answer \( c = \) ........................................... [2]

6

\[ p = \frac{0.002751 \times 3400}{(9.8923 + 24.7777)^2} \text{.} \]

(a) In the spaces provided, write each number in this calculation correct to 1 significant figure.

Answer\((a)\) \[ \frac{\text{__________} \times \text{__________}}{(\text{__________} + \text{__________})^2} \] [1]

(b) Use your answer to part (a) to estimate the value of \( p \).

Answer\((b)\) ........................................... [1]

7 Solve the simultaneous equations

\[ 2x + \frac{1}{7}y = 1, \]
\[ 6x - \frac{3}{2}y = 21. \]

Answer \( x = \) ........................................... [3]
\[ y = \) ...........................................
8 (a) In October the cost of a car in euros was €20 000.
The cost of this car in pounds was £14 020.
Calculate the exact value of the exchange rate in October.

\[\text{Answer (a) } \text{€1} = \text{£} \text{ } \text{[1]}\]

(b) In November the car still cost €20 000 and the exchange rate was €1 = £0.6915.
Calculate the difference, in pounds, between the cost in October and November.

\[\text{Answer (b) } \text{£} \text{ } \text{[2]}\]

9 \(x^2 + 4x - 8\) can be written in the form \((x + p)^2 + q\).
Find the values of \(p\) and \(q\).

\[\text{Answer } p = \underline{\text{ }} \text{ and } q = \underline{\text{ }} \text{[3]}\]

10

The shape above is made by removing a small semi-circle from a large semi-circle. 
\(AM = MB = 12\) cm
Calculate the area of the shape.

\[\text{Answer } \underline{\text{ }} \text{ cm}^2 \text{[3]}\]
11 \( M \) is proportional to the cube of \( r \).
When \( r = 3 \), \( M = 21.6 \).
When \( r = 5 \), find the value of \( M \).

\[ \text{Answer } M = \text{.................. [3] } \]

12 \( A \) and \( B \) are sets.
Write the following sets in their simplest form.

(a) \( A \cap A' \).

\[ \text{Answer(a) } \text{.................. [1] } \]

(b) \( A \cup A' \).

\[ \text{Answer(b) } \text{.................. [1] } \]

(c) \( (A \cap B) \cup (A \cap B') \).

\[ \text{Answer(c) } \text{.................. [1] } \]

13 A rectangle has sides of length 6.1 cm and 8.1 cm correct to 1 decimal place.
Complete the statement about the perimeter of the rectangle.

\[ \text{Answer } \text{.................. cm} \leq \text{perimeter} < \text{.................. cm [3]} \]
14 Solve the equations

(a) \( \frac{2x}{3} - 9 = 0 \),

\[ Answer(a) \quad x = \quad \text{[2]} \]

(b) \( x^2 - 3x - 4 = 0 \).

\[ Answer(b) \quad x = \quad \text{or} \quad x = \quad \text{[2]} \]

15

\[ O \] is the origin, \( \vec{OA} = a \) and \( \vec{OB} = b \).

(a) \( C \) has position vector \( \frac{1}{3}a + \frac{2}{3}b \).

Mark the point \( C \) on the diagram. \[ \text{[1]} \]

(b) Write down, in terms of \( a \) and \( b \), the position vector of the point \( E \).

\[ Answer(b) \quad \text{[1]} \]

(c) Find, in terms of \( a \) and \( b \), the vector \( \vec{EB} \).

\[ Answer(c) \quad \vec{EB} = \quad \text{[2]} \]
16 A car manufacturer sells a similar, scale model of one of its real cars.

(a) The fuel tank of the real car has a volume of 64 litres and the fuel tank of the model has a volume of 0.125 litres. 
Show that the length of the real car is 8 times the length of the model car.

Answer (a) 

(b) The area of the front window of the model is 0.0175 m$^2$.
Find the area of the front window of the real car.

Answer (b) .................................................. m$^2$  [2]

17

The length of time, $T$ seconds, that the pendulum in the clock takes to swing is given by the formula

$$ T = \frac{6}{\sqrt{1+g^2}}. $$

Rearrange the formula to make $g$ the subject.

Answer $g =$ ..................................................  [4]
The line \( l \) passes through the points \((10, 0)\) and \((0, 8)\) as shown in the diagram.

(a) Find the gradient of the line as a fraction in its simplest form.

\[
Answer(a) \quad \text{ } \quad \text{[1]}
\]

(b) Write down the equation of the line parallel to \( l \) which passes through the origin.

\[
Answer(b) \quad \text{ } \quad \text{[1]}
\]

(c) Find the equation of the line parallel to \( l \) which passes through the point \((3, 1)\).

\[
Answer(c) \quad y = \quad \text{ } \quad \text{[2]}
\]
The mass of each of 200 tea bags was checked by an inspector in a factory. The results are shown by the cumulative frequency curve.

Use the cumulative frequency curve to find

(a) the median mass,

\[ \text{Answer(a)} \quad \text{g} \quad [1] \]

(b) the interquartile range,

\[ \text{Answer(b)} \quad \text{g} \quad [2] \]

(c) the number of tea bags with a mass greater than 3.5 grams.

\[ \text{Answer(c)} \quad [1] \]
The points $A$, $B$, $C$ and $D$ lie on a circle centre $O$.
Angle $AOB = 90^\circ$, angle $COD = 50^\circ$ and angle $BCD = 123^\circ$.
The line $DT$ is a tangent to the circle at $D$.

Find

(a) angle $OCD$,

$$Answer(a) \ Angle \ OCD = \ \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots [1]$$

(b) angle $TDC$,

$$Answer(b) \ Angle \ TDC = \ \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots [1]$$

(c) angle $ABC$,

$$Answer(c) \ Angle \ ABC = \ \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots [1]$$

(d) reflex angle $AOC$.

$$Answer(d) \ Angle \ AOC = \ \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots [1]$$
21 (a) Simplify $(27x^6)^{\frac{1}{3}}$.  

\[ Answer(a) \]  

(b) $(512)^{-\frac{2}{3}} = 2^p$. Find $p$.  

\[ Answer(b) \ p = \]  

22 

\[ A = \begin{pmatrix} 1 & 2 \\ 1 & 1 \end{pmatrix} \quad I = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} \]

(a) The matrix $B = A^2 - 2A - I$. Calculate $B$. Show all your working.  

\[ Answer(a) \ B = \begin{pmatrix} \_ & \_ \\ \_ & \_ \end{pmatrix} \]  

(b) Simplify $AA^{-1}$.  

\[ Answer(b) \]