NEITHER ELECTRONIC CALCULATORS NOR MATHEMATICAL TABLES MAY BE USED IN THIS PAPER.

1 Evaluate

(a) \(10 - 7.56\),

(b) \(0.105 \times 0.2\).

Answer (a) ........................................... [1]

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

2 (a) Evaluate \(3\frac{1}{5} - 2\frac{3}{4}\).

(b) \(\frac{2}{3}\) of a plot of land is garden.

\(\frac{1}{5}\) of the garden is lawn.

Find the fraction of the plot of land which is lawn.

Answer (a) ........................................... [1]

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

3 The diagram shows a fuel gauge in a car.

(a) What fraction does the gauge show?

(b) The fuel tank holds 48 litres when it is full.

How many litres must be added to fill the tank?

Answer (a) ........................................... [1]

(b) ........................................... litres [1]
4 (a) Three numbers are given in the answer space.
Write $L$ against the largest, $M$ against the next largest and $S$ against the smallest.

\[ \begin{align*}
&\text{Answer (a) } 0.7 \text{ million} \quad ............ \\
&\quad 687000 \quad ............ \\
&\quad \text{eight hundred and four thousand} \quad ............ \quad [1]
\end{align*} \]

(b) An amount of money is divided into two parts in the ratio 1: 4.
Find the smaller part as a percentage of the whole amount.

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

5 The population of a country is \(3.2 \times 10^6\).
There are \(8 \times 10^5\) children.

(a) What fraction of the whole population are children?
Give your answer in its simplest form.

(b) Find the number of adults.
Give your answer in standard form.

\[ \begin{align*}
&\text{Answer (a) } \quad ...............\quad [1] \\
&(b) \quad ............... \quad [1]
\end{align*} \]

6 (a) The first five terms of a sequence are 1, 3, 6, 10, 15.
The \(n\)th term of this sequence is \(\frac{1}{2}n(n + 1)\).
Find the 19th term.

(b) Write down an expression, in terms of \(n\), for the \(n\)th term of the sequence

\[ 3, 6, 10, 15, 21, \quad ............ \]

\[ \begin{align*}
&\text{Answer (a) } \quad ...............\quad [1] \\
&(b) \quad ............... \quad [1]
\end{align*} \]
7 A cuboid is shown in the diagram.
The volume of the cuboid is 90 000 cm³.
Find the height of the cuboid.

Answer .............................................cm [2]

8 In the diagram, $BCD$ is a straight line.
$AD = AC$, $D\hat{A}C = 34^\circ$ and $A\hat{B}C = 42^\circ$.

Find
(a) $A\hat{D}C$,
(b) $B\hat{A}C$,
(c) the reflex angle $A\hat{B}C$.

Answer (a) $A\hat{D}C = ......................[1]$

(b) $B\hat{A}C = ......................[1]$

(c) reflex $A\hat{B}C = ......................[1]$
Which of the graphs shown above could be the graph of

(a) \( y = x^3 \),

(b) \( y = \frac{1}{x^2} \),

(c) \( y = x - 1 \) ?

Answer (a) Figure ......................... [1]

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

(c) Figure ......................... [1]

10 (a) Three of the angles of a quadrilateral are each 95°. Find the fourth angle.

(b) Each interior angle of a regular polygon is 165°. How many sides has the polygon?

Answer (a) ................................ [1]

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

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11 (a) Factorise fully $5x^2 - 10x$.

(b) Solve $3y + 6 = 7y - 10$.

(c) Solve $3p(p + 2) = 0$.

Answer (a) ........................................... [1]

(b) $y = .........................$ [1]

(c) $p = .............$ or ................ [1]

12 In the diagram, $AB$ is parallel to $DC$ and $\angle ABC = \angle DCA$.

(a) Explain why triangles $ABC$ and $CAD$ are similar.

(b) Given that $AB = 4$ cm, $BC = 7$ cm, $AC = 6$ cm and $CD = 9$ cm, calculate $AD$.

Answer (a) ............................................................................................................................

............................................................................................................................

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

(b) $AD = .....................$ cm [2]
13  (a) On the Venn Diagram in the answer space, shade the region $A \cup B'$.

![Venn Diagram](image)

Answer (a)

(b) $\mathcal{E} = \{\text{all polygons}\}, Q = \{\text{all quadrilaterals}\}, R = \{\text{all regular polygons}\}$.

(i) What is the special name of the polygons which belong to $Q \cap R$?

(ii) On the Venn Diagram in the answer space, show the set $T = \{\text{all equilateral triangles}\}$.

Answer (b)(i) 

14  (a) In the diagram, the unshaded region, $R$, is defined by three inequalities.

Two of these are

\[ y \leq 2x + 2 \text{ and } y \leq 5 - x. \]

Write down the third inequality.

\[
\begin{align*}
-2 & \quad -1 & \quad 0 & \quad 1 & \quad 2 & \quad 3 & \quad 4 & \quad 5 \\
-1 & \quad \quad 1 & \quad 2 & \quad 3 & \quad 4 & \quad 5
\end{align*}
\]

Answer (a)

(b) Find the integer values of $x$ which satisfy the following.

\[ 4 \leq 2x + 13 < 9 \]

Answer (b)
15 \[ A = \begin{pmatrix} 1 & 2 & 3 \\ \end{pmatrix} \quad B = \begin{pmatrix} 2 & 0 \\ 1 & 4 \\ -1 & -3 \end{pmatrix} \quad C = \begin{pmatrix} 2 & -1 \\ 2 & 2 \\ -1 & 0 \end{pmatrix} \]

Find

(a) \( B - C \),

(b) \( AB \).

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

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

16 It is given that \( f(x) = 3x - 5 \).

Find

(a) \( f(-4) \),

(b) the value of \( t \), given that \( f(t) = 10 \),

(c) \( f^{-1}(x) \),

(d) \( f^{-1}(4) \).

Answer (a) \( f(-4) = \) .........................[1]

(b) \( t = \) .................................[1]

(c) \( f^{-1}(x) = \) ...........................[1]

(d) \( f^{-1}(4) = \) ........................[1]
17  (a)  A rectangular table top is 100 cm long and 75 cm wide. Both lengths are correct to the nearest 5 cm. Find the least possible perimeter of the table.

(b)  The area of a rectangular room is 22 m², correct to the nearest square metre. The width is 3 m, correct to the nearest metre. Find the greatest possible length of the room.

Answer (a) .......................................cm [2]

(b) ........................................m [2]

18  (a)  The number 3002.05 can be written as  $3 \times 10^3 + 2 \times 10^x + 5 \times 10^y$. Given that $x$ and $y$ are integers, find the values of $x$ and $y$.

(b)  A bank exchanged Japanese yen and Singapore dollars ($) at a rate of 66 yen = $1.

(i) Calculate, in yen, the amount received for $200.

(ii) Calculate, in dollars, the amount received for 33 000 yen.

Answer (a) $x = $............................... [1]

$y = $..............................................[1]

(b)(i) ......................................yen [1]

(ii) $ ...................................... [1]
The diagram above is the cumulative frequency curve for the heights of 400 plants which were grown in Field A.

Use the graph to find

(a) the number of plants that grew to a height of more than 30 cm,

(b) the interquartile range.

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

(c) Another 400 plants were grown in Field B.

The cumulative frequency distribution of the heights of these plants is shown in the table.

<table>
<thead>
<tr>
<th>Height (£cm)</th>
<th>$h \leq 10$</th>
<th>$h \leq 15$</th>
<th>$h \leq 20$</th>
<th>$h \leq 25$</th>
<th>$h \leq 30$</th>
<th>$h \leq 35$</th>
<th>$h \leq 40$</th>
<th>$h \leq 50$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cumulative frequency</td>
<td>35</td>
<td>75</td>
<td>130</td>
<td>200</td>
<td>280</td>
<td>330</td>
<td>370</td>
<td>400</td>
</tr>
</tbody>
</table>

On the same axes as for Field A, draw the cumulative frequency curve for the plants grown in Field B. [2]

(d) By comparing the two curves, state, with a reason, which Field produced the taller plants.

Answer (d) Field .......... produced the taller plants because ................................................... [1]
The diagram shows the speed–time graph of a car’s journey.

(a) Find the speed when \( t = 20 \).

(b) Find the acceleration when \( t = 20 \).

(c) Find the distance travelled in

   (i) the first 40 seconds,
   (ii) the first 60 seconds.

(d) Part of the distance–time graph for the same journey is shown in the answer space. Complete this graph.

\[
\begin{align*}
\text{Answer} &\quad (a) \quad \ldots \ldots \ldots \ldots \ldots \text{m/s} \quad [1] \\
&\quad (b) \quad \ldots \ldots \ldots \ldots \ldots \text{m/s}^2 \quad [1] \\
&\quad (c)(i) \quad \ldots \ldots \ldots \ldots \ldots \text{m} \quad [1] \\
&\quad (ii) \quad \ldots \ldots \ldots \ldots \ldots \text{m} \quad [1]
\end{align*}
\]
PQRS is a parallelogram.
P is (–4, 0), Q is (1, 0) and R is (9, 4).

(a) Find the coordinates of S.

(b) Find the coordinates of the midpoint of PR.

(c) Find the equation of the line RS.

(d) Find the equation of the line QR.

(e) Calculate the area of the parallelogram PQRS.

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**Answer**

(a) (........., .........) [1]

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

(c) ..................................... [1]

(d) ..................................... [2]

(e) ......................................unit^2 [1]
22 The diagram below shows the point P and triangles A, B and C.

(a) The reflection, M, maps \( \Delta A \) onto \( \Delta B \).

Given that \( M(P) = Q \), write down the coordinates of \( Q \).

Answer (a) \((........... , ...........)\) \[1\]

(b) The rotation, R, maps \( \Delta A \) onto \( \Delta C \).

Find

(i) the coordinates of the centre of this rotation,
(ii) the angle and direction of this rotation.

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

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

(c) The matrix \( \begin{pmatrix} -2 & 0 \\ 0 & -2 \end{pmatrix} \) represents the transformation T.

Given that \( T(A) = D \), draw and label \( \Delta D \) on the diagram.

Answer (c) \[2\]

(d) Given that \( FT(A) = A \), find the matrix representing the transformation F.

Answer (d) \( \begin{pmatrix} \ldots \ldots & \ldots \ldots \end{pmatrix} \) \[1\]
The diagram below is a scale drawing representing three coastguard stations, A, B and C. In the drawing, 1 cm represents 20 km.

(a) (i) Express the scale in the form 1 : n.

(ii) Find the distance between the coastguard stations A and B.

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

(ii) .........................km [1]

(b) It is known that a ship is

I equidistant from CA and CB,

II nearer to C than A,

III less than 200 km from B.

By constructing 3 loci corresponding to I, II and III, find the possible positions of the ship and label the extreme positions S and P.

Answer (b)