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ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER

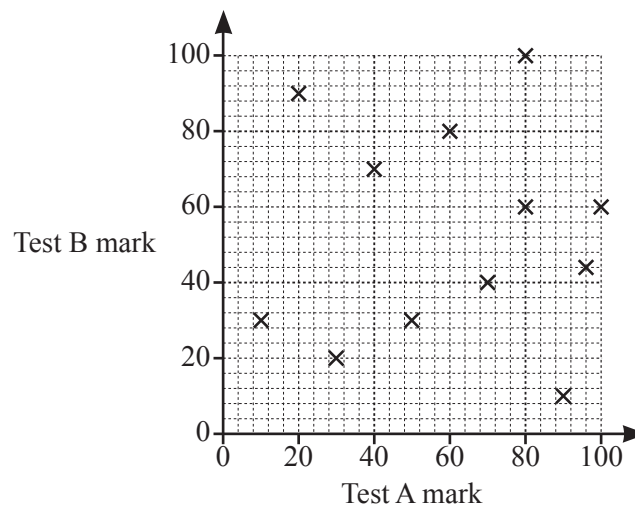
- 1 (a) Evaluate $3 \times 1\frac{4}{7}$.

..... [1]

- (b) Evaluate 1.3×0.3 .

..... [1]

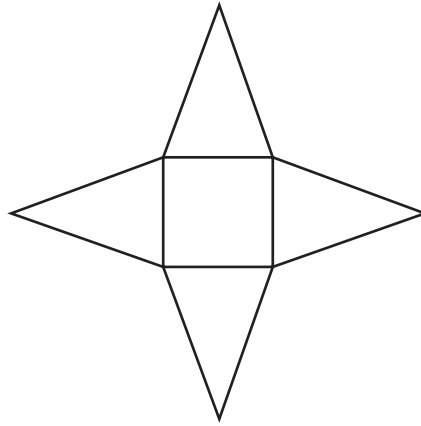
- 2 The scatter diagram shows the marks that 12 students each obtained in test A and test B.



Give a reason why it is not appropriate to draw a line of best fit for this diagram.

..... [1]

- 3 The diagram shows the net of a solid.



- (a) What is the special mathematical name of the solid?

..... [1]

- (b) For this solid, write down the number of vertices.

..... [1]

- 4 (a) Factorise $1 - 36p^2$.

..... [1]

- (b) Factorise $4x + 3y + xy + 12$.

..... [2]

5 A television programme is 2 hours 40 minutes long.

(a) It starts at 22 45.

At what time does it finish?

..... [1]

(b) The programme contains 8 advertisement breaks, each of which lasts for 3 minutes.

Find the fraction of the 2 hours 40 minutes that is taken by advertisements.
Give your answer in its simplest form.

..... [2]

6 Write these values in order, starting with the smallest.

$$\frac{1}{30} \quad 0.03 \quad \frac{1}{10} \quad 5\% \quad \frac{2}{25}$$

..... , , , , [2]
smallest

- 7 y is directly proportional to x .
When $x = 4$, $y = t$.

Find x , in terms of t , when $y = 2$.

$x = \dots\dots\dots$ [2]

- 8 By writing each number correct to 1 significant figure, estimate the value of

$$\frac{59.843^2}{20.13 \times 0.9024}.$$

$\dots\dots\dots$ [2]

9 Solve the simultaneous equations.

$$\begin{aligned}x + 4y &= 1 \\ 3x + 2y &= 8\end{aligned}$$

$$x = \dots\dots\dots$$

$$y = \dots\dots\dots [3]$$

- 10 (a) Amir buys a camera for \$250 and sells it for \$200.

Calculate his percentage loss.

..... % [2]

- (b) Meera invests some money at a rate of 2% per year **simple interest**.

How many years does it take for her investment to double in value?

..... [1]

- 11 (a) Simplify $7 - 3(5k - 2)$.

..... [1]

- (b) Solve the equation $5x^2 - 3x = 0$.

$x = \dots\dots\dots$ or $x = \dots\dots\dots$ [2]

12 (a) Evaluate $3^{-2} \times 3^4$.

..... [1]

(b) Evaluate $3 - 3^0$.

..... [1]

(c) Simplify $y^{\frac{1}{2}} \times 4y^{\frac{1}{4}}$.

..... [1]

13 (a) Write the number 0.000 23 in standard form.

..... [1]

(b) Evaluate $8 \times 10^9 - 9 \times 10^8$.
Give your answer in standard form.

..... [2]

14

$$p = 2^3 \times 3 \times 5^2 \qquad q = 2 \times 3^2 \times 5$$

- (a) Find the highest common factor (HCF) of p and q .

..... [1]

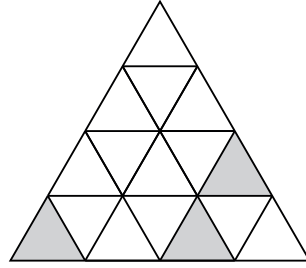
- (b) Find the lowest common multiple (LCM) of p , q and 21.
Give your answer as the product of prime factors.

..... [1]

- (c) Find the smallest integer N , such that pN is a square number.

$N =$ [1]

15 (a)

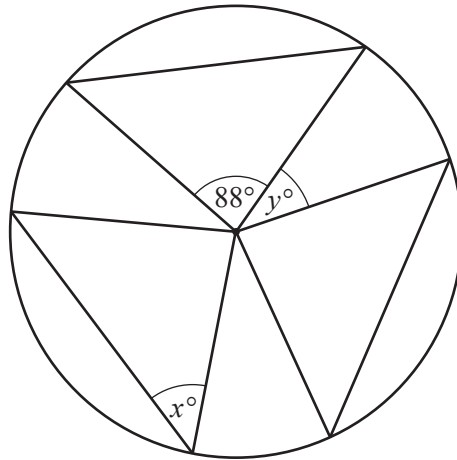


In the diagram, three small triangles are shaded.

Shade **one** more small triangle to give a diagram that has exactly one line of symmetry.

[1]

(b)



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In the diagram, the three triangles and the circle form a figure that has rotational symmetry of order 3.

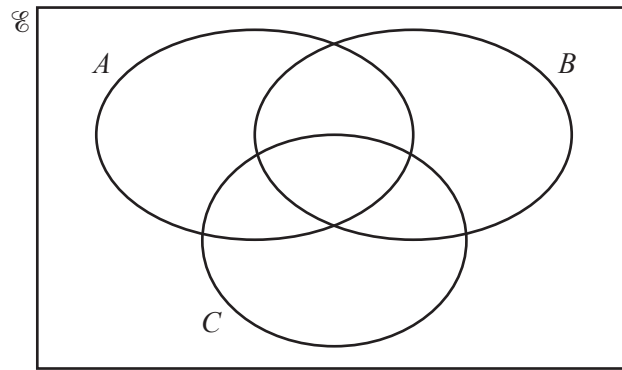
(i) Find x .

$x = \dots\dots\dots$ [1]

(ii) Find y .

$y = \dots\dots\dots$ [2]

- 16 (a) In the Venn diagram, shade the region which represents $C \cap (A \cup B)'$.



[1]

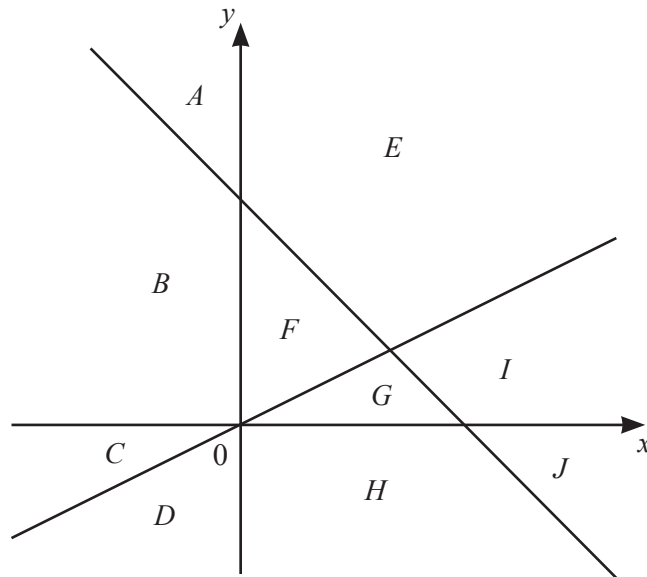
- (b) $U = \{ a, b, c, d, e, f, g, h, i, j \}$
 $T = \{ b, d, f, h, j \}$
 $V = \{ a, b, d, g, h, i \}$

- (i) List the members of $T \cap V'$.

..... [1]

- (ii) Find $n(T \cup V)$.

..... [1]



The diagram shows the lines $x + y = 8$, $y = \frac{1}{2}x$, $x = 0$ and $y = 0$.

The regions **between** the lines are labelled with letters.

(a) Write down the label of the region which is defined by these three inequalities.

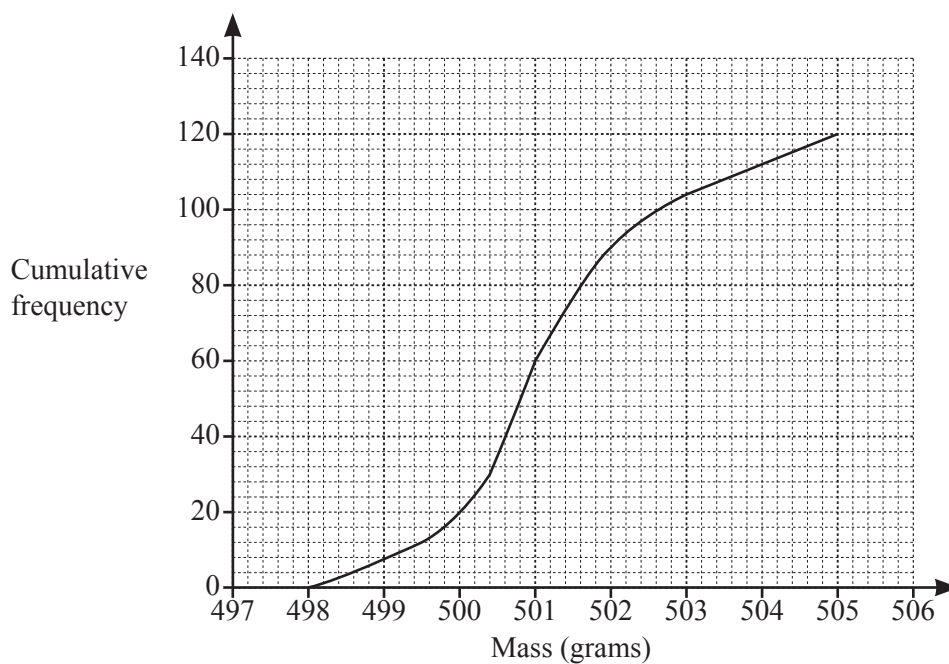
$$\begin{aligned} x + y &< 8 \\ y &< \frac{1}{2}x \\ y &> 0 \end{aligned}$$

..... [1]

(b) Write down **all** the inequalities which define region E.

..... [2]

- 18 The masses of 120 cereal packets were measured.
The results are summarised in the cumulative frequency diagram.



- (a) Use the diagram to estimate

- (i) the median,

..... g [1]

- (ii) the interquartile range.

..... g [2]

- (b) The measuring scales used were faulty.
The measured masses were all 0.8 g more than the actual masses.

Write down the median and the interquartile range of the actual masses.

Median = g Interquartile range = g [2]

19 $f(x) = \frac{5-x}{x}$

(a) Evaluate $f\left(\frac{1}{2}\right)$.

..... [1]

(b) Find $f^{-1}(x)$.

$f^{-1}(x) =$ [2]

- 20** The table shows the results when a dice is thrown 300 times.

Number on dice	1	2	3	4	5	6
Frequency	55	42	45	p	50	q

The relative frequency of throwing a 4 is 0.2 .

- (a)** Find the value of p and the value of q .

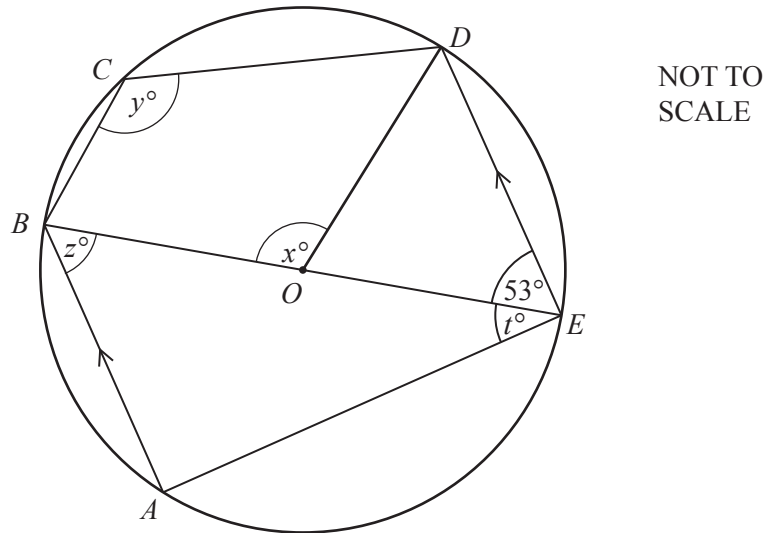
$p =$

$q =$ [2]

- (b)** How many times would you expect to throw a 2 when this dice is thrown 1000 times?

..... [1]

21



In the diagram, the points A , B , C , D and E lie on the circle, centre O .
The points B , O and E lie on a straight line.

AB is parallel to ED and $\angle DEO = 53^\circ$.

(a) Find x .

$x = \dots\dots\dots$ [1]

(b) Find y .

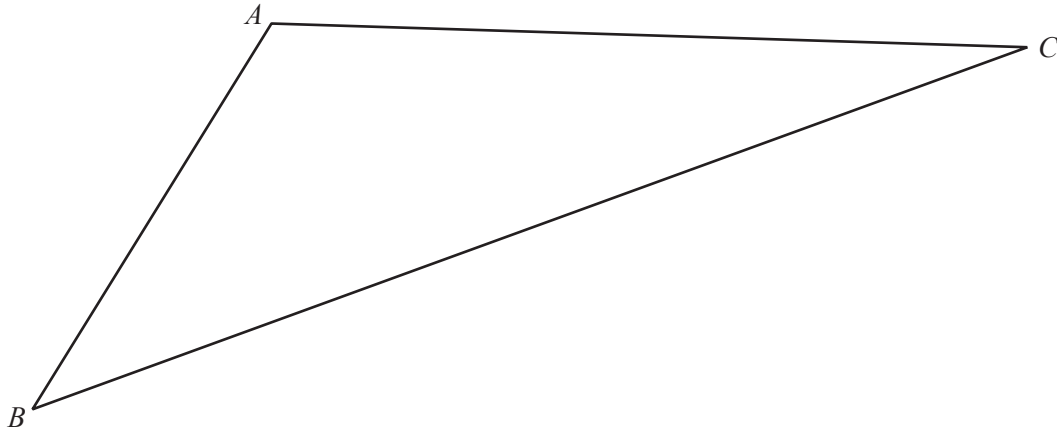
$y = \dots\dots\dots$ [1]

(c) Find z .

$z = \dots\dots\dots$ [1]

(d) Find t .

$t = \dots\dots\dots$ [1]



The diagram shows triangle ABC .

(a) Using a pair of compasses and a straight edge, construct

(i) the perpendicular bisector of AC . [2]

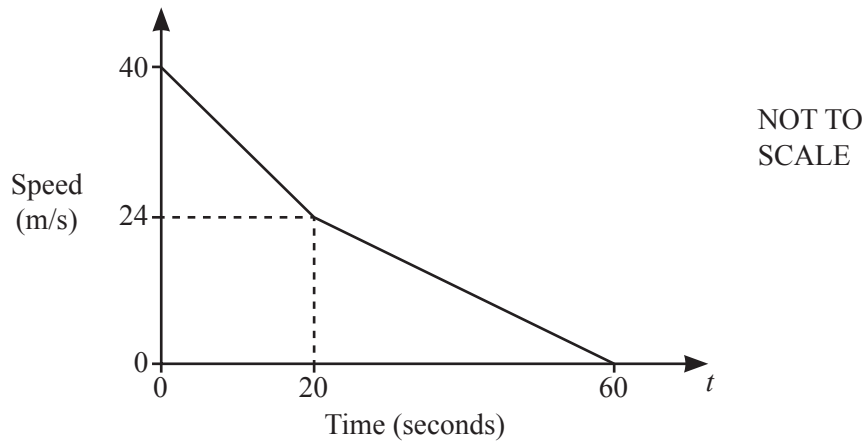
(ii) the locus of the points that are equidistant from AB and AC . [1]

(b) The perpendicular bisector of AC meets BC at P .
 Q is the point on BC that is equidistant from AB and AC .

Mark, and label, the points P and Q on the diagram and measure PQ .

$PQ = \dots\dots\dots$ cm [1]

- 23 The diagram is the speed–time graph representing part of a train’s journey.



The train slows down uniformly from a speed of 40 m/s to a speed of 24 m/s in a time of 20 seconds. It then slows down uniformly for a further 40 seconds, until it stops.

- (a) Find the deceleration between $t = 20$ and $t = 60$.

..... m/s^2 [1]

- (b) Find the speed when $t = 50$.

..... m/s [1]

- (c) Find the distance travelled from $t = 0$ to $t = 20$.

..... m [2]

24 $\mathbf{A} = \begin{pmatrix} 3 & 1 \\ -2 & 0 \end{pmatrix}$ $\mathbf{B} = \begin{pmatrix} -2 & 1 \\ 3 & 0 \end{pmatrix}$

(a) Evaluate $2\mathbf{A} - \mathbf{B}$.

$$\begin{pmatrix} & \\ & \end{pmatrix} \quad [2]$$

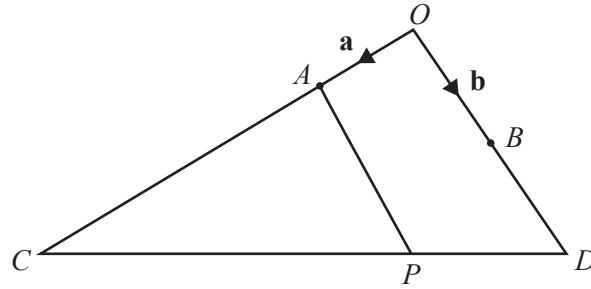
(b) Find $\mathbf{A}^{-1}$.

$$\begin{pmatrix} & \\ & \end{pmatrix} \quad [2]$$

(c) Find the matrix $\mathbf{X}$ such that $\mathbf{AX} = \begin{pmatrix} 3 \\ -4 \end{pmatrix}$.

[2]

Question 25 is printed on the next page.



In the diagram, B is the midpoint of OD and $OA : AC = 1 : 3$.

$\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OB} = \mathbf{b}$.

(a) Express, as simply as possible, in terms of $\mathbf{a}$ and/or $\mathbf{b}$

(i) $\overrightarrow{OC}$,

$\overrightarrow{OC} = \dots\dots\dots$ [1]

(ii) $\overrightarrow{CD}$.

$\overrightarrow{CD} = \dots\dots\dots$ [1]

(b) P is the point on CD where $CP = \frac{3}{4}CD$.

(i) Express $\overrightarrow{AP}$, as simply as possible, in terms of $\mathbf{a}$ and/or $\mathbf{b}$.

$\overrightarrow{AP} = \dots\dots\dots$ [2]

(ii) Find $AP : BD$.

$\dots\dots\dots : \dots\dots\dots$ [1]

(iii) What special type of quadrilateral is $ABDP$?

$\dots\dots\dots$ [1]

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