Write your name here

Surname	Other names

Pearson Edexcel GCSE

Centre Number | | | | | |

Candidate Number | | | | |

2016 Predicted Paper 1

Higher Tier

Time: 1 hour 45 minutes

Paper Reference **1MA0/1H**

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser. Tracing paper may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- **Calculators must not be used.**

Information

- The total mark for this paper is 100
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed.

Advice

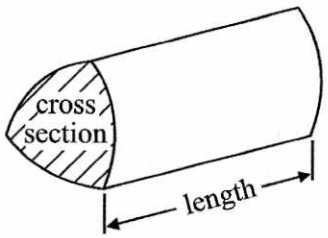
- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

GCSE Mathematics 1MA0

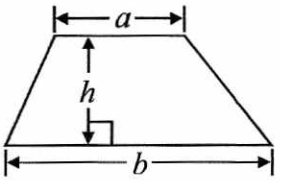
Formulae: Higher Tier

You must not write on this formulae page.
Anything you write on this formulae page will gain NO credit.

Volume of prism = area of cross section × length

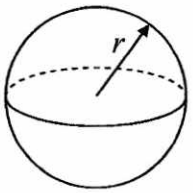


Area of trapezium $= \frac{1}{2}(a + b)h$



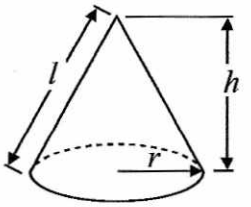
Volume of sphere $= \frac{4}{3}\pi r^3$

Surface area of sphere $= 4\pi r^2$

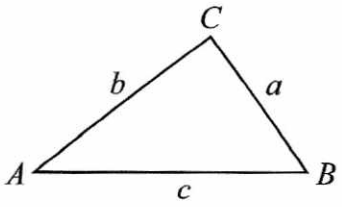


Volume of cone $= \frac{1}{3}\pi r^2 h$

Curved surface area of cone $= \pi rl$



In any triangle *ABC*



The Quadratic Equation

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

$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

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 $= \frac{1}{2}ab \sin C$

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

You must NOT use a calculator.

1 (a) Work out $1\frac{3}{4} + 3\frac{1}{2}$

$\frac{7}{4} + \frac{7}{2}$

$\frac{7}{4} + \frac{14}{4} = \frac{21}{4}$ [or $5\frac{1}{4}$]

$\frac{21}{4}$

(1)

(b) Work out $\frac{3}{7} \times £28$

$\frac{1}{7} = £4$

$\frac{3}{7} = £12$

£ 12

(2)

(c) Estimate the value of 19.89×201.71

20×200

4000

(2)

(Total for Question 1 is 5 marks)

2 Milly has a biased coin.

When she throws the coin once, the probability of getting heads is 0.2

(a) Write down the probability of getting tails.

$1 - 0.2$

0.8

(1)

Milly throws the coin 200 times.

(b) Work out an estimate for the number of times she gets heads.

0.2×200

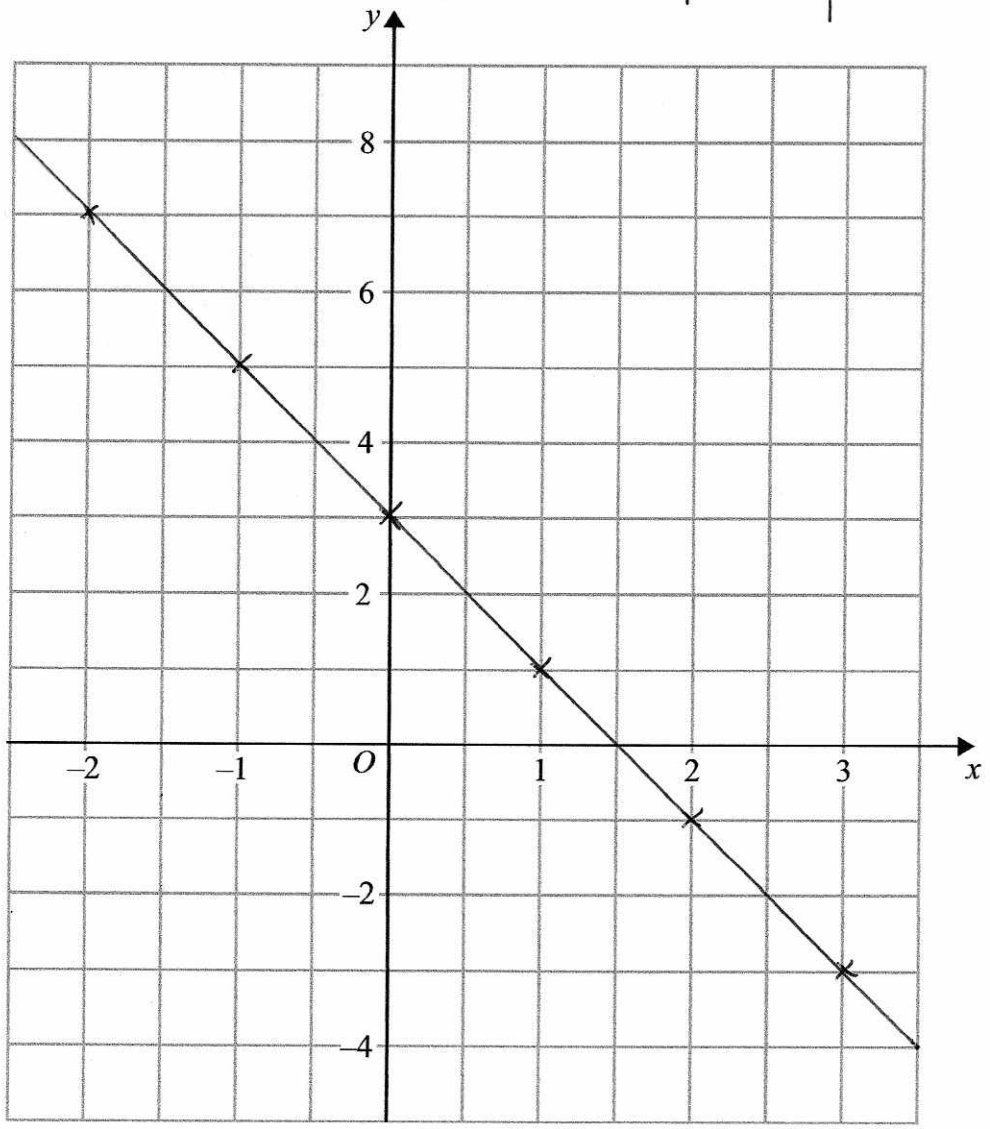
40

(2)

(Total for Question 2 is 3 marks)

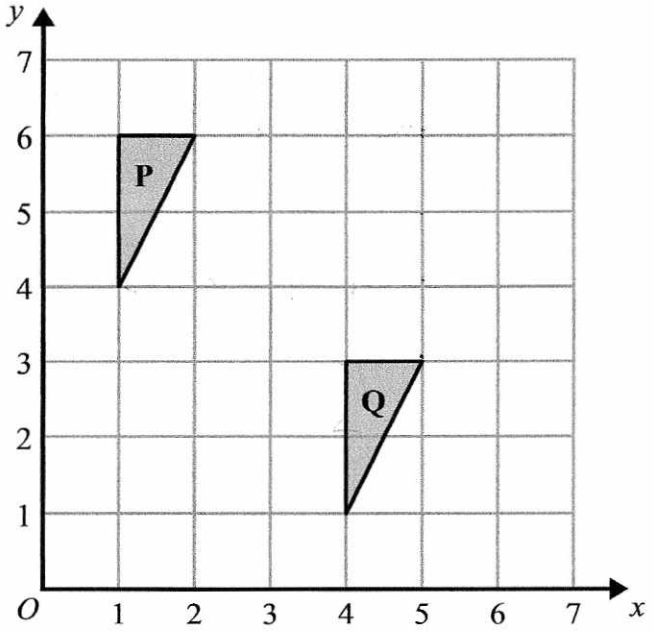
3 On the grid, draw the graph of $y = 3 - 2x$ for values of x from -2 to 3

x	-2	-1	0	1	2	3
y	7	5	3	1	-1	-3



(Total for Question 3 is 3 marks)

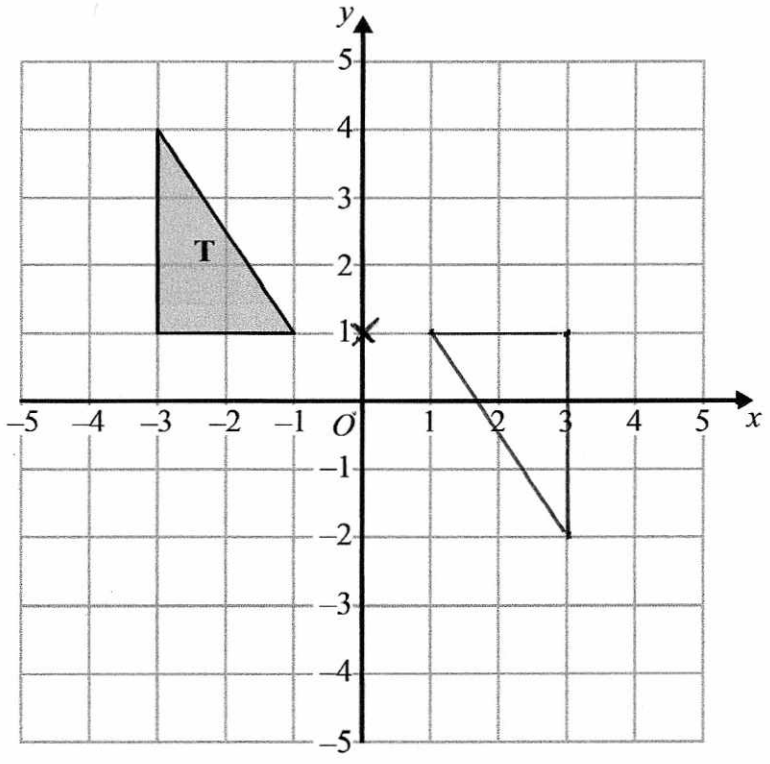
4



(a) Describe fully the single transformation that maps shape **P** to shape **Q**.

translation by the vector $\begin{pmatrix} 3 \\ -3 \end{pmatrix}$

(2)



(b) Rotate triangle **T** 180° about the point (0, 1).

(2)

(Total for Question 4 is 4 marks)

5 Kevin wants to get the ferry to Ireland.

A ferry crossing costs

£125 on Saturdays
£109 on Mondays

Kevin has a voucher for 15% off the cost of a ferry crossing on Mondays.

Kevin can go on Saturday without using the voucher or on Monday using the voucher.

What is the difference in the cost of the ferry crossing if Kevin goes on Monday rather than on Saturday?

£109 on Monday

10% = £10.90

5% = £5.45

15% = £16.35

PRICE ON MONDAY

$$\begin{array}{r} 10\overset{8}{9}.\overset{1}{0}0 \\ -\ 16.35 \\ \hline 92.65 \end{array}$$

Difference

£125 − £92.65 = £32.35

[OR 16 + 16.35]

£ 32.35

(Total for Question 5 is 3 marks)

6 Julian wants to find out whether people in his town like to buy food from the market.
He wants to carry out a survey.
He is going to ask people as they leave the market.

This is not a good way of collecting information.

(a) Give a reason why.

they will be more likely to use the market – not representative of the town.

(1)

Julian also wants to know what people think about the price of food from the market.

He uses this question on a questionnaire.

Food from the market is very cheap. Do you agree?

Yes	No	Do not know
☐	☐	☐

(b) Write down **one** thing wrong with this question.

Leading question (bias)

(1)

Julian also wants to know how far people travel to buy food from the market.

(c) Design a suitable question for Julian to use on his questionnaire.

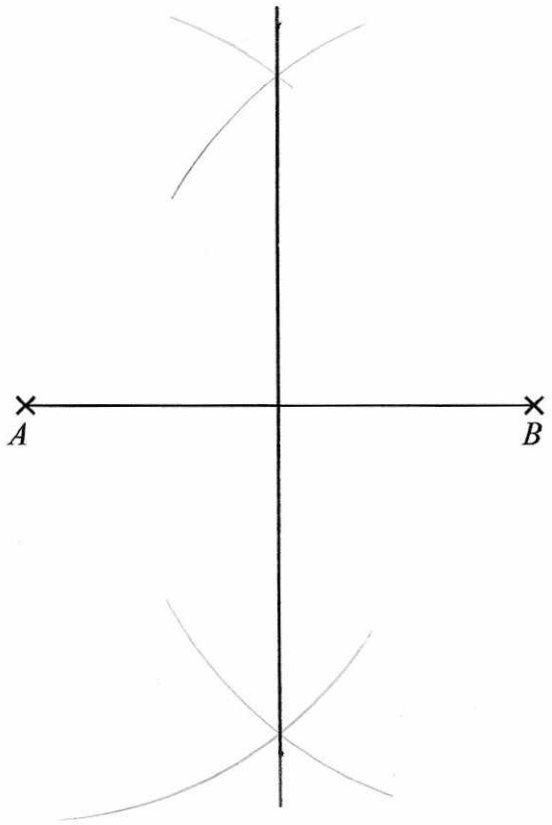
How far do you usually travel to buy food from the market?

☐ 0 - 1 miles ☐ 2 - 3 miles ☐ 4 - 5 miles ☐ 6 or more miles

(2)

(Total for Question 6 is 4 marks)

7



Use ruler and compasses to **construct** the perpendicular bisector of the line AB.
You must show all your construction lines.

(Total for Question 7 is 2 marks)

8 Andy is going to cover a wall with tiles.

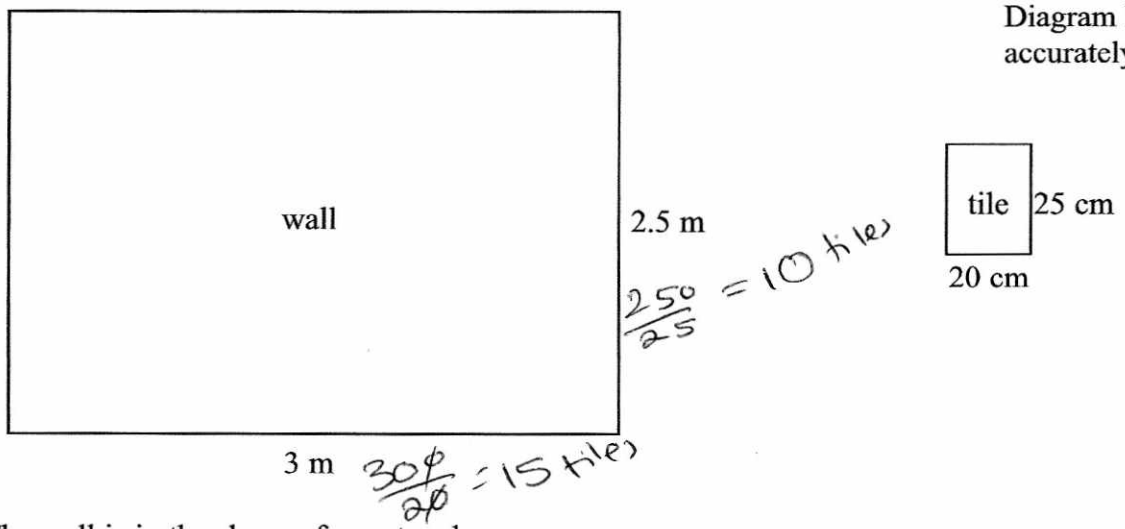


Diagram **NOT** accurately drawn

$\frac{250}{25} = 10$ tiles

$\frac{300}{20} = 15$ tiles

The wall is in the shape of a rectangle.
The wall is 3 m wide and 2.5 m high.
The tiles are rectangles 20 cm wide and 25 cm high.

The tiles are sold in boxes.
There are 20 tiles in each box.
Each box of tiles costs £8.50

Work out the total cost of the boxes of tiles Andy needs to buy.
You must show all your working.

15 × 10 tiles = 150 tiles

∴ 8 boxes required.

8 × £8.50

= £68

	800	50
8	6400	400

£ 68

(Total for Question 8 is 5 marks)

9 (a) Expand and simplify $3(y - 2) + 2(y + 5)$

$3y - 6 + 2y + 10$

$5y + 4$

(2)

(b) Simplify $\frac{w^5}{w^3}$

w^2

(1)

(c) Factorise $5x + 20$

$5(x + 4)$

(1)

(Total for Question 9 is 4 marks)

10 The diagram shows the area of each of three faces of a cuboid.

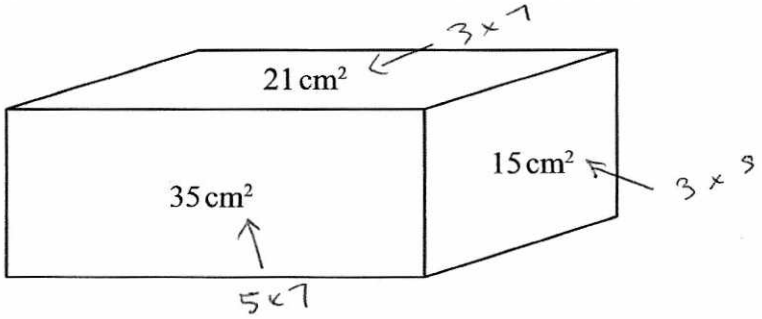


Diagram **NOT** accurately drawn

The length of each edge of the cuboid is a whole number of centimetres.

Work out the volume of the cuboid.

$3 \times 5 \times 7$

3×35

$= 105 \text{ cm}^3$

105cm³

(Total for Question 10 is 4 marks)

11 Tom and Amy set the alarms on their phones to sound at 6.45 am.

Both alarms sound together at 6.45 am.
Tom's alarm then sounds every 9 minutes.
Amy's alarm then sounds every 12 minutes.

At what time will both alarms next sound together?

9 18 27 36

12 24 36

36 minutes later.

7:21 am

7:21 am

(Total for Question 11 is 3 marks)

*12

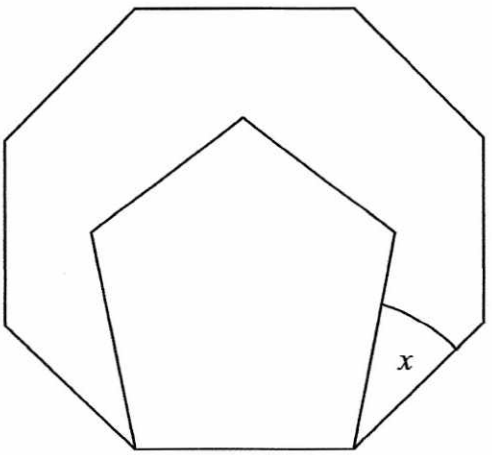


Diagram **NOT** accurately drawn

The diagram shows two regular polygons. Octagon and Pentagon

Find the size of the angle marked x.
Give reasons for your answer.

Octagon: ~~external~~ exterior angle $= \frac{360}{8} = \frac{180}{4} - \frac{90}{2} = 45°$

$\therefore$ interior angle $= 180 - 45 = 135°$

Pentagon exterior angle $= \frac{360}{5} = \frac{720}{10} = 72°$

interior angle $= 180 - 72 = 108°$

$x = 135 - 108 = 27°$

(Total for Question 12 is 4 marks)

13 (a) Write 0.0078 in standard form.

7.8×10^{-3}

(1)

(b) Write 6.71×10^6 as an ordinary number.

6710000

(1)

(c) Write these numbers in order of size.

Start with the smallest number.

$9^{\frac{1}{2}}$ 0.9 −9 9^0

3 1

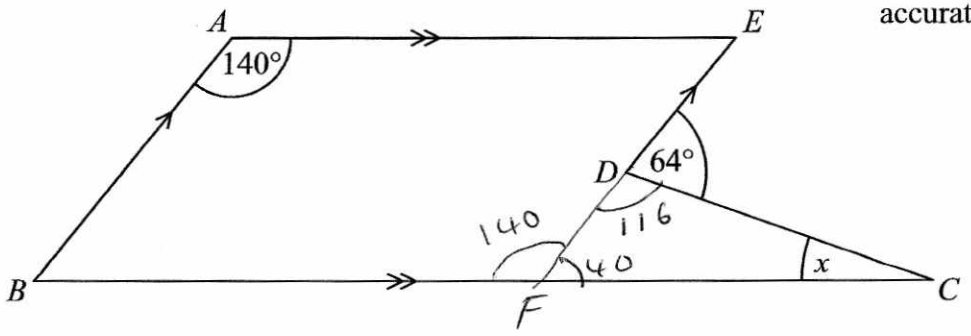
$-9, 0.9, 9^0, 9^{\frac{1}{2}}$

(2)

(Total for Question 13 is 4 marks)

***14** The diagram shows a pentagon *ABCDE*.

Diagram **NOT** accurately drawn



AE is parallel to *BC*.
BA is parallel to *DE*.

Angle *EDC* = 64°
Angle *BAE* = 140°

Work out the size of the angle marked *x*.
You must give reasons for your answer.

$B\hat{F}C = 140^\circ$ opposite angles in a parallelogram are equal

$C\hat{D}F = 116^\circ$ Angles on a straight line sum to 180°

$D\hat{F}C = 40^\circ$ Angles on a straight line sum to 180°

$x = 180 - (116 + 40)$
$180 - 156$
24°

Angles in a triangle sum to 180°

(Total for Question 14 is 4 marks)

***15** *ABCD* and *PQRS* are two rectangles.

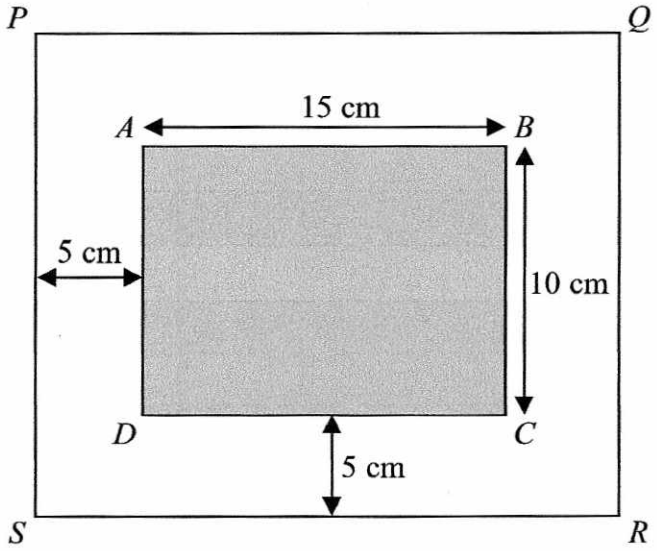


Diagram **NOT** accurately drawn

Rectangle *ABCD* is 15 cm by 10 cm.
There is a space 5 cm wide between rectangle *ABCD* and rectangle *PQRS*.

Are rectangle *ABCD* and rectangle *PQRS* mathematically similar?
You must show how you got your answer.

BC = 10cm QR = 10 + 5 + 5
= 20cm

scale factor ×2

AB = 15cm PQ = 15 + 5 + 5
= 25cm

scale factor × $\frac{25}{15}$

The scale factor for length and width is not consistent.
They are not similar.

(Total for Question 15 is 3 marks)

16 Solve $\frac{x+1}{2}+\frac{2x-1}{3}=\frac{5}{6}$

$\frac{3(x+1)}{6} + \frac{2(2x-1)}{6} = \frac{5}{6}$ [×6]

$3(x+1) + 2(2x-1) = 5$

$3x+3 + 4x - 2 = 5$

$7x + 1 = 5$

$7x = 4$

$x = \frac{4}{7}$

$x =$ $\frac{4}{7}$

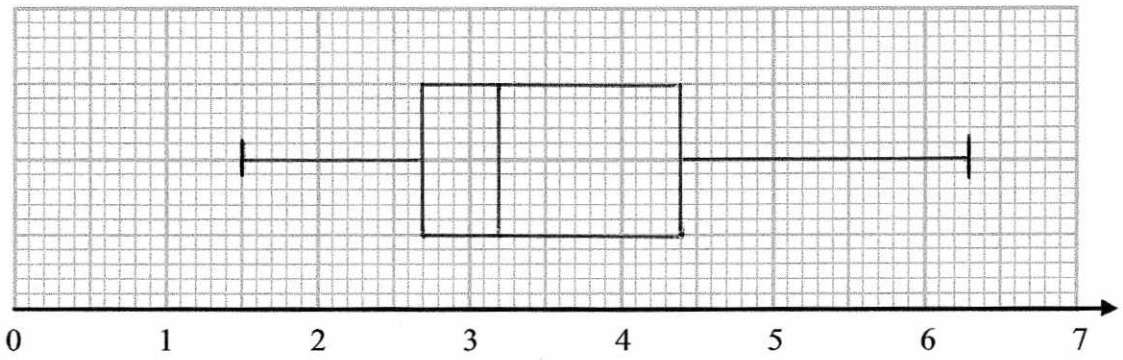
(Total for Question 16 is 4 marks)

17 The table gives information about the weights of 60 parcels.

Lowest	1.5 kg
Highest	6.3 kg
Lower quartile	2.7 kg
Interquartile range	1.7 kg
Median	3.2 kg

Upper q = 2.7 + 1.7
= 4.4

Draw a box plot for this information.



(Total for Question 17 is 3 marks)

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18 The table shows information about the heights of 40 plants.

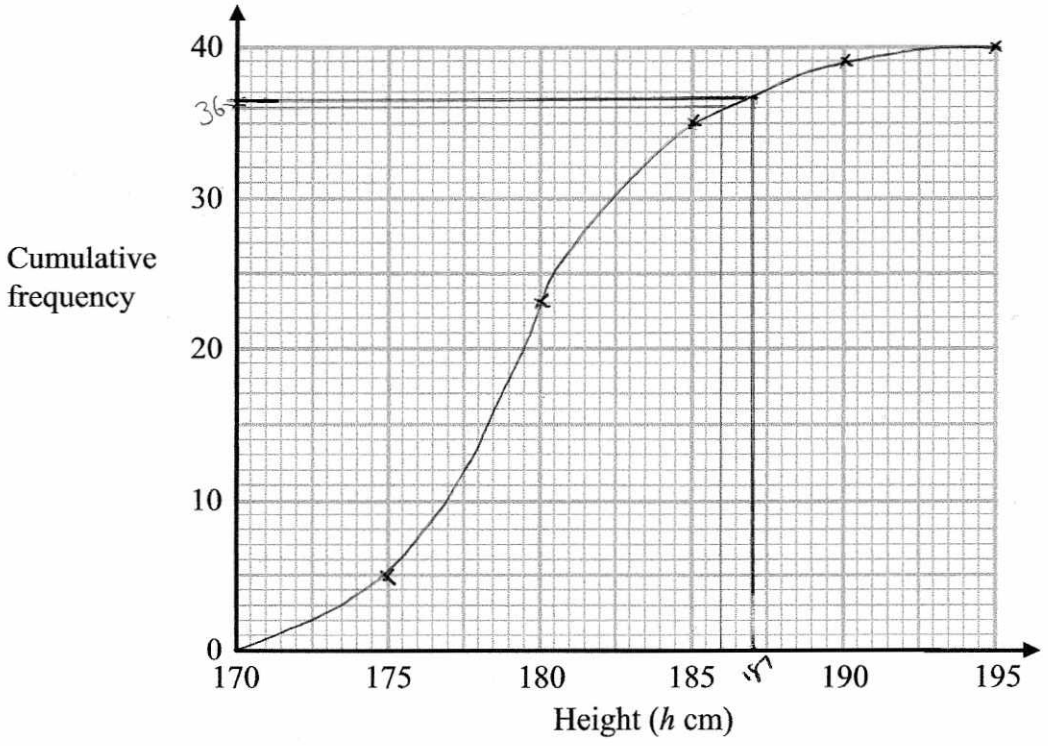
Height (h cm)	**Frequency**
$170 < h \leqslant 175$	5
$175 < h \leqslant 180$	18
$180 < h \leqslant 185$	12
$185 < h \leqslant 190$	4
$190 < h \leqslant 195$	1

(a) Complete the cumulative frequency table.

Height (h cm)	Cumulative frequency
$170 < h \leqslant 175$	5
$170 < h \leqslant 180$	23
$170 < h \leqslant 185$	35
$170 < h \leqslant 190$	39
$170 < h \leqslant 195$	40

(1)

(b) On the grid, draw a cumulative frequency graph for your table.



(2)

(c) Find an estimate for the number of plants with a height greater than 187 cm.

40 − 36

4

(2)

[OR 3]

(Total for Question 18 is 5 marks)

19 Here is a shape.

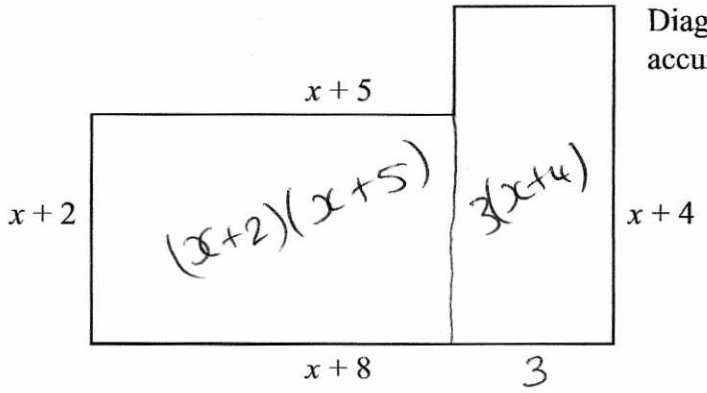


Diagram **NOT** accurately drawn

All the measurements are in centimetres.
All the corners are right angles.

The area of the shape is A cm^2.

Find a formula for A in terms of x.
Give your answer in its simplest form.

$A = (x+2)(x+5) + 3(x+4)$

$= x^2 + 5x + 2x + 10 + 3x + 12$

$= x^2 + 10x + 22$

$A = x^2 + 10x + 22$

(Total for Question 19 is 4 marks)

20 Solve the simultaneous equations

$$5x + y = 17$$
$$x + y = 3$$

Show clear algebraic working.

$4x = 14$

$x = \frac{14}{4} = \frac{7}{2} = 3.5$

$3.5 + y = 3$

$y = -0.5$

$x =$ 3.5

$y =$ −0.5

(Total for Question 20 is 3 marks)

---

21 Find an equation of the line that is parallel to the line $y = 4 - 2x$ and passes through the point (3, 7)

gradient = −2

$y = -2x + c$ (3, 7)

x y

$7 = -2(3) + c$

$7 = -6 + c$

$c = 13$

$y = -2x + 13$

(Total for Question 21 is 3 marks)

***22** Laura is raising money for charity.

She has a game with two sets of cards.

Set A	1	3	5	6	7
Set B	2	4	8	9	

80 students are each going to play Laura's game once.

Each student takes at random one card from each set of cards.
They add the two numbers to get a total score.

Each student pays 70p to play the game.
Laura pays £3 to any student getting a total score of 9

Show that Laura can expect to make a profit of £20
You must show all your working.

9: 1 and 8 $\frac{1}{5} \times \frac{1}{4} = \frac{1}{20}$

5 and 4 $\frac{1}{5} \times \frac{1}{4} = \frac{1}{20}$ $= \frac{3}{20}$

7 and 2 $\frac{1}{5} \times \frac{1}{4} = \frac{1}{20}$

Money In: (0.7)

80 × 70p = ~~£560~~

£56

Money Out:

$\frac{3}{20}$ win ∴ $\frac{12}{80}$

12 × 3 = £36

£56 − £36 = £20

(Total for Question 22 is 5 marks)

23 Solve $6x^2 - x - 15 = 0$

$(3x - 5)(2x + 3) = 0$

$x = \frac{5}{3}$ $x = \frac{-3}{2}$

(Total for Question 23 is 3 marks)

24 y is proportional to x^2.

When $x = 5$, $y = 100$

Work out the value of y when $x = 3$

$$y = kx^2$$

$$100 = k(5)^2$$

$$100 = k(25)$$

$$k = 4$$

$$y = 4x^2$$

$$y = 4(3)^2$$

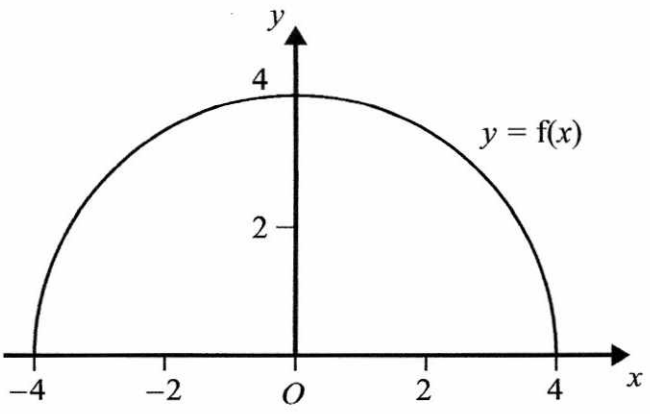
$$= 4(9)$$

$$= 36$$

$y =$ 36

(Total for Question 24 is 3 marks)

25 Here is the graph of $y = f(x)$.



(a) Write down the coordinates of the point where the graph of $y = f(x) - 3$ meets the y-axis.

(0 , 1)

(1)

The graph of $y = f(4x)$ meets the x-axis at the points P and Q.

(b) Work out the length of the line segment PQ.

(−1, 0) (1, 0)

2 units

(2)

(Total for Question 25 is 3 marks)

*26

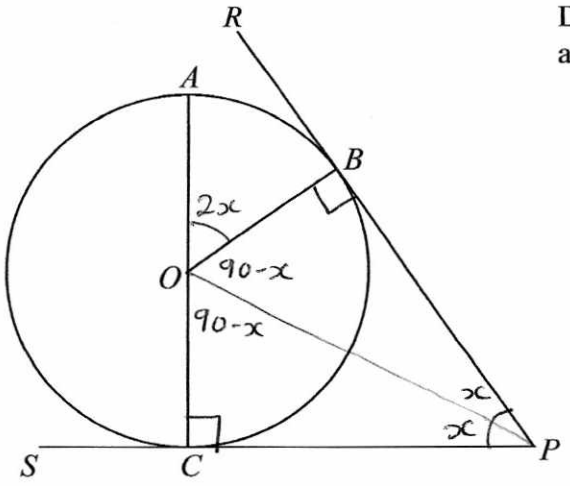


Diagram **NOT** accurately drawn

A, *B* and *C* are points on a circle, centre *O*.

RBP is the tangent to the circle at *B*.
SCP is the tangent to the circle at *C*.
AOC is a diameter of the circle.

Prove that angle *AOB* is equal to angle *CPB*.
You must give reasons at each stage.

let $C\hat{P}O$ and $B\hat{P}O = x$ $[C\hat{P}B = 2x]$

$O\hat{C}P$ and $O\hat{B}P = 90^\circ$ (tangent meets radius)

COP and $BOP = 90 - x$ (angles in a triangle sum to 180°)

$A\hat{O}B = 180 - (90 - x + 90 - x)$

$= 180 - (180 - 2x)$ Angles on a straight line sum to 180°

$= 2x$

(Total for Question 26 is 5 marks)

27

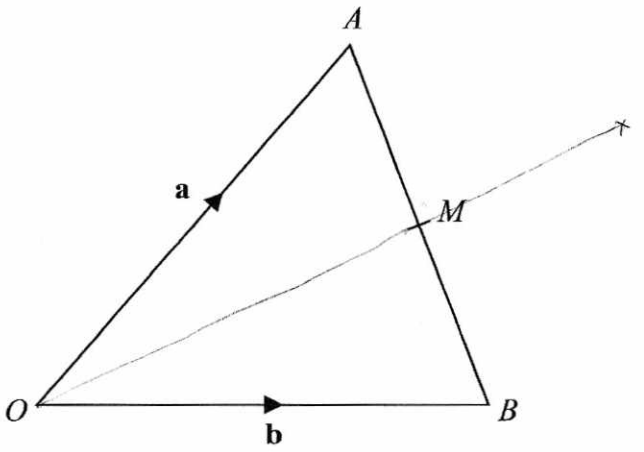


Diagram **NOT** accurately drawn

OAB is a triangle.

$\overrightarrow{OA} = \mathbf{a}$

$\overrightarrow{OB} = \mathbf{b}$

M is the midpoint of *AB*.
OMN is a straight line such that $ON : OM = 3 : 2$

Find, in terms of **a** and **b**, an expression for the vector $\overrightarrow{ON}$.
Write your answer in its simplest form.

$\overrightarrow{ON} = 1.5 \times \overrightarrow{OM}$

$\overrightarrow{AB} = -a + b$

$\overrightarrow{OM} = \overrightarrow{OA} + \frac{1}{2}\overrightarrow{AB}$

$= a + \frac{1}{2}(-a + b)$

$= a - \frac{1}{2}a + \frac{1}{2}b$

$= \frac{1}{2}a + \frac{1}{2}b$

$ON = \left(\frac{3}{2}\right) \times \left(\frac{1}{2}a + \frac{1}{2}b\right)$

$= \frac{3}{4}a + \frac{3}{4}b$

$\frac{3}{4}a + \frac{3}{4}b$

(Total for Question 27 is 4 marks)

TOTAL FOR PAPER IS 100 MARKS