

Write your name here

Surname	Other names
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**Pearson
Edexcel GCSE**

Centre Number

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Candidate Number

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November 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.

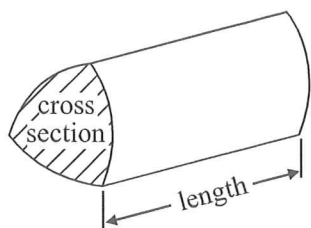
www.mathsgenie.co.uk

GCSE Mathematics 1MA0

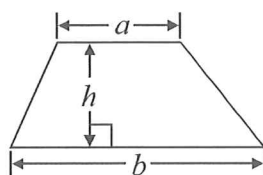
Formulae: Higher Tier

**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 \times length

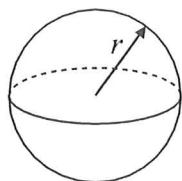


Area of trapezium = $\frac{1}{2} (a + b)h$



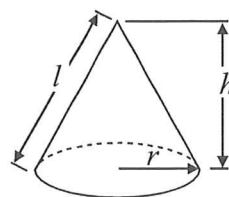
Volume of sphere = $\frac{4}{3} \pi r^3$

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

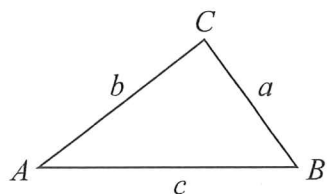


Volume of cone = $\frac{1}{3} \pi r^2 h$

Curved surface area of cone = $\pi r l$



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 Here are the ingredients needed to make leek and potato soup for 4 people.

<p>Leek and potato soup</p> <p>Serves 4</p> <p>4 leeks</p> <p>350 g potatoes</p> <p>600 ml vegetable stock</p> <p>300 ml milk</p>

2 people
2 leeks
175 g
300 ml
150 ml

Jenny wants to make soup for 6 people.

Work out the amount of each ingredient she needs.

$$4 \text{ people} + 2 \text{ people} = 6 \text{ people}$$

$$\text{Leeks: } 4 + 2 = 6 \text{ leeks}$$

$$\text{Potatoes: } 350 + 175 = 525 \text{ g}$$

$$\text{Veg. Stock: } 600 + 300 = 900 \text{ ml}$$

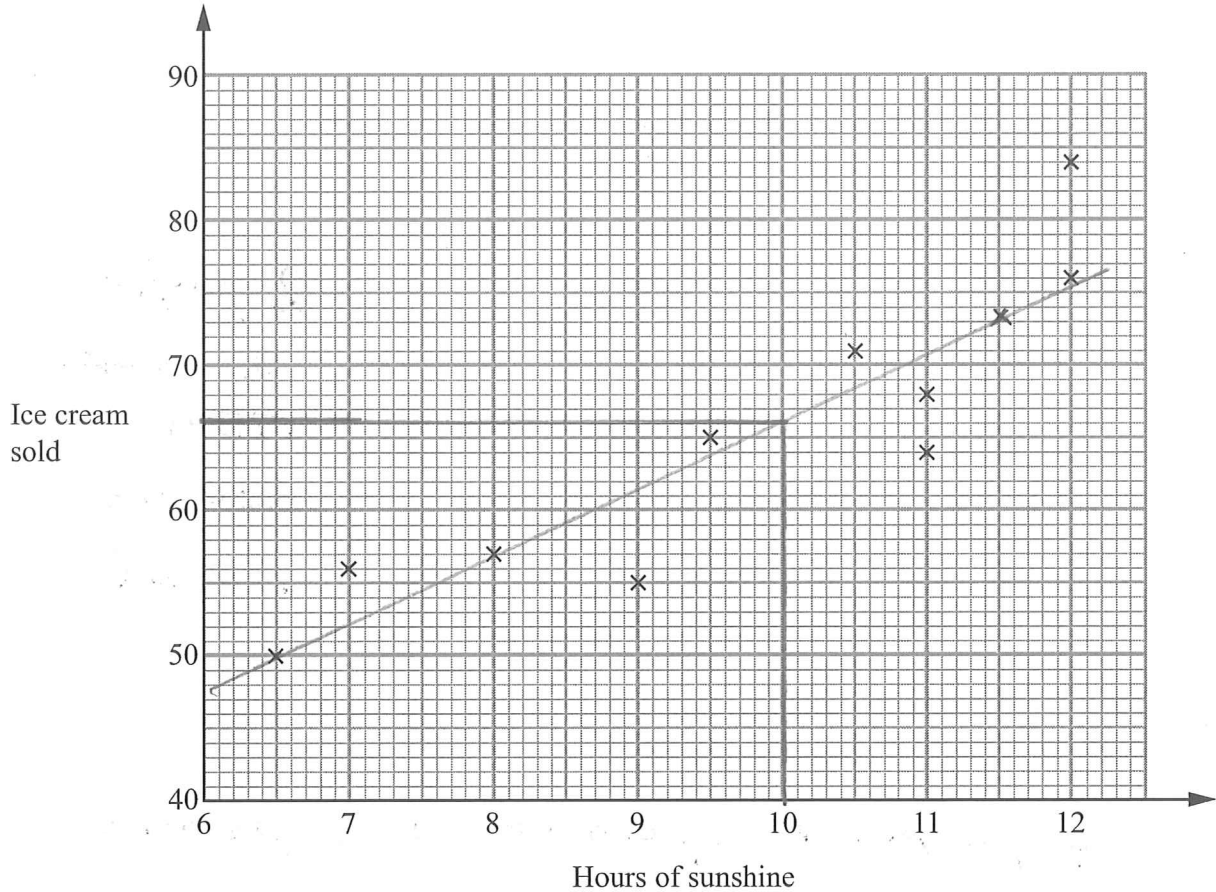
$$\text{Milk: } 300 + 150 = 450 \text{ ml}$$

..... 6 leeks
..... 525 g potatoes
..... 900 ml vegetable stock
..... 450 ml milk

(Total for Question 1 is 3 marks)

- 2 A beach cafe sells ice creams.
Each day the manager records the number of hours of sunshine and the number of ice creams sold.

The scatter graph shows this information.



On another day there were 11.5 hours of sunshine and 73 ice creams sold.

- (a) Show this information on the scatter graph.

(1)

- (b) Describe the relationship between the number of hours of sunshine and the number of ice creams sold.

as the number of hours of sunshine increases,
the number of ice creams sold increases ...
(positive correlation)

(1)

One day had 10 hours of sunshine.

- (c) Estimate how many ice creams were sold.

[You must use a line of best fit]

66

(2)

(Total for Question 2 is 4 marks)

- 3 Richard's car uses 1 litre of petrol every 8 miles.
Petrol costs £1.30 per litre.

$$\frac{240}{8} = \frac{120}{4} = \frac{60}{2} = 30$$

Richard drives 240 miles.

Work out the total cost of the petrol the car uses.

$$\begin{array}{l} \times 30 \downarrow \\ 1 \text{ litre} = 8 \text{ miles} \\ 30 \text{ litres} = 240 \text{ miles} \end{array} \quad \times 30$$

$$30 \times £1.30$$

$$3 \times £13$$

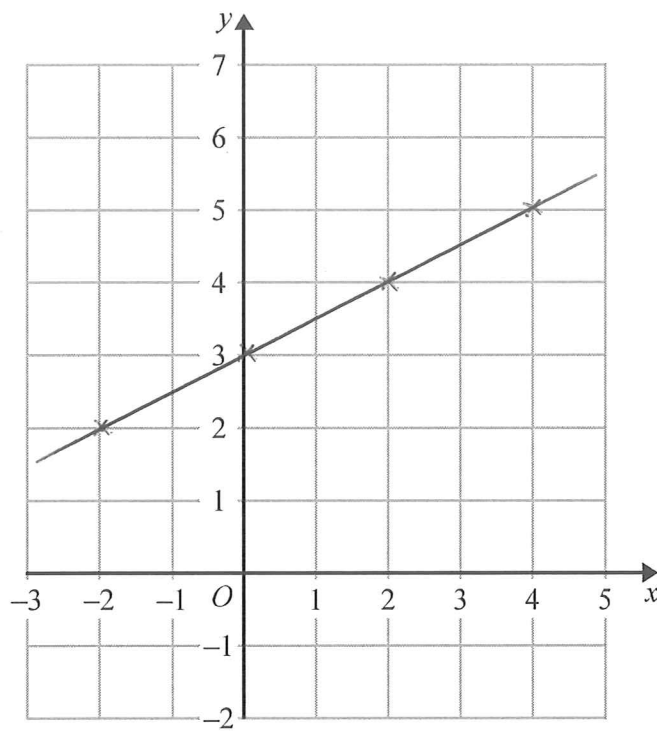
$$\underline{\underline{£39}}$$

£ 39

(Total for Question 3 is 3 marks)

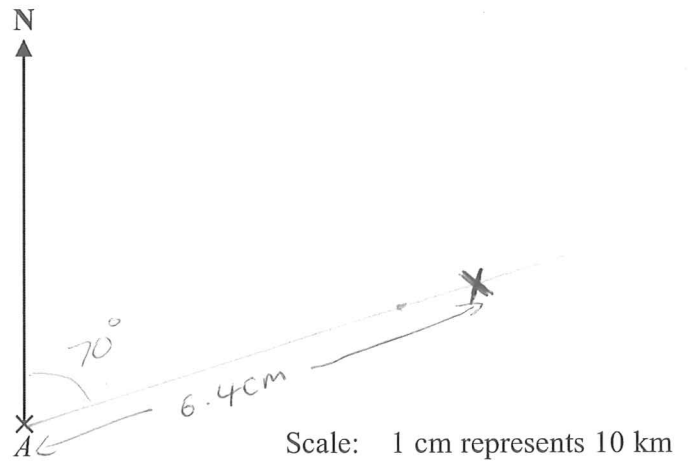
4 On the grid, draw the graph of $y = \frac{1}{2}x + 3$ for values of x from -2 to 4

x	-2	0	2	4
y	2	3	4	5



(Total for Question 4 is 3 marks)

5 The diagram shows the position of town *A*.



Town *B* is 64 km from town *A* on a bearing of 070° .

Mark the position of town *B*, with a cross (\times).

Use a scale of 1 cm represents 10 km.

(Total for Question 5 is 2 marks)

6 James wants to find out how long his friends spend using the internet.

He uses this question on his questionnaire.

How many hours do you spend using the internet?

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1 - 5	5 - 10	10 - 20

(a) Write down two things wrong with this question.

1. No time scale is given
2. There is no option for over 20 (or 0)
3. There is overlap, 5 and 10 appear twice⁽²⁾

(b) Write a better question for James to use on his questionnaire to find out how long his friends spend using the internet.

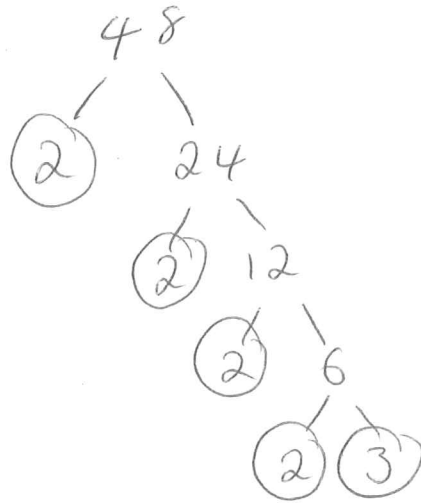
How many hours do you spend using the internet a week?

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0	1 - 5	6 - 10	11 - 15	16 or more

(2)

(Total for Question 6 is 4 marks)

7 (a) Express 48 as a product of its prime factors.



$$2 \times 2 \times 2 \times 2 \times 3$$

or // $2^4 \times 3$

$$\underline{2 \times 2 \times 2 \times 2 \times 3}$$

(2)

Buses to Exeter leave a bus station every 20 minutes.

Buses to Plymouth leave the bus station every 16 minutes.

A bus to Exeter and a bus to Plymouth both leave the bus station at 8am.

(b) When will buses to Exeter and to Plymouth next leave the bus station at the same time?

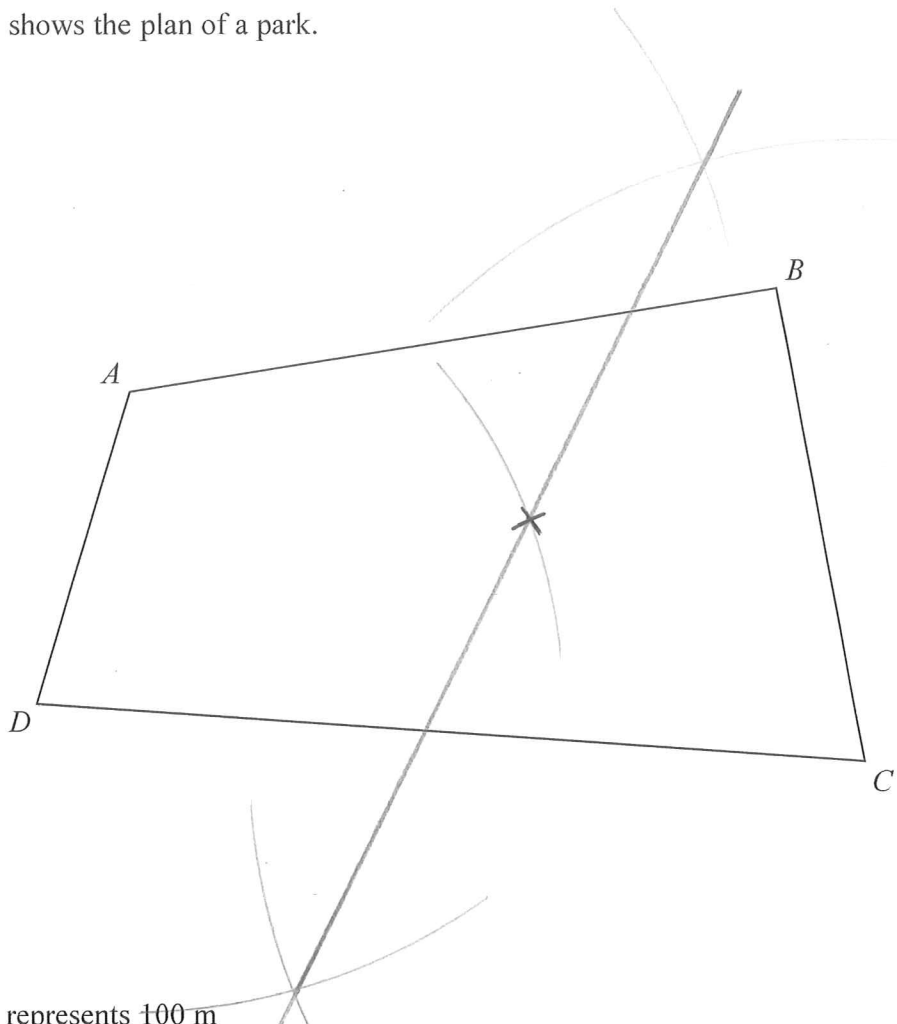
8:00	8:00
8:20	8:16
8:40	8:32
9:00	8:48
9:20	9:04
	9:20

$$\underline{9:20}$$

(3)

(Total for Question 7 is 5 marks)

8 The diagram shows the plan of a park.



Scale: 1 cm represents 100 m

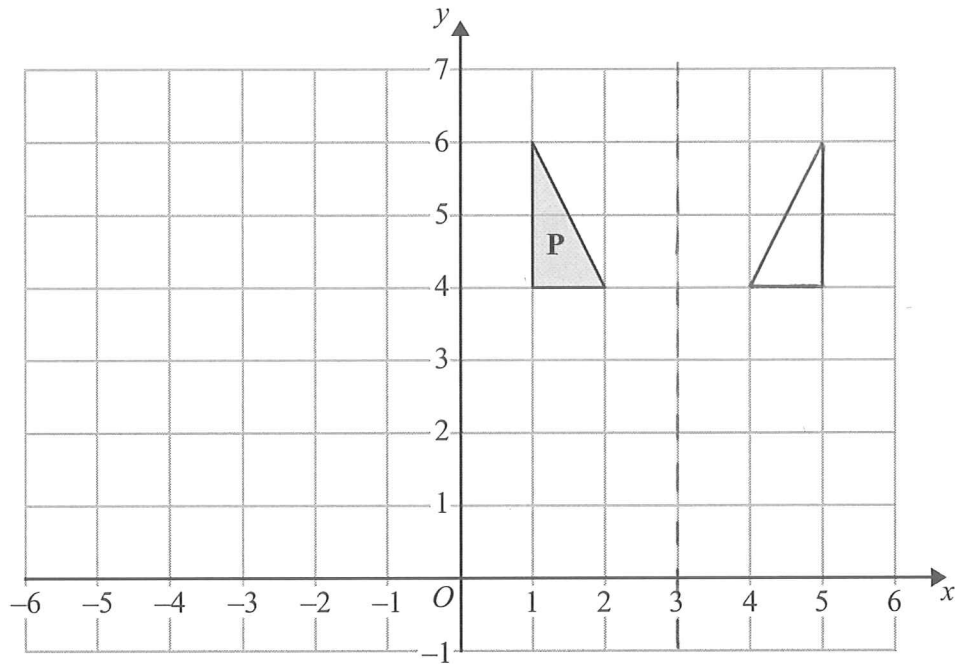
A fountain in the park is equidistant from *A* and from *C*.

The fountain is exactly 700 m from *D*.

On the diagram, mark the position of the fountain with a cross (X).

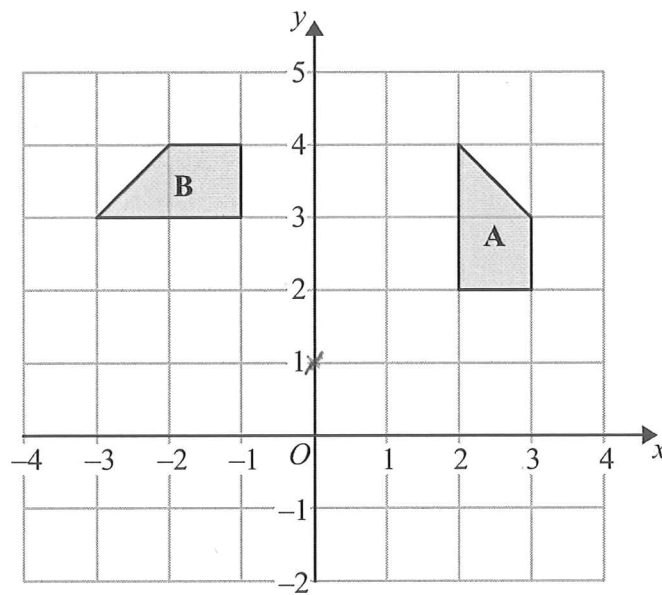
(Total for Question 8 is 3 marks)

9



(a) Reflect shape **P** in the line $x = 3$

(2)



(b) Describe fully the single transformation that maps shape **A** onto shape **B**.

Rotation, 90° Anti Clockwise, About
the point $(0, 1)$

(3)

(Total for Question 9 is 5 marks)

*10 The diagram shows the plan of Mrs Phillips' living room.

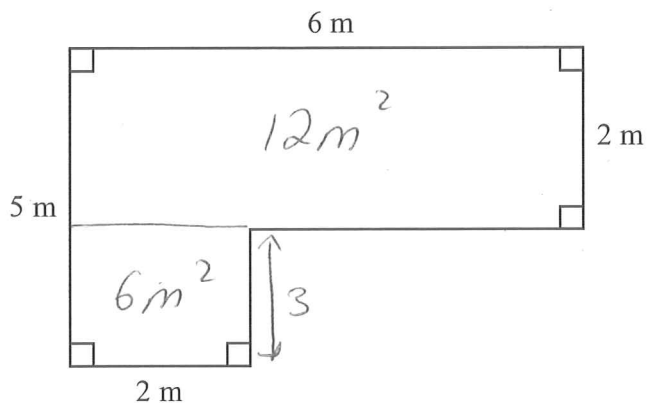


Diagram NOT
accurately drawn

Mrs Phillips is going to cover the floor with floor boards.
One pack of floor boards will cover 2.5 m^2 .

How many packs of floor boards does she need?
You must show your working.

$$\text{Area} = 18 \text{ m}^2$$

$$7 \times 2.5 = 17.5 \text{ m}^2 \quad (7 \text{ packs cover } 17.5 \text{ m}^2)$$

$$8 \times 2.5 = 20 \text{ m}^2 \quad (8 \text{ packs cover } 20 \text{ m}^2)$$

She will need 8 packs.

(Total for Question 10 is 4 marks)

11 Here is an equilateral triangle.

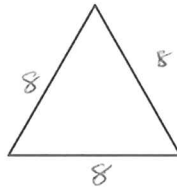
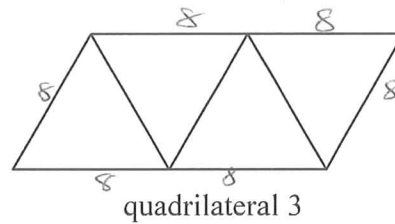
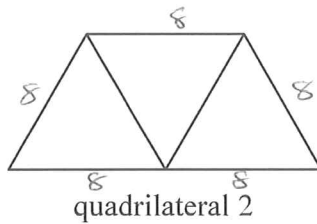
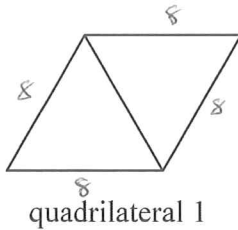


Diagram NOT accurately drawn

The equilateral triangle has a perimeter of 24 cm.

Some of these equilateral triangles are used to make this sequence of quadrilaterals.



Find an expression for the perimeter, in centimetres, of quadrilateral n .

$8n$ 32 40 48
 8 } $+24$ 16 } $+24$ 24 } $+24$

$8n + 24$

$8n + 24$

(Total for Question 11 is 3 marks)

12 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

10% = £10.90

5% = £5.45

15% = £16.35

£109 - £16.35

$$\begin{array}{r} 109.00 \\ - 16.35 \\ \hline 92.65 \end{array}$$

Monday : £92.65

Saturday : £125

DIFFERENCE

$$\begin{array}{r} 125.00 \\ - 92.65 \\ \hline 32.35 \end{array}$$

£32.35

£ 32.35

(Total for Question 12 is 3 marks)

13 The diagram shows a prism.

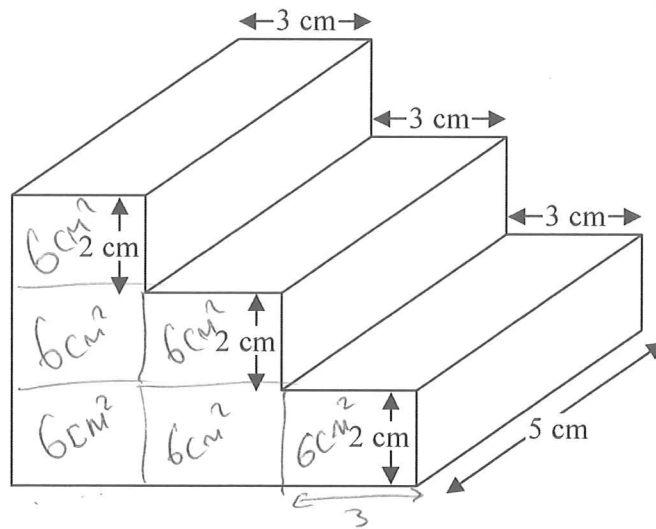


Diagram NOT
accurately drawn

All the corners are right angles.

Work out the volume of the prism.

$$\begin{aligned} \text{Area of cross section} &= 6 \times 6 \text{ cm}^2 \\ &= 36 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Volume} &= 36 \times 5 \\ &= 180 \text{ cm}^3 \end{aligned}$$

180 cm³

(Total for Question 13 is 3 marks)

14 Lyndsey records the number of miles (m) she drives each day for 120 days.

Some information about the results is given in the table.

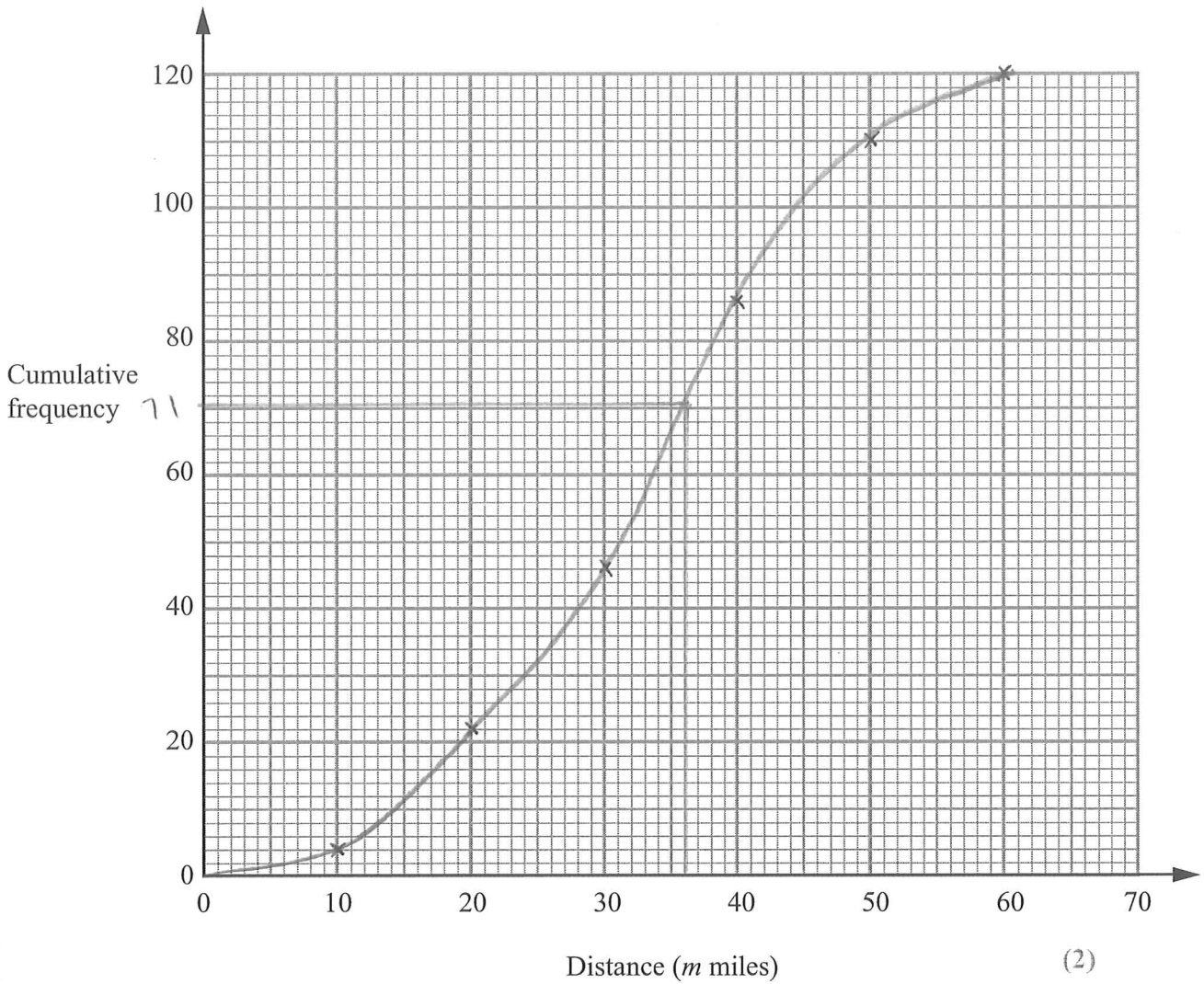
Distance (m miles)	Frequency
$0 < m \leq 10$	4
$10 < m \leq 20$	18
$20 < m \leq 30$	24
$30 < m \leq 40$	40
$40 < m \leq 50$	24
$50 < m \leq 60$	10

(a) Complete the cumulative frequency table.

Distance (m miles)	Cumulative frequency
$0 < m \leq 10$	4
$0 < m \leq 20$	22
$0 < m \leq 30$	46
$0 < m \leq 40$	86
$0 < m \leq 50$	110
$0 < m \leq 60$	120

(1)

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



(c) Work out an estimate for the number of days on which Lyndsey drives more than 36 miles.

$$120 - 71$$

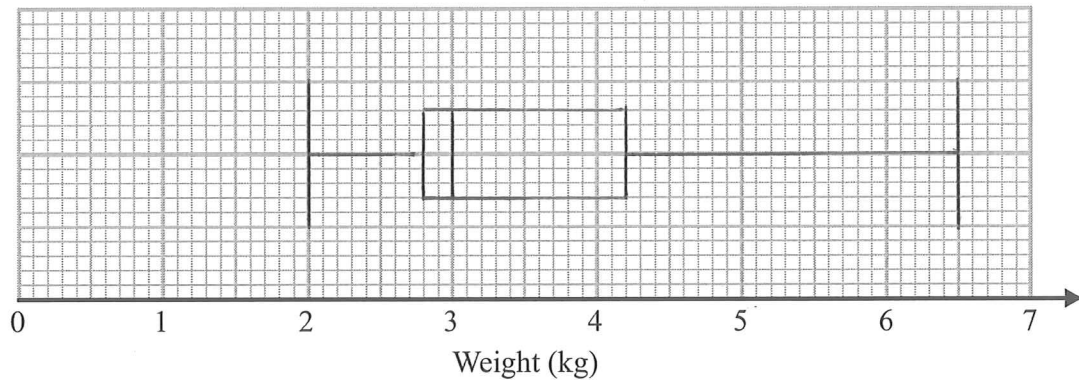
49 days
(2)

(Total for Question 14 is 5 marks)

15 The table gives some information about the weights of 60 babies.

Lowest	2.0 kg
Highest	6.5 kg
Lower quartile	2.8 kg
Upper quartile	4.2 kg
Median	3.0 kg

(a) Draw a box plot to show this information.



(2)

There are 60 babies.

(b) Work out an estimate for the number of these babies with a weight greater than 2.8 kg.

$\frac{3}{4}$ are above the L.Q.

$$\frac{3}{4} \text{ of } 60 = 45$$

45

(2)

(Total for Question 15 is 4 marks)

16 (a) Factorise $3t + 12$

$$\underline{3(t + 4)}$$

(1)

(b) (i) Expand and simplify $7(2x + 1) + 6(x + 3)$

$$14x + 7 + 6x + 18$$

$$\underline{20x + 25}$$

(ii) Show that when x is a whole number

$$7(2x + 1) + 6(x + 3)$$

is always a multiple of 5

$$5(4x + 5)$$

5 × a whole number is always a multiple of 5.

(3)

(Total for Question 16 is 4 marks)

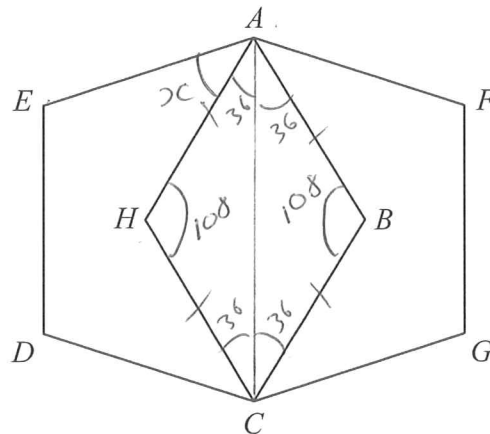


Diagram NOT
accurately drawn

$ABCDE$ and $AFGCH$ are regular pentagons.
The two pentagons are the same size.

Work out the size of angle EAH .
You must show how you got your answer.

$$\text{exterior angle} = \frac{360}{5} = 72^\circ$$

$$\text{interior angle} = 180 - 72 = 108^\circ$$

$$\hat{HAC}, \hat{HCA}, \hat{BAC} \text{ and } \hat{BCA} = 36^\circ \text{ (Isosceles triangles)}$$

$$\hat{EAH} = \frac{108^\circ}{180} - 36^\circ - 36^\circ = \underline{\underline{36^\circ}}$$

36°

(Total for Question 17 is 4 marks)

*18

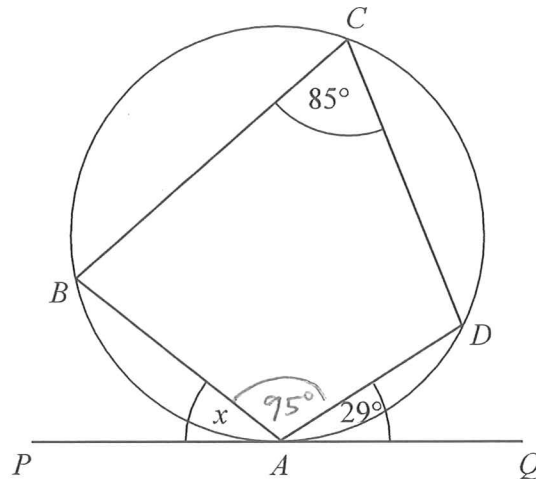


Diagram NOT
accurately drawn

In the diagram,

- the points A , B , C and D are on the circumference of a circle
- the line PAQ is a tangent to the circle
- angle $DAQ = 29^\circ$
- angle $BCD = 85^\circ$

Work out the size of the angle marked x .
Give a reason for each stage of your working.

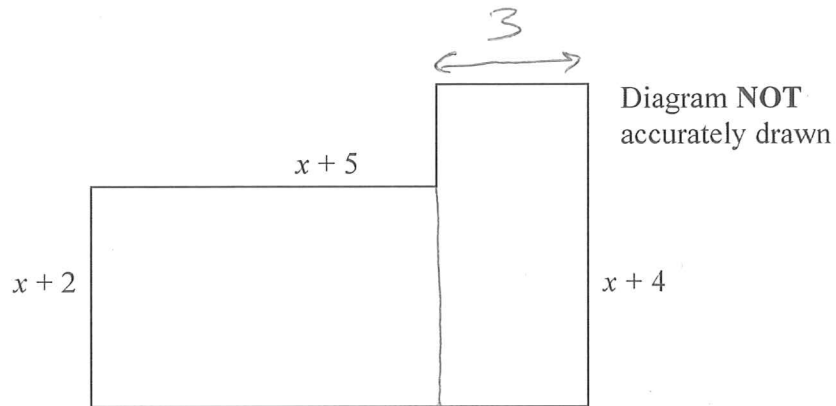
$$\hat{BAD} = 95^\circ \quad (\text{opposite angles in a cyclic quadrilateral sum to } 180^\circ)$$

$$180 - 95 - 29 = x$$

$$x = \underline{\underline{56^\circ}}$$

(Total for Question 18 is 3 marks)

19 Here is a shape.



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

The area of the shape is A cm².

Find a formula for A in terms of x .

Give your answer in its simplest form.

$$\begin{aligned} A &= (x+2)(x+5) + 3(x+4) \\ &= x^2 + 5x + 2x + 10 + 3x + 12 \\ &= x^2 + 10x + \del{22} 22 \end{aligned}$$

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

(Total for Question 19 is 4 marks)

20 Solve the simultaneous equations

$$\begin{aligned}3x - 2y &= 7 \\7x + 2y &= 13\end{aligned}$$

$$10x = 20$$

$$\underline{\underline{x = 2}}$$

$$3(2) - 2y = 7$$

$$6 - 2y = 7$$

$$6 = 7 + 2y$$

$$-1 = 2y$$

$$\underline{\underline{-\frac{1}{2} = y}}$$

$$\underline{\underline{x = 2 \quad y = -\frac{1}{2}}}$$

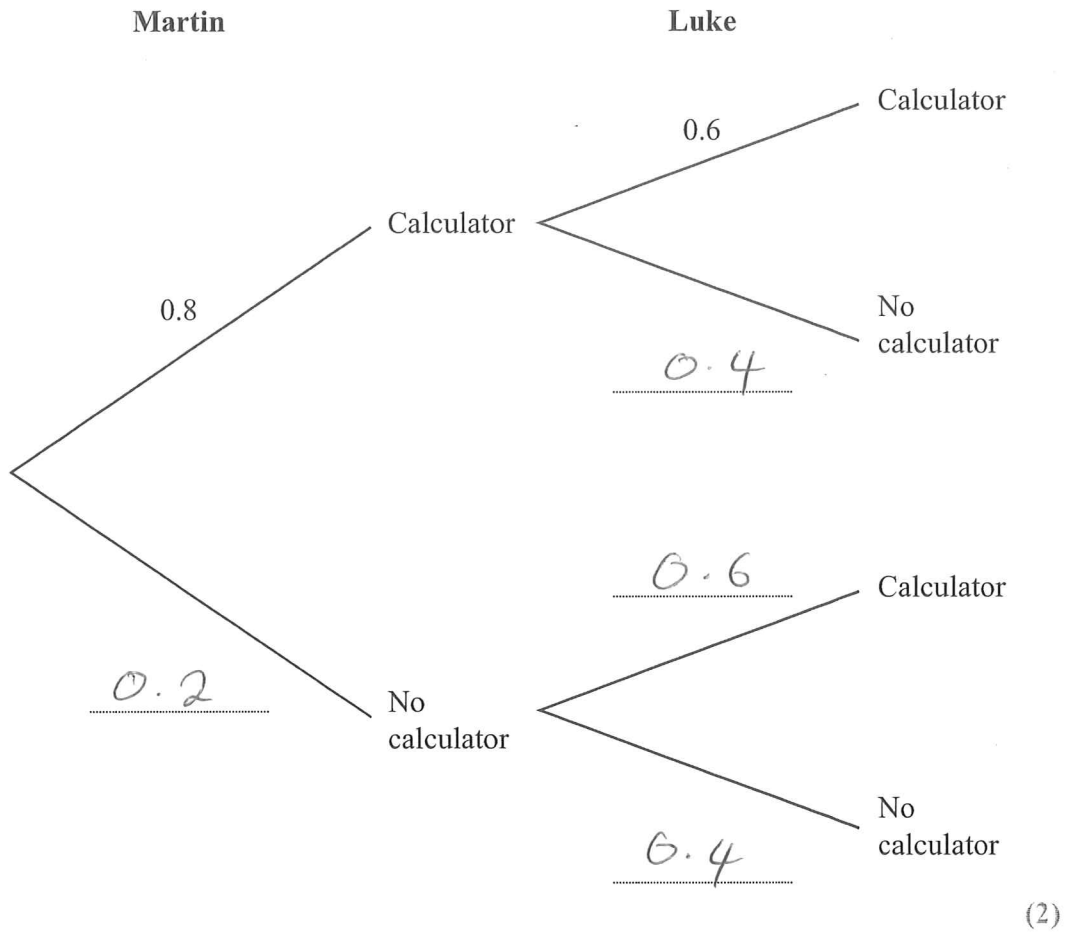
(Total for Question 20 is 3 marks)

21 Martin and Luke are students in the same maths class.

The probability that Martin will bring a calculator to a lesson is 0.8

The probability that Luke will bring a calculator to a lesson is 0.6

(a) Complete the probability tree diagram.



(b) Work out the probability that **both** Martin and Luke will **not** bring a calculator to a lesson.

$$0.2 \times 0.4 = \underline{\underline{0.08}}$$

$$\underline{\underline{0.08}}$$

(2)

(Total for Question 21 is 4 marks)

22 The straight line L has equation $y = 3x - 4$

$$y = mx + c$$

(a) Write down an equation of the line parallel to L which passes through the origin.

$$m = 3$$

$$c = 0$$

$$y = 3x$$

(2)

(b) Find an equation of the straight line that passes through (0, 5) and is perpendicular to L.

$$c = 5$$

$$m = -\frac{1}{3} \quad (\text{perpendicular gradient})$$

$$y = -\frac{1}{3}x + 5$$

(2)

(Total for Question 22 is 4 marks)

23 (a) Express $5\sqrt{27}$ in the form $n\sqrt{3}$, where n is a positive integer.

$$5 \times \sqrt{9} \times \sqrt{3}$$

$$5 \times 3 \times \sqrt{3}$$

$$15\sqrt{3}$$

$$\frac{15\sqrt{3}}{(2)}$$

(b) Rationalise the denominator of $\frac{21}{\sqrt{3}}$

$$\frac{21}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$$

$$\frac{21\sqrt{3}}{3}$$

$$\frac{7\sqrt{3}}{(2)}$$

(Total for Question 23 is 4 marks)

24 (a) Write down the value of $27^{\frac{1}{3}}$

Cube root

$$\frac{3}{(1)}$$

(b) Find the value of $25^{-\frac{1}{2}}$

Square root and flip

$$\frac{1}{5} \\ (2)$$

(Total for Question 24 is 3 marks)

25 (a) Simplify

$$\frac{2y-12}{y^2-8y+12}$$

$$\frac{2(y-\cancel{6})}{(y-2)(\cancel{y-6})}$$

$$\frac{2}{y-2}$$

(3)

(b) Write as a single fraction

$$\frac{3}{x-4} - \frac{1}{x+5}$$

$$\frac{3(x+5)}{(x-4)(x+5)} - \frac{1(x-4)}{(x-4)(x+5)}$$

$$\frac{3(x+5) - 1(x-4)}{(x-4)(x+5)}$$

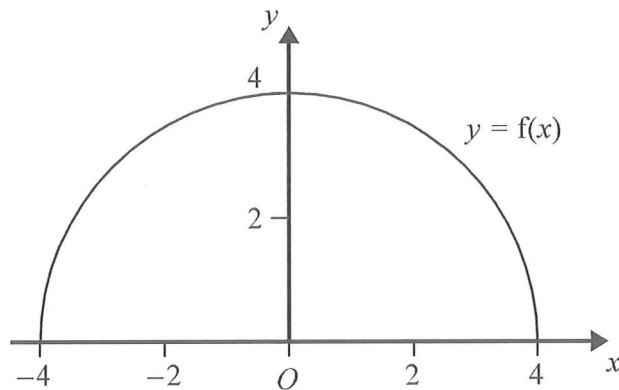
$$\frac{3x+15-x+4}{(x-4)(x+5)}$$

$$\frac{2x+19}{(x-4)(x+5)}$$

(2)

(Total for Question 25 is 5 marks)

26 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.

[Down 3]

(0, 1)
(1)

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

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

Crosses x axis at $(1, 0)$ and $(-1, 0)$

2
(2)

(Total for Question 26 is 3 marks)

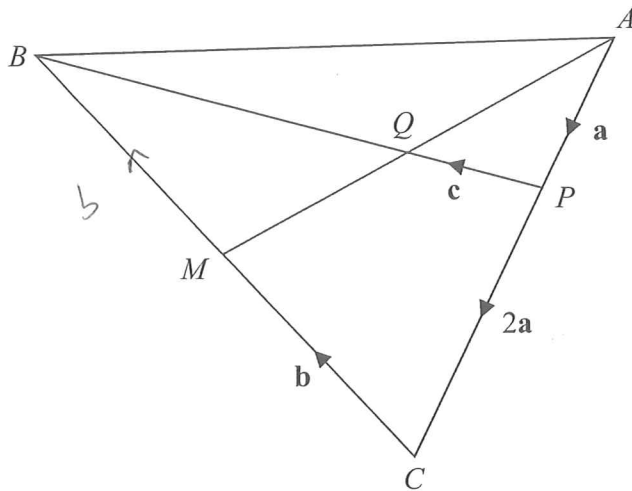


Diagram NOT
accurately drawn

M is the midpoint of BC .

Q is the midpoint of AM .

$$\vec{AP} = \mathbf{a} \quad \vec{PC} = 2\mathbf{a} \quad \vec{CM} = \mathbf{b} \quad \vec{PQ} = \mathbf{c}$$

(a) Find \vec{AM} in terms of \mathbf{a} and \mathbf{b} .

$$\vec{AM} = 3\mathbf{a} + \mathbf{b} \quad (1)$$

(b) Find \vec{QB} in terms of \mathbf{c} .

$$\begin{aligned} \vec{QB} &= \frac{1}{2}(\vec{AM}) + \vec{MB} \\ &= \frac{1}{2}(3\mathbf{a} + \mathbf{b}) + \mathbf{b} \\ &= \frac{3}{2}\mathbf{a} + \frac{1}{2}\mathbf{b} + \mathbf{b} \\ &= \frac{3}{2}\mathbf{a} + \frac{3}{2}\mathbf{b} \end{aligned}$$

$$\begin{aligned} \vec{QB} &= 3\left(\frac{1}{2}\mathbf{a} + \frac{1}{2}\mathbf{b}\right) \\ &= 3\mathbf{c} \end{aligned}$$

$$\begin{aligned} \vec{PQ} &= \mathbf{c} \\ \vec{PQ} &= \vec{PA} + \vec{AQ} \\ &= -\mathbf{a} + \frac{1}{2}(3\mathbf{a} + \mathbf{b}) \\ &= -\mathbf{a} + \frac{3}{2}\mathbf{a} + \frac{1}{2}\mathbf{b} \\ &= \frac{1}{2}\mathbf{a} + \frac{1}{2}\mathbf{b} \\ \therefore \mathbf{c} &= \frac{1}{2}\mathbf{a} + \frac{1}{2}\mathbf{b} \end{aligned}$$

$$\vec{QB} = 3\mathbf{c} \quad (4)$$

(Total for Question 27 is 5 marks)

TOTAL FOR PAPER IS 100 MARKS

