

Write your name here

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Pearson
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Centre Number

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Candidate Number

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Mathematics A

Paper 2 (Calculator)

Higher Tier

Friday 8 November 2013 – Morning

Time: 1 hour 45 minutes

Paper Reference

1MA0/2H

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. 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 may be used.**
- If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.



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.

Turn over ►

P44024A

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P 4 4 0 2 4 A 0 1 2 8

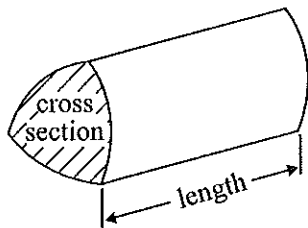
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GCSE Mathematics 1MA0

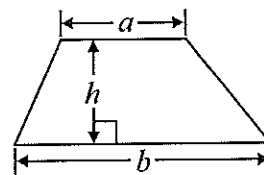
Formulae: Higher Tier

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

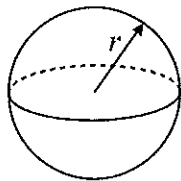


Area of trapezium = $\frac{1}{2} (a + b)h$



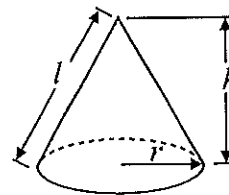
Volume of sphere = $\frac{4}{3} \pi r^3$

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

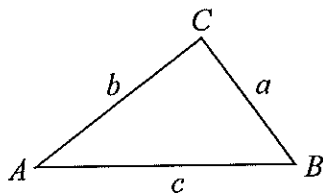


Volume of cone = $\frac{1}{3} \pi r^2 h$

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.

- 1 (a) Use your calculator to work out $\frac{\sqrt{7056}}{0.35 \times 12.8}$

Write down all the figures on your calculator display.
You must give your answer as a decimal.

$$\frac{\sqrt{7056}}{0.35 \times 12.8} = \frac{84}{4.48}$$

$$\frac{18.75}{(2)}$$

- (b) Write your answer to part (a) correct to 1 significant figure.

$$\frac{20}{(1)}$$

(Total for Question 1 is 3 marks)

- 2 Pavel and Katie share some sweets in the ratio 3 : 8
Katie gets 32 sweets.

- (a) How many sweets does Pavel get?

$$\begin{array}{l} P : K \\ 3 : 8 \\ \times 4 \quad \left. \begin{array}{l} ? : 32 \end{array} \right\} \times 4 \\ \hline \text{Pavel } 3 \times 4 = 12 \end{array}$$

$$\frac{12}{(2)}$$

Katie also has a tin of chocolates.
There are 80 chocolates in the tin.
45% of the chocolates have toffee in the middle.

- (b) Work out the number of chocolates that have toffee in the middle.

$$45\% \text{ of } 80$$

Calculator $0.45 \times 80 = 36$

Non-Calculator 10% of 80 = 8

40% of 80 = 32

$$\frac{36}{(2)}$$

or $80 \div 100 \times 45 = 36$

5% of 80 = $4 \times 2 = 8$

(Total for Question 2 is 4 marks)



P 4 4 0 2 4 A 0 3 2 8

3 Bill has some counters in a bag.

3 of the counters are red.

7 of the counters are blue.

The rest of the counters are yellow.

Bill takes at random a counter from the bag.

The probability that he takes a yellow counter is $\frac{2}{7}$

How many yellow counters are in the bag before Bill takes a counter?

<u>Red</u>	<u>Blue</u>	<u>Yellow</u>
3	7	x

$$P(\text{Red or Blue}) = \frac{10}{\text{total}} \quad P(\text{Yellow}) = \frac{2}{7}$$

$$= P(\text{Not Yellow}) = \frac{5}{7}$$

$$\begin{array}{l} \div 2 \\ \frac{10}{\text{total}} = \frac{5}{7} \\ \div 2 \\ \text{total} = 14 \end{array}$$

$$\text{Red} + \text{Blue} + \text{Yellow} = 14$$

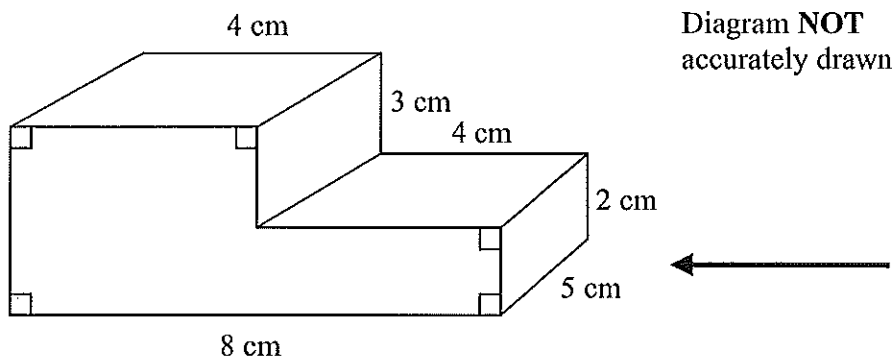
$$3 + 7 + x = 14 \quad \dots\dots\dots 4$$

$$x = 4$$

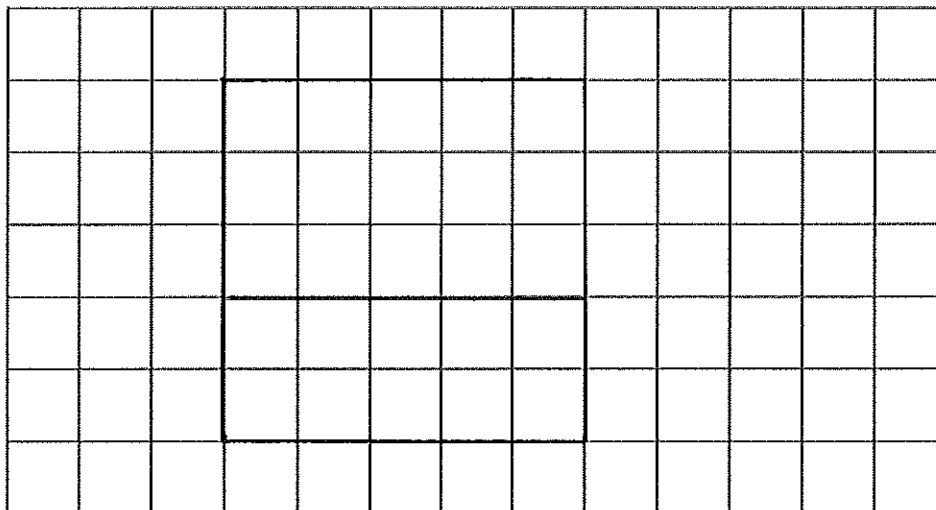
(Total for Question 3 is 2 marks)



4 The diagram shows a solid prism.



On the centimetre square grid, draw the side elevation of the solid prism from the direction shown by the arrow.



(Total for Question 4 is 2 marks)



5 Ben goes on holiday to Hong Kong.

In Hong Kong, Ben sees a camera costing HK\$3179.55

In London, an identical camera costs £285

The exchange rate is £1 = HK\$12.30

Ben buys the camera in Hong Kong.

How much cheaper is the camera in Hong Kong than in London?

Convert all to ~~Hong Kong~~
UK Pounds

$$\begin{aligned} & \times 12.30 \\ \hline \text{£1} & = \text{HK\$ } 12.30 \\ & \div 12.30 \\ \hline \text{£285.00} & = \text{HK\$ } 3505.50 \end{aligned}$$

Cheaper in Hong Kong

$$\begin{array}{r} \text{£285.00} \\ - \text{£258.50} \\ \hline \text{£26.50} \end{array}$$

OR

Convert all to ~~Pounds~~
Hong Kong \$

$$\begin{aligned} & \times 12.30 \\ \hline \text{£1} & = \text{HK\$ } 12.30 \\ & \div 12.30 \\ \hline \text{£285} & = \text{HK\$ } 3505.50 \end{aligned}$$

Cheaper in Hong Kong

$$\begin{array}{r} \text{HK\$ } 3505.50 \\ - \text{HK\$ } 3179.55 \\ \hline \text{HK\$ } 325.95 \end{array}$$

(Total for Question 5 is 3 marks)



- 6 There are 130 adults at a language school.
Each adult studies one of French or Spanish or German.

96 of the adults are women.
12 of the women study French.
73 of the adults study Spanish.
55 of the women study Spanish.
9 of the men study German.

How many of the adults study French?

	French	Spanish	German	TOTAL
Men	(4) 7	(3) 18	9	(2) 34
Women	12	55	(8) 29	96
TOTAL	(5) (1) 19	73	(7) 38	130

① fill in the values given

② men = $130 - 96 = 34$

③ men / spanish = $73 - 55 = 18$

④ men / french = $34 - (18 + 9)$
 $= 34 - 27 = 7$

⑤ total french = $7 + 12 = 19$

OR

① fill in the values given

② women / german = $96 - (12 + 55)$
 $= 96 - 67 = 29$

③ total german = $9 + 29 = 38$

④ total french = $130 - (73 + 38)$
 $= 130 - 111 = 19$

(Total for Question 6 is 4 marks)



P 4 4 0 2 4 A 0 7 2 8

*7 Plants are sold in three different sizes of tray.

A small tray of 30 plants costs £6.50

A medium tray of 40 plants costs £8.95

A large tray of 50 plants costs £10.99

Kaz wants to buy the tray of plants that is the best value for money.

Which size tray of plants should she buy? Small, medium or large.
You must show all your working.

Cost per plant

Small $£6.50 \div 30 = 0.216\bar{6}$

Medium $£8.95 \div 40 = 0.22375$

Large $£10.99 \div 50 = 0.2198$

Small is best value for money
(Least cost per plant)

Plants per £

Small $30 \div 6.50 = 4.615384$

Medium $40 \div 8.95 = 4.469273\dots$

Large $50 \div 10.99 = 4.549590\dots$

Small is best value for money
(Most plants per £)

Common multiple

Lowest Common Multiple of 30, 40, 50 = 600

Small $600 \div 30 = 20$

Medium $600 \div 40 = 15$

Large $600 \div 50 = 12$

600 plants cost $20 \times 6.50 = £130$

600 plants cost $15 \times 8.95 = £134.25$

600 plants cost $12 \times 10.99 = £131.88$

Small is best value for money

(Total for Question 7 is 4 marks)



8 Here are the first four terms of an arithmetic sequence.

$$\begin{array}{cccc}
 1 & 14 & 21 & 28 \\
 3 & 10 & 17 & 24 \downarrow -4
 \end{array}$$

(a) Find, in terms of n , an expression for the n th term of this arithmetic sequence.

Common Difference = $+7$ $7n$

(compare sequence to 7 times table)

$$\begin{array}{r}
 7n - 4 \\
 \hline
 (2)
 \end{array}$$

(b) Is 150 a term of this sequence?

You must explain how you get your answer.

If 150 is a term in the sequence, $7n - 4 = 150$ for an integer value of n .

$$\begin{array}{r}
 +4 \\
 7n = 154
 \end{array}$$

$$\begin{array}{r}
 \div 7 \\
 n = 22
 \end{array}$$

Yes, 150 is the 22nd term in the sequence.

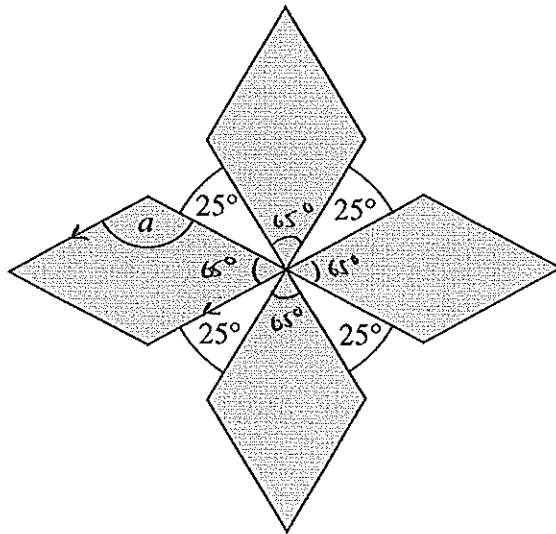
(2)

(Total for Question 8 is 4 marks)



9 The diagram shows a pattern using four identical rhombuses.

Diagram NOT accurately drawn



Work out the size of the angle marked a .
You must show your working.

$$\begin{aligned} \text{Total sum of angles around a point} &= 360^\circ \\ 25 \times 4 &= 100^\circ \\ \hline &260^\circ \text{ left.} \end{aligned}$$

$$260 \div 4 = 65^\circ$$

$$\begin{aligned} \text{Then, } a &= 180 - 65 \\ &= 115^\circ \end{aligned}$$

$$\begin{aligned} \text{OR } 2a + 2 \times 65 &= 360 \\ 2a + 130 &= 360 \\ -130 & \\ 2a &= 230 \\ \div 2 & \\ a &= 115^\circ \end{aligned}$$

(Total for Question 9 is 4 marks)



10 Sasha takes a music exam.

The table shows the result that Sasha can get for different percentages in her music exam.

Percentage	Result
50% – 69%	Pass
70% – 84%	Merit
85% – 100%	Distinction

Sasha gets 62 out of 80 in her music exam.

What result does Sasha get?
You must show your working.

$$\frac{62}{80} \times 100 = 77.5\%$$

Merit

(Total for Question 10 is 3 marks)

11 (a) Simplify $x^7 \times x^3$
 x^{7+3}

$$x^{10}$$

(1)

(b) Simplify $(m^4)^3$
 $m^{4 \times 3}$

$$m^{12}$$

(1)

(c) Simplify $\frac{36af^8}{12a^5f^2}$

$$36 \div 12 = 3$$

$$a^1 \div a^5 = a^{-4}$$

$$f^8 \div f^2 = f^6$$

$$3a^{-4}f^6$$

$$\text{or } \frac{3f^6}{a^4}$$

(2)

(Total for Question 11 is 4 marks)



P 4 4 0 2 4 A 0 1 1 2 8

12 A circle has a diameter of 140 cm.

Work out the circumference of the circle.

Give your answer correct to 3 significant figures.

$$\begin{aligned} \text{Circumference} &= \pi d \\ &= \pi \times 140 \\ &= 439.8229715 \\ &= 440 \text{ cm to } 3\text{sf}. \end{aligned}$$

..... cm

(Total for Question 12 is 2 marks)



*13 Axel and Lethna are driving along a motorway.

They see a road sign.

The road sign shows the distance to Junction 8

It also shows the average time drivers will take to get to Junction 8

<p style="text-align: center;">To Junction 8</p> <p style="text-align: center;">30 miles 26 minutes</p>
--

The speed limit on the motorway is 70 mph.

Lethna says,

'We will have to drive faster than the speed limit to go 30 miles in 26 minutes.'

Is Lethna right? Yes or No

You must show how you got your answer. Working Required

Speed

$$\begin{aligned} & 30 \text{ miles in } 26 \text{ minutes} \\ & = \frac{30}{26} \text{ miles per } 1 \text{ minute} \\ & = 1.153846 \text{ miles per } 1 \text{ minute} \\ & = 69.230769 \text{ miles per } 60 \text{ minutes/1 hour} \end{aligned}$$

No, they will not need to drive faster than the speed limit.

Distance

$$\begin{aligned} & 70 \text{ miles in } 1 \text{ hour/60 minutes} \\ & 30 \text{ miles in } \frac{30}{70} \times 60 \text{ minutes} \\ & = 25.714285 \text{ minutes} \end{aligned}$$

No, they can cover 30 miles in less than 26 minutes

(Total for Question 13 is 3 marks)

Time

$$\begin{aligned} & 70 \text{ miles in } 1 \text{ hour/60 minutes} \\ & \frac{26}{60} \times 70 \text{ miles in } 26 \text{ minutes} \\ & = 30.3 \text{ miles in } 26 \text{ minutes} \end{aligned}$$

No, they can cover more than 30 miles in 26 minutes



14 The table gives information about the temperature, $T^{\circ}\text{C}$, at noon in a town for 50 days.

Temperature ($T^{\circ}\text{C}$)	Frequency (f)	Mid Point (x)	Total (fx)
$8 < T \leq 12$	6	10	$6 \times 10 = 60$
$12 < T \leq 16$	8	14	$8 \times 14 = 112$
$16 < T \leq 20$	13	18	$13 \times 18 = 234$
$20 < T \leq 24$	21	22	$21 \times 22 = 462$
$24 < T \leq 28$	2	26	$2 \times 26 = 52$
	<u>50</u>		<u>920</u>

(a) Write down the modal class interval.

most common

$$\frac{20 < T \leq 24}{(1)}$$

(b) Calculate an estimate for the mean temperature.

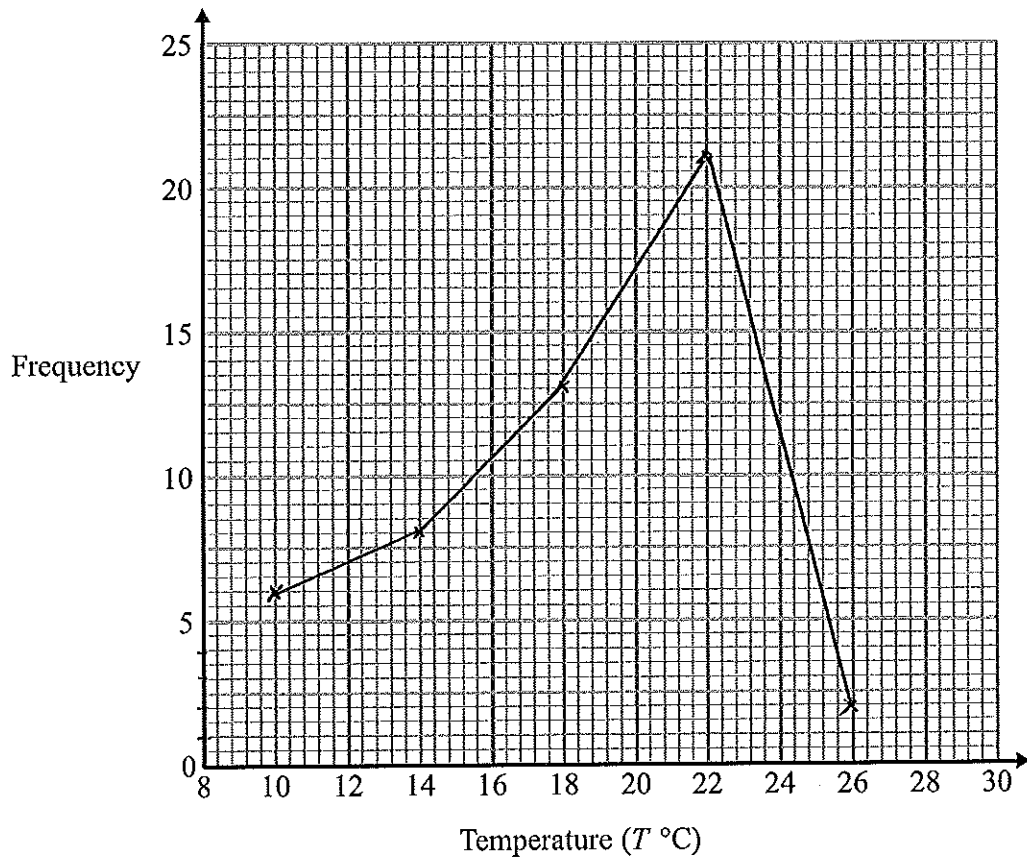
(midpoint)

$$\frac{\text{Total temp}}{\text{No of Days}} = \frac{920}{50}$$

$$\frac{18.4^{\circ}\text{C}}{(4)}$$



(c) Draw a frequency polygon for the information in the table.



- Plot points at the midpoint of each group (2)
- Join with a straight line (Total for Question 14 is 7 marks)



15 Here is a right-angled triangle.

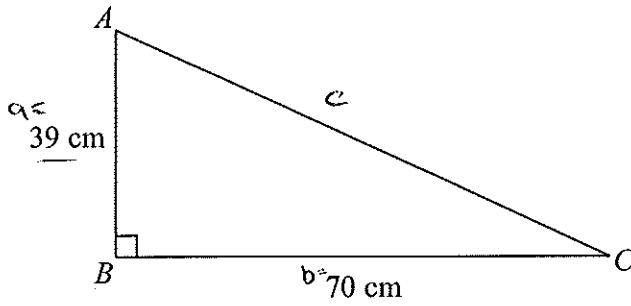


Diagram NOT
accurately drawn

Work out the length of AC. 3 lengths / Right Angle \Rightarrow Pythagoras
Give your answer correct to 1 decimal place.

$$a^2 + b^2 = c^2 \quad , \quad c \text{ is the hypotenuse} \\ \text{which is opposite the right angle}$$

$$39^2 + 70^2 = c^2$$

$$1521 + 4900 = c^2$$

$$c^2 = 6421$$

$$c = \sqrt{6421}$$

$$= 80.13114251$$

$$= 80.1 \text{ cm to 1dp}$$

..... 80.1 cm

(Total for Question 15 is 3 marks)



16 (a) Solve $5(f-3) = f+10$

$$5f - 15 = f + 10$$

$$-f$$

$$4f - 15 = 10$$

$$+15$$

$$4f = 25$$

$$\div 4$$

$$f = 6.25$$

$$\frac{6.25}{\dots\dots\dots}$$

(3)

(b) Solve $\frac{h+7}{3} + \frac{2h-1}{2} = \frac{5}{6}$

↑ ↑
common denominator

$$\frac{2(h+7) + 3(2h-1)}{6} = \frac{5}{6}$$

$$\frac{2h+14 + 6h-3}{6} = \frac{5}{6}$$

$$\times 6$$

$$2h+14 + 6h-3 = 5$$

$$8h+11 = 5$$

$$-11$$

$$8h = -6$$

$$\div 8$$

$$h = -\frac{6}{8} = -\frac{3}{4} = -0.75$$

$$\frac{-0.75}{\dots\dots\dots}$$

(4)

(Total for Question 16 is 7 marks)



17 (a) Complete the table of values for $y = x^3 - 4x$

x	-3	-2	-1	0	1	2	3
y	-15	0	3	0	-3	0	15

$$y = (-3)^3 - 4(-3) = -27 + 12$$

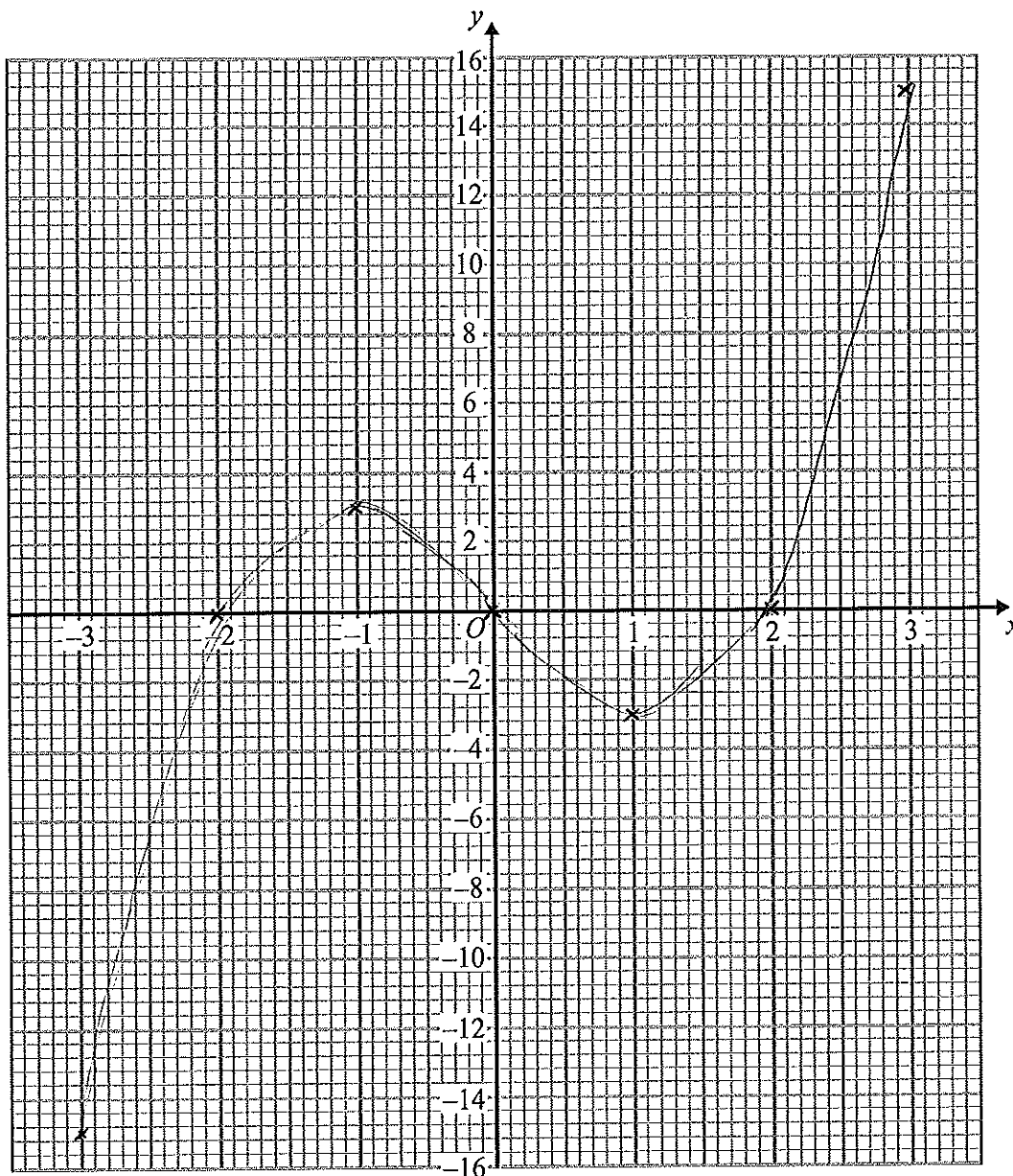
$$y = (-2)^3 - 4(-2) = -8 + 8$$

$$y = (1)^3 - 4(1) = 1 - 4$$

$$y = (2)^3 - 4(2) = 8 - 8$$

(2)

(b) On the grid, draw the graph of $y = x^3 - 4x$ from $x = -3$ to $x = 3$
smooth curve



(2)

(Total for Question 17 is 4 marks)



18 ABC is an isosceles triangle.

$$AB = AC$$

$$\angle ABC = \angle ACB$$

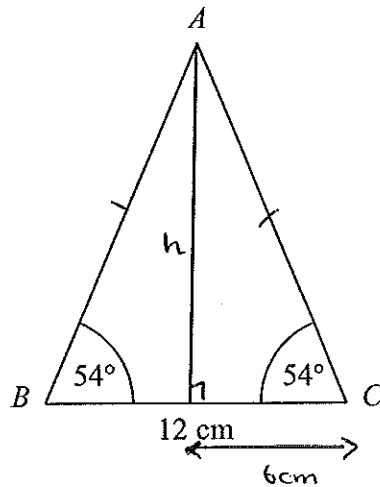


Diagram NOT accurately drawn

Work out the area of the triangle.

Give your answer correct to 3 significant figures.

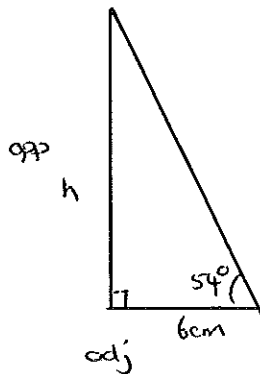
$$\text{Area of a Triangle} = \frac{1}{2} \times \text{base} \times \text{height}$$

$$= \frac{1}{2} \times 12 \times 8.258\dots$$

$$= \frac{1}{2} \times 99.099\dots$$

$$= 49.549\dots$$

$$= 49.5 \text{ cm}^2 \text{ to 3sf}$$



SO CA (TA)

$$\tan 54 = \frac{h}{6}$$

$$h = 6 \times \tan 54$$

$$= 8.258291523$$

..... 49.5 cm²

(Total for Question 18 is 4 marks)



19 (a) Write 7.8×10^{-4} as an ordinary number.

0.00078
 ↑ ↑
 (wavy line under the zeros)

← decimal point has "moved" 4 places right

0.00078

 (1)

(b) Write 95 600 000 as a number in standard form.

"move" decimal point 7 places left

9.56×10^7

 (1)

(Total for Question 19 is 2 marks)

20 In a sale normal prices are reduced by 20%.

A washing machine has a sale price of £464

By how much money is the normal price of the washing machine reduced?



80% of Original P. = Sale P.

$0.80 \times \text{Original P.} = \text{Sale P.}$

$0.80 \times \text{Original P.} = 464$

$\text{Original P.} = \frac{464}{0.8} = 580$

Reduction = $580 - 464$

= £116

£ 580

(Total for Question 20 is 3 marks)

OR

Sale Price = 80% of Original Price

Reduction = 20% of Original Price

Reduction = $\frac{20}{80}$ or $\frac{1}{4}$ of Sale Price

= $\frac{1}{4} \times 464$

= £116



21 (a) Factorise $4x^2 - 9$

Difference of
Two Squares

$$(2x - 3)(2x + 3) \quad (1)$$

(b) Make m the subject of

$$\begin{aligned} g - 3m &= am + 5 \\ -5 & \\ g - 5 - 3m &= am \\ +3m & \\ g - 5 &= am + 3m \\ g - 5 &= m(a + 3) \\ \div a + 3 & \\ \frac{g - 5}{a + 3} &= m \end{aligned}$$

$$m = \frac{g - 5}{a + 3} \quad (3)$$

(Total for Question 21 is 4 marks)



P 4 4 0 2 4 A 0 2 1 2 8

22 The diagram shows a trapezium.

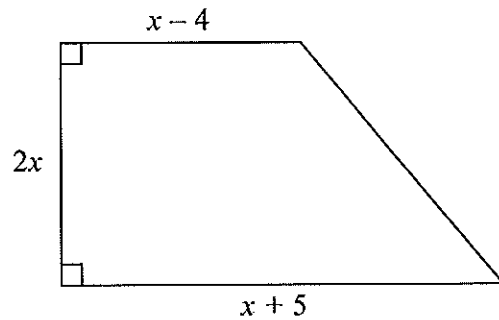


Diagram NOT accurately drawn

All the measurements are in centimetres.

The area of the trapezium is 351 cm^2 . $\text{Area}_{\text{trapezium}} = \frac{1}{2}(a+b)h$

(a) Show that $2x^2 + x - 351 = 0$

$$\begin{aligned} \text{Area} &= \frac{1}{2}(x-4 + x+5) \times 2x \\ 351 &= \frac{1}{2}(2x+1) \times 2x \\ 351 &= \frac{1}{2}(4x^2 + 2x) \\ 351 &= 2x^2 + x \\ 2x^2 + x - 351 &= 0 \end{aligned}$$

(2)

(b) Work out the value of x .

Solve quadratic by factoring

$$(2x+27)(x-13)$$

$$x = -\frac{27}{2} \text{ or } x = 13$$

can't have negative length

using formula

$$2x^2 + x - 351 = 0$$

\uparrow \uparrow \uparrow
 a b c

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-1 \pm \sqrt{(-1)^2 - 4(2)(-351)}}{2(2)}$$

$$x = 13$$

(3)

(Total for Question 22 is 5 marks)

$$= \frac{-1 \pm \sqrt{1 + 2808}}{4}$$

$$= \frac{-1 \pm \sqrt{2809}}{4} = \frac{-1 \pm 53}{4}$$

$$x = \frac{-54}{4} = -\frac{27}{2}$$

$$\text{or } \frac{52}{4} = 13$$

$$x = 13$$



23 The table shows information about 1065 students.

	Male	Female
Year 7	126	109
Year 8	112	134
Year 9	121	114
Year 10	87	94
Year 11	88	80

Elena takes a stratified sample of 120 students by year group and by gender.
Work out the number of Year 8 female students in her sample.

$$\frac{134}{1065} = \frac{?}{120}$$

$$\frac{134}{1065} \times 120 = 15.09859 \dots$$

= 15 to the nearest whole

15 students

(Total for Question 23 is 2 marks)



24 The diagram shows a large tin of pet food in the shape of a cylinder.

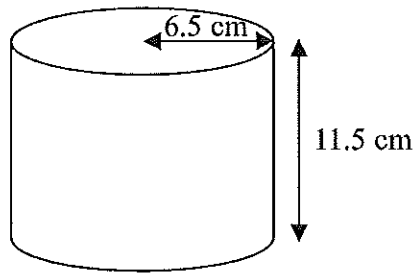


Diagram NOT accurately drawn

The large tin has a radius of 6.5 cm and a height of 11.5 cm.

A pet food company wants to make a new size of tin.

The new tin will have a radius of 5.8 cm.
It will have the same volume as the large tin.

Calculate the height of the new tin.
Give your answer correct to one decimal place.

$$\begin{aligned}
 \text{Vol}_{\text{cylinder}} &= \pi r^2 h \\
 \text{ORIGINAL} &= \pi \times 6.5^2 \times 11.5 \\
 &= \pi \times 42.25 \times 11.5 \\
 &= \pi \times 485.875
 \end{aligned}$$

$$\begin{aligned}
 \text{Vol}_{\text{cylinder}} &= \pi r^2 h \\
 \text{NEW} &= \pi \times 5.8^2 \times h \\
 &= \pi \times 33.64 \times h
 \end{aligned}$$

$$\begin{aligned}
 \text{Same Volume } \cancel{\pi} \times 485.875 &= \cancel{\pi} \times 33.64 \times h \\
 485.875 &= 33.64 \times h \\
 &= 33.64
 \end{aligned}$$

$$\begin{aligned}
 h &= \frac{485.875}{33.64} = 14.4337\dots \\
 &= 14.4 \text{ cm to 1 dp}
 \end{aligned}$$

..... 14.4 cm

(Total for Question 24 is 3 marks)



*25 A and B are straight lines.

Line A has equation $2y = 3x + 8$

Line B goes through the points $(-1, 2)$ and $(2, 8)$

Do lines A and B intersect? Yes or No
You must show all your working.

Eqn of Line A $\Rightarrow 2y = 3x + 8$

$$y = \frac{3}{2}x + 4$$

gradient = 1.5 y-intercept = (0, 4)

Eqn of Line B $\Rightarrow y = mx + c$

$$\text{gradient} = \frac{8-2}{2-(-1)} = \frac{6}{3} = 2$$

$$y = 2x + c$$

y-intercept

$$8 = 2(2) + c$$
$$8 = 4 + c, \quad c = 4$$

$$y = 2x + 4$$

gradient = 2 y-intercept = (0, 4)

Yes, Lines A and B will intersect since:

• they have different gradients
same gradient implies parallel
and therefore will not intersect.
but different gradients mean they will

OR • they have the same y-intercept
and therefore intersect at (0, 4)

(Total for Question 25 is 3 marks)



P 4 4 0 2 4 A 0 2 5 2 8

26 The diagram shows triangle LMN .

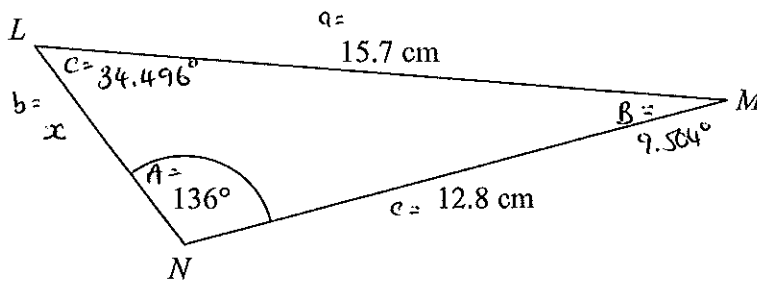


Diagram NOT accurately drawn

Calculate the length of LN .

3 sides + 1 angle \Rightarrow Cosine Rule.

Give your answer correct to 3 significant figures.

Cosine Rule

$$a^2 = b^2 + c^2 - (2bc \cos A)$$

$$15.7^2 = x^2 + 12.8^2 - (2 \times x \times 12.8 \times \cos 136)$$

$$246.49 = x^2 + 163.84 - (25.6x \times -0.691357)$$

$$246.49 = x^2 + 163.84 + 17.68075x$$

$$x^2 + 17.68075x - 82.65 = 0$$

+ Quadratic

$$x = \frac{-17.68075 \pm \sqrt{(17.68075)^2 - 4(1)(-82.65)}}{2(1)}$$

$$= \frac{-17.68075 \pm \sqrt{669.712...}}{2}$$

$$= \frac{-17.68075 \pm 25.878...}{2}$$

$$x = 3.73...$$

(or $x = -22.1465$ can't have negative length)

OR

Sine Rule twice

$$\frac{\sin 136}{15.7} = \frac{\sin C}{12.8}$$

$$\sin C = \frac{\sin 136}{15.7} \times 12.8 = 0.56634...$$

$$C = \sin^{-1} 0.56634...$$

$$= 34.495^\circ$$

$$180 - 136 - 34.496 = 9.5^\circ$$

$$\frac{12.8}{\sin 136} = \frac{b}{\sin 9.5}$$

$$b = \frac{15.7}{\sin 136} \times \sin 9.5$$

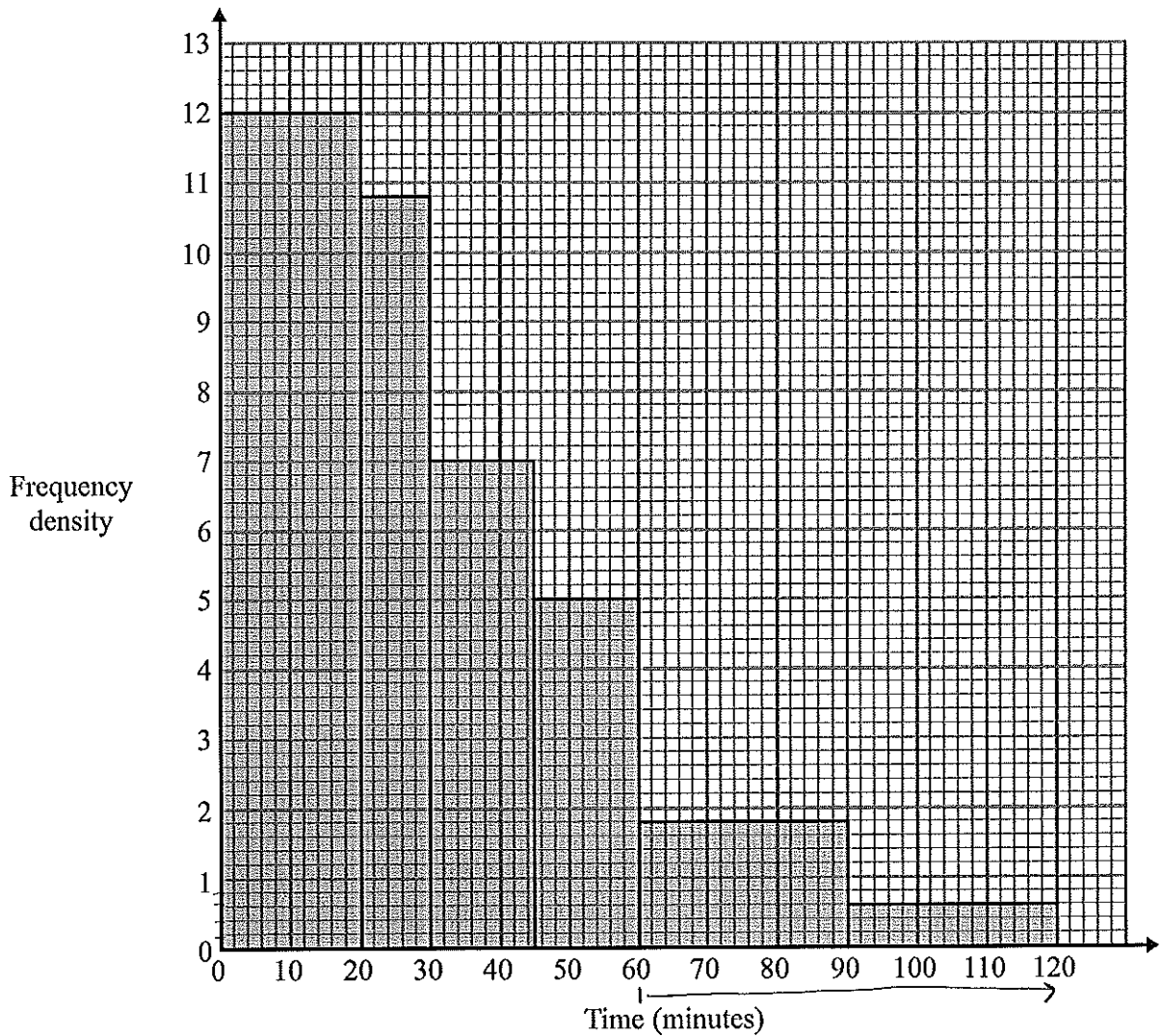
(Total for Question 26 is 5 marks)

$$= 3.73...$$

..... 3.73 cm



27 The histogram shows information about the times, in minutes, that some passengers had to wait at an airport.



Work out the percentage of the passengers who had to wait for more than one hour.

frequency = frequency density \times time
 (area of bar = height of bar \times width of bar)

$$\begin{aligned}
 \text{frequency} &= 12 \times 20 = 240 \\
 &+ 10.8 \times 10 = 108 \\
 &+ 7 \times 15 = 105 \\
 &+ 5 \times 15 = 75 \\
 &+ 1.8 \times 30 = 54 \\
 &+ 0.6 \times 30 = 18 \\
 \hline
 &600
 \end{aligned}$$

$$\% = \frac{72}{600} \times 100$$

12%

(Total for Question 27 is 3 marks)



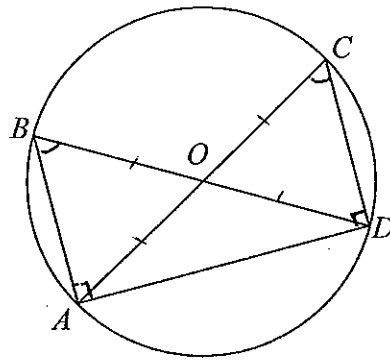


Diagram NOT accurately drawn

AOC and BOD are diameters of a circle, centre O .

Prove that triangle ABD and triangle DCA are congruent.

$AO = BO = CO = DO$ since they are radii
 $\therefore \triangle ABO$ and $\triangle COO$ are isosceles triangles

$BO = AC$ since they are diameters

$\hat{A}BD = \hat{A}CD$ since angles in the same segment are equal

$\hat{B}AD = \hat{A}DC = 90^\circ$ since triangles drawn in a semi circle are right-angled

Conditions of congruency

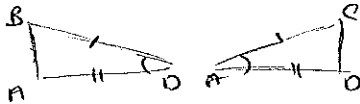
SSS

SAS

ASA

RHS

SAS

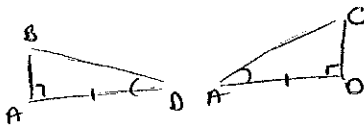


$BD = AC$ since they are diameters

AD common to both triangles

$\hat{A}DB = \hat{A}CD$ since they are base angles in the isosceles triangle ADO

ASA

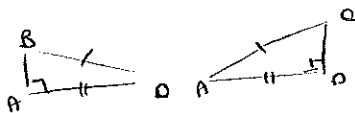


$\hat{B}AD = \hat{A}DC = 90^\circ$ since triangles drawn in a semicircle are right-angled.

AD common to both triangles

$\hat{A}DB = \hat{A}CD$ since they are base angles in the isosceles triangle ADO

RHS



$\hat{B}AD = \hat{A}DC = 90^\circ$ since triangles drawn in a semi circle are right-angled

$BD = AC$ since they are diameters

AD common to both triangles

(Total for Question 28 is 3 marks)

TOTAL FOR PAPER IS 100 MARKS

