

Write your name here

Surname <i>M. Semar-</i>	Other names <i>Correction</i>
--------------------------	-------------------------------

Pearson

Edexcel GCSE

Centre Number

--	--	--	--	--

Candidate Number

--	--	--	--

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

©2013 Pearson Education Ltd.

5/4/5/5/



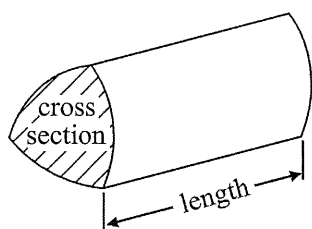
PEARSON

GCSE Mathematics 1MA0

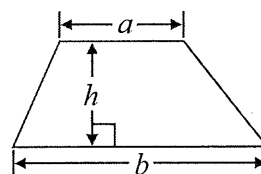
Formulae: Higher Tier

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

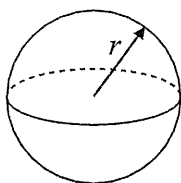


Area of trapezium = $\frac{1}{2} (a + b)h$



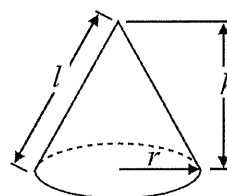
Volume of sphere = $\frac{4}{3} \pi r^3$

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

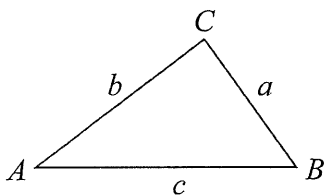


Volume of cone = $\frac{1}{3} \pi r^2 h$

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.

18.75

(2)

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

$$18.75 = 20$$

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?

$$\begin{array}{l} \text{Pavel : Katie} \\ 3 = 8 \\ 4 \times \left(\begin{array}{cc} 3 & 8 \\ 12 & 32 \end{array} \right) \times 4 \end{array}$$

12 sweets

(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.

$$\frac{45}{100} \times 80 = \frac{45}{5} \times 4 = 9 \times 4$$

OR $0.45 \times 80 = 36$

36

(2)

(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?

3 Red

7 Blue

? yellow.

$$P(\text{yellow}) = \frac{2}{7}$$

$$P(\text{Red}) = \frac{3}{x}$$

$$P(\text{Blue}) = \frac{7}{x}$$

$$\frac{2}{7} + \frac{3}{x} + \frac{7}{x} = 1$$

$$\frac{2}{7} + \frac{10}{x} = 1$$

$$\frac{10}{x} = \frac{5}{7}$$

$$x = 14$$

yellow counters

$$14 - 10 =$$

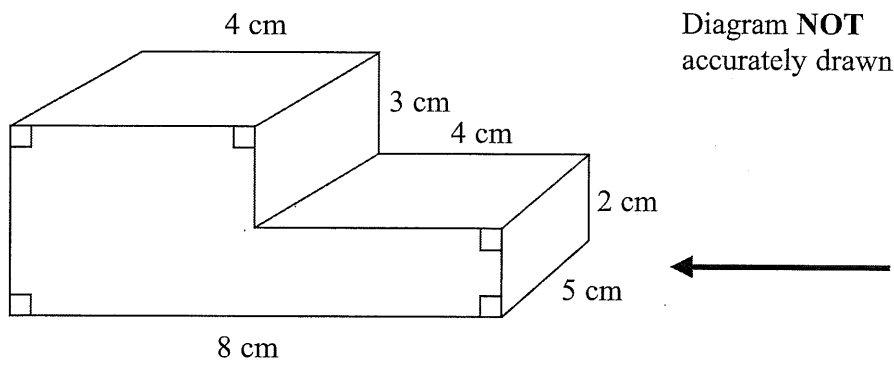
$$4$$

(Total for Question 3 is 2 marks)

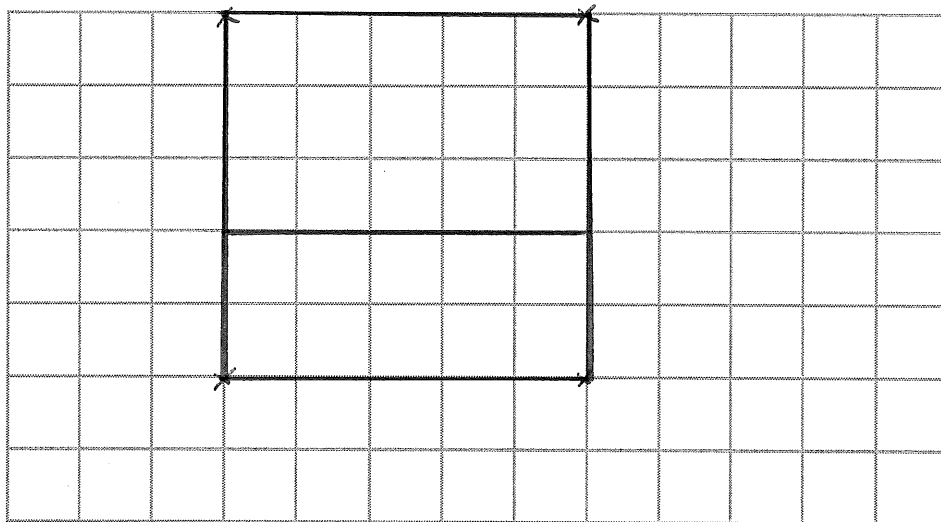
Another method:



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?

$$\begin{array}{l|l} & \text{£1} = \text{HK\$12.30} \\ \hline \text{London} & \text{Hong Kong} \\ \text{Cost } \text{£}285 & \text{Cost HK\$}3179.55 \\ \text{Cost in HK\$} : & \\ 285 \times 12.30 = & \\ \text{HK\$} \underline{\underline{3505.50}} & \end{array}$$

The camera is cheaper by : $= 3505.50 - 3179.55$
 $= \text{HK\$}325.95$

in £ : $325.95 \div 12.30 = \text{£}26.50$

(Total for Question 5 is 3 marks)

The camera is cheaper by $\text{£}26.50$
or
 $\text{HK\$}325.95$



- 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. \longrightarrow Men $130 - 96 = 34$

12 of the women study French.

73 of the adults study Spanish.

55 of the women study Spanish. \longrightarrow Men (Spanish) = $73 - 55$

9 of the men study German. French = $34 - (18 + 9) = 7$ men

How many of the adults study French?

	French	German	Spanish	Total
Men	7	9	18	34
Women	12	29	55	96
	19	38	73	130

$$\text{Women (German)} = 96 - (12 + 55) = 29$$

19

(Total for Question 6 is 4 marks)



*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?

You must show all your working.

Small tray

30 plants

£ 6.50

1 plant cost:

$$6.50 \div 30 = 0.2166$$

Medium tray

40 plants

£ 8.95

1 plant cost

$$8.95 \div 40 =$$

$$0.22375$$

Large tray

50 plants

£ 10.99

1 plant cost

$$10.99 \div 50 =$$

$$0.2198$$

$$0.2166 < 0.2198 < 0.2237$$

Kaz should buy the small tray

(Total for Question 7 is 4 marks)



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

1	2	3	4
3	10	17	24

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

Term to term rule $+7$

$$3 = 7 \times 1 - 4$$

$$10 = 7 \times 2 - 4$$

$$17 = 7 \times 3 - 4$$

n th term ... $7 \times n - 4$

$$\underline{7n - 4}$$

(2)

(b) Is 150 a term of this sequence?

You must explain how you get your answer.

By inspection: $7 \times 21 - 4 = 147 - 4 = 143$

$$7 \times 22 - 4 = 154 - 4 = 150$$

150 is the 22nd term of the sequence.

(2)

OR:

(Total for Question 8 is 4 marks)

Method 2:

$$7n - 4 = 150$$

$$7n = 150 + 4$$

$$7n = 154$$

$$n = 154 \div 7$$

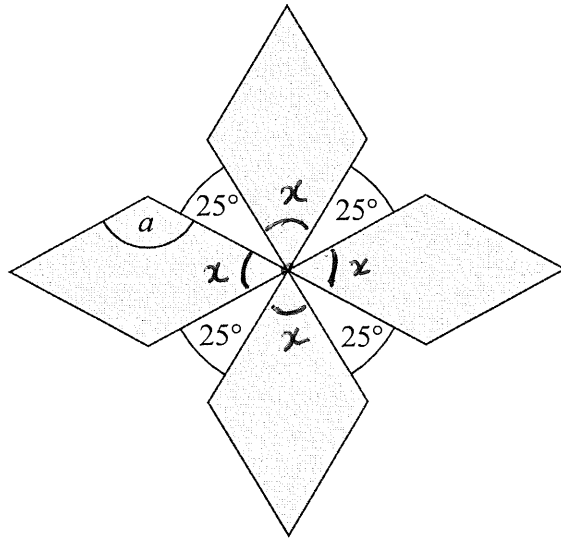
$$n = 22$$

150 is in the sequence -



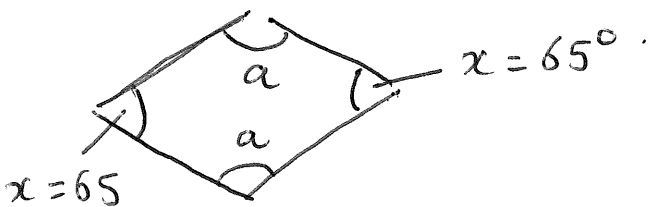
9 The diagram shows a pattern using four identical rhombuses.

Diagram NOT accurately drawn



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

$$\begin{aligned}
 x + x + x + x + 25 + 25 + 25 + 25 &= 360 \\
 4x + 100 &= 360 \quad (\text{angles at a point add up to } 360^\circ) \\
 4x &= 360 - 100 \\
 4x &= 260 \\
 x &= 260 \div 4 \\
 x &= 65^\circ
 \end{aligned}$$



In a Rhombus, opposite angles are equal.

$$\begin{aligned}
 a + a + 65 + 65 &= 360 \\
 (\text{angles in a rhombus add up to } 360^\circ)
 \end{aligned}$$

$$\begin{aligned}
 2a + 130 &= 360 \\
 2a &= 360 - 130
 \end{aligned}$$

$$\begin{aligned}
 2a &= 230 \\
 a &= 230 \div 2 = 115^\circ
 \end{aligned}$$

115°

(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.

$$\frac{62}{80} \times 100 = 0.775$$

$$= 77.5\%$$

Sasha got a Merit.

(Total for Question 10 is 3 marks)

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

$$x^{7+3}$$

$$x^{10}$$

(1)

(b) Simplify $(m^4)^3$

$$m^4 \times m^4 \times m^4 = m^{4+4+4} = m^{12}$$

$$\text{or } (m^4)^3 = m^{4 \times 3} = m^{12}$$

$$m^{12}$$

(1)

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

$$= \frac{3\cancel{6} \times a \times f \times f \times f \times f \times f \times f \times f}{1\cancel{2} \times a \times a \times a \times a \times a \times f \times f}$$

$$= \frac{3f^6}{a^4}$$

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

(2)

(Total for Question 11 is 4 marks)



12 A circle has a diameter of 140 cm.

Work out the circumference of the circle.

Give your answer correct to 3 significant figures.

$$\begin{aligned} \text{Circumference} &= \pi \times \text{Diameter} \\ &= 439.822 \\ &= 440 \text{ (3sf)} \end{aligned}$$

..... 440 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

To Junction 8

30 miles
26 minutes

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?

You must show how you got your answer.



$$S = \frac{D}{T}$$

To drive 30 miles in 26 minutes, you need to
drive with a speed of : $S = \frac{30}{26/60}$ mph.

$$S = \frac{30 \times 60}{26} = 69.2 \text{ mph.}$$

69.2 mph is less than 70 mph

Lethna is wrong.

$$\left(\begin{array}{l} 60 \text{ min} = 1 \text{ hour} \\ 26 \text{ min} = ? \\ 26 \text{ min} = \frac{26}{60} \text{ hrs.} \end{array} \right)$$

(Total for Question 13 is 3 marks)



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	Midpoint T°
$8 < T \leq 12$	6	10
$12 < T \leq 16$	8	14
$16 < T \leq 20$	13	18
$20 < T \leq 24$	21	22
$24 < T \leq 28$	2	26

(a) Write down the modal class interval.

Given by the highest freq.

$$\underline{20 < T \leq 24.}$$

(1)

(b) Calculate an estimate for the mean temperature.

$$\text{Mean} = \frac{\text{Total } t^{\circ}}{\text{Total days}}$$

$$= \frac{10 \times 6 + 14 \times 8 + 18 \times 13 + 22 \times 21 + 26 \times 2}{50}$$

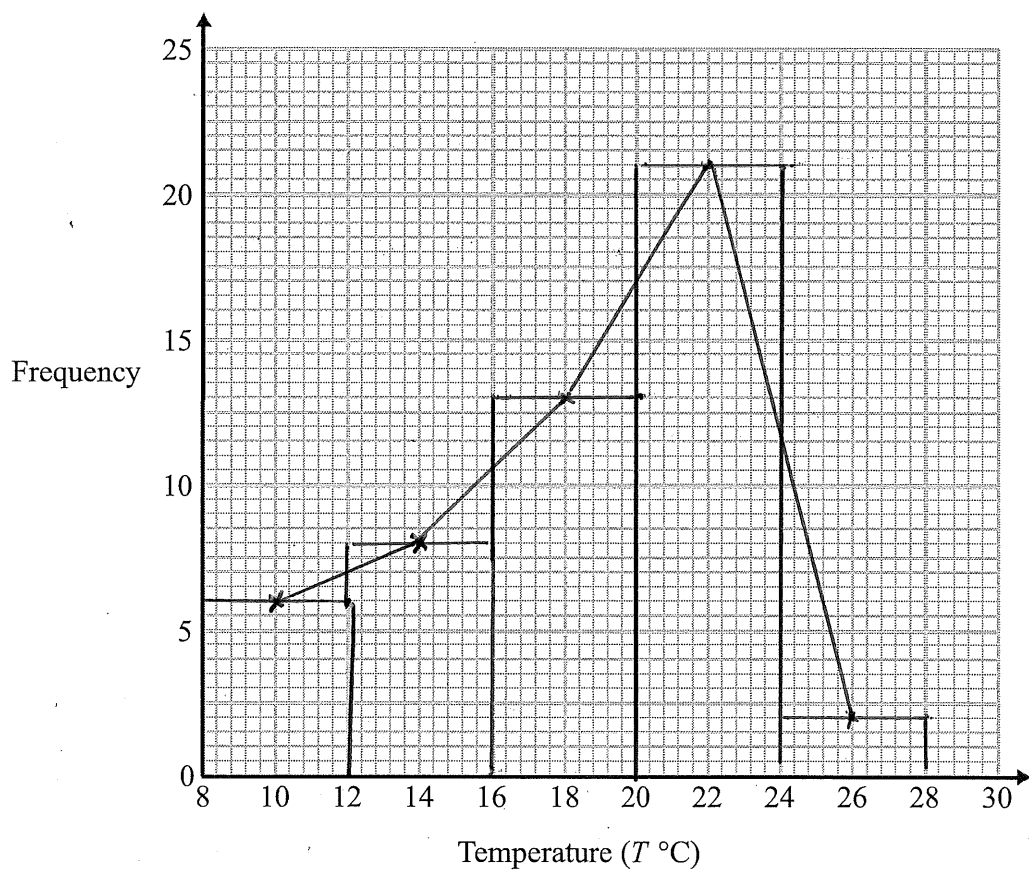
$$= 18.4^{\circ}$$

$$\underline{18.4^{\circ} \text{ } ^{\circ}\text{C}}$$

(4)



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



(2)

(Total for Question 14 is 7 marks)



15 Here is a right-angled triangle.

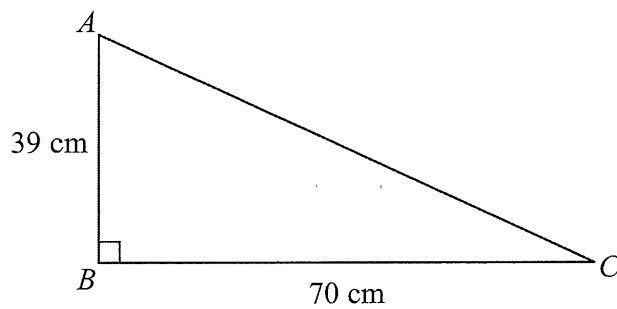


Diagram NOT
accurately drawn

Work out the length of AC .

Give your answer correct to 1 decimal place.

Using Pythagoras $AC^2 = 70^2 + 39^2$

$$AC = 80.1$$

..... 80.1 cm

(Total for Question 15 is 3 marks)



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

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

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

$$4f = 25$$

$$f = 25 \div 4$$

$$f = \frac{6.25}{(3)}$$

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

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

$$2(h+7) + 3(2h-1) = 5$$

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

$$8h + 11 = 5$$

$$8h = 5 - 11$$

$$8h = -6$$

$$h = -\frac{6}{8}$$

$$h = -\frac{3}{4}$$

$$h = \frac{-0.75}{(4)}$$

(Total for Question 16 is 7 marks)



P 4 4 0 2 4 A 0 1 7 2 8

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

$$x=1 \quad y = 1^3 - 4 \times 1 = -3$$

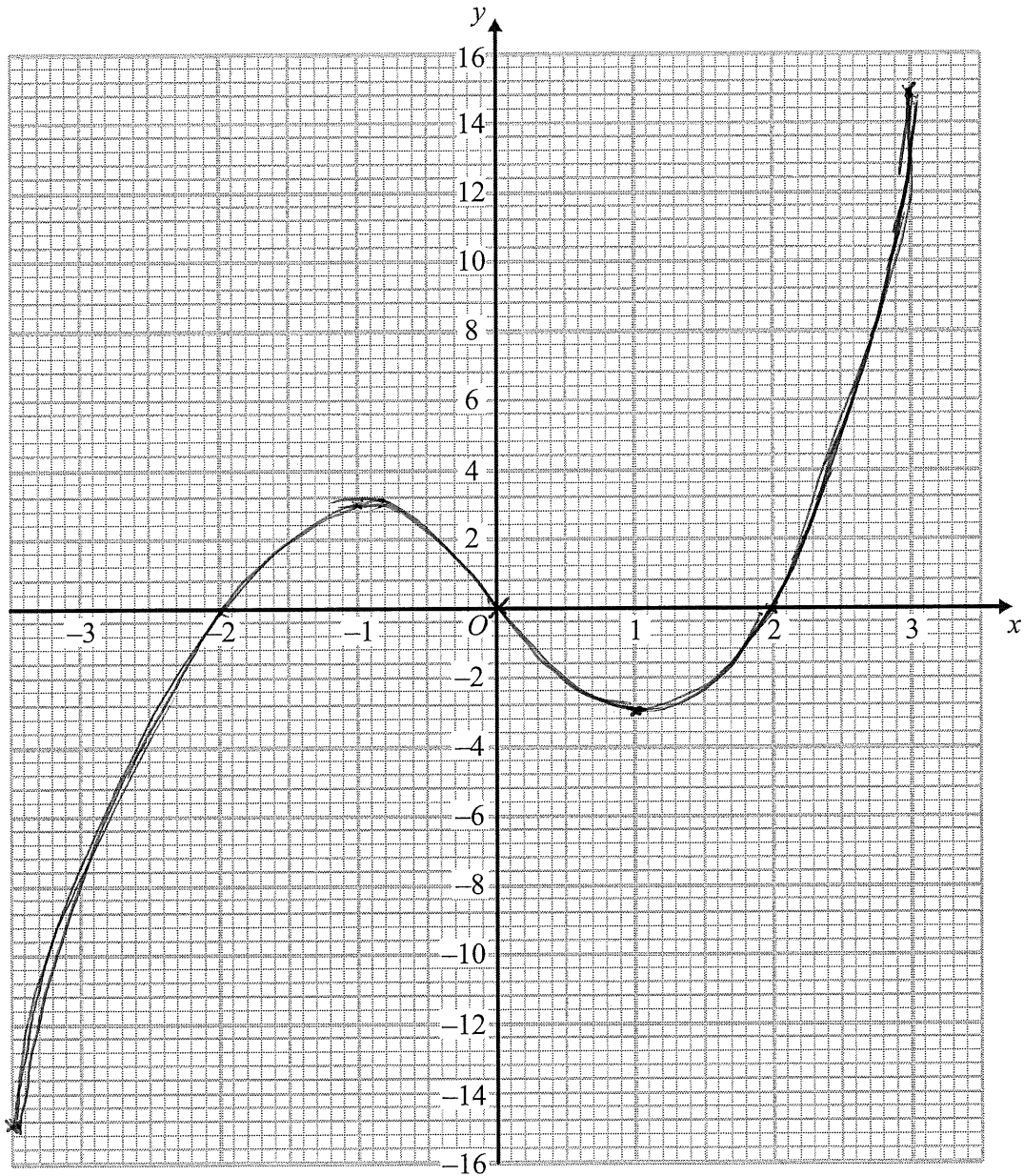
$$x=2 \quad y = 2^3 - 4 \times 2 = 8 - 8$$

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

$$x=-2 \quad y = -2^3 - 4(-2) \quad (2)$$

$$= -8 + 8 = 0$$

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



(2)

(Total for Question 17 is 4 marks)



18 ABC is an isosceles triangle.

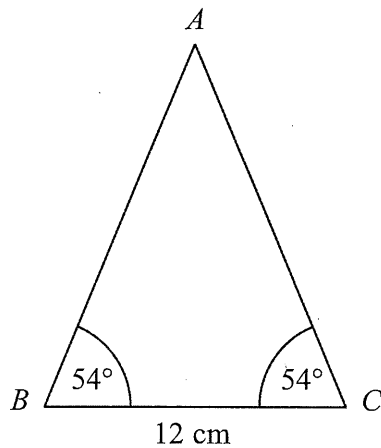


Diagram NOT accurately drawn

Work out the area of the triangle.

Give your answer correct to 3 significant figures.

$$\angle BAC = 180 - 54 - 54 = 72^\circ$$

• using sine rule: $\frac{12}{\sin 72} = \frac{AB}{\sin 54}$

$$AB = 12 \times \frac{\sin 54}{\sin 72}$$

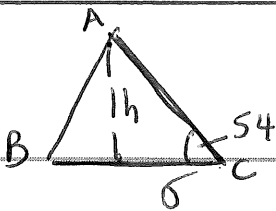
• Area = $\frac{1}{2} AB \times AC \times \sin C$

$$\begin{aligned} \sin C &= \sin 72^\circ \\ AB &= AC \end{aligned}$$

$$\text{Area} = \frac{1}{2} \times \left(12 \times \frac{\sin 54}{\sin 72} \right)^2 \sin 72^\circ$$

$$\text{Area} = 49.549$$

Other method:-



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

$$49.5 \text{ cm}^2$$

$$h = 6 \times \tan 54 \quad (\text{Total for Question 18 is 4 marks})$$

$$\text{Area} = \frac{12 \times 6 \times \tan 54}{2}$$

$$= 36 \tan 54^\circ = 49.5 \text{ cm}^2 \quad (3\text{sf})$$



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

0.00078

0.00078

(1)

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

95 600 000

9.56 10^7

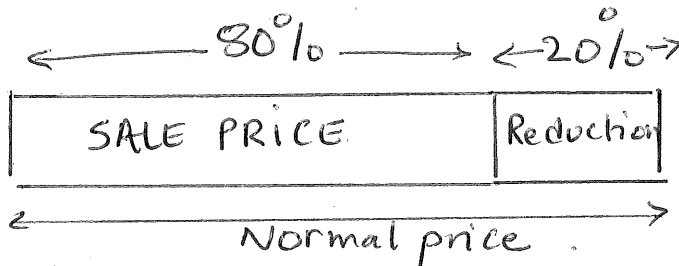
(1)

(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?



Sale Price = 80% of Normal price

464 = 80% \times Normal price

Normal price = $\frac{464}{80\%} = \frac{464}{0.8}$

£ 580 - 464
£116

(Total for Question 20 is 3 marks)

Reduction = $580 - 464 = \underline{\underline{£116}}$



21 (a) Factorise $4x^2 - 9 = (2x - 3)(2x + 3)$

$$\frac{(2x - 3)(2x + 3)}{(1)}$$

(b) Make m the subject of

$$g - 3m = am + 5$$

$$g - 3m - 5 = am$$

$$g - 5 = 3m + am$$

$$g - 5 = m(3 + a)$$

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

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

(Total for Question 21 is 4 marks)



22 The diagram shows a trapezium.

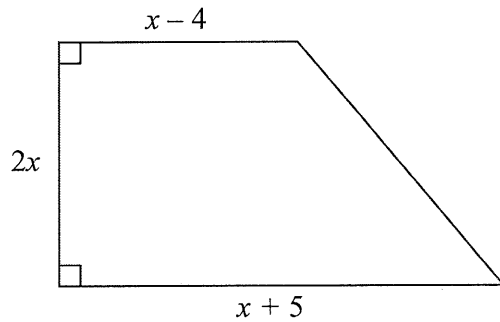


Diagram **NOT** accurately drawn

All the measurements are in centimetres.

The area of the trapezium is 351 cm^2 .

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

$$\text{Area} = \frac{(x+5) + (x-4)}{2} \times 2x$$

$$351 = \frac{2x+1}{2} \times 2x$$

$$351 = x(2x+1)$$

$$351 = 2x^2 + x \quad \therefore \quad 2x^2 + x - 351 \stackrel{(2)}{=} 0$$

(b) Work out the value of x .

$$x = \frac{-1 \pm \sqrt{1 - 4(2)(-351)}}{4}$$

$$x = \frac{-1 \pm 53}{4}$$

$$x = \frac{-54}{4} \quad \text{invalid (negative height)}$$

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

13

(3)

(Total for Question 22 is 5 marks)



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

$$= 534 \quad | \quad = 531$$

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.

$$\text{Total number of students} = 534 + 531 = 1065$$

To create a sample of 120 student we need

$$\frac{120}{1065}$$

$$\text{year 8 Female} = \frac{120}{1065} \times 134 \approx 15$$

15 Females - yr

(Total for Question 23 is 2 marks)



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

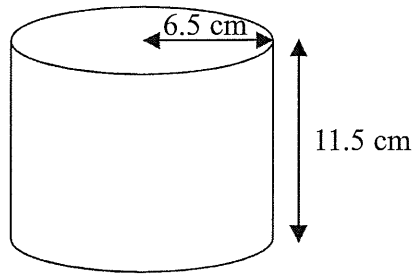


Diagram **NOT** accurately drawn

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.

$$V = \pi r^2 \times h$$

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

$$V_{\text{Large Tin}} = 6.5^2 \times \pi \times 11.5$$

$$V_{\text{new Tin}} = 5.8^2 \times \pi \times H \quad (H = \text{height of new tin})$$

Same volume

$$5.8^2 \times \pi \times H = 6.5^2 \times \pi \times 11.5$$

$$H = \frac{6.5^2 \times \pi \times 11.5}{5.8^2 \times \pi}$$

$$H = 14.443$$

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?

You must show all your working.

$$\text{Line A: } y = \frac{3}{2}x + \frac{8}{2}$$

$$y = \underline{1.5}x + 4$$

$$\text{Gradient A} = 1.5$$

$$\text{Line B: } \cdot \text{ Gradient} = \frac{8-2}{2-(-1)} = \frac{6}{3} = 2$$

$$y = \underline{2}x + c$$

$$\text{Gradient B} = 2$$

Gradient of Line A and Line B are different

\therefore Line A and Line B intersect

(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 .

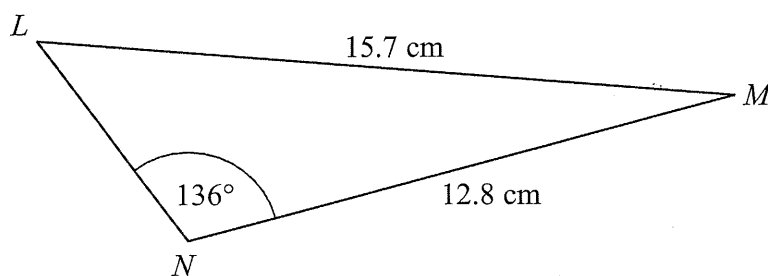


Diagram NOT accurately drawn

Calculate the length of LN .

Give your answer correct to 3 significant figures.

$$(a) \frac{\sin \hat{L}}{12.8} = \frac{\sin 136^\circ}{15.7}$$

$$\sin \hat{L} = \frac{12.8}{15.7} \times \sin 136^\circ$$

$$\hat{L} = 34.5^\circ$$

$$\hat{M} = 180 - 136 - 34.5$$

$$\hat{M} = 9.5^\circ$$

$$(b) \sin \hat{M} \frac{LN}{15.7} = \frac{\sin \hat{N}}{\sin \hat{M}} \therefore LN = \frac{\sin \hat{M}}{\sin \hat{N}} \times 15.7$$

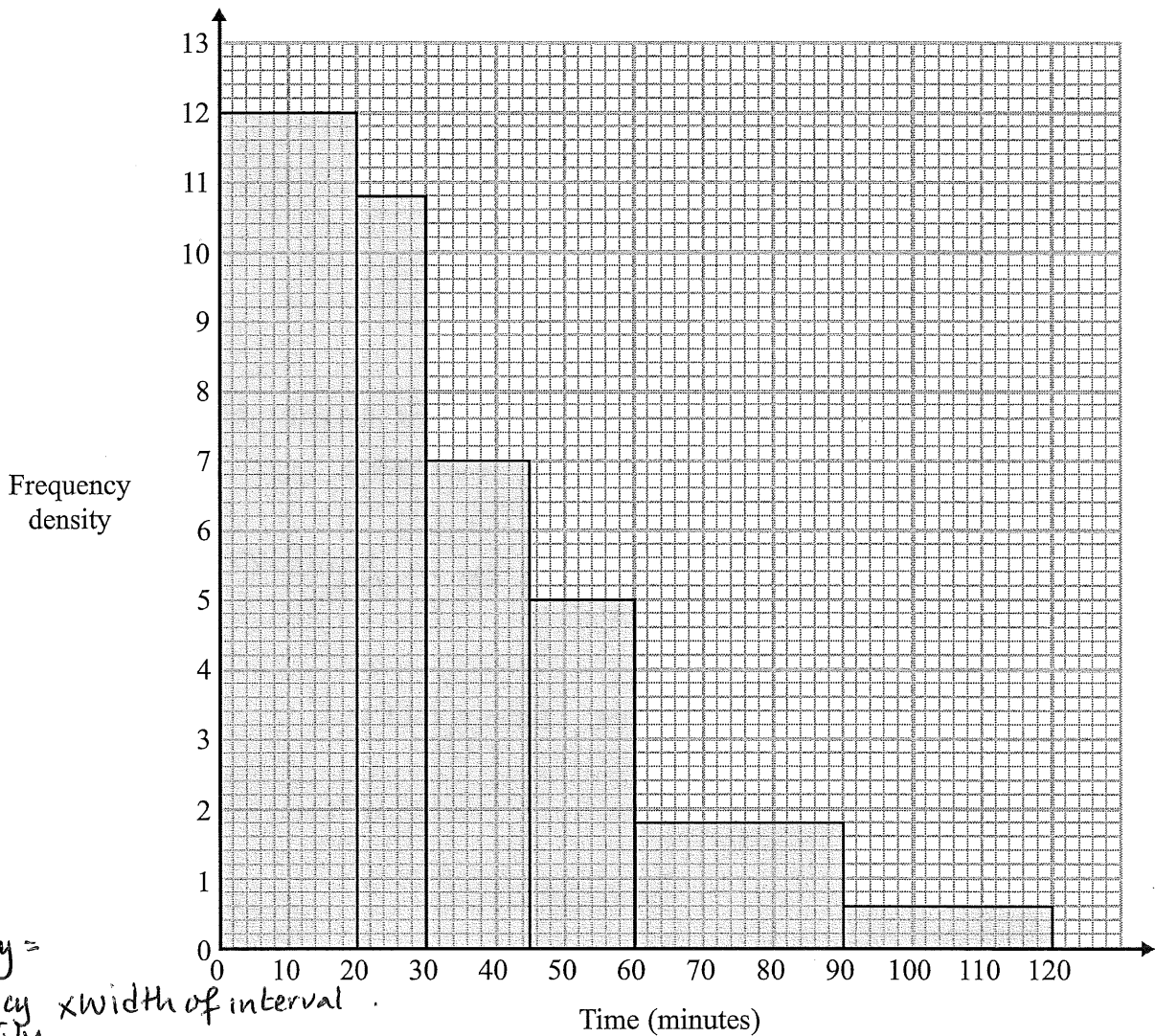
$$\underline{LN = 3.73 \text{ cm}}$$

3.73 cm

(Total for Question 26 is 5 marks)



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



frequency =
Frequency density × width of interval

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

$$\begin{aligned} \text{Total} &= 20 \times 12 + 10 \times 10.8 + 15 \times 7 + 15 \times 5 + 30 \times 1.8 + 30 \times 0.6 \\ &= 600 \text{ passengers} \end{aligned}$$

$$\text{Total passen. (over one hour)} = 30 \times 1.8 + 30 \times 0.6 = 72 \text{ passengers}$$

$$\text{Passenger over 1hr wait} = \frac{72}{600} \times 100 = 12\%$$

12%

(Total for Question 27 is 3 marks)



P 4 4 0 2 4 A 0 2 7 2 8

*28

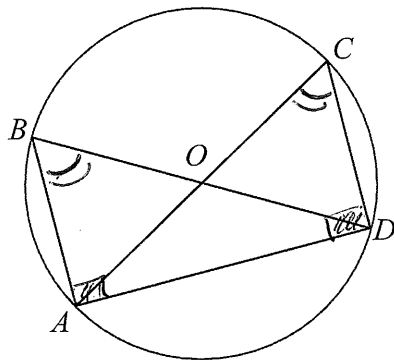


Diagram NOT
accurately drawn

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

Prove that triangle ABD and triangle DCA are congruent.

- $\hat{A}BD = \hat{A}CD$ (angles in the same segment are equal)
- AD is common
- $\hat{B}AD = \hat{C}DA$ (angles in a semi-circle are 90°)

ABD and DCA are congruent. ASA.

(Total for Question 28 is 3 marks)

TOTAL FOR PAPER IS 100 MARKS

