

Centre No.						Paper Reference						Surname	Initial(s)	
Candidate No.						1	3	8	0	/	4	H	Signature	

Paper Reference(s)

**1380/4H**

**Edexcel GCSE**

**Mathematics (Linear) – 1380**

Paper 4 (Calculator)

**Higher Tier**

Tuesday 10 November 2009 – Morning

Time: 1 hour 45 minutes

Examiner's use only

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Team Leader's use only

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**Materials required for examination**

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

**Items included with question papers**

Nil

**Instructions to Candidates**

In the boxes above, write your centre number, candidate number, your surname, initials and signature.

Check that you have the correct question paper.

Answer ALL the questions. Write your answers in the spaces provided in this question paper.

**You must NOT write on the formulae page.**

**Anything you write on the formulae page will gain NO credit.**

If you need more space to complete your answer to any question, use additional answer sheets.

**Information for Candidates**

The marks for individual questions and the parts of questions are shown in round brackets: e.g. (2).

There are 29 questions in this question paper. The total mark for this paper is 100.

There are 24 pages in this question paper. Any blank pages are indicated.

**Calculators may be used.**

If your calculator does not have a  $\pi$  button, take the value of  $\pi$  to be 3.142 unless the question instructs otherwise.

**Advice to Candidates**

Show all stages in any calculations.

Work steadily through the paper. Do not spend too long on one question.

If you cannot answer a question, leave it and attempt the next one.

Return at the end to those you have left out.

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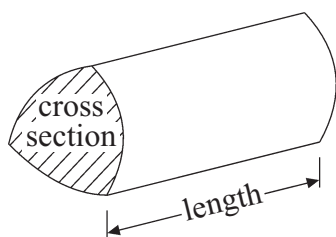
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## GCSE Mathematics (Linear) 1380

Formulae: Higher Tier

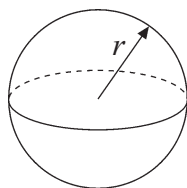
**You must not write on this formulae page.  
Anything you write on this formulae page will gain NO credit.**

**Volume of a prism** = area of cross section  $\times$  length



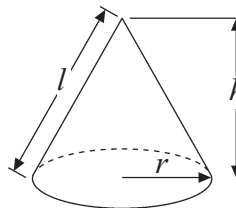
**Volume of sphere** =  $\frac{4}{3}\pi r^3$

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

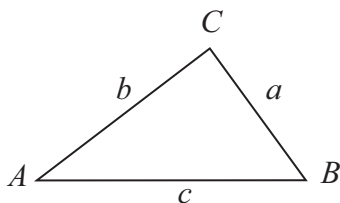


**Volume of cone** =  $\frac{1}{3}\pi r^2 h$

**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 TWENTY NINE questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. Ali asked 200 students which sport they like best. They could choose swimming or tennis or athletics.

$$\begin{array}{r} 79 \\ -36 \\ \hline 43 \end{array} \quad \begin{array}{r} 79 \\ +54 \\ \hline 133 \end{array} \quad \begin{array}{r} 200 \\ -133 \\ \hline 67 \end{array}$$

The two-way table shows some information about their answers.

	Swimming	Tennis	Athletics	Total
Female	43 ✓	25 ✓	19	87 ✓
Male	36	42	35 ✓	113 ✓
Total	79	67 ✓	54	200

Complete the two-way table.

$$\begin{array}{r} 43 \\ -19 \\ \hline 24 \end{array} \quad \begin{array}{r} 67 \\ -42 \\ \hline 25 \end{array} \quad \begin{array}{r} 43 \\ +25 \\ +19 \\ \hline 87 \end{array} \quad \begin{array}{r} 36 \\ 42 \\ +35 \\ \hline 113 \end{array}$$

(Total 3 marks)

Q1

3

2. (a) Use your calculator to work out the value of  $\frac{8.7 \times 12.3}{9.5 - 5.73}$

Write down all the digits from your calculator.  
Give your answer as a decimal.

$$28.384615 \quad \checkmark$$

.....

(2)

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

$$28.384615 = 30 \text{ (1sf)}$$

↑  
more than 5

$$30 \text{ (1sf)} \quad \checkmark$$

.....

(1)

(Total 3 marks)

Q2

3



3. (a)  $p = 2$   
 $q = -4$

Work out the value of  $3p + 5q$

$$3p + 5q$$

$$(3 \times 2) + (5 \times -4)$$

$$= 6 + -20$$

$$= 6 - 20 = -14$$

$$\frac{-14 \checkmark}{(2)} \quad 2$$

(b) Factorise  $3m - 6$

$$\begin{array}{c} \div 3 \downarrow \quad \downarrow \div 3 \\ 3(m - 2) \end{array}$$

$$\frac{3(m - 2) \checkmark}{(1)} \quad 1$$

(Total 3 marks)

Q3  
3

4. Frank did a survey on the areas of pictures in a magazine.

The magazine had 60 pages.

Frank worked out the area of each of the pictures in the first 2 pages.

This may not be a good method to do the survey.

Explain why.

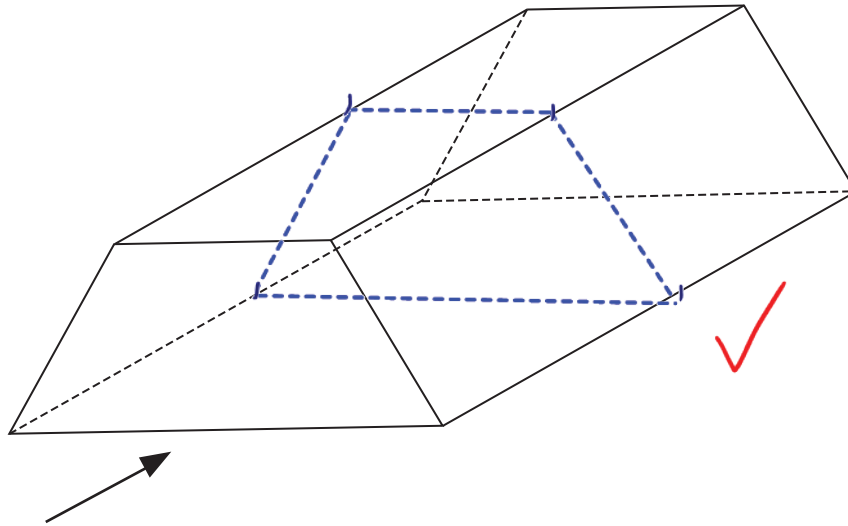
The sample might not be representative. The first two pages could be the contents page or a full page advertisement. ✓

(Total 1 mark)

Q4  
1



5.



The diagram shows a prism.

(a) On the diagram, draw in **one** plane of symmetry for the prism.

(2)

(b) In the space below, sketch the front elevation from the direction marked with an arrow.



(2)

(Total 4 marks)

2

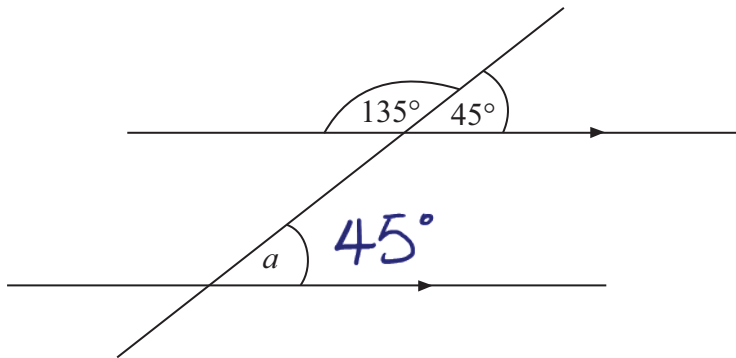
2

Q5  
4



6.

Diagram NOT accurately drawn



(i) Write down the size of the angle marked  $a$ .

45 ✓  
.....

(ii) Give a reason for your answer.

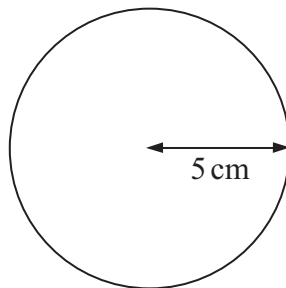
$a$  is a corresponding angle to  $45^\circ$  ✓  
.....

(Total 2 marks)

1  
1  
Q6  
2

7. A circle has a radius of 5 cm.

Diagram NOT accurately drawn



Work out the area of the circle.  
Give your answer correct to 3 significant figures.

$$\begin{aligned} \text{Area of circle} &= \pi r^2 \\ &= \pi \times 5^2 \\ &= 25\pi \\ &= 78.5 \text{ cm}^2 \text{ (3sf)} \end{aligned}$$

78.5 ✓  
..... cm<sup>2</sup>

(Total 2 marks)

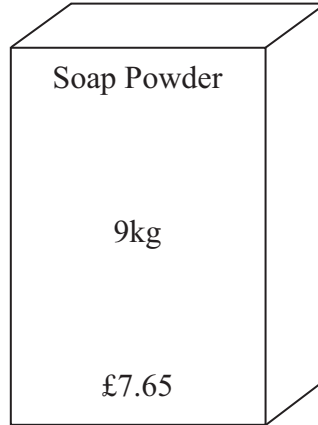
Q7  
2



8. Soap powder is sold in two sizes of box.



Small box



Large box

A small box contains 2 kg of soap powder and costs £1.72

A large box contains 9 kg of soap powder and costs £7.65

Which size of box gives the better value for money?

The large box ✓

Explain your answer.

You must show all your working.

Small box 2kg £1.72

large box 9kg £7.65

Price per kg

$$1.72 \div 2$$

$$= \text{£}0.86/\text{kg} \checkmark$$

$$7.65 \div 9$$

$$= \text{£}0.85/\text{kg} \checkmark$$

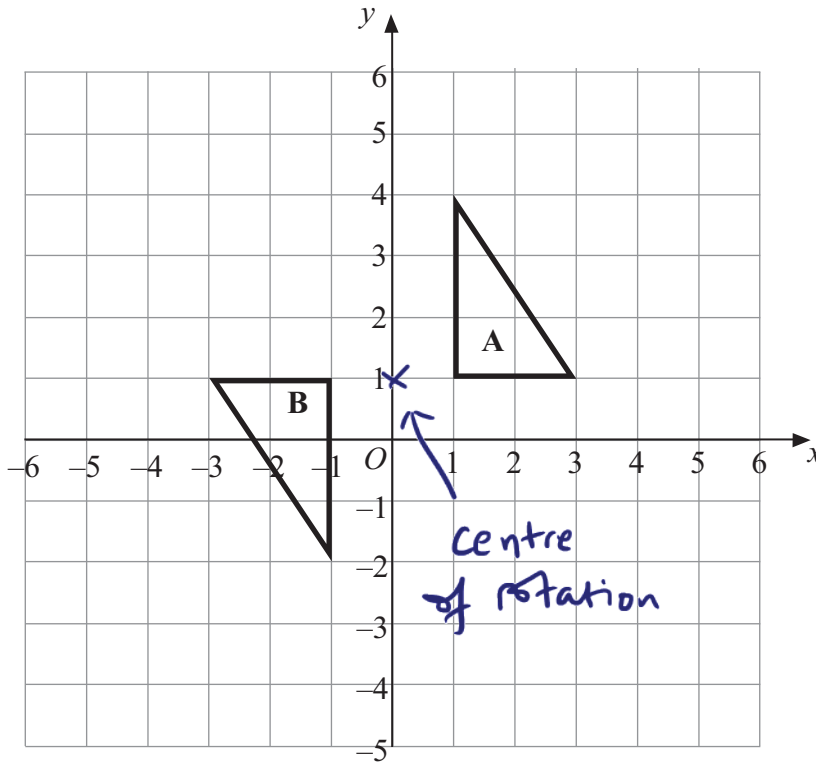
(Total 3 marks)

Q8

3



9.



Describe fully the single transformation that maps triangle A onto triangle B.

A ROTATION of 180° with CENTRE OF ROTATION (0, 1)

(Total 3 marks)

Q9  
3

10. A computer costs £360 plus  $17\frac{1}{2}\%$  VAT.

Calculate the total cost of the computer.

	£360
	plus
	$17\frac{1}{2}\%$ VAT

method 1

$$17.5\% \text{ of } 360 = 63$$

$$\text{PRICE} = 360 + 63 = 423$$

method 2

$$360 \times 1.175 = 423$$

percentage multiplier for increase of 17.5%

£ 423 ✓

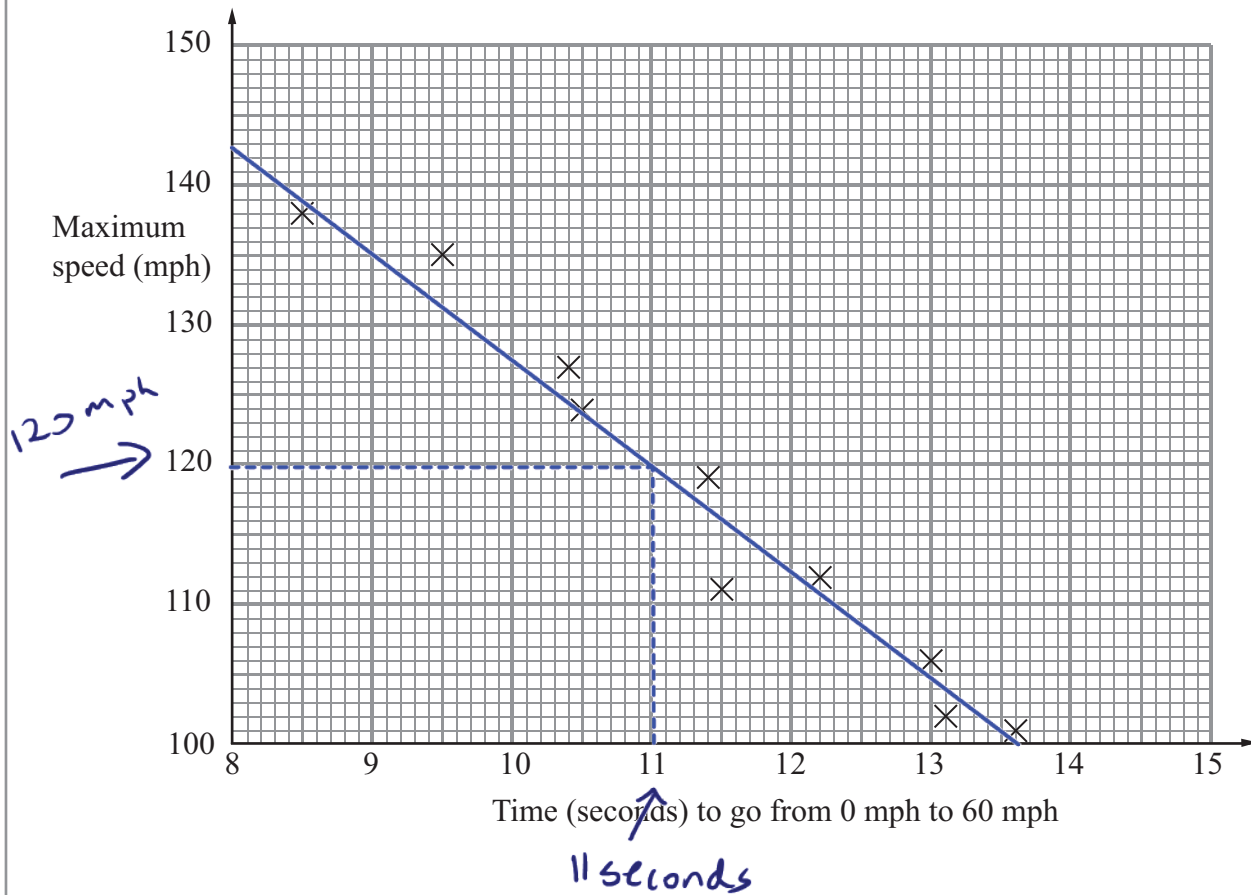
(Total 3 marks)

Q10  
3





11. The scatter graph shows some information about 10 cars. It shows the time, in seconds, it takes each car to go from 0 mph to 60 mph. For each car, it also shows the maximum speed, in mph.



(a) What type of correlation does this scatter graph show?

NEGATIVE CORRELATION ✓  
(1)

The time a car takes to go from 0 mph to 60 mph is 11 seconds.

(b) Estimate the maximum speed for this car.

120 ✓ mph  
(2)

(Total 3 marks)

1  
2  
Q11  
3



12.

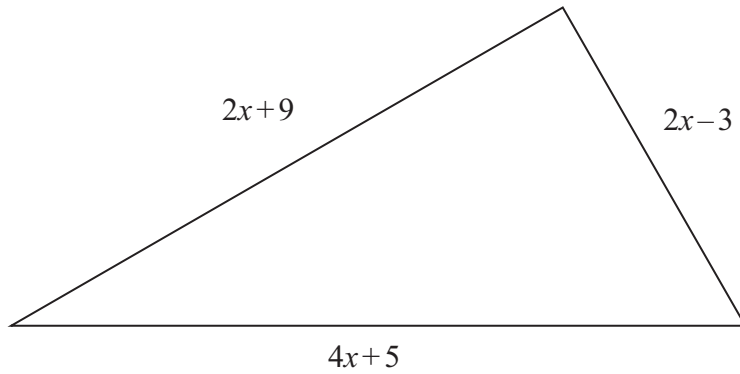


Diagram **NOT** accurately drawn

In the diagram, all measurements are in centimetres.

The lengths of the sides of the triangle are

- $2x+9$
- $2x-3$
- $4x+5$

- (a) Find an expression, in terms of  $x$ , for the perimeter of the triangle.  
Give your expression in its simplest form.

$$\begin{aligned}
 & (2x+9) + (2x-3) + (4x+5) \\
 = & 2x + 9 + 2x - 3 + 4x + 5 \\
 = & 2x + 2x + 4x + 9 - 3 + 5 =
 \end{aligned}$$

$8x + 11$  ✓

..... (2)

2

The perimeter of the triangle is 39 cm.

- (b) Find the value of  $x$ .

$$\begin{aligned}
 & 8x + 11 = 39 \\
 (-11) & \quad 8x = 28 \\
 (\div 8) & \quad x = 3.5 \text{ cm}
 \end{aligned}$$

$x = 3.5$  ✓

..... (2)

2

(Total 4 marks)

Q12

4



13. A piece of wood is 180 cm long.  
Tom cuts it into three pieces in the ratio 2 : 3 : 4

Work out the length of the longest piece.

$$2 : 3 : 4$$

$$2 \times 20 : 3 \times 20 : 4 \times 20$$

$$40 : 60 : 80$$

↑  
longest piece

No. of parts  
 $2 + 3 + 4 = 9$

Length of 1 part

$$180 \text{ cm} \div 9 = 20 \text{ cm}$$

..... 80 ..... cm

(Total 3 marks)

Q13  
3

14. The equation

$$x^3 + 2x = 60$$

has a solution between 3 and 4

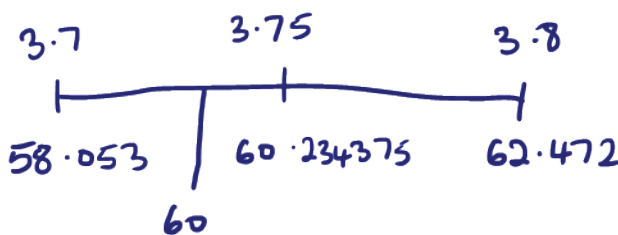
Use a trial and improvement method to find this solution.

Give your answer correct to 1 decimal place.

You must show all your working.

$x$	$x^3$	$2x$	$x^3 + 2x$	too big / too small
3	27	6	33	too small
4	64	8	72	too big ✓
3.5	42.875	7	49.875	too small
3.8	54.872	7.6	62.472	too big
3.7	50.658	7.4	58.053	too small ✓
3.75	52.734375	7.5	60.234375	too big ✓

↑  
mid point



$x = 3.7$  ✓

(Total 4 marks)

Q14  
4



15. (a) Simplify

$$m^3 \times m^4 = m^{3+4} = m^7$$

$m^7$  ✓  
.....  
(1)

Leave blank

1

(b) Simplify

$$p^7 \div p^3 = p^{7-3} =$$

$p^4$  ✓  
.....  
(1)

1

(c) Simplify

$$4x^2y^3 \times 3xy^2$$

$$= 4 \times 3 \times x^2 \times x \times y^3 \times y^2$$

$12x^3y^5$  ✓  
.....  
(2)

2

Q15

4

(Total 4 marks)

16.

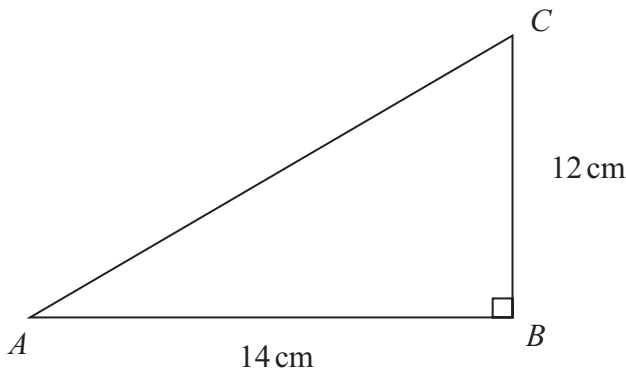


Diagram NOT accurately drawn

ABC is a right-angled triangle.

AB = 14 cm.

BC = 12 cm.

Calculate the length of AC.

Give your answer correct to 3 significant figures.

$$c^2 = a^2 + b^2$$

$$c^2 = 14^2 + 12^2$$

$$= 196 + 144$$

$$c^2 = 340$$

$$c = \sqrt{340}$$

$$c \approx 18.43908891$$

$$c = 18.4 \text{ (3sf)}$$

$18.4$  ✓  
..... cm

Q16

3

(Total 3 marks)



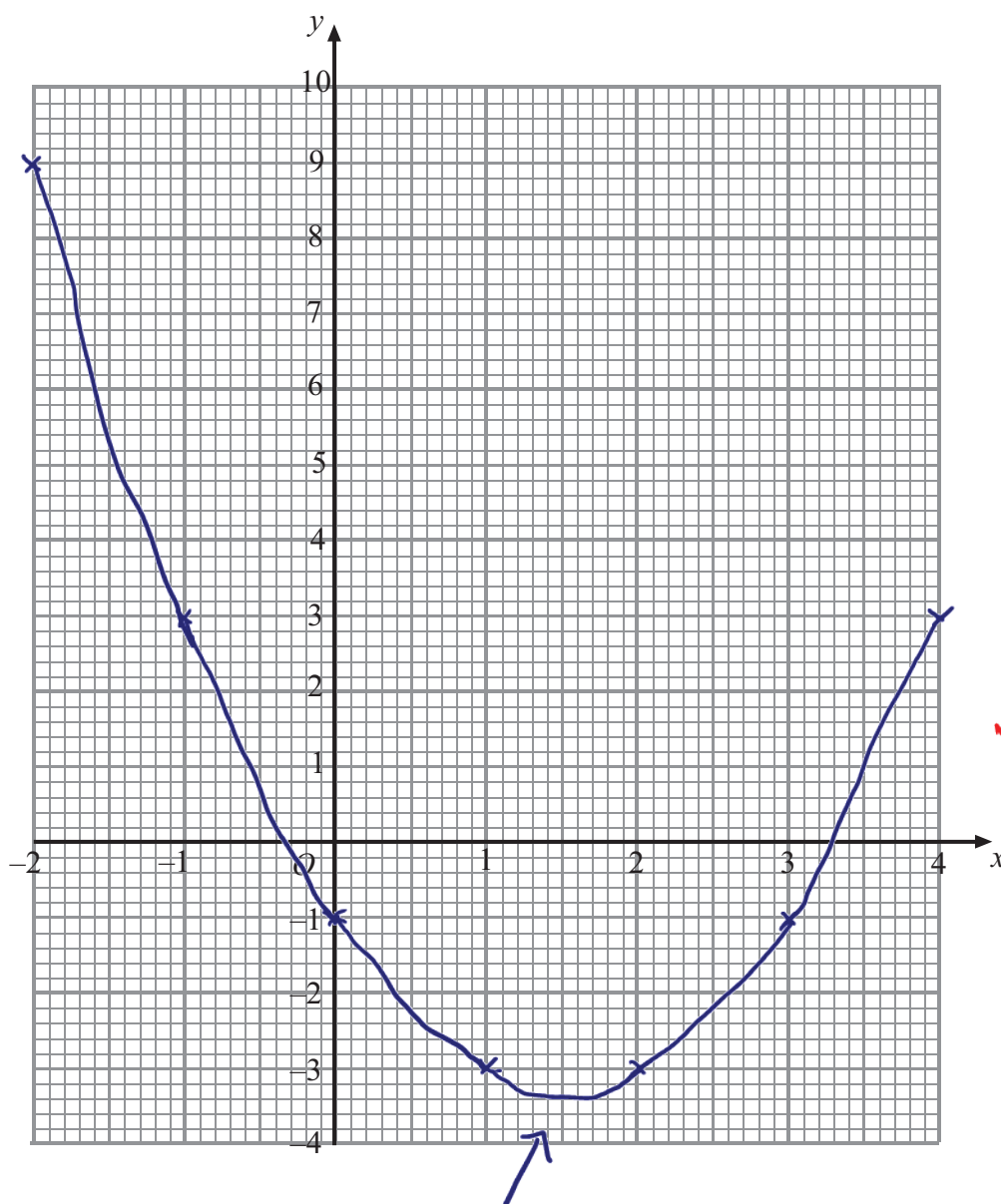
17. (a) Complete the table of values for  $y = x^2 - 3x - 1$  *If the equation has  $x^2$  in it the y values should always show symmetry.*

x	-2 ✓	-1	0	1	2 ✓	3	4 ✓
y	9 ✓	3	-1	-3	-3 ✓	-1	3 ✓

2

$x^2$	4	1	0	1	4	9	16 <sup>(2)</sup>
$-3x$	6	3	0	-3	-6	-9	-12
$-1$	-1	-1	-1	-1	-1	-1	-1

(b) On the grid, draw the graph of  $y = x^2 - 3x - 1$  for values of x from -2 to 4



2

Quadratic curves should be curved!

(2)

(Total 4 marks)

Q17

4



18. The table shows some information about the heights ( $h$  cm) of 100 students.

Height ( $h$ cm)	Frequency	Cumulative Freq.	midpoint	midx freq
$120 \leq h < 130$	8	8	125	1000
$130 \leq h < 140$	16	24	135	2160
$140 \leq h < 150$	25	49	145	3625
$150 \leq h < 160$	30	79	155	4650
$160 \leq h < 170$	21	100	165	3465

50<sup>th</sup> to 79<sup>th</sup> →  
value

(a) Find the class interval in which the median lies. TOTAL 100      14900

use cumulative frequency to find median  
 median position =  $\frac{n+1}{2} = \frac{101}{2} = 50.5$

so find 50<sup>th</sup> and 51<sup>st</sup> values  
 and take average

$150 \leq h < 160$  ✓  
 .....  
 (1)

BOTH are in  $150 \leq h < 160$  interval

(b) Work out an estimate for the mean height of the students.

ESTIMATE OF MEAN =  $\frac{14900}{100} = 149$  cm ✓

149

..... cm  
 (4)

(Total 5 marks)

Q18  
 5



19. (a) Expand and simplify

$$(x-3)(x+5)$$

$$\begin{array}{r} F \quad x^2 \\ 0 \quad 5x \\ 1 \quad -3x \\ L \quad -15 \\ S \quad x^2 + 5x - 3x - 15 = x^2 + 2x - 15 \end{array}$$

$$x^2 + 2x - 15 \dots\dots\dots (2)$$

2

(b) Solve  $\frac{29-x}{4} = x+5$

$$(\times 4) \quad 29 - x = 4(x + 5)$$

$$29 - x = 4x + 20 \quad (\text{expand})$$

$$(-20) \quad 9 - x = 4x$$

$$(+x) \quad 9 = 5x$$

$$(\div 5) \quad x = \frac{9}{5} = 1.8$$

$$x = 1.8 \dots\dots\dots (3)$$

3

(Total 5 marks)

Q19  
5

20. The table gives information about the cost of the gas used by a family.

Month	Jan-Mar 2007	Apr-Jun 2007	Jul-Sep 2007	Oct-Dec 2007	Jan-Mar 2008	Apr-Jun 2008	Jul-Sep 2008
Cost of gas (in £)	124	63	24	121	136	71	32

(a) Work out the four-point moving averages for this information. The first three have been worked out for you.

$$121 + 136 + 71 + 32 = 360$$

$$360 \div 4 = 90$$

$$\dots\dots\dots \pounds 83 \quad \dots\dots\dots \pounds 86 \quad \dots\dots\dots \pounds 88 \quad \dots\dots\dots \pounds 90 \dots\dots\dots (2)$$

2

(b) Use the moving averages to describe the trend.

The cost of gas is on an upward trend

(Total 3 marks)

Q20  
3



21. In a sale, normal prices are reduced by 12%.  
The sale price of a digital camera is £132.88

REVERSE PERCENTAGE  
QUESTION

Leave blank

Work out the normal price of the digital camera.

Method 1

NORMAL

£x

100%

SALE

£132.88

88%

or method 2

normal price

$$= \frac{132.88}{0.88} = 151$$

$$1\% \text{ of normal} = 132.88 \div 88 = 1.51$$

$$100\% \text{ of normal price} = 100 \times 1.51 = \pounds 151$$

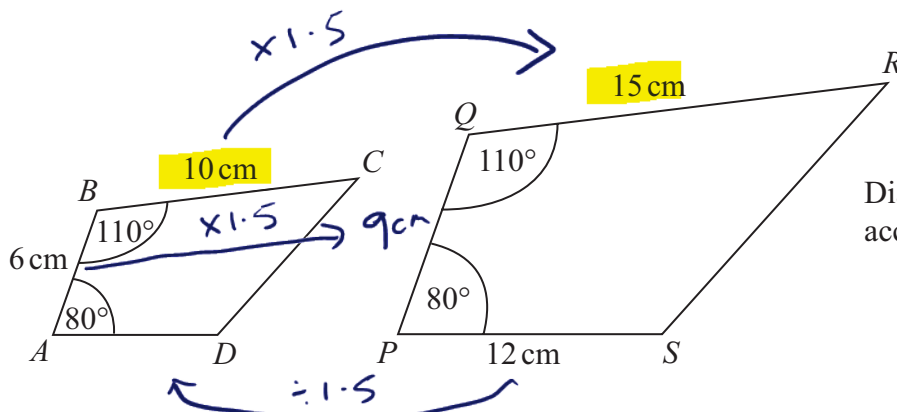
£ 151 ✓

(Total 3 marks)

Q21

3

22.



Diagrams NOT accurately drawn

ABCD and PQRS are mathematically similar.

- (a) Find the length of PQ.

$$6 \text{ cm} \times 1.5 = 9 \text{ cm}$$

9 ✓ cm  
(2)

2

- (b) Find the length of AD.

$$12 \text{ cm} \div 1.5 = 8 \text{ cm}$$

8 ✓ cm  
(2)

2

(Total 4 marks)

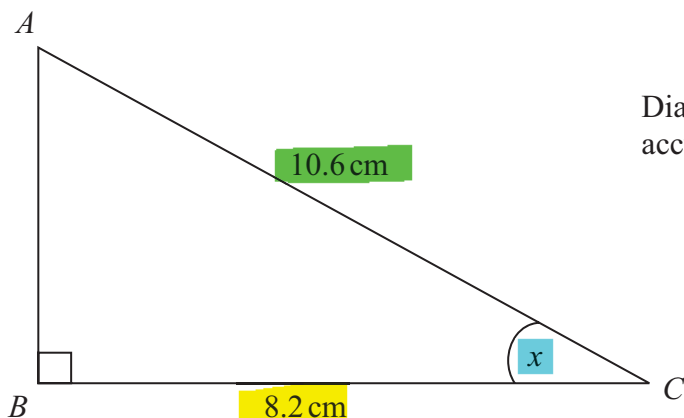
Q22

4





23.



$ABC$  is a right-angled triangle.  
 $AC = 10.6$  cm.  
 $BC = 8.2$  cm.



Calculate the size of the angle marked  $x$ .  
 Give your answer correct to 3 significant figures.

$$\cos x = \frac{8.2}{10.6} \quad x = \cos^{-1}\left(\frac{8.2}{10.6}\right)$$

$$= 39.3^\circ \text{ (3sf)}$$

39.3<sup>o</sup> ✓

(Total 3 marks)

Q23

3



24. The table below gives some information about some students in a school.

Year group	Boys	Girls	Total
Year 12	126	94	220
Year 13	77	85	162
<b>Total</b>	203	179	<b>382</b>

Andrew is going to carry out a survey of these students.  
He uses a sample of 50 students, stratified by year group and gender.

Work out the number of Year 13 girls that should be in his sample.

These are 85 Year 13 girls out of 382 students

$$\left(\frac{85}{382}\right) \times 50 = 11.2565445$$

$$= 11 \text{ (to nearest student)}$$

11 ✓

(Total 2 marks)

Q24

2

25.  $y$  is directly proportional to  $x$ .

When  $x = 500$ ,  $y = 10$

(a) Find a formula for  $y$  in terms of  $x$ .

$$y \propto x$$

$$y = kx$$

$$10 = 500 \times k$$

$$k = \frac{10}{500} = \frac{1}{50}$$

$$y = \frac{x}{50} \quad \checkmark$$

(3)

3

(b) Calculate the value of  $y$  when  $x = 350$

$$y = \frac{350}{50} = 7$$

$$y = 7 \quad \checkmark$$

(1)

Q25

4

(Total 4 marks)



26.

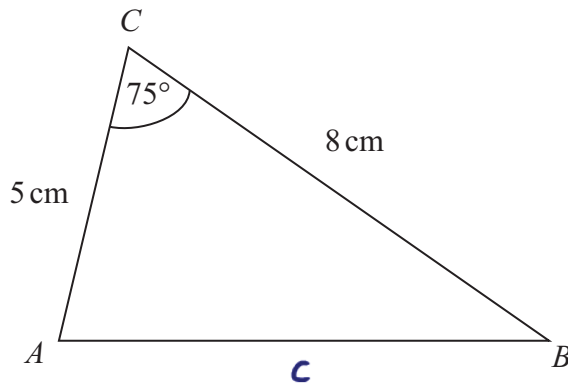


Diagram NOT accurately drawn

In triangle  $ABC$ ,

$AC = 5 \text{ cm.}$

$BC = 8 \text{ cm.}$

Angle  $ACB = 75^\circ.$

- (a) Calculate the area of triangle  $ABC$ .  
Give your answer correct to 3 significant figures.

FORMULA SHEET      Area  $\Delta = \frac{1}{2} ab \sin C$

$$= \frac{1}{2} \times 5 \times 8 \times \sin 75^\circ$$

$$= 19.31851653$$

$$= 19.3 \text{ (3sf)}$$

..... 19.3  $\checkmark$   $\text{cm}^2$  (2)      2

- (b) Calculate the length of  $AB$ .  
Give your answer correct to 3 significant figures.

FORMULA SHEET: COSINE RULE       $a^2 = b^2 + c^2 - 2bc \cos A$

In terms of the given diagram       $c^2 = a^2 + b^2 - 2ab \cos C$

$$c^2 = 5^2 + 8^2 - (2 \times 5 \times 8 \times \cos 75^\circ)$$

$$c^2 = 25 + 64 - (80 \times \cos 75^\circ)$$

$$c^2 = 68.29447639$$

$$c = \sqrt{68.29447639}$$

$$= 8.264067216 = \dots 8.26 \checkmark \text{ (3sf)} \text{ cm} \text{ (3)}$$

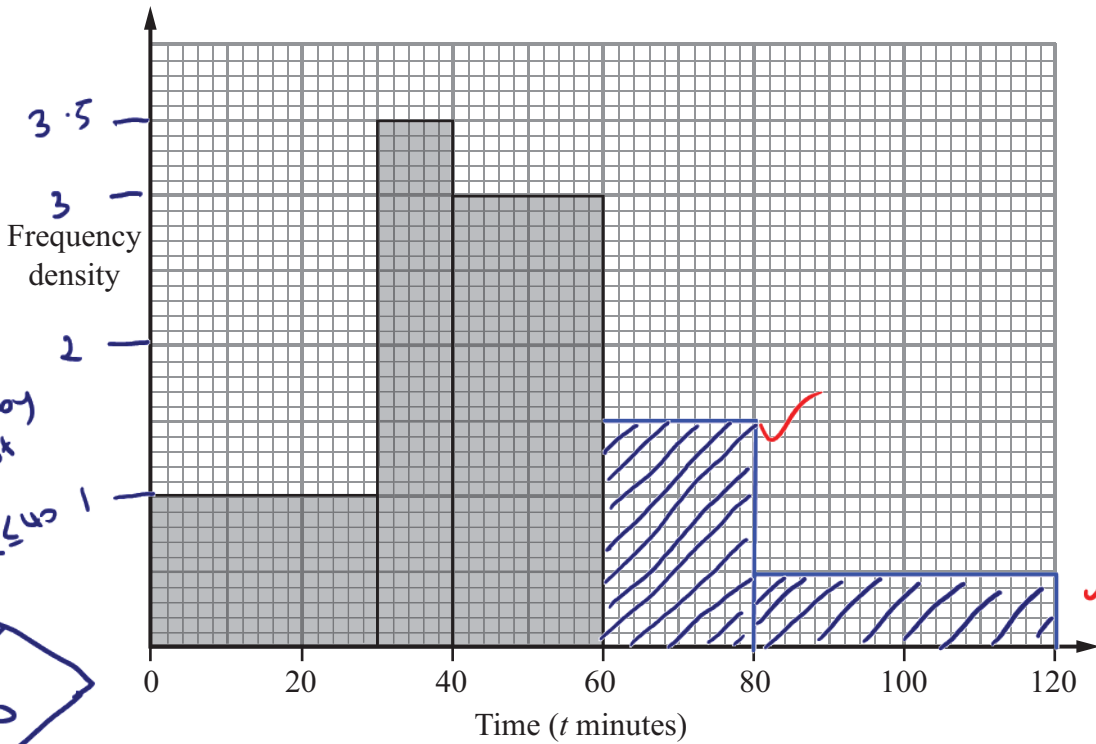
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(Total 5 marks)

Q26  
5



27. The incomplete histogram and table give some information about the times, in minutes, that cars were parked in a car park.



(a) Use the information in the histogram to complete the frequency table.

Time ( $t$ minutes)	Frequency
$0 < t \leq 30$	30 ✓
$30 < t \leq 40$	35
$40 < t \leq 60$	60 ✓
$60 < t \leq 80$	30
$80 < t \leq 120$	20

width	fd
30	1
10	3.5 2
20	3
20	1.5 ✓
40	0.5 ✓

(2)

(b) Use the information in the table to complete the histogram.

$$fd = \frac{f}{w}$$

$$fd = \frac{30}{20} = 1.5$$

$$fd = \frac{20}{40} = 0.5$$

(2)

(Total 4 marks)

Q27  
4



28.

$$v = \sqrt{\frac{a}{b}}$$

accuracy - steps that you are counting in

$$\text{tolerance} = \text{accuracy} \div 2$$

$$\text{UB} = \text{amount} + \text{tolerance}$$

$$\text{LB} = \text{amount} - \text{tolerance}$$

$a = 6.43$  correct to 2 decimal places.

$b = 5.514$  correct to 3 decimal places.

By considering bounds, work out the value of  $v$  to a suitable degree of accuracy.

You must show all your working and give a reason for your final answer.

value	amount	accuracy	tolerance	UB	LB
a	6.43	0.01	0.005	6.435	6.425
b	5.514	0.001	0.0005	5.5145	5.5135

$$\text{UB of } v = \sqrt{\frac{\text{UB of } a}{\text{LB of } b}} = \sqrt{\frac{6.435}{5.5135}} = 1.080340323 \quad \checkmark$$

$$\text{LB of } v = \sqrt{\frac{\text{LB of } a}{\text{UB of } b}} = \sqrt{\frac{6.425}{5.5145}} = 1.079402689 \quad \checkmark$$

$$\text{UB of } v = 1.08 \text{ (2dp)} \quad \checkmark$$

$$\text{LB of } v = 1.08 \text{ (2p)} \quad \checkmark$$

so UB and LB values converge at accuracy of 2dp.

$$v = \underline{\quad 1.08 \text{ (2dp)} \quad} \quad \checkmark$$

(Total 5 marks)

Q28  
5



The first step should be to multiply away the denominators

29. Solve  $\frac{4}{x+3} + \frac{3}{2x-1} = 1$

$\times (x+3)$   $\frac{4(\cancel{x+3})}{(\cancel{x+3})} + \frac{3(x+3)}{2x-1} = (x+3)$

$\times (2x-1)$   $4(2x-1) + \frac{3(x+3)(\cancel{2x-1})}{(\cancel{2x-1})} = (x+3)(2x-1)$

$4(2x-1) + 3(x+3) = (x+3)(2x-1)$

(expand)

$8x - 4 + 3x + 9 = 2x^2 - x + 6x - 3$

$8x + 3x - 4 + 9 = 2x^2 + 5x - 3$

$11x + 5 = 2x^2 + 5x - 3$

(-5)

$11x = 2x^2 + 5x - 8$

(-11x)

$2x^2 - 6x - 8 = 0$

FROM HERE YOU WOULD SOLVE USING QUADRATIC FORMULA

(÷2)

$x^2 - 3x - 4 = 0$

(factorise)

$(x-4)(x+1) = 0$

so  $x = 4$

or  $x = -1$

$x = 4$  or  $x = -1$

(Total 5 marks)

Q29

5

TOTAL FOR PAPER: 100 MARKS

END



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