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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 π button, take the value of π 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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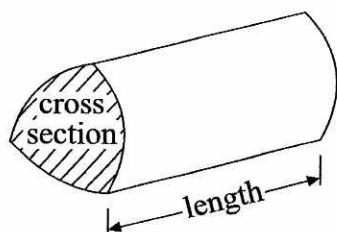
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GCSE Mathematics (Linear) 1380

Formulae: Higher Tier

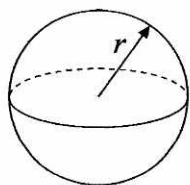
**You must not write on this formulae page.
Anything you write on this formulae page will gain NO credit.**

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



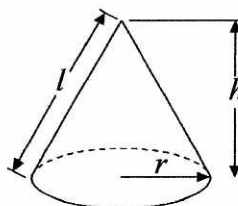
Volume of sphere = $\frac{4}{3}\pi r^3$

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

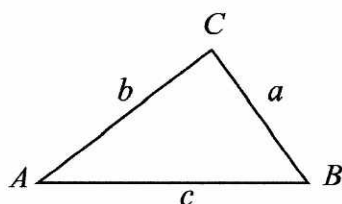


Volume of cone = $\frac{1}{3}\pi r^2 h$

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.

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.

(Total 3 marks)

Q1

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.

28.38461538
(2)

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

30
(1)

(Total 3 marks)

Q2



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

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

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

$$\begin{array}{r} -14 \\ \hline \end{array} \quad (2)$$

(b) Factorise $3m - 6$

$$\begin{array}{r} 3(m-2) \\ \hline \end{array} \quad (1)$$

(Total 3 marks)

Q3

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.

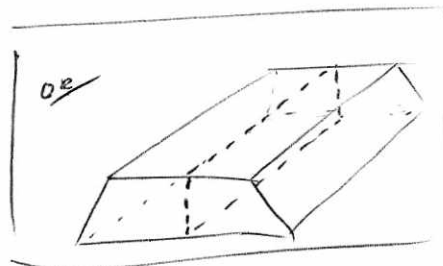
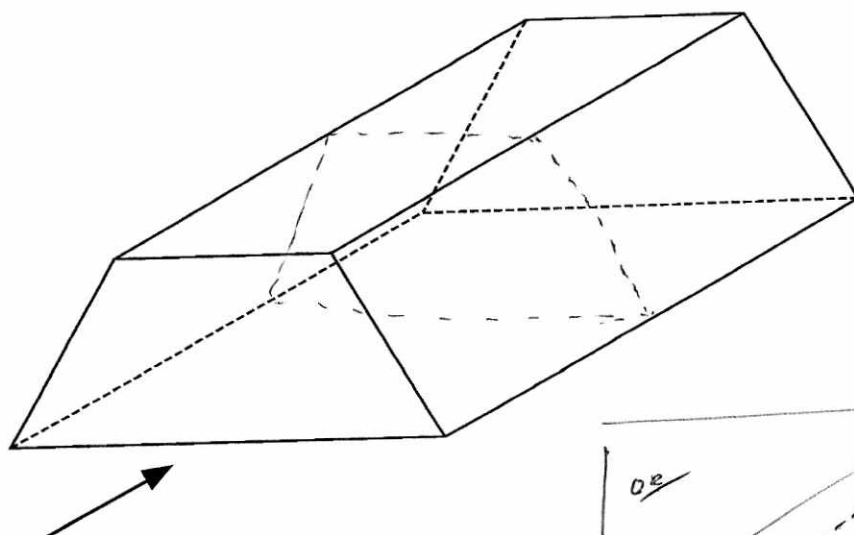
the first two pages may not be representative of
the whole magazine

(Total 1 mark)

Q4

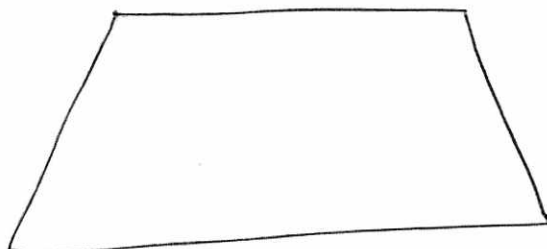


5.



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.



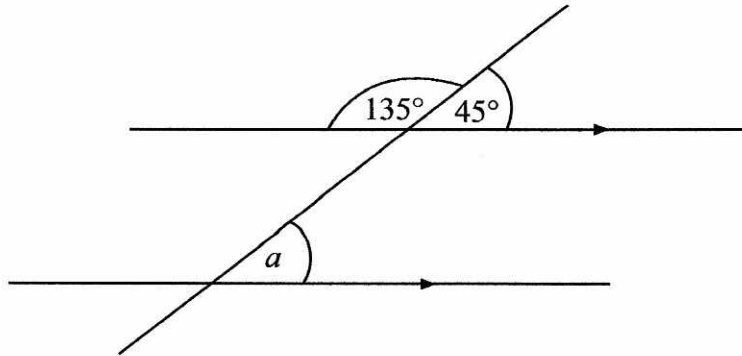
(2) Q5

(Total 4 marks)



6.

Diagram NOT accurately drawn



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

..... 45 °

(ii) Give a reason for your answer.

..... Corresponding angles are equal

(Total 2 marks)

Q6

7. A circle has a radius of 5 cm.

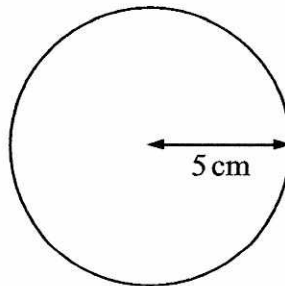


Diagram NOT accurately drawn

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

$$\pi \times 5^2 = 78.53981634$$

..... 78.5 cm²

(Total 2 marks)

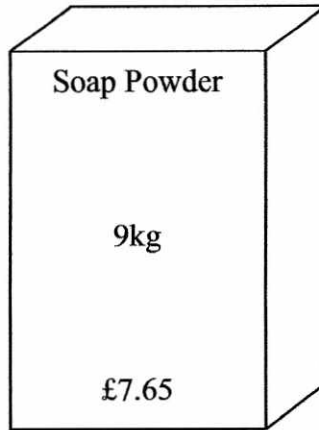
Q7



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.

$$\frac{1.72}{2} = 86p \text{ per kg}$$

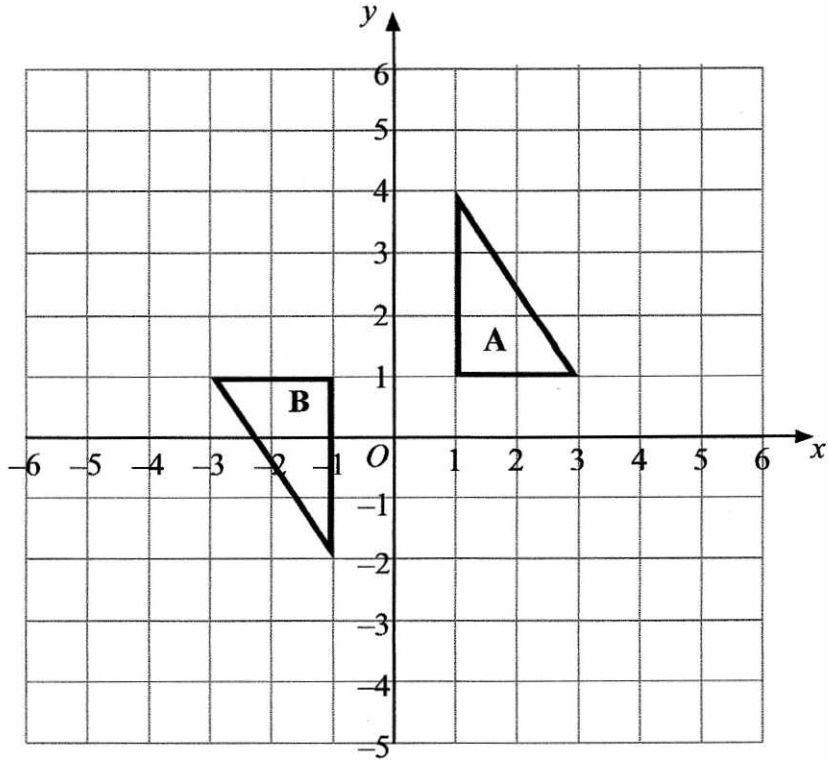
$$\frac{7.65}{9} = \underline{\underline{85p \text{ per kg}}}$$

(Total 3 marks)

Q8



9.



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

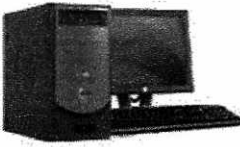
Rotation, 180° , centre $(0, 1)$

(Total 3 marks)

Q9

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

$$100\% + 17.5\% = 117.5\%$$

$$360 \times 117.5\%$$

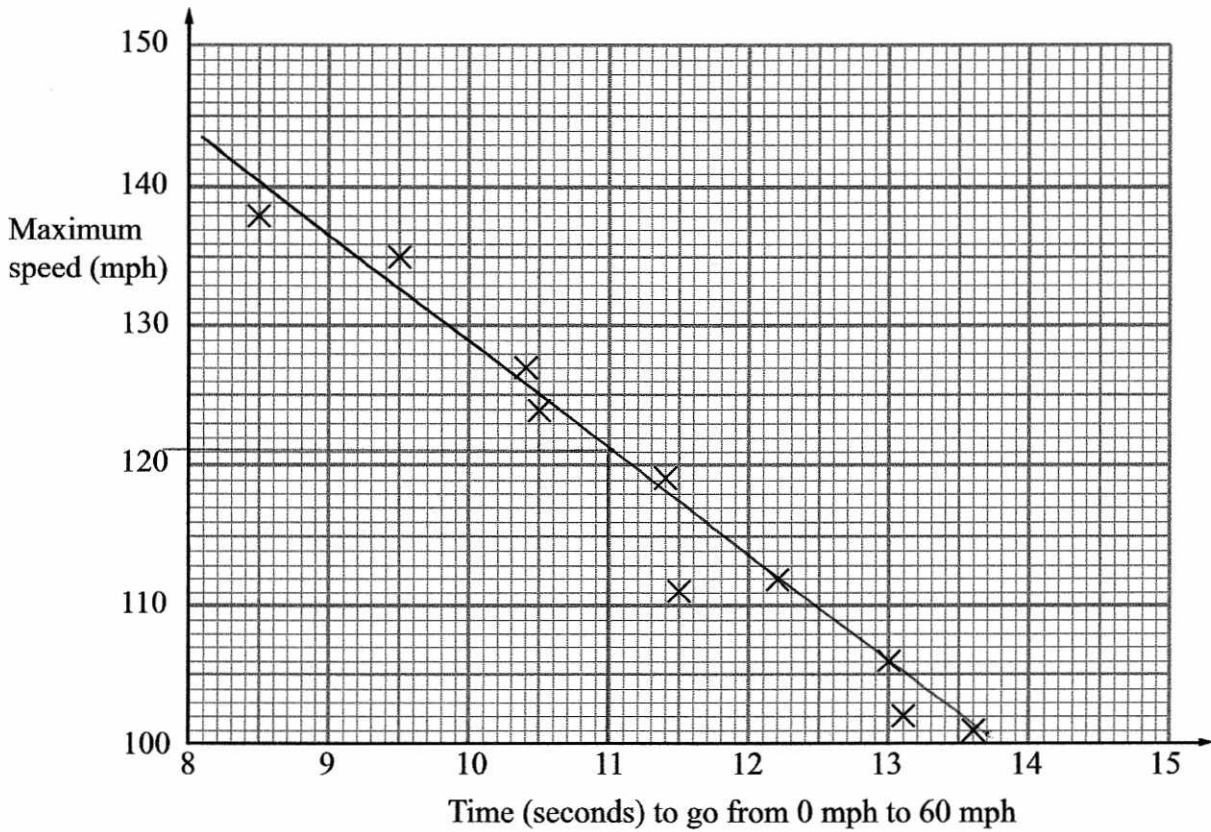
£ 423

(Total 3 marks)

Q10



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.....
(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.

[117 - 123]
.....121..... mph
(2)

(Total 3 marks)

Q11



12.

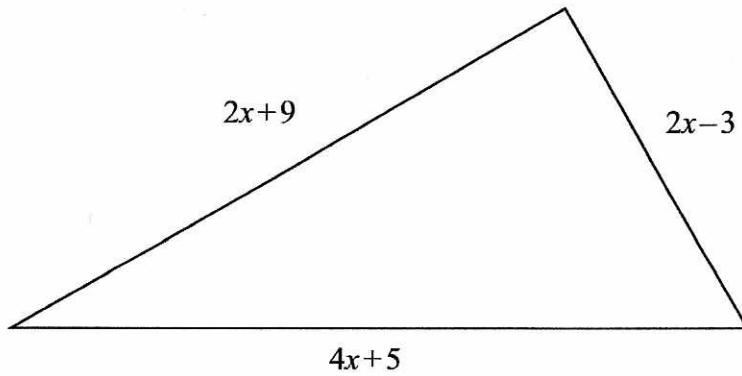


Diagram **NOT** accurately drawn

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.

$$\underline{8x + 11} \quad (2)$$

The perimeter of the triangle is 39 cm.

- (b) Find the value of x .

$$\begin{aligned} 8x + 11 &= 39 \\ \underline{-11} \quad \underline{-11} & \\ 8x &= 28 \\ x &= 3.5 \end{aligned}$$

$$x = \underline{3.5} \quad (2)$$

(Total 4 marks)

Q12



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.

9 parts

$$\frac{180}{9} = 20 \text{ (cm per part)}$$

$$4 \times 20$$

..... 80 cm

(Total 3 marks)

Q13

14. The equation

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

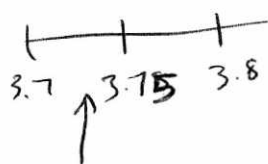
has a solution between 3 and 4

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	$(x)^3 + 2(x)$	Comment
3.5	$(3.5)^3 + 2(3.5)$ = 49.875	too low
3.7	$(3.7)^3 + 2(3.7)$ = 58.053	too low
3.8	$(3.8)^3 + 2(3.8)$ = 62.472	too high
3.75	$(3.75)^3 + 2(3.75)$ = 60.234375	too high



$x =$ 3.7

(Total 4 marks)

Q14



15. (a) Simplify $m^3 \times m^4$

$$\frac{m^7}{\dots\dots\dots} \quad (1)$$

(b) Simplify $p^7 \div p^3$

$$\frac{p^4}{\dots\dots\dots} \quad (1)$$

(c) Simplify $4x^2y^3 \times 3xy^2$

$$\frac{12x^3y^5}{\dots\dots\dots} \quad (2)$$

(Total 4 marks)

Q15

16.

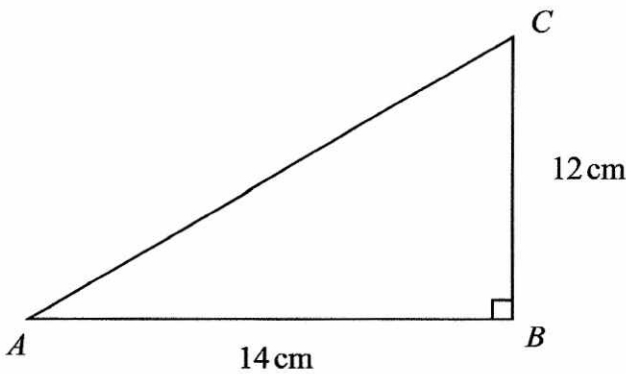


Diagram NOT accurately drawn

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.

$$\begin{aligned} 12^2 + 14^2 &= x^2 \\ 340 &= x^2 \\ x &= \sqrt{340} \\ &= 18.43908891 \\ &= \underline{18.4} \text{ 3sf} \end{aligned}$$

$$\frac{18.4}{\dots\dots\dots} \text{ cm}$$

(Total 3 marks)

Q16

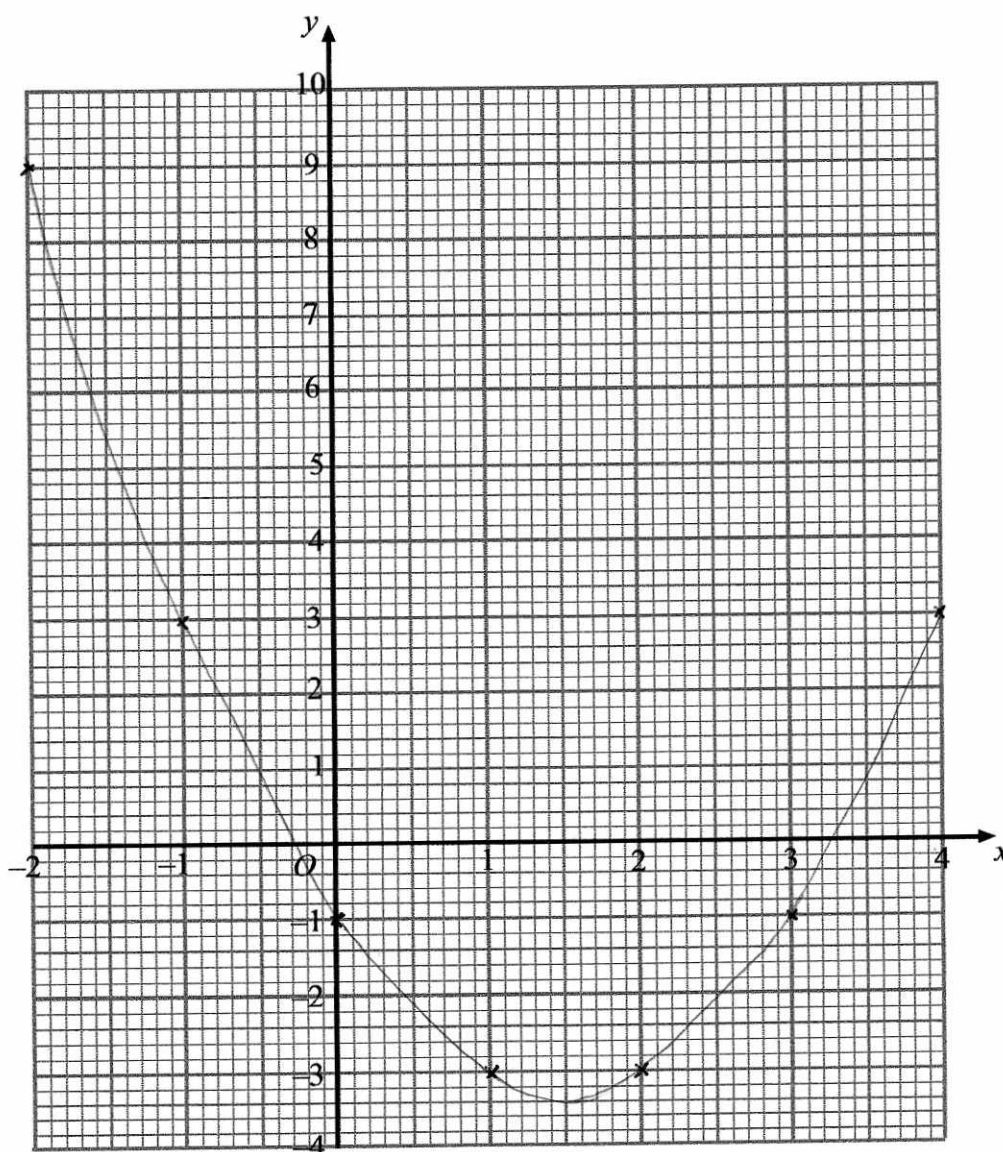


17. (a) Complete the table of values for $y = x^2 - 3x - 1$

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

(2)

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



(2)

Q17

(Total 4 marks)



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

Height (h cm)	Frequency	Mid point	Midpoint \times f
$120 \leq h < 130$	8	125	1000
$130 \leq h < 140$	16	135	2160
$140 \leq h < 150$	25	145	3625
$150 \leq h < 160$	30	155	4650
$160 \leq h < 170$	21	165	3465

14900

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

150 ≤ h < 160
(1)

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

$$\frac{14900}{100}$$

..... 149 cm
(4)

(Total 5 marks)

Q18



19. (a) Expand and simplify $(x-3)(x+5)$

$$x^2 + 5x - 3x - 15$$

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

(2)

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

$$29 - x = 4(x+5)$$

$$29 - x = 4x + 20$$

$$29 = 5x + 20$$

$$9 = 5x$$

$$x = \frac{9}{5}$$

$$x = \dots\dots\dots 1.8 \dots\dots\dots$$

(3)

(Total 5 marks)

Q19

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.

$$\dots\dots\dots \pounds 83 \dots\dots\dots \pounds 86 \dots\dots\dots \pounds 88 \dots\dots\dots \pounds 90 \dots\dots\dots$$

(2)

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

$\dots\dots\dots$ increasing gas prices $\dots\dots\dots$

(1)

(Total 3 marks)

Q20



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

Work out the normal price of the digital camera.

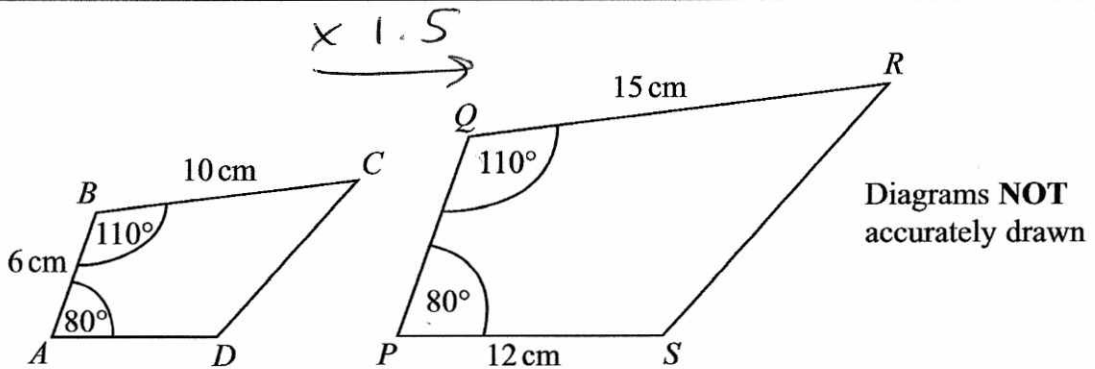
$$\begin{aligned} \pounds 132.88 &= 88\% \\ \pounds 1.51 &= 1\% \\ \pounds 151 &= 100\% \end{aligned}$$

£ 151

(Total 3 marks)

Q21

22.



ABCD and *PQRS* are mathematically similar.

(a) Find the length of *PQ*.

$$6 \times 1.5$$

9 cm
(2)

(b) Find the length of *AD*.

$$12 \div 1.5$$

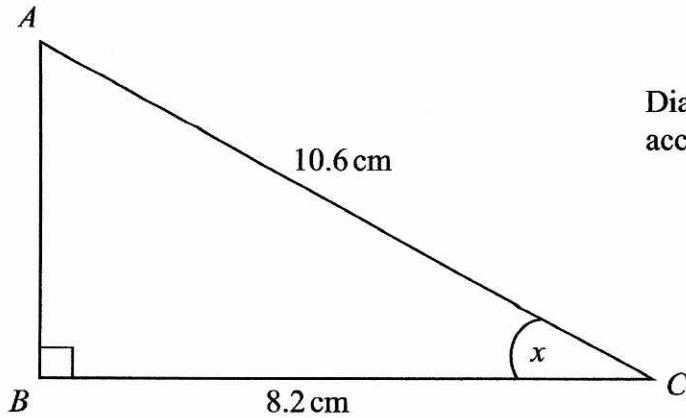
8 cm
(2)

(Total 4 marks)

Q22



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.

$$\cos x = \frac{A}{H}$$

$$\cos x = \frac{8.2}{10.6}$$

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

$$= 39.32308918$$

..... 39.3 °

(Total 3 marks)

Q23



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
Total	203	179	382

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.

$$\frac{85}{382} \times 50 = 11.12565445$$

..... 11

(Total 2 marks)

Q24

25. y is directly proportional to x .

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

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

$$y = kx$$

$$10 = k(500)$$

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

$$y = \frac{1}{50}x$$

(3)

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

$$y = \frac{1}{50}(350)$$

$$y = 7$$

(1)

(Total 4 marks)

Q25



26.

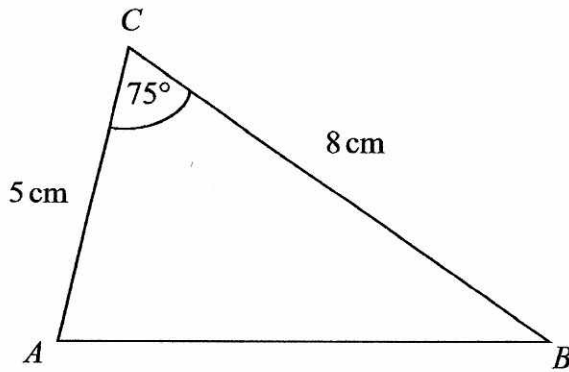


Diagram NOT accurately drawn

In triangle ABC ,

$AC = 5$ cm.

$BC = 8$ cm.

Angle $ACB = 75^\circ$.

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

$$\begin{aligned} \text{Area} &= \frac{1}{2} ab \sin C \\ &= \frac{1}{2} (5)(8) \sin(75) \\ &= 19.31851653 \end{aligned}$$

19.3 cm^2
(2)

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

$$\begin{aligned} a^2 &= b^2 + c^2 - 2bc \cos A \\ &= 5^2 + 8^2 - 2(5)(8) \cos(75) \\ &= 68.29447639 \\ a &= 8.264047216 \end{aligned}$$

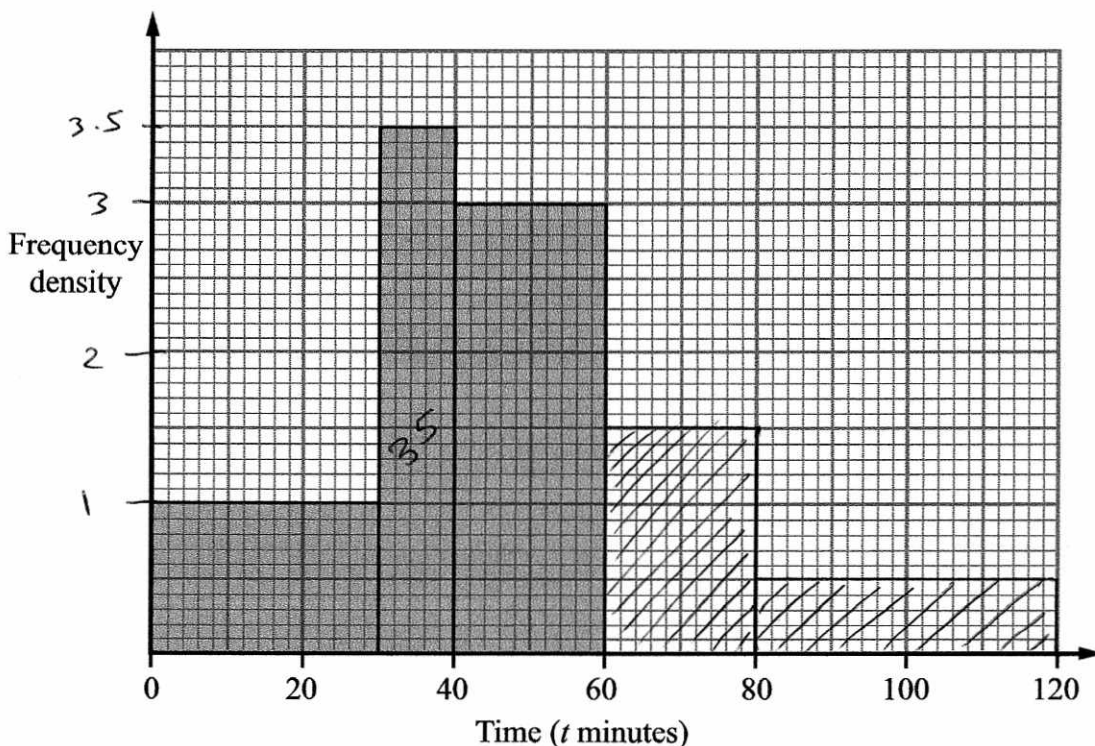
8.26 cm
(3)

(Total 5 marks)

Q26



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	<i>F.d</i>
$0 < t \leq 30$	30	
$30 < t \leq 40$	35	3.5
$40 < t \leq 60$	60	
$60 < t \leq 80$	30	1.5
$80 < t \leq 120$	20	0.5

(2)

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

(2) Q27

(Total 4 marks)



28.

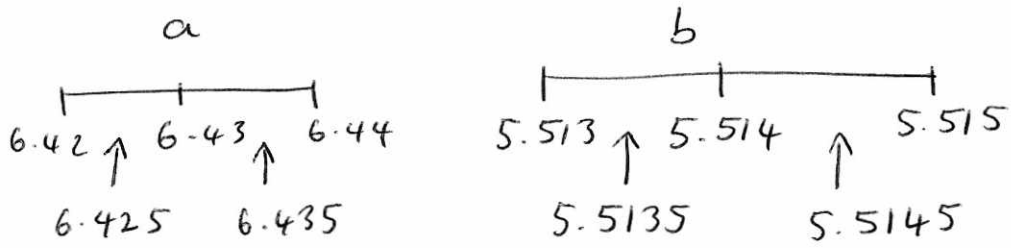
$$v = \sqrt{\frac{a}{b}}$$

$a = 6.43$ 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.



$$\begin{aligned} \text{upper } v &= \sqrt{\frac{\text{upper } a}{\text{lower } b}} \\ &= \sqrt{\frac{6.435}{5.5135}} \\ &= 1.080340323 \\ &= 1.08 \text{ (3 s.f.)} \end{aligned}$$

$$\begin{aligned} \text{lower } v &= \sqrt{\frac{\text{lower } a}{\text{upper } b}} \\ &= \sqrt{\frac{6.425}{5.5145}} \\ &= 1.079402689 \\ &= 1.08 \text{ (3 s.f.)} \end{aligned}$$

$$v = \underline{\underline{1.08}}$$

(Total 5 marks)

Q28



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

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

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

$$\frac{8x-4+3x+9}{(2x-1)(x+3)} = 1$$

$$\frac{11x+5}{(2x-1)(x+3)} = 1$$

$$11x+5 = (2x-1)(x+3)$$

$$11x+5 = 2x^2+6x-x-3$$

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

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

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

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

$$\underline{\underline{x=4}} \quad \underline{\underline{x=-1}}$$

Q29

.....
(Total 5 marks)

TOTAL FOR PAPER: 100 MARKS

END

