WJEC GCSE MATHEMATICS (LINEAR)

MATHS



EXAM QUESTION PACK

PAPER 2 HIGHER TIER 0185 PAPERS

STEMUP

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Surname	Centre Number	Candidate Number
Other Names		0

GCSE

185/10

MATHEMATICS

HIGHER TIER

PAPER 2

A.M. THURSDAY, 17 November 2011

2 hours

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1	**5**	
2	**9**	
3	**9**	
4	**6**	
5	**6**	
6	**8**	
7	**6**	
8	**8**	
9	**4**	
10	**11**	
11	**3**	
12	**5**	
13	**7**	
14	**6**	
15	**7**	
TOTAL MARK		

0185
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ADDITIONAL MATERIALS

A calculator will be required for this paper.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** the questions in the spaces provided.

Take π as 3·14 or use the π button on your calculator.

INFORMATION FOR CANDIDATES

You should give details of your method of solution especially when a calculator is used.

Unless stated, diagrams are not drawn to scale.

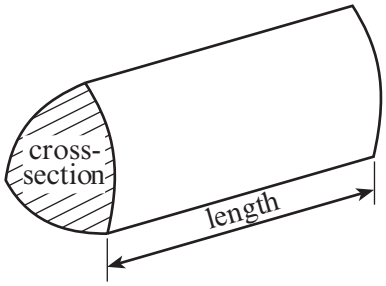
Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

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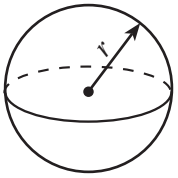
Formula List

Volume of prism = area of cross-section × length



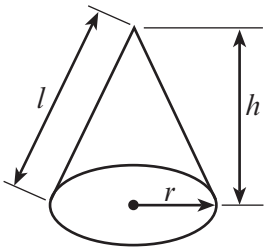
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

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

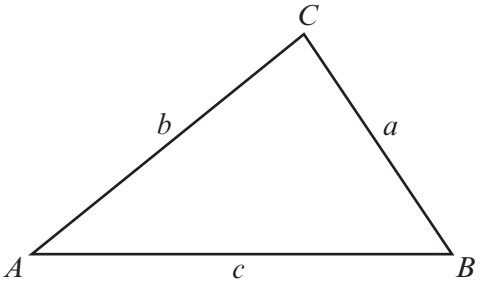


In any triangle ABC

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 = $\frac{1}{2}ab\sin C$



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$

where $a \neq 0$ are given by

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

Standard Deviation

Standard deviation for a set of numbers

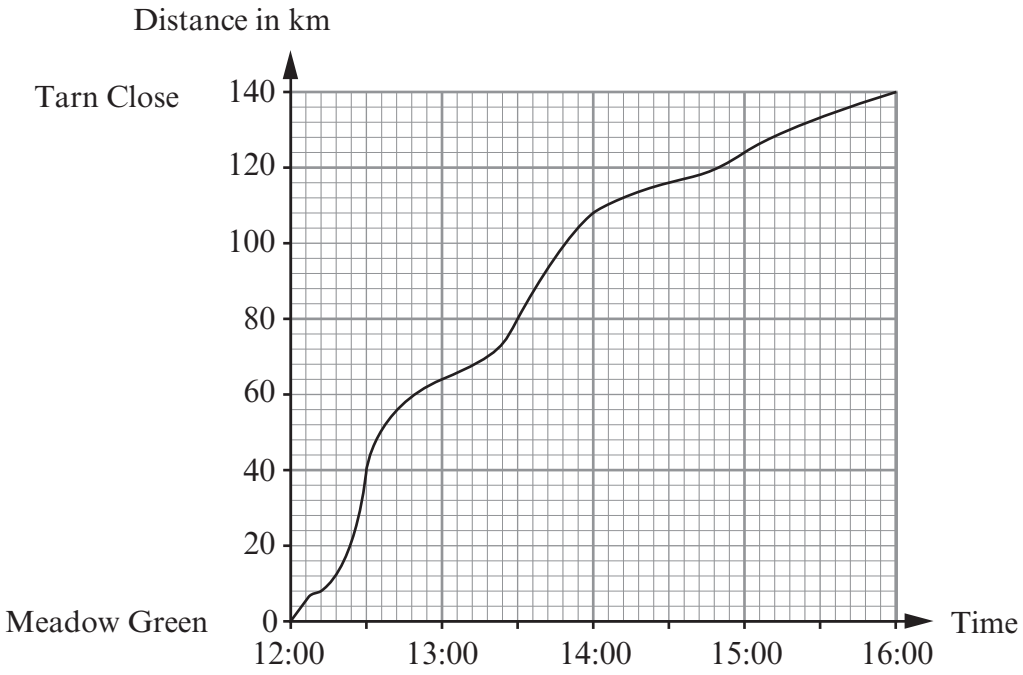
$x_1, x_2, \ldots, x_n$, having a mean of $\bar{x}$ is given by

$$s = \sqrt{\frac{\sum(x - \bar{x})^2}{n}} \text{ or } s = \sqrt{\frac{\sum x^2}{n} - \left\{\frac{\sum x}{n}\right\}^2}$$

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1. The distance-time graph shows a 140 km journey from Meadow Green to Tarn Close.



(a) (i) What is the distance travelled between 13:00 and 14:30?

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(ii) Find the average speed for this part of the journey.

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[4]

(b) Explain how you can tell from the graph that it took less time to travel the first 70 km of the journey than it took to travel the final 70 km of the journey.

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[1]

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Examiner only

2. *(a)* The nth term of a sequence is $n^2 - 6$.
Write down the first three terms of the sequence.

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[2]

(b) Factorise $x^2 - 5x$.

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[1]

(c) Factorise $240y - 360$.

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[2]

(d) Solve $4(3x - 11) = 40$.

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[3]

(e) Solve $\frac{45}{x} = 5$.

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[1]

3. *(a)* Find $\frac{14{\cdot}5 \times 33{\cdot}4}{710{\cdot}7 - 35{\cdot}9}$ correct to two decimal places.

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[2]

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(b) A trader sells a table for £45, excluding tax.
Given that tax is charged at a rate of 18%, calculate the price charged for the table.

[3]

(c) Kim bought a scooter for £1600 on 1st January 2010.
Every year the value of the scooter depreciates by 8% of its value at the start of the year.
Find the value of the scooter on 1st January 2012.

[4]

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4. The exchange rate for buying Canadian dollars ($) at an exchange bureau is $1.64 for £1.
Carys only has £700 to exchange into Canadian dollars.
The lowest Canadian dollar notes the exchange bureau has are $50 notes.

How many Canadian dollars can Carys buy and how much will this cost her?
You must give the units of your answer.

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[6]

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Examiner only

5. *(a)* The lengths of 100 fish were recorded.
The results are summarised in the table below.

Length, l cm	Frequency
$0 < l \leqslant 8$	15
$8 < l \leqslant 16$	67
$16 < l \leqslant 24$	18

Find an estimate for the mean length of these fish.

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[4]

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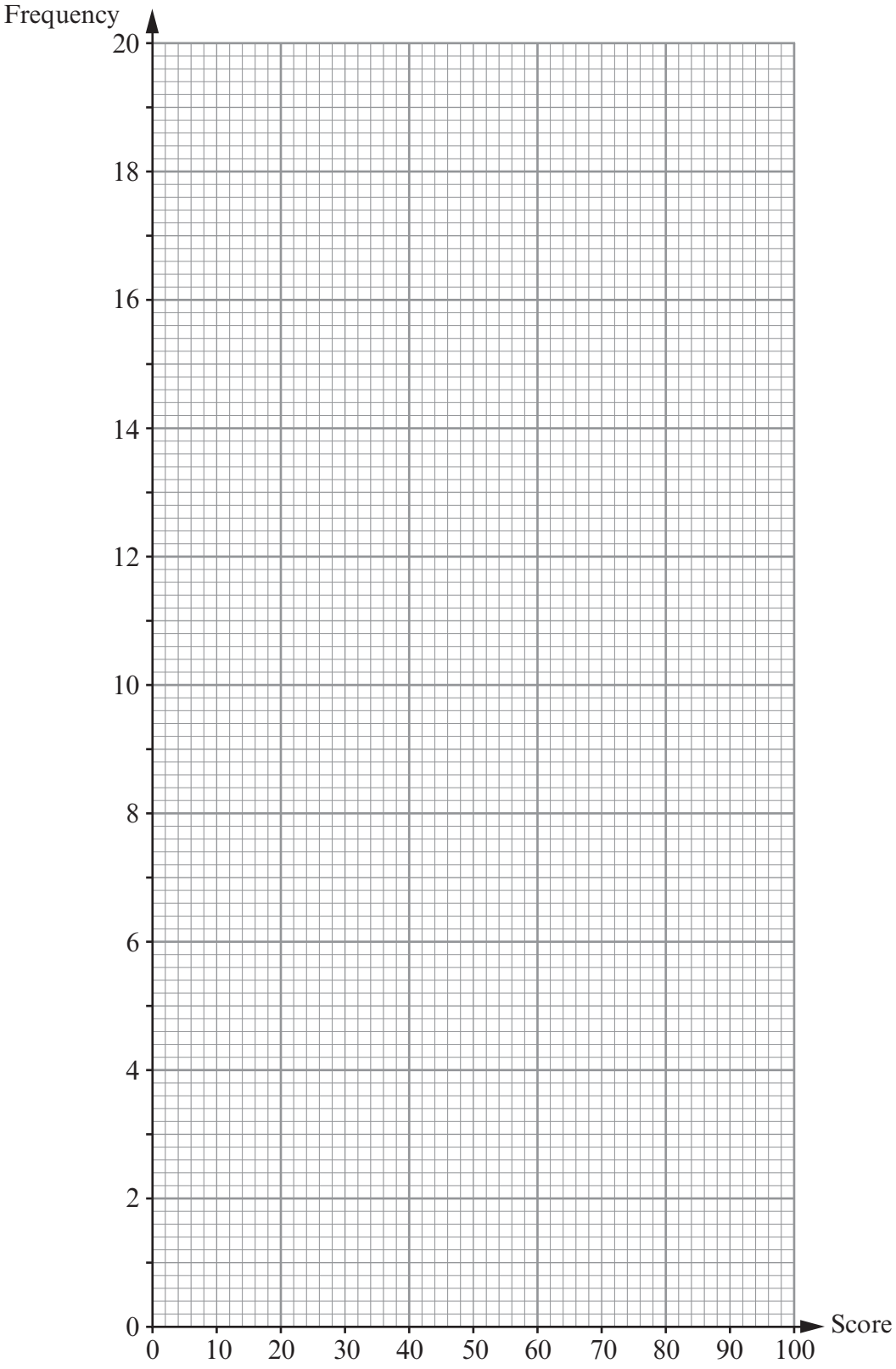
Examiner only

(b) The points scored by 40 fishermen in a competition were recorded.
The table shows a grouped frequency distribution of the results.

Score	1 to 20	21 to 40	41 to 60	61 to 80	81 to 100
Frequency	4	16	12	6	2

On the graph paper below, draw a frequency polygon to show the data.

[2]



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6. *(a)* Calculate the circumference of a circle with a radius of 7·2 cm, giving your answer to an appropriate degree of accuracy.

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[3]

(b) Calculate the area of a semicircle with a diameter of 44·8 cm.

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[3]

(c)

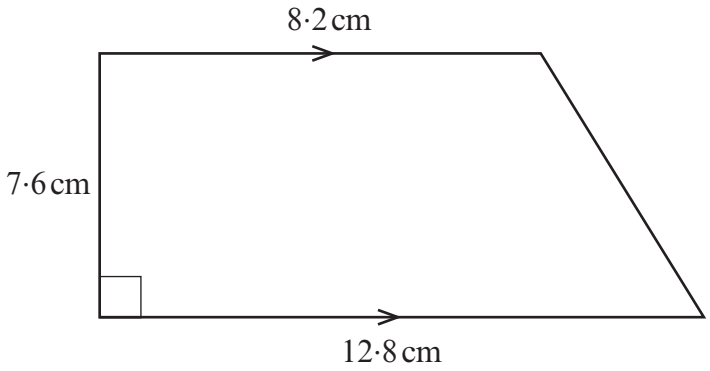


Diagram not drawn to scale

Calculate the area of the trapezium.

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[2]

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7. *(a)* Make k the subject of the formula

$$6(3k - q) = dk + 7.$$

[4]

(b) (i) Write 76 million in standard form.

(ii) Find, in standard form, the value of $(4 \times 10^{13}) \times (2 \times 10^{-5})$.

[2]

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8. *(a)* A solution to the equation $2x^3 + x - 100 = 0$ lies between 3 and 4.
Use the method of trial and improvement to find this solution correct to 1 decimal place.

[4]

(b) Solve the following simultaneous equations by an algebraic (not graphical) method.
Show all your working.

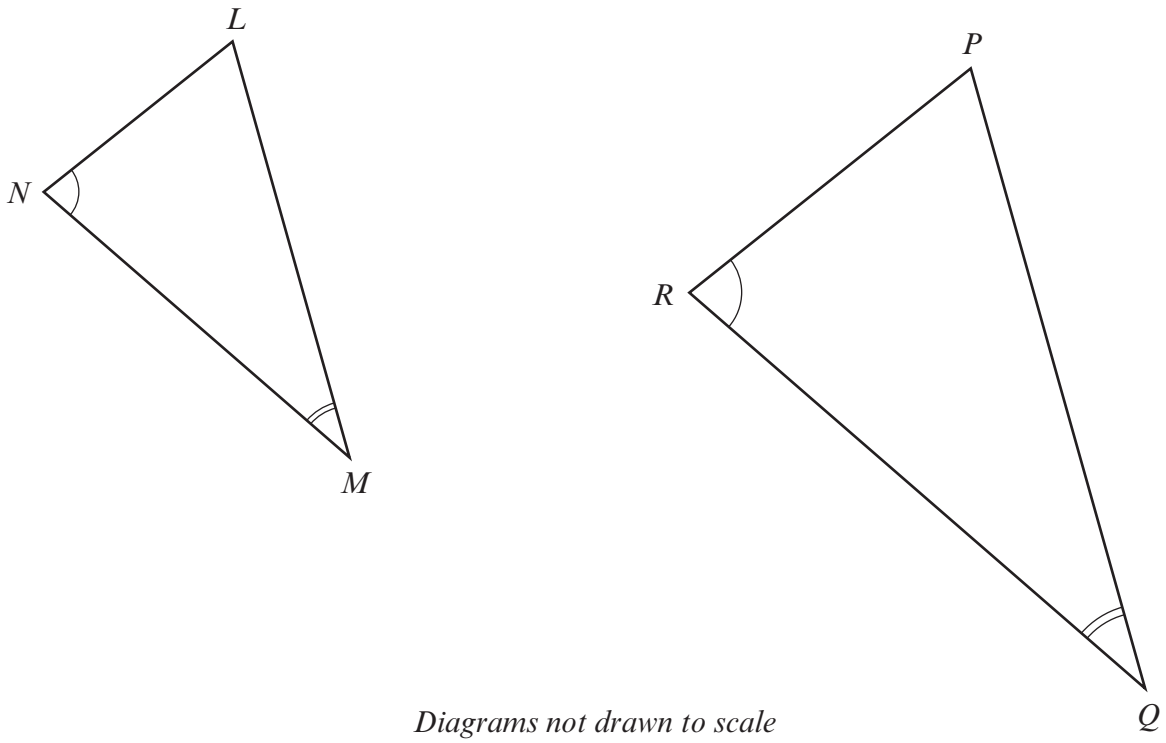
$$7x + 2y = 2$$
$$2x - 5y = 34$$

[4]

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9. Triangles LMN and PQR are similar.



Diagrams not drawn to scale

$LM = 3\,\text{cm}$, $MN = 2{\cdot}5\,\text{cm}$, $PR = 3{\cdot}6\,\text{cm}$ and $PQ = 5{\cdot}4\,\text{cm}$.
Showing all your working, find the length of

(a) RQ,

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[2]

(b) LN.

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[2]

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10. The points *A, B, C* and *D* all lie on the circumference of a circle with centre *O*.

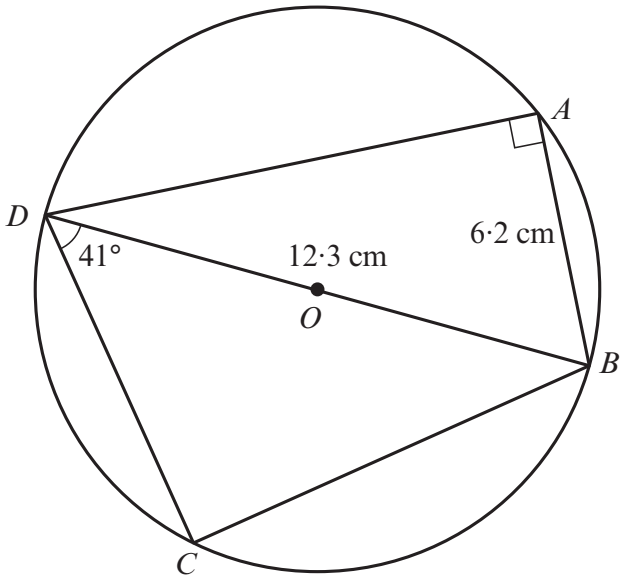


Diagram not drawn to scale

Given that $BD = 12{\cdot}3$ cm, $AB = 6{\cdot}2$ cm, $B\hat{D}C = 41°$ and $D\hat{A}B = 90°$, calculate

(a) the length AD,

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.....

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.....

.....

[3]

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(b) the area of triangle *BCD*.

[8]

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11. There are 100 pupils in year 8.
The time taken by each pupil to answer a question was recorded.
The following grouped frequency distribution was obtained.

Time, t seconds	$0 < t \leqslant 10$	$10 < t \leqslant 20$	$20 < t \leqslant 30$	$30 < t \leqslant 40$	$40 < t \leqslant 60$
Number of pupils	10	16	24	42	8

(a) Find an estimate for the median of this distribution.

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[1]

(b) Draw a histogram to illustrate the distribution on the graph paper opposite.

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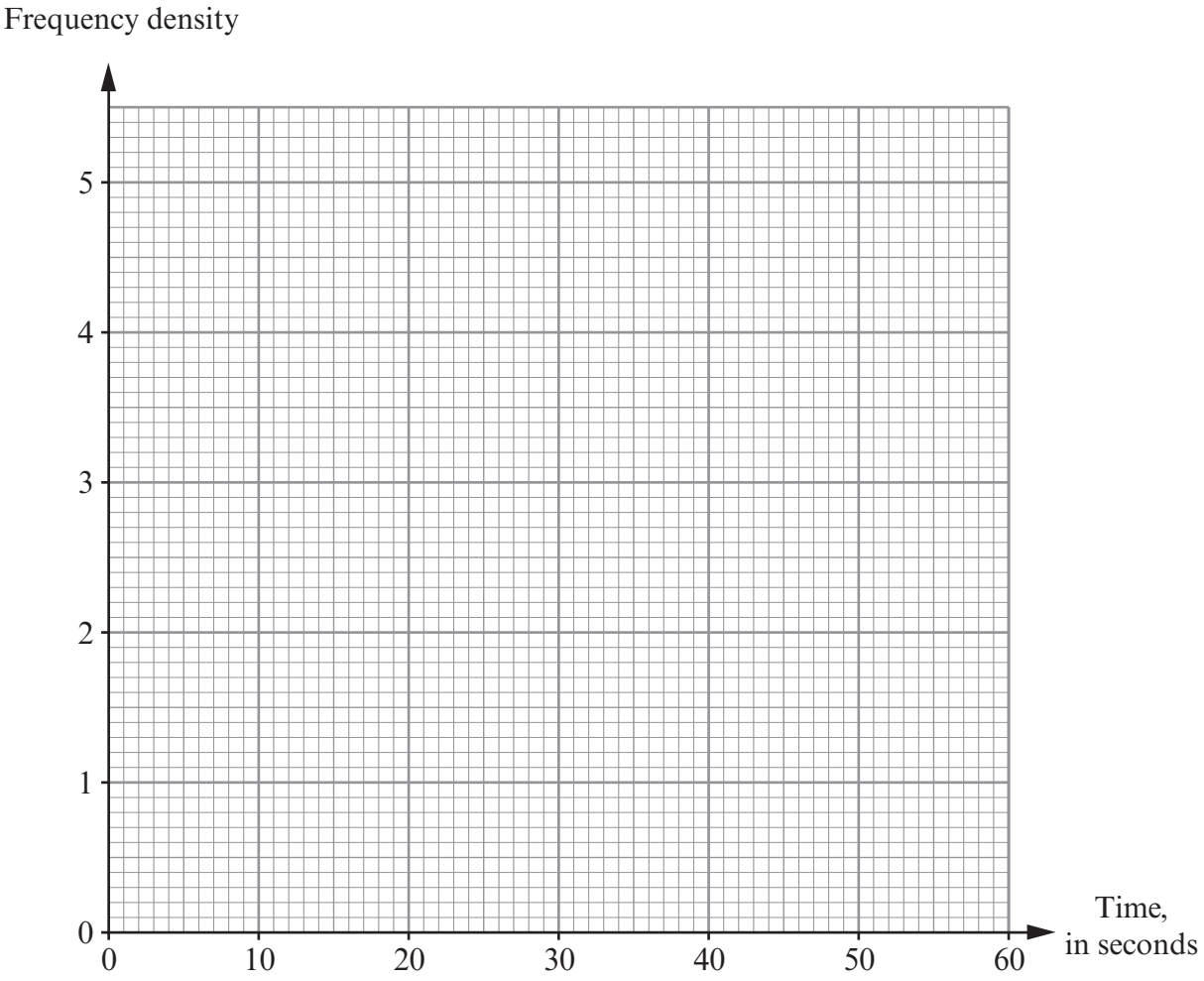
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[2]

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Time taken to answer in seconds



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12. Given that y is proportional to x^2, and that $y = 4$ when $x = 0{\cdot}5$,

(a) find an expression for y in terms of x,

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[3]

(b) use the expression you found in *(a)* to complete the following table.

x	0·5	3	
y	4		6400

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[2]

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13. A solid cuboid has length $(x + 5)$ cm, width $(x + 4)$ cm and height 6 cm. The surface area of the cuboid is 205 cm^2.

(a) Show that x satisfies the equation $2x^2 + 42x - 57 = 0$.

[3]

(b) Use the formula method to solve the equation $2x^2 + 42x - 57 = 0$, giving solutions correct to two decimal places.

[3]

(c) Hence write down the dimensions of the cuboid.

[1]

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14. *(a)* The marks scored by 10 pupils in a test were as follows:

48 26 82 34 56 86 56 24 72 63

Calculate the mean and standard deviation of the 10 test marks.

[3]

(b) Marks are added for the standard of presentation of work.
In this case, two marks were added to each pupil's test mark.
State the new mean and standard deviation for the test results.
Give a reason for your answer.

[3]

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15.

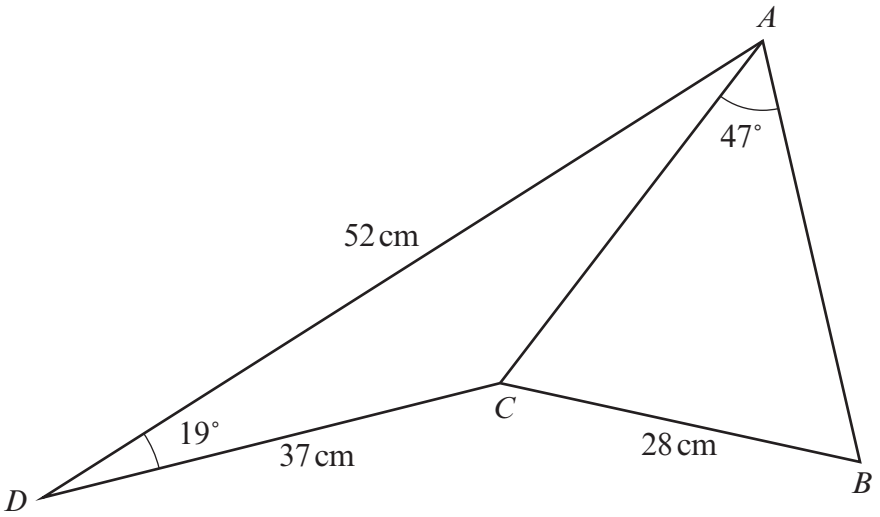


Diagram not drawn to scale

Calculate the size of $A\hat{B}C$.

[7]

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GCSE MARKING SCHEME

MATHEMATICS - TWO TIER LEGACY

NOVEMBER 2011

INTRODUCTION

The marking schemes which follow were those used by WJEC for the November 2011 examination in GCSE MATHEMATICS - TWO TIER LEGACY. They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conferences was to ensure that the marking schemes were interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conferences, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about these marking schemes.

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Mathematics Paper 2 - Foundation Tier	4
Mathematics Paper 1 - Higher Tier	7
Mathematics Paper 2 - Higher Tier	9

PAPER 2 – HIGHER TIER

Higher Tier November 2011 Paper 2	Mark	Comments Final 28/11/11
1.(a)(i) Their readings at 14:30 & 13:00 and intention to subtract	M1	116 – 64. Allow for 'their readings' with intention to subtract
= 52 (km)	A1	CAO
(ii) 52/ 1.5	M1	FT their (i)
34.666(km / h)	A1	Accept rounded or truncated. *However, do not accept an answer of 35 without working or from incorrect working* *SC1 for an answer of 40*
(b) Explanation, e.g. "first half journey in just over an hour", "steeper to start"	E1	Accept, e.g. "more vertical", "line increases means it is quicker"
	5	
2.(a) -5, -2, 3	B2	B1 for any two terms in correct position. Award B1 for -6, -5, -2
(b) $x(x - 5)$	B1	CAO
(c) $120(2y - 3)$	B2	B1 for correct partially factorised, or 120(2y …) or 120(… -3) B0 for 240(y – 1.5)
(d) $12x – 44 = 40$ OR $3x-11 = 40/4$	B1	FT until 2nd error in (d)
$12x = 40+44$ OR $3x = 10 + 11$	B1	
$x = 84/12$ (ISW) OR $x = 21/3$ (ISW) OR $x = 7$	B1	Accept embedded answer
(e) 9	B1	CAO
	9	
3.(a) 0.72	B2	B1 for 0.7(17694….)
(b) 18/100 × 45 (= 8.1(0))	M1	
45 + their tax	m1	Alternatively allow M2 for 1.18 × 45
(£)53.1(0)	A1	CAO
(c) Any correct 8% of a value used in workings	B1	
1600 – 8% of 1600 (= 1600 – 128)	M1	OR M2 for 1600×0.92^2 (M1 for 1600×0.92)
1472 – 8% of 1472 (= 1472 – 117.76)	m1	FT their 128
(£) 1354.24	A1	CAO. Penalise extra working -1
	9	*Appreciate: Possible B1 and SC1 for (£)1866.24* *Simple depreciate: Possible B1 and M1 (1344)*
4. 700× 1.64	M1	
= ($)1148 (Canadian dollars)	A1	
Conclusion, has to buy 1100 (Canadian dollars)	A1	FT their rounding down to nearest 50 provided M1
1100 ÷1.64	M1	FT their amount of Canadian dollars but not 'their 1148', for M
= 670.73(17..)	A1	and 1st A only, however FT multiples of 50 for all marks
£670.73	A1	£ must be given. Accept £670.73p
	6	*Accept an answer of '£29.27 in credit' or similar, but an answer of 29.27 would not get the final A mark, but would do award the previous M1 A1 as alternative method*
5.(a) Mid points 4, 12 and 20	B1	Two shown is sufficient if no error
$\frac{(15\times4 + 67\times12+ 18\times20)}{100}$ (OR 60+804+360 = 1224)	M1	Attempt ∑fx for their mid-points that fall within the intervals including bounds
	m1	Attempt their∑ fx divided by 100
= 12.2(4)	A1	CAO. Accept 12 only if all working shown
(b)Polygon with at least 3 vertices correctly plotted (vertical & horizontal)	M1	No polygon M0. Ignore bars. Mid points - allow intention (e.g. from 10 to 12 inclusion)
All 5 vertices of the polygon correct	A1	*SC1* for a correct polygon translated horizontally or all correct plots with no polygon (or curved polygon!). Ignore joining to axis or to form a complete shape
	6	
6.(a) $2 \times \pi \times 7.2$	M1	
= 45.2(16…) to 45.3… (cm)	A1	
Degree of accuracy, whole or 1 d.p.	A1	FT rounding to whole or 1d.p. provided M1 A1 awarded
(b) $½ \pi \times 22.4^2$	M2	Allow M1 $\pi \times 22.4^2$
= 787.7(6…) to 788.2(…cm^2)	A1	A1 FT 1575.5.. to 1576.3… *SC1 for answer 3151 to 3152.65…*
(c) ½ (8.2 + 12.8) × 7.6	M1	
79.8 (cm^2)	A1	Accept 80 from working
	8	
7. (a) $18k – 6q = dk + 7$	B1	Expand *FT each stage for equivalent level of difficulty*
$18k – dk = 6q + 7$	B1	Collect *until 2nd error*
$k (18 – d) = 6q + 7$	B1	Factorise
$k = (6q+7)/ (18-d)$	B1	Divide
(b)(i) 7.6×10^7	B1	CAO
(ii) 8×10^8	B1	CAO *Penalise incorrect notation once only*
	6	

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Higher Tier November 2011 Paper 2	Mark	Comments Final 28/11/11
8. (a) One correct evaluation, $3 \le x \le 4$ 2 correct evaluations, $3.55 \le x \le 3.7$, one either side of 0 2 correct evaluations, $3.55 \le x \le 3.65$, one either side of 0 OR correct evaluation of 3.65 if previous B1 awarded 3.6 *No calculations shown: accept "too high",">", etc.* (b) Correctly setting up 2 equations for eliminating 1 variable First variable's value Correctly substituting their first variable Second variable's value	B1 B1 M1 A1 M1 A1 M1 A1 8	x $2x^3 + x - 100$ 3 -43 3.1 -37.318 3.2 -31.264 3.3 -24.826 3.4 -17.992 3.5 -10.75 **3.55 -6.97225** 3.6 -3.088 **3.65 0.90425** 3.7 5.006 3.8 13.544 3.9 22.538 4 32 Or alternate substitution method, allow one slip in multiplication in non-eliminate Either $x = 2$ or $y = -6$ FT their first variable FT their first variable
9.(a) $5.4/3 \times 2.5$ $= 4.5$ (cm) (b) $3.6 / 5.4/3$ $= 2$ (cm)	M1 A1 M1 A1 4	Or equivalent calculation that could lead to correct answer Or equivalent calculation that could lead to correct answer If no marks in (a) or (b) then award *SC1 for sight of scale factor 1.8*
10.(a) $(AD^2 =) 12.3^2 - 6.2^2$ $(AD^2 =) 112.85$ $AD = 10.6(23\ldots$ cm) (b) Strategy, idea to find BC and CD sin41 = BC/12.3 OR cos41 = CD/12.3 BC = 12.3×sin41 OR CD = cos41×12.3 BC = 8.0695… OR CD = 9.28……. Use of correct method to find the other side Other side correct CD or BC Area BCD = ½ BC×CD Answers between 37.4 and 37.7 (cm^2)	M1 A1 A1 S1 M1 M1 A1 M1 A1 M1 A1 11	Or idea to find DC and use ½ cbsinD Implies previous M1 Correct Pythagoras substitution, or trig Allow FT from rounding errors FT their CD and BC provided at least S1 FT **OR** M2 ½ absinD correctly substituted (M1 if 1 slip, not the wrong angle) A2 Correct answer
11. (a) 30 (seconds) (b) Histogram drawn with at least 4 frequency densities correct Correct histogram drawn	B1 M1 A1 3	Frequency density 1, 1.6, 2.4, 4.2 and 0.4
12.(a) $y \propto x^2$ OR $y = kx^2$ $4 = k0.5^2$ $y = 16x^2$ (b) x 0.5 3 **20** y 4 **144** 6400	B1 M1 A1 B2 5	FT non linear only Maybe implied in part (b) B1 for each value. FT their non linear expression
13.(a) $2(x+5)(x+4) + 2(x+4)\times 6 + 2(x+5)\times 6$ $2x^2 + 42x - 57 = 0$ (b) $\{-42 \pm \sqrt{(42^2 - 4\times 2\times -57)}\}/4$ $(-42 \pm \sqrt{2220})/4$ 1.28 and -22.28 (c) (6,) 5.28, 6.28	M2 A1 M1 A1 A1 B1 7	M1 for area of any 2 of the 6 faces, or 1 of the 3 terms. Must follow from working, convincing Allow 1 slip. Incorrect formula is M0 FT $x + 4$ and $x + 5$. (Accept 5.3 and 6.3). Allow FT from +ve only. B0 if +ve and –ve given
14.(a) Mean 54.7 $\Sigma x^2 = 34257$ or $\Sigma(x - \bar{x})^2 = 4336.1$ SD = 20.8(233…) (b) New mean 56.7 SD = 20.8(233…) Explanation e.g. 'spread unchanged'	B1 M1 A1 B1 B1 E1 6	 FT mean + 2 FT 'their SD' unchanged Depends on B2 in (b). Understanding, not calculated. If no calculations accept simple statement 'all marks went up'

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Higher Tier November 2011 Paper 2	Mark	Comments Final 28/11/11
15.Overall strategy, cosine rule followed by sine rule	S1	
$AC^2=52^2+37^2-2\times52\times37\times$ cos19	M1	
AC^2 = 434.644…	A1	
AC = 20.8(481...)	A1	Accept 21.
$\frac{\sin B}{AC} = \frac{\sin 47}{28}$	M1	FT candidate's AC
sinB = sin47×AC/28	M1	Implies previous M1
32.9(9….°) to 33(.26…°)	A1	
	7	

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Surname	Centre Number	Candidate Number
Other Names		0

GCSE

185/10

MATHEMATICS

HIGHER TIER

PAPER 2

A.M. FRIDAY, 10 June 2011

2 hours

ADDITIONAL MATERIALS

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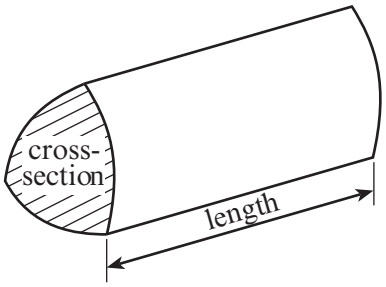
For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1	**5**	
2	**5**	
3	**4**	
4	**11**	
5	**3**	
6	**7**	
7	**11**	
8	**13**	
9	**9**	
10	**5**	
11	**8**	
12	**7**	
13	**3**	
14	**9**	
TOTAL MARK		

0185
100001

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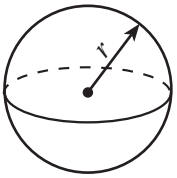
Formula List

Volume of prism = area of cross-section × length



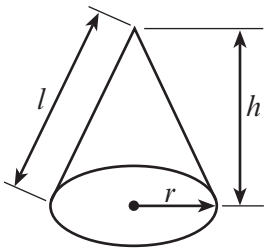
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

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

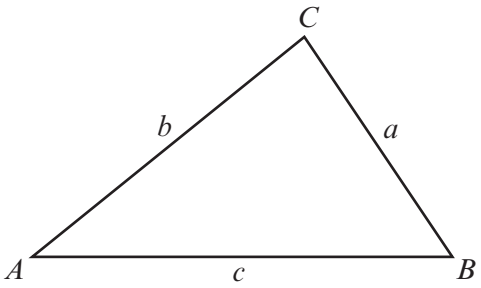


In any triangle ABC

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 = $\frac{1}{2}ab\sin C$



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$

where $a \neq 0$ are given by

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

Standard Deviation

Standard deviation for a set of numbers

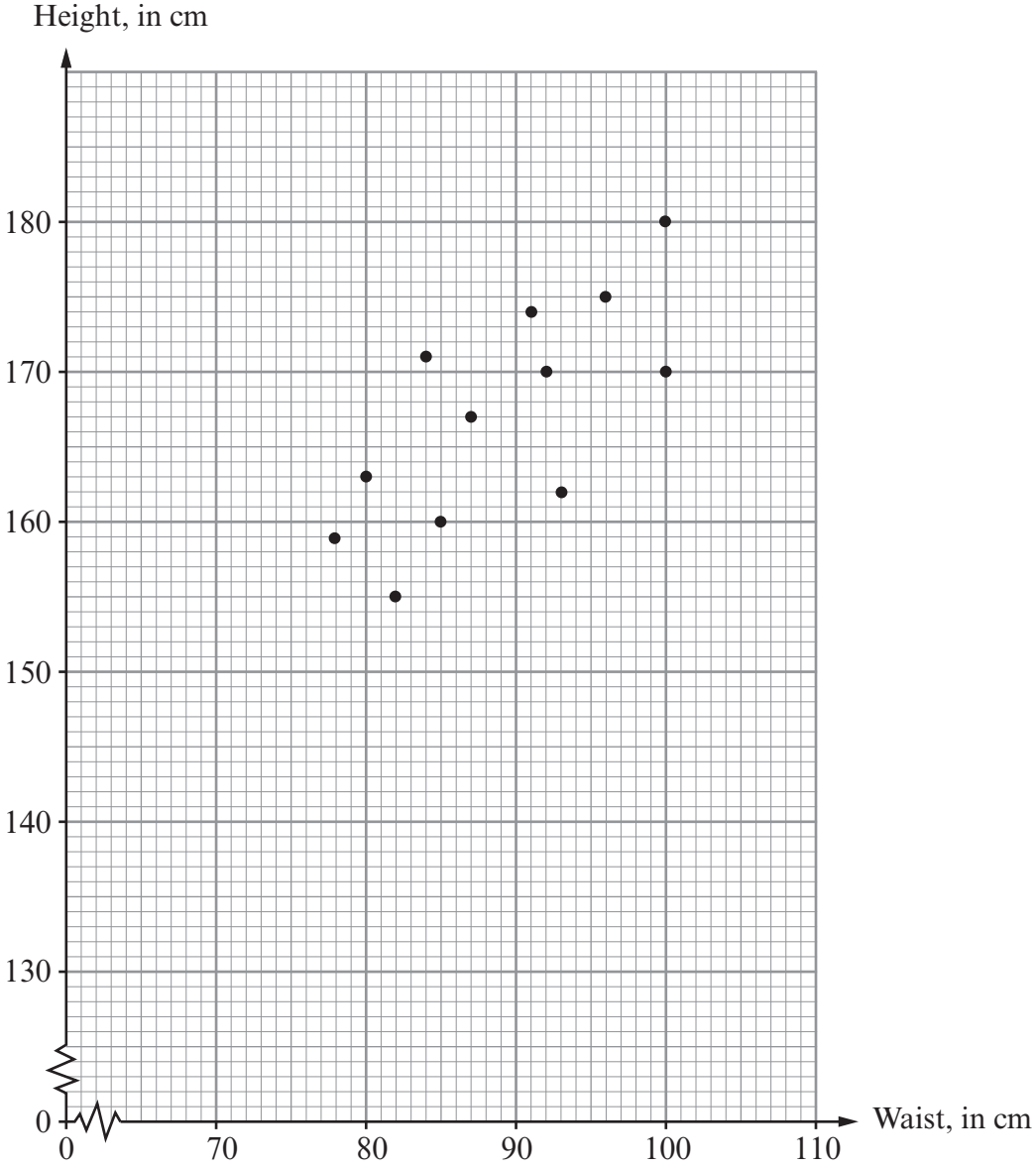
$x_1, x_2, \ldots, x_n$, having a mean of $\bar{x}$ is given by

$$s = \sqrt{\frac{\sum(x-\bar{x})^2}{n}} \text{ or } s = \sqrt{\frac{\sum x^2}{n} - \left\{\frac{\sum x}{n}\right\}^2}$$

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1. The scatter diagram shows the heights and waist measurements, in cm, of 12 people in a darts club.



(a) Write down the height and waist measurement of the **tallest** of the 12 people.

Height ..... cm

Waist ..... cm
[2]

(b) Write down the type of correlation shown by the scatter diagram.

.....

[1]

(c) Draw, by eye, a line of best fit on the scatter diagram. [1]

(d) Estimate the height of another member of the darts club with a waist measurement of 90 cm.

.....

[1]

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2. *(a)* The diagram below shows a number machine.



Write down the **OUTPUT** when the **INPUT** is n.

.....

.....

[1]

(b) Find the nth term of the sequence 1, 7, 13, 19, 25, ...

.....

.....

.....

[2]

(c) The nth term of a sequence is $n^2 + 6$.
Find the value of the 15th term of the sequence.

.....

.....

.....

[2]

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3.

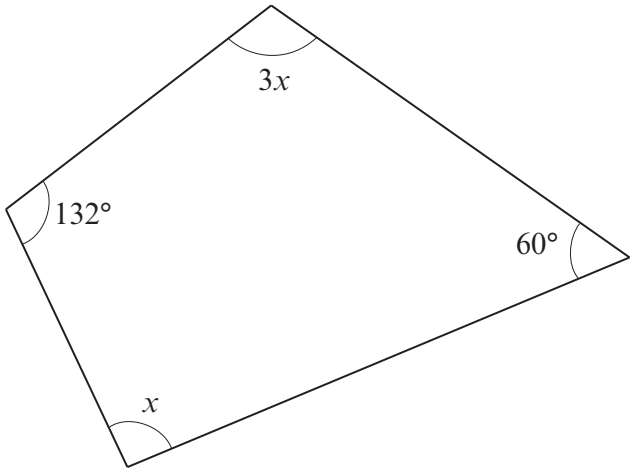


Diagram not drawn to scale

Calculate the value of x.

.....

.....

.....

.....

.....

.....

.....

x = ...

[4]

0185
100005

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4. Trainer sizes are given as whole numbers.

A survey of the size of trainers worn by 20 women is carried out.
The table below shows a summary of the results.

Size of trainers	Number of women
34 to 36	4
37 to 39	12
40 to 42	3
43 to 45	1

(a) Calculate an estimate for the mean size of these trainers.

.....

.....

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.....

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.....

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.....

.....

[4]

(b) Which is the modal group?

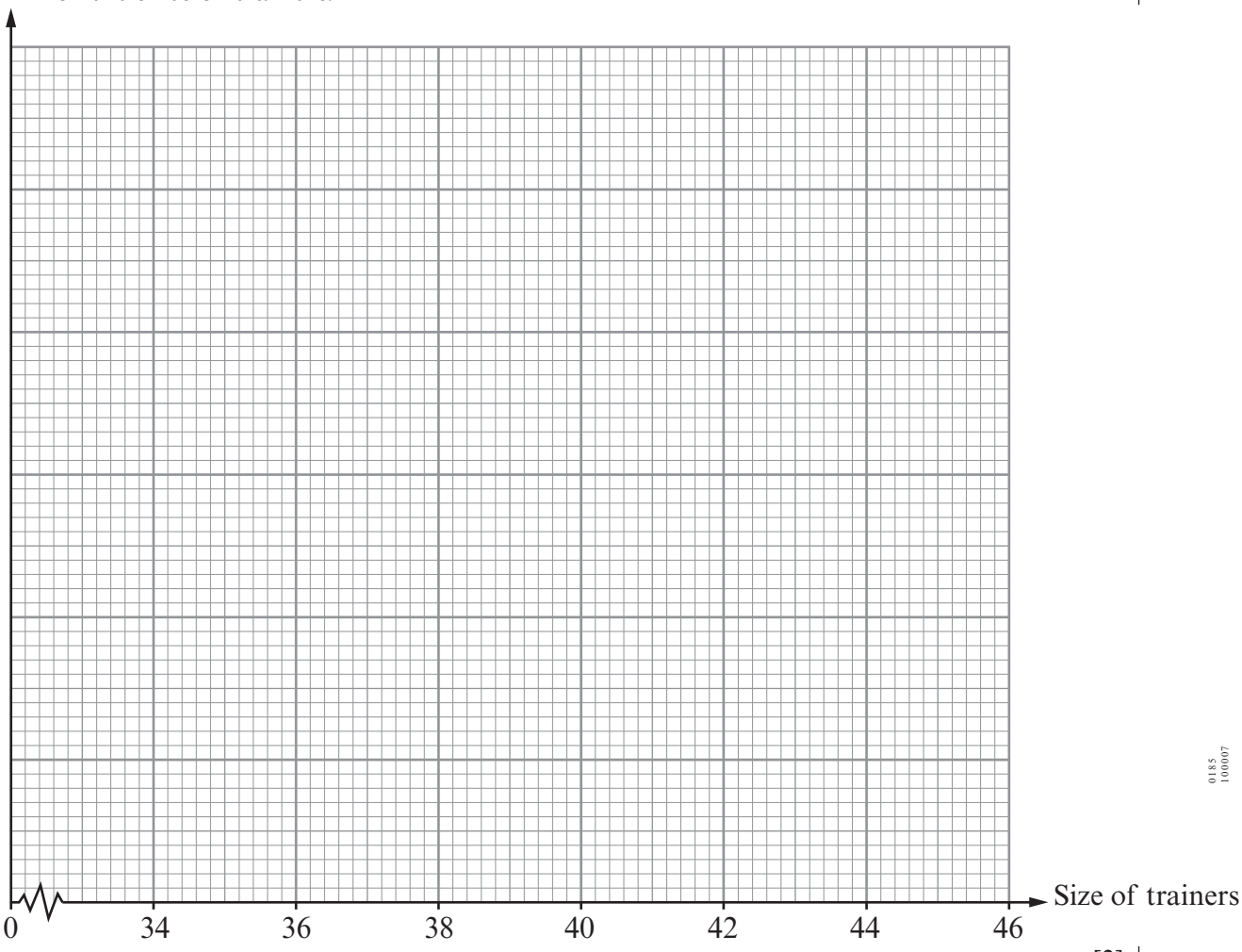
.....

[1]

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(c) On the graph paper below, draw a grouped frequency polygon to show the distribution of the sizes of trainers.



[3]

(d) A shop decides to stock 600 pairs of women's trainers in the same proportions as the results of the survey.
Complete the stock order form below.

Women's trainers stock order form	
Size of trainers	Number of pairs of trainers
34 to 36	
37 to 39	
40 to 42	
43 to 45	

.....

.....

.....

.....

[3]

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5. On the graph paper below, draw the region which satisfies **all** of the following inequalities.

$$y \leqslant x + 1$$
$$y \geqslant -2$$
$$x \leqslant 3$$

Make sure that you clearly indicate the region that represents your answer.

.....

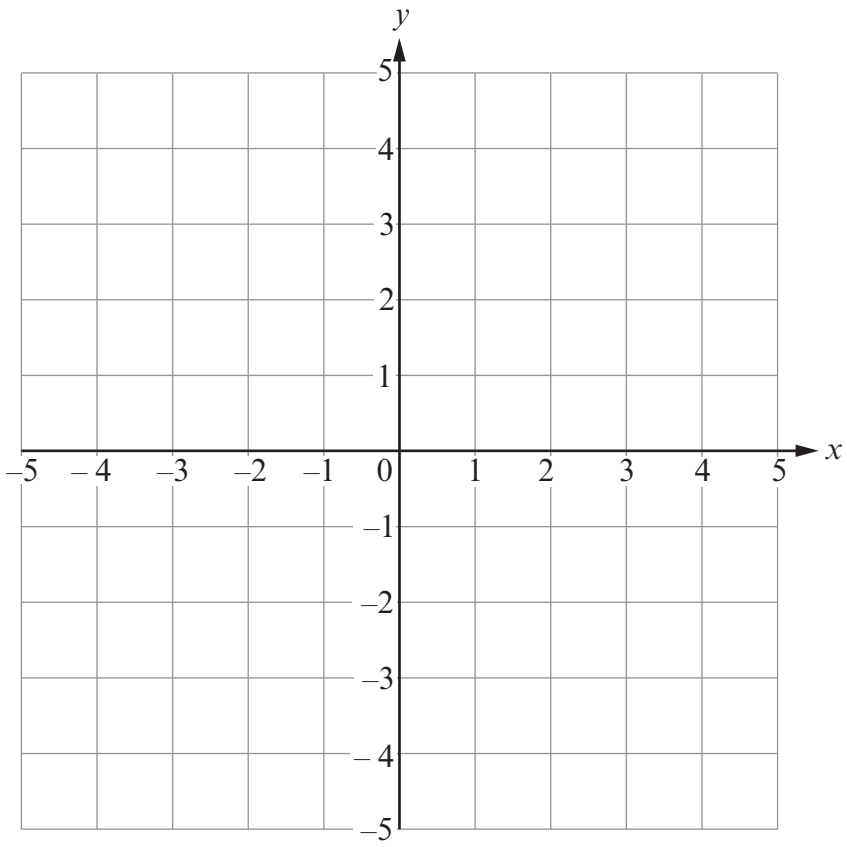
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.....

[3]



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6. *(a)* Make r the subject of the following formula.

$$3r + d = f^2 + 4$$

.....

.....

.....

.....

[2]

(b) Solve the inequality $5(t - 2) > 3t + 14$.

.....

.....

.....

.....

.....

.....

.....

[3]

(c) Solve $x(x + 4) = 0$.

.....

.....

.....

.....

[2]

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7. *(a)* Ruth and Tony share £1491 in the ratio 2 : 5.
Calculate how much they each receive.

.....

.....

.....

Ruth £ .....

Tony £ .....

[2]

(b) Find the compound interest, to the nearest penny, when £6000 is invested for 3 years at 4% per annum.

.....

.....

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.....

.....

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.....

.....

[4]

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(c) The cost of a meal for a group of people, including an 8% service charge, is £203.04.
Calculate the cost of the meal before the service charge was added.

.....

.....

.....

.....

.....

.....

[3]

(d) Two boxes are stacked one on top of the other.
The height of one box is 57 cm correct to the nearest centimetre.
The height of the other box is 38 cm correct to the nearest centimetre.
Find the least height and the greatest height of the boxes when stacked one on top of the other.

.....

.....

.....

Least height ..... cm

Greatest height ..... cm

[2]

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8. Two friends, Kim and Terry, are planning a camping holiday.

(a) The floor of their tent can be thought of as a rectangle.
The tent has a ground area of $5{\cdot}12\,m^2$.



Diagram not drawn to scale

The length of the tent is twice as long as the width.
Calculate the length and width of the floor of the tent.

.....

.....

.....

.....

.....

.....

.....

.....

Length ..... metres Width ..... metres

[4]

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(b) Their tent packs away in a bag.



Diagram not drawn to scale

The bag can be thought of as a cylinder.
When packed with the tent the diameter of the bag is 28 cm and the length is 44 cm.
Calculate the volume, in litres, of the bag when it is packed.

.....

.....

.....

.....

.....

[4]

(c)

Europark Campsite

Charges per night

1 person	.... 9.20 euros
Pets	.... 0.30 euros
Each tent plot	.... 0.69 euros

Kim and Terry share one tent and stay for 2 nights at the Europark Campsite.
They changed pounds into euros for an exchange rate of 1.15 euros to the pound.
Calculate the cost, in pounds, of their 2 night stay in their tent.

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.....

[5]

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9. *(a)*

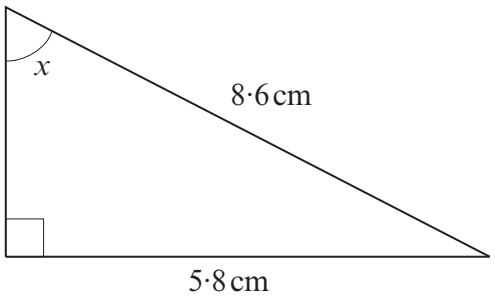


Diagram not drawn to scale

Calculate the size of the angle marked x.

.....

.....

.....

.....

.....

[3]

(b)

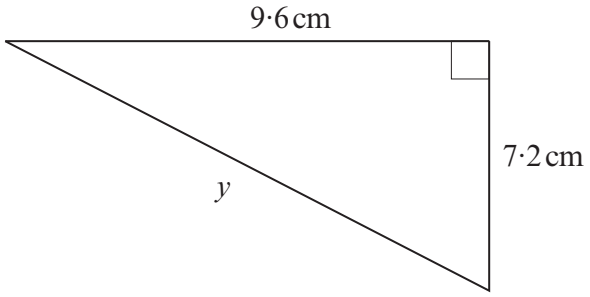


Diagram not drawn to scale

Calculate the length of the side marked y.

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.....

.....

[3]

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(c)

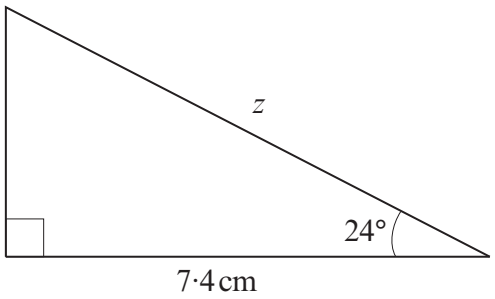


Diagram not drawn to scale

Calculate the length of the side marked z.

.....

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.....

.....

.....

[3]

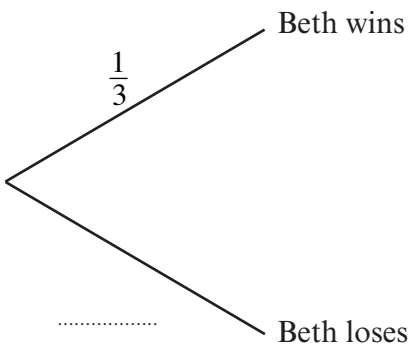
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10. Whenever Beth plays a game of pool against Zainab, the probability that she wins the game is $\frac{1}{3}$.

Beth plays **two** games of pool against Zainab.

(a) Complete the following tree diagram to show the probabilities of what can happen when Beth plays **two** games of pool against Zainab.



[3]

(b) Calculate the probability that Beth wins both games against Zainab.

.....

.....

.....

.....

.....

[2]

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11. *(a)* You are given that y is inversely proportional to x^2, and that $y = 100$ when $x = 2$.

(i) Find an expression for y in terms of x.

.....

.....

.....

.....

(ii) Use the expression you found in (i) to complete the following table.

x	2	10	
y	100		$\frac{1}{4}$

.....

.....

.....

[5]

(b) Use the quadratic formula to solve the equation $5x^2 + 20x - 4 = 0$.
Give your answers correct to two decimal places.

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[3]

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12. Vectors **OM**, **ON** and **OP** are shown in the diagram below.

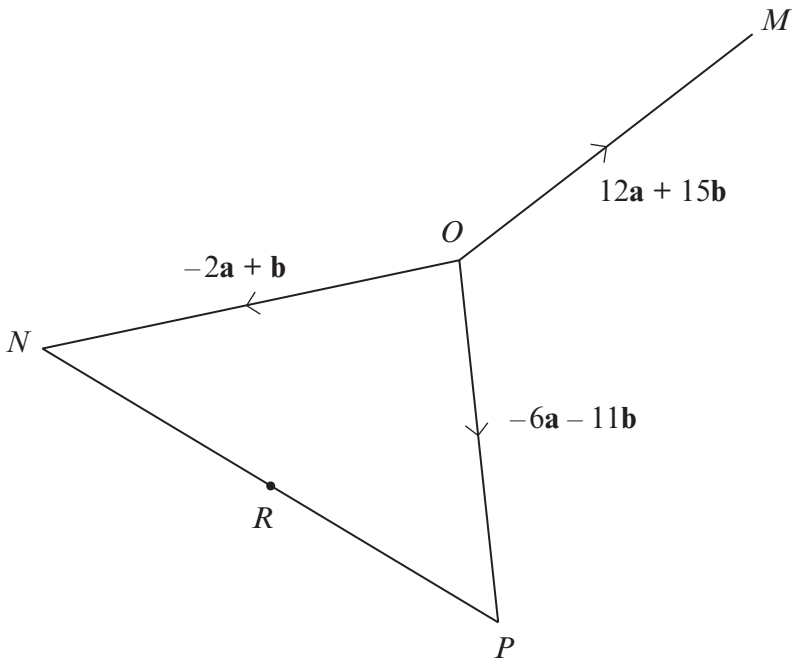


Diagram not drawn to scale

(a) Find **PN** in terms of **a** and **b**.

.....

.....

.....

[2]

(b) The point *R* is the mid-point of *NP*.

(i) Find **RO** in terms of **a** and **b** in its simplest form.

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.....

.....

.....

(ii) Show that **OM** = *k***RO** where *k* is a constant.

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(iii) State **two** geometrical relationships between RO and OM.

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[5]

13.

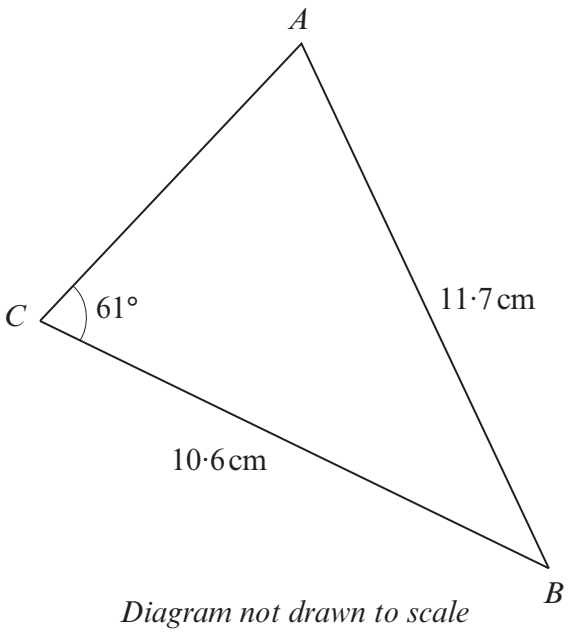


Diagram not drawn to scale

Calculate the size of $C\hat{A}B$.

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[3]

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14. In the diagram below, AD is an arc of a circle with centre O and OCB is a triangle.

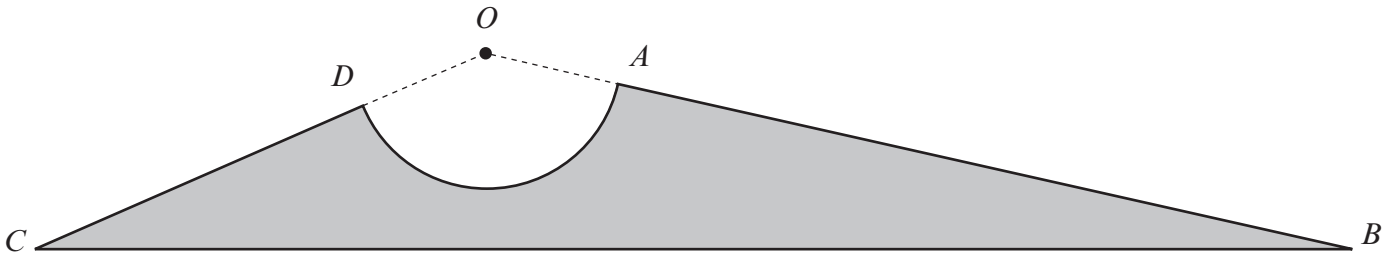


Diagram not drawn to scale

You are given that $D\hat{O}A = 135°$, $OD = 5{\cdot}3\,\text{cm}$, $CD = 8{\cdot}2\,\text{cm}$ and $AB = 18{\cdot}8\,\text{cm}$.
Calculate the area of the shaded region $ABCD$.

[9]

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