CCEA GCSE MATHEMATICS (MODULAR)

MATHS



EXAM QUESTION PACK

MODULE N3 PAPER 2 (CALCULATOR) HIGHER TIER GMN32 PAPERS

STEMUP

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Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
January 2012

Mathematics

Module N3 Paper 2
(With calculator)
Higher Tier

[GMN32]

WEDNESDAY 11 JANUARY
10.30 am–11.30 am

GMN32

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all twelve** questions.
Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.

INFORMATION FOR CANDIDATES

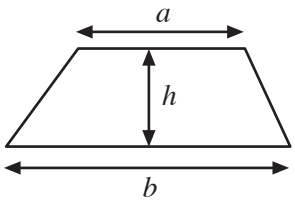
The total mark for this paper is 44.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
You should have a calculator, ruler, compasses, set-square and protractor.
The Formula Sheet is on page 2.

For Examiner's use only	
Question Number	**Marks**
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
Total Marks	

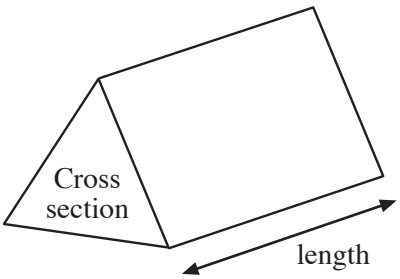
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Formula Sheet

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



Volume of prism = area of cross section × length

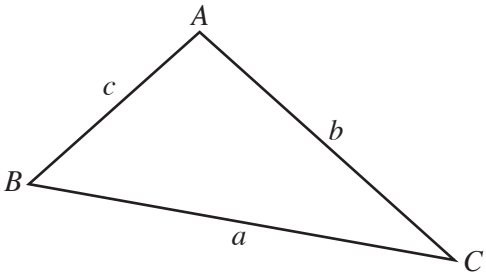


In any triangle ABC

Area of triangle $= \frac{1}{2}ab\sin C$

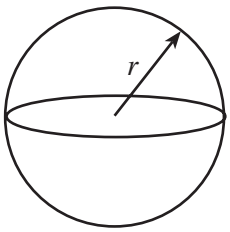
Sine rule : $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

Cosine rule: $a^2 = b^2 + c^2 - 2bc\cos A$



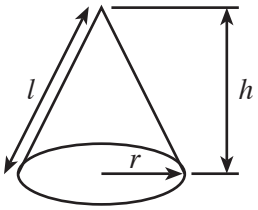
Volume of sphere $= \frac{4}{3}\pi r^3$

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



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

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



Quadratic equation:

The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

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

Examiner Only	
Marks	Remark

1 **(a)** Calculate $\dfrac{6.5 \times 5.8}{5.3 + 2.1}$

Give your answer correct to 2 decimal places.

Answer _____ [2]

(b) An investor bought shares for £3 600.

He sold them for 40% profit.

What was his selling price?

Answer £ _____ [3]

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Examiner Only	
Marks	Remark

2 Work out the value of x in the quadrilateral below.

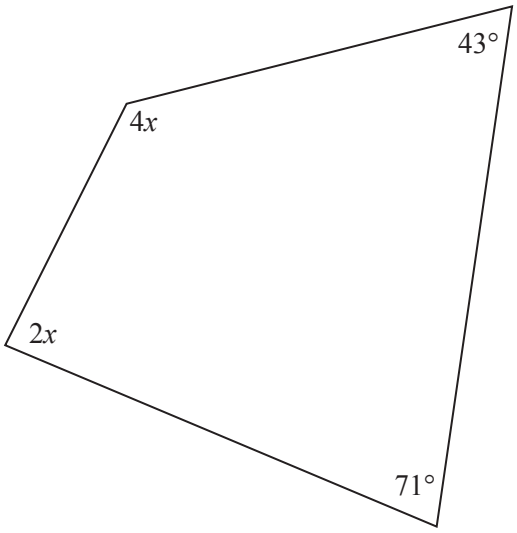


Diagram not drawn accurately

Answer x = _____° [4]

3 In April last year, it rained on 24 days.

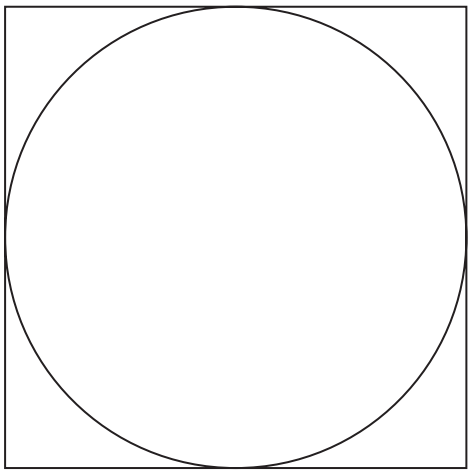
What percentage of days in April were dry?

Answer _____% [2]

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4 A square of side 8 cm has a circle drawn inside it which just touches its four sides.

Calculate the area of the circle.



Not drawn to scale

Answer _____ [3]

Examiner Only	
Marks	Remark

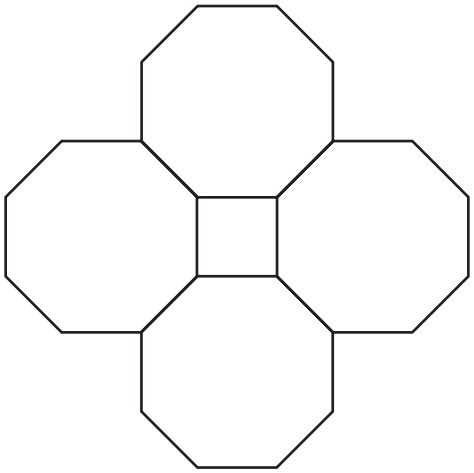
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Examiner Only	
Marks	Remark

5 **(a)** Calculate the size of the interior angle in a regular octagon.

Answer _____° [2]

(b) Four floor tiles, each in the shape of a regular octagon are placed together as shown. Explain why the shape between them must be a square.



Answer _____

_____ [2]

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(Questions continue overleaf)

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6 The table shows information about the number of hours that 100 children used a computer for last week.

Number of hours (H)	Frequency
$0 < H \leq 3$	8
$3 < H \leq 6$	16
$6 < H \leq 9$	21
$9 < H \leq 12$	36
$12 < H \leq 15$	12
$15 < H \leq 18$	7

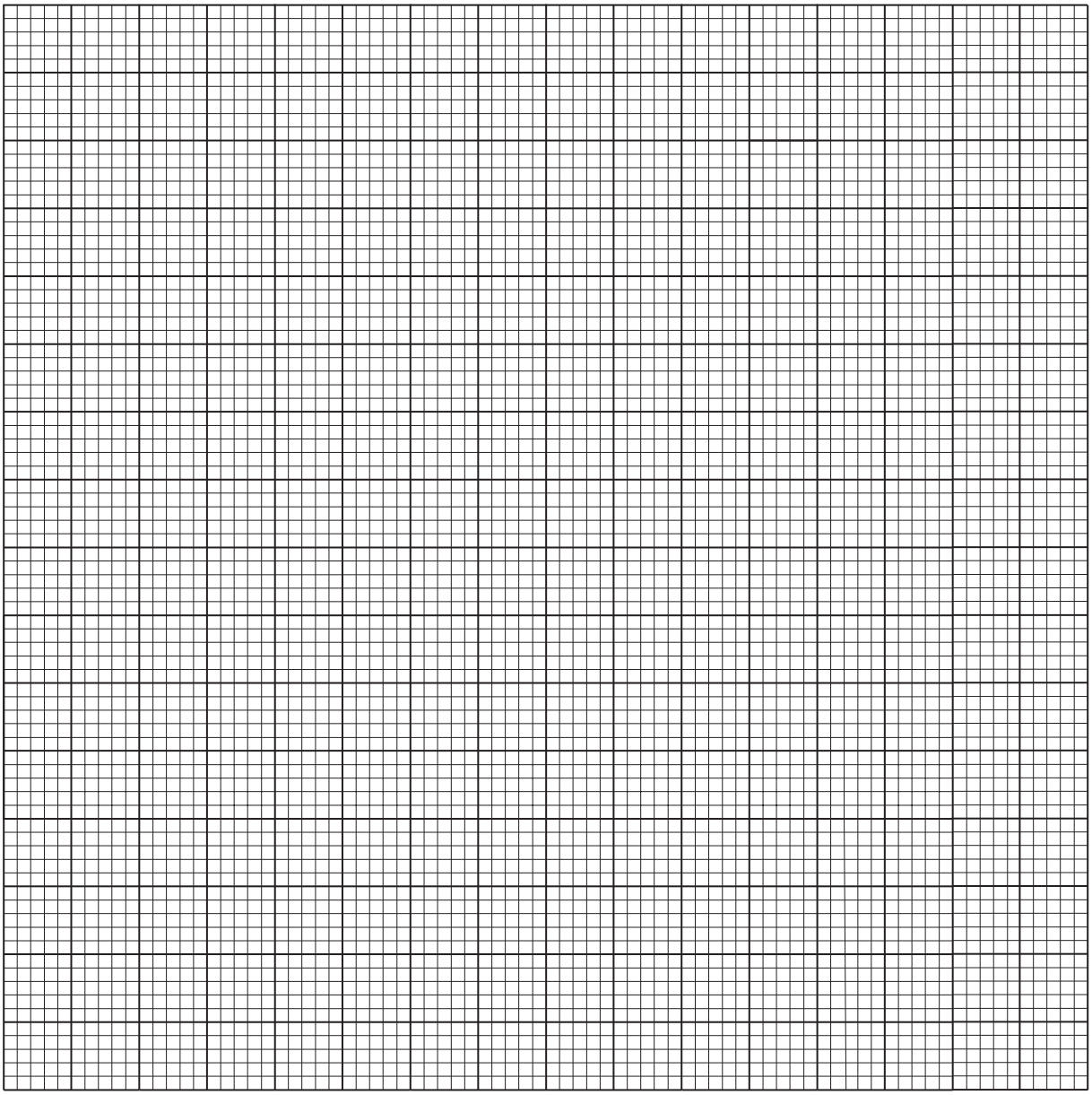
(a) Work out an estimate for the mean number of hours that the children used a computer for last week.

Answer _____ hours [4]

Examiner Only	
Marks	Remark

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(b) On the grid below draw a frequency polygon to illustrate the data opposite.



[2]

Examiner Only	
Marks	Remark

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7 A solution to the equation $x^3 - 5x = 27$ lies between 3 and 4.

Use trial and improvement to find this solution.

Give your answer correct to 1 decimal place.

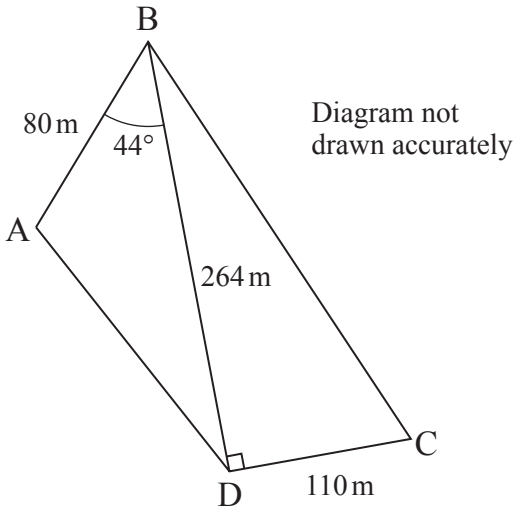
Show each stage of your working.

Answer $x =$ _____ [3]

Examiner Only	
Marks	Remark

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8 A field ABCD has straight sides. AB = 80 m, DC = 110 m and BD = 264 m. Angle BDC = 90° and angle ABD = 44°.



(a) Calculate the length of BC.

Answer _____ m [3]

(b) Calculate angle ABC.

Answer _____° [3]

Examiner Only

Marks	Remark

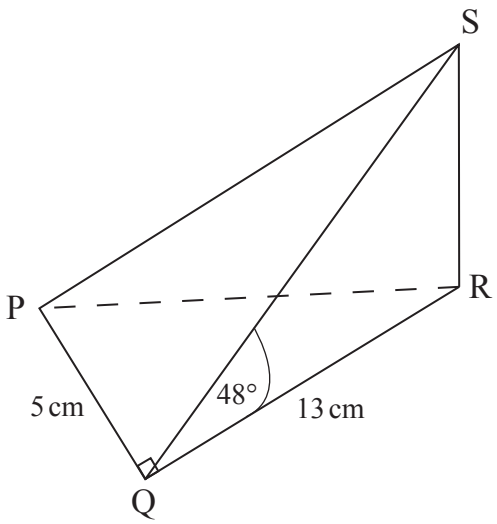
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Examiner Only	
Marks	Remark

9 Solve the simultaneous equations $7x + 3y = 15$
$4x - y = 14$

Answer $x =$ _____ , $y =$ _____ [3]

10 The diagram shows a pyramid PQRS in which RS is at right angles to the horizontal base PQR. PQ = 5 cm, QR = 13 cm, angle PQR = 90° and angle RQS = 48°.



Calculate the length SR.

Answer _____ cm [3]

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11 An electric fire cost £135.66 including VAT at 20%.

How much VAT was payable on the bill?

Answer £ _____ [3]

12 The temperature in a cooling furnace falls by 5% every hour.

The temperature is measured every hour.

At 10 am the temperature is 1200 °C.

At what hour will it first be found to measure below 1000 °C?

Show your working.

Answer _____ [2]

Examiner Only	
Marks	Remark

THIS IS THE END OF THE QUESTION PAPER

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General Certificate of Secondary Education
January 2012

Mathematics

Module N3 Paper 2
(With calculator)
Higher Tier

[GMN32]

WEDNESDAY 11 JANUARY
10.30 am – 11.30 am

MARK SCHEME

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GCSE MATHEMATICS

Introduction

The mark scheme normally provides the most popular solution to each question. Other solutions given by candidates are evaluated and credit given as appropriate; these alternative methods are not usually illustrated in the published mark scheme.

The marks awarded for each question are shown in the right-hand column and they are prefixed by the letters **M, A** and **MA** as appropriate. The key to the mark scheme is given below:

M indicates marks for correct method.

A indicates marks for accurate working, whether in calculation, readings from tables, graphs or answers.

MA indicates marks for combined method and accurate working.

The solution to a question gains marks for correct method and marks for an accurate working based on this method. Where the method is not correct no marks can be given.

A later part of a question may require a candidate to use an answer obtained from an earlier part of the same question. A candidate who gets the wrong answer to the earlier part and goes on to the later part is naturally unaware that the wrong data is being used and is actually undertaking the solution of a parallel problem from the point at which the error occurred. If such a candidate continues to apply correct method, then the candidate's individual working must be **followed through** from the error. If no further errors are made, then the candidate is penalised only for the initial error. Solutions containing two or more working or transcription errors are treated in the same way. This process is usually referred to as "follow-through marking" and allows a candidate to gain credit for that part of a solution which follows a working or transcription error.

It should be noted that where an error trivialises a question, or changes the nature of the skills being tested, then as a general rule, it would be the case that not more than half the marks for that question or part of that question would be awarded; in some cases the error may be such that no marks would be awarded.

Positive marking:

It is our intention to reward candidates for any demonstration of relevant knowledge, skills or understanding. For this reason we adopt a policy of **following through** their answers, that is, having penalised a candidate for an error, we mark the succeeding parts of the question using the candidate's value or answers and award marks accordingly.

Some common examples of this occur in the following cases:

(a) a numerical error in one entry in a table of values might lead to several answers being incorrect, but these might not be essentially separate errors;

(b) readings taken from candidates' inaccurate graphs may not agree with the answers expected but might be consistent with the graphs drawn.

When the candidate misreads a question in such a way as to make the question easier only a proportion of the marks will be available (based on the professional judgement of the examiner).

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				AVAILABLE MARKS
1	**(a)**	5.09459 = 5.09	MA1 A1	
	(b)	40% of £3600 = £1440 S.P. = £5040	M1A1 A1	5
2		$4x + 2x + 71 + 43 = 360$ or equivalent	MA1	
		$6x + 114 = 360$	MA1	
		$6x = 246$	MA1	
		$x = 41$	A1	4
3		6/30 **or** 80%	MA1	
		= 20%	A1	2
4		Area = $\pi \times 4^2 = 50.3$ (50.26548)	M1A1	
		units cm^2	A1	3
5	**(a)**	360/8 = 45 180 – 45 = 135 **or** $6 \times 180 = 1080$ $1080 \div 8 = 135$	MA1 MA1	
	(b)	Angles are 360 – 270 = 90	MA1	
		Sides are equal sides because of regular octagon (explanation necessary)	MA1	4
6	**(a)**	$1.5 \times 8 + 4.5 \times 16 + 7.5 \times 21 + 10.5 \times 36 + 13.5 \times 12 + 16.5 \times 7$ $12 + 72 + 157.5 + 378 + 162 + 115.5 = 897$ $897 \div 100$ 8.97	MA1 MA1 MA1 A1	
	(b)	Accurate frequency polygon	MA2	6
7		$x = 3.5 \rightarrow 25.375$ and $x = 3.6 \rightarrow 28.656$	MA1	
		$x = 3.55 \rightarrow 26.988875$	MA1	
		$x = 3.6$	MA1	3

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				AVAILABLE MARKS
8	**(a)**	$BC^2 = 110^2 + 264^2$	MA1	
		$BC = \sqrt{81796}$	MA1	
		$BC = 286$	A1	
	(b)	$DBC = Tan^{-1}\ (110/264)$	MA1	
		$DBC = 22.6$	A1	
		$ABC = 22.6 + 44 = 66.6$	MA1	6
9		$7x + 3y = 15$		
		$12x - 3y = 42$	MA1	
		$19x = 57$		
		$x = 3$	MA1	
		$y = -2$	MA1	3
10		$\tan 48° = RS/13$	MA1	
		$RS = 13 \tan 48°$	MA1	
		$RS = 14.4\ (14.438)$	A1	3
11		$135.66 = 120\%$	MA1	
		$\frac{135.66}{120} \times 20$	MA1	
		$= £22.61$	A1	3
12		$0.95\ (\times 0.95 \times 0.95 \times 0.95) \times 1200$	MA1	
		$\Rightarrow 4$ hours $\Rightarrow$ 2pm	A1	2
			Total	**44**

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Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
2011

Mathematics

Module N3 Paper 2
(With calculator)
Higher Tier

[GMN32]

TUESDAY 31 MAY
10.30 am–11.30 am

GMN32

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1 hour.

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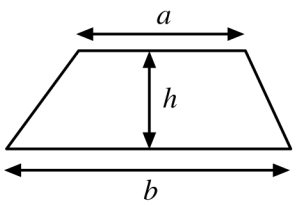
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2	
3	
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5	
6	
7	
8	
9	
10	
11	
12	
Total Marks	

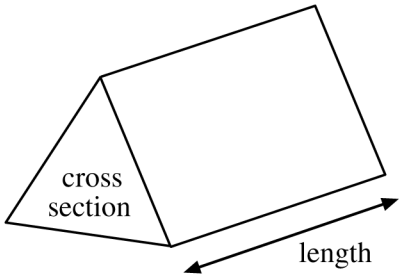
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Formula Sheet

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



Volume of prism = area of cross section × length

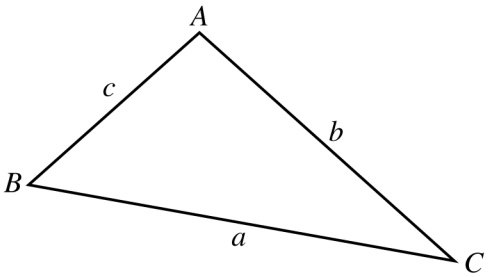


In any triangle ABC

Area of triangle = $\frac{1}{2}ab\sin C$

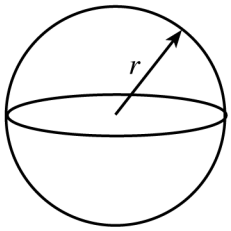
Sine rule : $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule: $a^2 = b^2 + c^2 - 2bc\cos A$



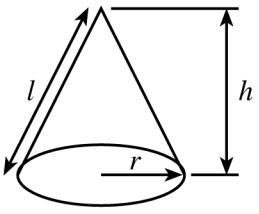
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

Curved surface area of cone = πrl



Quadratic equation:

The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

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

Examiner Only	
Marks	Remark

1 A new bicycle is priced at £240

In a sale it is reduced by 35%.

Calculate the sale price.

Answer £ _____ [3]

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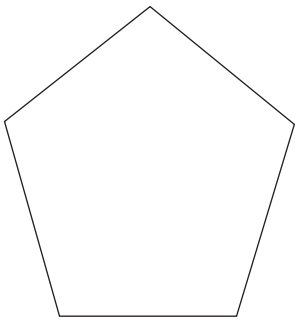
2 **(a)** 

© *The Royal Mint*

A ten pence piece has a radius of 1.4 cm.

Calculate the circumference of this coin.

Answer _____ cm [2]

(b) 

Explain why the sum of the interior angles in a regular pentagon is 540°.

_____

_____

_____

_____

[2]

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3 An adult ticket for a show costs £a.

A child ticket costs £4 less than an adult ticket.

Daisy buys two adult tickets and three child tickets. The total cost is £23

(a) Use this information to write down an **equation** in terms of a.

Answer _____ [3]

(b) Solve your equation to find the cost of an adult ticket.

Answer £ _____ [2]

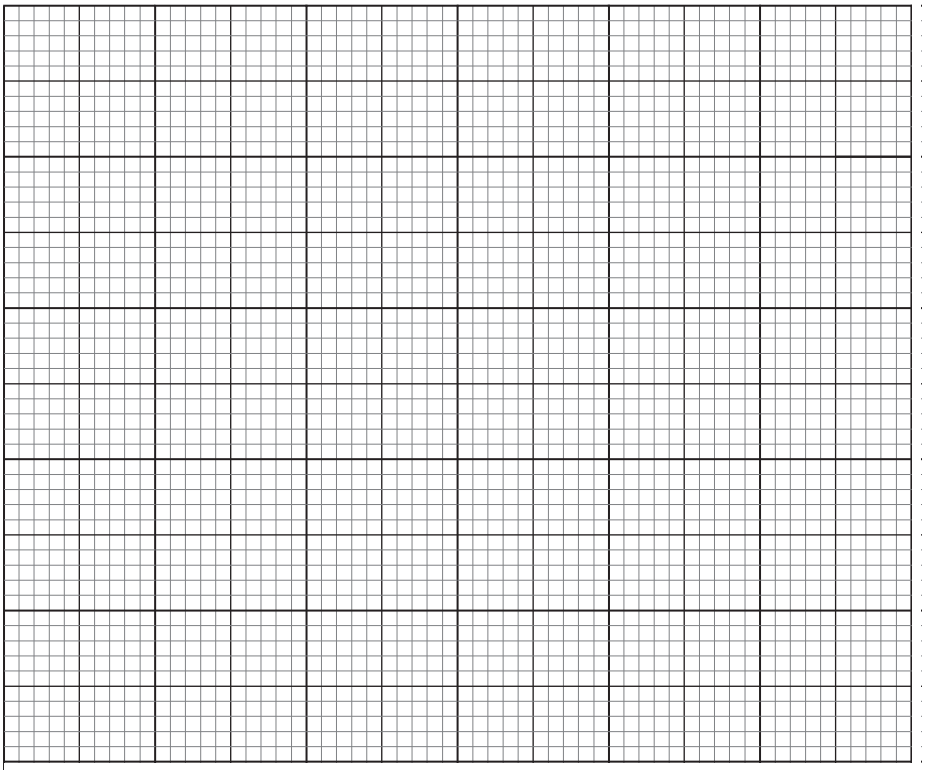
Examiner Only	
Marks	Remark

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4 The increase in weight of 100 children over a period of time was recorded.

Increase in weight (w kg)	$0 < w \leq 5$	$5 < w \leq 10$	$10 < w \leq 15$	$15 < w \leq 20$	$20 < w \leq 25$
Frequency	16	36	22	14	12

(a) Show this information on a grouped frequency diagram. [3]



(b) Write down the modal class interval.

Answer _____ [1]

Examiner Only

Marks	Remark

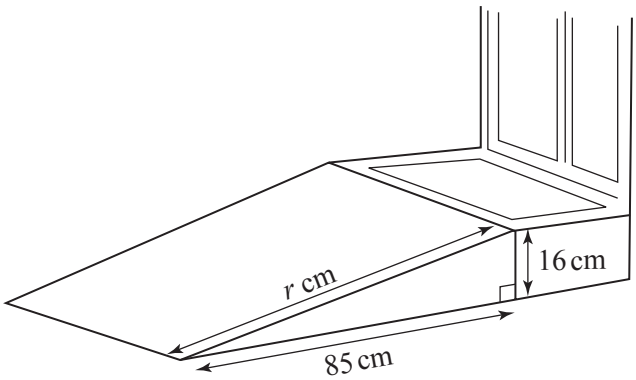
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Examiner Only	
Marks	Remark

5 A ramp is placed next to a step to allow wheelchair access.

The ramp is 16 cm high and reaches 85 cm from the step.

Calculate the sloping length, r cm, of the ramp to the edge of the step.



Answer _____ cm [3]

6 **(a)** At birth a baby boy weighed 4 kg. Six weeks later he weighed 7 kg.

What was the percentage increase in his weight?

Answer _____ % [2]

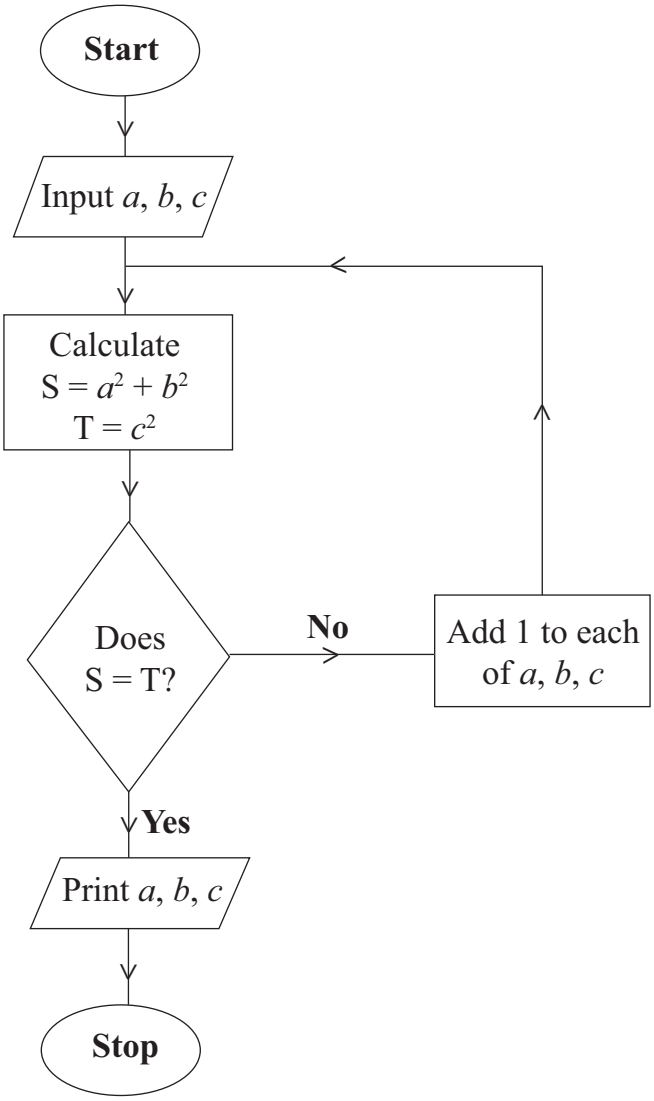
(b) Colin leaves £4800 in the bank for two years.

It earns compound interest of 3% per year.

Calculate the total amount Colin has in the bank at the end of the two years.

Answer £ _____ [2]

7



Starting with $a = 2$, $b = 9$, $c = 10$ use the flow chart to find the values printed.

a	b	c	S	T
2	9	10		

Answer $a =$ _____, $b =$ _____, $c =$ _____ [3]

Examiner Only

Marks	Remark

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Examiner Only	
Marks	Remark

8 One solution of $x^2 + 4x = 50$ lies between 5 and 6

Use the method of **trial and improvement** to find this solution correct to one decimal place. **Show all your working**.

Answer $x =$ _____ [3]

---

9 A large spherical glass marble has a radius of 2.5 cm:



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Calculate the volume of glass in this marble correct to 2 decimal places.

Answer _____ [3]

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Examiner Only	
Marks	Remark

10 A tea set has a sale price of £63.36 which is a saving of 12% on the original price.

What was the original price of the tea set?

Answer £ _____ [3]

11 **(a)** Factorise $10y + 4$

Answer _____ [1]

(b) Factorise $9a^2 - 3ay$

Answer _____ [2]

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12 The graph opposite shows the cumulative frequency of scores obtained in a darts tournament.

Examiner Only	
Marks	Remark

(a) Use the graph to estimate

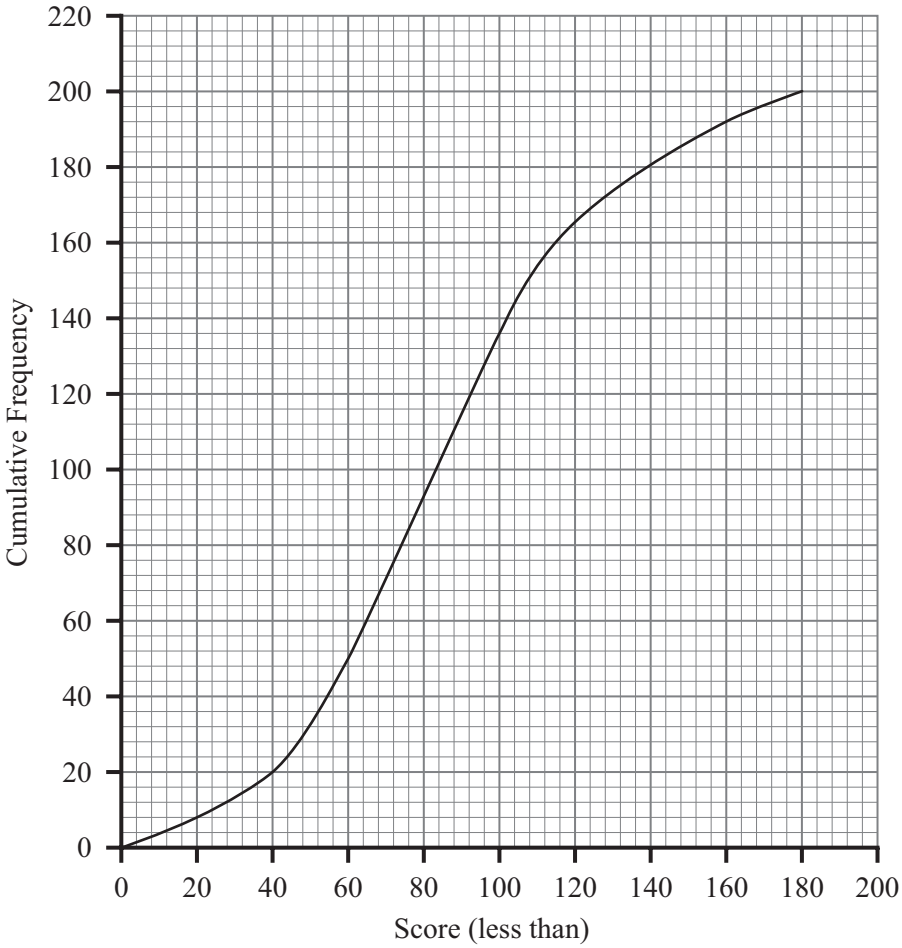
(i) the median,

Answer _____ [1]

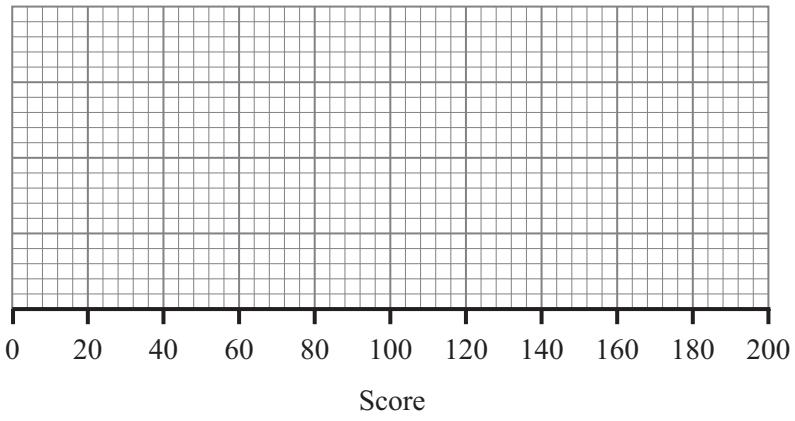
(ii) how many scores were more than 150

Answer _____ [2]

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(b) From the graph draw a box plot. [3]



THIS IS THE END OF THE QUESTION PAPER

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Marks	Remark

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Module N3 Paper 2
(With calculator)
Higher Tier

[GMN32]

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MARK SCHEME

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M indicates marks for correct method.

A indicates marks for accurate working, whether in calculation, reading from tables, graphs or answers. Accuracy marks may depend on preceding **M** (method) marks, hence **M0 A1** cannot be awarded i.e. where the method is not correct no marks can be given.

MA indicates marks for combined method and accurate working.

A later part of a question may require a candidate to use an answer obtained from an earlier part of the same question. A candidate who gets the wrong answer to the earlier part and goes on to the later part is naturally unaware that the wrong data is being used and is actually undertaking the solution of a parallel problem from the point at which the error occurred. If such a candidate continues to apply correct method, then the candidate's individual working must be **followed through** from the error. If no further errors are made, then the candidate is penalised only for the initial error. Solutions containing two or more working or transcription errors are treated in the same way. This process is usually referred to as "follow-through marking" and allows a candidate to gain credit for that part of a solution which follows a working or transcription error.

It should be noted that where an error trivialises a question, or changes the nature of the skills being tested, then as a general rule, it would be the case that not more than half the marks for that question or part of that question would be awarded; in some cases the error may be such that no marks would be awarded.

Positive marking:

It is our intention to reward candidates for any demonstration of relevant knowledge, skills or understanding. For this reason we adopt a policy of **following through** their answers, that is, having penalised a candidate for an error, we mark the succeeding parts of the question using the candidate's value or answers and award marks accordingly.

Some common examples of this occur in the following cases:

(a) a numerical error in one entry in a table of values might lead to several answers being incorrect, but these might not be essentially separate errors;

(b) readings taken from candidates' inaccurate graphs may not agree with the answers expected but might be consistent with the graphs drawn.

When the candidate misreads a question in such a way as to make the question easier, only a proportion of the marks will be available (based on the professional judgement of the examiner).

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General Marking Advice

(i) If the correct answer is seen in the body of the script and the answer given in the answer line is clearly a transcription error, full marks should be awarded.

(ii) If the answer is missing, but the correct answer is seen in the body of the script, full marks should be awarded.

(iii) If the correct answer is seen in working but a completely different answer is seen in the answer space, then some marks will be awarded depending on the severity of the error.

(iv) Work crossed out but not replaced should be marked.

(v) In general, if two or more methods are offered, mark only the method that leads to the answer on the answer line. If two (or more) answers are offered (with no solution offered on the answer line), mark the poorest answer.

(vi) For methods not provided for in the mark scheme, give as far as possible equivalent marks for equivalent work.

(vii) Where a follow through mark is indicated on the mark scheme for a particular part question, the marker must ensure that you refer back to the answer of the previous part of the question.

(viii) Unless the question asks for an answer to a specific degree of accuracy, always mark at the greatest number of significant figures seen. E.g. the answer in the mark scheme is 4.65 and the candidate then correctly rounds to 4.7 or 5 on the answer line. Allow full marks for 4.65 seen in the working.

(ix) Anything in the mark scheme which is in brackets (...) is not required for the mark to be earned, but if present it must be correct.

(x) For any question, the range of answers given in the mark scheme is inclusive.

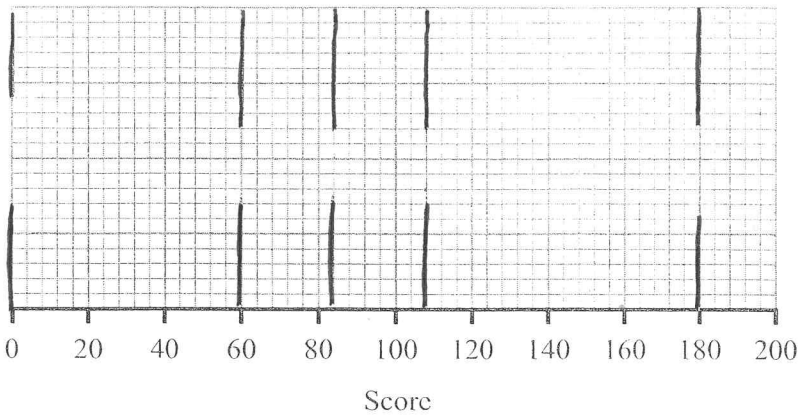
			AVAILABLE MARKS
1	$0.35 \times 240 = 84$ or 0.65×240	M1 A1	
	$240 - 84 = £156$	MA1	3
2	**(a)** $C = \pi \times 2.8$	MA1	
	$= 8.796$ ..... cm	A1	
	(b) EITHER 3 Triangles $= 3 \times 180 = 540°$	A2	
	OR explain Interior $= 108°$ (from ext $= 72$)	A1	
	$\therefore$ total $= 108 \times 5 = 540°$	A1	4
3	**(a)** $2a + 3(a - 4) = 23$	A1 for $(a - 4)$	
		A1 for correct expression set up/A1 for equation	
	(b) $2a + 3a - 12 = 23$		
	$5a - 12 = 23$	MA1	
	$5a = 35$		
	$a = 7$	MA1	5
4	**(a)** correct scales	A1	
	correct heights	A2	
	(award A1 for 3 correct heights)		
	(b) $5 < w \leq 10$	A1	4
5	$r^2 = 85^2 + 16^2$	MA1	
	$r^2 = 7481$	A1	
	$r = 86.5$	A1	3
6	**(a)** $\frac{3}{4} \times 100$	MA1	
	75	A1	
	(b) 4944	MA1	
	5092.32	MA1	4
7	$S_1 = 85, T_1 = 100$	MA1	
	$S_2 = 109, T_2 = 121$		
	$S_3 = 137, T_3 = 144$	MA1	
	$S_4 = 169, T_4 = 169$		
	5, 12, 13	MA1	3

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			AVAILABLE MARKS
8	$5.3 \rightarrow 49.29$ $5.4 \rightarrow 50.76$ 5.35 tested $\rightarrow 50.0225$ 5.3	 MA1 MA1 A1	 3
9	Volume $= \dfrac{4 \times \pi \times 2.5^3}{3}$	MA1	
	$= 65.45$ cm^3	A1, A1 units	3
10	$88\% = £63.36$	MA1	
	$\dfrac{63.36}{88} \times 100$	MA1	
	$= 72$	A1	3
11	**(a)** $2(5y + 2)$	A1	
	(b) $3a(3a - y)$	A2	3
12	**(a)** **(i)** 84	MA1	
	(ii) $200 - 186$ 14	MA1 A1	
	(b) median at 84 quartiles at 60 and 108 range (see overlay)	A1 A1 A1	6
		Total	**44**

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GCSE MATHEMATICS SUMMER 201
MODULE N3-2
OVERLAYS QUESTION 12



Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
January 2011

Mathematics



Module N3 Paper 2
(With calculator)
Higher Tier

[GMN32]

GMN32

TUESDAY 11 JANUARY

10.30 am – 11.30 am

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all twelve** questions.
Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.

INFORMATION FOR CANDIDATES

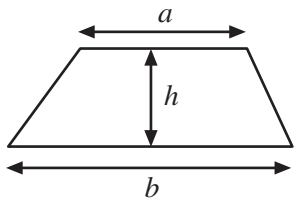
The total mark for this paper is 44.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
You should have a calculator, ruler, compasses, set-square and protractor.
The Formula Sheet is on page 2.

For Examiner's use only	
Question Number	**Marks**
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
Total Marks	

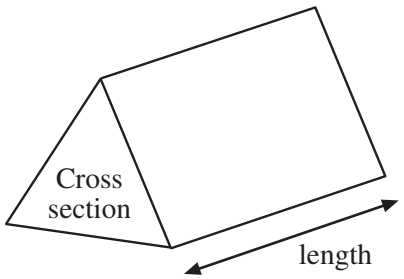
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Formula Sheet

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



Volume of prism = area of cross section × length

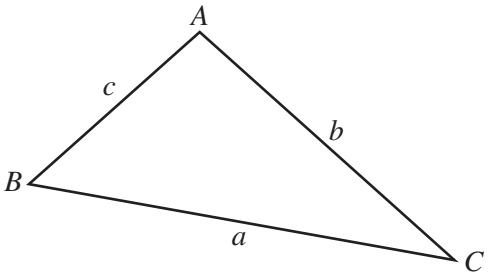


In any triangle ABC

Area of triangle = $\frac{1}{2}ab\sin C$

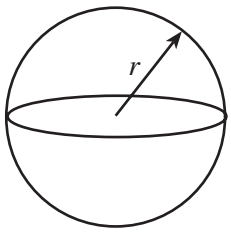
Sine rule : $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule: $a^2 = b^2 + c^2 - 2bc\cos A$



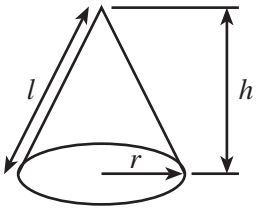
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

Curved surface area of cone = πrl



Quadratic equation:

The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

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

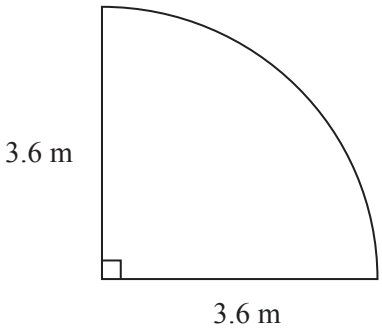
Examiner Only	
Marks	Remark

1 **(a)** A box contains 240 g of cereal, correct to the nearest 10 g.

What is the least possible weight of the box of cereal?

Answer _____ g [1]

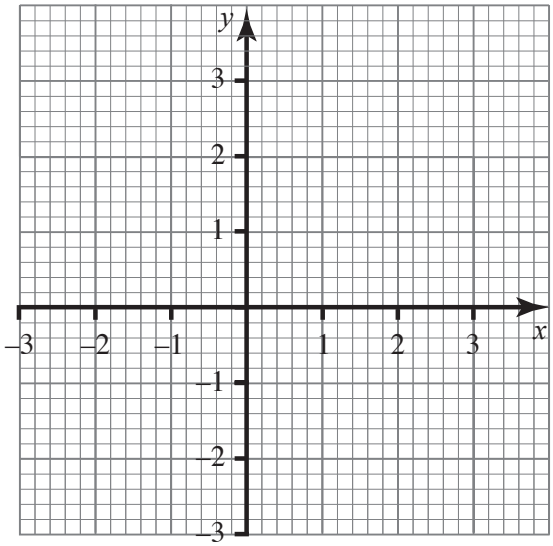
(b) Calculate the perimeter of the garden shown below.



Answer _____ [4]

---

2 Draw the graph of $y = 2x - 1$



[3]

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Examiner Only	
Marks	Remark

3 **(a)** A packet of porridge oats contains 660 g.

A special offer packet contains an extra 15%.

How many grams of porridge oats are in the special offer packet?

Answer _____ g [3]

(b) Richard bought a games console for £240

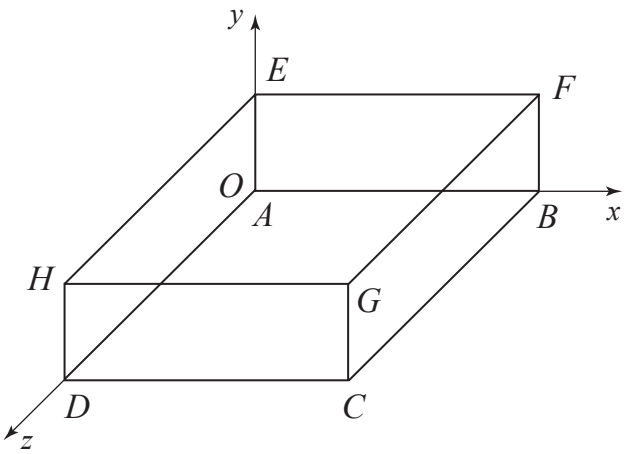
Two years later he sold it for £150

Work out his percentage loss.

Answer _____ % [3]

---

4 The diagram shows a cuboid drawn on a 3D grid.



B is the point (8, 0, 0)
G is the point (8, 2, 6)
Write down the co-ordinates of *H*.

Answer (____, ___, ___) [1]

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Examiner Only	
Marks	Remark

5 James is designing a questionnaire to test the idea that

"the amount of sleep you need changes with age".

(a) One of his questions will find out the ages of those being questioned.

Write a suitable question he could ask, with response boxes for people to tick.

[2]

Having completed his questionnaire James decided to give it out to all his school friends and their parents.

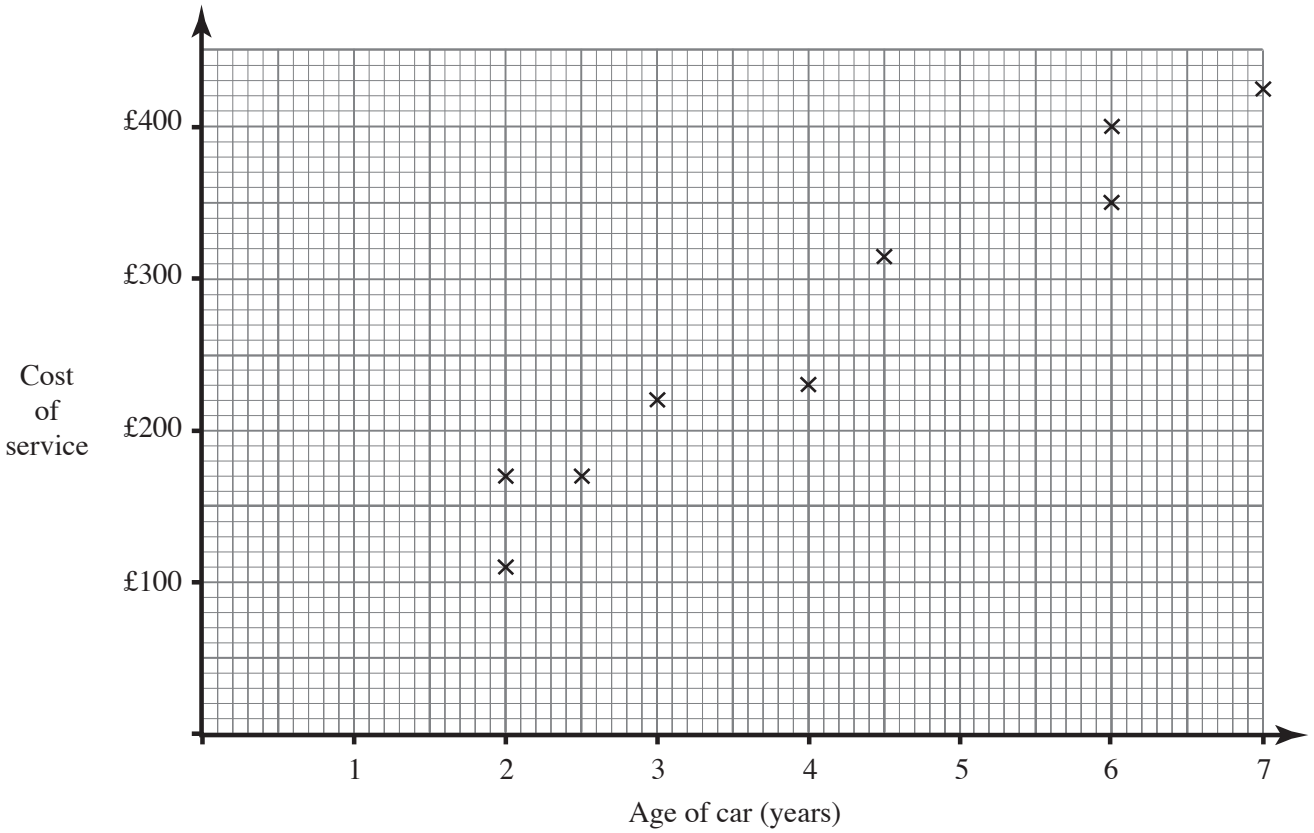
(b) Give one reason why this is not a good sample.

Answer _____

_____ [1]

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6



The scatter graph shows the cost of service for cars of various age.

(a) Draw a line of best fit. [1]

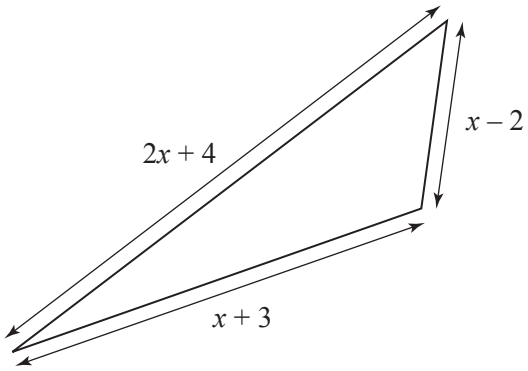
(b) Use your line to estimate the cost of service for a 5 year old car.

Answer £ _____ [1]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

7 **(a)** Write an expression, in terms of x, for the perimeter of the triangle shown. Give your answer in its simplest form.



Answer _____ [2]

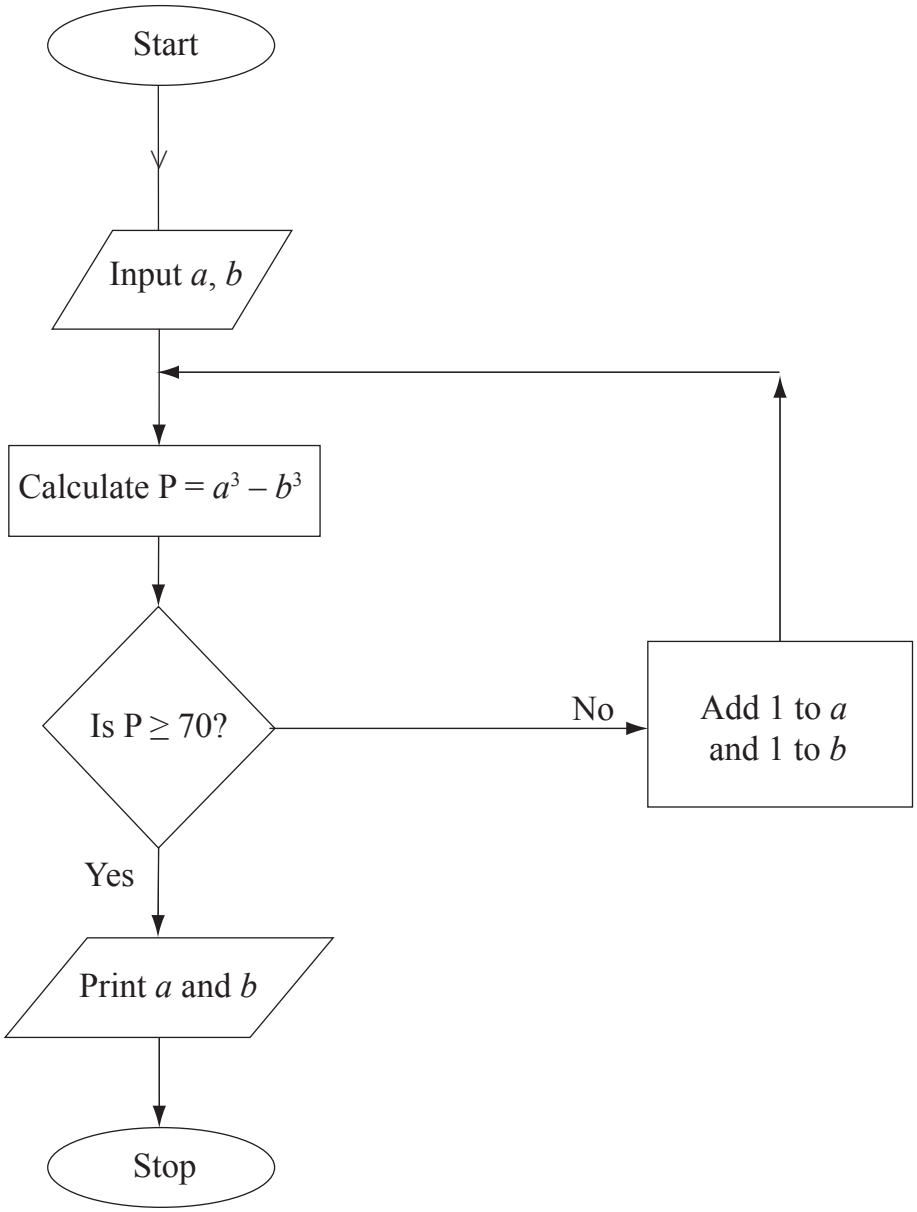
(b) The perimeter of this triangle is 29 cm.

Write down an equation for the perimeter in terms of x and solve it to find x.

Answer x = _____ [2]

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8



Starting with $a = 2$, $b = 1$ use the flow chart to find the values printed.

a	b	P
2	1	

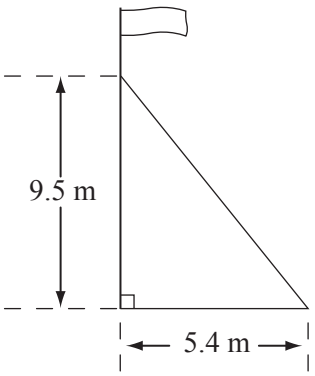
Answer $a =$ _____, $b =$ _____ [3]

Examiner Only

Marks	Remark

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9 A flagpole is held vertically by a wire fixed to a point 9.5 m above the horizontal ground and to a point on the ground 5.4 m from the pole.



(a) Calculate the length of the wire.

Answer _____ m [3]

(b) Calculate the angle that the wire makes with the ground.

Answer _____ ° [3]

Examiner Only

Marks	Remark

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Examiner Only	
Marks	Remark

10 In a sale normal prices are reduced by 12%.

The sale price of a computer is £682

Work out the normal price of the computer.

Answer £ _____ [3]

11 **(a)** Factorise fully $21xy - 7y^2$

Answer _____ [2]

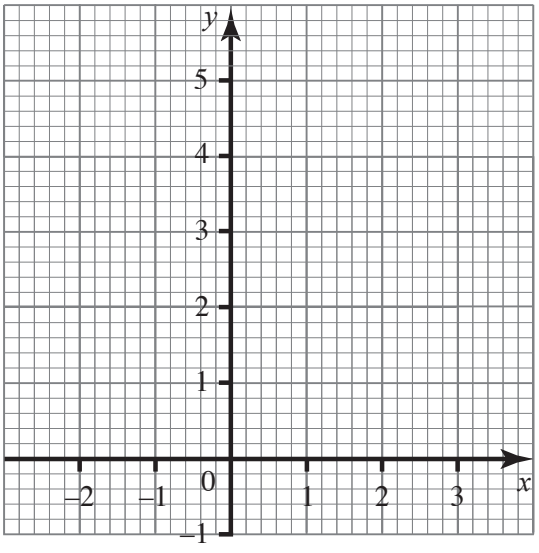
(b) Express $\frac{1}{4v} + \frac{2}{3v}$ as a single fraction in its simplest form.

Answer _____ [3]

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12 A straight line with gradient 2 passes through the points (–2, –1) and (1, b).

(a) Using the axes below, or otherwise, find the value of b.



Answer b = _____ [1]

(b) Find the equation of this line.

Answer _____ [2]

THIS IS THE END OF THE QUESTION PAPER

Examiner Only	
Marks	Remark

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Rewarding Learning

General Certificate of Secondary Education
January 2011

Mathematics

Module N3 Paper 2
(With calculator)
Higher Tier

[GMN32]

TUESDAY 11 JANUARY
10.30 am – 11.30 am

MARK SCHEME

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Introduction

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The marks awarded for each question are shown in the right hand column and they are prefixed by the letters **M**, **A** and **MA** as appropriate. The key to the mark scheme is given below:

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				AVAILABLE MARKS
1	**(a)** 235		A1	
	(b) $2 \times \pi \times 3.6 = 22.61946711$		MA1	
	$22.61946711 \div 4 = 5.654866776$		MA1	
	Perimeter $= 2 \times 3.6 + 5.65 = 12.85$ m		MA1, A1 units	5
2	Correct graph to include – intercept at (0,–1)/correct gradient of 2 and a straight line drawn		A3	3
3	**(a)** $660 \times 0.15 = 99$		M1, A1	
	759		A1	
	(b) $240 - 150 = 90$		A1	
	$\frac{90}{240} \times 100 = 37.5$		M1, A1	6
4	(0, 2, 6)		A1	1
5	**(a)** Suitable question and response boxes, non-overlapping, covering all ages		MA2 allow 1 for partial answer	
	(b) Suitable reason eg. not a variety of ages		MA1	3
6	**(a)** line		A1	
	(b) reading		A1	2
7	**(a)** $2x + 4 + x + 3 + x - 2$		MA1	
	$= 4x + 5$		A1	
	(b) $4x + 5 = 29$		A1	
	$4x = 24$			
	$x = 6$		MA1	4
8	a b P 2 1 7 3 2 19 4 3 37 5 4 61 6 5 91		all correct MA2 (3, 4 correct) (MA1)	
		$a = 6$ $b = 5$	MA1	3

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			AVAILABLE MARKS
9	**(a)** $9.5^2 + 5.4^2$	M1	
	$= 119.41$	A1	
	$\sqrt{119.41} = 10.93$	MA1	
	(b) $\text{Tan}\ \alpha = 9.5/5.4$	M1, A1	
	60.4°	A1	6
10	$88\% = 682$	MA1	
	$\frac{682}{88} \times 100 = 775$	M1, A1	3
11	**(a)** $7y(3x - y)$	A1, A1	
	(b) $\frac{3}{12v} + \frac{8}{12v}$	MA1, MA1	
	$= \frac{11}{12v}$	A1	5
12	**(a)** $b = 5$	A1	
	(b) $c = 3$	A1	
	$y = 2x + 3$	A1	3
		Total	44

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Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
2010

Mathematics



Module N3 Paper 2
(With calculator)
Higher Tier

[GMN32]

GMN32

TUESDAY 1 JUNE

10.30 am – 11.30 am

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all thirteen** questions.
Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.

INFORMATION FOR CANDIDATES

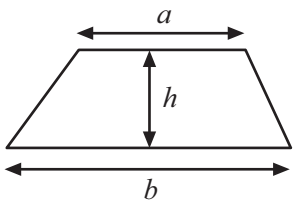
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You should have a calculator, ruler, compasses, set-square and protractor.
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For Examiner's use only	
Question Number	**Marks**
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
Total Marks	

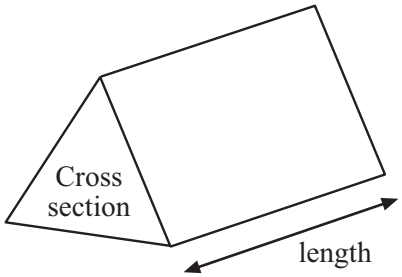
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Formula Sheet

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



Volume of prism = area of cross section × length

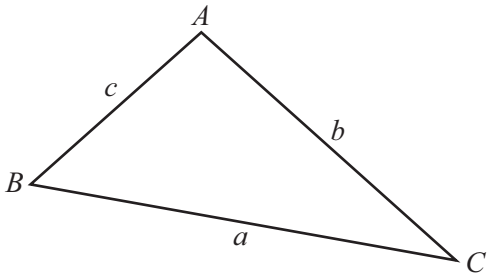


In any triangle ABC

Area of triangle $= \frac{1}{2}ab\sin C$

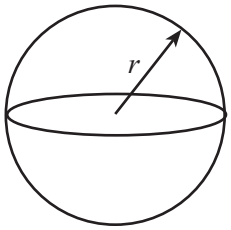
Sine rule : $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

Cosine rule: $a^2 = b^2 + c^2 - 2bc\cos A$



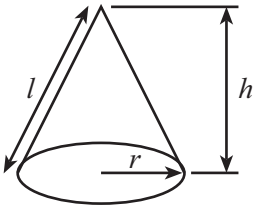
Volume of sphere $= \frac{4}{3}\pi r^3$

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



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

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

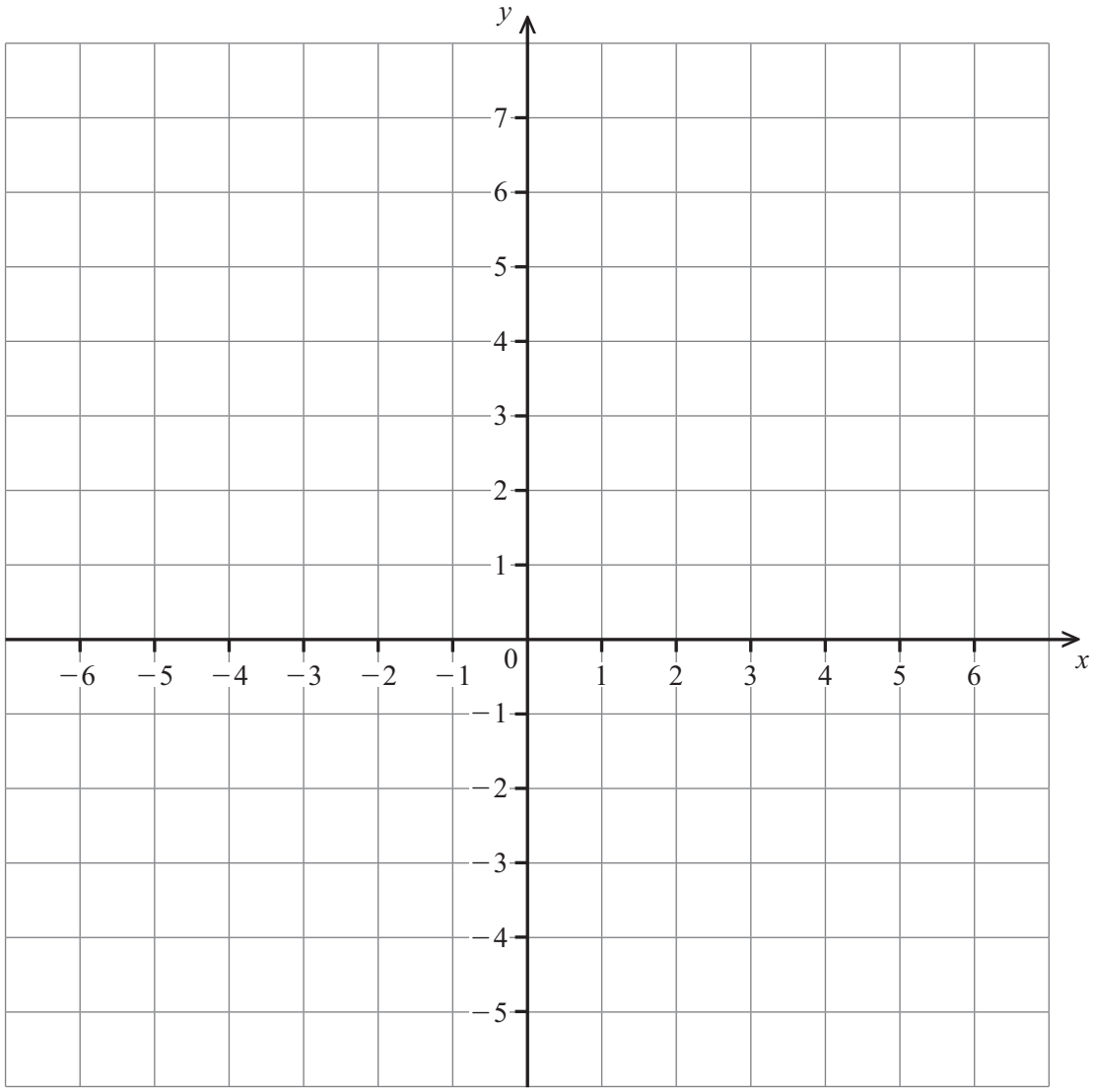


Quadratic equation:

The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

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

1



Draw the line $y = 2x - 1$ on the grid. [3]

Examiner Only	
Marks	Remark

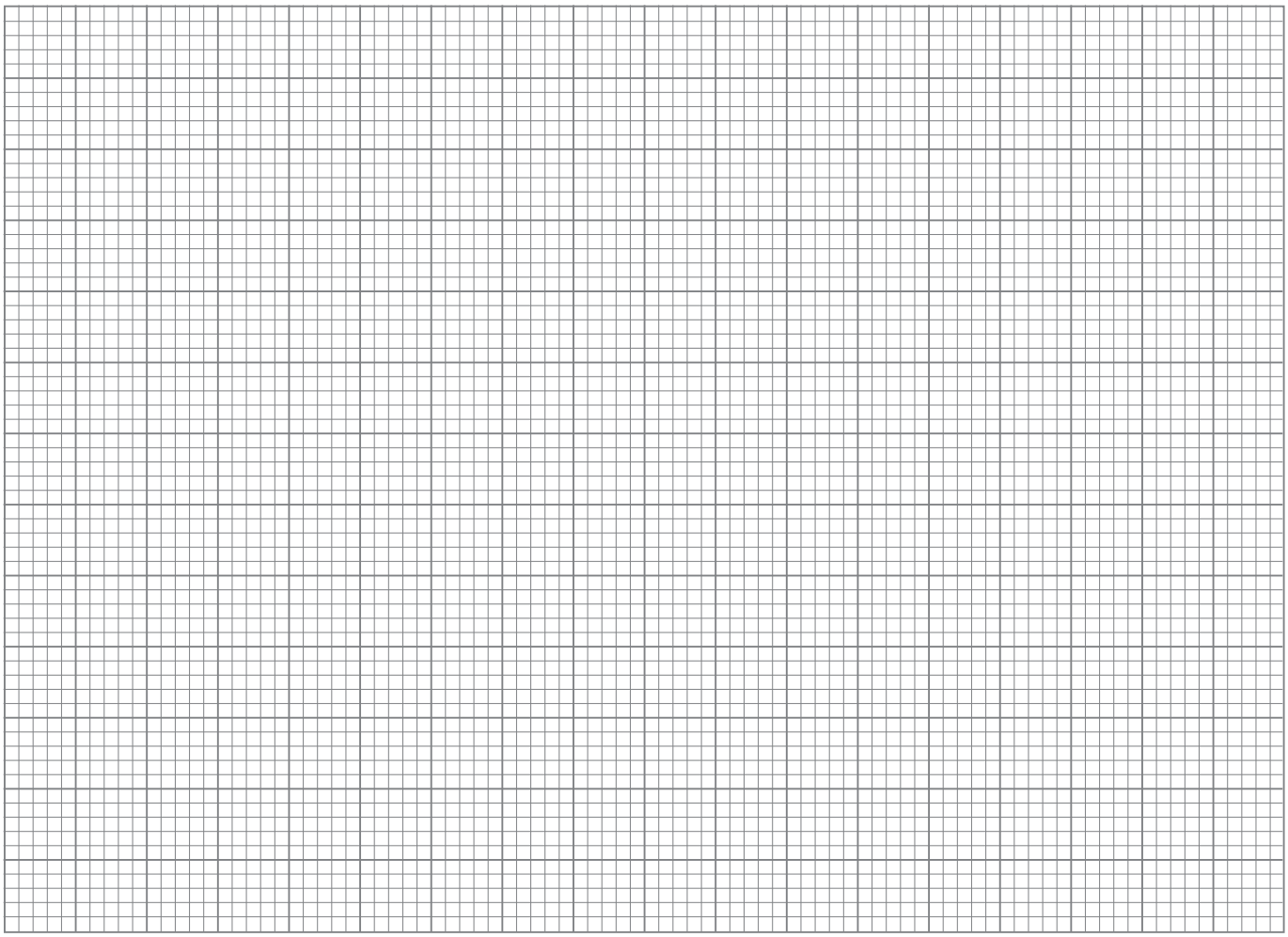
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2 The ages of members of a health club were recorded.

Examiner Only	
Marks	Remark

Age (years)	0–9	10–19	20–29	30–39	40–49	50–59
Frequency	5	28	36	25	14	10

Draw a grouped frequency diagram for this data. [3]



Examiner Only	
Marks	Remark

3 Jane is having a party. She needs twelve cans of cola.
A single can of cola costs 40p in each of two local shops.
Each shop has a particular offer on cans of cola.

* Ventra *	* Viva *
20% off every twelve cans	buy 3 for the price of 2

Which is better value?
Show your working clearly.

Answer _____ [4]

4 Give the names of two different shapes which both have equal sides of length x and both have perimeters of length $4x$.

Answer _____ and _____ [3]

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Examiner Only	
Marks	Remark

5 PQRS is a square.
PQ has length $(5x - 14)$ cm.
PS has length $(3x + 38)$ cm.

(a) Write down an equation in terms of x.

Answer _____ [1]

(b) Solve your equation to find the value of x.

Answer x = _____ [3]

---

6 A = (4, –5), B = (–2, 9)
Find the co-ordinates of the midpoint of the line AB.

Answer (_____, _____) [2]

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7 The time taken by ladies to complete the Belfast "Runher" Fun Run were recorded to the nearest minute.

Time (min)	Number of ladies	Mid value	
25–34	13	29.5	
35–44	107		
45–54	234		
55–64	71		
65–74	22		
75–84	1		

(a) Which class interval contains the median time?

Answer _____ [1]

(b) Calculate an estimate for the mean time to complete the Fun Run.

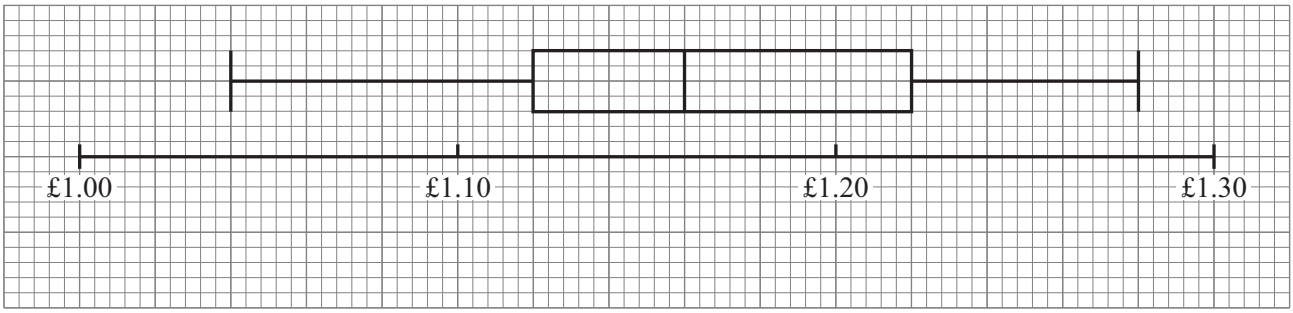
Answer _____ minutes [3]

Examiner Only

Marks	Remark

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8 The boxplot shows information about the price of a litre of diesel in a number of garages in England.



(a) What is the range of these prices?

Answer _____p [1]

(b) In the same number of garages in Northern Ireland the interquartile range was 8 pence.
How does this value compare with the interquartile range in the boxplot shown?

_____

_____ [1]

Examiner Only	
Marks	Remark

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9 The mass of bacteria in a mixture increases by 5% every hour.
At 9.00 am there is 120 mg of bacteria.
What will the mass of bacteria be at midday?

Answer _____ mg [3]

Examiner Only	
Marks	Remark

---

10 Find the perimeter of a semi-circle with diameter 15 cm.

Answer _____ [4]

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11 One hundred and twenty men in a city company have their blood pressure taken. The results are shown in the frequency table.

Examiner Only	
Marks	Remark

Frequency table

Blood pressure (P)	Number of men
$P < 100$	4
$100 \leqslant P < 120$	28
$120 \leqslant P < 140$	49
$140 \leqslant P < 160$	28
$160 \leqslant P < 170$	8
$170 \leqslant P < 180$	3

Cumulative frequency table

Blood pressure (P) (less than)	Number of men
100	4
120	
140	
160	
170	
180	

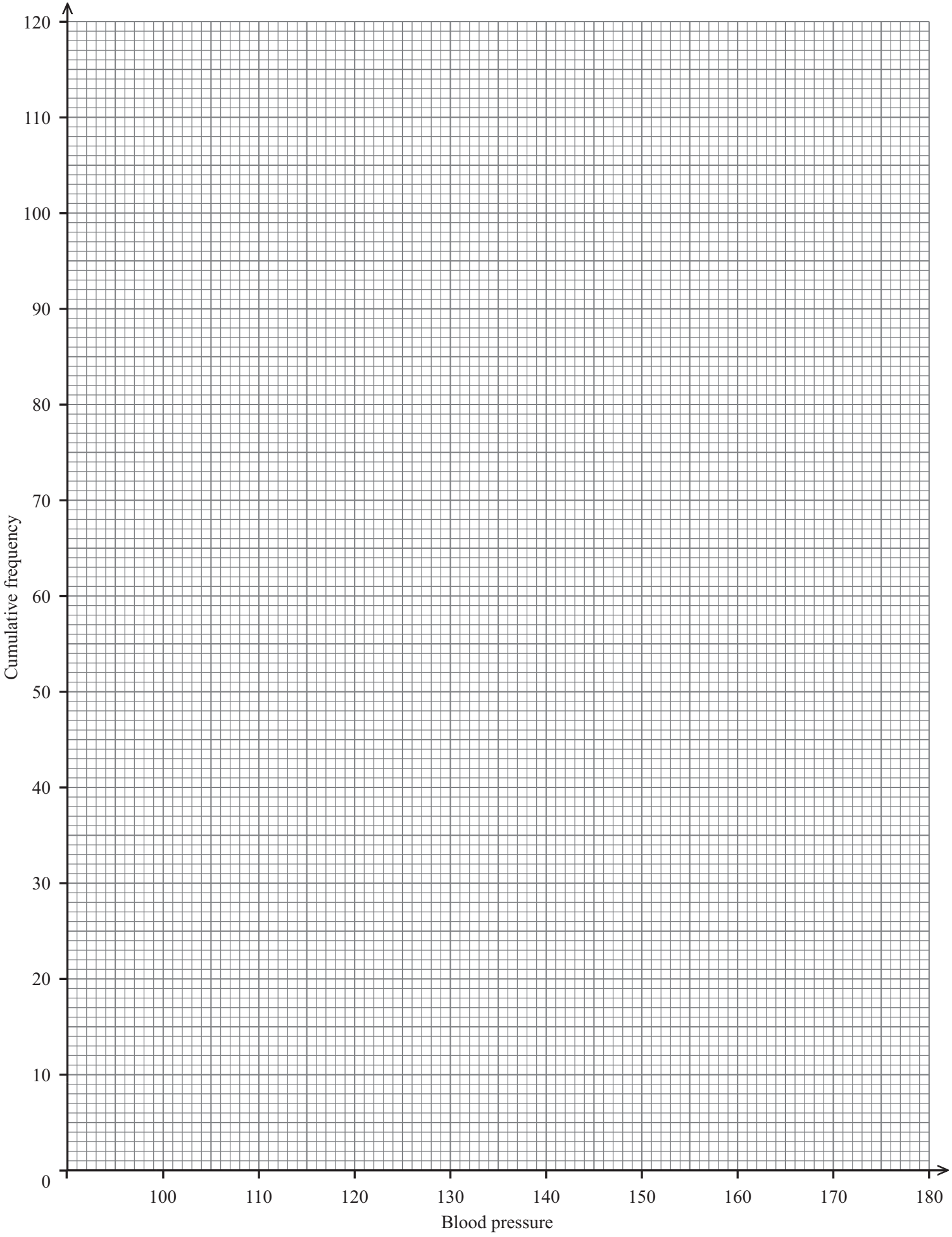
(a) Complete the cumulative frequency table. [1]

(b) Draw a cumulative frequency graph to illustrate this information. [3]

(c) All those men with readings less than 100 or more than 150 must have a retest the following week. How many men must have a retest?

Answer _____ [2]

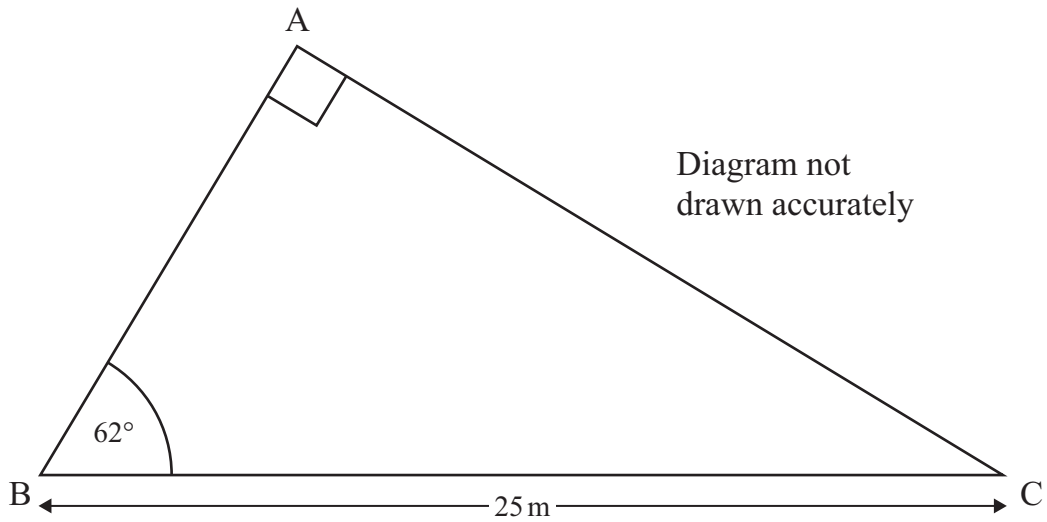
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120
110
100
90
80
70
60
50
40
30
20
10
0
Cumulative frequency
100
110
120
130
140
150
160
170
180
Blood pressure

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Examiner Only	
Marks	Remark

12



Calculate the length of the side AC.

Answer _____ m [3]

13 The total bill in a restaurant is £49.22, including a service charge of 15%.
Calculate the bill before the service charge.

Answer £ _____ [3]

THIS IS THE END OF THE QUESTION PAPER

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GCSE

Mathematics (Modular)

Summer 2010

Mark Schemes

Issued: October 2010

STEMUP.CO.UK

General Certificate of Secondary Education
2010

Mathematics

Module N3 Paper 2
(With calculator)
Higher Tier

[GMN32]

TUESDAY 1 JUNE

10.30 am – 11.30 am

MARK SCHEME

STEMUP.CO.UK

GCSE MATHEMATICS 2010

Introduction

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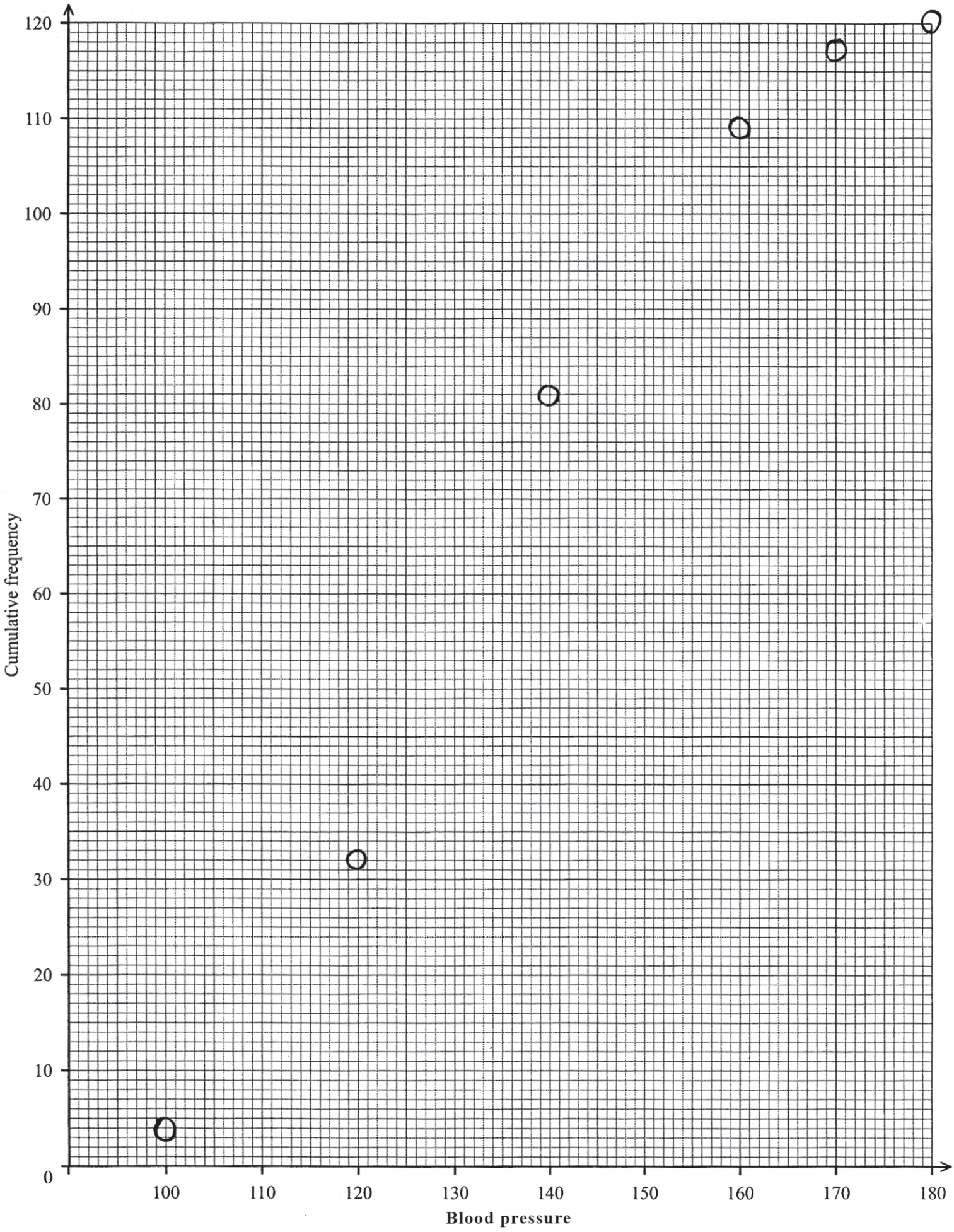
			AVAILABLE MARKS
1	one correct point second correct point correct line	MA1 A1 A1	3
2	axes, labels frequency diagram	A1 A2	3
3	Ventra – £3.84 } 1st value correct Viva – £3.20 } 2nd value correct Viva is better	M1, A1 MA1 MA1	4
4	Square and Rhombus	A1, A2	3
5	**(a)** $5x - 14 = 3x + 38$	A1	
	(b) $5x - 3x = 38 + 14$	MA1	
	$2x = 52$	MA1	
	$x = 26$	A1	4
6	(1, 2)	A1, A1	2
7	**(a)** 45 – 54	A1	
	(b) Mid values 29.5, 39.5, 49.5, 59.5, 69.5, 79.5		
	"fx" values 383.5, 4226.5, 11583, 4224.5, 1529, 79.5	A1	
	22026/448 = 49.2 (1 d.p.)	M1, A1	4
8	**(a)** £1.28 − £1.04 = 24 pence	MA1	
	(b) It is less because the inter-quartile range for England is 10	A1	2

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			AVAILABLE MARKS
9	5% of 120 = 6 120 + 6 = 126	MA1	
	5% of 126 = 6.3 126 + 6.3 = 132.3	MA1	
	5% of 132.3 = 6.615 132.3 + 6.615 = 138.915	MA1	3
10	Curved part = $\pi \times 7.5 = 23.56...$	MA1, A1	
	Straight part = 15 23.56... + 15 = 38.6 cm	MA1	
		A1 units	4
11	**(a)** (4) 32, 81, 109, 117, 120	A1	
	(b) See overlay 6 points correct (allow MA1 for 4 points correct) curve	MA2 MA1	
	(c) 4 + (120 – correct reading from graph) = number retested	M1, A1	6
12	Sin 62° = AC/25	MA1	
	25 sin 62° = AC	MA1	
	AC = 22.07(368...)	A1	3
13	115% = £49.22	MA1	
	$100\% = \frac{49.22}{115} \times 100$	M1	
	£42.80	A1	3
		Total	**44**

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GCSE MATHEMATICS SUMMER 2010
MODULE N3-2
OVERLAYS QUESTION 11



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Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
January 2010

Mathematics



Module N3 Paper 2
(With calculator)
Higher Tier

[GMN32]

GMN32

TUESDAY 12 JANUARY

10.30 am – 11.30 am

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all thirteen** questions.
Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.

INFORMATION FOR CANDIDATES

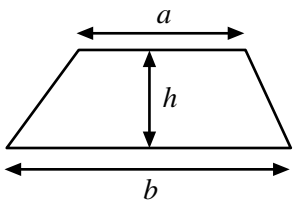
The total mark for this paper is 44.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
You should have a calculator, ruler, compasses, set-square and protractor.
The Formula Sheet is on page 2.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
Total Marks	

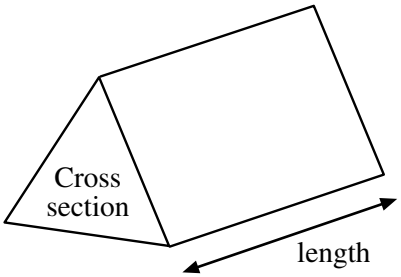
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Formula Sheet

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



Volume of prism = area of cross section × length

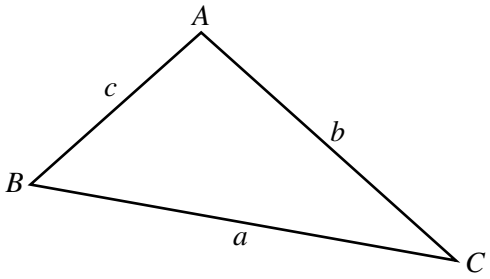


In any triangle ABC

Area of triangle = $\frac{1}{2}ab\sin C$

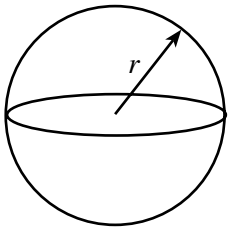
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule: $a^2 = b^2 + c^2 - 2bc\cos A$



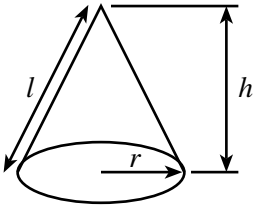
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

Curved surface area of cone = πrl



Quadratic equation:

The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

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

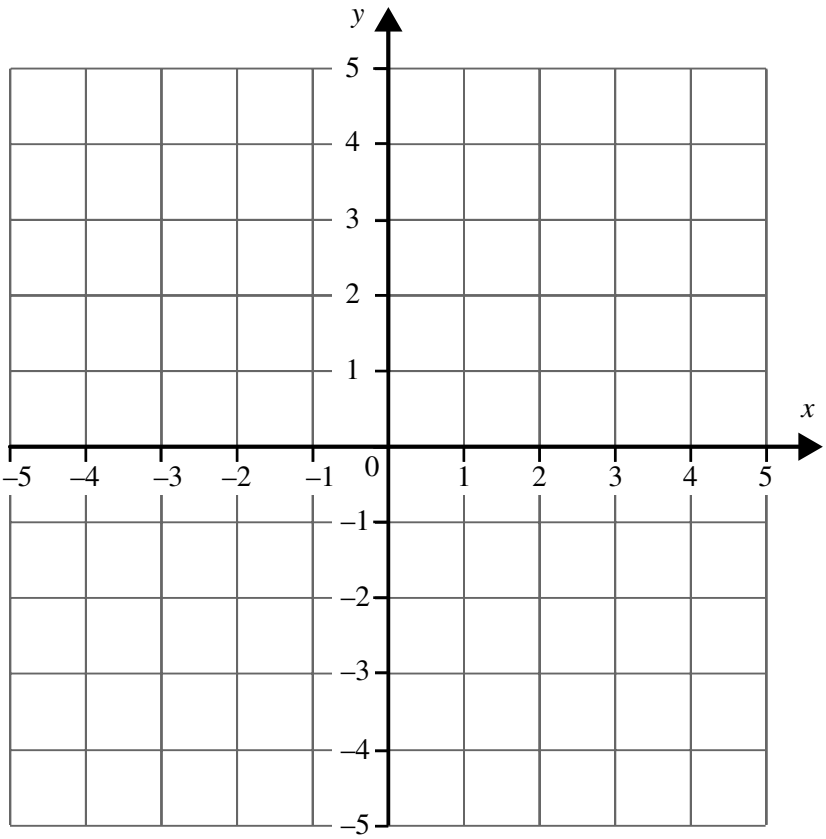
Examiner Only	
Marks	Remark

1 Calculate $\dfrac{4.3\times 3.9}{7.8-1.9}$ correct to one decimal place.

Answer _____ [2]

---

2 **(a)** Draw the graph of $y = 2x - 3$ on the grid below.



[3]

(b) Factorise $6 + 10x$

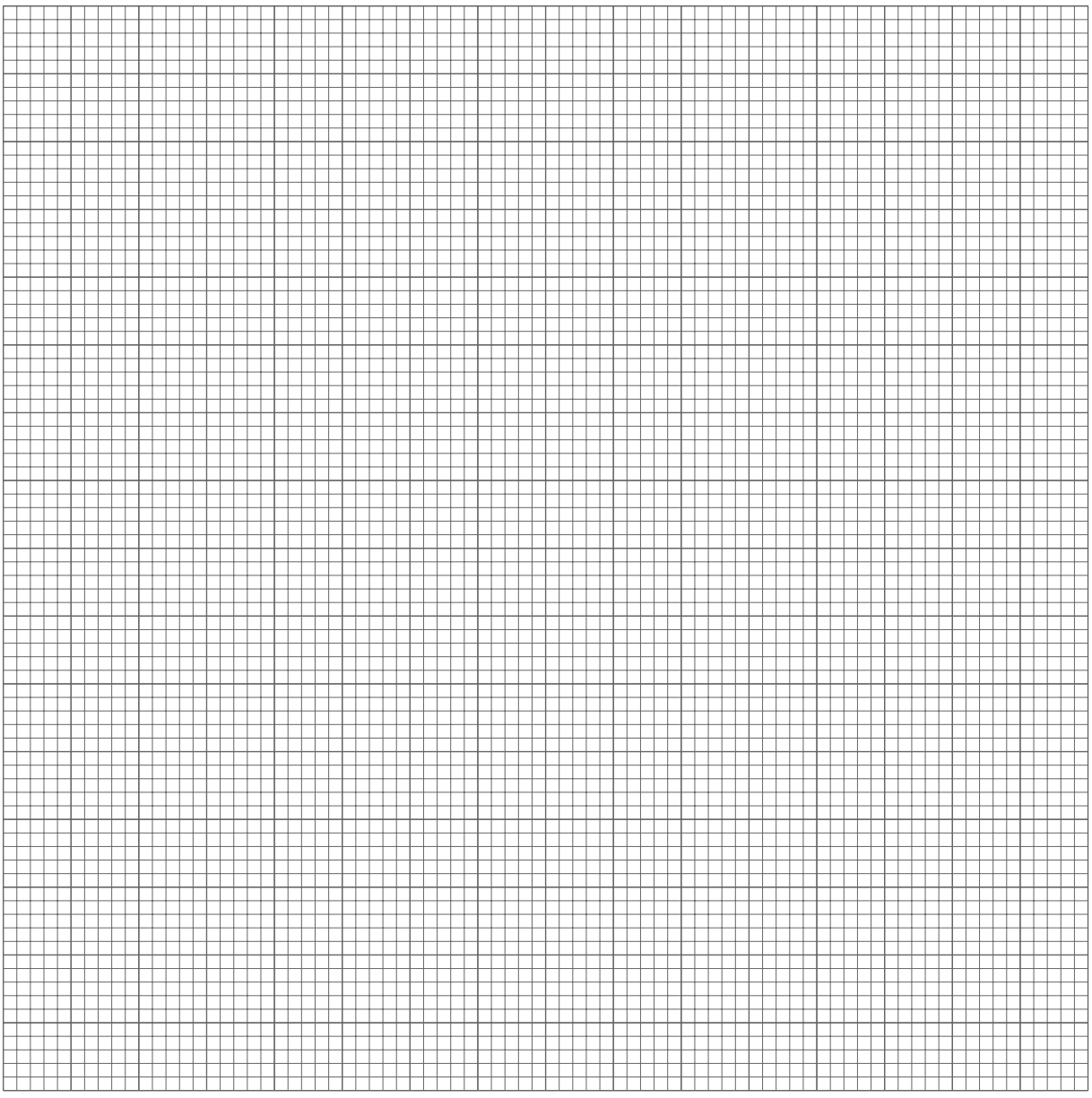
Answer _____ [1]

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3 Penny recorded the play time of each of the tracks on her iPod.
The results are recorded in the table below.

Time (t seconds)	$90 < t \leqslant 120$	$120 < t \leqslant 150$	$150 < t \leqslant 180$	$180 < t \leqslant 210$	$210 < t \leqslant 240$
Frequency	22	35	18	10	6

(a) Show this information on a grouped frequency diagram.



[3]

Examiner Only	
Marks	Remark

(b) What is the modal class interval?

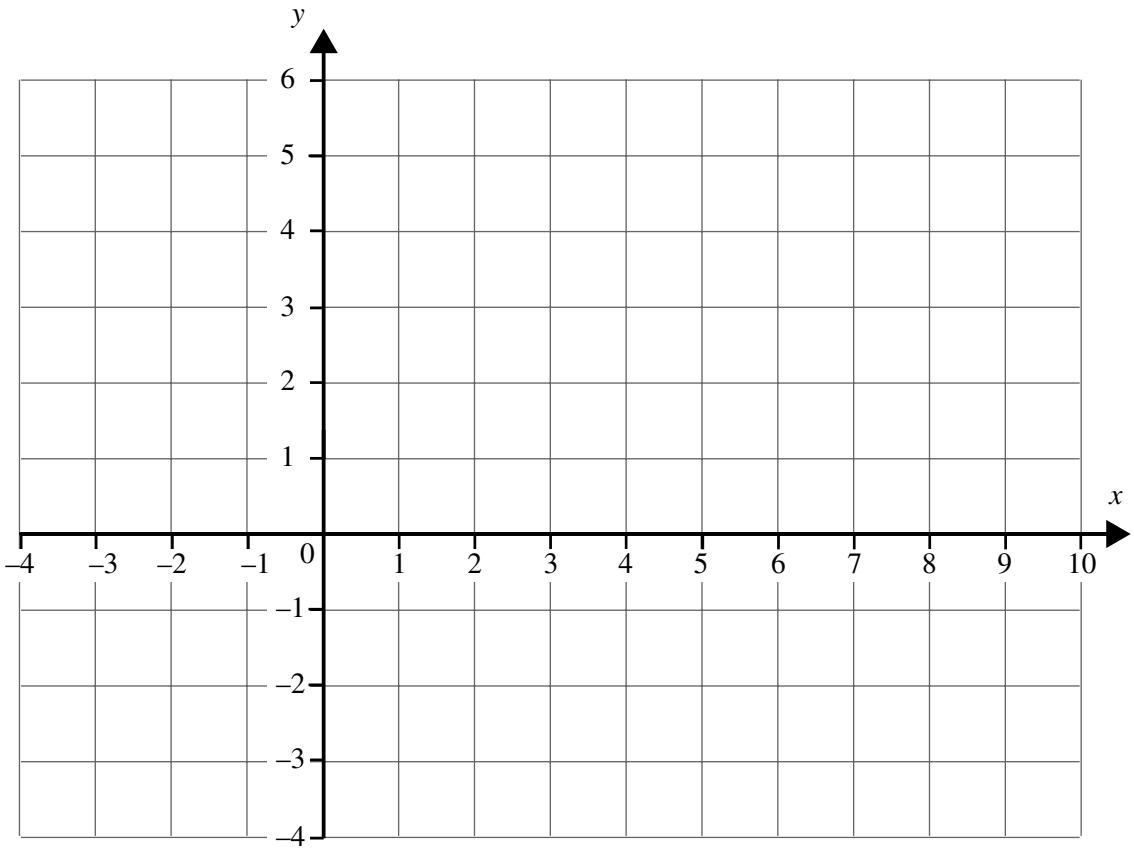
Answer _____ [1]

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4 **(a)** Change 4.6 m^2 into cm^2.

Answer _____ cm^2 [2]

(b)



G is the point (–2, 4). H is the point (8, –2).
Find the co-ordinates of the midpoint of GH.

Answer (_____ , _____) [2]

Examiner Only

Marks	Remark

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5 The lines PQ and RS are parallel.

Write down the size of angles a and b.

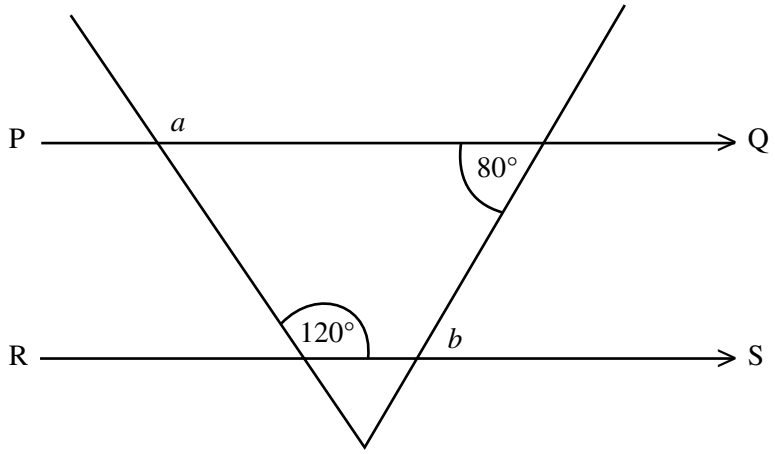


Diagram not drawn accurately

Answer a = _____ °

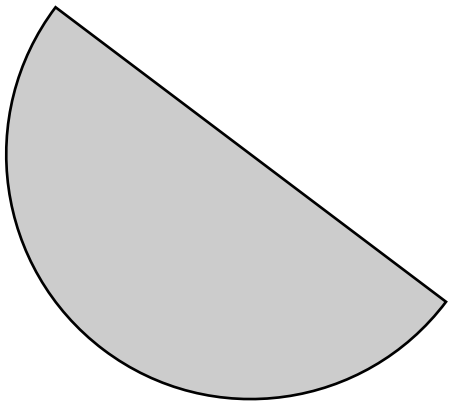
b = _____ ° [2]

Examiner Only	
Marks	Remark

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Examiner Only	
Marks	Remark

6



Calculate the perimeter of a semicircle with diameter 8 cm.

Answer _____ [4]

---

7 In September, Georgina received £600 commission on sales she had made that month.
In October she received 15% less than September.
In November her commission **increased** by 18% and in December by 25% on the previous month.
How much commission did Georgina receive in December?

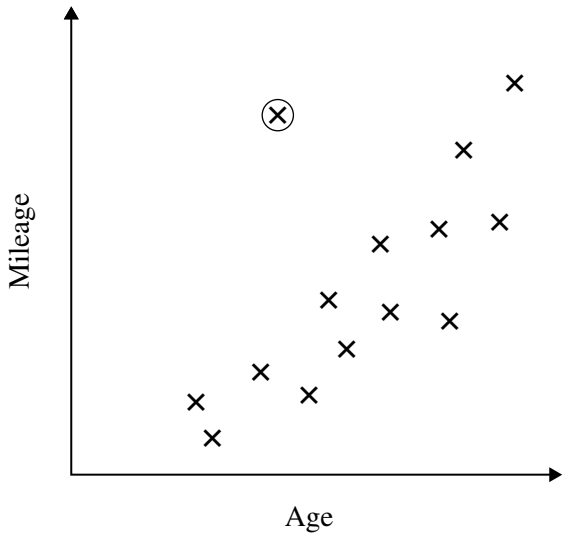
Show all your working.

Answer £ _____ [3]

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Examiner Only	
Marks	Remark

8 **(a)** The scatter graph shows the relationship between the ages of cars and their mileage.



Suggest a reason for the unusual point (circled).

Answer _____

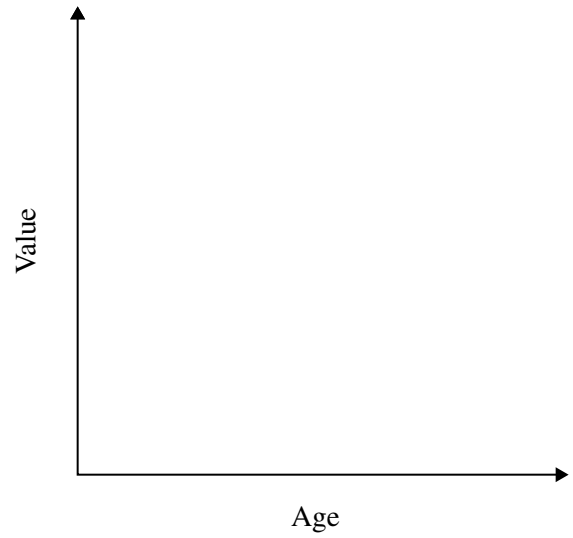
_____ [1]

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(b) (i) What type of correlation exists between the ages of cars and their value?

Answer _____ [1]

(ii) Sketch a scatter graph with at least six points to illustrate this correlation. [1]



(c) Write down a variable for cars which would have no correlation to the ages of the cars.

Answer _____ [1]

Examiner Only

Marks	Remark

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9 The size of the angles, in degrees, of the triangle below are $2x$, $2x + 19$ and $x + 16$.

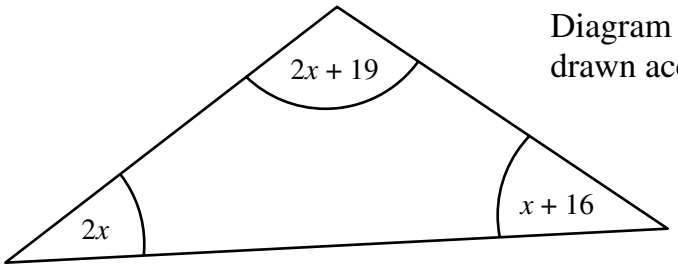


Diagram not drawn accurately

(a) Use the information to write down an equation in terms of x.

Answer _____ [1]

(b) Solve your equation to find the value of x.

Answer x = _____° [2]

Examiner Only

Marks	Remark

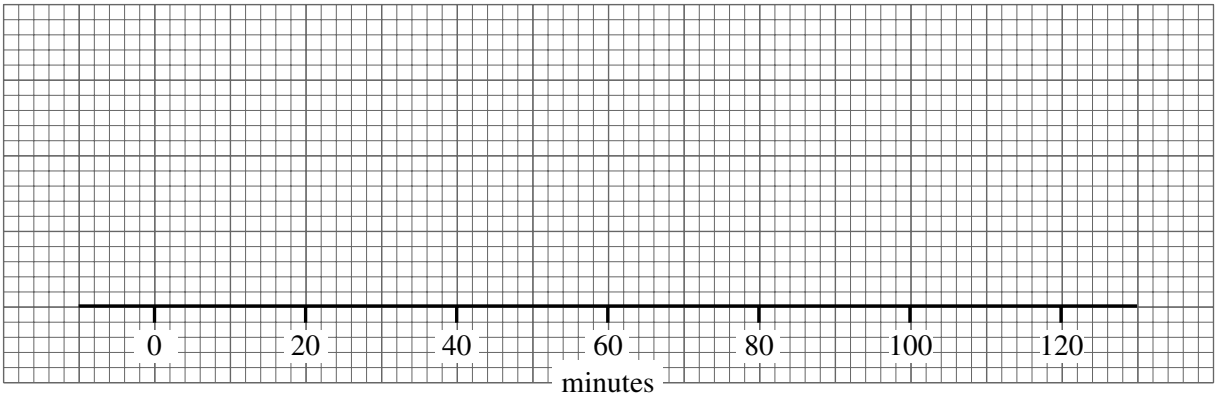
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10 A tennis club holds a Junior Tournament.
The time taken to complete each match is recorded.

(a) The statistical data for the girls' matches is:

Minimum time	42 minutes
Maximum time	104 minutes
Lower quartile	68 minutes
Upper quartile	90 minutes
Median time	84 minutes

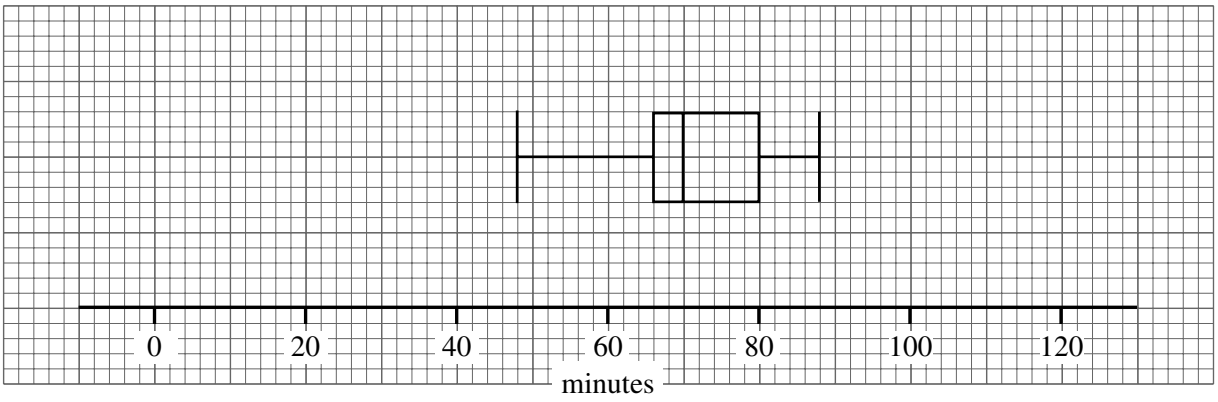
Draw a box plot to illustrate this data.



[2]

Examiner Only	
Marks	Remark

(b) Similar data is recorded for the boys' matches and a box plot drawn.



Give **two** comments on the times taken to complete the girls' matches compared to the times taken to complete the boys' matches.

Examiner Only	
Marks	Remark

_____ [1]

_____ [1]

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Examiner Only	
Marks	Remark

11 St Elsewhere High School had an 8% absence rate on a particular day.

If there were 989 pupils present, how many pupils were absent?

Answer _____ [3]

12

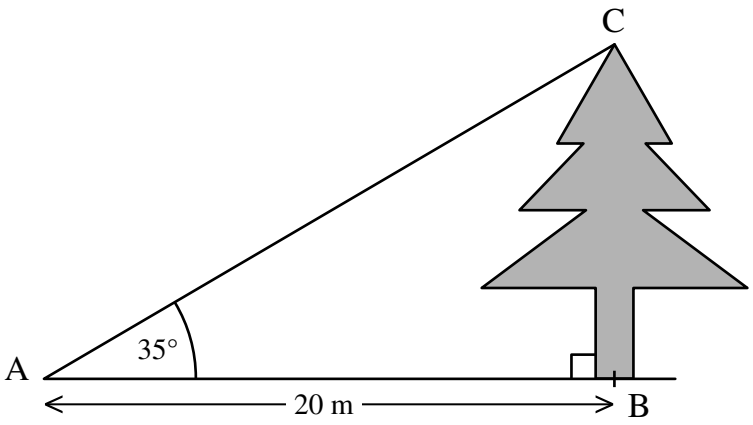


Diagram not drawn accurately

The angle of elevation from A to the top of the tree C is 35°.
The distance AB = 20 m.

Calculate the height BC of the tree.

Answer _____ m [3]

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13 **(a)** Expand and simplify $(3x + 5)(4x - 2)$

Examiner Only	
Marks	Remark

Answer _____ [2]

(b) Factorise $x^2 - 3x - 40$

Answer _____ [2]

THIS IS THE END OF THE QUESTION PAPER

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GCSE

Mathematics (Modular)

January 2010

Mark Schemes

Issued: April 2010

Rewarding Learning

General Certificate of Secondary Education
January 2010

Mathematics

Module N3 Paper 2
(With calculator)
Higher Tier

[GMN32]

TUESDAY 12 JANUARY

10.30am – 11.30am

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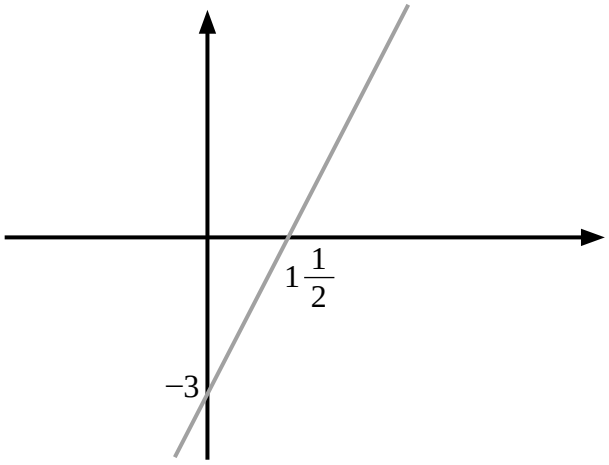
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			AVAILABLE MARKS
1	2.8423	MA1	
	2.8	A1	2
2	**(a)** correct point	MA1	
	2nd point	MA1	
	line	MA1	



	(b) $2(3 + 5x)$	A1	4
3	**(a)** diagram	M1, A2	
	(b) $120 < t \leq 150$	MA1	4
4	**(a)** $4.6 \times 10\,000$	MA1	
	46 000	A1	
	(b) (3,1)	A1, A1	4
5	120	A1	
	80	A1	2
6	$\pi \times 8 \div 2 = 12.56637061$	M1, A1	
	20.56637061 cm	A1, A1 units	4

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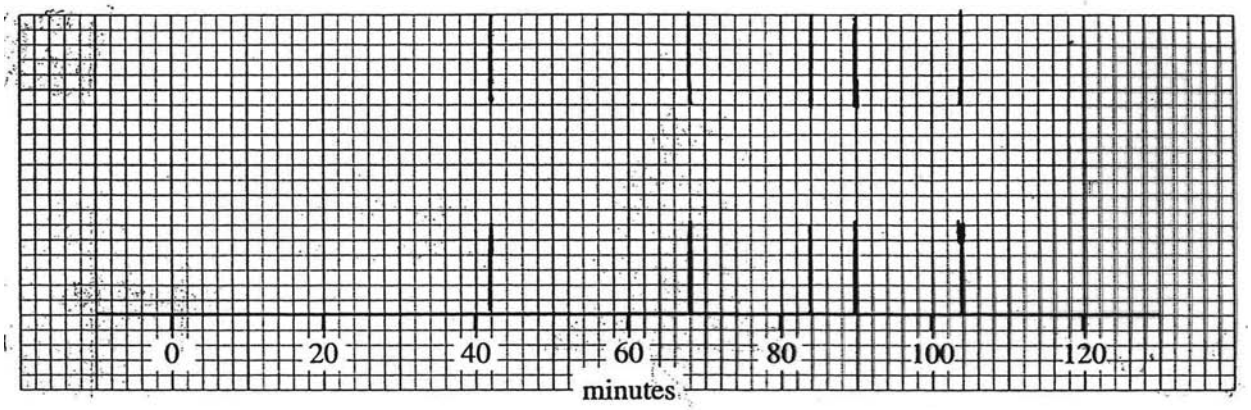
				AVAILABLE MARKS
7	October	$600 \times 0.85 = £510$	MA1	
	November	$510 \times 1.18 = £601.80$	MA1	
	December	$601.80 \times 1.25 = £752.25$	MA1	3
8	**(a)**	Possibly a salesman who travels a lot of miles (or other suitable explanation)	A1	
	(b)	**(i)** Negative	A1	
		(ii) Suitable sketch	A1	
	(c)	For example height, number of doors, amount of tyre wear, age of owner	A1	4
9	**(a)**	$2x + 2x + 19 + x + 16 = 180$ or equivalent	MA1	
	(b)	$5x = 145$	MA1	
		$x = 29$	A1	3
10	**(a)**	Box plot drawn	M1, A1	
	(b)	Boys' matches completed quicker – lower median/quartiles	A1	
		Greater range of times in girls' matches	A1	4
11	$989 = 92\%$		MA1	
	$8\% = \frac{989}{92} \times 8$		MA1	
	$= 86$ absent		A1	3
12	$\text{Tan } 35° = \frac{BC}{20}$		MA1	
	$BC = 20 \text{ Tan } 35°$		MA1	
	14(.00415076)		A1	3

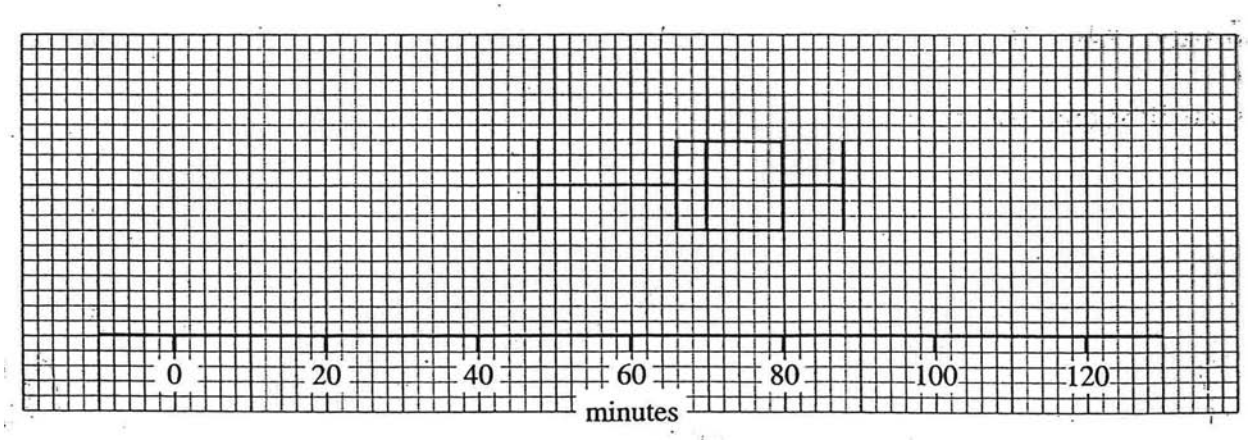
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			AVAILABLE MARKS
13	**(a)** $12x^2 + 20x - 6x - 10$	MA1	
	$12x^2 + 14x - 10$	MA1	
	(b) $(x + 5)(x - 8)$	MA2	4
		Total	**44**

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GCSE MATHEMATICS JANUARY 2010
MODULE N3-2
OVERLAY QUESTION 10





Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education

2009

Mathematics



Module N3 Paper 2
(With calculator)
Higher Tier

[GMN32]

GMN32

MONDAY 18 MAY

2.45 pm – 3.45 pm

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all twelve** questions.
Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.

INFORMATION FOR CANDIDATES

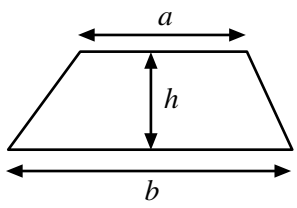
The total mark for this paper is 44.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
You should have a calculator, ruler, compasses, set-square and protractor.
The Formula Sheet is on page 2.

For Examiner's use only	
Question Number	**Marks**
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
Total Marks	

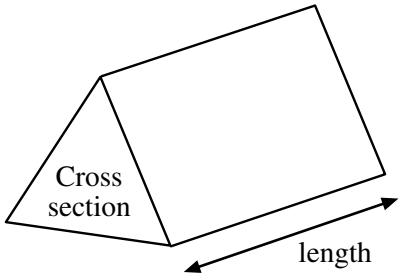
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Formula Sheet

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



Volume of prism = area of cross section × length

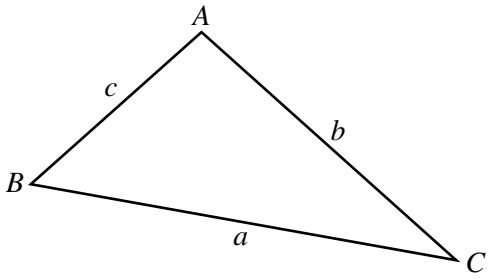


In any triangle *ABC*

Area of triangle = $\frac{1}{2}ab\sin C$

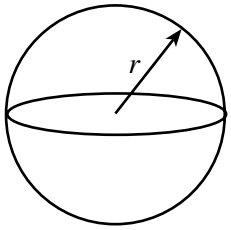
Sine rule: $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

Cosine rule: $a^2 = b^2 + c^2 - 2bc\cos A$



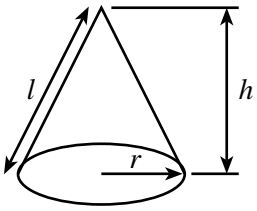
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

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

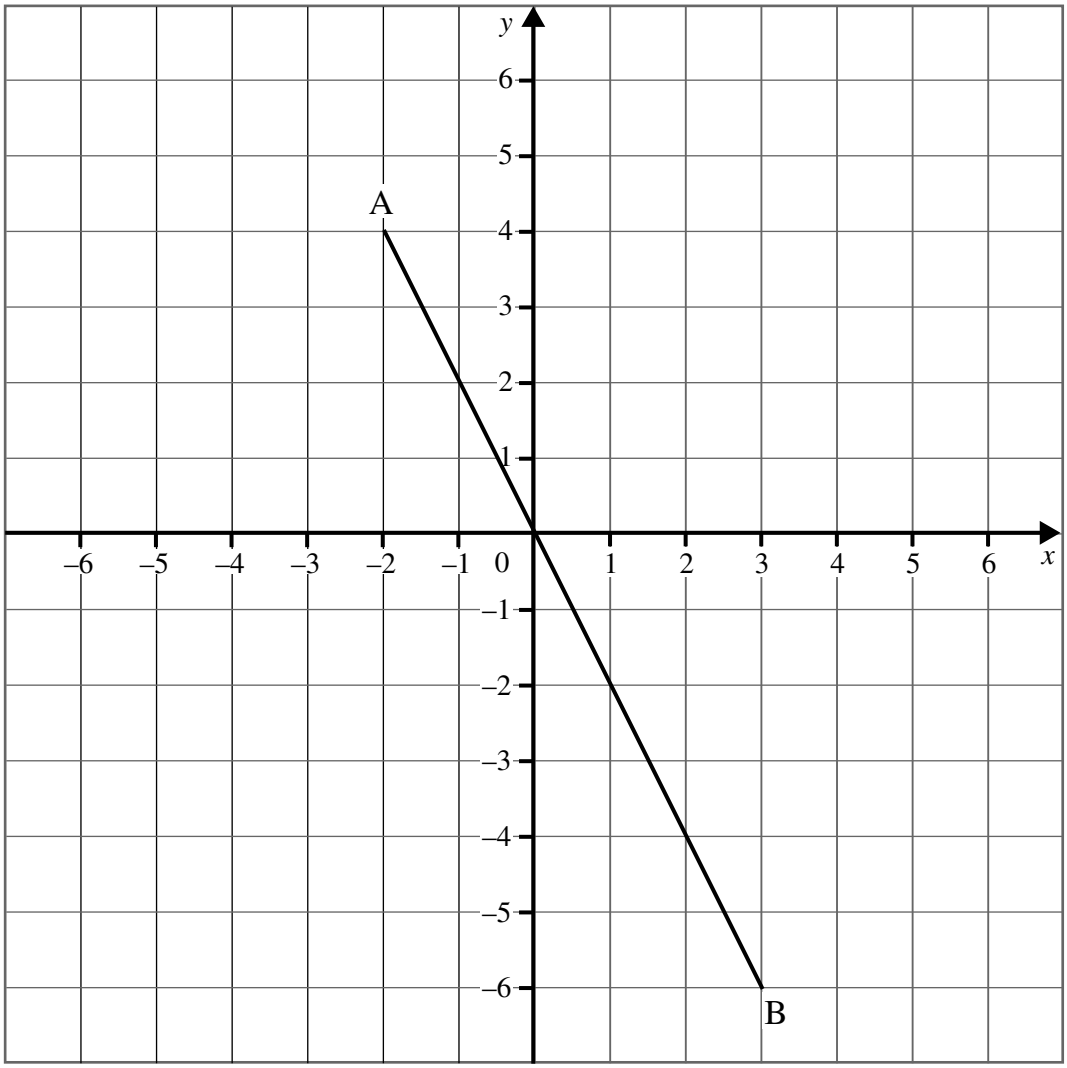


Quadratic equation:

The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

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

1



A is the point (–2, 4). B is the point (3, –6).

Find the midpoint of AB.

Answer (____, ____) [2]

Examiner Only	
Marks	Remark

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Examiner Only	
Marks	Remark

2 The heights (in centimetres) of twenty boys in a local hockey club are:

181	170	162	153	182	171	163	158	185	174
166	157	177	167	178	167	178	167	169	168

Construct a stem and leaf diagram to illustrate these heights.

[3]

3 A wardrobe is priced at £640
In a sale its price was reduced by 35%.
Calculate the sale price of the wardrobe.

Answer £_____ [3]

4 Construct a rhombus of side 6.5 cm which has one of its diagonals 5 cm in length.

[4]

Examiner Only	
Marks	Remark

---

5 Katy wants to know how many times a month, on average, the people in her town go to the cinema. She asks 200 pupils in her school.

Explain why Katy's sample may not be representative of the people in her town.

Answer _____

_____ [1]

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Examiner Only	
Marks	Remark

6 **(a)** Expand and simplify $4(2a + 3) - 7$

Answer _____ [2]

(b) Factorise

(i) $6a - 10$

Answer _____ [1]

(ii) $a^2 + a$

Answer _____ [1]

---

7 A man is filling his garden pond with water. He can fill a bucket of water and empty it into the pond every 25 seconds.
The bucket holds 15 litres of water.
It takes the man 4 minutes and 35 seconds to fill the pond.

What volume of water does the pond hold?

Answer _____ [4]

---

8 Use trial and improvement to solve $x^3 - 2x = 41$
giving the answer correct to 1 decimal place.
Show your working.

Answer _____ [4]

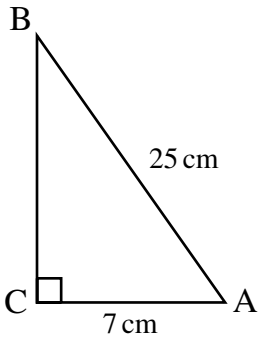
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Examiner Only	
Marks	Remark

9 £2500 is placed in a bank account and gains 4% compound interest per year.
What should be the total amount in the account at the end of 3 years?

Answer £ _____ [3]

10



(a) Calculate the length of BC in the right-angled triangle.

Answer _____ cm [3]

(b) Calculate the size of angle BAC.

Answer _____ ° [3]

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Examiner Only	
Marks	Remark

11 The number of trees undamaged in an orchard after a hurricane was 220.
It was observed that 12% had been damaged.
How many trees were in the orchard before the hurricane?

Answer _____ [3]

---

12 Peter is a gardener. He recorded how much money he made each week for 40 weeks.

Money in £ (m)	**Frequency**	**Money in £**	**Cumulative frequency**
$180 \leqslant m < 200$	4	< 200	4
$200 \leqslant m < 220$	7	< 220	11
$220 \leqslant m < 240$	12	< 240	
$240 \leqslant m < 260$	9		
$260 \leqslant m < 280$	5		
$280 \leqslant m < 300$	2		
$300 \leqslant m < 320$	1		

(a) Complete the table. [1]

(b) Draw the cumulative frequency graph on the opposite page. [3]

(c) Use the graph to estimate

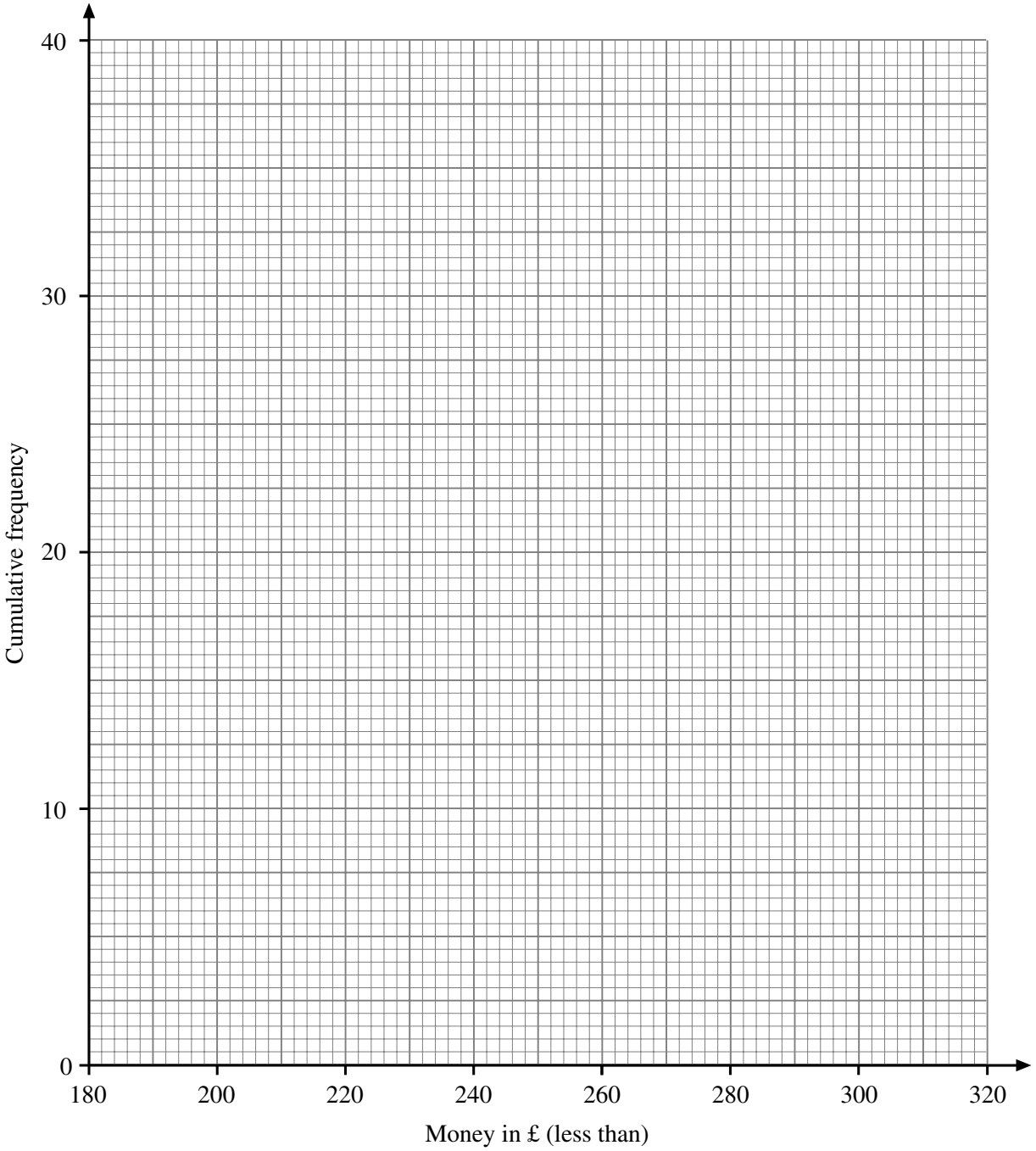
(i) the median,

Answer £_____ [1]

(ii) the inter-quartile range.

Answer £_____ [2]

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THIS IS THE END OF THE QUESTION PAPER

GCSE

Mathematics (Modular)

Summer 2009

Mark Schemes

Issued: October 2009

Rewarding Learning

General Certificate of Secondary Education

Summer 2009

Mathematics

Module N3 Paper 2

(With calculator)

Higher Tier

[GMN32]

MONDAY 18 MAY

2.45 pm – 3.45 pm

MARK SCHEME

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GCSE MATHEMATICS 2009

Introduction

The mark scheme normally provides the most popular solution to each question. Other solutions given by candidates are evaluated and credit given as appropriate; these alternative methods are not usually illustrated in the published mark scheme.

The marks awarded for each question are shown in the right hand column and they are prefixed by the letters **M**, **A** and **MA** as appropriate. The key to the mark scheme is given below:

M indicates marks for correct method.

A indicates marks for accurate working, whether in calculation, readings from tables, graphs or answers.

MA indicates marks for combined method and accurate working.

The solution to a question gains marks for correct method and marks for an accurate working based on this method. Where the method is not correct no marks can be given.

A later part of a question may require a candidate to use an answer obtained from an earlier part of the same question. A candidate who gets the wrong answer to the earlier part and goes on to the later part is naturally unaware that the wrong data is being used and is actually undertaking the solution of a parallel problem from the point at which the error occurred. If such a candidate continues to apply correct method, then the candidate's individual working must be followed through from the error. If no further errors are made, then the candidate is penalised only for the initial error. Solutions containing two or more working or transcription errors are treated in the same way. This process is usually referred to as "follow-through marking" and allows a candidate to gain credit for that part of a solution which follows a working or transcription error.

It should be noted that where an error trivialises a question, or changes the nature of the skills being tested, then as a general rule, it would be the case that not more that half the marks for that question or part of that question would be awarded; in some cases the error may be such that no marks would be awarded.

Positive marking:

It is our intention to reward candidates for any demonstration of relevant knowledge, skills or understanding. For this reason we adopt a policy of **following through** their answers, that is, having penalised a candidate for an error, we mark the succeeding parts of the question using the candidate's value or answers and award marks accordingly.

Some common examples of this occur in the following cases:

(a) a numerical error in one entry in a table of values might lead to several answers being incorrect, but these might not be essentially separate errors;

(b) readings taken from candidates' inaccurate graphs may not agree with the answers expected but might be consistent with the graphs drawn.

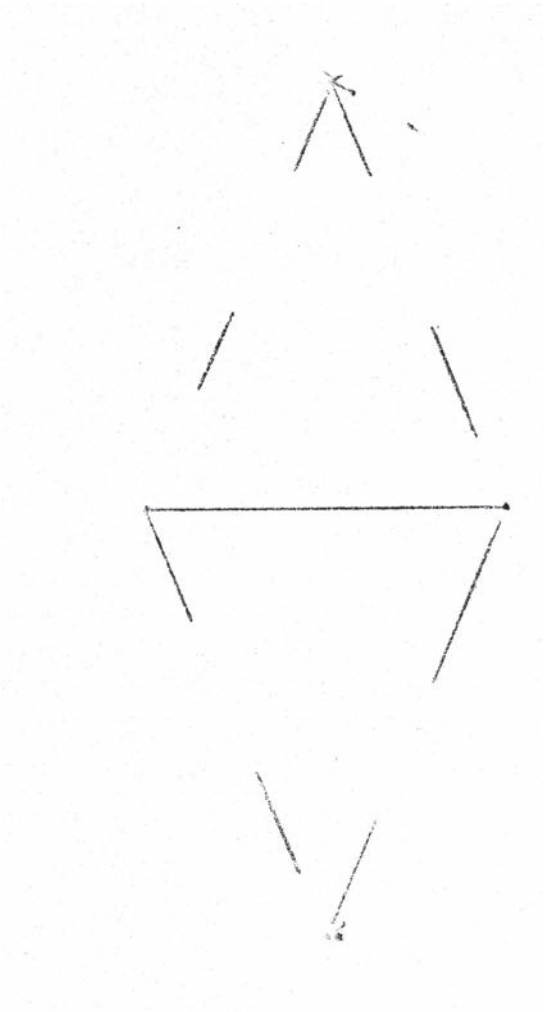
When the candidate misreads a question in such a way as to make the question easier only a proportion of the marks will be available (based on the professional judgement of the examiner).

			AVAILABLE MARKS
1	$(\frac{1}{2}, -1)$	A1A1	2
2	15 | 3 7 8 16 | 2 3 6 7 7 7 8 9 17 | 0 1 4 7 8 8 18 | 1 2 5	M1A1	
	Key: 15 | 7 means 157 cm	MA1	3
3	35% of £640 $= \frac{35}{100} \times 640$	M1	
	$=$ £224	A1	
	s.p. = £640 – £224 = £416	MA1	3
4	Diagonal 5 cm (±2 mm)	A1	
	Arcs 6.5 cm (±2 mm) above and below diagonal	A1A1	
	Rhombus completed	A1	4
5	Suitable answer, e.g. sample is made up totally of young people/teenagers etc. sample does not represent all age groups etc.	A1	1
6	**(a)** 8a + 12 – 7	MA1	
	= 8a + 5	A1	
	(b) **(i)** 2(3a – 5)	MA1	
	(ii) a(a + 1)	MA1	4
7	4 minutes 35 sec = 275 seconds	MA1	
	$\frac{275}{25}$ = 11 buckets	MA1	
	11 × 15 = 165 litres	MA1A1 units	4
8	$x = 4$ 56 $x = 3$ 21	MA1	
	$x = 3.6$ 39.456 $x = 3.7$ 43.253	MA1	
	$x = 3.65$ 41.327 …	MA1	
	$x = 3.6$	A1	4

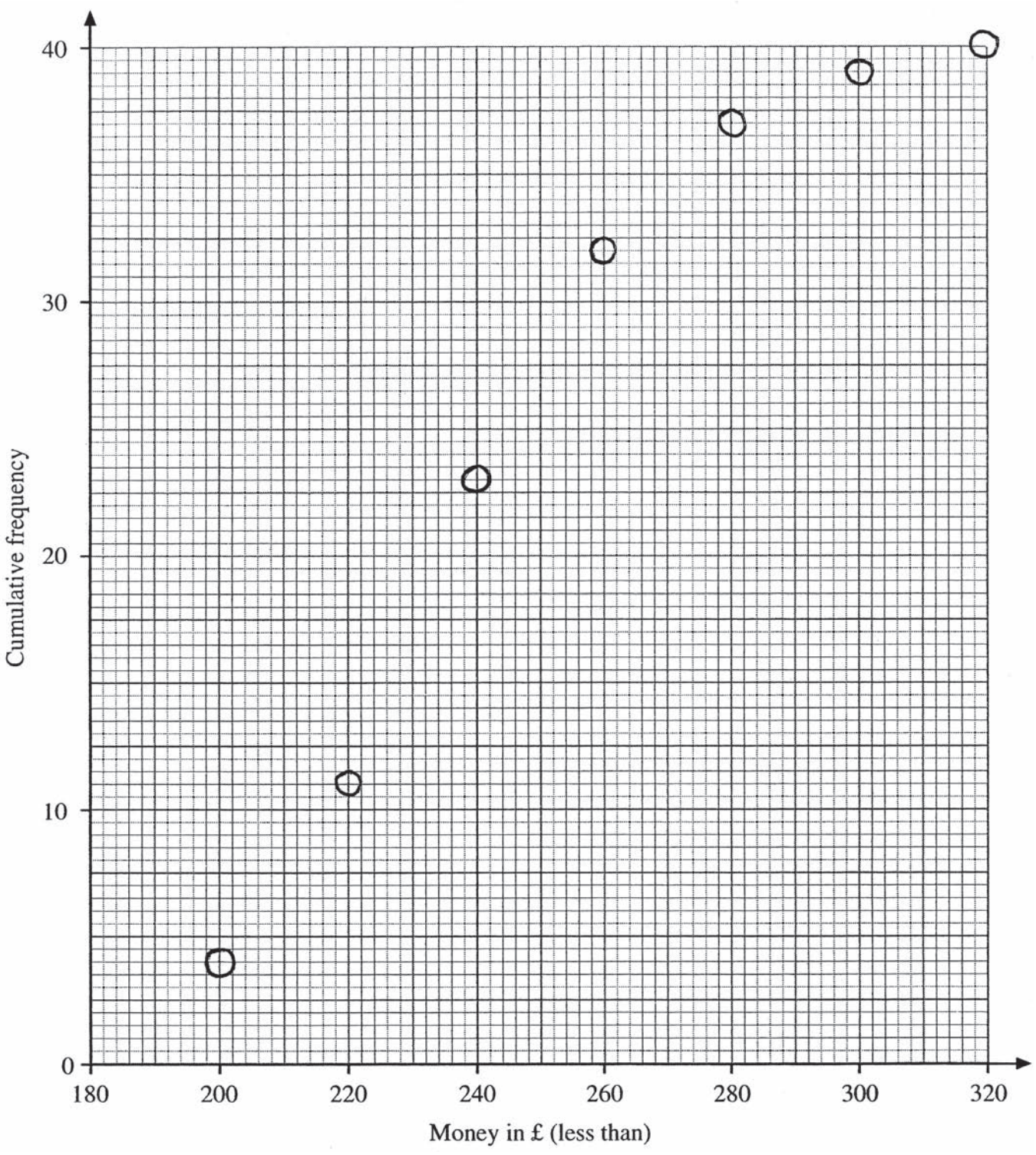
			AVAILABLE MARKS
9	1st yr Int = $\frac{4}{100} \times 2500 = £100$		
	Value yr 1 = 2500 + 100 = £2600	MA1	
	2nd yr Int = $\frac{4}{100} \times 2600 = £104$		
	Value yr 2 = 2600 + 104 = £2704	MA1	
	3rd yr Int = $\frac{4}{100} \times 2704 = £108.16$		
	Value yr 3 = £2812.16	MA1	3
10	**(a)** $25^2 = 7^2 + x^2$	MA1	
	$625 = 49 + x^2$		
	$576 = x^2$	MA1	
	BC = 24 cm	MA1	
	(b) $\cos BAC = \frac{7}{25}$	M1A1	
	BAC = 73.74	MA1	6
11	220 = 88%	M1	
	$\frac{220}{88} = 1\% = 2.5$	A1	
	$\frac{220}{88} \times 100 = 100\% = 250$	MA1	3
12	**(a)**		
	< 260 23		
	< 280 32		
	< 300 37		
	< 320 39		
	40	A1	
	(b) points plotted correctly	M1A1	
	smooth curve	A1	
	(c) **(i)** 235 (follow pupil's curve)	MA1	
	(ii) 256 – 217 (follow pupil's curve)	MA1	
	39	A1	7
		Total	**44**

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GCSE MATHEMATICS SUMMER 2009
MODULE N3-2
OVERLAYS QUESTION 4



GCSE MATHEMATICS SUMMER 2009
MODULE N3-2
OVERLAYS QUESTION 12



Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
January 2009

Mathematics



Module N3 Paper 2
(With calculator)
Higher Tier

[GMN32]

GMN32

FRIDAY 9 JANUARY

10.30 am – 11.30 am

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all thirteen** questions.
Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.

INFORMATION FOR CANDIDATES

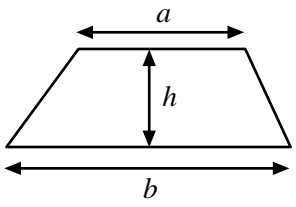
The total mark for this paper is 44.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
You should have a calculator, ruler, compasses, set-square and protractor.
The Formula Sheet is on page 2.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
Total Marks	

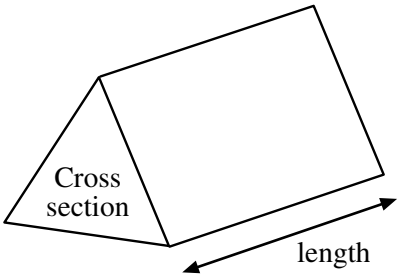
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Formula Sheet

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



Volume of prism = area of cross section × length

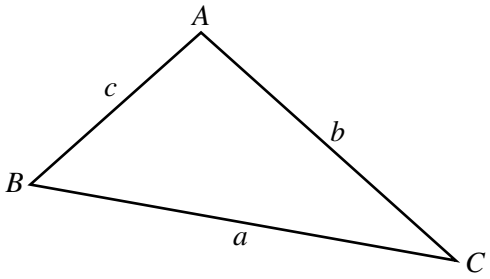


In any triangle *ABC*

Area of triangle = $\frac{1}{2}ab\sin C$

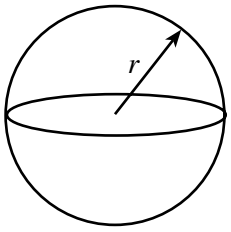
Sine rule : $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule: $a^2 = b^2 + c^2 - 2bc\cos A$



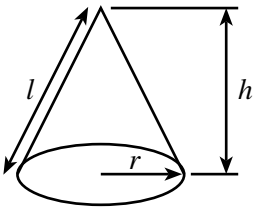
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

Curved surface area of cone = πrl



Quadratic equation:

The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

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

1 Calculate the area of a circle of radius 2.5 cm.

Answer _____ [3]

Examiner Only	
Marks	Remark

---

2 A new table is priced at £140
In a sale it is reduced by 35%
Calculate the sale price.

Answer £ _____ [3]

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Examiner Only	
Marks	Remark

3 The table shows the engine capacity in litres and the fuel consumption (number of miles per gallon (mpg)) for a selection of new cars.

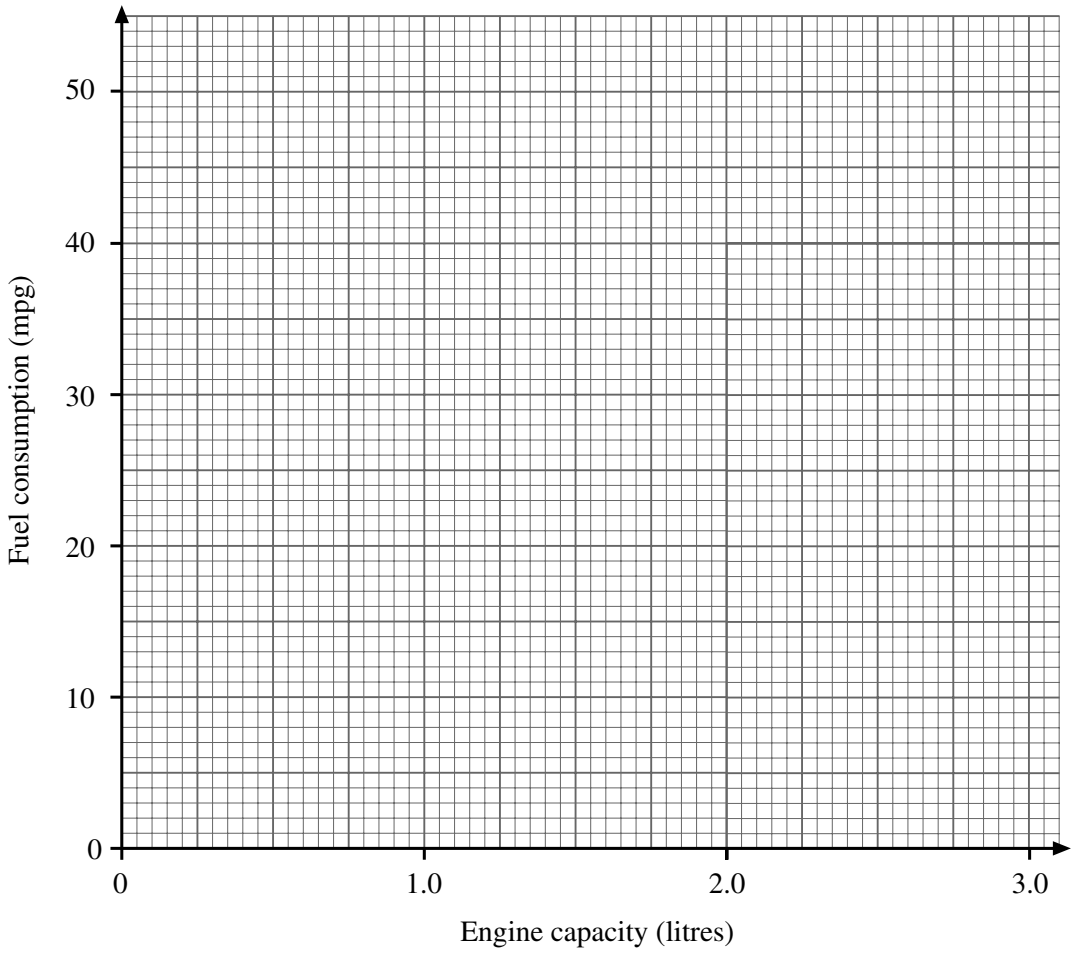
Car	Engine capacity (litres)	Fuel consumption (mpg)
Aster	1.3	45
Viva	2.0	37
Megro	2.5	32
Lazio	1.6	42
Torino	1.8	39
Serene	1.0	50

(a) Draw a scatter graph on the grid opposite to show the data in the table. [2]

(b) Draw a line of best fit for the data. [1]

(c) Using your line of best fit, what fuel consumption in mpg would you expect from a car with an engine capacity of 2.2 litres?

Answer _____ mpg [1]


Fuel consumption (mpg)
50
40
30
20
10
0
0
1.0
2.0
3.0
Engine capacity (litres)

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4 (a)

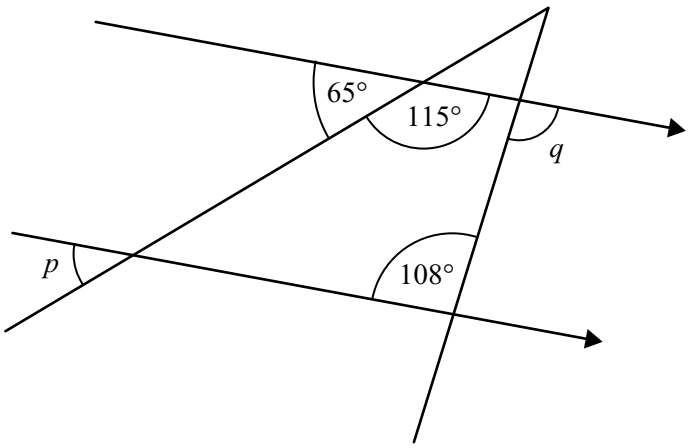


Diagram not drawn accurately

Calculate

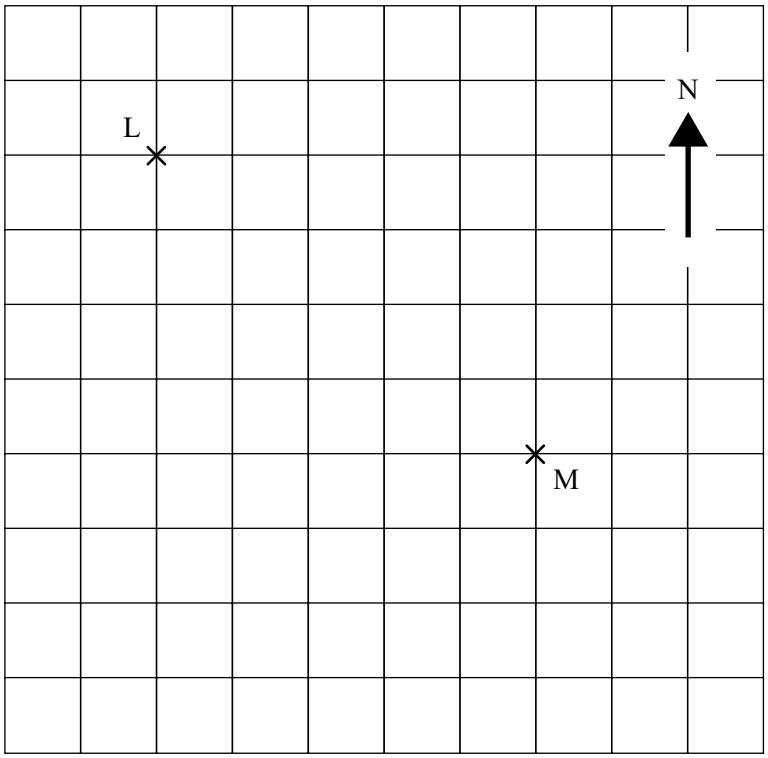
(i) angle p Answer _____° [1]

(ii) angle q Answer _____° [1]

Examiner Only	
Marks	Remark

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(b) Measure the bearing of L from M.



Answer _____° [1]

Examiner Only	
Marks	Remark

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Examiner Only	
Marks	Remark

5 In a game of Foozball a player scores 2 'Goals' worth x points each, 3 'Overs' worth y points each and 1 'Nearly' worth z points.

(a) Write down an expression in terms of x, y and z for the total number of points scored by this player.

Answer _____ [2]

(b) If the total points scored by this player were 19, how many points could each of the 3 scores have been worth?
Give **one** possible solution.

Points

1 Goal = _____

1 Over = _____

1 Nearly = _____ [2]

---

6 Ciara is using Trial and Improvement to find a value of x to satisfy the equation

$$x + \frac{1}{x} = 6$$

The table shows her first trial.

Value of x	$x + \frac{1}{x}$	Comment
2	2.5	Too Low

Complete the table to help her find the correct value of x to 1 decimal place.

Answer x = _____ [4]

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Examiner Only	
Marks	Remark

7 Carol leaves £1200 in the bank for three years.
It earns compound interest of 6% each year.

Calculate the total amount Carol has in the bank at the end of the three years.

Answer £ _____ [3]

8 The PSNI recorded the speeds of a number of vehicles passing under a bridge on the M2 motorway during a 2 minute period one morning.
The speeds recorded are in miles per hour (mph).

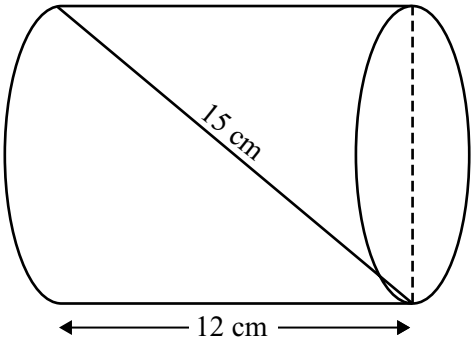
Speed s (mph)	**Frequency**		
$44 \leqslant s < 50$	3		
$50 \leqslant s < 56$	7		
$56 \leqslant s < 62$	8		
$62 \leqslant s < 68$	6		
$68 \leqslant s < 74$	5		
$74 \leqslant s < 80$	1		

Calculate an estimate for the mean speed.

Answer _____ mph [4]

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9



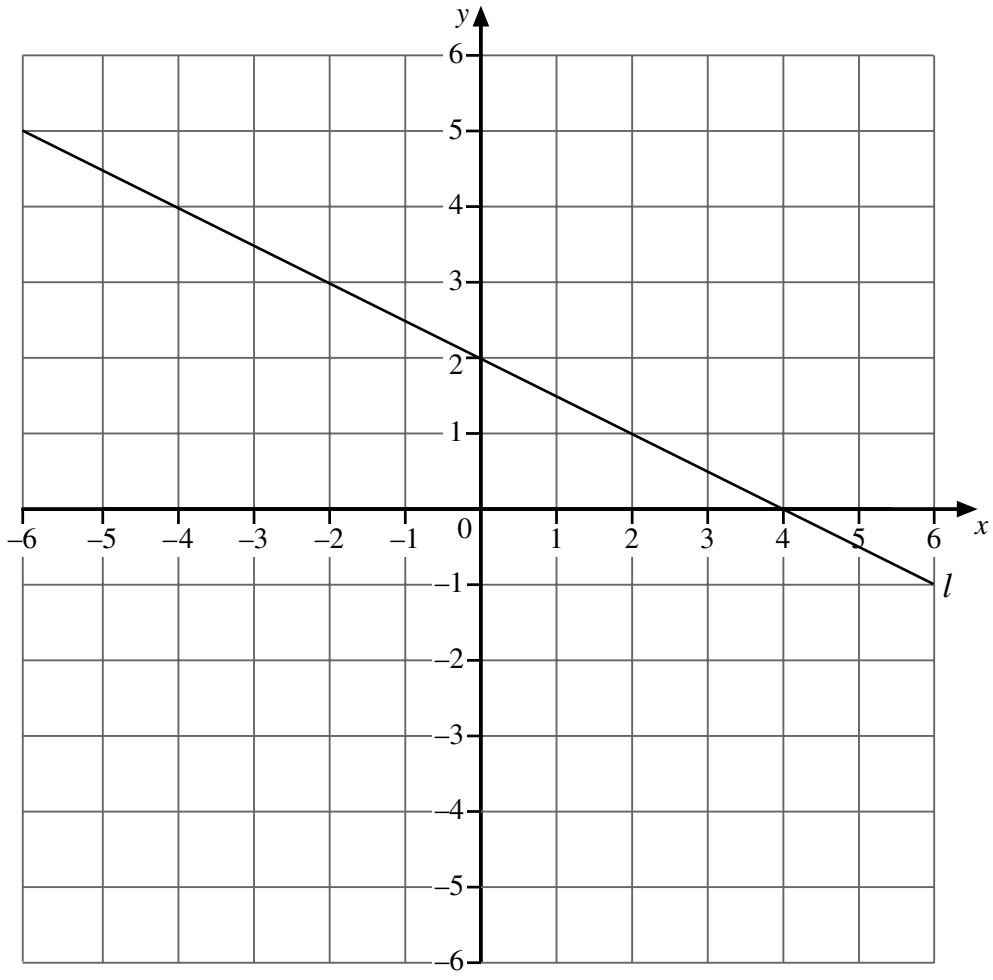
A straw of length 15 cm just fits inside a cylindrical container of length 12 cm as shown. Calculate the diameter of the cylinder.

Answer _____ cm [3]

Examiner Only	
Marks	Remark

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10



(a) **(i)** Find the gradient of the line l Answer _____ [1]

(ii) Hence write down the equation of this line in the form $y = mx + c$.

Answer _____ [2]

(b) Here are the equations of another 4 lines

Line 1: $y = 2x$
Line 2: $y = -2$
Line 3: $y = x - 3$
Line 4: $y = 2x - 2$

Which one of these lines is parallel to the line with equation $y = x - 2$?

Answer _____ [1]

Examiner Only	
Marks	Remark

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11 A coat has a sale price of £54.40 which is a saving of 15% on the original price.

What was the original price of the coat?

Answer £ _____ [3]

Examiner Only	
Marks	Remark

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12 The diagram shows a trapezium.

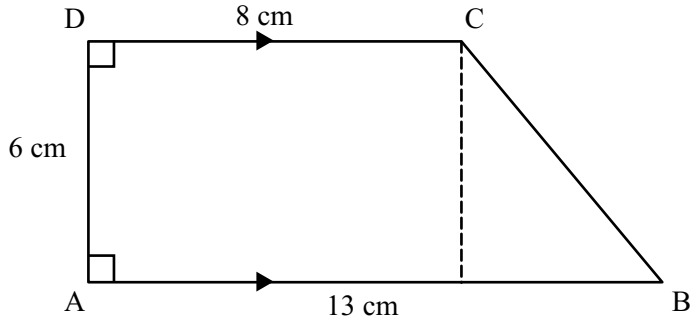


Diagram not drawn accurately

AB is parallel to DC. AB = 13 cm, AD = 6 cm and CD = 8 cm.

Calculate the size of angle B.

Answer _____° [3]

Examiner Only

Marks	Remark

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13

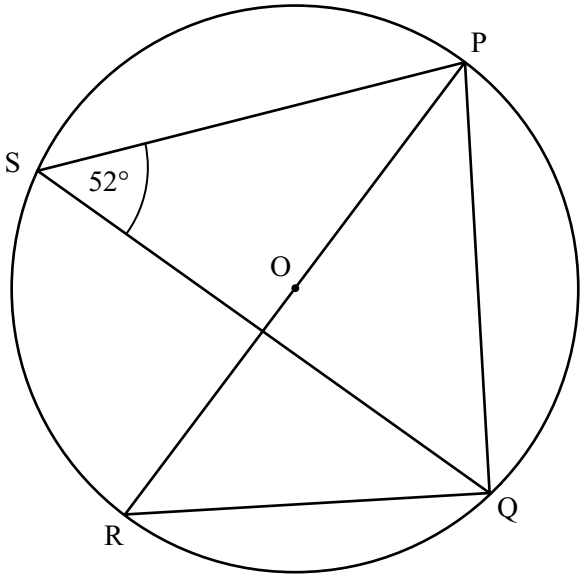


Diagram not drawn accurately

Examiner Only	
Marks	Remark

O is the centre of the circle.

(a) Explain why angle PQR = 90°

_____ [1]

(b) Calculate

(i) angle PRQ, Answer _____° [1]

(ii) angle POQ. Answer _____° [1]

THIS IS THE END OF THE QUESTION PAPER

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GCSE

Mathematics (Modular)

January 2009

Mark Schemes

Issued: April 2009

Rewarding Learning

General Certificate of Secondary Education

January 2009

Mathematics

Module N3 Paper 2

(With calculator)

Higher Tier

[GMN32]

FRIDAY 9 JANUARY

10.30 am – 11.30 am

MARK SCHEME

STEMUP.CO.UK

GCSE MATHEMATICS JANUARY 2009

Introduction

The mark scheme normally provides the most popular solution to each question. Other solutions given by candidates are evaluated and credit given as appropriate; these alternative methods are not usually illustrated in the published mark scheme.

The marks awarded for each question are shown in the right hand column and they are prefixed by the letters **M**, **A** and **MA** as appropriate. The key to the mark scheme is given below:

M indicates marks for correct method.

A indicates marks for accurate working, whether in calculation, readings from tables, graphs or answers.

MA indicates marks for combined method and accurate working.

The solution to a question gains marks for correct method and marks for an accurate working based on this method. Where the method is not correct no marks can be given.

A later part of a question may require a candidate to use an answer obtained from an earlier part of the same question. A candidate who gets the wrong answer to the earlier part and goes on to the later part is naturally unaware that the wrong data is being used and is actually undertaking the solution of a parallel problem from the point at which the error occurred. If such a candidate continues to apply correct method, then the candidate's individual working must be **followed through** from the error. If no further errors are made, then the candidate is penalised only for the initial error. Solutions containing two or more working or transcription errors are treated in the same way. This process is usually referred to as "follow-through marking" and allows a candidate to gain credit for that part of a solution which follows a working or transcription error.

It should be noted that where an error trivialises a question, or changes the nature of the skills being tested, then as a general rule, it would be the case that not more than half the marks for that question or part of that question would be awarded; in some cases the error may be such that no marks would be awarded.

Positive marking:

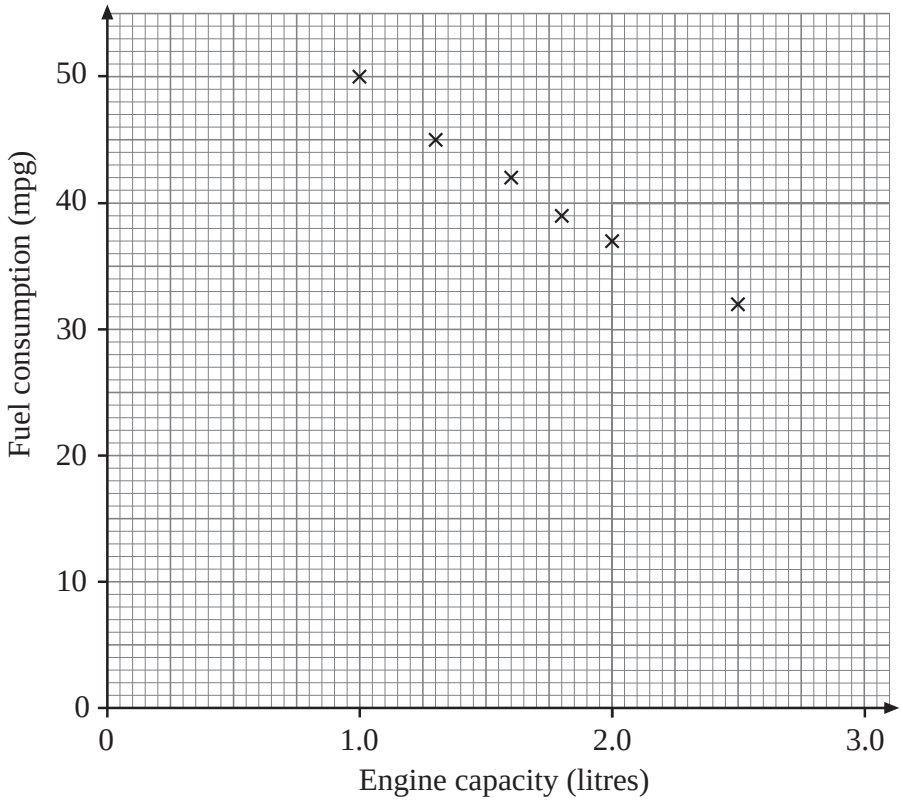
It is our intention to reward candidates for any demonstration of relevant knowledge, skills or understanding. For this reason we adopt a policy of **following through** their answers, that is, having penalised a candidate for an error, we mark the succeeding parts of the question using the candidate's value or answers and award marks accordingly.

Some common examples of this occur in the following cases:

(a) a numerical error in one entry in a table of values might lead to several answers being incorrect, but these might not be essentially separate errors;

(b) readings taken from candidates' inaccurate graphs may not agree with the answers expected but might be consistent with the graphs drawn.

When the candidate misreads a question in such a way as to make the question easier only a proportion of the marks will be available (based on the professional judgement of the examiner).

			AVAILABLE MARKS
1	$\pi \times 2.5^2$	MA1	
	$= 19.6\,\text{cm}^2$	A1 A1 units	3
2	$0.35 \times 140 = 49$	M1, A1	
	$140 - 49 = 91$	MA1	3
3			
	(a) points, A1 for 3 correct	A2	
	(b) line	A1	
	(c) reading from line	A1	4
4	**(a)** **(i)** 65°	A1	
	(ii) 108°	A1	
	(b) 309° (±2°)	MA1	3
5	**(a)** $2x + 3y + z$	A2 (A1 for 2 correct)	
	(b) 1 Goal = 6 Points 1 Over = 2 Points 1 Nearly = 1 Point or any alternative combination	A2	4

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					AVAILABLE MARKS
6	Try $x = 5$	5.2	Too low		
	Try $x = 6$	6.17	Too high	MA1	
	Try $x = 5.8$	5.97	Too low		
	Try $x = 5.9$	6.07	Too high	MA1	
	Try $x = 5.85$	6.02	Too high	MA1	
	Answer $x = 5.8$			A1	4
7	$1200 \times 0.06 = 72$				
	$1200 + 72 = 1272$			MA1	
	$1272 \times 1.06 = 1348.32$			MA1	
	$1348.32 \times 1.06 = £1429.22$			MA1	3
8	47, 53, 59, 65, 71, 77			MA1	
	141, 371, 472, 390, 355, 77			MA1	
	$\frac{1806}{30} = 60.2$			M1, A1	4
9	$15^2 = 12^2 + d^2$			MA1	
	$225 = 144 + d^2$				
	$d^2 = 225 - 144 = 81$			MA1	
	$d = \sqrt{81} = 9$			MA1	3
10	**(a)** **(i)** Gradient $= -\frac{1}{2}$			A1	
	(ii) $y = -\frac{1}{2}x + 2$			A1, A1	
	(b) Line 3 or $y = x - 3$			A1	4
11	85% = £54.40			MA1	
	$\frac{54.4}{85} \times 100$			M1	
	= £64			A1	3

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			AVAILABLE MARKS
12	$\tan B = \frac{6}{5}$	MA2	
	$B = 50.2°$	A1	3
13	**(a)** angle at the circumference of a semicircle is always 90° (angle at circumference standing on a diameter is 90°)	A1	
	(b) **(i)** 52°	A1	
	(ii) 104°	A1	3
		Total	**44**

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