CCEA GCSE MATHEMATICS (MODULAR)

MATHS



EXAM QUESTION PACK

MODULE N3 PAPER 1 (NON-CALCULATOR) HIGHER TIER GMN31 PAPERS

STEMUP

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Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
January 2012

Mathematics

Module N3 Paper 1
(Non-calculator)
Higher Tier

[GMN31]

WEDNESDAY 11 JANUARY
9.15 am–10.15 am

GMN31

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 ten** questions.
Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.
You **must not** use a calculator for this paper.

INFORMATION FOR CANDIDATES

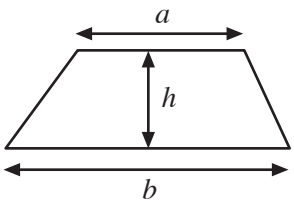
The total mark for this paper is 44.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
You should have a ruler, compasses, set-square and protractor.
The Formula Sheet is on page 2.

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

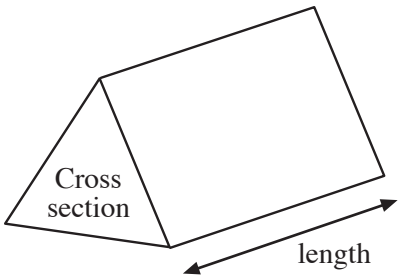
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Formula Sheet

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



Volume of prism = area of cross section × length

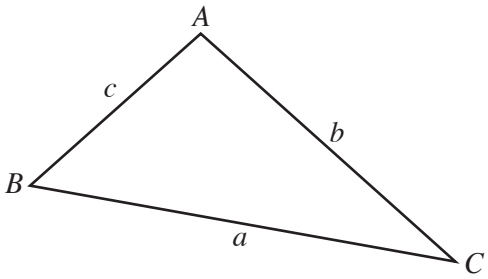


In any triangle ABC

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

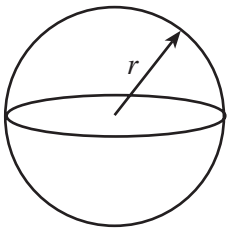
Sine rule: $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

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



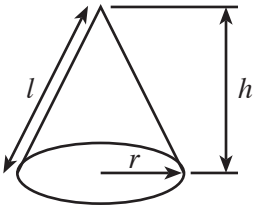
Volume of sphere $= \frac{4}{3}\pi r^3$

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 Factorise

(a) $20d + 35$

Answer _____ [1]

(b) $y^2 + y$

Answer _____ [1]

Examiner Only	
Marks	Remark

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Examiner Only	
Marks	Remark

2 Aaron wants to find out how often people go to the cinema.
He designs the following questionnaire to use to gather data for his survey.

> How often do you go to the cinema?
>
> Tick one box below.
>
> Not very often ☐ Sometimes ☐ A lot ☐

(a) Write down two things that are wrong with this questionnaire.

1. _____

_____

2. _____

_____ [2]

(b) Design a better questionnaire for him to use to find out how often people go to the cinema.
You should include some response boxes.

[2]

(c) Aaron intends to give out his questionnaire to all the men leaving the cinema.
Give two reasons why the data he will collect from his survey will be biased.

1. _____

2. _____ [2]

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Examiner Only	
Marks	Remark

3 **(a)** A square just touches an equilateral triangle as shown.

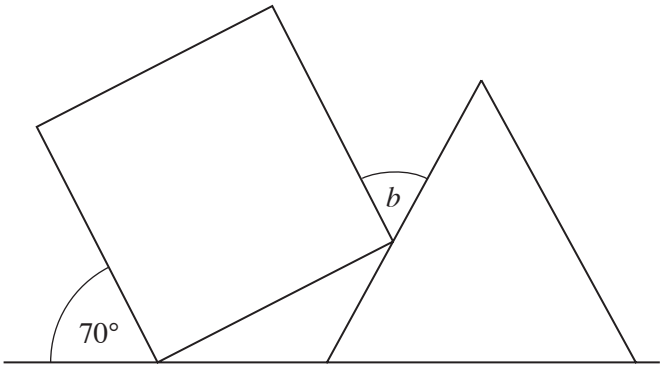


Diagram not drawn accurately

Calculate the size of angle b.

Answer b = _____° [3]

(b) AB is parallel to CD. EF is a straight line. BC = BD. Angle ABC = 42°

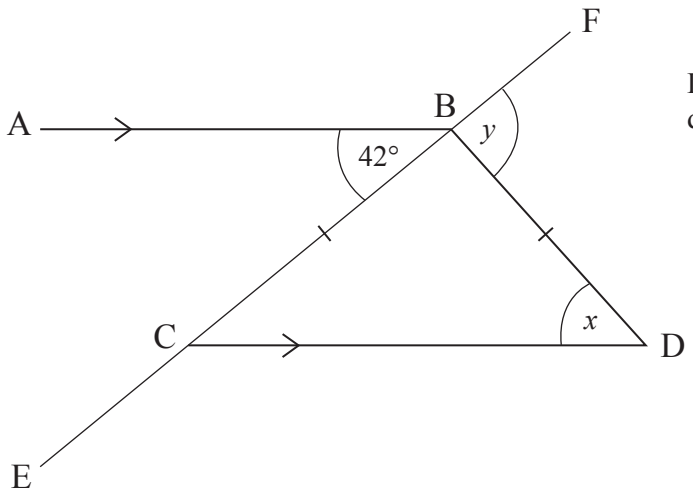


Diagram not drawn accurately

(i) Calculate the size of angle x.

Answer x = _____° [1]

(ii) Calculate the size of angle y.

Answer y = _____° [2]

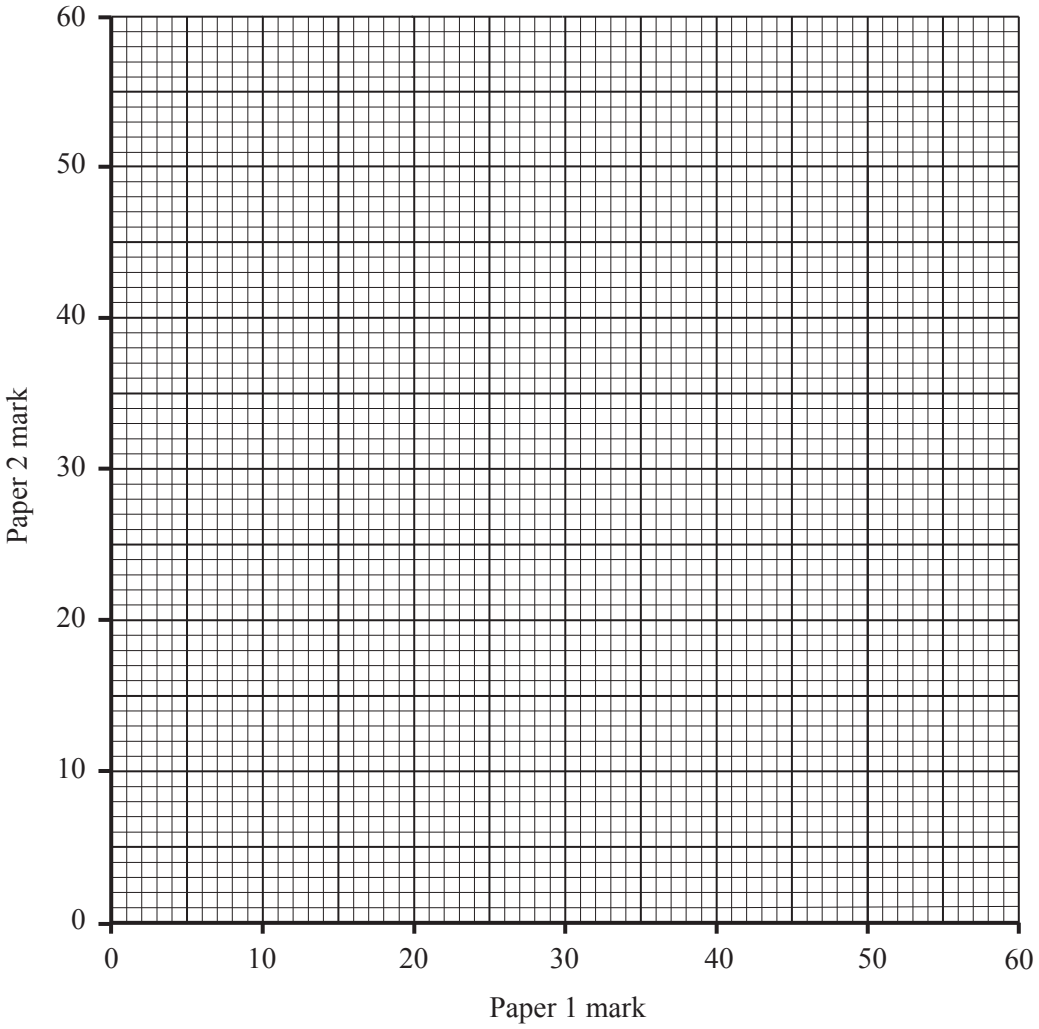
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Examiner Only	
Marks	Remark

4 The table below shows the marks scored by 8 students in two papers in a Mathematics examination.

Paper 1 mark	20	7	14	23	31	35	41	35
Paper 2 mark	20	2	9	28	41	46	58	50

(a) Draw a scatter graph below.



[2]

(b) Draw a line of best fit on the grid. [1]

Another student was absent for Paper 1 but scored 35 marks on Paper 2.

(c) Use your line of best fit to estimate a mark for Paper 1 for this student.

Answer _____ [1]

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Examiner Only	
Marks	Remark

5 **(a)** **(i)** Write 24 as a product of prime factors.

Answer _____ [2]

(ii) What is the smallest whole number 24 could be multiplied by to make it a square number?

Answer _____ [2]

(b) From a large bottle containing $2\frac{1}{2}$ litres of lemonade, a girl pours four full glasses each holding $\frac{2}{5}$ litre.

How many **more** full glasses can she pour before running short of lemonade?

Answer _____ [3]

---

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

Answer _____ [2]

(b) Kyle bought 6 pears at x pence each and 3 tins of meat at $4x$ pence each. He got £4.24 change from £10.

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

Answer $x =$ _____ [4]

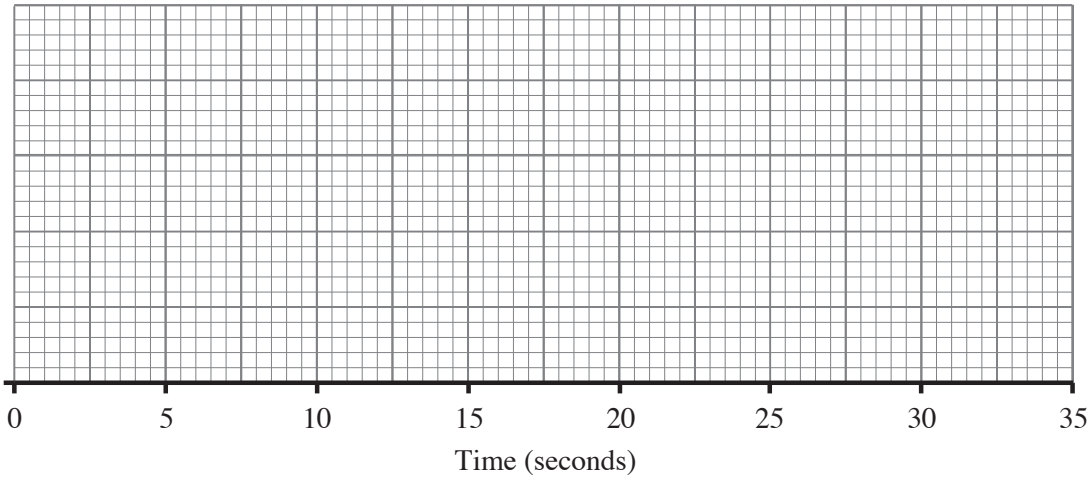
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Examiner Only	
Marks	Remark

7 The times, in seconds, taken by 11 teachers to solve a puzzle are listed in order below.

4, 12, 13, 17, 18, 20, 22, 24, 25, 30, 34

Draw a box plot for this data on the grid below.



[3]

8 Solve the equation $\frac{4x+1}{12}+\frac{2x-3}{6}=\frac{7}{4}$

Answer $x =$ _____ [4]

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9 There are 14 boys and 16 girls in a class.

In a test the mean mark for the boys was b.

In the same test the mean mark for the girls was g.

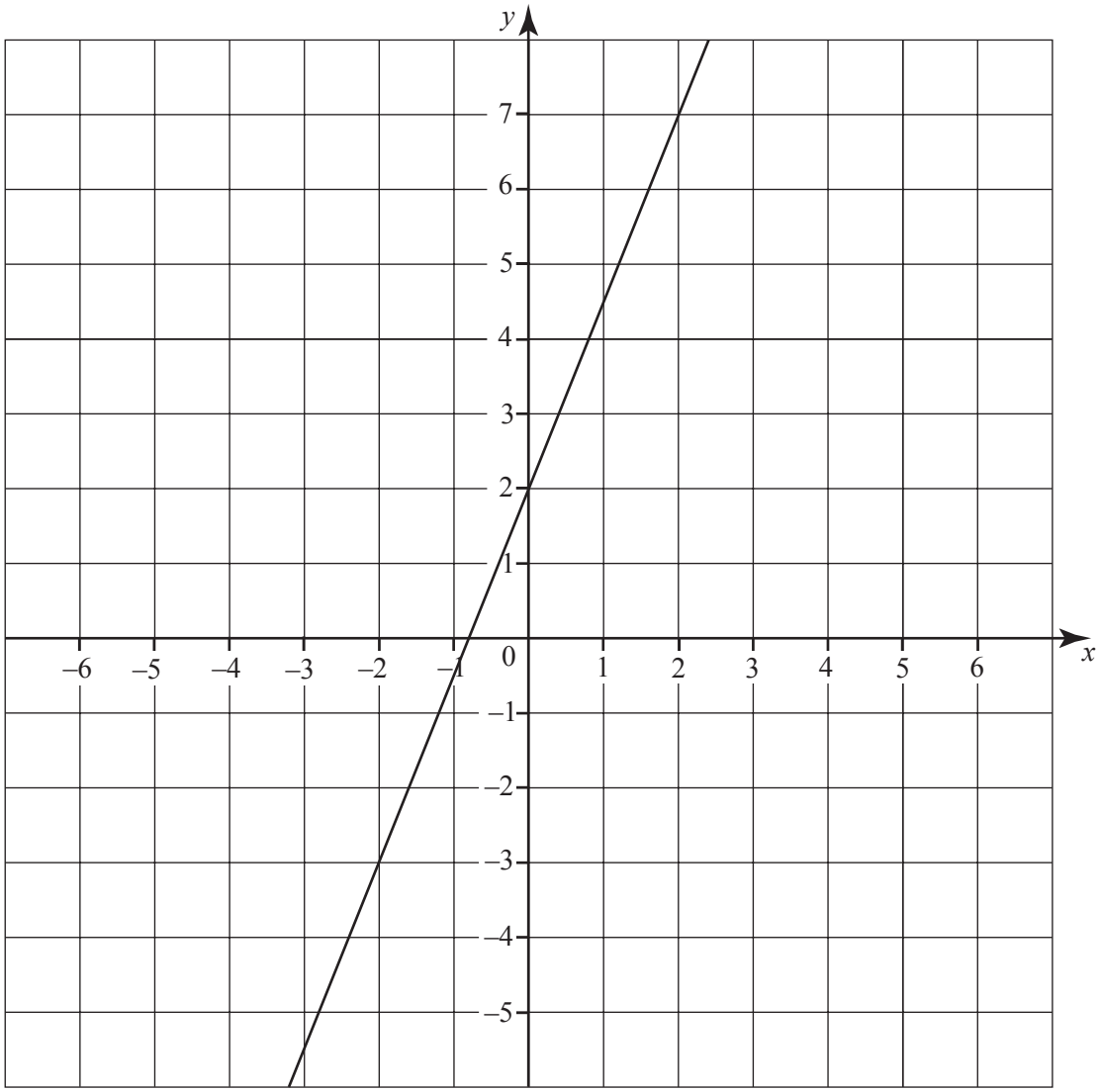
Find an expression for the mean mark of the whole class of 30 pupils.

Answer _____ [3]

Examiner Only	
Marks	Remark

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10



(a) Write down the gradient of the line drawn above.

Answer _____ [1]

(b) Hence write down the equation of this line.

Answer _____ [2]

Examiner Only

Marks	Remark

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THIS IS THE END OF THE QUESTION PAPER

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Rewarding Learning

General Certificate of Secondary Education
January 2012

Mathematics

Module N3 Paper 1
(Non-calculator)
Higher Tier

[GMN31]

WEDNESDAY 11 JANUARY
9.15AM–10.15AM

MARK SCHEME

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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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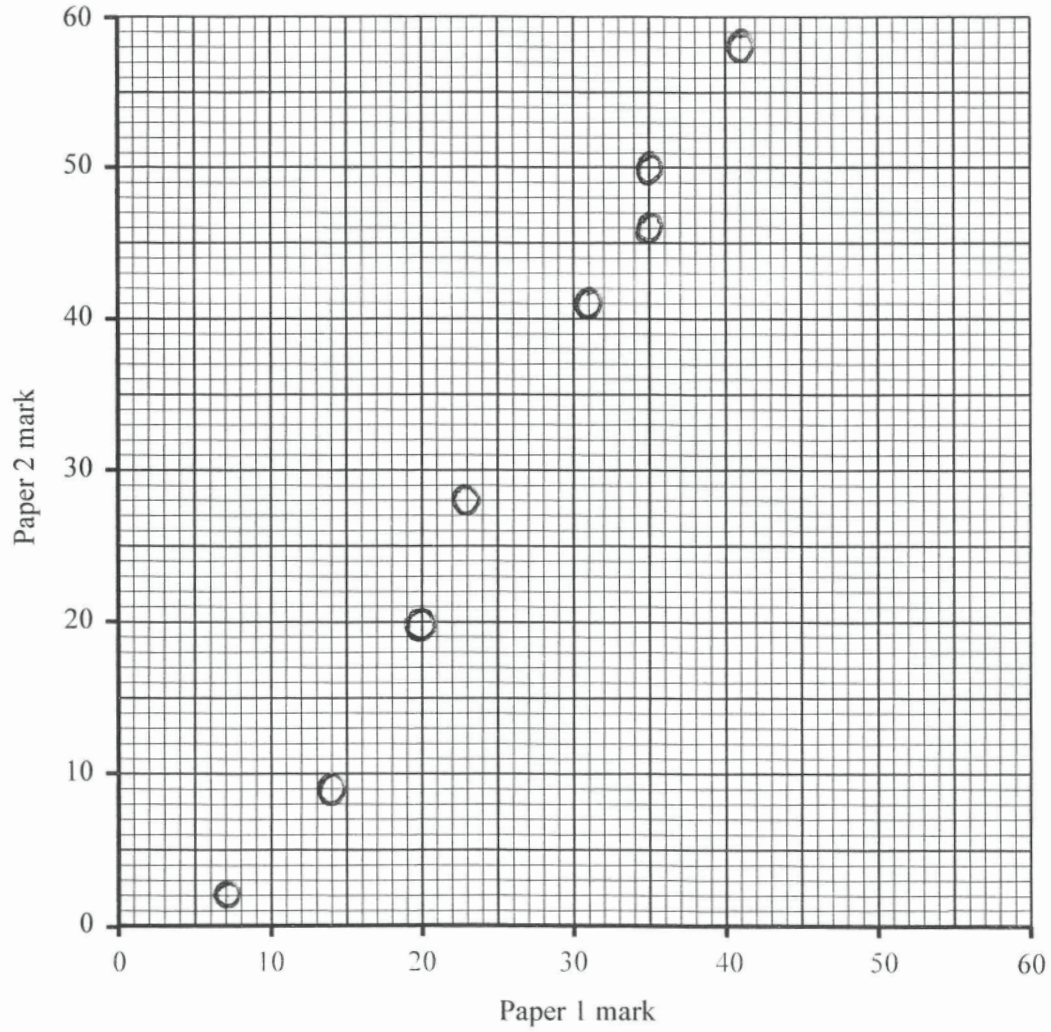
				AVAILABLE MARKS
1	**(i)**	$5(4d + 7)$	A1	
	(ii)	$y(y + 1)$	A1	2
2	**(a)**	1. No time period	A1	
		2. Labels on boxes too vague — 2 of these reasons	A1	
		3. No box for never		
	(b)	Use of time period	A1	
		Good response boxes (at least three), exhaustive and non-overlapping	A1	
	(c)	1. Only males questioned	A1	
		2. Questionnaire to cinema-goers only	A1	6
3	**(a)**	**(i)** $180 – (70 + 90) = 20$	MA1	
		$180 – (20 + 120) = 40$	MA1	
		$b = 180 – (40 + 90) = 50$	MA1	
	(b)	**(i)** $x = 42$	A1	
		(ii) $180 – (42 + 42) = 96$	MA1	
		$y = 180 – 96$ $= 84$	MA1	6
4	All points plotted correctly		A2	
	(a)	Correct line drawn	A1	
	(b)	Answer from pupil's line	A1	4
5	**(a)**	**(i)** $2 \times 2 \times 2 \times 3$	M1, A1	
		(ii) $2 \times 3 = 6$	M1, A1	
	(b)	$2.5 – 4 \times 0.4 = 0.9$ **or** $2.5 \div 0.4 = 6.25$	MA1	
		$0.9 \div 0.4 = 2.25$ $\quad$ $6.25 – 4 = 2.25$	MA1	
		2 $\quad$ 2	A1	7

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				AVAILABLE MARKS
6	**(a)**	$14a + 21 + 12a - 6$	MA1	
		$26a + 15$	MA1	
		Alternatively, A1 for each of $26a$ and 15		
	(b)	$6x + 12x + 424 = 1000$ (or equivalent)	M1, A1	
		$18x = 576$	MA1	
		$x = 32$	MA1	6
7		Median = 20	A1	
		Quartiles = 13, 25	A1	
		limits = 4, 34	A1	3
8		$\frac{4x+1+4x-6}{12} = \frac{21}{12}$	MA1	
		$4x + 1 + 4x - 6 = 21$	MA1	
		$8x = 26$	MA1	
		$x = \frac{26}{8}$ or $\frac{13}{4}$ or 3.25	MA1	4
9		14b ; 16g	A1, A1	
		$\frac{14b + 16g}{30}$	A1	3
10	**(a)**	**(i)** $\frac{5}{2}$	MA1	
		(ii) $y = \frac{5}{2}x + 2$	MA2	3
			Total	**44**

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GCSE MATHEMATICS JANUARY 2012
MODULE N3–1
OVERLAY QUESTION 4



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Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2011

Mathematics



Module N3 Paper 1
(Non-calculator)
Higher Tier

[GMN31]

TUESDAY 31 MAY

9.15 am–10.15 am

GMN31

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.
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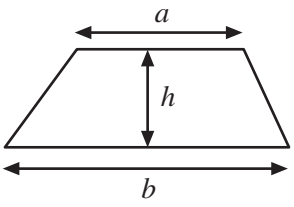
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11	
12	
13	
Total Marks	

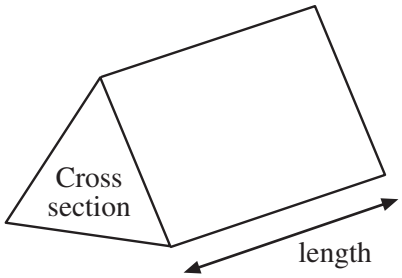
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Formula Sheet

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



Volume of prism = area of cross section × length

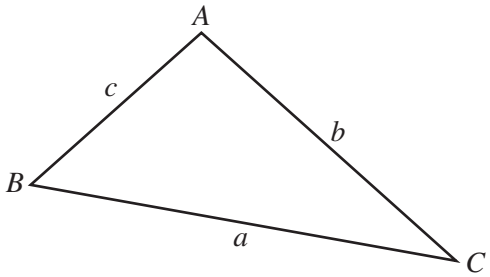


In any triangle ABC

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

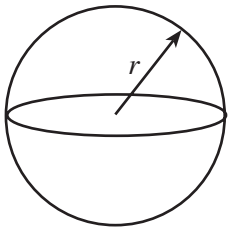
Sine rule : $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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



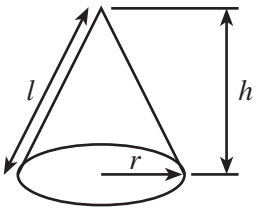
Volume of sphere = $\frac{4}{3}\pi r^3$

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 **(a)** Lines AB, CD and EF are parallel.

Angles of 96° and 60° are marked in the diagram as shown.

Calculate the size of the angles marked x, y and z.

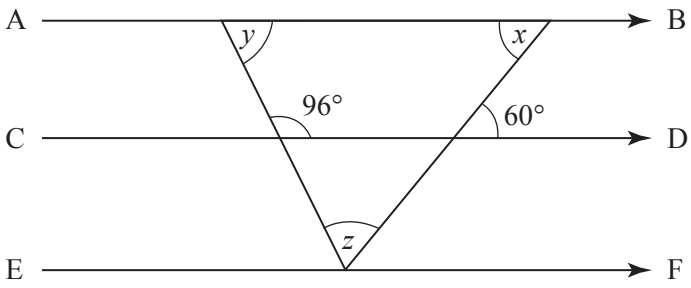


diagram not drawn accurately

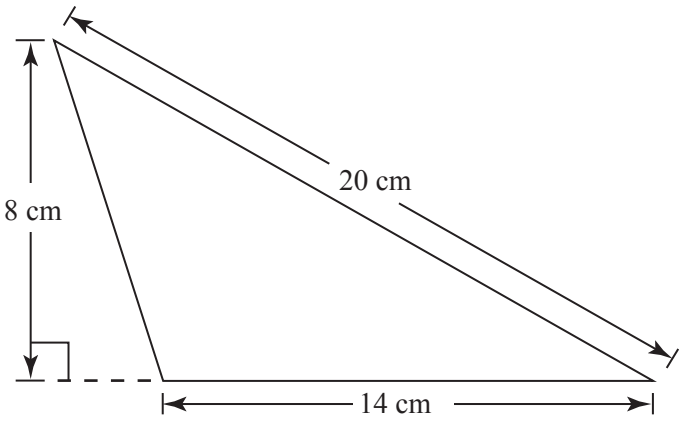
Answer Angle x = _____° [1]

Angle y = _____° [1]

Angle z = _____° [1]

(b) This triangle has some lengths marked on it.

Calculate the area of the triangle.



Answer _____ cm^2 [2]

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Examiner Only	
Marks	Remark

2 The Ross family eat $\frac{3}{5}$ of a loaf of bread each day.

What is the least number of loaves they will need to buy for 9 days?

Answer _____ [3]

---

3 Julie is a pupil at Northwood Girls Comprehensive and she wants to know how many times a month, on average, the people in her town go to the swimming pool. She asks 500 pupils in her school.

Give **two** reasons why Julie's sample may not be representative of the people in her town.

Reason 1 _____

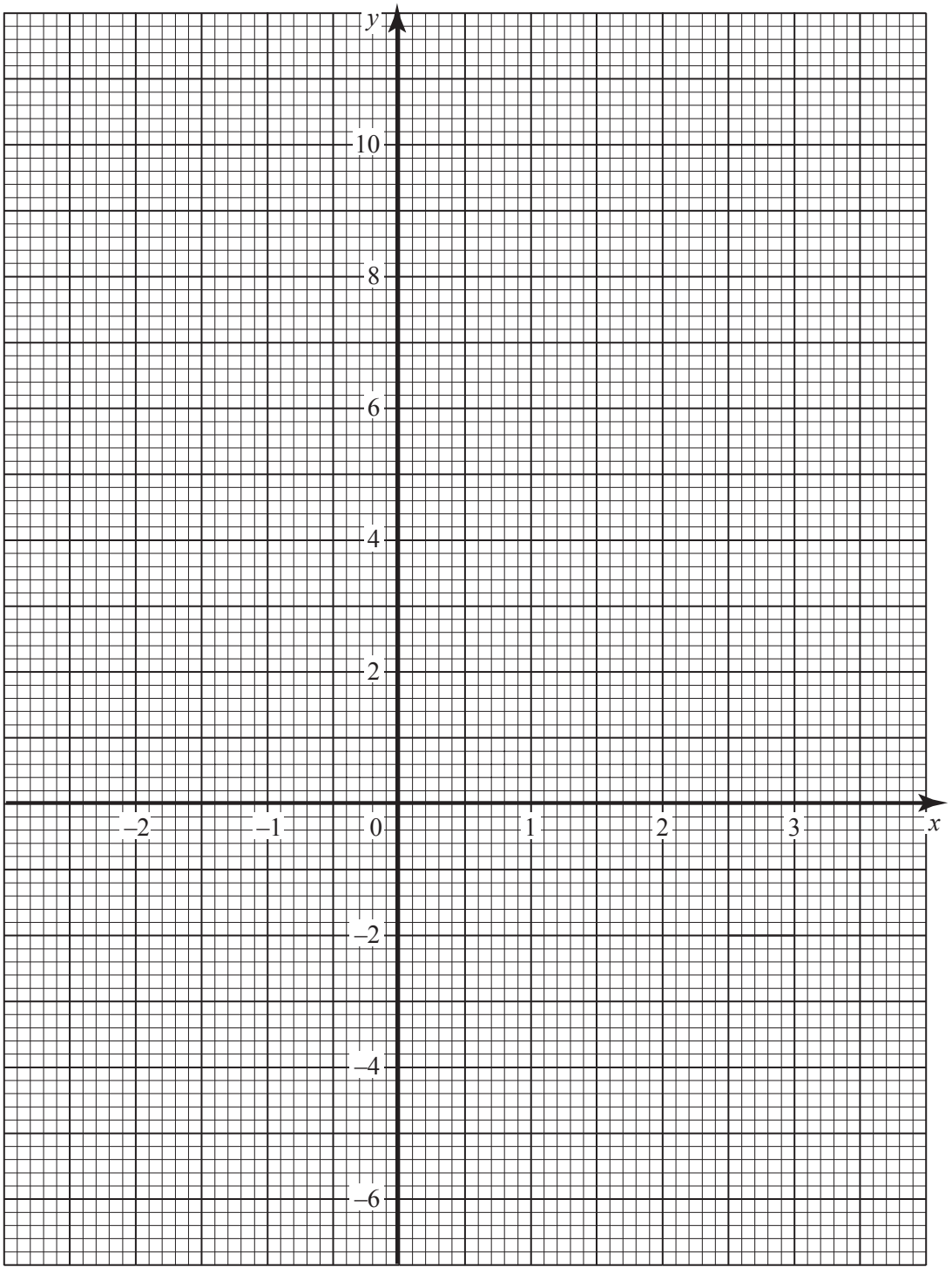
_____ [1]

Reason 2 _____

_____ [1]

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4 Draw the graph of $y = 4 - 3x$ on the graph paper below.



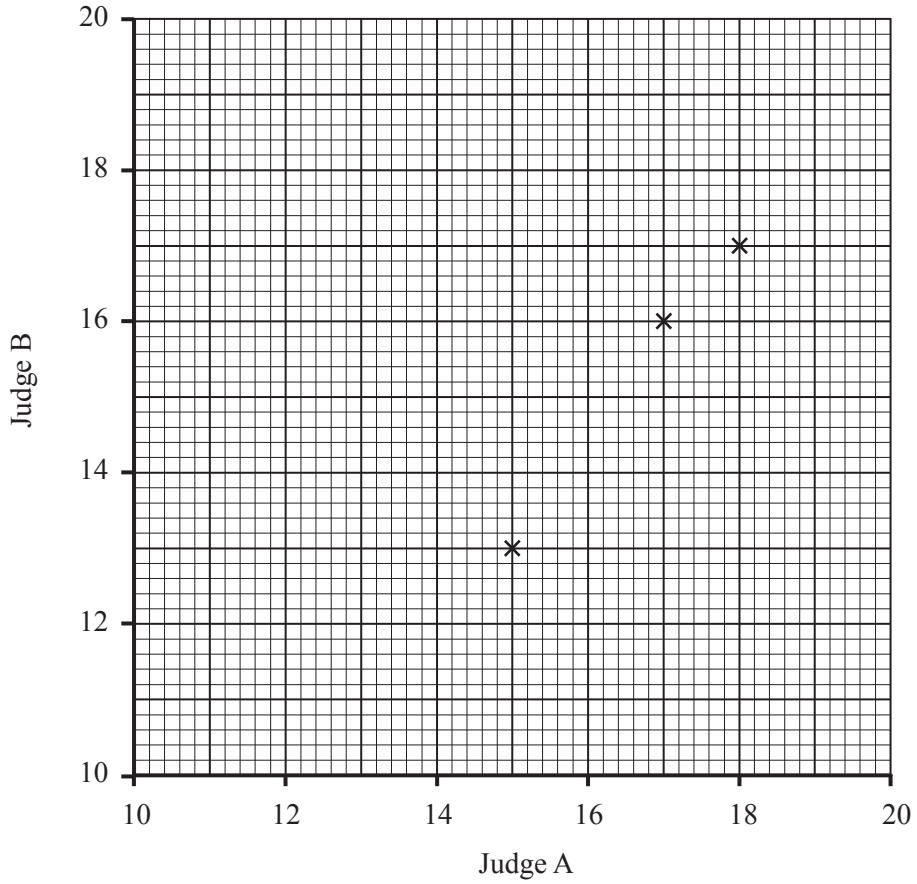
[3]

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Marks	Remark

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5 The table shows the marks awarded by two judges to the first eight competitors in a gymnastics competition.

Judge A	**18**	**15**	**17**	13	19	15	12	18
Judge B	**17**	**13**	**16**	13	18	16	14	16



(a) The first three points have already been plotted.

Use the data to complete the scatter graph. [2]

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

(c) Another competitor was awarded 14 marks by Judge A.

Estimate the marks awarded to this competitor by Judge B.

Answer _____ [1]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

6 **(a)** Find the midpoint of the line joining the points A (–1, 6) and B (3, –2).

Answer (_____ , _____) [2]

(b) The point M (4, 1) is the midpoint of the line joining the points C and D. C is the point (1, –1).

Find the coordinates of the point D.

Answer (_____ , _____) [2]

---

7 Write 84 as a product of prime factors.

Express your answer in index notation.

Answer _____ [3]

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Examiner Only	
Marks	Remark

8 **(a)** Expand and simplify

$$(x - 6)(x + 4)$$

Answer _____ [2]

(b) Write down the nth term for the sequence 4, 8, 12, 16, ...

Answer _____ [1]

---

9 The times that 100 students spent watching TV during one weekend were recorded. The times were grouped as shown in the table.

Time t (hours)	**Frequency**		
$0 < t \leq 2$	4		
$2 < t \leq 4$	18		
$4 < t \leq 6$	32		
$6 < t \leq 8$	20		
$8 < t \leq 10$	16		
$10 < t \leq 12$	10		

Calculate an estimate for the mean time.

Answer _____ hours [4]

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10 Solve the equation $\frac{2x-4}{5}+\frac{x+11}{2}=2$

Show your working.
A solution by trial and improvement will not be accepted.

Answer $x =$ _____ [4]

Examiner Only	
Marks	Remark

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11

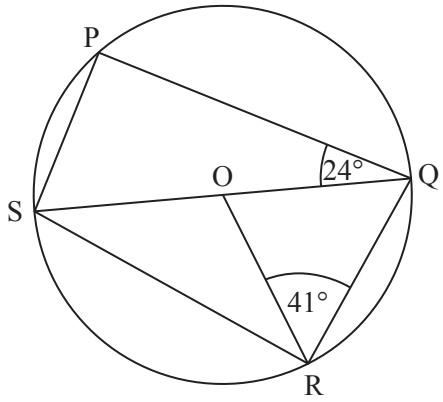


diagram not drawn accurately

In the diagram O is the centre of the circle. SOQ is a straight line.
Angle ORQ = 41° and angle PQS = 24°.

Find the size of the following angles:

(a) OQR = _____ ° [1]

(b) PSQ = _____ ° [1]

(c) PSR = _____ ° [1]

Examiner Only	
Marks	Remark

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Examiner Only	
Marks	Remark

12 Calculate $2\frac{1}{3} \div 1\frac{1}{4}$

Give your answer as a mixed number.

Answer = _____ [3]

---

13 **(a)** Factorise $x^2 + x - 6$

Answer _____ [2]

(b) Hence solve the equation $x^2 + x - 6 = 0$

Answer x = _____ [1]

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Rewarding Learning

General Certificate of Secondary Education
Summer 2011

Mathematics

Module N3 Paper 1
(Non-calculator)
Higher Tier

[GMN31]

TUESDAY 31 MAY

9.15 am – 10.15 am

MARK SCHEME

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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 solution to a question gains marks for correct method and marks for accurate working based on this method. 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, 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.

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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;

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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.

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				AVAILABLE MARKS
1	**(a)**	60	A1	
		84	MA1	
		36	MA1	
	(b)	$\frac{1}{2}\times 14\times 8=56$	M1 A1	5
2		$9\times\frac{3}{5}$ or $\frac{3}{5}+\frac{3}{5}+\frac{3}{5}+\frac{3}{5}+\frac{3}{5}+\frac{3}{5}+\frac{3}{5}+\frac{3}{5}+\frac{3}{5}$	M1	
		$\frac{27}{5}$ or $5\frac{2}{5}$ or 5.4	A1	
		6	MA1	3
3		suitable answers e.g. no boys in sample no adults in sample or only one age group pupils may not live in her town	A2	2
4		2 points correctly identified	MA1	
		2 points accurately plotted	A1	
		Straight line	A1	3
5	**(a)**	correct points (Allow A1 for 3 correct)	A2	
	(b)	oblique line with roughly half the points on either side	A1	
	(c)	follow pupil's line	A1	4
6	**(a)**	(1, 2)	A1 A1	
	(b)	(7, 3)	A1 A1	4

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			AVAILABLE MARKS
7	$2\overline{)84}$ $2\overline{)42}$ $3\overline{)21}$ 7	M1 A1	
	$2^2 \times 3 \times 7$	A1	3
8	**(a)** $x^2 - 6x + 4x - 24$	MA1	
	$x^2 - 2x - 24$	A1	
	(b) $4n$	A1	3

9

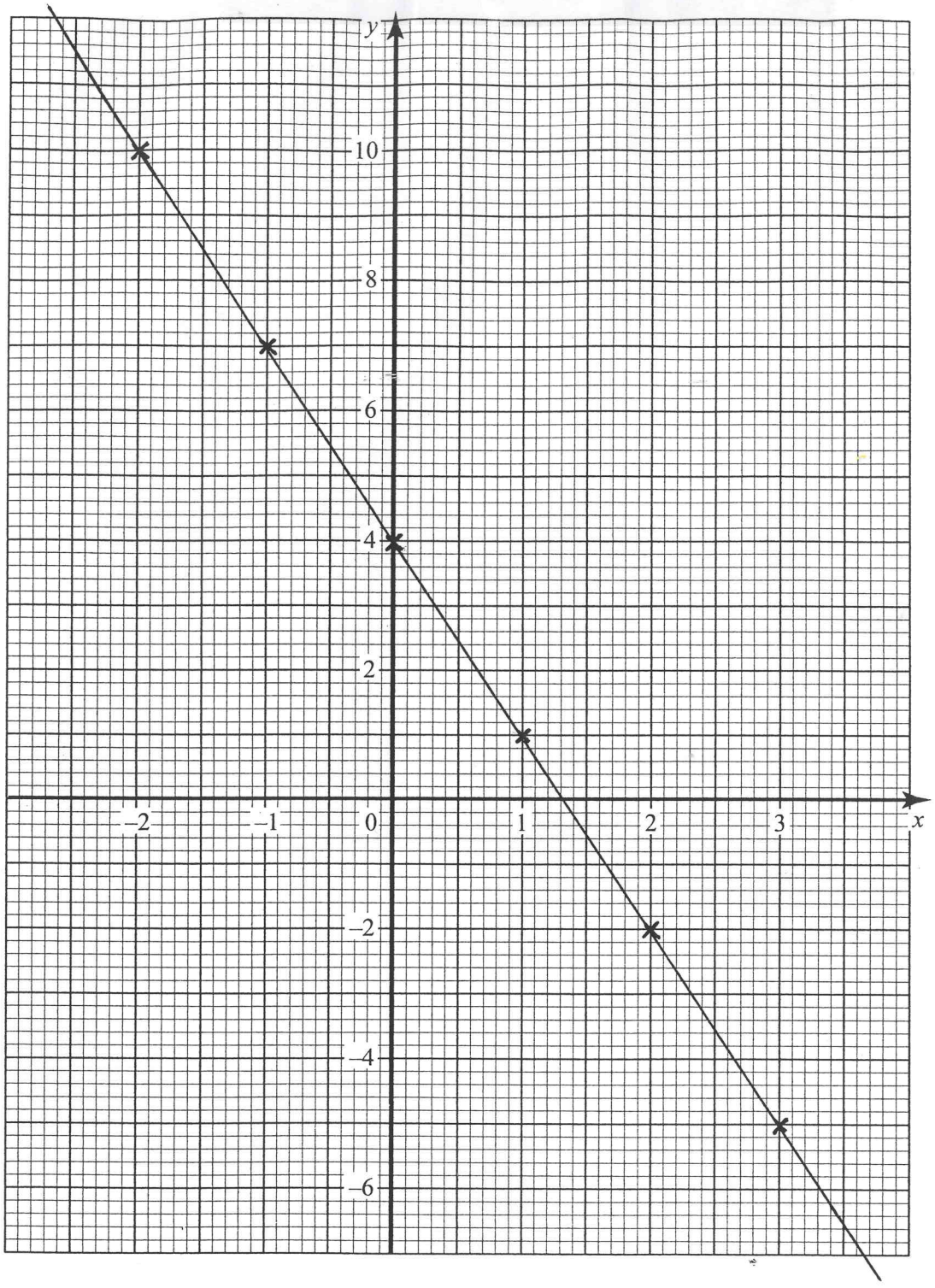
Mid-Points	fx
1	4
3	54
5	160
7	140
9	144
11	110

fx products	M1	
612	A1	
$612 \div 100 = 6.12$	M1 A1	4
10 $2(2x - 4) + 5(x + 11) = 20$	MA1	
$4x - 8 + 5x + 55 = 20$	MA1	
$9x + 47 = 20$	MA1	
$9x = -27$		
$x = -3$	MA1	4
11 **(a)** 41	A1	
(b) 66	A1	
(c) 115	A1	3
12 $\frac{7}{3} \div \frac{5}{4}$	MA1	
$\frac{7}{3} \times \frac{4}{5} = \frac{28}{15}$	MA1	
$1\frac{13}{15}$	MA1	3

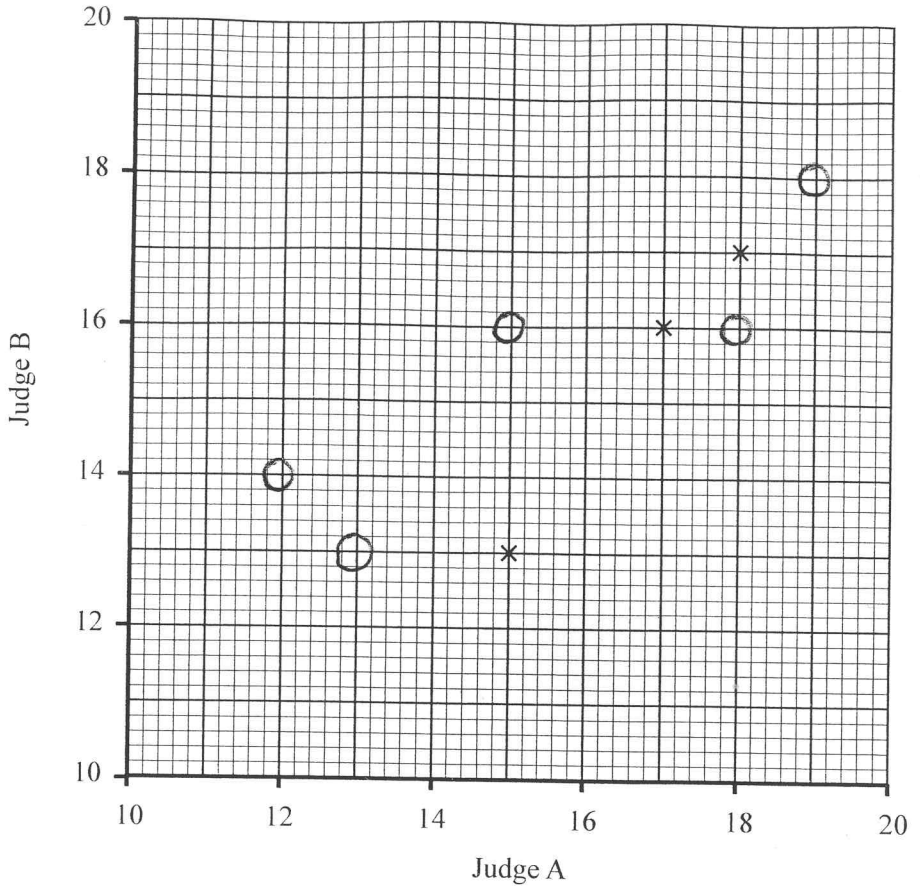
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			AVAILABLE MARKS
13	**(a)** $(x + 3)(x - 2)$	A2	3
	(b) $x = -3$ or $x = 2$	A1	
		Total	**44**

GCSE MATHEMATICS SUMMER 2011
MODULE N3-1
OVERLAY QUESTION 4



GCSE MATHEMATICS SUMMER 2011
MODULE N3-1
OVERLAY QUESTION 5



Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
January 2011

Mathematics

Module N3 Paper 1
(Non-calculator)
Higher Tier

[GMN31]

TUESDAY 11 JANUARY
9.15 am – 10.15 am

GMN31

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.
You **must not** use a calculator for this paper.

INFORMATION FOR CANDIDATES

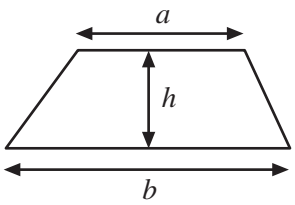
The total mark for this paper is 44.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
You should have a ruler, compasses, set-square and protractor.
The Formula Sheet is on page 2.

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

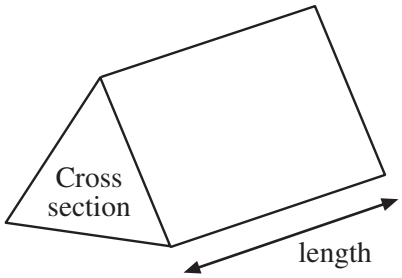
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Formula Sheet

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



Volume of prism = area of cross section × length

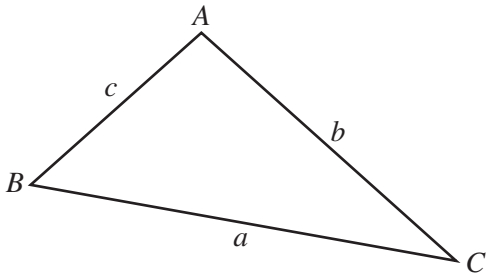


In any triangle *ABC*

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

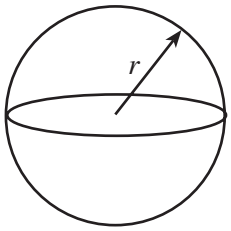
Sine rule : $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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



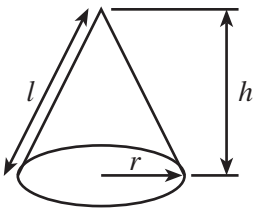
Volume of sphere = $\frac{4}{3}\pi r^3$

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)** VWXYZ is a regular pentagon.

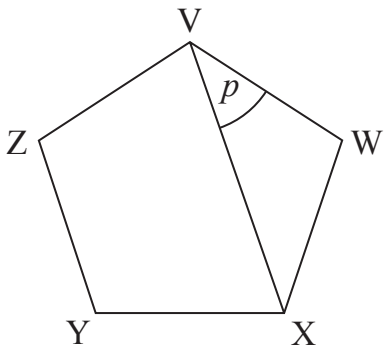


Diagram not drawn accurately

Calculate angle p.
Show your working.

Answer _____ ° [3]

(b) Calculate the size of angle x marked on the signpost.

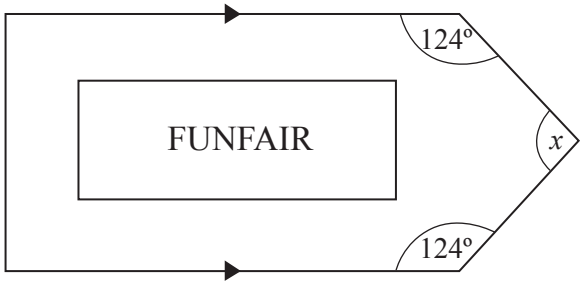


Diagram not drawn accurately

Answer _____ ° [2]

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Examiner Only	
Marks	Remark

2 A baker uses $\frac{3}{5}$ of a bag of flour to make 6 muffins.

How many bags of flour will he need to make 48 muffins?

Answer _____ bags [3]

---

3 The school bus for Oldtown Secondary School carried a mixture of boys and girls. Some of the students were wearing scarves.

(a) Design a table in the space below which could be used to record the numbers of boys and girls and the numbers of each wearing scarves and not wearing scarves.

[3]

(b) There were 40 students on the bus. Show how they might have been recorded in your table above. [1]

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Examiner Only	
Marks	Remark

4 **(a)** Factorise $12 - 8a$

Answer _____ [1]

(b) Solve $18 - 3x = 2 + 5x$

Answer _____ [3]

(c) Solve $\dfrac{21 - 2x}{3} = 5$

Answer _____ [3]

---

5 **(a)** Work out $5\frac{3}{4} - 2\frac{5}{6}$

Give your answer as a mixed number.

Answer _____ [3]

(b) Evaluate 2^{-2}

Answer _____ [1]

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6 Convert $0.6\,m^3$ into cm^3

Answer _____ cm^3 [2]

7 Express $\frac{2a}{5} - \frac{a}{4}$ as a single fraction.

Answer _____ [3]

Examiner Only	
Marks	Remark

8 The heights of trees in an orchard were recorded. The heights were grouped as shown in the table.

Height h (metres)	Frequency	Mid Point	
$0 < h \leq 2$	12	1	
$2 < h \leq 4$	8	3	
$4 < h \leq 6$	12		
$6 < h \leq 8$	10		
$8 < h \leq 10$	7		
$10 < h \leq 12$	1		

(a) Which class interval contains the median height?

Answer _____ [1]

(b) Complete the table and hence find an estimate for the mean height of the trees.

Answer _____ m [3]

Examiner Only

Marks	Remark

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9 A green light flashes every 6 minutes while a red light flashes every 32 minutes.

Both lights flash together at 12 noon.

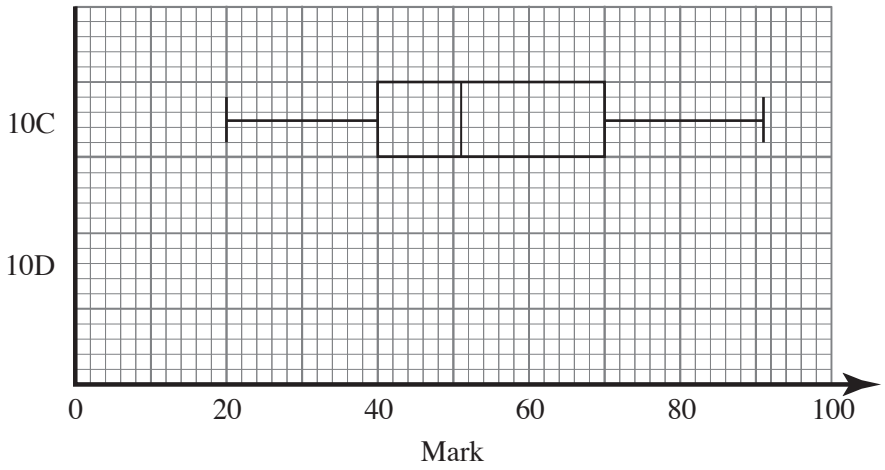
When is the next time that both lights will flash together?

Answer _____ [2]

Examiner Only	
Marks	Remark

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10 The box plot shows the marks in a test for class 10C.



(a) Class 10D did the same test and the median mark was 52, the lower quartile was 35, the upper quartile was 82, the lowest mark was 22 and the highest mark was 93.

Draw a box plot for 10D on the grid above. [2]

(b) The head of the mathematics department says that these classes performed similarly in the test. Do you agree with her comment? Give **two** reasons to support your decision.

Answer _____ because _____

_____

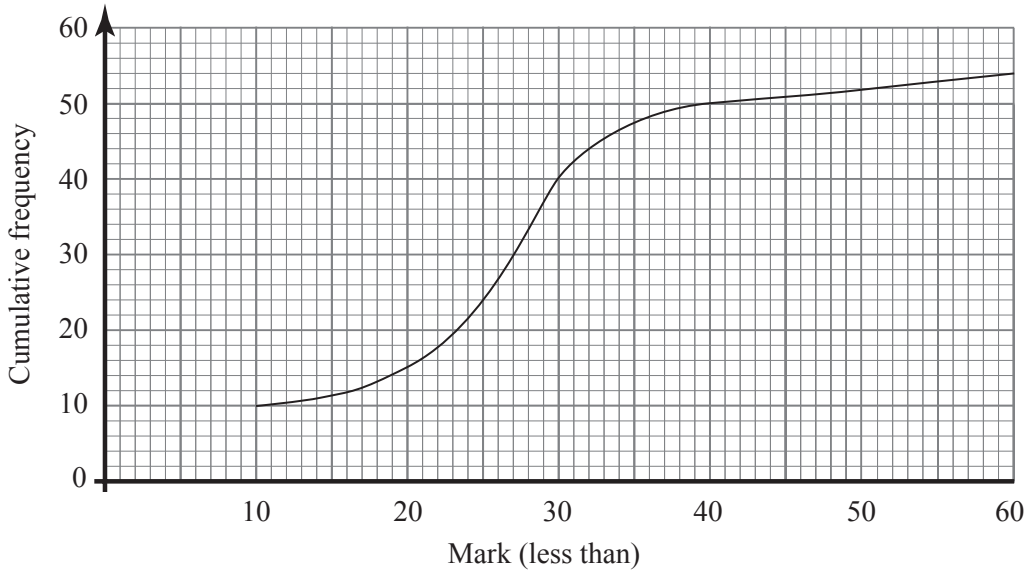
_____ [2]

Examiner Only

Marks	Remark

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11



The cumulative frequency graph above illustrates the marks scored by pupils in a Physics test.

(a) Estimate the median mark.

Answer _____ [1]

(b) The pass mark was set at 34. Estimate the number of pupils who passed.

Answer _____ [2]

Examiner Only	
Marks	Remark

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12 The diagram shows a circle with centre O.

A, B and C are three points on the circumference of the circle.

Angle AOC is 130°

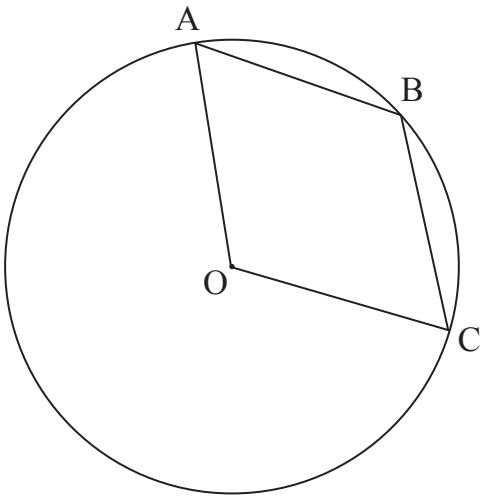


Diagram not drawn accurately.

(a) Explain why angle ABC is 115°

[2]

(b) The lengths AB and OB are equal. Calculate angle OBC.

Answer _____ ° [1]

Examiner Only

Marks	Remark

THIS IS THE END OF THE QUESTION PAPER

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Higher Tier

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				AVAILABLE MARKS
1	**(a)** Interior angle of pentagon = 108	{ext = 72; int = 180 – 72 = 108} {3 × 180 = 540; 540/5 = 108}	M1 A1	
	p = (180 – 108)/2 = 36		MA1	
	(b) 180 – 124 = 56		MA1	
	2 × 56 = 112		MA1	5
2	48 ÷ 6 = 8		MA1	
	$8\times\frac{3}{5}=4\frac{4}{5}$		MA1	
	5		A1	3
3	**(a)**			

	Scarf	No scarf
Boy		
Girl		

			2 × 2 squares MA1 Labels MA1, MA1	
	(b) Suitable numbers totalling to 40		MA1	4
4	**(a)** 4(3 – 2*a*)		MA1	
	(b) 18 – 2 = 5*x* + 3*x*		MA2	
	16 = 8*x*			
	2 = *x*		MA1	
	(c) 21 – 2*x* = 15		MA1	
	2*x* = 6		MA1	
	x = 3		A1	7
5	**(a)** $5\frac{9}{12}-2\frac{10}{12}$ or $\frac{23}{4}-\frac{17}{6}$		MA1	
	$=3-\frac{1}{12}$ or $\frac{69}{12}-\frac{34}{12}$		A1	
	$\left(=\frac{35}{12}\right)=2\frac{11}{12}$		A1	
	(b) $\frac{1}{4}$		A1	4
6	0.6×100^3		M1	
	600000		A1	2

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			AVAILABLE MARKS
7	$\frac{8a}{20} - \frac{5a}{20}$	MA2	
	$\frac{3a}{20}$	A1	3
8	**(a)** $4 < h \leq 6$	MA1	
	(b)		

	F	**Mid Pt (x)**	**Fx**
$0 < h \leq 2$	12	1	12
$2 < h \leq 4$	8	3	24
$4 < h \leq 6$	12	5	60
$6 < h \leq 8$	10	7	70
$8 < h \leq 10$	7	9	63
$10 < h \leq 12$	1	11	11
	50		240

fx M1

mean $= \frac{240}{50} = 4.8$ M1 A1 4

9 every 96 mins MA1
1.36 pm A1 2

10 **(a)** Median and Quartiles correct MA1
Extreme values MA1

(b) If yes – approx same median, same range } { MA2
If no – two acceptable reasons } { MA2 4

11 **(a)** 26 A1

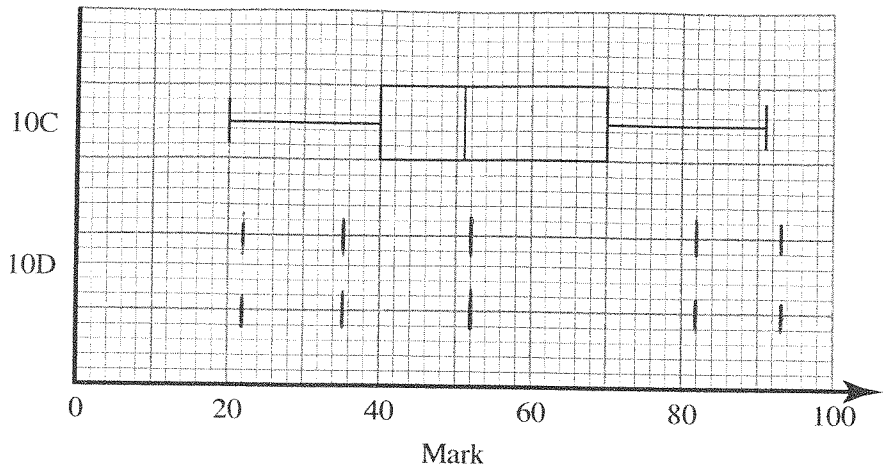
(b) correct reading at 34 MA1
54 – reading 46 = 8 MA1 3

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			AVAILABLE MARKS
12	**(a)**	AOC reflex = 360 – 130 = 230º MA1 ABC = $\frac{1}{2}$(230) = 115º because angle at circumference = $\frac{1}{2}$ angle at centre A1	
	(b)	55º MA1	3
		Total	44

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GCSE MATHEMATICS JANUARY 2011
MODULE N3-1
OVERLAY QUESTION 10



Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
2010

Mathematics



Module N3 Paper 1
(Non-calculator)
Higher Tier

[GMN31]

GMN31

TUESDAY 1 JUNE

9.15 am – 10.15 am

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

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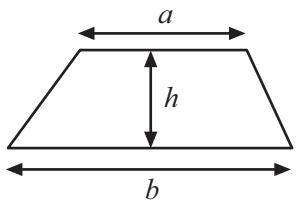
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10	
11	
12	
Total Marks	

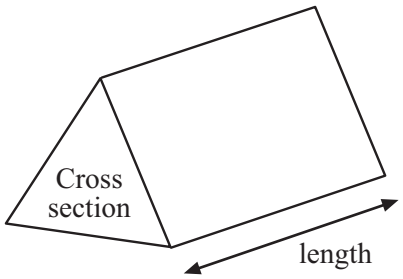
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Formula Sheet

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



Volume of prism = area of cross section × length

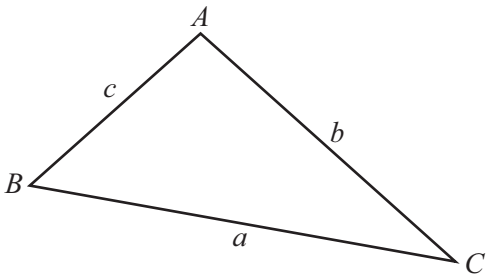


In any triangle ABC

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

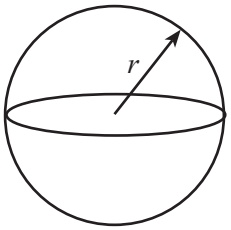
Sine rule : $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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



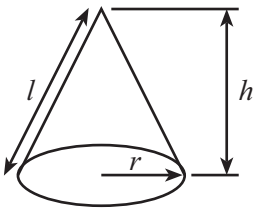
Volume of sphere = $\frac{4}{3}\pi r^3$

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Curved surface area of cone = πrl



Quadratic equation:

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

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

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(Questions start overleaf)

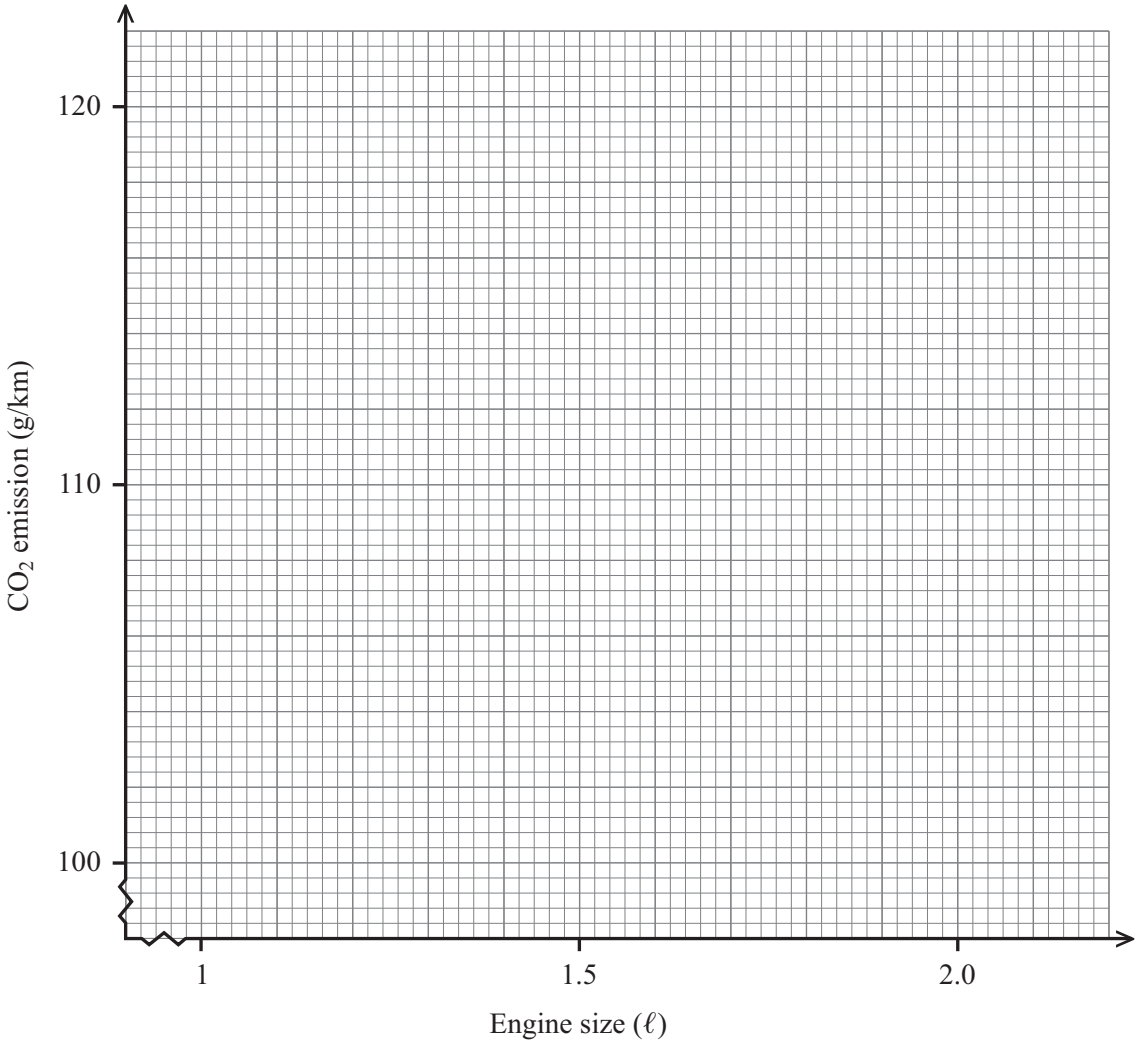
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Examiner Only	
Marks	Remark

1 **(a)** Seven cars were tested for their CO_2 emission value.
Draw a scatter diagram, plotting engine size against CO_2 emission.

Make	Model	Engine size (ℓ)	CO_2 emission (g/km)
Audi	A3	1.9	118
BMW	1 Series	2.0	120
Citroën	C1	1.4	109
Ford	Fiesta	1.4	110
Ford	Focus	1.6	115
Seat	Ibiza	1.4	100
Volkswagen	Golf	1.9	119

[2]



(b) One of the results appears to be different from the others. Which car is it?

_____ [1]

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(c) Use the rest of the results to draw a line of best fit. [1]

(d) Use your line of best fit to estimate the CO_2 emission value for a Fiat with engine size 1.3 l.

Answer _____ g/km [1]

Examiner Only	
Marks	Remark

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Examiner Only	
Marks	Remark

2 In a class there are 18 girls and 12 boys.
Six of the girls wear glasses and three of the boys wear glasses.
What percentage of the class wear glasses?

Answer _____% [3]

---

3 **(a)** Write down the first three terms of the sequence where the nth term is $n^2 + 2$

Answer _____, _____, _____ [2]

(b) Find the nth term of the sequence

2, 6, 10, 14, 18, ...

Answer _____ [2]

---

4 **(a)** Change 2.6 m^2 into cm^2.

Answer _____ cm^2 [2]

(b) A bag of coal weighs 14 kg, correct to the nearest kg.
Write down the smallest weight the bag of coal could be.

Answer _____ kg [1]

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5

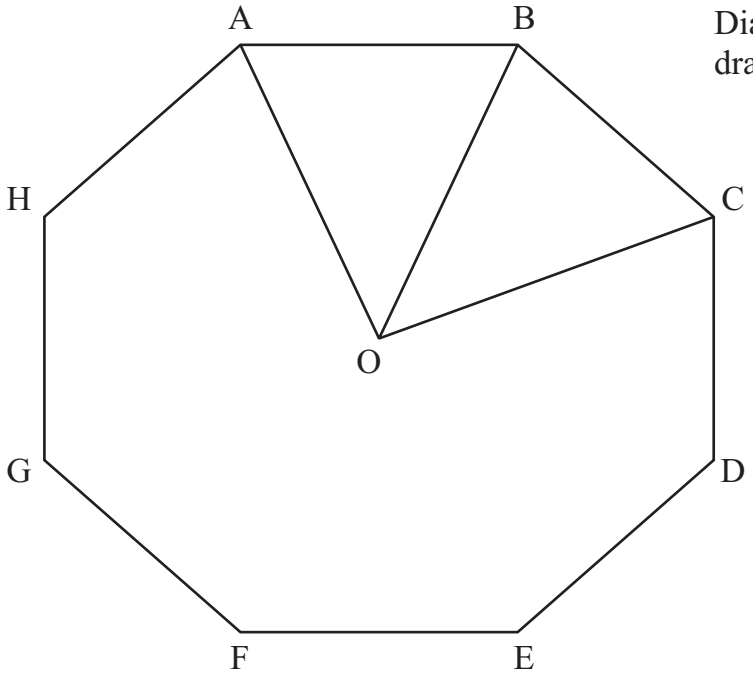


Diagram not drawn accurately

ABCDEFGH is a regular octagon.

(a) Calculate the size of the angle AOB.

Answer _____° [2]

(b) Hence, or otherwise, calculate the size of the interior angle ABC.

Answer _____° [2]

Examiner Only	
Marks	Remark

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Examiner Only	
Marks	Remark

6 Expand and simplify $(x - 1)(x + 7)$

Answer _____ [2]

7 Calculate the LCM (lowest common multiple) of 54 and 60

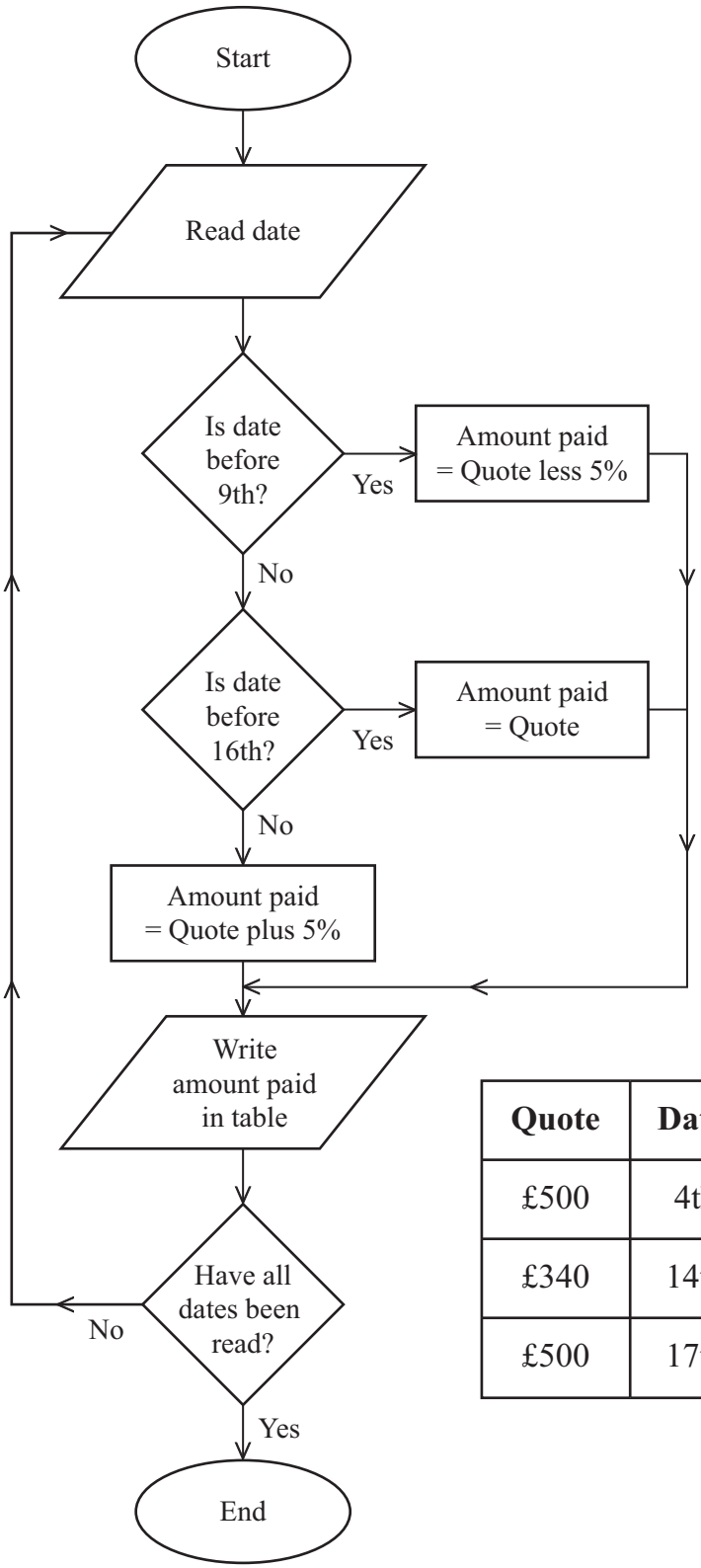
Answer _____ [3]

8 Jason bought four apples at x pence each and four cans of cola at $2x$ pence each.
He got £1.28 change from £5
Write down an equation in terms of x and solve it to find the value of x.

Answer x = _____ [4]

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9 "OILCO" delivers heating oil to three customers on Monday 2 February. Each customer is quoted a price, but the amount they actually pay depends on the date they pay. Use the flow chart to complete the table.



Quote	Date	Amount paid
£500	4th	
£340	14th	
£500	17th	

[3]

Examiner Only

Marks	Remark

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Examiner Only	
Marks	Remark

10 Solve the equation $\frac{4x + 3}{10} + \frac{6x - 5}{5} = \frac{13}{2}$

Answer $x =$ _____ [4]

---

11 **(a)** Find the equation of the line passing through the points (0, 1) and (2, 9).

Answer _____ [3]

(b) Find the exact length of the line from (4, –7) to (–1, 5).

Answer _____ [3]

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12 Calculate $6\frac{1}{8} \div 2\frac{1}{3}$

Give your answer as a mixed number.

Answer _____ [3]

Examiner Only	
Marks	Remark

THIS IS THE END OF THE QUESTION PAPER

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GCSE

Mathematics (Modular)

Summer 2010

Mark Schemes

Issued: October 2010

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General Certificate of Secondary Education
2010

Mathematics

Module N3 Paper 1
(Non-calculator)
Higher Tier

[GMN31]

TUESDAY 1 JUNE

9.15 am – 10.15 am

MARK SCHEME

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GCSE MATHEMATICS 2010

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

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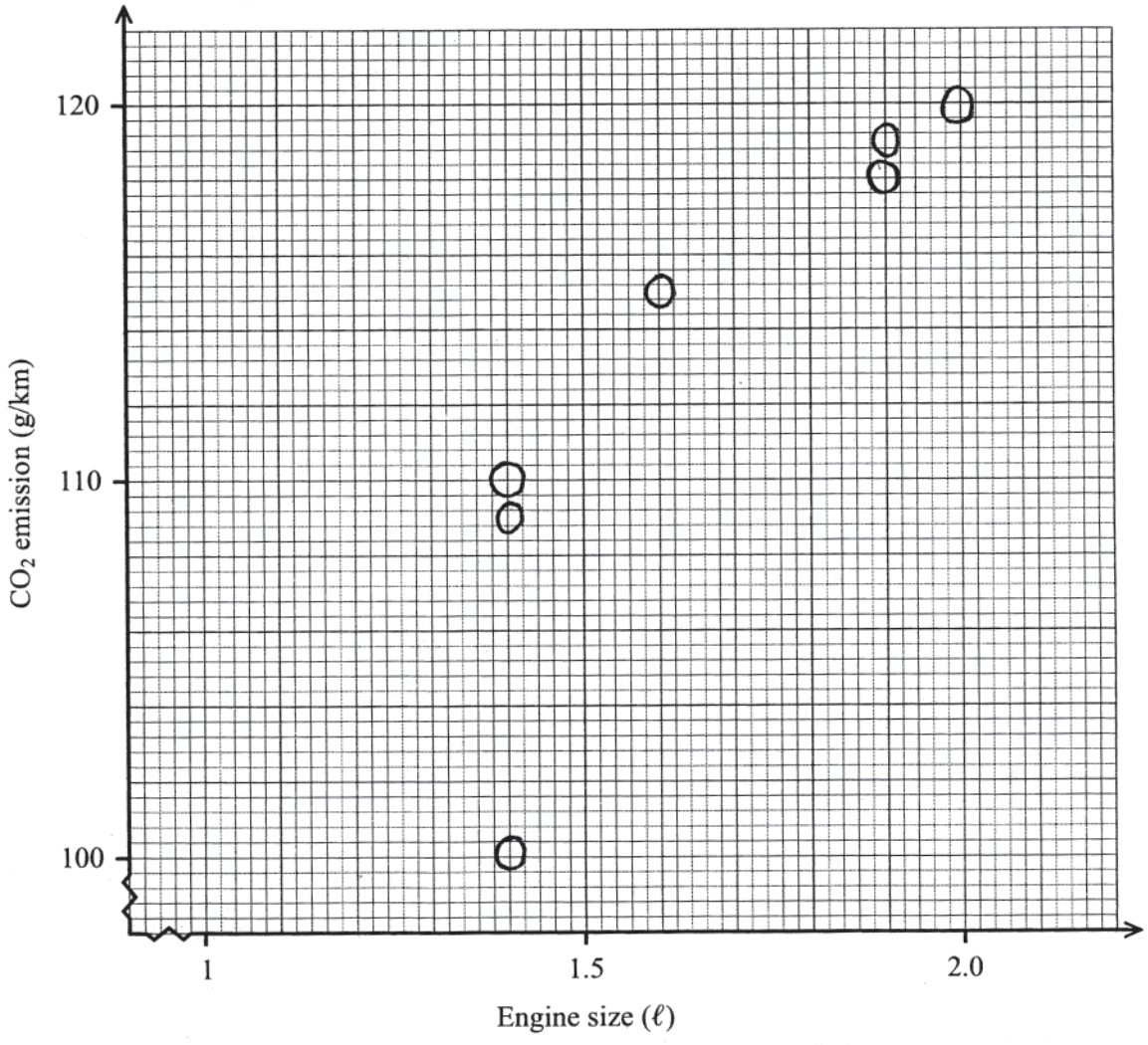
			AVAILABLE MARKS
1	**(a)** See overlay 7 Points correct (allow MA1 for 4 points correct)	MA2	
	(b) Seat (Ibiza 1.4)	A1	
	(c) Line drawn correctly	A1	
	(d) Correct reading from line	MA1	5
2	$\frac{9}{30}$	MA1	
	$\frac{9}{30} \times 100$	M1	
	$= 30\%$	A1	3
3	**(a)** 3, 6, 11 (allow A1 for 2 correct)	A2	
	(b) $4n - 2$	MA1, A1	4
4	**(a)** $2.6 \times 100 \times 100$	MA1	
	$= 26000$	A1	
	(b) 13.5	A1	3
5	**(a)** AOB = 360/8	MA1	
	$= 45$	A1	
	(b) ABO = (180 − 45)/2 = 67.5	MA1	
	So ABC = 2 × 67.5 = 135	MA1	4
6	$x^2 - x + 7x - 7$	MA1	
	$x^2 + 6x - 7$	MA1	2
7	$54 = 2 \times 3 \times 3 \times 3$	MA1	
	$60 = 2 \times 2 \times 3 \times 5$	MA1	
	LCM = 2 × 2 × 3 × 3 × 3 × 5 = 540	MA1	3

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			AVAILABLE MARKS
8	$4x + 8x + 128 = 500$ (or equivalent)	M1, A1	
	$12x = 372$	MA1	
	$x = 31$	MA1	4
9	£475	MA1	
	£340	MA1	
	£525	MA1	3
10	$\frac{4x + 3 + 12x - 10}{10} = \frac{65}{10}$ **or** $\frac{13}{2}$	MA1	
	$4x + 3 + 12x - 10 = 65$	MA1	
	$16x = 72$	MA1	
	$x = \frac{9}{2}$	MA1	4
11	**(a)** gradient $= (9 - 1)/(2 - 0) = 4$	M1, A1	
	$y = 4x + 1$	MA1	
	(b) Length $= \sqrt{5^2 + 12^2}$	M1, A1	
	$= \sqrt{(25 + 144)} = \sqrt{169} = 13$	A1	6
12	$\frac{49}{8} \div \frac{7}{3}$	MA1	
	$\frac{49}{8} \times \frac{3}{7} = \frac{21}{8}$ (or equivalent)	MA1	
	$2\frac{5}{8}$	A1	3
	Total		**44**

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GCSE MATHEMATICS SUMMER 2010
MODULE N3-1
OVERLAY QUESTION 1



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Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
January 2010

Mathematics



Module N3 Paper 1
(Non-calculator)
Higher Tier

[GMN31]

GMN31

TUESDAY 12 JANUARY

9.15 am – 10.15 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.
You **must not** use a calculator for this paper.

INFORMATION FOR CANDIDATES

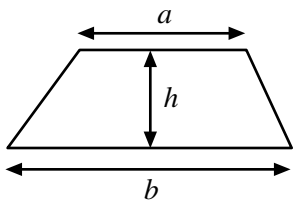
The total mark for this paper is 44.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
You should have a ruler, compasses, set-square and protractor.
The Formula Sheet is on page 2.

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

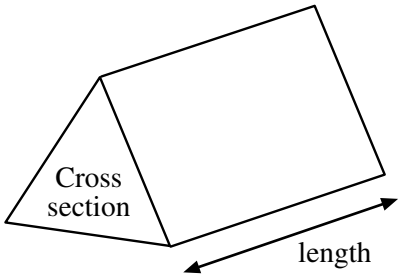
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Formula Sheet

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



Volume of prism = area of cross section × length

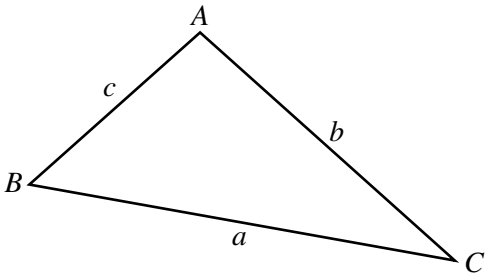


In any triangle ABC

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

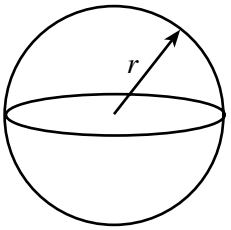
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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



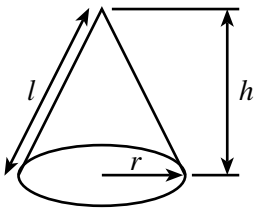
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Examiner Only	
Marks	Remark

1 The BBC wishes to survey opinion on a new TV series.
A researcher interviews 250 people leaving a supermarket between 10 am and noon, one Monday morning.

Give one reason why this survey may be biased.

_____

_____ [1]

---

2 **(a)** Expand $4(3 - x)$

Answer _____ [1]

(b) Factorise $k^2 - k$

Answer _____ [1]

(c) Solve $7x + 5 = 3x + 8$

Answer x = _____ [3]

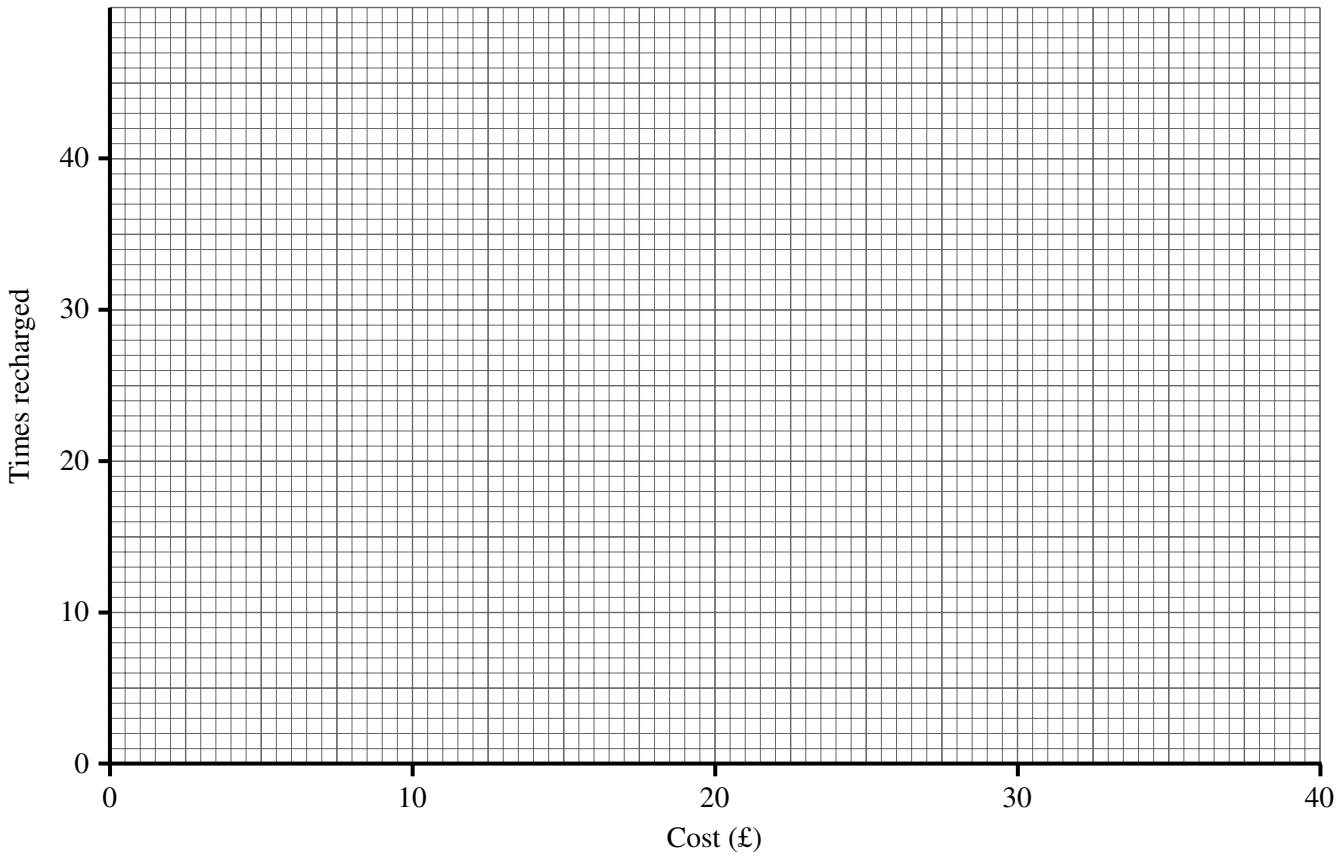
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3 Seven friends compared the costs of their mobile phones and how many times they had to recharge them in a period of 2 months.

The table shows the results.

Cost (£)	17	19	21	23	25	27	30
Times recharged	38	31	28	24	20	16	8

(a) Draw a scatter graph for this data. [2]



(b) Draw a line of best fit on the scatter graph. [1]

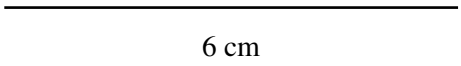
(c) Estimate the cost of another mobile phone which had to be recharged four times.

Answer £_____ minutes [1]

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4 A parallelogram has sides 6 cm and 5 cm. The shorter diagonal is 5 cm.

Make an **accurate** drawing of this parallelogram.
One side has been drawn for you.



[4]

Examiner Only	
Marks	Remark

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Examiner Only	
Marks	Remark

5 **(a)** $\frac{5}{8}$ of the length of a wall has been completed.

If there is still 30 ft to build, how long will the wall be when it is finished?

Answer _____ ft [3]

(b) Calculate $6\frac{3}{4} - 4\frac{1}{3}$

Answer _____ [3]

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Examiner Only	
Marks	Remark

6 Write down an expression for the nth term of the sequence

–3, –6, –9, –12, . . .

Answer nth term = _____ [1]

7 Jake asked a number of students in his year group how much they paid for their home computer.
The results are shown in the frequency table.

Price (£P)	**Frequency**
$0 < P \leqslant 500$	5
$500 < P \leqslant 1000$	20
$1000 < P \leqslant 1500$	10
$1500 < P \leqslant 2000$	4
$2000 < P \leqslant 2500$	1

Calculate an estimate for the mean price.

Answer £ _____ [4]

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Examiner Only	
Marks	Remark

8 The interior angle of a regular polygon is 140°.
How many sides has this regular polygon?

Answer _____ [3]

---

9 Simplify

(a) $\frac{3a}{2} + \frac{2a}{3}$

Answer _____ [3]

(b) $\frac{(x+2)^2}{2(x+2)}$

Answer _____ [1]

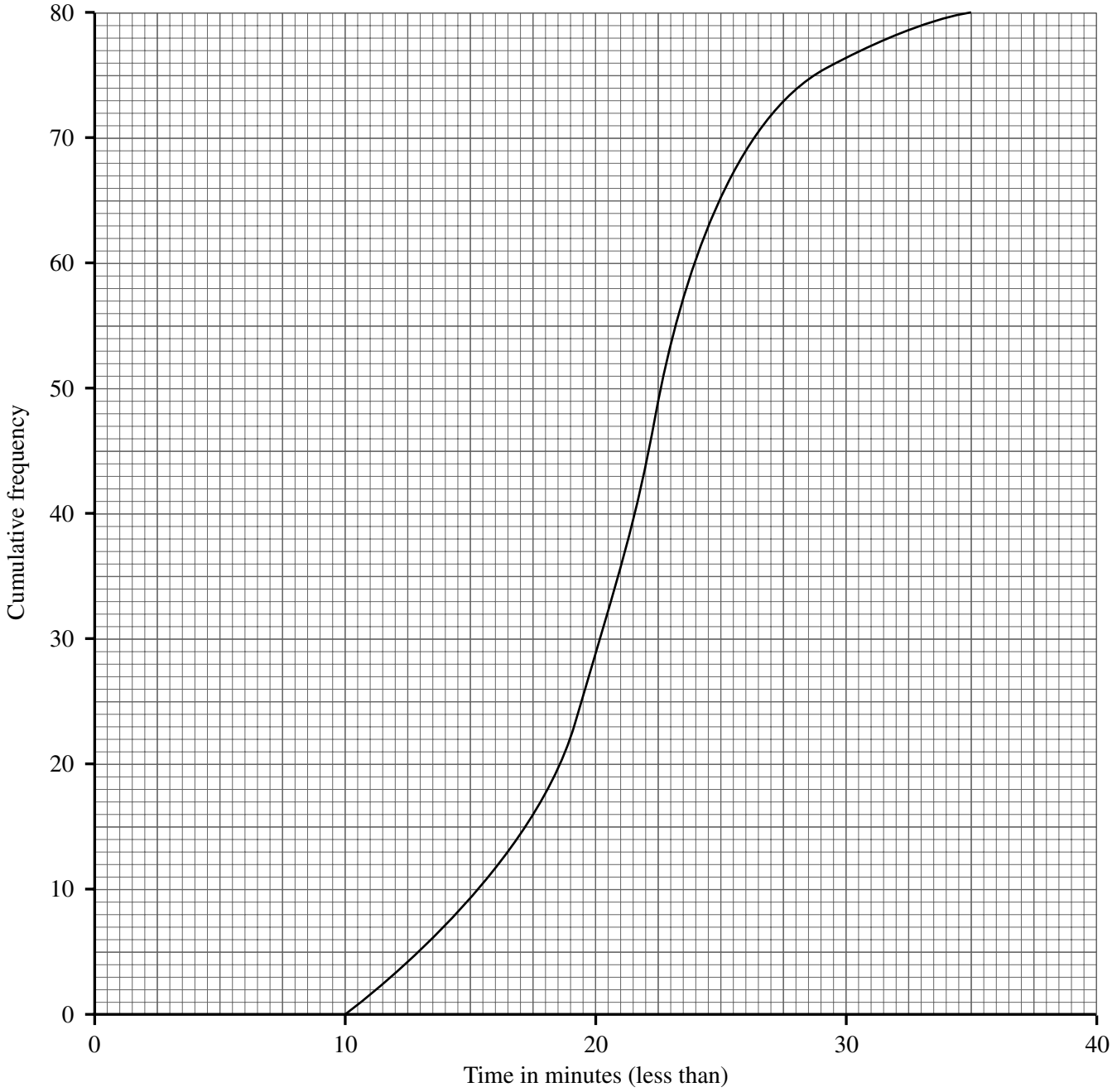
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(Questions continue overleaf)

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10 The time taken by a number of adults to complete a Sudoku puzzle was recorded.
The cumulative frequency graph for the results is shown.



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Use the graph to estimate

(a) the median time,

Answer _____ minutes [1]

(b) the interquartile range.

Answer _____ minutes [2]

Examiner Only	
Marks	Remark

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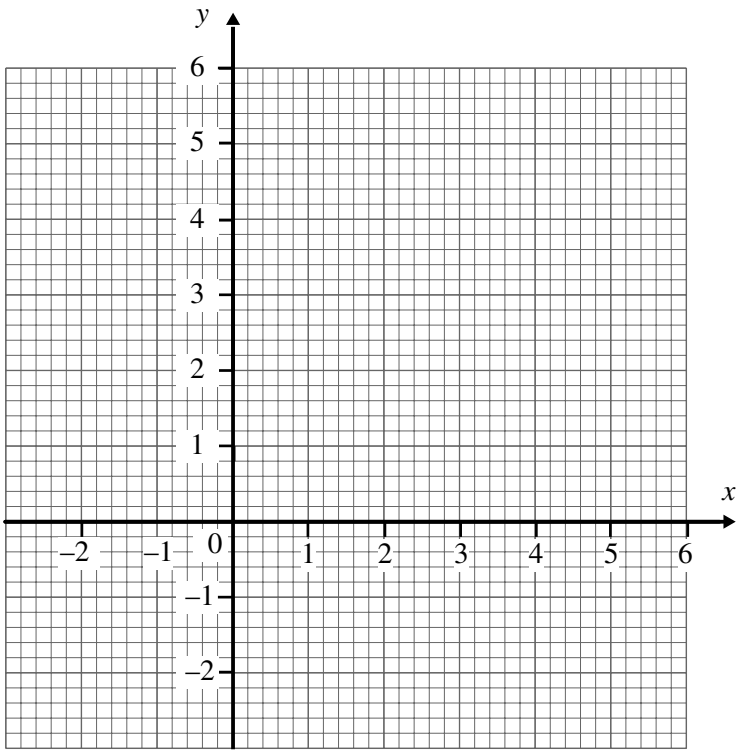
11 On the grid below, draw the lines $3x + 4y = 12$

$y = 3 - 3x$

and $y = -1$

Hence indicate clearly the region R where

$3x + 4y \leqslant 12$ $y \geqslant 3 - 3x$ and $y \geqslant -1$



[3]

Examiner Only	
Marks	Remark

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12 A new HD ready TV was sold at the reduced price of £434 because the surround was slightly damaged.

30% of the original price had been deducted.
What was the original price?

Answer £ _____ [3]

Examiner Only	
Marks	Remark

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Examiner Only	
Marks	Remark

13 A, B, C and D are points on the circumference of a circle with centre O.
Angle DAC = 20°

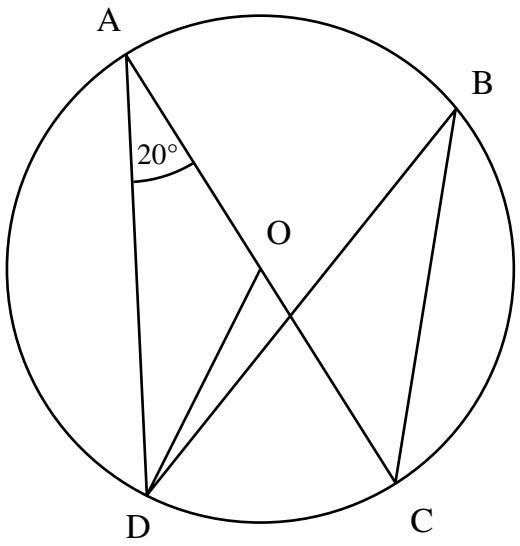


Diagram not drawn accurately

(a) Find the size of angles:

(i) DOC, Answer _____ ° [1]

(ii) ADC. Answer _____ ° [1]

(b) Explain why angle DBC = 20°

Answer _____ [1]

THIS IS THE END OF THE QUESTION PAPER

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1312-054-1

GCSE

Mathematics (Modular)

January 2010

Mark Schemes

Issued: April 2010

Rewarding Learning

General Certificate of Secondary Education
January 2010

Mathematics

Module N3 Paper 1
(Non-calculator)
Higher Tier

[GMN31]

TUESDAY 12 JANUARY

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			AVAILABLE MARKS
1	More women, no children or other suitable reason	A1	1
2	**(a)** $12 - 4x$	MA1	
	(b) $k(k - 1)$	MA1	
	(c) $7x - 3x = 8 - 5$	MA1	
	$4x = 3$	MA1	
	$x = \frac{3}{4}$	A1	5
3	**(a)** 7 points correct (A1 for 4 correct)	A2	
	(b) Appropriate line	MA1	
	(c) Correct reading from candidate's line	MA1	4
4	Accurate diagonal	A1	
	Correct parallelogram	A3	4
5	**(a)** $\frac{3}{8} = 30$ ft	MA1	
	$\frac{1}{8} = 10$ ft	MA1	
	Wall length $= 10 \times 8 = 80$	MA1	
	(b) $\frac{27}{4} - \frac{13}{3}$ **or** $2\frac{3}{4} - \frac{1}{3}$	MA1	
	$\frac{81}{12} - \frac{52}{12}$ **or** $2\frac{9}{12} - \frac{4}{12}$	MA1	
	$\frac{29}{12}$ $(2\frac{5}{12})$ **or** $2\frac{5}{12}$	A1	6
6	$-3n$	A1	1

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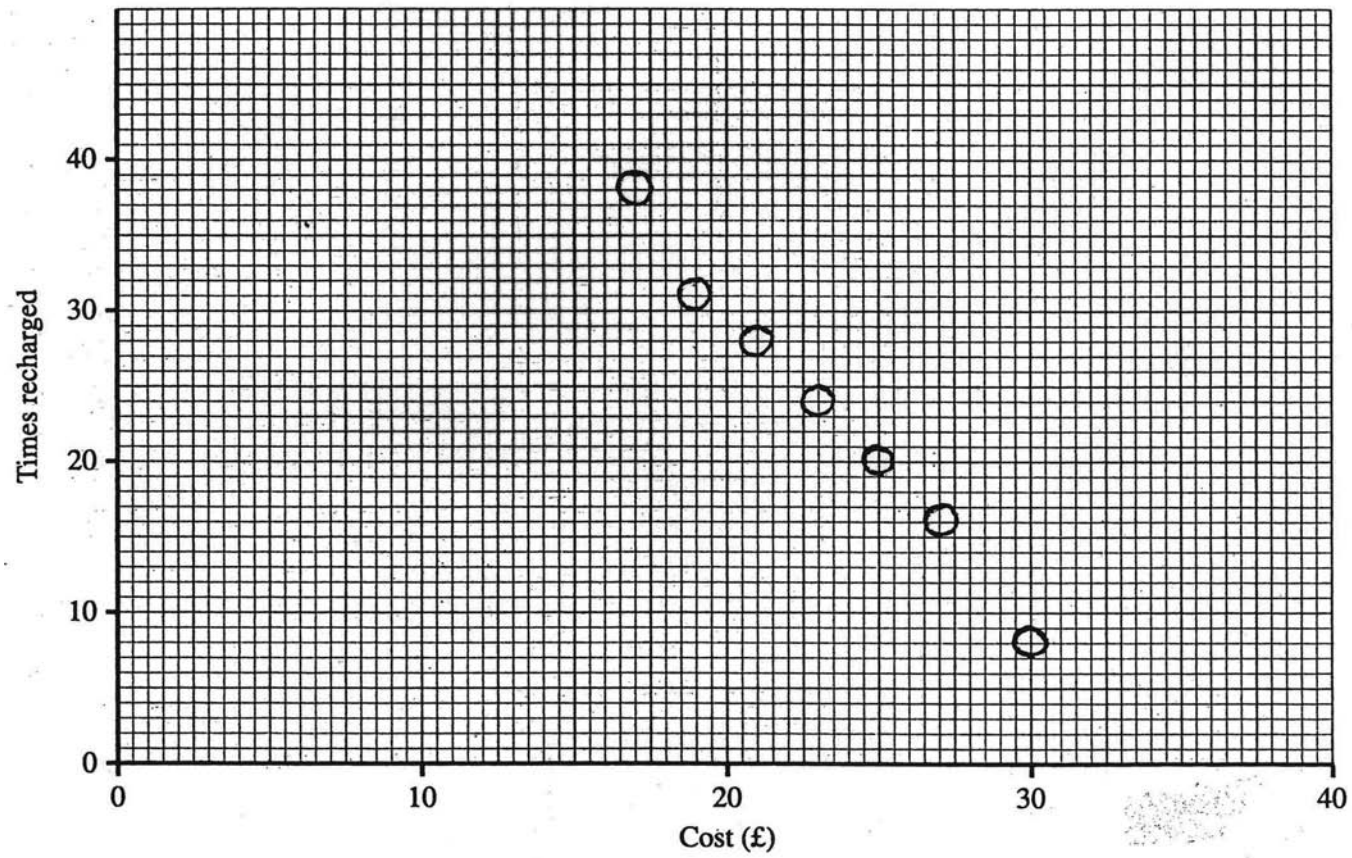
			AVAILABLE MARKS
7	$250 \times 5 + 750 \times 20 + 1250 \times 10 + 1750 \times 4 + 2250 \times 1$	M1	
	$= 38\,000$	A1	
	$38\,000 \div 40$	M1	
	$= 950$	A1	4
8	40°	MA1	
	$360 \div 40 = 9$	M1, A1	3
9	**(a)** $\frac{9a}{6} + \frac{4a}{6}$	MA1, MA1	
	$= \frac{13a}{6}$	MA1	
	(b) $\frac{x+2}{2}$	MA1	4
10	**(a)** 21.5	MA1	
	(b) $24 - 18.5 = 5.5$	M1, A1	3
11	2 correct lines and correct shading	MA1	
	3rd line drawn and correct shading	MA1	
	R correctly positioned	MA1	3
12	£434 = 70%	MA1	
	£62 = 10% **or** $\frac{434}{70} \times 100$	MA1	
	Original price = 62×10 = £620	MA1	3

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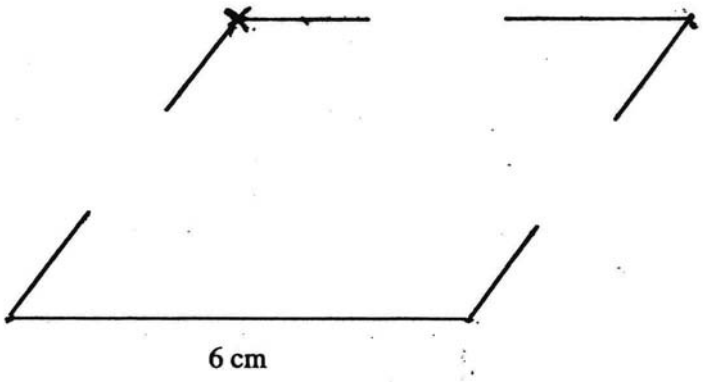
			AVAILABLE MARKS
13	**(a)** **(i)** 40°	MA1	
	(ii) 90°	MA1	
	(b) Suitable explanation	MA1	3
		Total	**44**

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GCSE MATHEMATICS JANUARY 2010
MODULE N3-1
OVERLAY QUESTION 3



GCSE MATHEMATICS JANUARY 2010
MODULE N3-1
OVERLAY QUESTION 4



Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
2009

Mathematics



Module N3 Paper 1
(Non-calculator)
Higher Tier

[GMN31]

GMN31

MONDAY 18 MAY

1.30 pm – 2.30 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 fourteen** questions.
Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.
You **must not** use a calculator for this paper.

INFORMATION FOR CANDIDATES

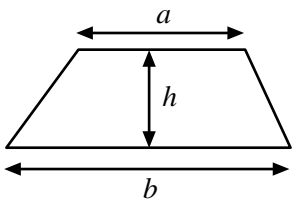
The total mark for this paper is 44.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
You should have a ruler, compasses, set-square and protractor.
The Formula Sheet is on page 2.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
Total Marks	

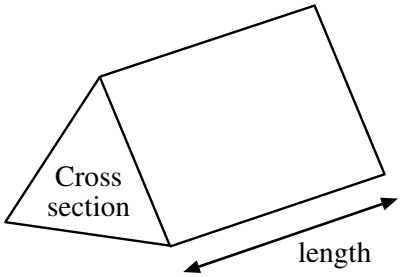
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Formula Sheet

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



Volume of prism = area of cross section × length

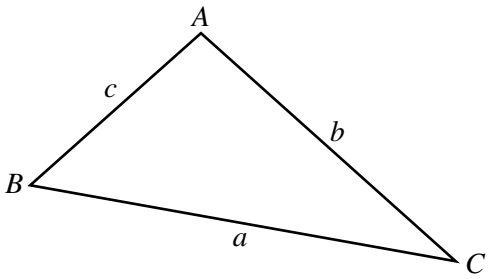


In any triangle ABC

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

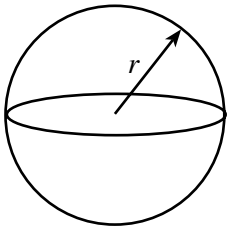
Sine rule : $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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



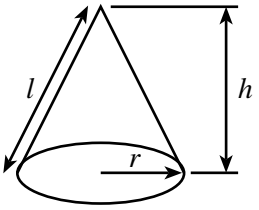
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

Curved surface area of cone = πrl

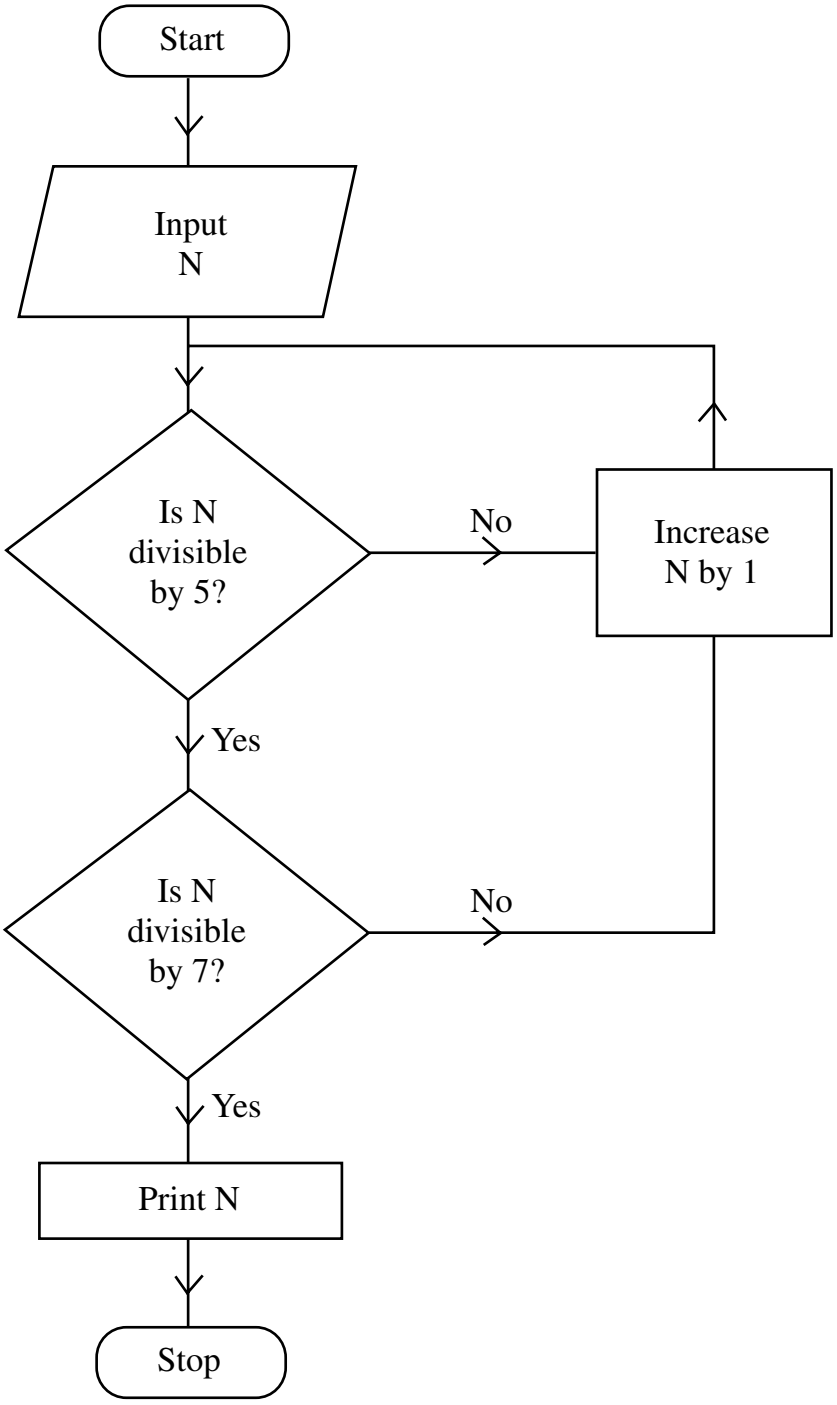


Quadratic equation:

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



Starting with N = 64, use the flow chart to find the number printed.

Answer Number Printed _____ [2]

Examiner Only	
Marks	Remark

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Examiner Only	
Marks	Remark

2 On holiday Mark drinks $\frac{3}{4}$ of a bottle of water each day.
What is the least number of bottles Mark will have to buy for a 9 day holiday?

Answer _____ [3]

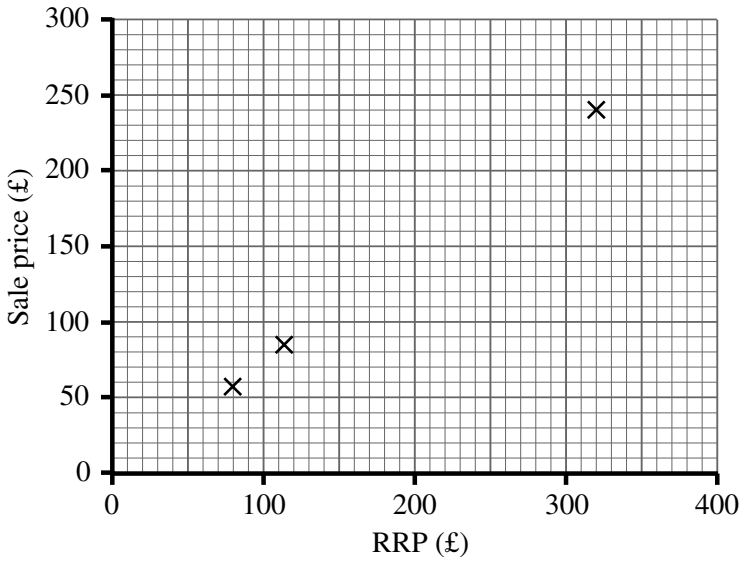
---

3 I buy y bars of chocolate at 42 pence each.
Write an expression in terms of y for the change, in **pence**, I will get from £5.

Answer _____ p [2]

4 The table shows the RRP (recommended retail price) and the sale price of some products in Jack's Discount Store.

RRP (£)	**80**	**113**	140	170	180	210	230	270	300	**320**
Sale price (£)	**58**	**85**	105	130	132	155	178	200	232	**240**



The data in bold type has already been plotted.

(a) Complete the scatter graph. [2]

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

(c) Estimate the RRP of a product on sale for £150

Answer £ _____ [1]

(d) What type of correlation does your graph show?

Answer _____ [1]

Examiner Only

Marks	Remark

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Examiner Only	
Marks	Remark

5

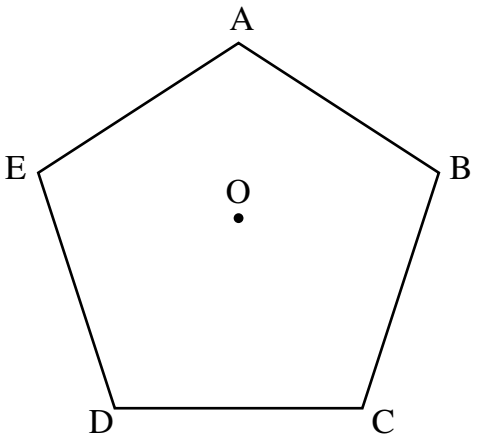


Diagram not drawn accurately

ABCDE is a regular pentagon with centre O.

Calculate the size of

(a) angle AOB

Answer _____° [2]

(b) angle ABC

Answer _____° [2]

---

6 The nth term of a sequence is represented by $n^2 - 3$
Which term of the sequence will equal 78?

Answer _____ [2]

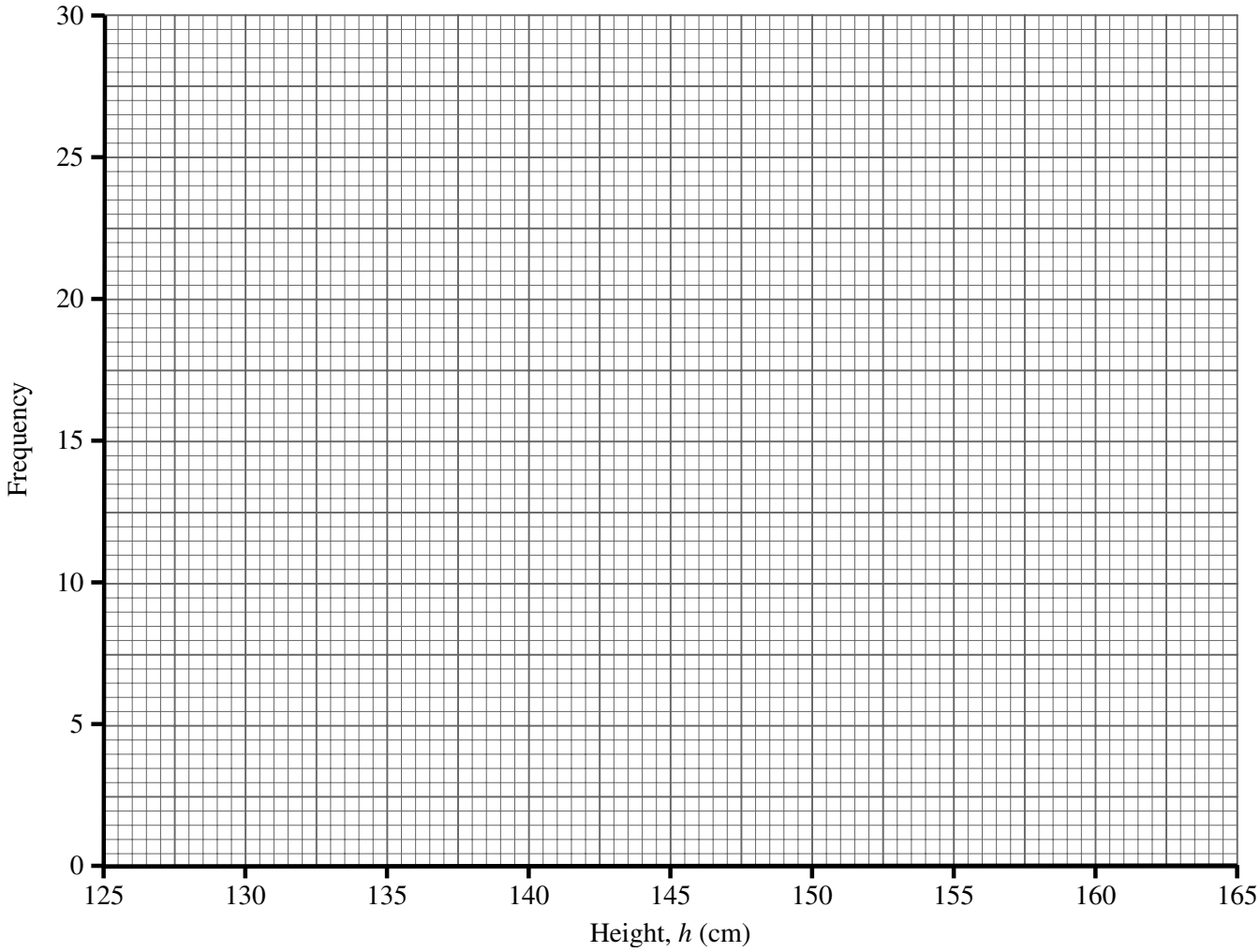
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7 The heights of 100 students were recorded.

Examiner Only	
Marks	Remark

Height, h, in cm	Frequency
$130 \leqslant h < 135$	15
$135 \leqslant h < 140$	25
$140 \leqslant h < 145$	26
$145 \leqslant h < 150$	21
$150 \leqslant h < 155$	8
$155 \leqslant h < 160$	5

Draw a frequency polygon for the data.



[2]

Examiner Only	
Marks	Remark

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Examiner Only	
Marks	Remark

8 Write 80 as a product of its prime factors, giving your answer in index form.

Answer _____ [3]

---

9 Jack is x years old. His brother Dan is 5 years younger.
In 3 years' time the sum of their ages will be 15.

(a) Write an equation in terms of x using the sum of their ages in 3 years' time.

Answer _____ [2]

(b) Solve the equation to find Jack's age now.

Answer _____ [1]

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10 The percentage marks in a class test were recorded in the following table:

Marks (%)	Frequency		
55–59	1		
60–64	1		
65–69	2		
70–74	5		
75–79	9		
80–84	5		
85–89	2		

Calculate an estimate for the mean mark.

Answer _____ % [4]

11 **(a)** Expand and simplify $(3x - 2)(2x + 1)$

Answer _____ [2]

(b) Solve the simultaneous equations

$$3x - 2y = 14$$
$$x + 2y = 10$$

Show your working.
A solution by trial and improvement will not be accepted.

Answer x = _____, y = _____ [2]

Examiner Only

Marks	Remark

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Examiner Only	
Marks	Remark

12

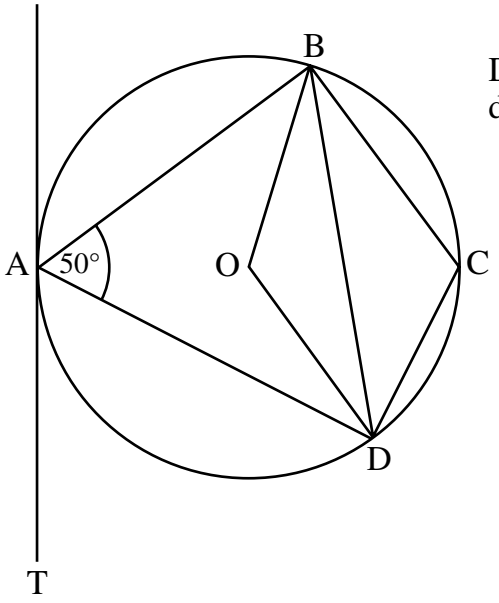


Diagram not drawn accurately

O is the centre of a circle and A, B, C and D are points on the circumference of the circle.
TA is a tangent to the circle.
Angle BAD is 50°
Calculate the size of

(a) angle OAT,

Answer _____° [1]

(b) angle BCD,

Answer _____° [1]

(c) angle BOD.

Answer _____° [1]

---

13 Calculate $2\frac{1}{5} \div 1\frac{2}{3}$

Answer _____ [3]

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14 Solve the equation $\frac{2x+1}{3} - \frac{x+1}{5} = 3$

Examiner Only	
Marks	Remark

Show your working.
A solution by trial and improvement will not be accepted.

Answer $x =$ _____ [4]

THIS IS THE END OF THE QUESTION PAPER

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GCSE

Mathematics (Modular)

Summer 2009

Mark Schemes

Issued: October 2009

Rewarding Learning

General Certificate of Secondary Education

Summer 2009

Mathematics

Module N3 Paper 1

(Non-calculator)

Higher Tier

[GMN31]

MONDAY 18 MAY

1.30 pm – 2.30 pm

MARK SCHEME

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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	70	M1, A1	2
2	$\frac{3}{4} \times 9$	M1	
	$\frac{27}{4} = 6\frac{3}{4}$	MA1	
	= 7 bottles	A1	3
3	$500 - 42y$	A1, A1	2
4	**(a)** scatter graph (Allow A1 for 4 correct)	A2	
	(b) oblique line with roughly half the points on either side	A1	
	(c) follow pupil's line	A1	
	(d) positive	A1	5
5	**(a)** AOB = $\frac{360}{5}$ = 72	M1A1	
	(b) ABC = 180 – 72 = 108	M1A1	4
6	$n^2 - 3 = 78$ $n^2 = 81$	M1	
	$n = 9$	A1	2
7	polygon, see overlay		
	correct frequencies at mid-points	MA1	
	points joined by straight lines	MA1	2
8	2 | 80 2 | 40 2 | 20 2 | 10 5 | 5 1	M1 A1	
	$= 2^4 \times 5$	MA1	3

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			AVAILABLE MARKS
9	**(a)** now: Jack = x Dan = $x - 5$	A1	
	3 years time $x + 3 + x - 5 + 3 = 15$ (or equivalent)	MA1	
	(b) $x = 7$	A1	3

10

Mid-Points	fx
57	57
62	62
67	134
72	360
77	693
82	410
87	174

mid-points	MA1	
fx products	M1	
1890	MA1	
75.6	MA1	4

11	**(a)**	$6x^2 + 3x - 4x - 2$	MA1
		$= 6x^2 - x - 2$	A1
	(b)	$4x = 24$	
		$x = 6$	MA1
		$y = 2$	A1 4

12	**(a)**	90	MA1
	(b)	130	MA1
	(c)	100	MA1 3

13 $2\frac{1}{5} \div 1\frac{2}{3}$

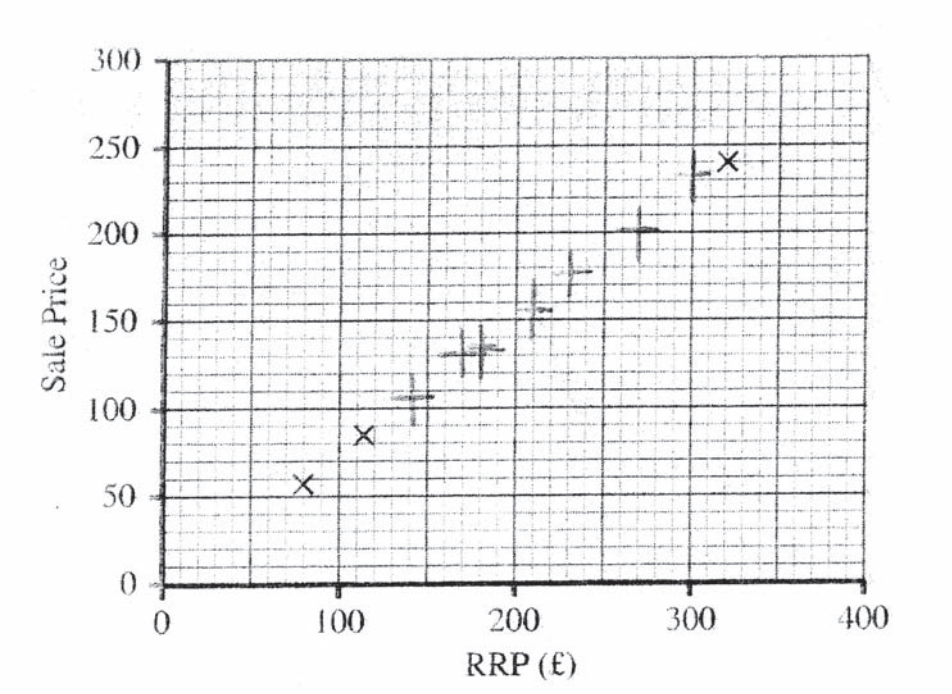
$\frac{11}{5} \div \frac{5}{3}$	MA1	
$\frac{11}{5} \times \frac{3}{5}$	MA1	
$\frac{33}{25}$ $\left(=1\frac{8}{25}\right)$	A1	3

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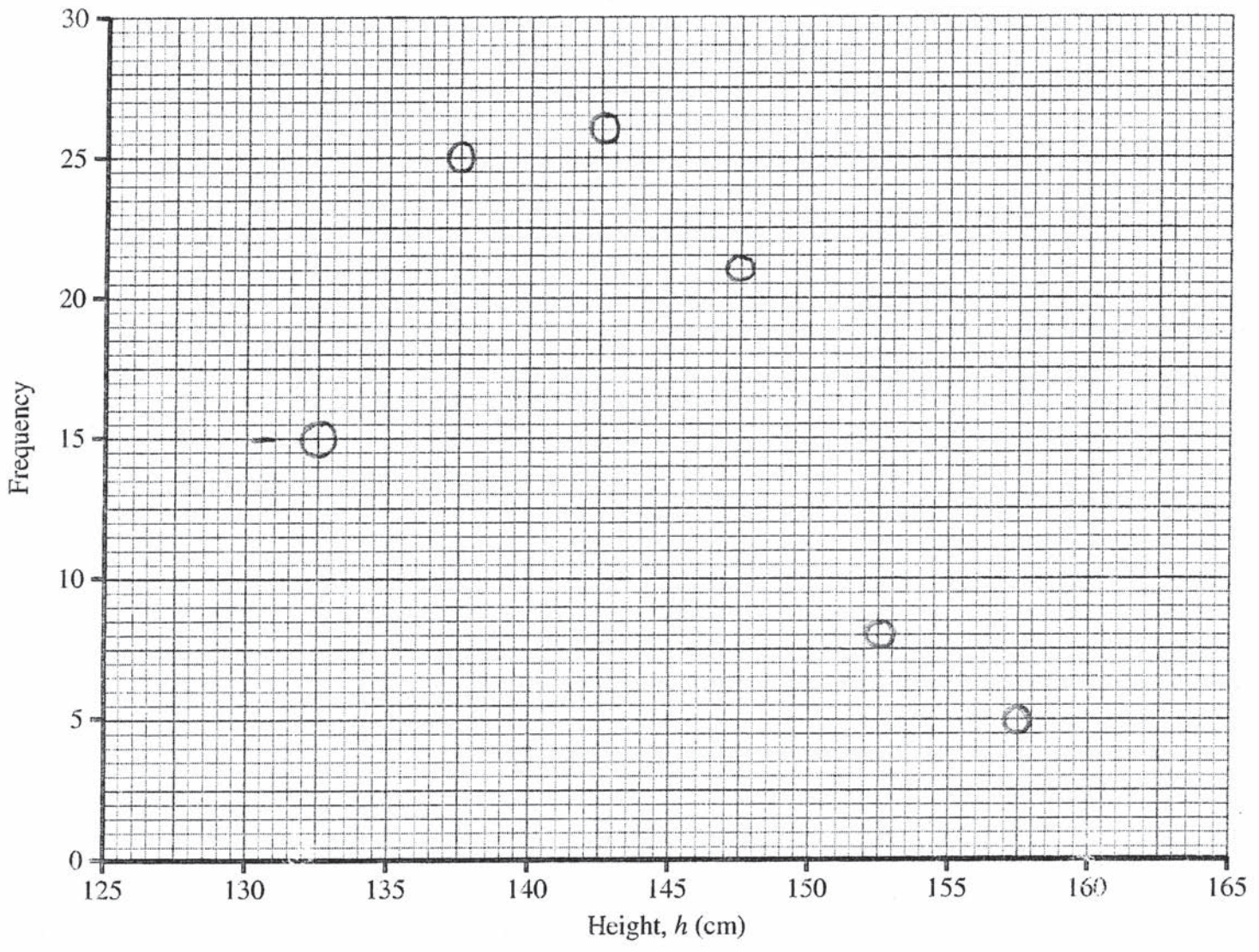
			AVAILABLE MARKS
14	$5(2x + 1) - 3(x + 1) = 45$	MA1	
	$10x + 5 - 3x - 3 = 45$	MA1	
	$7x + 2 = 45$	MA1	
	$7x = 45 - 2$		
	$7x = 43$		
	$x = \frac{43}{7}$ or $6\frac{1}{7}$	A1	4
		Total	**44**

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GCSE MATHEMATICS SUMMER 2009
MODULE N3-1
OVERLAY QUESTION 4



GCSE MATHEMATICS SUMMER 2009
MODULE N3-1
OVERLAY QUESTION 7



Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
January 2009

Mathematics



Module N3 Paper 1
(Non-calculator)
Higher Tier

[GMN31]

GMN31

FRIDAY 9 JANUARY

9.15 am – 10.15 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 eleven** questions.
Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.
You **must not** use a calculator for this paper.

INFORMATION FOR CANDIDATES

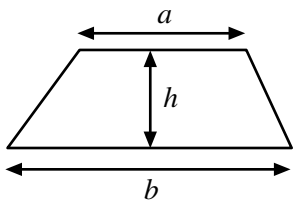
The total mark for this paper is 44.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
You should have a ruler, compasses, set-square and protractor.
The Formula Sheet is on page 2.

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

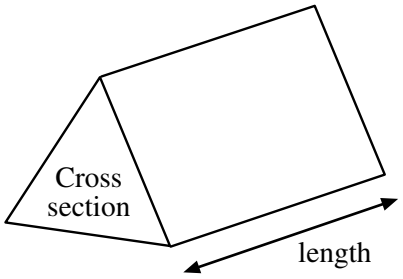
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Formula Sheet

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



Volume of prism = area of cross section × length

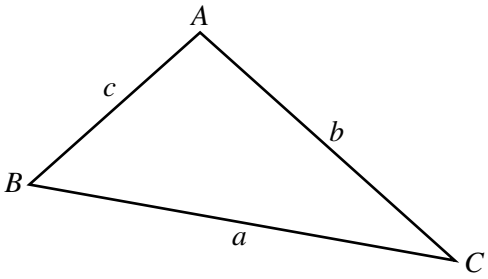


In any triangle ABC

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

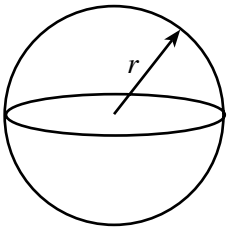
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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



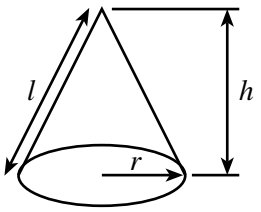
Volume of sphere = $\frac{4}{3}\pi r^3$

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)

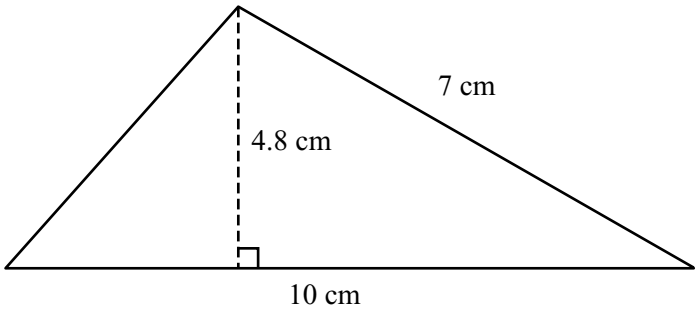


Diagram not drawn accurately

Calculate the area of the triangle.

Answer _____ cm^2 [2]

(b) Convert 8.4 m^2 to cm^2

Answer _____ cm^2 [2]

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2 Joe uses $\frac{3}{4}$ of a tin of paint to paint a garden shed.

What is the least number of tins he requires to paint 10 similar sheds?

Answer _____ [3]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

3 A survey was carried out in Belfast City centre to find out the opinions of people on the subject of 'healthy living'.

A sample of 100 people was questioned.

(a) (i) Explain why these 100 people might not represent the opinions of the Belfast public on 'healthy living'.

_____

_____ [1]

(ii) One of the questions used in the survey was "Do you not think that thin people are healthier than fat people?"
Give a reason why this question may not have been a suitable question for the survey.

Reason _____

_____ [1]

(b) The same survey was carried out inside a leisure centre in Lisburn.
Give **two** reasons why the survey should not have been carried out in this location.

Reason _____

_____ [1]

Reason _____

_____ [1]

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Examiner Only	
Marks	Remark

4 The heights, in cm, of 11 children in a nursery class were:

81 86 90 97 88 79 83 91 93 85 88

Illustrate this using a stem and leaf diagram. [3]

5 **(a)** Factorise

(i) $28 - 7y$

Answer _____ [1]

(ii) $p - pt$

Answer _____ [1]

(b) **(i)** Expand $5(3 - y)$

Answer _____ [1]

(ii) Expand and simplify $(x - 3)(x + 1)$

Answer _____ [2]

(c) Write down an expression for the nth term of the sequence

2, 7, 12, 17, ...

Answer _____ [2]

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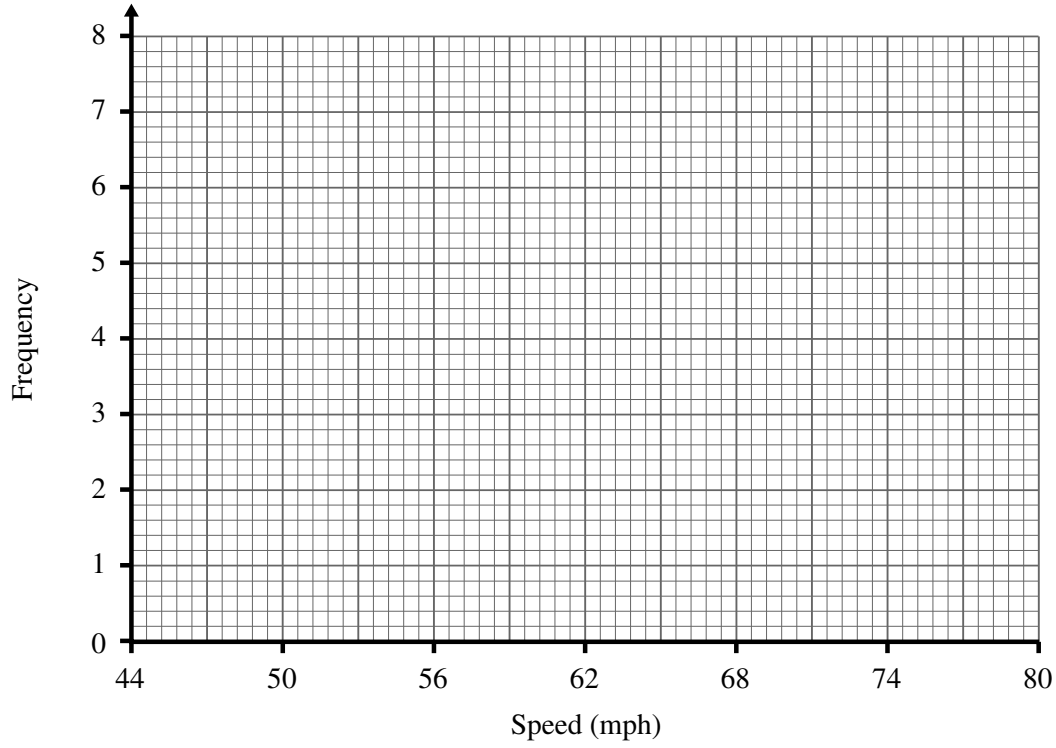
6 The PSNI recorded the speeds of a number of vehicles passing under a bridge on the M2 motorway during a 2 minute period one morning. The speeds recorded are in miles per hour (mph).

Speed x (mph)	Frequency f
$44 \leq x < 50$	3
$50 \leq x < 56$	7
$56 \leq x < 62$	8
$62 \leq x < 68$	6
$68 \leq x < 74$	5
$74 \leq x < 80$	1

(a) Which of the class intervals contains the median speed?

Answer _____ [1]

(b) On the graph paper draw a frequency polygon for the data. [2]



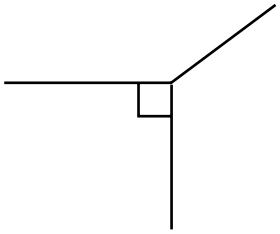
Examiner Only

Marks	Remark

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Examiner Only	
Marks	Remark

7 Two identical regular polygons join with a square to form a tiling pattern.



Explain why these polygons must be regular octagons.

_____

_____

_____

_____ [3]

8 Write 120 as a product of prime factors and express your answer in index notation.

Answer _____ [3]

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BLANK PAGE

(Questions continue overleaf)

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9 Eileen constructed a cumulative frequency table from her mobile phone bill to display her call times over the previous month. The results are shown in the table below.

Time in minutes	Cumulative frequency
<5	29
<10	62
<15	114
<20	153
<25	179
<30	195

(a) Draw a cumulative frequency graph, on the opposite page, to display the data. [3]

(b) From your graph, estimate the interquartile range.

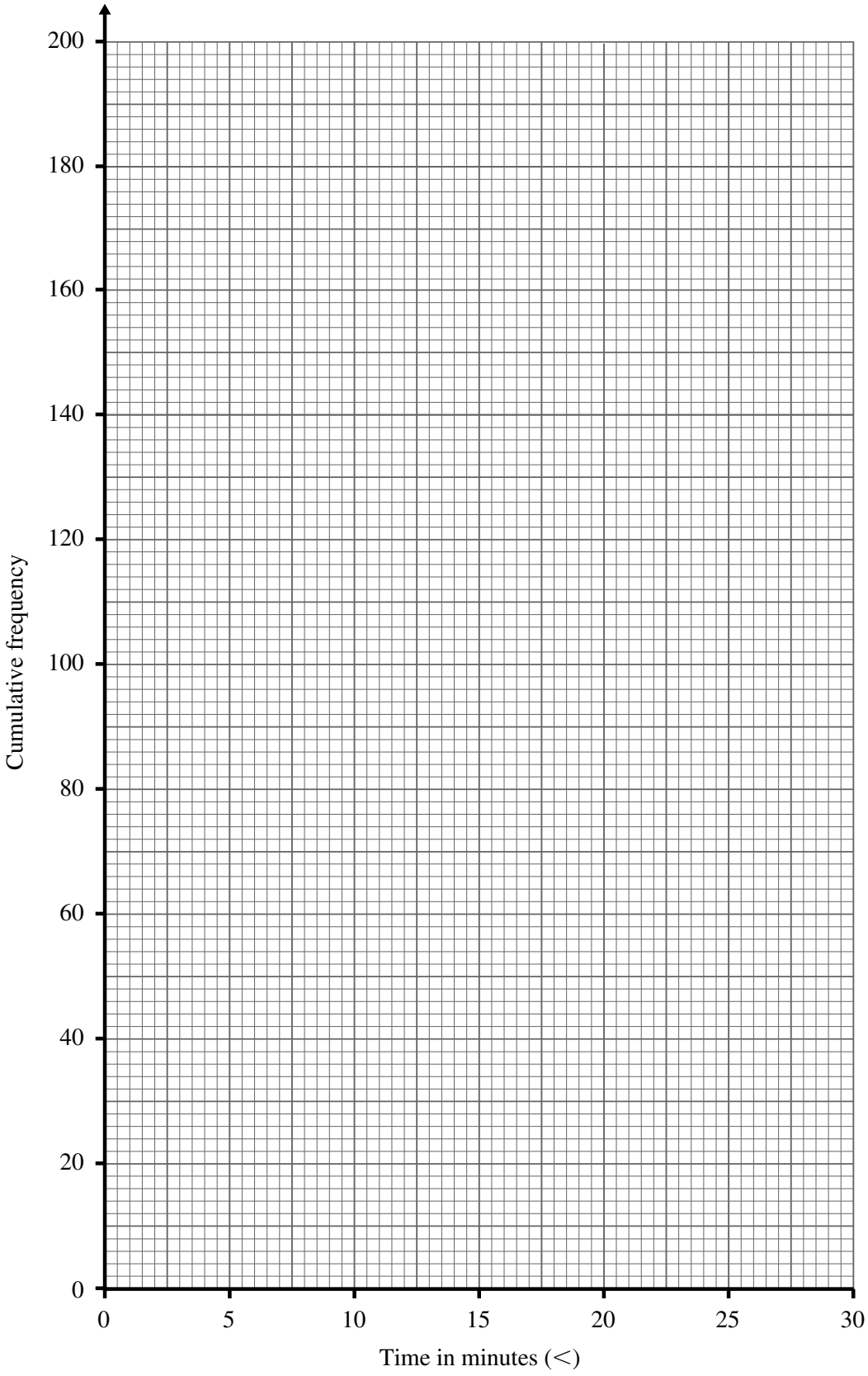
Answer _____ minutes [2]

(c) Eileen's pricing plan with the phone company allows her free calls provided that they last no more than 12 minutes.
From your graph, estimate the number of calls which will be charged to Eileen's account by the phone company.

Answer _____ calls [2]

Examiner Only	
Marks	Remark

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Cumulative frequency
200
180
160
140
120
100
80
60
40
20
0
0
5
10
15
20
25
30
Time in minutes (<)

STEMUP.CO.UK

10 Calculate $4\frac{1}{4} \times 2\frac{2}{3}$

Give your answer as a mixed number.

Answer _____ [3]

Examiner Only	
Marks	Remark

---

11 Solve the equation $\frac{x+2}{2} - \frac{2x-1}{3} = 2$

Show your working.
A solution by trial and improvement will not be accepted.

Answer x = _____ [4]

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THIS IS THE END OF THE QUESTION PAPER

GCSE

Mathematics (Modular)

January 2009

Mark Schemes

Issued: April 2009

Rewarding Learning

General Certificate of Secondary Education

January 2009

Mathematics

Module N3 Paper 1

(Non-calculator)

Higher Tier

[GMN31]

FRIDAY 9 JANUARY

9:15 am – 10:15 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).

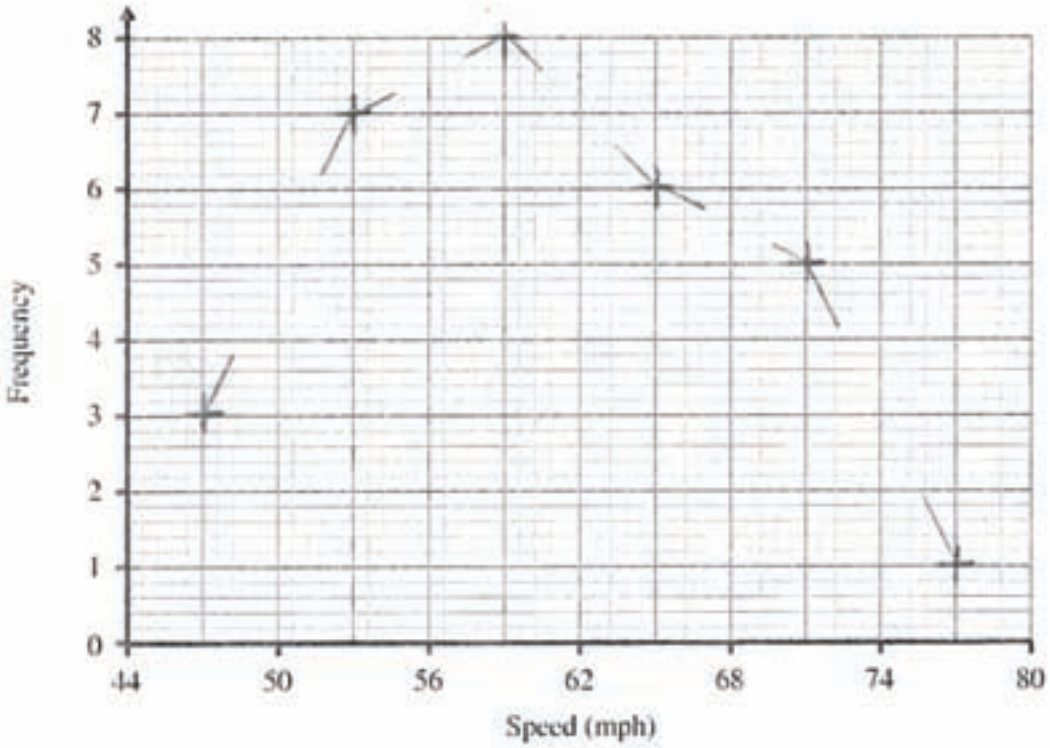
			AVAILABLE MARKS
1	**(a)** $\frac{1}{2}(4.8) \times 10 = 24$	M1, A1	
	(b) 8.4×100^2 $= 84\,000$	MA1 A1	4
2	$10 \div \frac{3}{4} = \frac{30}{4} = 7.5$	M1, A1	
	$\Rightarrow 8$	MA1	3
3	**(a)** **(i)** age, sex, not members of Belfast public, suitable reason	MA1	
	(ii) leading question, suitable reason	MA1	
	(b) users of leisure centres committed to healthy lifestyle unlikely to survey older people or other suitable reasons (no repeats from part (**a**))	MA2	4
4	7 | 9 8 | 1 3 5 6 8 8 9 | 0 1 3 7	M1, A1	
	7 | 9 means 79 cm	A1	3
5	**(a)** **(i)** $7(4 - y)$	A1	
	(ii) $p(1 - t)$	A1	
	(b) **(i)** $15 - 5y$	A1	
	(ii) $x^2 + x - 3x - 3$ $= x^2 - 2x - 3$	MA1 A1	
	(c) $5n - 3$	A1, A1	7
6	**(a)** $56 \leqslant x < 62$	MA1	
	(b) See overlay A1 for points, A1 for lines		3
7	$360 - 90 = 270$ $270 \div 2 = 135$ $180 - 135 = 45$ $360 \div 45 = 8 \Rightarrow$ octagon	 MA1 MA1 MA1	3

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			AVAILABLE MARKS
8	$2\overline{)120}$ $2\overline{)60}$ $2\overline{)30}$ $3\overline{)15}$ $5\overline{)5}$ 1	M1, A1	
	$2^3 \times 3 \times 5$	A1	3
9	**(a)** See overlay points A2 curve/lines A1	A3	
	(b) reading from graph	MA1, A1	
	(c) reading from graph e.g. 195 – 83 = 112	MA1 MA1	7
10	$\frac{17}{4} \square \frac{8}{3}$	MA1	
	$= \frac{136}{12}$	MA1	
	$= 11\frac{1}{3}$	MA1	3
11	$3(x + 2) – 2(2x – 1) = 12$	MA1	
	$3x + 6 – 4x + 2 = 12$	MA1	
	$–x + 8 = 12$	MA1	
	$–x = 4$		
	$x = –4$	A1	4
		Total	**44**

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GCSE MATHEMATICS JANUARY 2009
MODULE N3-1
OVERLAY QUESTION 6



GCSE MATHEMATICS JANUARY 2009
MODULE N3-1
OVERLAY QUESTION 9

