

GCSE

**Mathematics
(Modular)**

January 2009

Mark Schemes

Issued: April 2009

**NORTHERN IRELAND GENERAL CERTIFICATE OF SECONDARY EDUCATION (GCSE)
AND NORTHERN IRELAND GENERAL CERTIFICATE OF EDUCATION (GCE)**

MARK SCHEMES (2009)

Foreword

Introduction

Mark Schemes are published to assist teachers and students in their preparation for examinations. Through the mark schemes teachers and students will be able to see what examiners are looking for in response to questions and exactly where the marks have been awarded. The publishing of the mark schemes may help to show that examiners are not concerned about finding out what a student does not know but rather with rewarding students for what they do know.

The Purpose of Mark Schemes

Examination papers are set and revised by teams of examiners and revisers appointed by the Council. The teams of examiners and revisers include experienced teachers who are familiar with the level and standards expected of 16- and 18-year-old students in schools and colleges. The job of the examiners is to set the questions and the mark schemes; and the job of the revisers is to review the questions and mark schemes commenting on a large range of issues about which they must be satisfied before the question papers and mark schemes are finalised.

The questions and the mark schemes are developed in association with each other so that the issues of differentiation and positive achievement can be addressed right from the start. Mark schemes therefore are regarded as a part of an integral process which begins with the setting of questions and ends with the marking of the examination.

The main purpose of the mark scheme is to provide a uniform basis for the marking process so that all the markers are following exactly the same instructions and making the same judgements in so far as this is possible. Before marking begins a standardising meeting is held where all the markers are briefed using the mark scheme and samples of the students' work in the form of scripts. Consideration is also given at this stage to any comments on the operational papers received from teachers and their organisations. During this meeting, and up to and including the end of the marking, there is provision for amendments to be made to the mark scheme. What is published represents this final form of the mark scheme.

It is important to recognise that in some cases there may well be other correct responses which are equally acceptable to those published: the mark scheme can only cover those responses which emerged in the examination. There may also be instances where certain judgements may have to be left to the experience of the examiner, for example, where there is no absolute correct response – all teachers will be familiar with making such judgements.

The Council hopes that the mark schemes will be viewed and used in a constructive way as a further support to the teaching and learning processes.

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Rewarding Learning

General Certificate of Secondary Education

January 2009

Mathematics

Module N1 Paper 1

(With calculator)

Foundation Tier

[GMN11]

FRIDAY 9 JANUARY

9.15 am – 10.00 am

**MARK
SCHEME**

GCSE MATHEMATICS JANUARY 2009

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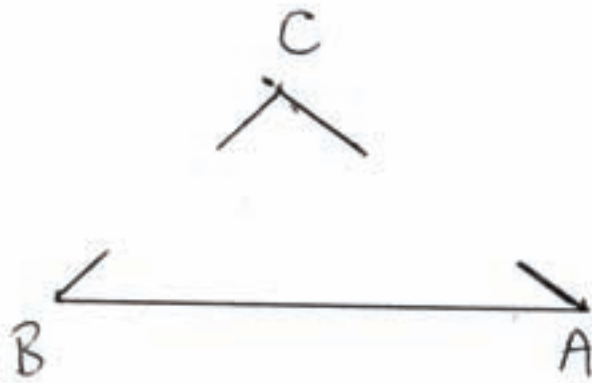
			AVAILABLE MARKS
1	(a) 7, 9, 4, 3, 2, 5 A1 for 3 frequencies correct	A2	5
	(b) (i) 4	MA1	
	(ii) $3 + 6 + 4 + 8 + 2 = 23$	M1, A1	
2	(a) (i) 34, 46	A1	6
	(ii) 65, 25	A1	
	(iii) 12, 18	A1	
	(iv) 25	A1	
	(b) 80×65 5200	MA1 A1	
3	(a) (i) See overlay circle drawn with radius 4 cm (± 0.2)	A1	4
	(ii) chord correctly drawn	A1	
	(b) (i) any quadrilateral with 1 pair of parallel sides	A1	
	(ii) trapezium	A1	
4	Arranged in order	M1	2
	$\frac{(11 + 13)}{2} = 12$	A1	
5	(a) 28°	MA1	2
	(b) 140°	MA1	
6	(a) (i) 34	A1	7
	(ii) 24	A2	
	(iii) 0.15	A1	
	(iv) $\frac{1}{8}$	A2	
	(b) 8	A1	

			AVAILABLE MARKS	
7	(a)	(1, 4)	A1	
	(b)	Point plotted correctly at (-4, 0)	A1	
	(c)	Line $x = 3$ drawn correctly	A1	
8	(a)	$5(-2) - 2(4)$ $= -10 - 8$ $= -18$	M1 A1	
	(b)	(i)	$x = 3$	A1
		(ii)	$y = 18$	A1
		(iii)	$z = 6$	A1
	9	(a)	26	MA1
		(b)	147	MA1
10	(a)	See overlay MA1 for each correct side	MA3	
	(b)	$34^\circ (\pm 2^\circ)$	A1	
11	(a)	$0.4 \times 60 = 24$	M1, A1	
	(b)	3.47	A1	
	(c)	angle marked	A1	
			Total	
			44	

GCSE MATHEMATICS JANUARY 2009
MODULE N1-1
OVERLAY QUESTION 3



GCSE MATHEMATICS JANUARY 2009
MODULE N1-1
OVERLAY QUESTION 10





Rewarding Learning

General Certificate of Secondary Education

January 2009

Mathematics

Module N1 Paper 2

(With calculator)

Foundation Tier

[GMN12]

FRIDAY 9 JANUARY

10.30 am – 11.15 am

**MARK
SCHEME**

GCSE MATHEMATICS JANUARY 2009

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			AVAILABLE MARKS
1	(a) 4	MA1	3
	(b) 14	MA1	
	(c) 5 circles	MA1	
2	(a) 19	A1	2
	(b) Add on 4	A1	
3	(a) ml	A1	2
	(b) kg	A1	
4	(a) $\frac{8}{12}$	MA1	6
	$\frac{2}{3}$	A1	
	(b) 25%	A1	
	(c) $\frac{3}{4}$	A1	
	(d) $\frac{4}{12}, \frac{2}{5}$ not equal to $\frac{2}{3}$	A2	
5	Sum = 20 + 33 + 19 + 22 + 31 + 36 + 28 + 25 + 27 + 34 = 275	M1, A1	3
	Mean = $\frac{275}{10} = 27.50$	MA1	
6	(a) 37 056	A1	5
	(b) 10.6929	A1	
	(c) 0.58	A1	
	(d) 51.08	A1	
	(e) 34.6	A1	

			AVAILABLE MARKS
7	(a) evidence of counting squares = 58 cm ² or 64 – 6 = 58 cm ²	M1	
		A1, A1 (units)	
		MA1	
		A1, A1 (units)	
(b)	4 × 5 × 6 = 120	M1	
		A1	
(c)	Any pair of values with a product of 60	A1	6
8	10 ÷ 0.85 11 65p or £0.65	MA1	
		A1	
		MA1	
			3
9	(a) (i) 12 (ii) $\frac{30}{360} \times 48 = 4$	MA1	
		M1, A1	
(b)	See overlay Total = 60 (million) 9.6°, 16.2°, 23.4°, 30°, 280.8° Sectors, labels	MA1	
		MA1	
		A1, A1	
			7
10	(a) B (b) A (c) C		
		allow A1 for 2 correct A2	
			2
11	9.00 am to 3.25 pm = 6 hrs 25 mins 6 hrs 25 mins – 65 mins = 5 hrs 20 mins 320 ÷ 8 = 40 mins	MA1	
		MA1	
		MA1	
			3
12	(a) 216 (b) 16	A1	
		A1	
			2
Total			44



Rewarding Learning

General Certificate of Secondary Education

January 2009

Mathematics

Module N2 Paper 1

(Non-calculator)

Foundation Tier

[GMN21]

FRIDAY 9 JANUARY

9.15 am – 10.15 am

**MARK
SCHEME**

GCSE MATHEMATICS JANUARY 2009

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			AVAILABLE MARKS
1	(a) 0.15	A1	4
	(b) $\frac{3}{8} - \frac{2}{8} = \frac{1}{8}$	A2	
	(c) 3.47	A1	
2	(a) $162 - 136 = 26$	MA1	2
	(b) 147	MA1	
3	MA1 for each correct side	MA3	3
4	$0.8 \times 1.55 = \text{£}1.24$	MA1	4
	$\text{£}1.94 - \text{£}1.24 = \text{£}0.70$ or 70p	MA1	
	$\text{£}0.70 \div 0.5 = \text{£}1.40$ or $\text{£}0.70 \times 2 = \text{£}1.40$	M1, A1	
5	(a) 18 cm	MA1	5
	(b) $\frac{1}{2}(4.8) \times 10$ $= 24 \text{ cm}^2$	M1 A1 A1 (units)	
	(c) 31.5	A1	
6	$10 \times \frac{3}{4} = \frac{30}{4} = 7.5$	M1, A1	3
	$= 8$	MA1	
7	(a) (i) age, sex, not members of Belfast public, suitable reason	MA1	4
	(ii) leading question, depends on age, shape etc., 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	
8	(a) $5(-2) - 2(4)$ $= -10 - 8$ $= -18$	M1 A1	5
	(b) 18	A1	
	(c) $4p - p^3$	A1, A1	

		AVAILABLE MARKS	
9	$\frac{\div 100^3}{0.6 \text{ m}^3}$	MA1 A1	2
10	(a) (i) $7(4 - y)$	A1	
	(ii) $p(1 - t)$	A1	
	(b) (i) $15 - 5y$	A1	
	(ii) $\frac{x^2 + x - 3x - 3}{x^2 - 2x - 3}$	MA1 A1	
	(c) $-4n$	A1	6
11	(a) $56 \leq x < 62$	MA1	
	(b) correct points correct lines	A1 A1	3
12	$\begin{array}{r l} 2 & 120 \\ \hline & 60 \\ 2 & \hline & 30 \\ 3 & \hline & 15 \\ 5 & \hline & 5 \\ & \hline & 1 \end{array}$	M1, A1	
	$2^3 \ 3 \ 5$	A1	3
		Total	44



Rewarding Learning

General Certificate of Secondary Education
January 2009

Mathematics

Module N2 Paper 2
(With calculator)
Foundation Tier

[GMN22]

FRIDAY 9 JANUARY

10.30 am – 11.15 am

MARK
SCHEME

GCSE MATHEMATICS JANUARY 2009

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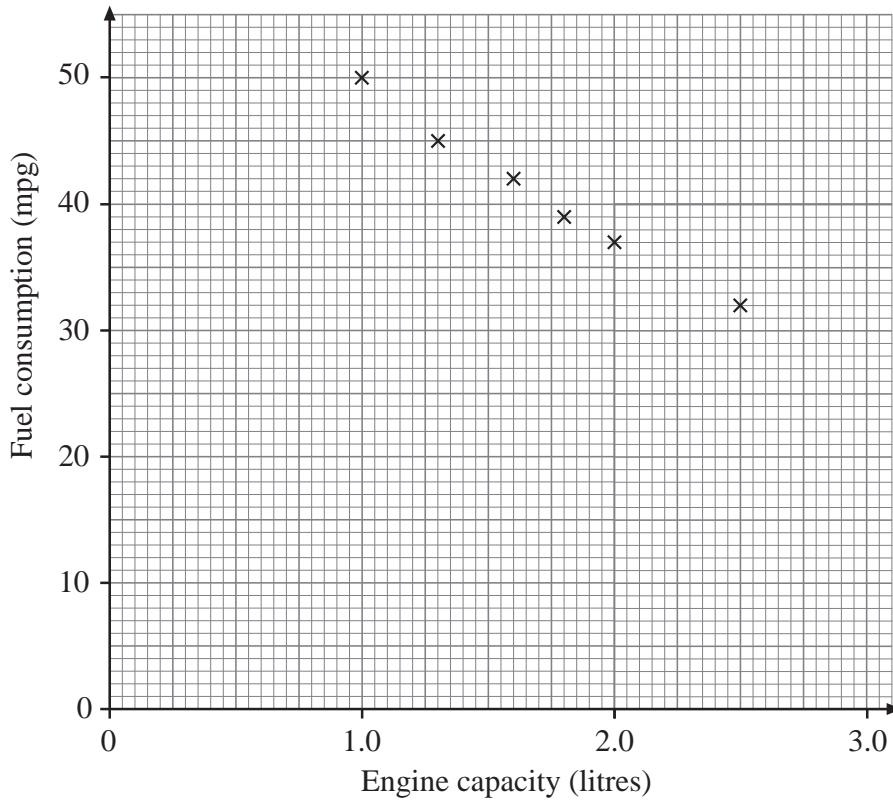
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			AVAILABLE MARKS
1	See overlay Total = 60 (million) 9.6°, 16.2°, 23.4°, 30°, 280.8° Sectors, labels	MA1 MA1 A1, A1	4
2	(a) $3x + 2y$ (b) -6	A1, A1 A1	3
3	(a) B (b) A (c) C Allow A1 for 2 correct	 A2	2
4	9.00 am to 3.25 pm = 6 hours 25 minutes 6 hours 25 minutes – 65 minutes = 5 hours 20 minutes $320 \div 8 = 40$ minutes	MA1 MA1 MA1	3
5	(a) (i) 216 (ii) 16 (b) 34.6	A1 A1 A1	3
6	(a) any pair of values with a product of 60 (b) $\pi \times 2.5^2$ = 19.6	A1 MA1 A1	3
7	$0.35 \times 140 = 49$ $140 - 49 = 91$	M1, A1 MA1	3

8



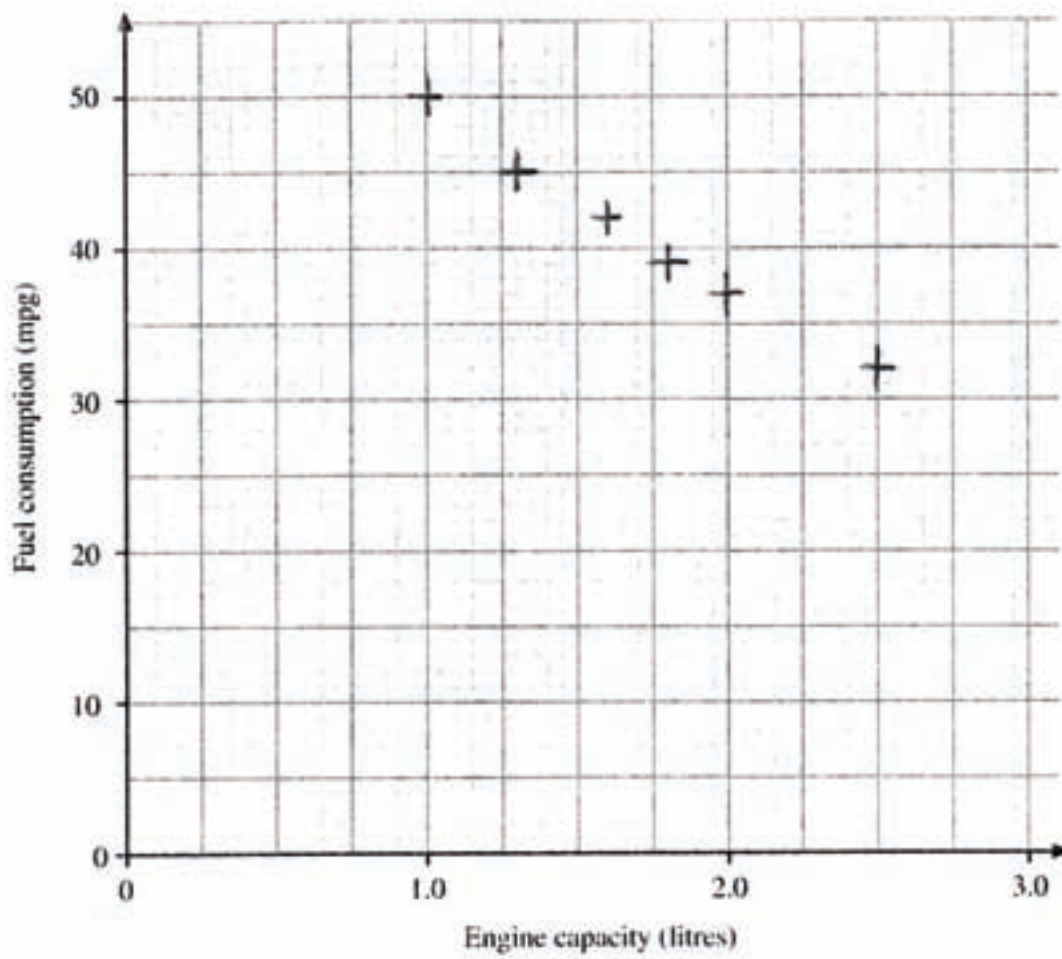
AVAILABLE MARKS	
(a) See overlay points, A1 for 3 correct	A2
(b) negative	A1
(c) line	A1
(d) reading from line	A1
5	
9 (a) 108	A1
(b) 115	A1
2	
10 (a) (0, 1) or 1 other correct point	A1
second correct point	A1
Line drawn correctly	MA1
(b) (6, 4)	A1
4	

			AVAILABLE MARKS
11	$1200 \times 0.06 = 72$ $1200 + 72 = 1272$ $1272 \times 1.06 = 1348.32$ $1348.32 \times 1.06 = \text{£}1429.22$	MA1 MA1 MA1	3
12	$47, 53, 59, 65, 71, 77$ $141, 371, 472, 390, 355, 77$ $\frac{1806}{30} = 60.2$	MA1 MA1 M1, A1	4
13	$\text{Exterior} = 180 - 135 = 45$ $360 \div 45 = 8$	MA1 MA1	2
14	$15^2 = 12^2 + d^2$ $225 = 144 + d^2$ $d^2 = 225 - 144 = 81$ $d = \sqrt{81} = 9 \text{ cm}$	MA1 MA1 MA1	3
Total			44

GCSE MATHEMATICS JANUARY 2009
MODULE N2-2
OVERLAY QUESTION 1



GCSE MATHEMATICS JANUARY 2009
MODULE N2-2
OVERLAY QUESTION 8





Rewarding Learning

General Certificate of Secondary Education

January 2009

Mathematics

Module N5 Paper 1

(Non-calculator)

Foundation Tier

[GMN51]

WEDNESDAY 14 JANUARY

9.15 am – 10.15 am

**MARK
SCHEME**

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1	(a) Blue	A1	4
	(b) Even, fifty/fifty etc	A1	
	(c) Impossible	A1	
	(d) Certain	A1	
2	(a) cylinder	A1	6
	(b) cone	A1	
	(c) triangular prism	A1	
	(d) cuboid	A1	
	(e) corner in (c), (d)	A1, A1	
3	(a) 7700	A1	6
	(b) $30 \div 4 \rightarrow 7$	M1, A1	
	(c) $80 \times 3 = 240$	M1, A1	
	(d) 9 to 9.5	A1	
4	$7 \times 30 = \text{£}210$	MA1	4
	10 to 3 \rightarrow 5 hours	MA1	
	$5 \times \text{£}10 = \text{£}50$	MA1	
	Total $\text{£}260$	A1	
5	(a) (i) U	A1	4
	(ii) B	A1	
	(iii) S	A1	
	(b) HAT	A1	

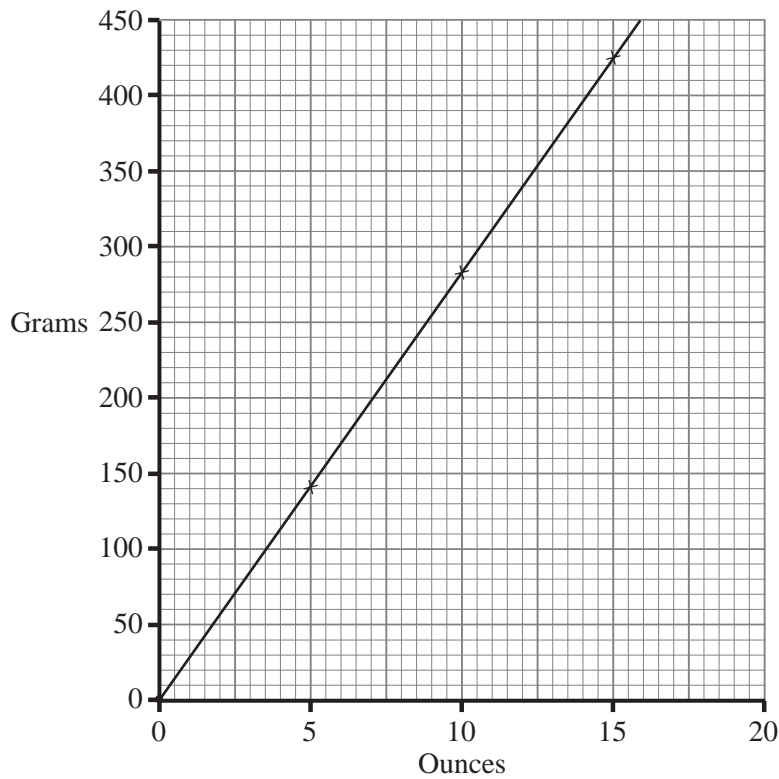
6 C, F, D, B

A1 each

AVAILABLE
MARKS

4

7 (a) See overlay. Points A2 (allow A1 for 2 points); Line A1



(b) Approximately 200 (from graph)

A1

(c) Yes because 350 grams is approximately 12.4 ounces

M1, A1

6

8 (a) (i) 27

A1

(ii) -21

A1

(iii) 8

A1

(b) 400

A1

(c) $1/7$

A1

5

9 0752 train identified
0752 to 0903 = 71 minutes
= 1 hour 11 minutes

MA1

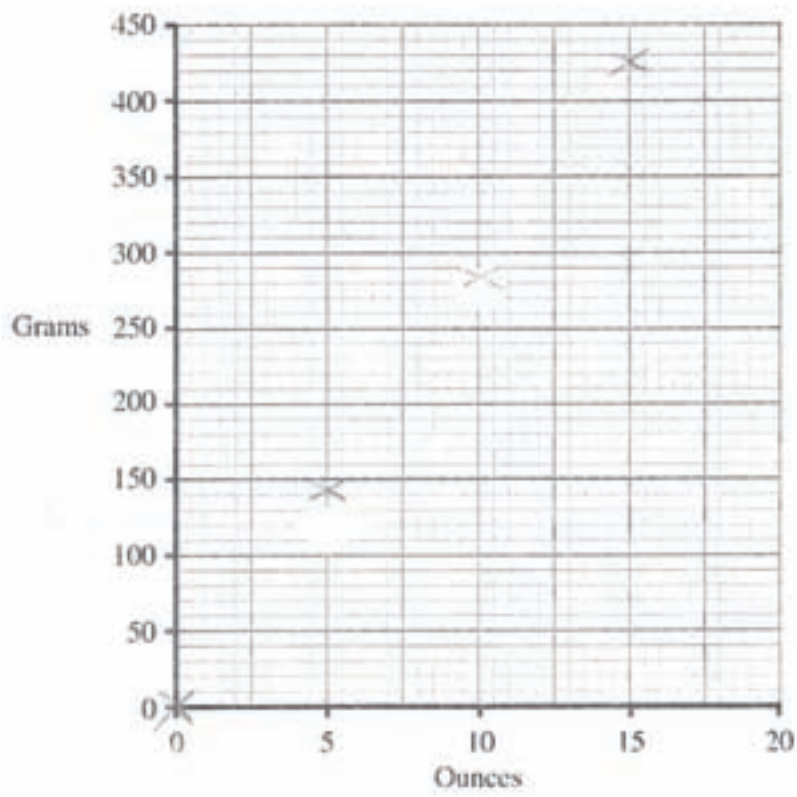
MA1

MA1

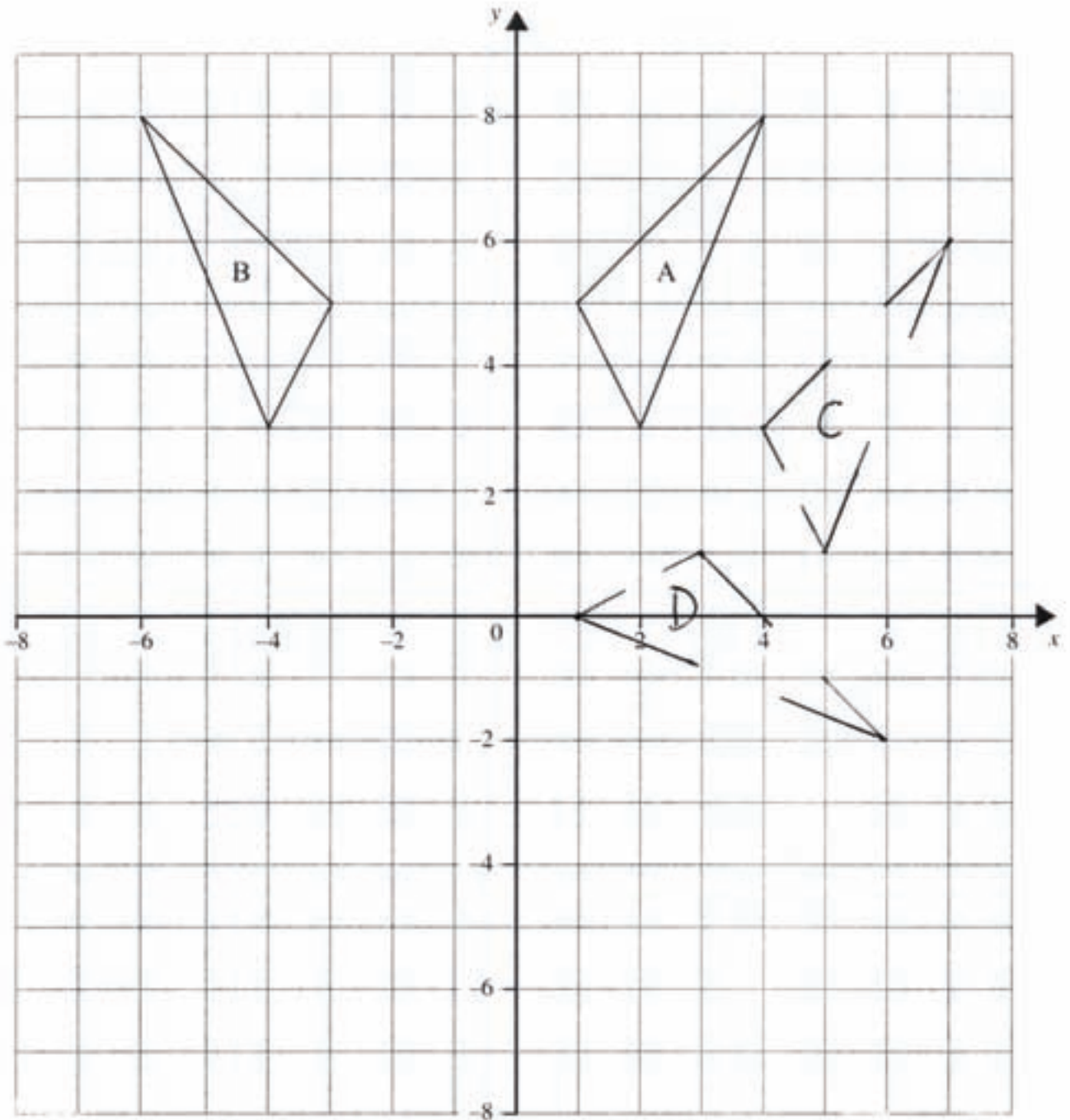
3

		AVAILABLE MARKS	
10	400 or $\frac{2}{3}$	MA1	3
	360	A1	
	200	A1	
	16		
	4		
11	(a) Reflection in line $x = -1$	A1, A1	6
	(b) Correct translation	A1, A1	
	(c) See overlay 90° clockwise, correct centre used	A1, A1	
12	(a) $S = \frac{12}{(1 - \frac{1}{2})}$		5
	$= \frac{12}{\frac{1}{2}}$	MA1	
	$= 24$	A1	
	(b) $-\frac{4}{3} < n < 3$	MA1	
	$n = -1, 0, 1, 2$	A2	
		Total	56

GCSE MATHEMATICS JANUARY 2009
MODULE N5-1
OVERLAY QUESTION 7



GCSE MATHEMATICS JANUARY 2009
MODULE N5-1
OVERLAY QUESTION 11





Rewarding Learning

General Certificate of Secondary Education

January 2009

Mathematics

Module N5 Paper 2

(With calculator)

Foundation Tier

[GMN52]

WEDNESDAY 14 JANUARY

3.00 pm – 4.00 pm

**MARK
SCHEME**

GCSE MATHEMATICS JANUARY 2009

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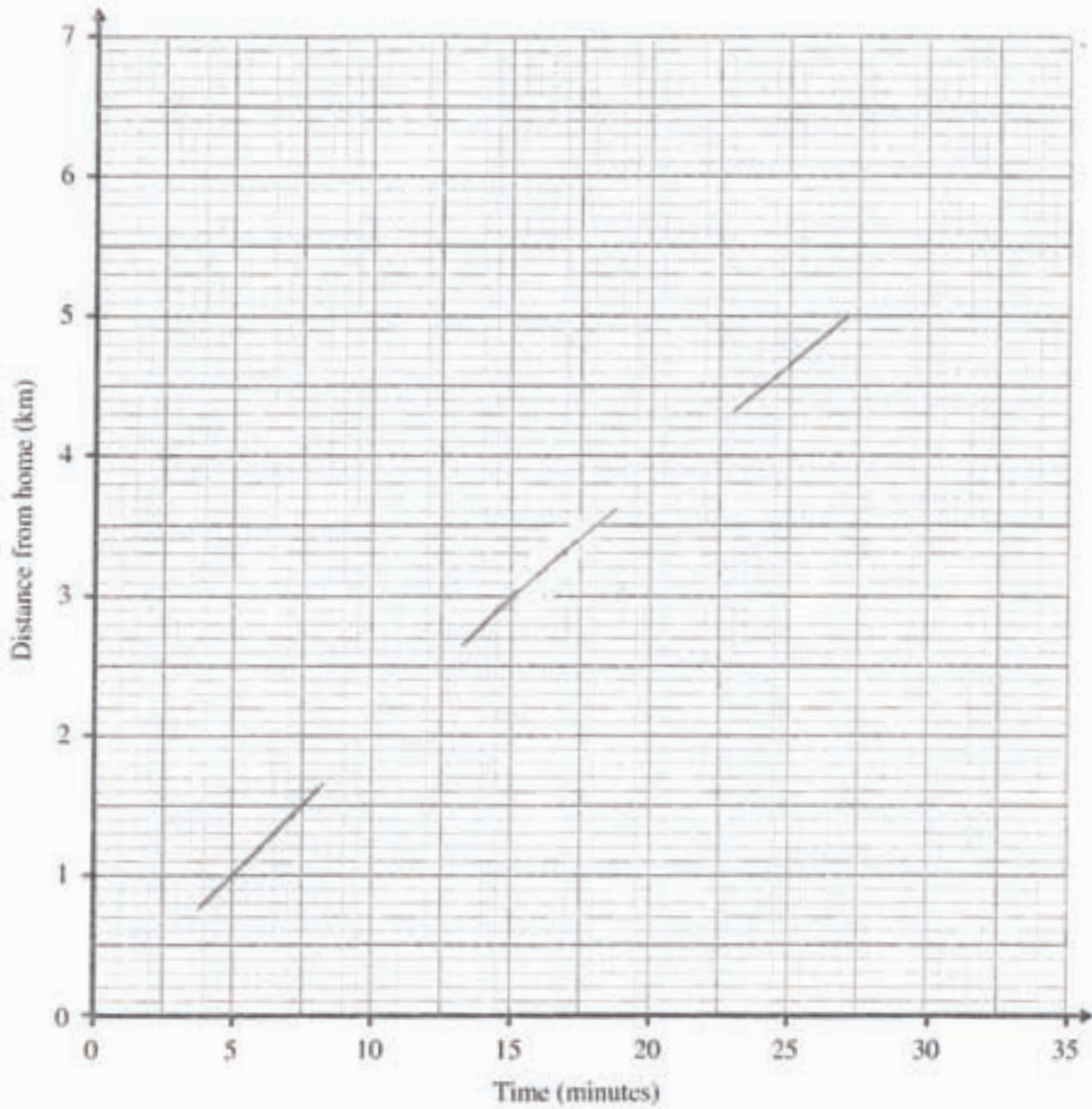
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			AVAILABLE MARKS
1	(a) 110	A1	5
	(b) 1 hour 45 minutes or 105 minutes	A1	
	(c) 1 kg 260g	A1	
	(d) 0 kg 760g indicated	A1	
	(e) 500g	A1	
2	(a) rhombus	A1	6
	(b) equal and parallel	A1, A1	
	(c) right	A1	
	(d) 2	A1	
	(e) correct line of symmetry	A1	
3	(a) £2.80 or 280 pence	M1, A1	4
	(b) £155 + 24 × 2.8 = £222.20	MA1 A1	
4	(a) impossible, unlikely, likely, certain	A4	6
	(b) 150/400 (3/8)	M1, A1	
5	$I = 20 \square 8 \square 0.75$ = 120	MA1 A1	2
6	(a) e.g. kite	A1	4
	(b) 2	A1	
	(c) completed correctly	A2	

			AVAILABLE MARKS
7	(a) (1, C), (1, E), (1, A) (2, C), (2, E), (2, A) (3, C), (3, E), (3, A) (4, C), (4, E), (4, A)	MA2	
	(b) $\frac{1}{12}$	MA1	3
8	$\pounds 8.50 \times 24 = \pounds 204$ Total paid = $\pounds 329$ Cost = $\pounds 329 - \pounds 130 = \pounds 199$	M1, A1 MA1 MA1	4
9	$14 \div 1\frac{3}{4}$ = 8	M1 A1	2
10	See overlay each line	A1, A1	2
11	(a) $255 \times 1.35 = \pounds 344.25$ (b) $50 \div 1.35 = \pounds 37.04$	M1, A1 M1, A1	4
12	$3.1 \times 3.1 = 9.61$ $6 \times 9.61 = 57.66$ 58 or 57.7	MA1 MA1 A1	3
13	(a) $0.1 + 0.25 + 0.3 + 0.15 = 0.8$ $1 - 0.8 = 0.2$ (b) $(0.25 + 0.15) \times 600 = 0.4 \times 600 = 240$	MA1 MA1 M1, A1	4
14	always odd suitable reason, e.g. $4n$ always even, subtracting 3 always odd	A1, A1	2
15	$8500 \div 25 = 340$ Alice $\pounds 3400$ Barbara $\pounds 3060$ Carol $\pounds 2040$	MA1 MA1 MA1	3
16	Average speed = $\frac{28}{36} \times 60 = 46\frac{2}{3}$ mph	MA1, A1	2
Total			56

GCSE MATHEMATICS JANUARY 2009
MODULE N5-2
OVERLAY QUESTION 10





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**

GCSE MATHEMATICS JANUARY 2009

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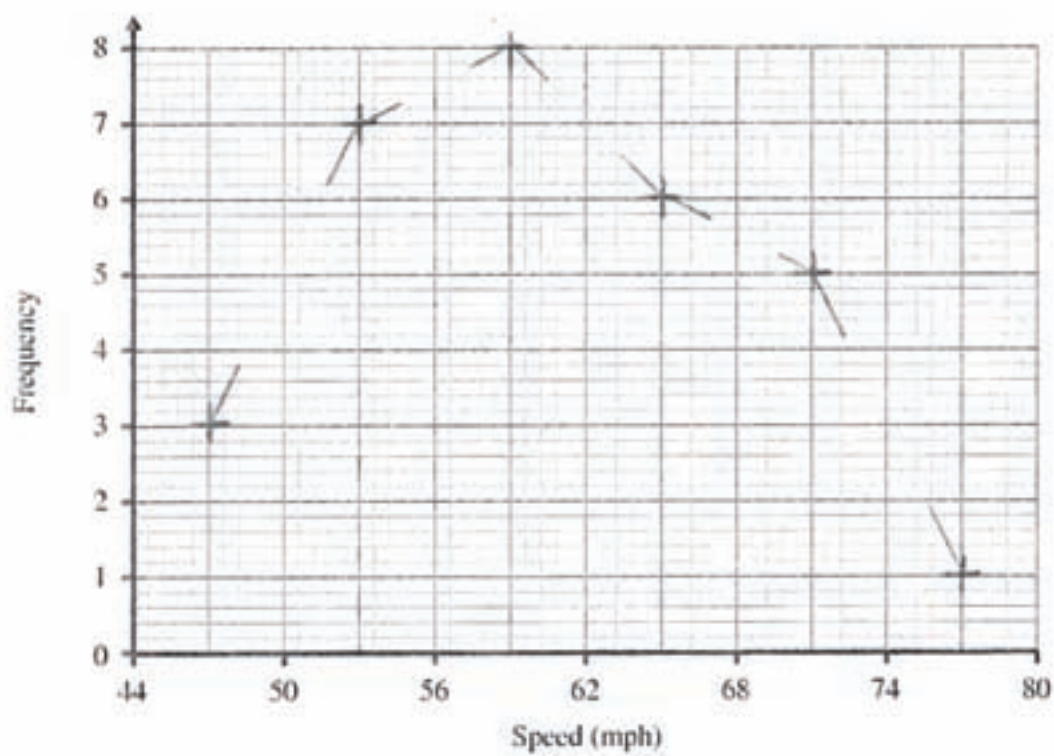
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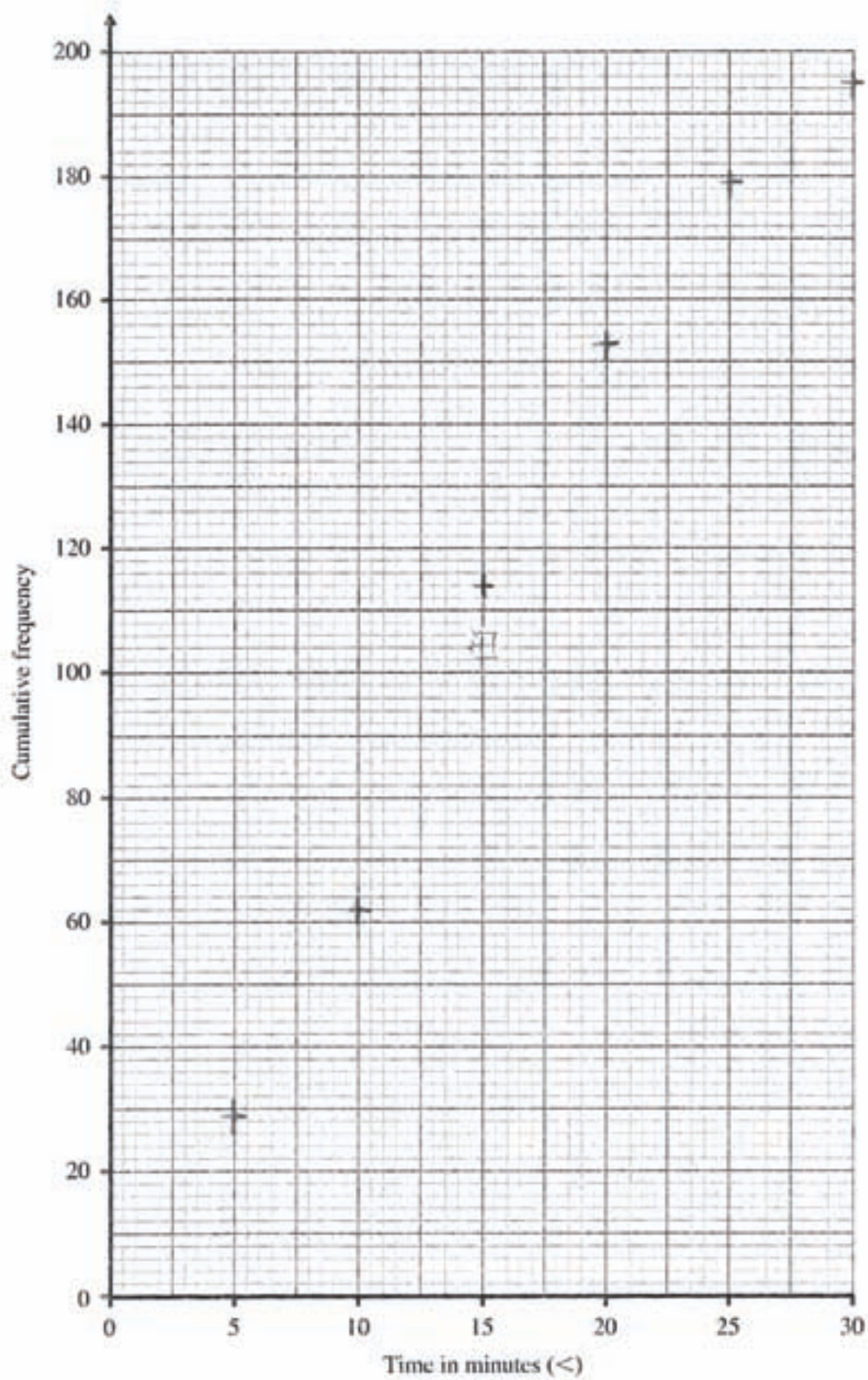
			AVAILABLE MARKS
1	(a) $\frac{1}{2}(4.8) \square 10 = 24$	M1, A1	
	(b) 8.4×100^2 $= 84\,000$	MA1 A1	4
2	$10 \square \frac{3}{4} = \frac{30}{4} = 7.5$ $\Rightarrow 8$	M1, A1 MA1	3
3	(a) (i) age, sex, not members of Belfast public, suitable reason (ii) leading question, suitable reason	MA1 MA1	
	(b) users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

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

GCSE MATHEMATICS JANUARY 2009
MODULE N3-1
OVERLAY QUESTION 6



GCSE MATHEMATICS JANUARY 2009
MODULE N3-1
OVERLAY QUESTION 9





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**

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1 $\pi \times 2.5^2$
 $= 19.6 \text{ cm}^2$

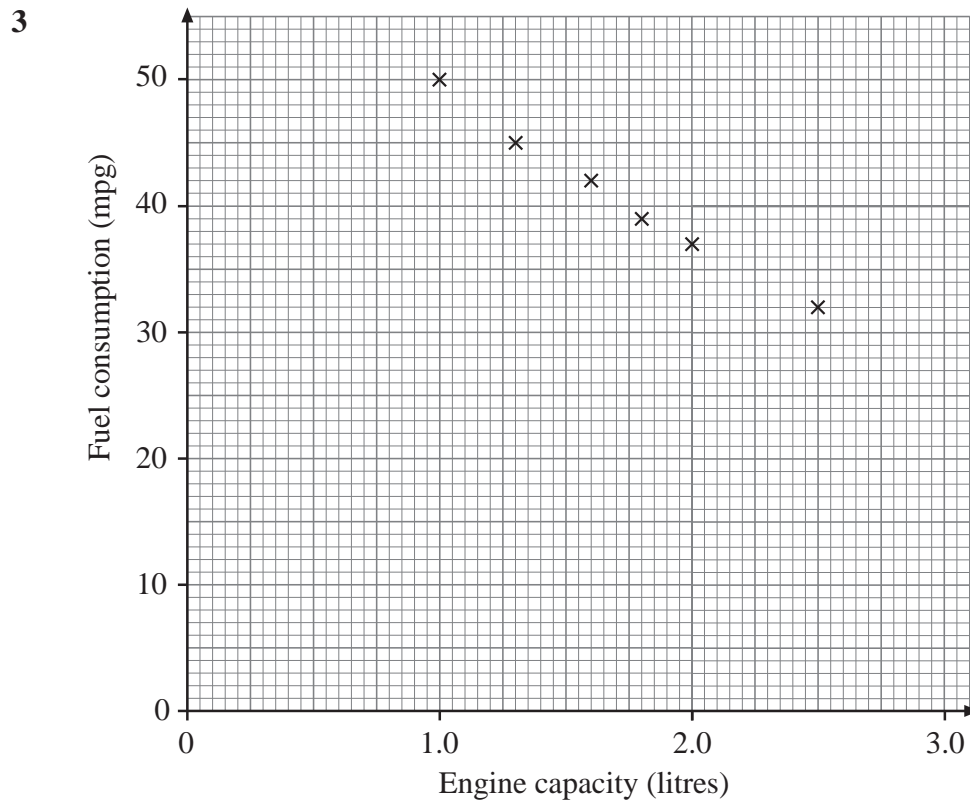
MA1
 A1
 A1 units

3

2 $0.35 \times 140 = 49$
 $140 - 49 = 91$

M1, A1
 MA1

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) $309^\circ (\pm 2^\circ)$

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

				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
7	$1200 \times 0.06 = 72$			
	$1200 + 72 = 1272$			MA1
	$1272 \times 1.06 = 1348.32$			MA1
	$1348.32 \times 1.06 = \text{£}1429.22$			MA1
8	47, 53, 59, 65, 71, 77			MA1
	141, 371, 472, 390, 355, 77			MA1
	$\frac{1806}{30} = 60.2$			M1, A1
9	$15^2 = 12^2 + d^2$			MA1
	$225 = 144 + d^2$			
	$d^2 = 225 - 144 = 81$			MA1
	$d = \sqrt{81} = 9$			MA1
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
11	85% = $\text{£}54.40$			MA1
	$\frac{54.4}{85} \times 100$			M1
	= $\text{£}64$			A1

12 $\tan B = \frac{6}{5}$
 $B = 50.2^\circ$

MA2

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

AVAILABLE
MARKS



Rewarding Learning

General Certificate of Secondary Education

January 2009

Mathematics

Module N4 Paper 1

(Non-calculator)

Higher Tier

[GMN41]

FRIDAY 9 JANUARY

9:15 am – 10:15 am

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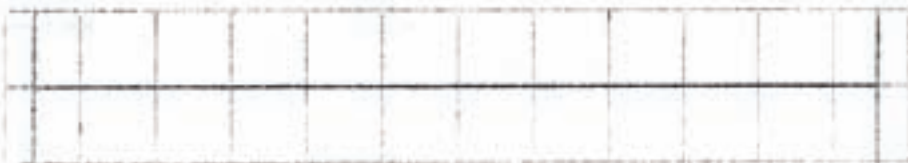
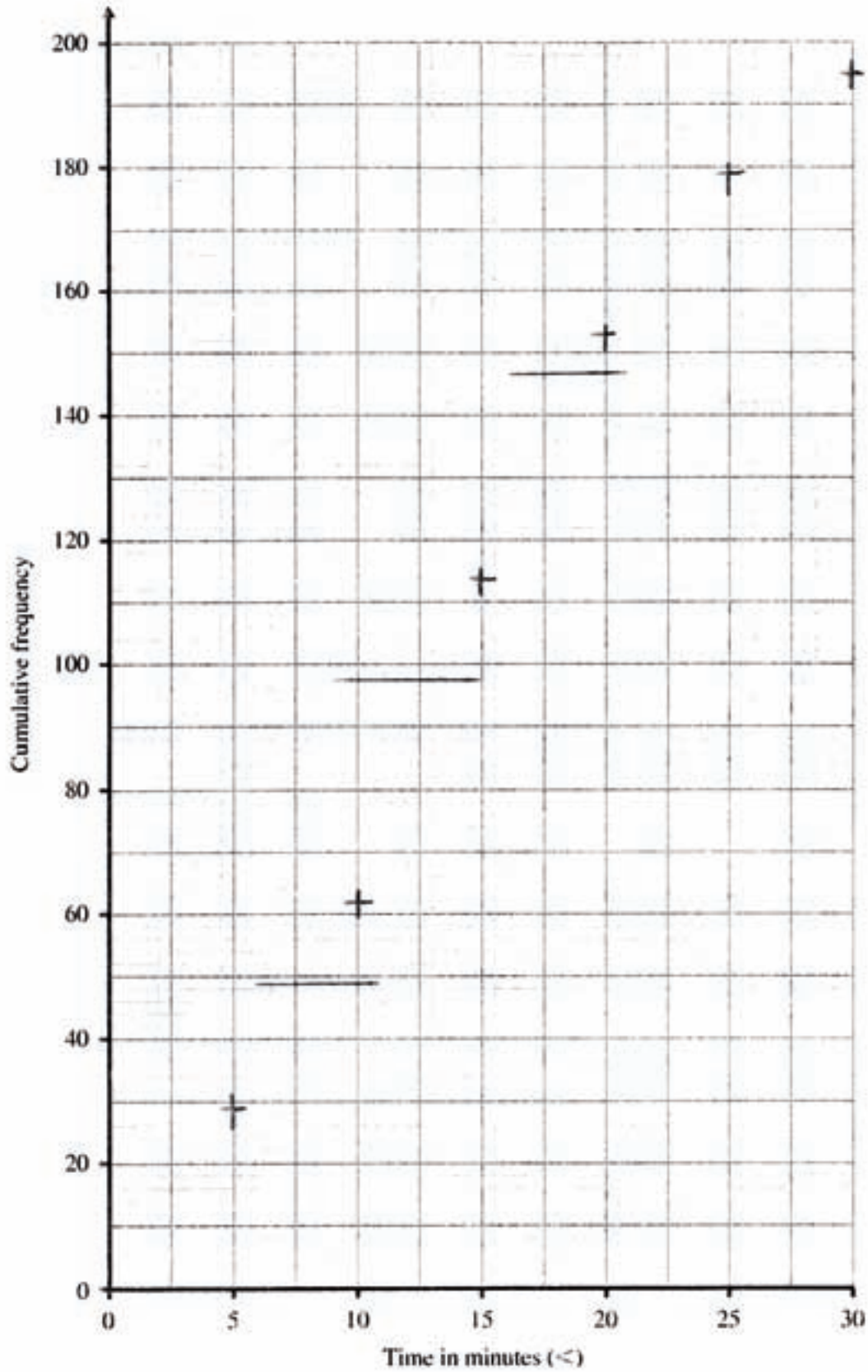
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			AVAILABLE MARKS
1	(a) See overlay points A2 curve/lines A1	A3	9
	(b) reading from graph at 97.5	A1	
	(c) reading from graph $195 - 83 = 112$	MA1 MA1	
	(d) range, box median (13.3) approx	A3	
2	$\frac{17}{4} \square \frac{8}{3}$	MA1	3
	$= \frac{136}{12}$	MA1	
	$= 11\frac{1}{3}$	MA1	
3	$3(x + 2) - 2(2x - 1) = 12$	MA1	4
	$3x + 6 - 4x + 2 = 12$	MA1	
	$-x + 8 = 12$	MA1	
	$-x = 4$		
	$x = -4$	A1	
4	(a) Correct side of $y = x + 1$ Correct side of $x + 2y = 8$ Correct side of $x = 0$	Three correct MA2 Two correct MA1	5
	(b) $x = 2$	MA1	
	(c) $x = 0$ and $y = 4$	A2 (MA1 for trial of points)	
5	Class sizes unlikely to be the same Pupils early in the alphabet unlikely to be chosen other suitable reason	MA2	2
6	$\sqrt{4^2 + 5^2 + 3^2}$	M1	2
	$= \sqrt{50}$ or $5\sqrt{2}$	A1	
7	area ratio $100 : 225 = 4:9$		2
	width ratio $2:3$	MA1	
	widths $x:12$ $x = 8$	MA1	

			AVAILABLE MARKS
8	(a) 8	A1	
	(b) $27^{\frac{2}{3}} = 3^2 = 9$	A1, A1	
	(c) $\frac{1}{\frac{3}{16^4}} = \frac{1}{8}$	M1, A1	5
9	$\frac{(2x-y)(x-y)}{2(2x-y)}$ $= \frac{x-y}{2}$	MA1 MA1 MA1	3
10	(a) readings $-74^\circ, -106^\circ (\pm 2^\circ)$	MA1, MA1	2
	(b) $\sin x = 0.6$ $x = 37^\circ$ (1 correct reading) ($\pm 2^\circ$) $x = 143^\circ$ (2nd correct reading) ($\pm 2^\circ$)	MA1 A1	2
11	B because $x^3 = \frac{27}{8}$ $x = \frac{3}{2}$ which is rational	MA2	2
12	$x^2 - 2ax + a^2 = x^2 - 12x + b$ $a = 6$ $b = 36$	MA1 A1 A1	3
Total			44

GCSE MATHEMATICS JANUARY 2009
 MODULE N4-1
 OVERLAY QUESTION 1



Box from



Rewarding Learning

General Certificate of Secondary Education

January 2009

Mathematics

Module N4 Paper 2

(With calculator)

Higher Tier

[GMN42]

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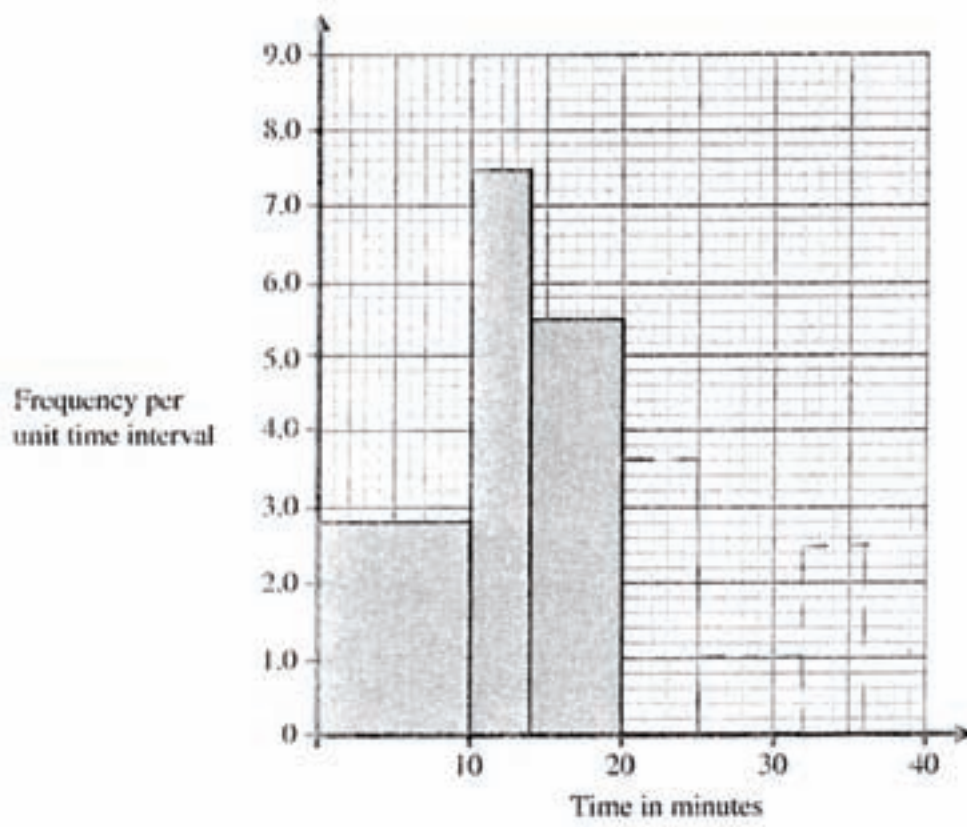
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		AVAILABLE MARKS	
1	$\frac{x}{22.5} = \frac{4}{5}$	MA1	
	$5x = 90$ $x = 18$	MA1	2
2	$85\% = \text{£}54.40$ $54.40 \div 0.85 = \text{£}64$	MA1 M1A1	3
3	(a) $\tan B = \frac{6}{5}$ $B = 50.2^\circ$	MA2 A1	
	(b) $\frac{4}{3} \times \pi \times 5^3$ $= 523.6 \text{ cm}^3$	MA1 A1, A1 units	6
4	$y(x + 4) + 5(x + 4)$ $(y + 5)(x + 4)$	MA1 MA1	2
5	(a) angle at the circumference of a semicircle is always 90° (angle at circumference standing on a diameter is 90°)	A1	
	(b) (i) 52° (ii) 104°	A1 A1	3
6	(a) $(2x + 16)(3x + 6) = 504$ $6x^2 + 12x + 48x + 96 = 504$ $6x^2 + 60x - 408 = 0$ $x^2 + 10x - 68 = 0$	A1 A1 A1	
	(b) $x = \frac{-10 \pm \sqrt{(100 - (-272))}}{2}$ $x = 4.64 \text{ m or } -14.64$ Width of patio 4.64	A1 A1 A1	6

			AVAILABLE MARKS
7	(a) See overlay 30 33	A1, A1	12
	(b) 3 areas correct (2 areas MA1)	MA2	
	(c) mid-modal class value 17 minutes Number of aircraft = 16 (or 17) + 18 + 7 + 10 = 51 (or 52)	MA1 M1 A1	
	(d) description	A2	
	(e) $\frac{28}{98} \times 7 = 2$	M1, A2	
8	$\frac{200}{\sin 48^\circ} = \frac{DF}{\sin 74^\circ}$ or $\frac{200}{\sin 48^\circ} = \frac{FE}{\sin 58^\circ}$	MA1	4
	DF = 258.7 FE = 228.2	MA1	
	$\sin 58^\circ = \frac{\text{width}}{258.7}$ $\sin 74^\circ = \frac{\text{width}}{228.2}$	MA1	
	width = 219.4 m width = 219.4 m	MA1	
9	$2(x - 1)^2 + 2 = 5(x - 1)$	MA1	6
	$2(x^2 - 2x + 1) + 2 = 5x - 5$	MA1	
	$2x^2 - 9x + 9 = 0$	A1	
	$(2x - 3)(x - 3) = 0$	MA1	
	$x = \frac{3}{2}$ or 3	A1, A1	
Total			44

GCSE MATHEMATICS JANUARY 2009
MODULE N4-2
OVERLAY QUESTION 7





Rewarding Learning

General Certificate of Secondary Education

January 2009

Mathematics

**Module N6 Paper 1
(Non-calculator)**

Higher Tier

[GMN61]

WEDNESDAY 14 JANUARY

1.30 pm – 2.45 pm

**MARK
SCHEME**

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.

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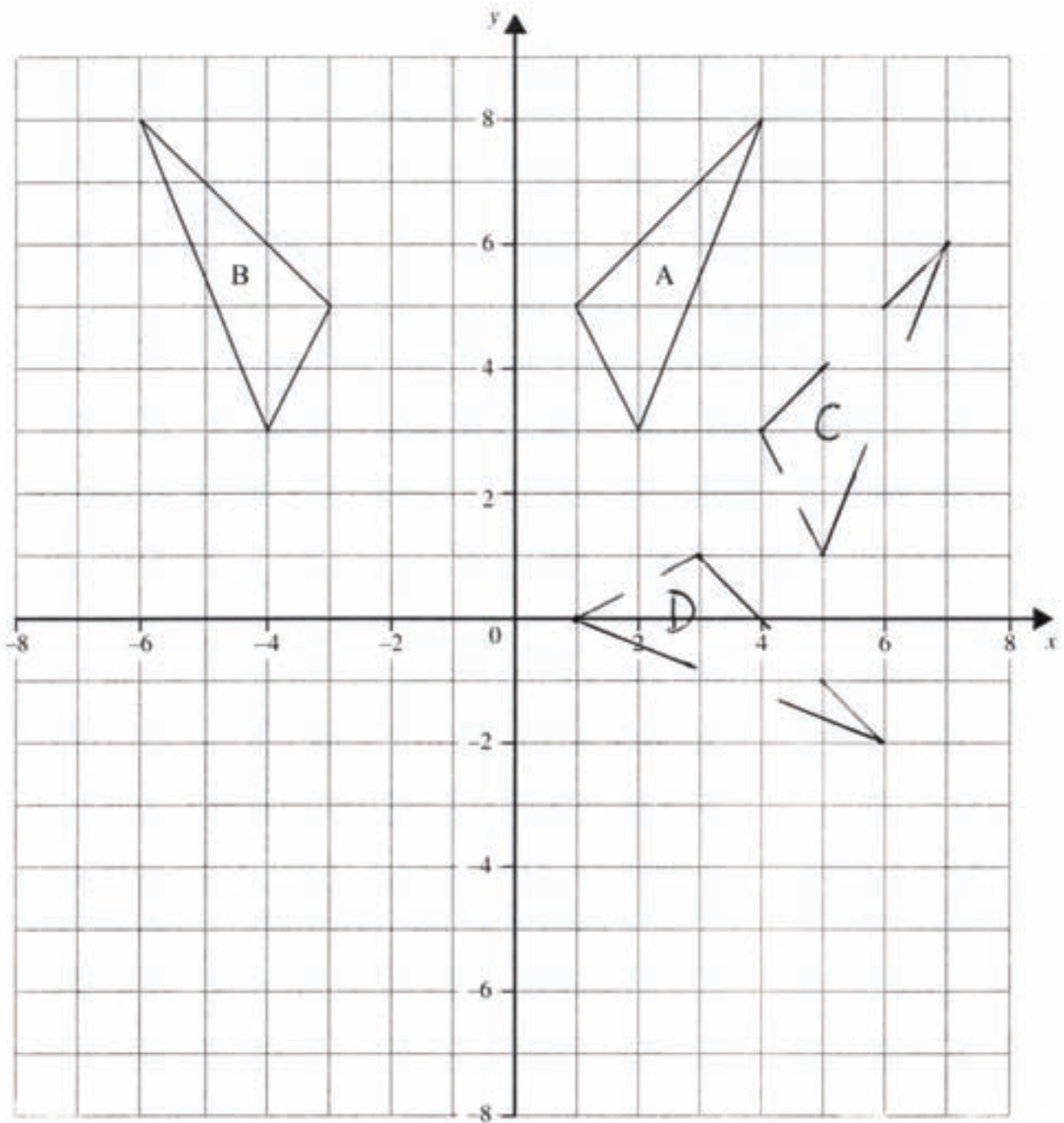
When the candidate misreads a question in such a way as to make the question easier only a proportion of the marks will be available (based on the professional judgement of the examiner).

			AVAILABLE MARKS
1	$200 \times 0.15 = 30$	M1, A1	2
2	(a) (i) 11.718 (ii) 12.6 (b) 8, -8 (c) 0.373737 ...	A1 A1 A1 A1	4
3	Speed = $240 \div 2\frac{1}{2}$ $= 240 \times \frac{2}{5}$ $= 96$	MA1 MA1 A1	3
4	(a) $S = \frac{12}{\left(1 - \frac{1}{2}\right)}$ $= \frac{12}{\frac{1}{2}}$ $= 24$ (b) $T - 80 = 8 \times -2$ $T = -16 + 80$ $T = 64$ (c) $-\frac{4}{3} < n < 3$ $n = -1, 0, 1, 2$	MA1 A1 MA1 MA1 A1 MA1 A2	8
5	400 or $\frac{2}{3}$ 360 200 16 4	MA1 A1 A1	3

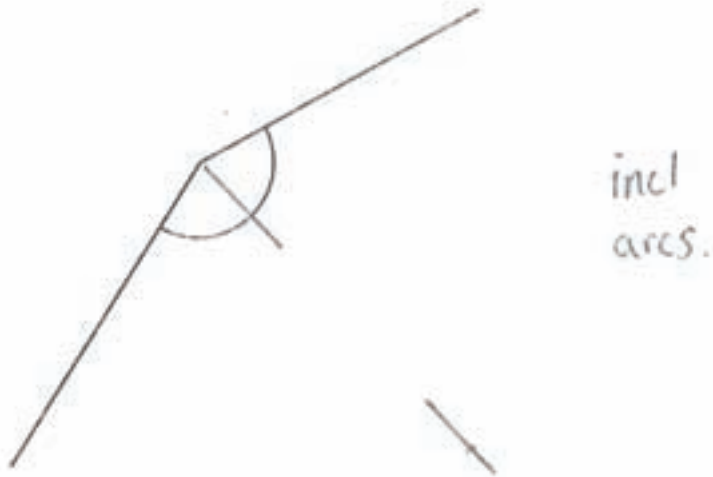
			AVAILABLE MARKS
6	(a) Reflection in line $x = -1$	A1, A1	6
	(b) Correct translation	A1, A1	
	(c) See overlay 90° clockwise, correct centre used	A1, A1	
7	$\frac{700 \times 5}{0.2}$ 17500	MA1	3
		MA2	
8	(a) m^7	A1	5
	(b) a^5	A1	
	(c) y^{-4}	A1	
	(d) $2b^5c^5$	A1 for 2 and 1 power correct; A1 for second power correct	
9	(a) See overlay Construction of angle bisector	M1, A1	4
	(b) 4 cm parallel to and on either side of line	MA1, MA1	
10	$\frac{\pi r^3}{x}$ and $\pi r^2 + rx$	A1, A1	2
11	(a) 6.52×10^{-7}	MA1	4
	(b) 0.363636... or $0.\overline{36}$	MA1	
	(c) $100x = 51.515151\dots$ $x = 00.515151\dots$ <hr style="width: 20%; margin-left: 0;"/> $99x = 51$ $x = \frac{51}{99}$ or $\frac{17}{33}$	MA1 MA1	

			AVAILABLE MARKS
12	<p>(a) $\vec{PC} = -\mathbf{p} + 3\mathbf{q}$</p> <p>(b) $\vec{PQ} = \mathbf{q} - \mathbf{p}$</p> <p style="margin-left: 20px;">$\vec{BC} = 3\mathbf{q} - 3\mathbf{p}$</p> <p style="margin-left: 20px;">$\vec{BC} = 3(\mathbf{q} - \mathbf{p})$ (which is parallel to PQ)</p>	<p>MA1</p> <p>MA1</p> <p>MA1</p> <p>A1</p>	4
13	<p>(a) $\sqrt{3} \times \sqrt{27} = \sqrt{81} = 9$</p> <p>(b) $(\sqrt{3} + \sqrt{6})(\sqrt{3} + \sqrt{6}) = 3 + \sqrt{18} + \sqrt{18} + 6$</p> <p style="margin-left: 20px;">$9 + 2\sqrt{18} = 9 + 6\sqrt{2}$</p>	<p>M1, A1</p> <p>MA1</p> <p>MA1</p>	4
14	<p>Total area = $\frac{1}{2}(4x)(3x) + \frac{1}{2}\pi\left(\frac{5}{2}x\right)^2$</p> <p style="margin-left: 40px;">$= 6x^2 + \frac{1}{2}\left(\frac{25}{4}\right)\pi x^2$</p> <p style="margin-left: 40px;">$= 6x^2 + \frac{25}{8}\pi x^2$</p> <p style="margin-left: 40px;">$= \left(6 + \frac{25}{8}\pi\right)x^2$</p>	<p>MA1 for 4x, MA1, MA1 for 2 areas</p> <p>A1</p>	4
Total			56

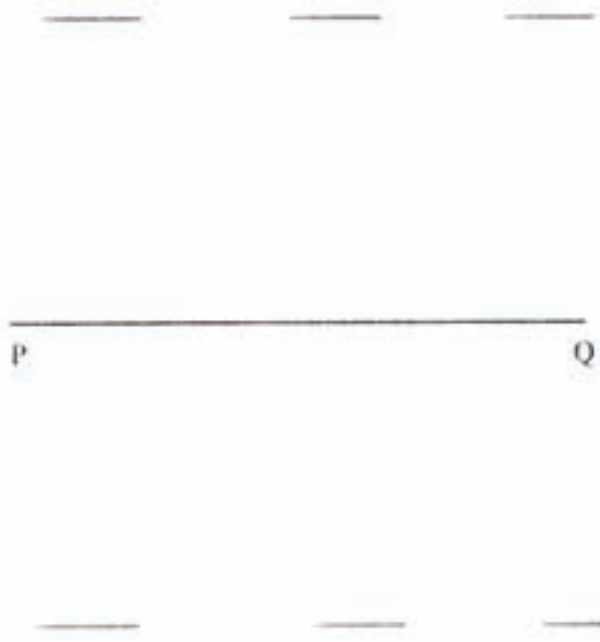
GCSE MATHEMATICS JANUARY 2009
MODULE N6-1
OVERLAY QUESTION 6



GCSE MATHEMATICS JANUARY 2009
MODULE N6-1
OVERLAY QUESTION 9



(b) Draw the locus of the point which is a fixed distance of 4 cm from the line PQ.





Rewarding Learning

General Certificate of Secondary Education

January 2009

Mathematics

Module N6 Paper 2

(With calculator)

Higher Tier

[GMN62]

WEDNESDAY 14 JANUARY

3.00 pm – 4.15 pm

**MARK
SCHEME**

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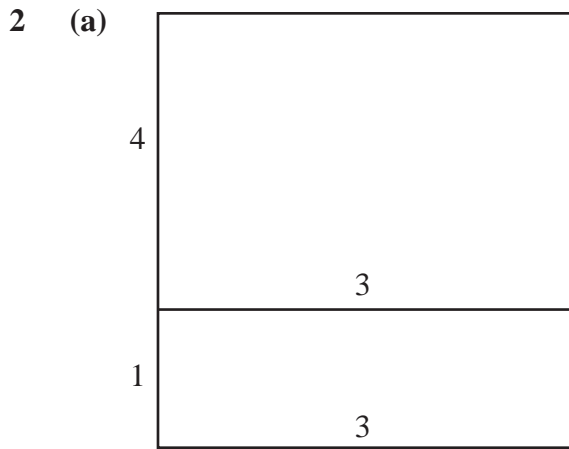
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1 $y + x = 2$
 $x = 2 - y$

A1
A1

2



A1, A1 (each rectangle)

(b) 2 vertical planes identified

A1, A1

4

3 (a)

x	-2	2
y	1	1

A1, A1

See overlay

(b) Points correctly plotted
Accuracy of curve

A1
A1

4

4 always odd
suitable reason, e.g. $4x$ is always even; subtracting 3 gives odd number

A1, A1

2

5 (a) $0.1 + 0.25 + 0.3 + 0.15 = 0.8$
 $1 - 0.8 = 0.2$

MA1
MA1

(b) $(0.25 + 0.15) \times 600 = 0.4 \times 600 = 240$

M1, A1

(c) $0.2 + 0.15 = 0.35$

M1, A1

6

6 See overlay
Correct size
Correct centre used

A1
A1

2

7 $8500 \div 25 = 340$
Alice £3400
Barbara £3060
Carol £2040

MA1
MA1
MA1

3

8 $240 \times 0.4 + 180 \times 0.45$
 $96 + 81 = 177$

M1, A1
 MA1, A1

4

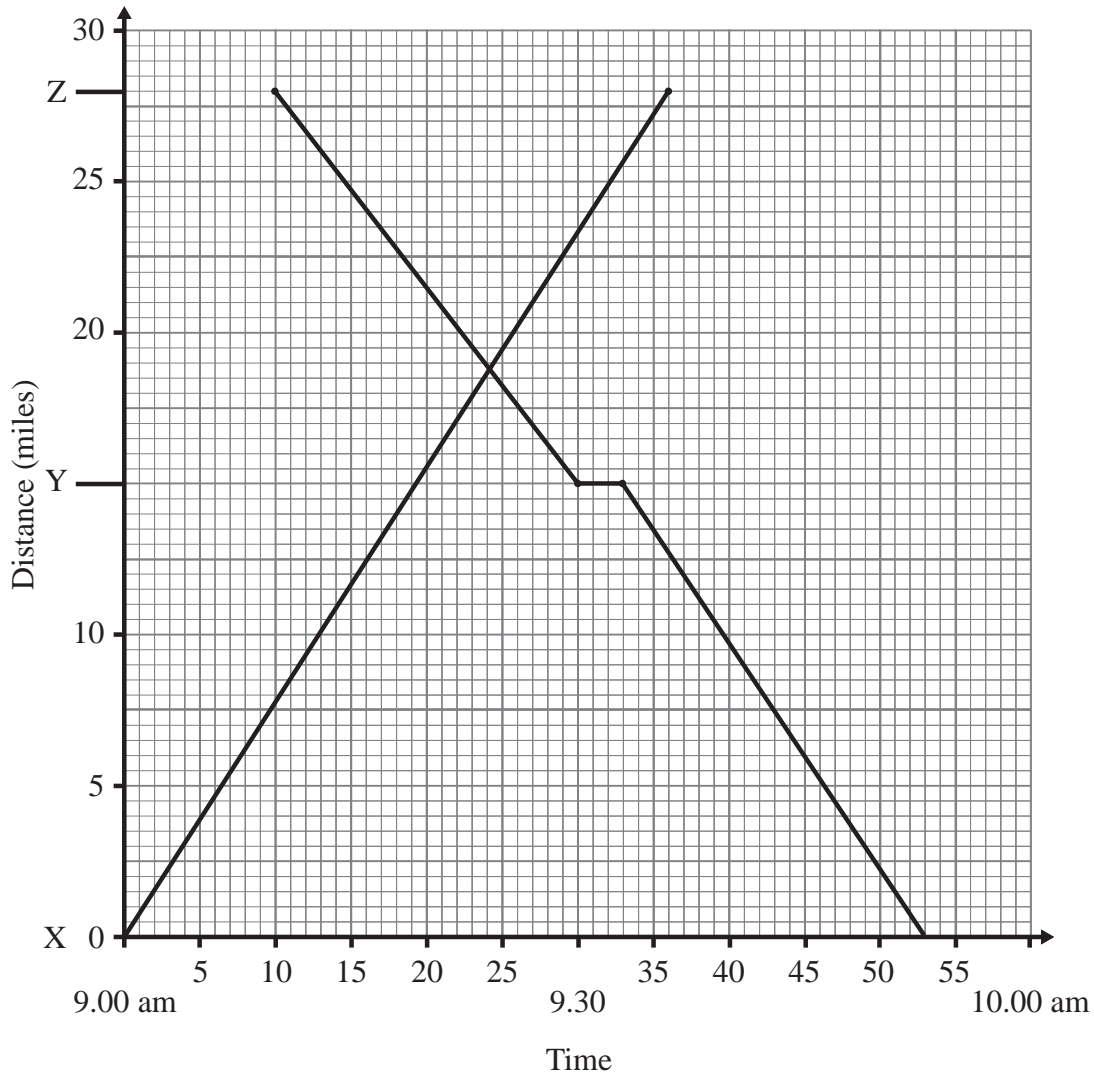
- 9 (a) See overlay
 Correct straight line drawn to y
 Correct line for 3 minutes
 Indication of 20 minutes for last part of journey and line drawn to axes

A1
 A1
 MA1

(b) 9.24 am (from graph)

A1

4



10 (a) $\frac{1}{2}(12.2 + 6.5) \times 8.4$
 $= 78.54$

MA1
 A1

Answer 79 (accept 78.5)

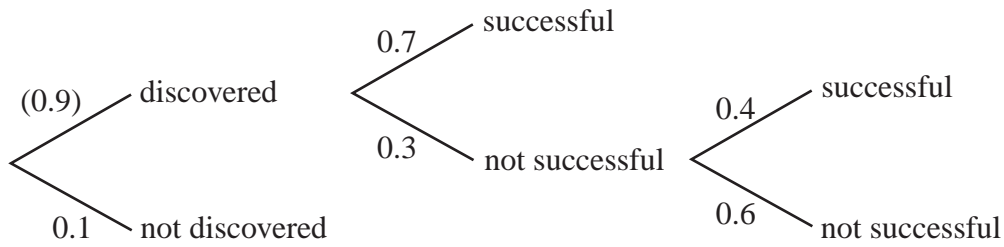
A1

(b) $2 \times \pi \times 4 \times 10$
 $= 251.3$

MA1
 A1

5

11 (a)



(A1 for 3 or 4 correct) A2

(b) $0.9 \times 0.7 = 0.63$

MA1, A1

(c) $0.9 \times 0.7 + 0.9 \times 0.3 \times 0.4$
 $= 0.63 + 0.108 = 0.738$

MA1, A1

A1

(d) $1 - 0.738 = 0.262$

MA1

8

12 (a)

$$y + 1 = \frac{2}{x}$$

MA1

$$y = \frac{2}{x} - 1$$

MA1

or $xy + x = 2 \rightarrow xy = 2 - x$

MA1

$$y = \frac{2-x}{x}$$

MA1

(b) $v^2 = ar$

MA1

$$r = \frac{v^2}{a}$$

A1

4

13 (a)

$$y = \frac{k}{x^2}$$

$$6.75 = \frac{k}{36}$$

MA1

$$k = 36 \times 6.75 = 243$$

MA1

$$y = \frac{243}{x^2}$$

A1

(b) $y = \frac{243}{\left(\frac{1}{3}\right)^2}$

$$= 2187$$

A1

4

14 Slant height of small cone 5 cm

M1, A1

$$CSA = \pi \times 12 \times 15 - \pi \times 4 \times 5$$

MA1

$$160\pi (= 502.7)$$

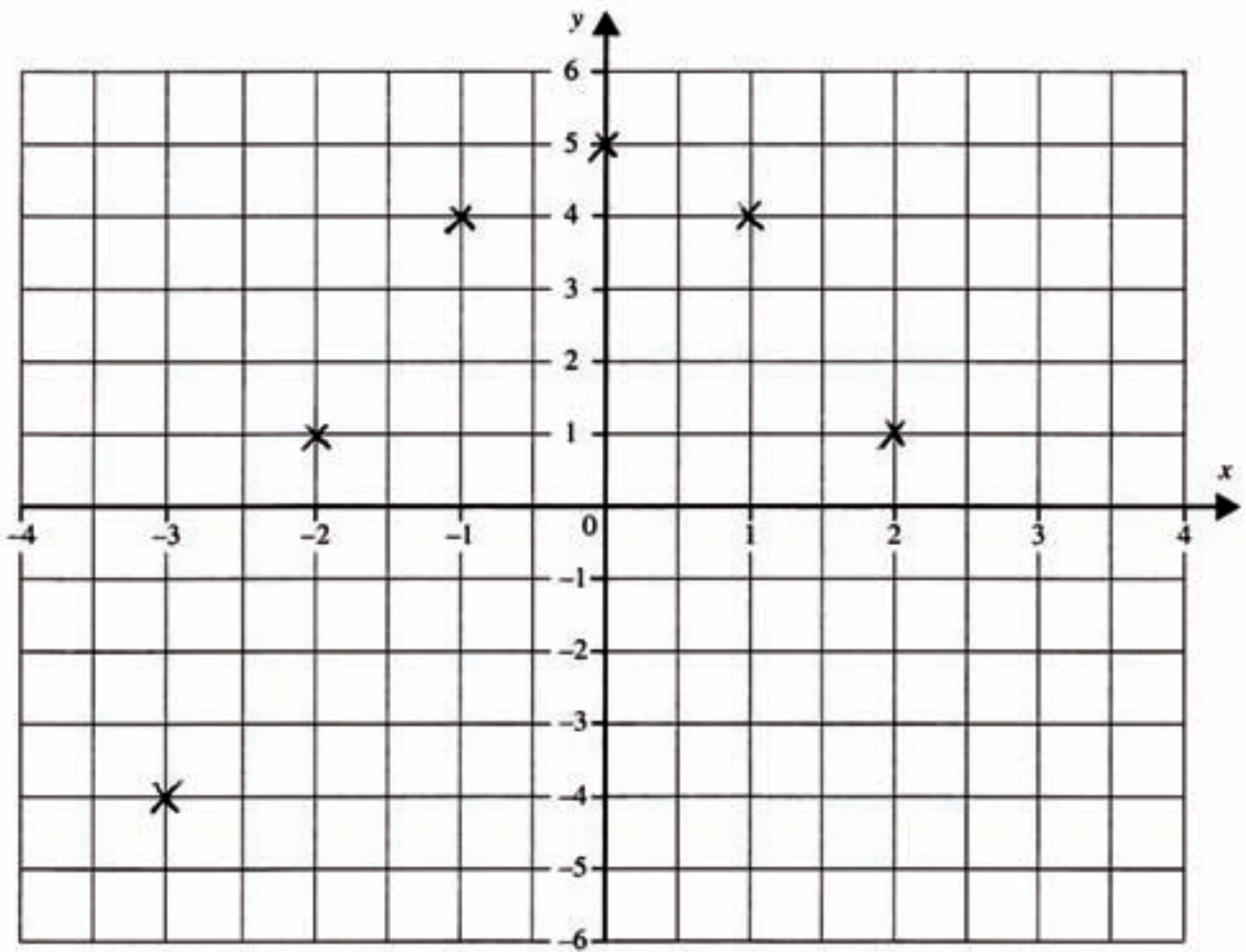
A1

4

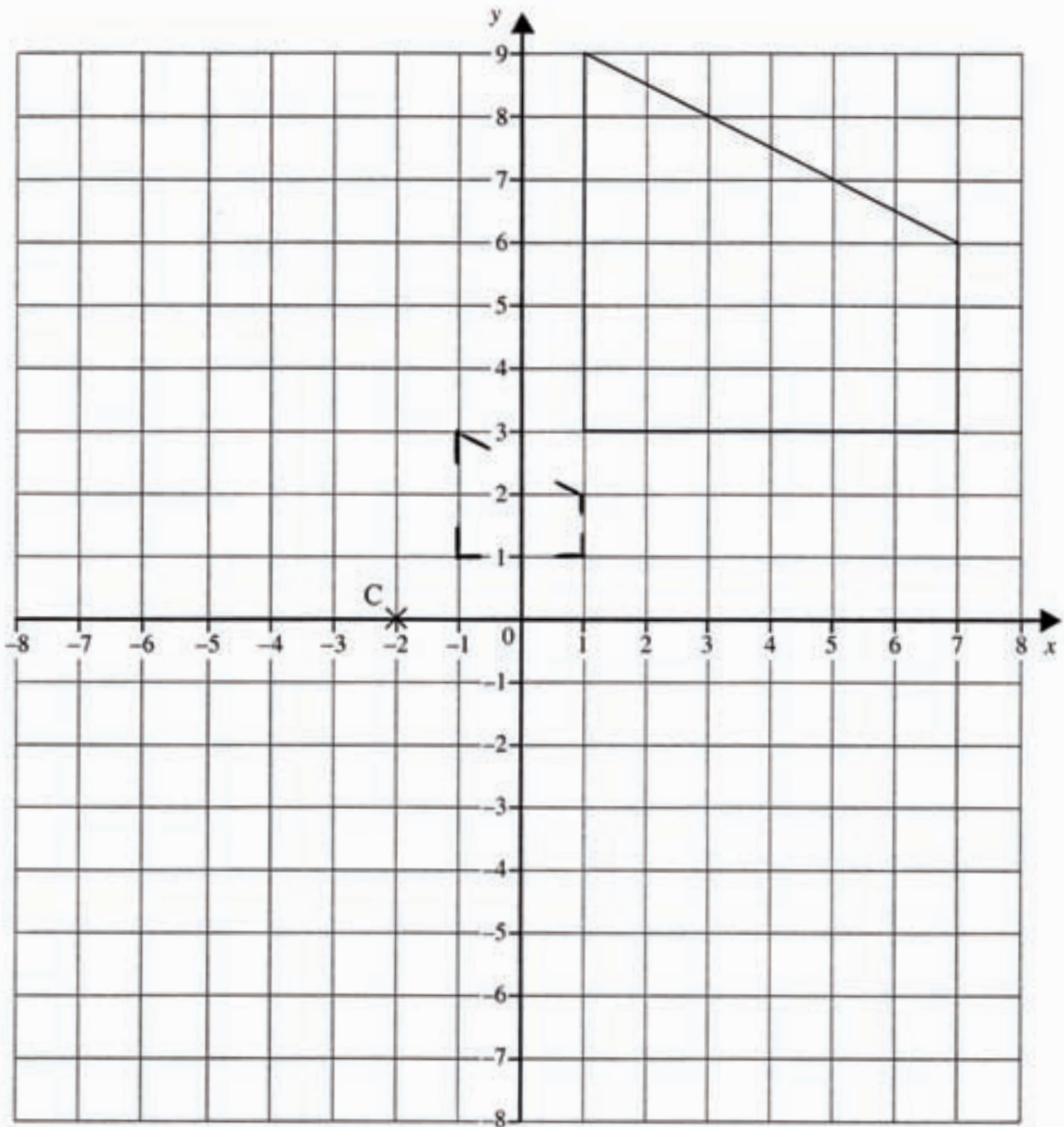
Total

56

GCSE MATHEMATICS JANUARY 2009
MODULE N6-2
OVERLAY QUESTION 3



GCSE MATHEMATICS JANUARY 2009
MODULE N6-2
OVERLAY QUESTION 6



GCSE MATHEMATICS JANUARY 2009
MODULE N6-2
OVERLAY QUESTION 9

