GCSE

Mathematics (Modular)

January 2010

Mark Schemes

Issued: April 2010

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

MARK SCHEMES (2010)

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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General Certificate of Secondary Education
January 2010

Mathematics

Module N1 Paper 1
(Non-calculator)
Foundation Tier

[GMN11]

TUESDAY 12 JANUARY

9.15am – 10.00am

MARK SCHEME

GCSE MATHEMATICS 2010

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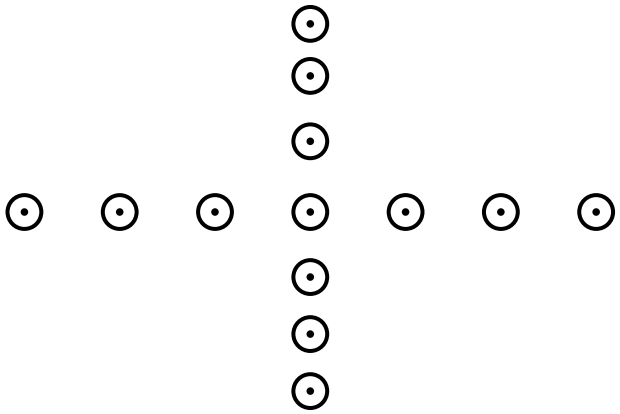
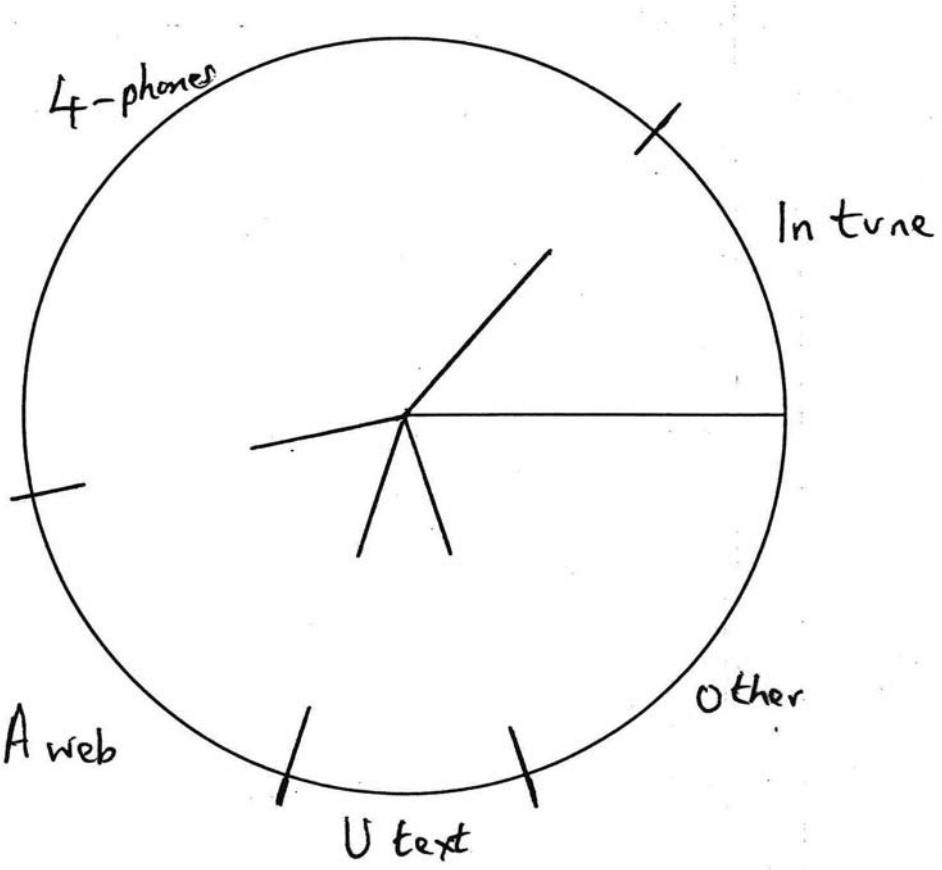
				AVAILABLE MARKS
1	**(a)**	3 and 5	A1	
	(b)	2 and 8	A1	
	(c)	14	A1	
	(d)	3	A1	4
2	**(a)**	46	A1	
	(b)	64 + 46 + 46 + 30 + 18		
		= 204	M1, A1	
	(c)	Floor 8 Reason given, e.g. larger rooms on this floor	A1	4
3	**(a)**	3000	A1	
	(b)	4	A1	
	(c)	Renault Megane Hatchback	A1	
	(d)	£8200 − £1800 = £6400	MA1	4
4	**(a)**	**(i)** Diameter	A1	
		(ii) Arc	A1	
	(b)	Correct line	A1	
	(c)	Correct point	A1	4
5	**(a)**	56	A1	
	(b)	−21	A1	2
6	**(a)**	Bar of height 65 drawn for girls on Wednesday	MA1	
	(b)	Thursday	A1	
	(c)	No, because 20% of 120 = 24, and on Friday there were only 20 boys (or similar explanation)	A2	4

				AVAILABLE MARKS
7	**(a)**		A1	
	(b)	13, 17	A1	
	(c)	Add 4 to previous term	A1	3
8	**(a)**	120 + 85 + 40 = 245	MA1	
		360 – 245 = 115	MA1	
	(b)	10 cm^2	A1, A1 (units)	4
9	**(a)**	50.61	A1	
	(b)	0.289, 0.29, 0.3	A1	2
10		$6\ell + m$	A1, A1	2
11		Angles 48° 144° 60° 36° 72°	M1, A1	
		Sectors	M1, A1	4
12	**(a)**	23 and 29	A2	
	(b)	$\frac{2}{15}$	A1	3
13	**(a)**	130 ± 2	A1	
	(b)	9.2 (± 0.2)	A1	
		9.2 × 5 = 46 (± 1)	M1, A1	4
			Total	**44**

GCSE MATHEMATICS JANUARY 2010
MODULE N1-1
OVERLAY QUESTION 11



Rewarding Learning

General Certificate of Secondary Education

January 2010

Mathematics

Module N1 Paper 2

(With calculator)

Foundation Tier

[GMN12]

TUESDAY 12 JANUARY

10.30 am – 11.15 am

MARK SCHEME

GCSE MATHEMATICS 2010

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				AVAILABLE MARKS
1	**(a)**	175	A1	
	(b)	4 whole symbols and 1 half symbol drawn	MA1 A1	3
2		£5.50 + £4.40 + £3.40	MA1 each	
		= £13.30	MA1	4
3		(36 × 7) ÷ 4	MA2	
		= 63	A1	3
4	**(a)**	**(i)** Parallelogram	A1	
		(ii) Hexagon	A1	
	(b)	12	A1	
	(c)	Correct sketch	A1	4
5	**(a)**	(3, 4)	A1	
	(b)	H at (2, 0) and S at (4, –1)	A1, A1	
	(c)	Line $y = 4$ drawn	A1	4
6		one 4 × 3 rectangle two 4 × 1 rectangles in correct position two 3 × 1 rectangles in correct position	A1 A1 A1	3
7	**(a)**	65% of 480		
		$= \frac{480}{100} \times 65 = 312$	M1, A1	
	(b)	£32.40 ÷ 5.80	M1	
		= 5.586 . . . = 5 Tickets	A1	
		Which means 4 friends	A1	5

			AVAILABLE MARKS
8	**(a)** Total = 112	MA1	
	$\frac{112}{20} = 5.6$	M1, A1	
	(b) Indication of 10.5th value	M1	
	= 5.5	A1	
	(c) Mode because it is the most common shoe size sold	A2	7
9	1 9 | 3 5 7 | 2 6 8 10 | 4		
	All correct (5 correct MA1)	MA2	2
10	–10	MA1	1
11	20 + 6 × 16 = 116	MA1	
	270 – 116 = 154	MA1	
	154 ÷ 22 = 7 months	MA1	
	Answer 13 months	MA1	4
12	**(a)** (180 – 104)/2 = 38	MA1, A1	
	(b) 6.8 × 2.6 = 17.68	M1, A1	4
		Total	**44**

Rewarding Learning

General Certificate of Secondary Education
January 2010

Mathematics

Module N2 Paper 1
(Non-calculator)
Foundation Tier

[GMN21]

TUESDAY 12 JANUARY

9.15am – 10.00am

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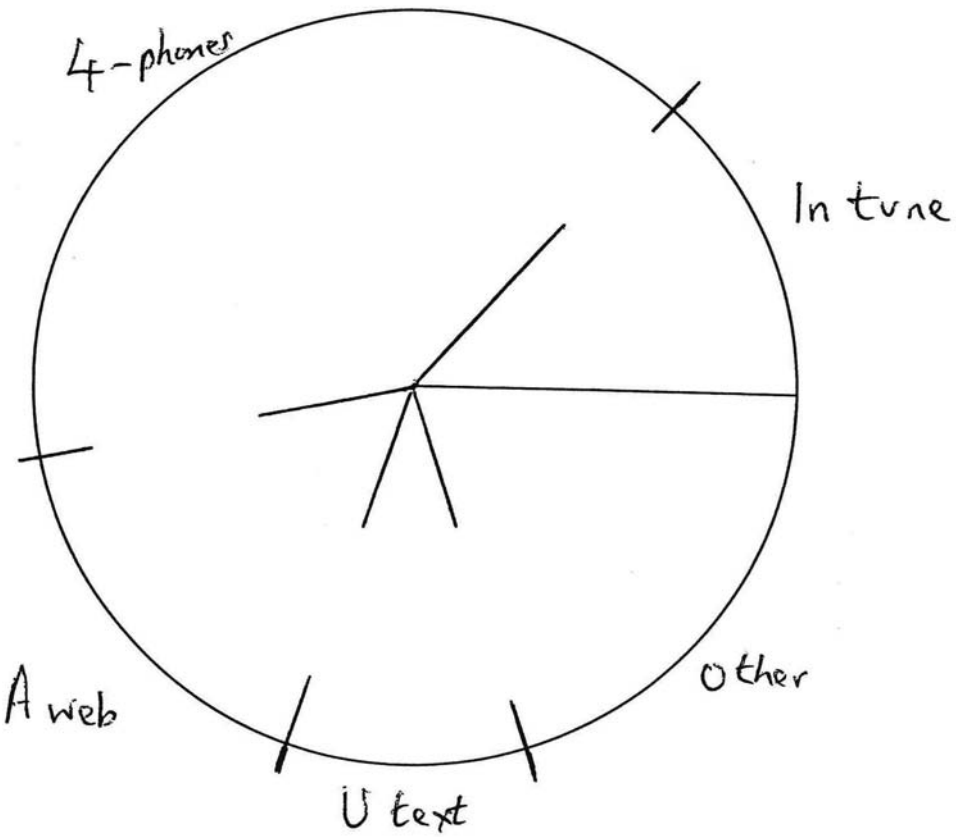
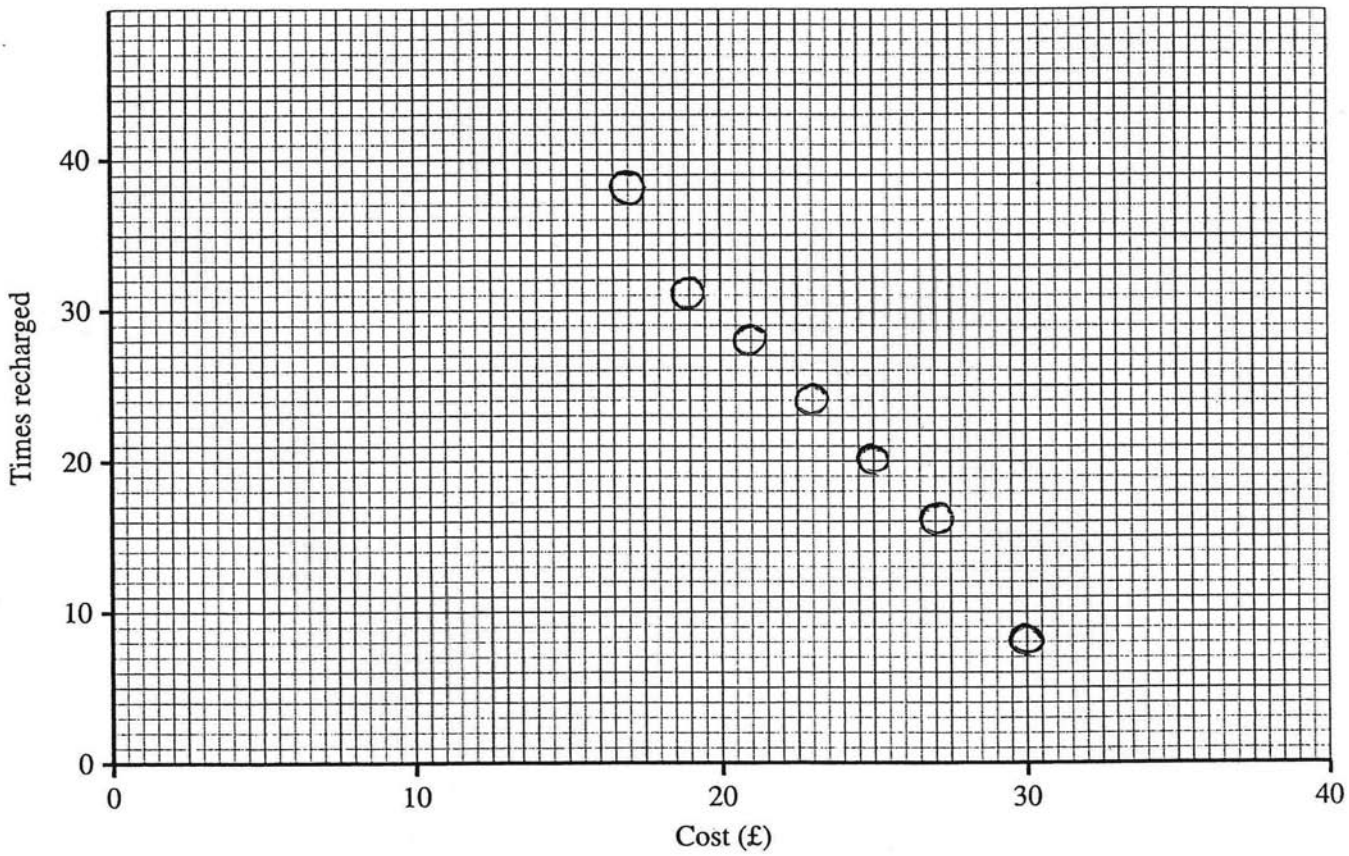
			AVAILABLE MARKS
1	**(a)** Angles 48° 144° 60° 36° 72°	M1, A1	
	Sectors	M1, A1	
	(b) **(i)** 2.45	A1	
	(ii) 5.3	A1	6
2	**(a)** 23 and 29	A2	
	(b) $\frac{2}{15}$	A1	3
3	$360 - (100 + 88 + 70) = 102$	M1, A1	
	$180 - 102 = 78$	MA1	3
4	$7x - 3x = 8 - 5$	MA1	
	$4x = 3$	MA1	
	$x = \frac{3}{4}$	A1	3
5	**(a)** $\frac{4}{12} + \frac{2}{12} + \frac{3}{12} = \frac{9}{12}$	M1, A1	
	$1 - \frac{9}{12} = \frac{3}{12}$ $(\frac{1}{4})$	MA1	
	(b) $\frac{3}{8} = 30$ ft	MA1	
	$\frac{1}{8} = 10$ ft	MA1	
	Wall length $= 10 \times 8 = 80$	MA1	6
6	**(a)** 7 points correct (A1 for 4 correct)	A2	
	(b) Appropriate line	MA1	
	(c) Correct reading from candidate's line	MA1	4

			AVAILABLE MARKS
7	Accurate diagonal Correct parallelogram	A1 A3	4
8	**(a)** 6, + m	MA1, MA1	
	(b) $\frac{9a}{6} + \frac{4a}{6}$	MA1, MA1	
	$= \frac{13a}{6}$	MA1	5
9	$250 \times 5 + 750 \times 20 + 1250 \times 10 + 1750 \times 4 + 2250 \times 1$	M1	
	$= 38\,000$	A1	
	$38\,000 \div 40$	M1	
	$= 950$	A1	4
10	40°	MA1	
	$360 \div 40 = 9$	M1, A1	3
11	$\frac{27}{4} - \frac{13}{3}$ **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	3
		Total	**44**

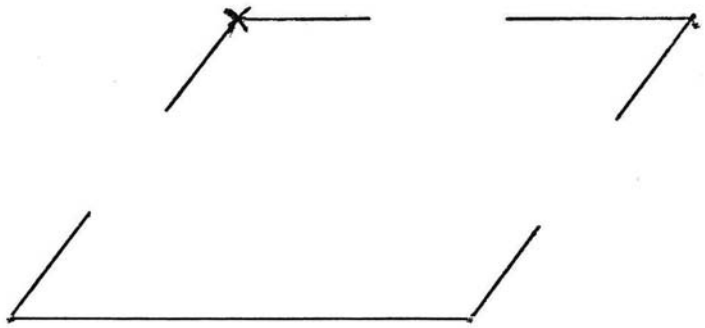
GCSE MATHEMATICS JANUARY 2010
MODULE N2-1
OVERLAY QUESTION 1



GCSE MATHEMATICS JANUARY 2010
MODULE N2-1
OVERLAY QUESTION 6



GCSE MATHEMATICS JANUARY 2010
MODULE N2-1
OVERLAY QUESTION 7



Rewarding Learning

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January 2010

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Module N2 Paper 2
(With calculator)
Foundation Tier

[GMN22]

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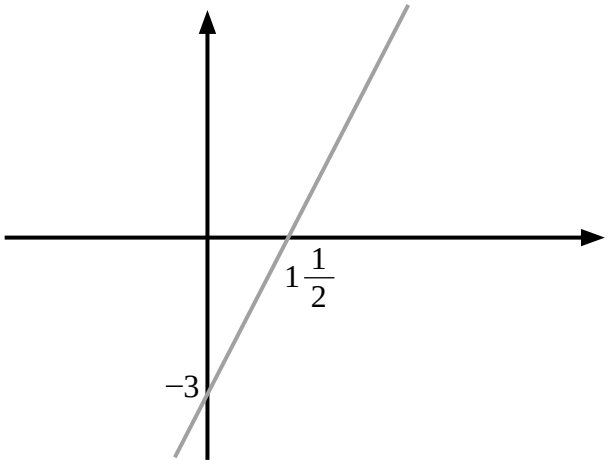
			AVAILABLE MARKS
1			
	1 9	3 5 7	2 6 8 10	4	
	All correct	MA2	
	(5 correct MA1)		2
2	$20 + 6 \times 16 = 116$	MA1	
	$270 - 116 = 154$	MA1	
	$154 \div 22 = 7$	MA1	
	13 months	MA1	4
3	**(a)** 76	MA1	
	38	A1	
	(b) **(i)** 6.8×2.6 or 17.6	M1	
	17.68 or 17.7	A1	
	(ii) 18.8	MA1	5
4	**(a)** $13n$	A1	
	(b) $16n$	A1	
	(c) $64n$	A1	3
5	**(a)** correct point	MA1	
	2nd point	MA1	
	line	MA1	



	(b) 36	A1	4

				AVAILABLE MARKS
6	**(a)**	$\sqrt[3]{35} = 3.2710...$	A1	
		$= 3.3$ (2 s.f.)	A1	
	(b)	2.8423	MA1	
		2.8	A1	4
7	**(a)**	appropriate diagram	M1, accuracy A2	
	(b)	$120 < t \leq 150$	MA1	4
8	**(a)**	4.6×10000	MA1	
		46 000	A1	
	(b)	(3,1)	A2	4
9		$\pi \times 8 \div 2 = 12.56637061$	M1, A1	
		20.56637061 cm	A1, A1 units	4
10	October	$600 \times 0.85 = £510$	MA1	
	November	$510 \times 1.18 = £601.80$	MA1	
	December	$601.80 \times 1.25 = £752.25$	MA1	3
11	**(a)**	Positive	A1	
	(b)	**(i)** Negative	A1	
		(ii) Suitable sketch	A1	
	(c)	For example height, number of doors, amount of tyre wear, age of owner	A1	4
12	**(a)**	$2x + 2x + 19 + x + 16 = 180$ or equivalent	MA1	
	(b)	$5x = 145$	MA1	
		$x = 29$	MA1	3
			Total	**44**

Rewarding Learning

General Certificate of Secondary Education
January 2010

Mathematics

Module N5 Paper 1
(Non-calculator)
Foundation Tier

[GMN51]

FRIDAY 15 JANUARY

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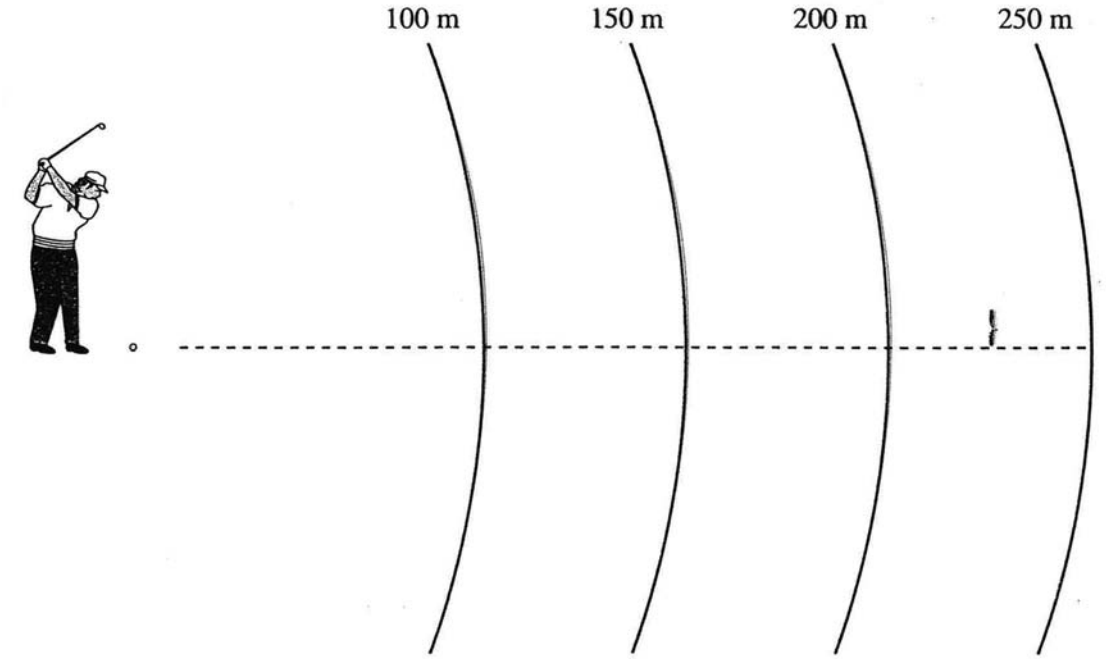
1	**(a)**	Correct lines	A1, A1	
	(b)	Correct reflection	A2	4
2	**(a)**	360	A1	
	(b)	X marked correctly	A1	
	(c)	Correct scale (1 cm = 100 ml) Water level marked at 280 ml	MA1 MA1	4
3	**(a)**	B	A1	
	(b)	It has an equal number of red and blue sectors	A1	2
4		8 × 150	MA1	
		= 1200	A1	2
5	**(a)**	17 correct answers and/or 3 wrong answers	MA2	
	(b)	5 correct and/or 15 wrong	MA2	4
6	**(a)**	kilograms **or** grams	A1	
	(b)	litres **or** millilitres	A1	2
7	**(a)**	Centre marked correctly	A1	
	(b)	5 correct lines	A2	
	(c)	12 ÷ 3 **or** 3 feet = 1 metre 4 (accept 3.6)	MA1 A1	5
8	**(a)**	All points plotted correctly Straight line graph drawn	A2 A1	
	(b)	56 km	A1	4

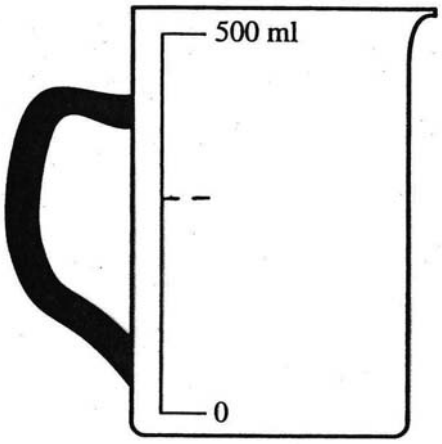
				AVAILABLE MARKS
9	**(a)**	**(i)** $15 - (-5)$		
		$= 20$	MA1	
		(ii) $24 - 3$		
		$= 21$	MA1	
	(b)	$14 - 4 \times (3 - 2)$ **or** $(14 - 4) \times (3 - 2)$	A1	
	(c)	9	A1	
	(d)	10% = £18.60	M1, A1	
		18.60	A1	7
10	**(a)**	**(i)** $\frac{1}{800}$	A1	
		(ii) May not have been an equal number of tickets bought by males/females	A1	
	(b)	0.88	A1	3
11	**(a)**	1 hr 20 mins **or** 80 mins	A1	
	(b)	1300	A1	
	(c)	Friday	A1	3
12		$2p - 3 - 6 = -q$ **or** $2p - 9 = -q$	MA1	
		$3 + 6 - 2p = q$ **or** $9 - 2p = q$	MA1	2
13	**(a)**	e.g. $3^3 = 27$ (which is odd)	A2	
	(b)	$\frac{90}{120} = \frac{3}{4}$	A1	
		$\frac{3}{4} \times 72 = 54$	MA1	4

			AVAILABLE MARKS
14	625 ml		
	450 ml		
	7.5 scoops	MA2 (MA1 for any 1 correct)	2
15	$\frac{1}{12} \times 120 = 10$ people $\times$ £1.50 = £15	MA1	
	$60 - 15 = 45$	MA1	2
16	Correct translation 6 right	A1	
	Correct translation 2 down	A1	2
17	$4 + 5 + 2$	MA1	
	$= 11$	A1	2
18	$\frac{45}{200} \times 4000$	MA1	
	$= 900$	A1	2
		Total	**56**

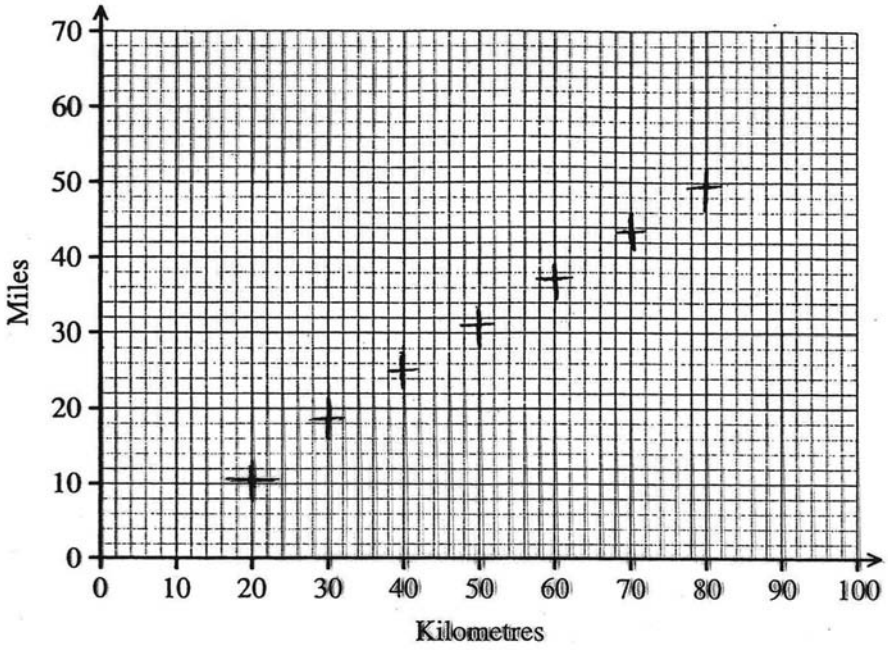
GCSE MATHEMATICS JANUARY 2010
MODULE N5-1
OVERLAY QUESTION 2(b)



GCSE MATHEMATICS JANUARY 2010
MODULE N5-1
OVERLAY QUESTION 2(c)



GCSE MATHEMATICS JANUARY 2010
MODULE N5-1
OVERLAY QUESTION 8



Rewarding Learning

General Certificate of Secondary Education
January 2010

Mathematics

Module N5 Paper 2
(With calculator)
Foundation Tier

[GMN52]

FRIDAY 15 JANUARY

10.45am – 11.45am

MARK SCHEME

GCSE MATHEMATICS 2010

Introduction

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				AVAILABLE MARKS
1	**(a)**	Cone	A1	
	(b)	Pyramid	A1	
	(c)	Cylinder	A1	3
2	**(a)**	$60 + 45 \times 3$	MA1	
		195	A1	
	(b)	$285 - 60 = 225$	MA1	
		5 hours	A1	4
3	**(a)**	$6 \times 30 = 180$	MA1	
		$2 \times 6 \times 4 = 48$	MA1	
		Total 228	MA1	
	(b)	$30 \times 7.26 = 217.80$	MA1	
		$7.26 \times 4 \times 1.5 = 43.56$	MA2	
		Total 261.36	MA1	
		Answer 33.36	MA1	8
4	**(a)**	impossible	A1	
	(b)	unlikely	A1	
	(c)	certain	A1	
	(d)	evens	A1	4
5		24 9 36 27 54 81	MA3	3
		(Award 1 for 2 correct, 2 for 4 correct)		

			AVAILABLE MARKS
6	$24 \div 8 = 3$ **or** 8 km = 5 miles	MA1	
	$3 \times 5 = 15$	MA1	2
7	**(a)** **(i)** unlikely	A1	
	(ii) certain	A1	
	(b) T labelled approximately $\frac{5}{6}$ of scale	A1	
	U labelled approximately $\frac{1}{4}$ of scale	A1	4
8	$56 + 45$	MA1	
	$= 101$	A1	2
9	**(a)** Correct square	A1	
	(b) Regular hexagon	A1	
	(c) Parallelogram, rectangle, rhombus (any **two**)	A1, A1	4
10	$800 \times 1.234 = €987.20$	MA1	
	Euro left $\frac{1}{4} \times 987.20 = €246.80$	MA1	
	Amount in £'s $246.80 \div 1.323 = 186.55$	MA1	3
11	**(a)** 15	A1	
	12	A1	
	(b) Correct centre	A1	
	Correct enlargement	A2	5
	(Award 1 mark for 4 points correct)		
12	Total = 20	MA1	
	Probability = $\frac{4}{20}$ **or** $\frac{1}{5}$	A1	2

				AVAILABLE MARKS
13	**(a)**	0	A1	
	(b)	Points plotted correctly	A1	
		Smooth curve through points	A1	3
14	**(a)**	45	A1	
	(b)	30 ÷ 0.75	MA1	
		40 km/hr	A1	3
15		162 000 ÷ 3 = 54 000	MA1	
		54 000 × 14 = 756 000	MA1	2
16		40 × 21 = 840	A1	
		7900 ÷ 840 = 9.40476	M1, A1	
		9.4 or 9	A1	4
			Total	**56**

Rewarding Learning

General Certificate of Secondary Education
January 2010

Mathematics

Module N3 Paper 1
(Non-calculator)
Higher Tier

[GMN31]

TUESDAY 12 JANUARY

9.15am – 10.15am

MARK SCHEME

GCSE MATHEMATICS 2010

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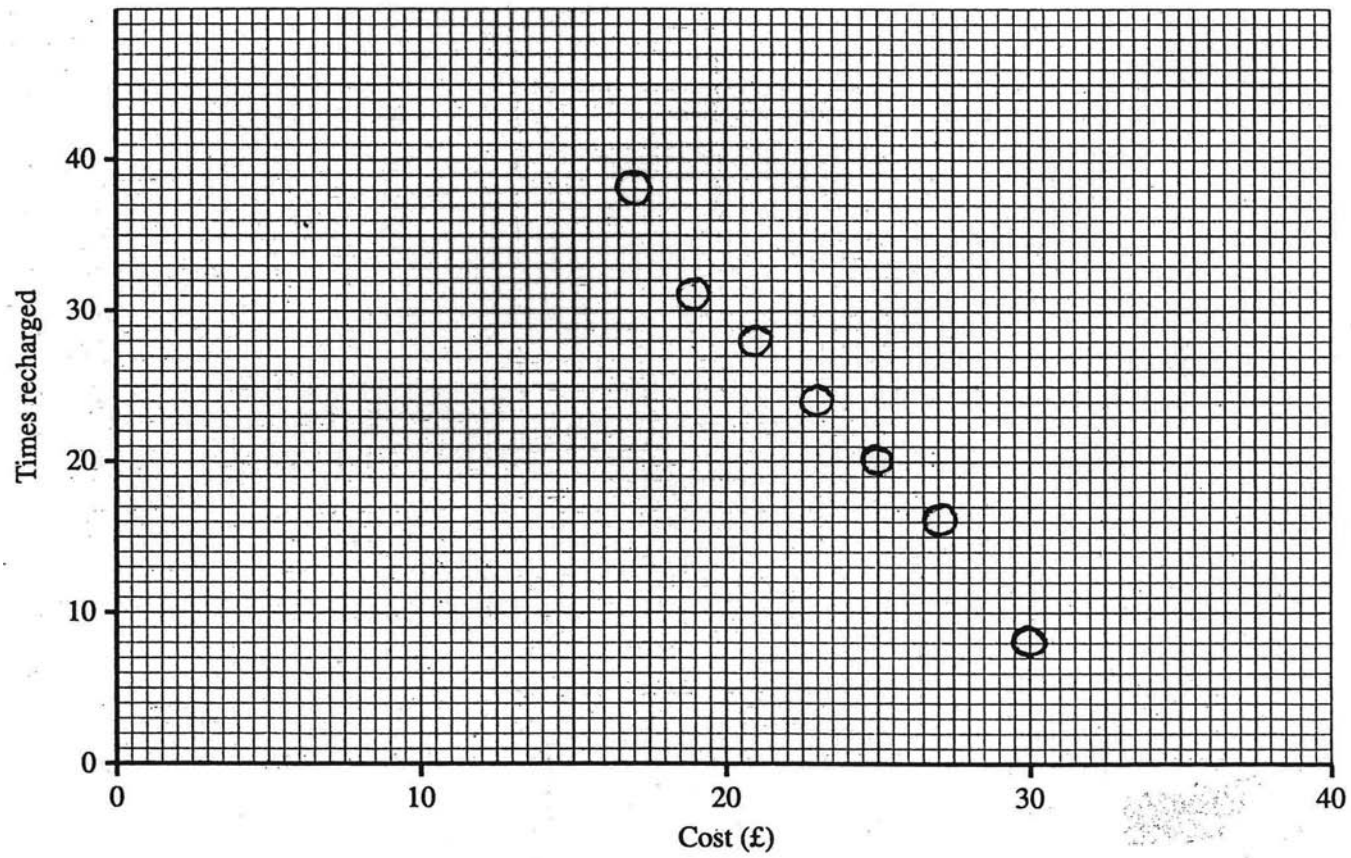
			AVAILABLE MARKS
1	More women, no children or other suitable reason	A1	1
2	**(a)** $12 - 4x$	MA1	
	(b) $k(k - 1)$	MA1	
	(c) $7x - 3x = 8 - 5$	MA1	
	$4x = 3$	MA1	
	$x = \frac{3}{4}$	A1	5
3	**(a)** 7 points correct (A1 for 4 correct)	A2	
	(b) Appropriate line	MA1	
	(c) Correct reading from candidate's line	MA1	4
4	Accurate diagonal Correct parallelogram	A1 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

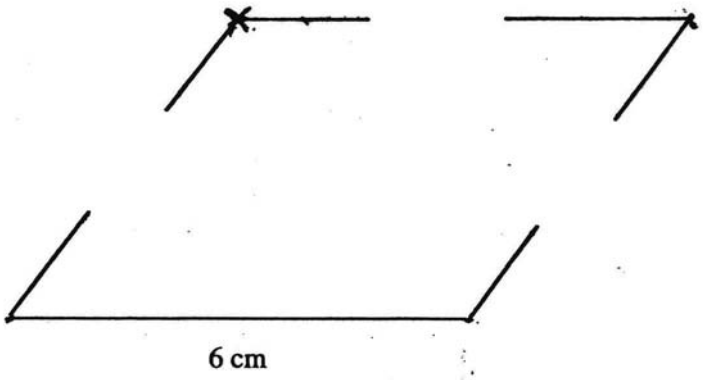
			AVAILABLE MARKS
7	$250 \times 5 + 750 \times 20 + 1250 \times 10 + 1750 \times 4 + 2250 \times 1$	M1	
	$= 38\,000$	A1	
	$38\,000 \div 40$	M1	
	$= 950$	A1	4
8	$40°$	MA1	
	$360 \div 40 = 9$	M1, A1	3
9	**(a)** $\frac{9a}{6} + \frac{4a}{6}$	MA1, MA1	
	$= \frac{13a}{6}$	MA1	
	(b) $\frac{x+2}{2}$	MA1	4
10	**(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

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

GCSE MATHEMATICS JANUARY 2010
MODULE N3-1
OVERLAY QUESTION 3



GCSE MATHEMATICS JANUARY 2010
MODULE N3-1
OVERLAY QUESTION 4



Rewarding Learning

General Certificate of Secondary Education
January 2010

Mathematics

Module N3 Paper 2
(With calculator)
Higher Tier

[GMN32]

TUESDAY 12 JANUARY

10.30am – 11.30am

MARK SCHEME

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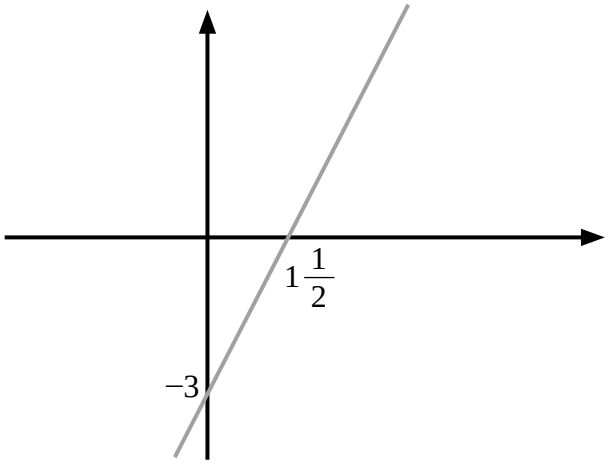
			AVAILABLE MARKS
1	2.8423	MA1	
	2.8	A1	2
2	**(a)** correct point	MA1	
	2nd point	MA1	
	line	MA1	

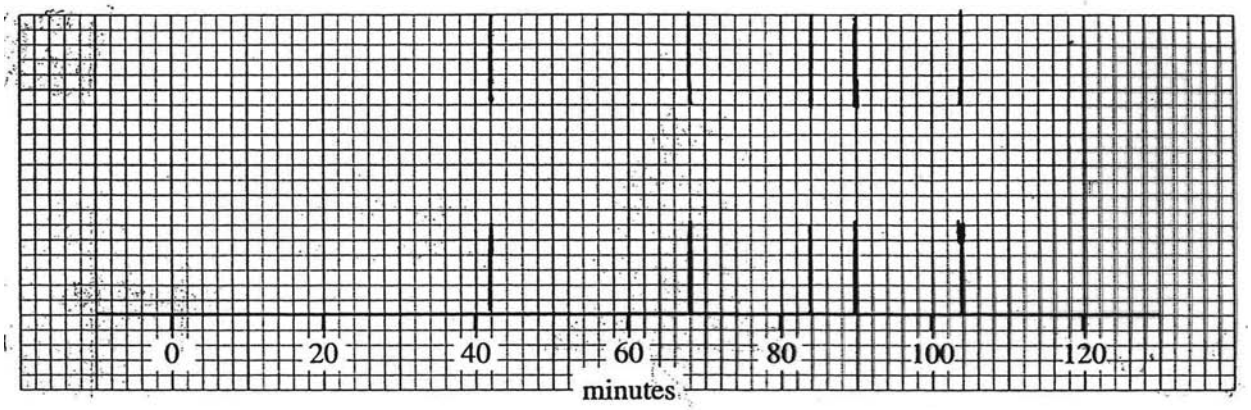


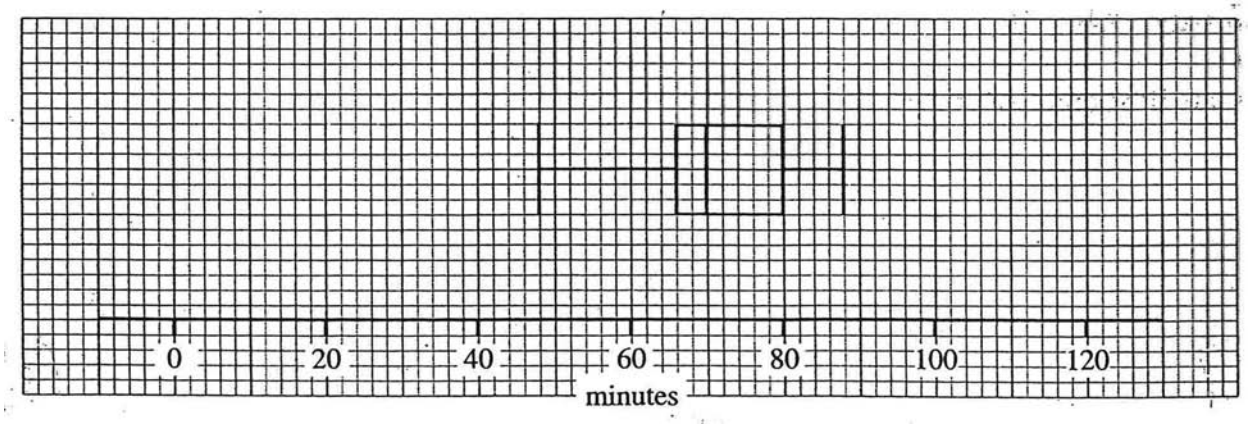
	(b) $2(3 + 5x)$	A1	4
3	**(a)** diagram	M1, A2	
	(b) $120 < t \leq 150$	MA1	4
4	**(a)** $4.6 \times 10\,000$	MA1	
	46 000	A1	
	(b) (3,1)	A1, A1	4
5	120	A1	
	80	A1	2
6	$\pi \times 8 \div 2 = 12.56637061$	M1, A1	
	20.56637061 cm	A1, A1 units	4

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

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

GCSE MATHEMATICS JANUARY 2010
MODULE N3-2
OVERLAY QUESTION 10





Rewarding Learning

General Certificate of Secondary Education
January 2010

Mathematics

Module N4 Paper 1
(Non-calculator)
Higher Tier

[GMN41]

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9.15am – 10.15am

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1	£434 = 70%	MA1	
	£62 = 10%	MA1	
	Original price = 62 × 10 = £620	MA1	3
2	155	A1	
	145	A1	2
3	**(a)** $21\frac{1}{2}$	MA1	
	(b) $24 - 18\frac{1}{2} = 5\frac{1}{2}$	M1, A1	
	(c) Reading of 74	MA1	
	$\frac{6}{80} \times 100 = 7.5\%$	MA1	5
4	**(a)** **(i)** 40°	MA1	
	(ii) 90°	MA1	
	(b) Suitable explanation	MA1	3
5	10 visits occurs in two different groups	A1	1

				AVAILABLE MARKS
6	**(a)**	2 correct lines and correct shading	MA1	
		3rd line drawn and correct shading	MA1	
		Rc orrectlypos itioned	MA1	
	(b)	Minimum occurs at point (2, − 1), Value − 1	M1, A1	5
7	**(a)**	Number of employees in each department varies and this must be represented in sample, otherwise results may be biased if too many from one particular department appear in sample chosen via simple random sampling (or similar explanation)	A2	
	(b)	$\frac{30}{450} = \frac{1}{15}$	MA1	
		$\frac{90}{15} = 6$	MA1	4
8		$(7 - 3x)(7 + 3x)$	MA2	2
9		Length ratio = 2:1	MA1	
		Area ratio = 4:1	MA1	2
10	**(a)**	$27^{\frac{1}{3}} = 3$	MA1	
		$3^2 = 9$	MA1	
	(b)	$3^y = 3^{-3}$	MA1	
		$y = -3$	MA1	4
11	**(a)**	228 ± 1	MA1	
		312 ± 1	MA1	
	(b)	$\sin x = 0.25$ 13 ± 1 167 ± 1	MA1 MA1	4

			AVAILABLE MARKS
12	Vertical axis scale 1cm = 0.25 **or** Key 1cm^2 = 2.5	MA1	
	$20 < d \leq 30$, $1.3 \times 10 = 13$ $\quad$ $5.2 \times 2.5 = 13$ $60 < d \leq 90$, $0.2 \times 30 = 6$ $\quad$ $2.4 \times 2.5 = 6$	MA1	
	$30 < d \leq 40$, $16 \div 10 = 1.6$ $\quad$ $16 \div 2.5 = 6.4\text{cm}^2$ $40 < d \leq 60$, $5 \div 20 = 0.25$ $\quad$ $5 \div 2.5 = 2\text{cm}^2$	MA1	3
13	**(a)** $62.3 = 7.893^2$		
	$6230 = 100 \times 7.893^2$	MA1	
	$= 10^2 \times 7.893^2$		
	$= 78.93^2$		
	$\sqrt{6230} = 78.93$	A1	
	(b) $3.\dot{1}\dot{4}$	A1	3
14	$a\,(3x - 2y)\,(3x - y)$	A1, A1, A1	3
		Total	**44**

Rewarding Learning

General Certificate of Secondary Education
January 2010

Mathematics

Module N4 Paper 2
(With calculator)
Higher Tier

[GMN42]

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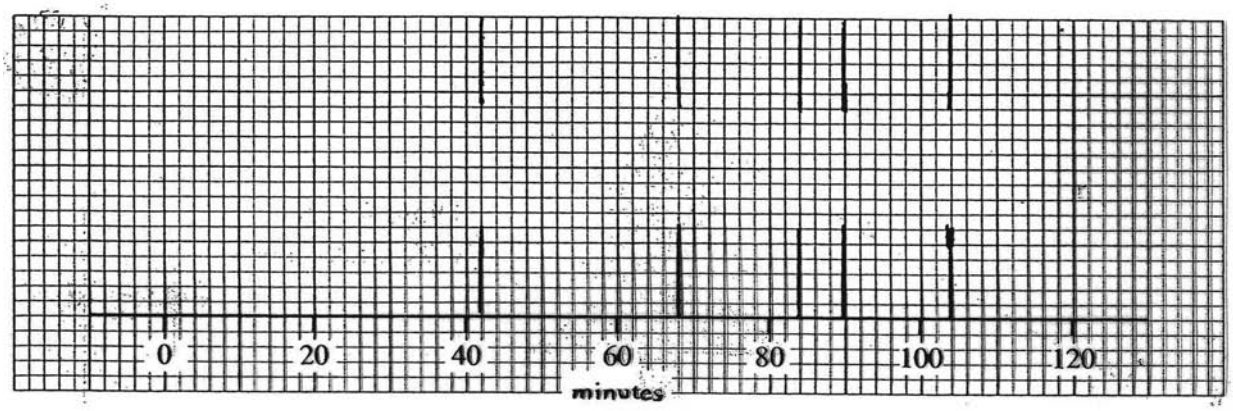
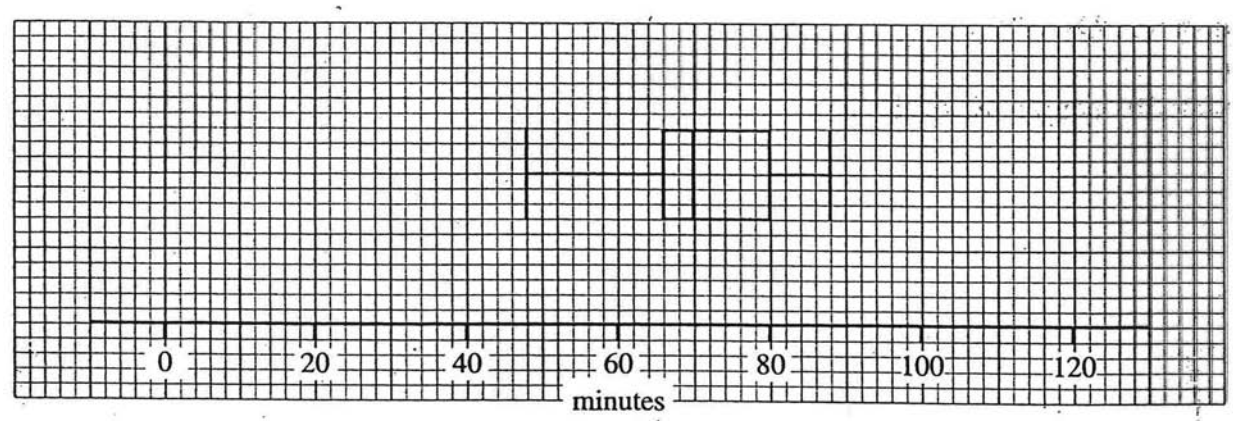
				AVAILABLE MARKS
1	**(a)**	Box plot drawn	M1, A1	
	(b)	Boys' matches completed quicker – lower median and quartiles	A1	
		Greater range of times in girls' matches	A1	4
2		$989 = 92\%$	MA1	
		$8\% = \frac{989}{92} \times 8$	MA1	
		$= 86$ absent	A1	3
3		$\text{Tan } 35° = \frac{BC}{20}$	MA1	
		$BC = 20 \text{ Tan } 35°$	MA1	
		14(.00415076)	A1	3
4		$\frac{4}{3} \times \pi \times 10^3$	MA1	
		4188.79(0205) cm^3	A1	
			A1 units	3
5	**(a)**	$12x^2 + 20x - 6x - 10$	MA1	
		$12x^2 + 14x - 10$	MA1	
	(b)	$(x + 5)(x - 8)$	MA2	4
6		$y = -\frac{1}{4}x - 3$	MA1, MA1	2
7		$\sqrt{(4^2 + 3^2 + 12^2)}$	MA1	
		13	A1	2

				AVAILABLE MARKS
8	**(a)**	$(3m + 2)(2m + 1) = 0$	MA2	
		$m = -\frac{2}{3}$, $m = -\frac{1}{2}$	A1	
	(b)	$x = \frac{5 \pm \sqrt{37}}{2}$	MA2	
		$x = 5.54$, $x = -0.54$	A1	6
9	**(a)**	3, 7.5, 7.2, 13.2, 1.8	MA1	
		Scaling and 2 bars correct	MA1	
		Remaining 3 correct	MA1	
	(b)	$\frac{6}{18} = \frac{1}{3}$	MA1	
		$\frac{1}{3}$ of 66 = 22		
		$40 - (22 + 6) = 12$	MA1	
		$12 = \frac{1}{3}$ of 36		
		H = 175	MA1	6
10		DBC = 95°	MA1	
		$DC^2 = 15^2 + 7^2 - 2(15)(7) \cos 95° = 292(.302706)$	M1, A1	
		17(.09686)	A1	4

			AVAILABLE MARKS
11	$x + 1 + 4(2x - 3) = (2x - 3)(x + 1)$	MA1	
	$x + 1 + 8x - 12 = 2x^2 + 2x - 3x - 3$	MA1	
	$9x - 11 = 2x^2 - x - 3$	MA1	
	$2x^2 - 10x + 8 = 0$	MA1	
	$x^2 - 5x + 4 = 0$		
	$(x - 1)(x - 4) = 0$	MA2	
	$x = 1$ **or** $x = 4$	A1	7
		Total	**44**

GCSE MATHEMATICS JANUARY 2010
MODULE N4-2
OVERLAY QUESTION 1





Rewarding Learning

General Certificate of Secondary Education
January 2010

Mathematics

Module N6 Paper 1
(Non-calculator)
Higher Tier

[GMN61]

FRIDAY 15 JANUARY

9.15am – 10.30am

MARK SCHEME

GCSE MATHEMATICS 2010

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:

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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;

(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)**	$\frac{90}{120} = \frac{3}{4}$	A1	
		$\frac{3}{4} \times 72 = 54$	MA1	
	(b)	625 ml		
		450 ml		
		7.5 scoops	MA2 (MA1 for any 1 correct)	4
2	**(a)**	12	MA1	
	(b)	+ 6 on RHS or – 6 on LHS	MA1	2
3		$\frac{1}{12} \times 120 = 10$ people £1.50 × 10 = £15	MA1	
		60 − 15 = 45	MA1	2
4	**(a)**	60.27	A1	
	(b)	123	A1	2
5	**(a)**	− 18 − 4(− 8 − 2)	MA1	
		− 18 + 40	MA1	
		22	A1	
	(b)	$\frac{9(-30+8)}{6}$	MA1	
		$\frac{-198}{6}$	MA1	
		−33	A1	6

				AVAILABLE MARKS
6	**(a)**	$2p - 3 - 6 = -q$ **or** $2p - 9 = -q$	MA1	
		$q = 3 + 6 - 2p$ **or** $q = q - 2p$	MA1	
	(b)	**(i)** d^7	A1	
		(ii) e^4	A1	
		(iii) f^{-5} or $\frac{1}{f^5}$	A1	
	(c)	False because it is even if either a or b equals 2	MA1	6
7	**(a)**	0.15×0.2	M1	
		$= 0.03$	A1	
	(b)	The events are independent	A1	3
8	**(a)**	Correct reflection	A2	
	(b)	**(i)** Correct translation 6 right	A1	
		Correct translation 2 down	A1	
		(ii) Rotation, 90° clockwise, about (1, 1)	A3	7
9		$4 + 5 + 2$	MA1	
		$= 11$	A1	2
10		$\frac{45}{200} \times 4000$	MA1	
		$= 900$	A1	2
11		D	A1	
		D is the only area **or** A and B are volumes and C is a length	A1	2
12		$n^2 + 4n + 4 - (n^2 - 4n + 4)$	MA1	
		$n^2 + 4n + 4 - n^2 + 4n - 4 = 4n + 4n = 8n$	MA1	2

			AVAILABLE MARKS
13	**(a)** 0.9	A1	
	(b) 0.178	A1	
	(c) Let $x = 0.21515\ldots$		
	$1000x = 215.1515\ldots$ $10x = 2.1515\ldots$		
	$990x = 213$	M1	
	$x = \frac{213}{990}$ $(\frac{71}{330})$	A1	4
14	$81x^8y^{12}$	MA2	2
15	**(a)** $-\mathbf{b}$	MA1	
	(b) $\frac{1}{2}\mathbf{a} + \mathbf{b}$	MA1	
	(c) $\mathbf{b} - \frac{1}{2}\mathbf{a}$	MA1	3
16	**(a)** $\mathbf{d} = 8$, $\mathbf{e} = 5$	MA1, MA1	
	(b) 5	A1	3
17	$\frac{20}{60} \times \frac{19}{59} + \frac{40}{60} \times \frac{39}{59}$	MA2	
	$= \frac{19}{177} + \frac{78}{177}$ **or** $\frac{380}{3540} + \frac{1560}{3540}$	MA1	
	$= \frac{97}{177}$ **or** $\frac{1940}{3540}$	A1	4
		Total	**56**

Rewarding Learning

General Certificate of Secondary Education
January 2010

Mathematics

Module N6 Paper 2
(With calculator)
Higher Tier

[GMN62]

FRIDAY 15 JANUARY

10.45am – 12.00am

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			AVAILABLE MARKS
1	**(a)** $30 \div \frac{1}{2} = 60$	M1, A1	
	(b) 1530, 1600	A1	3
2	Correct centre Correct enlargement (Award 1 mark for 3 points correct)	A1 A2	3
3	$96 \div 6 = 16$	MA1	
	80, 16	A1	2
4	**(a)** **(i)** 46	A1	
	(ii) $14 \times 6 - 3 \times 4$	MA1	
	72	A1	
	(b) $6.4(3 + 4)/2$	MA1	
	22.4	A1	5
5	odd or even with suitable examples	MA2	2
6	**(a)** $0.18 + 0.3 + 0.28 + 0.02 = 0.78$	MA1	
	$1 - 0.78 = 0.22$	MA1	
	(b) $0.18 + 0.3$	M1	
	$= 0.48$	A1	4
7	$162\,000 \div 3 = 54\,000$	MA1	
	$54\,000 \times 14 = 756\,000$	MA1	2

				AVAILABLE MARKS
8	**(a)**	$40 \times 21 = 840$	A1	
		$7900 \div 840 = 9.40476$	M1, A1	
		9.4 or 9	A1	
	(b)	**(i)** 4	A1	
		(ii) 2	A1	6
9	**(a)**	5, 2	A1, A1	
	(b)	all points correct smooth curve	A1 A1	
	(c)	readings	A1, A1	
	(d)	$2x^2 - 3x = 8$	A1	7
10		$7x - 3x \geq 1 - 9$	MA1	
		$4x \geq -8$		
		$x \geq -2$	A1	2
11		$8\pi \times 10$	MA1	
		251 (.3274123)	A1	2
12		$6.1 \times 10^8 \div 700$	MA1	
		$= 8.7 \times 10^5$	A1	2
13	**(a)**	1st branch completed with fail = 40%	MA1	
		2nd branch completed with 75%, 25% (should **not** be a branch from first attempt as pass)	MA1	
	(b)	0.4×0.75	MA1	
		30% or 0.3	A1	
		Answer 90% or 0.9	MA1	5

			AVAILABLE MARKS
14	$t = \frac{k}{w}$		
	$27 = \frac{k}{12}$		
	$k = 324$	MA1	
	$t = \frac{324}{w}$		
	$t = \frac{324}{t}$		
	$t^2 = 324$		
	$t = 18$	MA1	2
15	$x - 9 = (5 - \sqrt{x})^2$	M1	
	$x - 9 = 25 - 10\sqrt{x} + x$	MA1	
	$10\sqrt{x} = 34$		
	$\sqrt{x} = 3.4$		
	$x = 11.56$	A1	3
16	Arc PR = $36\pi \times \frac{80}{360}$ = 8π or 25.13274123	MA1	
	$8\pi = \pi d \longrightarrow r = 4$	MA1	
	$h^2 + 4^2 = 18^2$	MA1	
	$h = \sqrt{308} = 17.54992877$	MA1	
	$\frac{1}{3} \times \pi \times 4^2 \times 17.54992877$	MA1	
	294(.051879)	A1	6
		Total	**56**

GCSE MATHEMATICS JANUARY 2010
MODULE N6-2
OVERLAY QUESTION 9