

GCS

**Mathematics
(Modular)**

Summer 2009

Mark Schemes

Issued: October 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
Summer 2009

Mathematics

Module N1 Paper 1
(Non-calculator)
Foundation Tier

[GMN11]

MONDAY 18 MAY

1.30 pm – 2.15 pm

MARK
SCHEME

GCSE MATHEMATICS 2009

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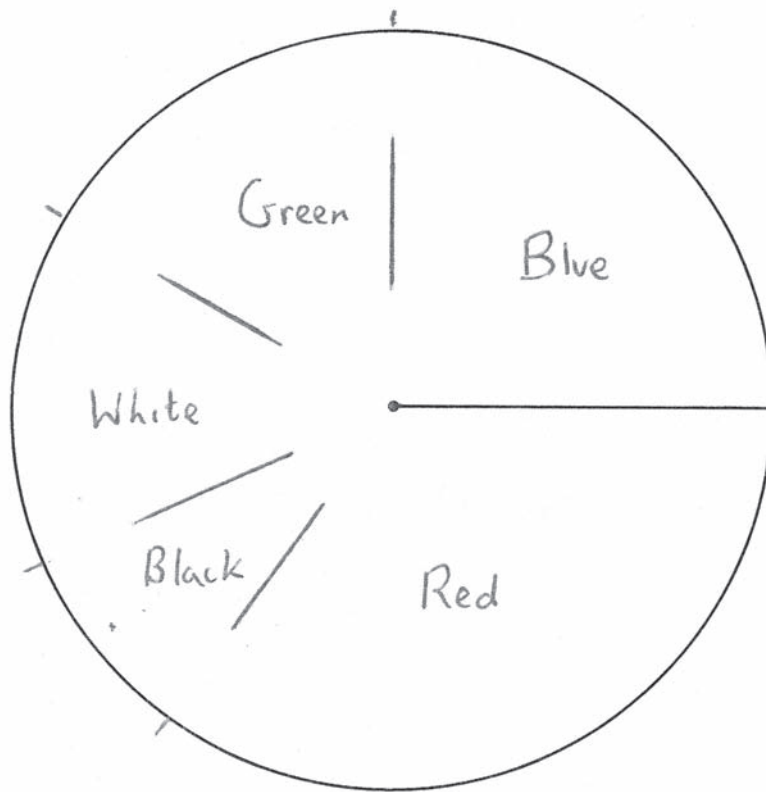
- (a) a numerical error in one entry in a table of values might lead to several answers being incorrect, but these might not be essentially separate errors;
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			AVAILABLE MARKS
1	(a) Square based pyramid, cuboid	A1, A1	5
	(b) circumference, radius, chord	A1, A1, A1	
2	(a) 6	A1	4
	(b) 36	A1	
	(c) 3 cones drawn	M1, A1	
3	(a) 16	A1	3
	(b) 18	A1	
	(c) 12 and 18	A1	
4	(a) 1, 4, 9, 16	A1	2
	(b) Square numbers	A1	
5	(a) $500 - 272 = 228$	M1, A1	3
	(b) 26 000 000	A1	
6	28% = 0.28	MA1	3
	$\frac{3}{10} = 0.3$	MA1	
	0.28, $\frac{3}{10}$, 0.4 are in correct order	MA1	
7	(a) $\frac{200}{10}$ 20	M1, A1 A1	7
	(b) (i) 1.5 hours	A2	
	(ii) 2 hours (allow 15 mins tolerance)	A1	
	(iii) 100 degrees (allow 2 degrees tolerance)	A1	

			AVAILABLE MARKS
8	(a) 16	A1	
	(b) (i) $15 \times 10 \times 12 = 1800 \text{ cm}^3$	M1, A1, A1 (units)	
	(ii) $\frac{120}{(8 \times 5)} = 3$	M1, A1	6
9	See overlay 90°, 60°, 54°, 30°, 126° (award one mark for evidence of 60 or 6) All sectors correct and labelled	A2	
		A2	4
10	(a) -4	A1	
	(b) graph	M1, A1	3
11	(a) $25 \times 8 = 200$	A1, A1	
	(b) $\frac{7}{8} \times 100 = \frac{700}{8}$	MA1	
	$= 87 \frac{1}{2}$	MA1	4
		Total	44

GCSE MATHEMATICS SUMMER 2009
MODULE N1-1
OVERLAY QUESTION 9





Rewarding Learning

**General Certificate of Secondary Education
2009**

Mathematics

Module N1 Paper 2
(With calculator)

Foundation Tier

[GMN12]

MONDAY 18 MAY

2.45 pm – 3.30 pm

**MARK
SCHEME**

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			AVAILABLE MARKS
1	(a) Diagram 4 correct	A1	2
	(b) 10 and 15	A1 (both correct)	
2	(a) $\frac{6}{9} = \frac{2}{3}$	A1, A1	4
	(b) $\frac{4}{15}, \frac{8}{30}$	A1, A1	
3	(a) scales bars (allow A1 for 3 correct)	A1 A2	5
	(b) car	A1	
	(c) 27	A1	
4	(a) kilogram	A1	3
	(b) millilitre or litre	A1	
	(c) kilometre	A1	
5	(a) $4 \times 63p = \text{£}2.52$ change = $\text{£}5 - \text{£}2.52 = \text{£}2.48$	MA1 MA1	4
	(b) $30 \div 4.2 = 7.14\dots$ $= 7$	MA1 MA1	

			AVAILABLE MARKS	
6	(a)	12 cm^2	A1	2
	(b)	$180 - 48 - 29 = 103$	A1	
7	(a)	(i) 5.6	A1	6
		(ii) 53.29	A1	
	(b)	$\frac{5}{100} \times 16\,000$	MA1	
		$= \text{£}800$	MA1	
(c)	(i) 25.29	A1		
	(ii) 8.5	A1		
8	(a)	$2 + 1 - 4$	MA1	3
		$= -1$	A1	
	(b)	$y = 18$	MA1	
9	(a)	8	A1	2
	(b)	-4	A1	
10	Girls		A1	4
	Boys' mean	$= 130/10 = 13$	M1, A1	
	Girls' mean	$= 128/8 = 16$	MA1	
11	(a)	7	A1	3
		(b)	$\frac{10}{0.25}$	
	$= 40$		A1	

12 (a) (i) 053° or $N53^\circ E (\pm 2^\circ)$

A1

(ii) distance $4.5 \text{ cm } (\pm 2 \text{ mm})$
bearing $160^\circ (\pm 2^\circ)$

A1

A1

(b) (i) 80

MA1

(ii) $180 - 80 = 100$
 $100 \div 2 = 50$

MA1

MA1

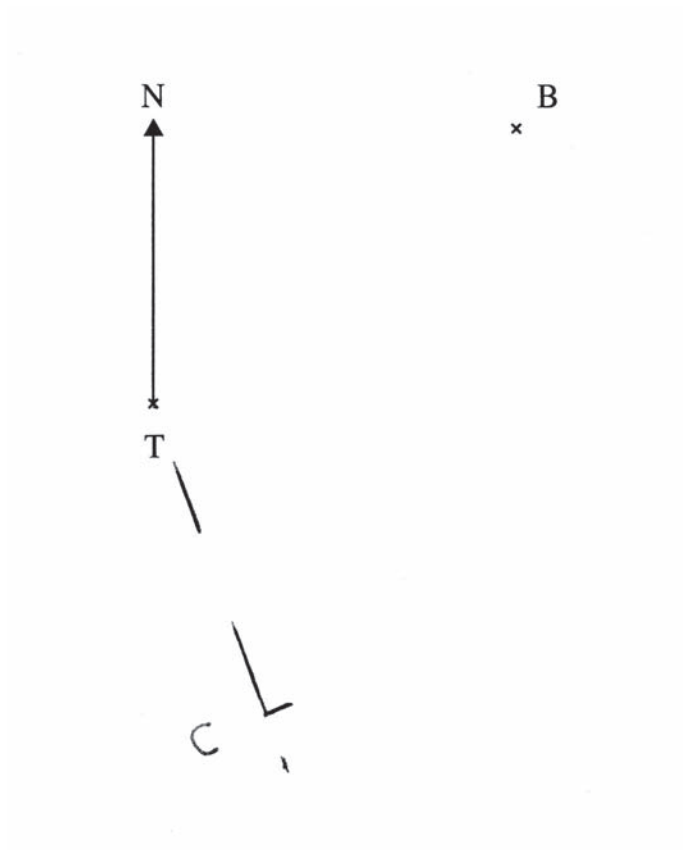
6

Total

44

AVAILABLE
MARKS

GCSE MATHEMATICS SUMMER 2009
MODULE N1-2
OVERLAY QUESTION 12





Rewarding Learning

General Certificate of Secondary Education
Summer 2009

Mathematics

Module N2 Paper 1
(Non-calculator)
Foundation Tier

[GMN21]

MONDAY 18 MAY

1.30 pm – 2.15 pm

**MARK
SCHEME**

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1	2, -3	A1, A1	2
2	$120/(8 \times 5) = 3$	M1, A1	2
3	See overlay 90°, 60°, 54°, 30°, 126° (award one mark for evidence of $\frac{360}{60}$ or 6) All sectors correct and labelled	A2 A2	4
4	(a) -4	A1	
	(b) graph	M1, A1	3
5	(a) 25×8 = 200	MA1 A 1	
	(b) 0.08	MA1	
	(c) 2.77	MA1	
	(d) $\frac{7}{12} - \frac{2}{12}$ = $\frac{5}{12}$	MA1 A1	6
6	(a) Scatter graph allow A1 for 4 correct	A2	
	(b) oblique line with roughly half the points on either side	A1	
	(c) follow line	A1	
	(d) positive	A1	5
7	(a) $p(p + 7)$	MA1	
	(b) $n^2 - 3 = 78$ $n^2 = 81$ $n = 9$	M1 A1	3

8 (a) $AOB = 360/5 = 72$

M1, A1

(b) $ABC = 180 - 72 = 108$

M1, A1

9 $\frac{3}{4} \times 9$
 $= \frac{27}{4} = 6\frac{3}{4}$

MA1

= 7 bottles

MA1

A1

10 Polygon, see overlay
 Correct frequencies at mid-points
 Points joined by straight lines

MA1

MA1

11
$$\begin{array}{r} 2 \overline{)80} \\ \underline{2} \\ 2 \\ \underline{2} \\ 2 \\ \underline{5} \\ 5 \\ \underline{5} \\ 1 \end{array}$$

M1

A1

= $2^4 \times 5$

MA1

12 (a) Now: Jack = x Dan = $x - 5$
 3 years time $x + 3 + x - 5 + 3 = 15$ (or equivalent)

A1

MA1

(b) $x = 7$

A1

13

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

Mid-points
 fx products
 1890
 75.6

MA1

M1

MA1

MA1

Total

4

3

2

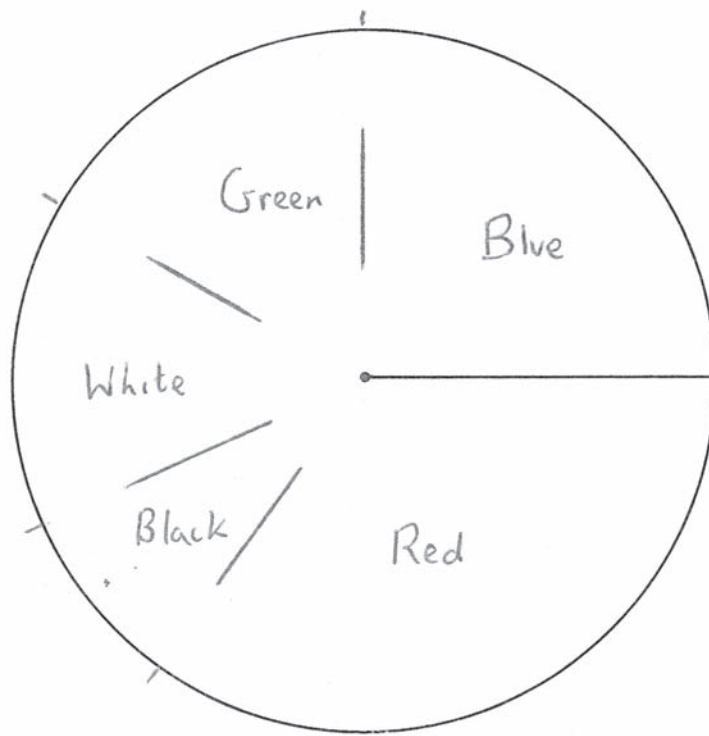
3

3

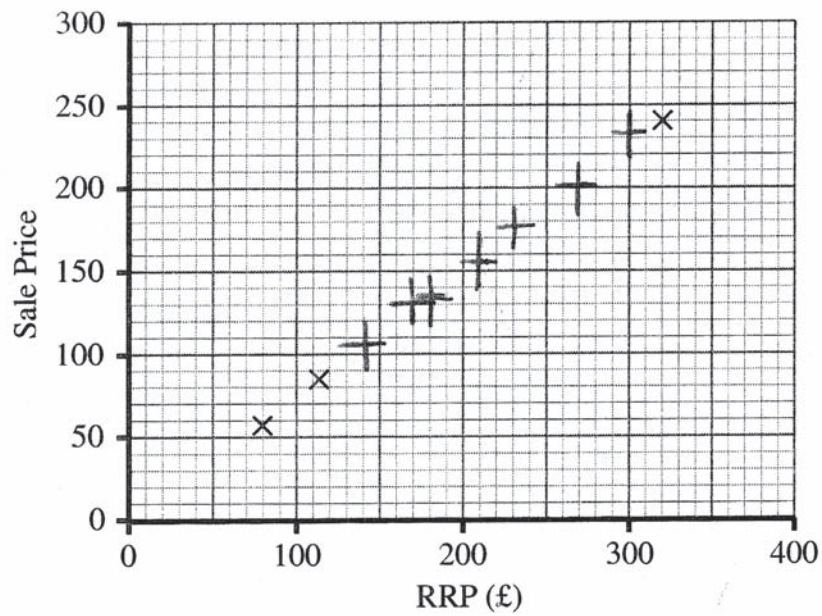
4

44

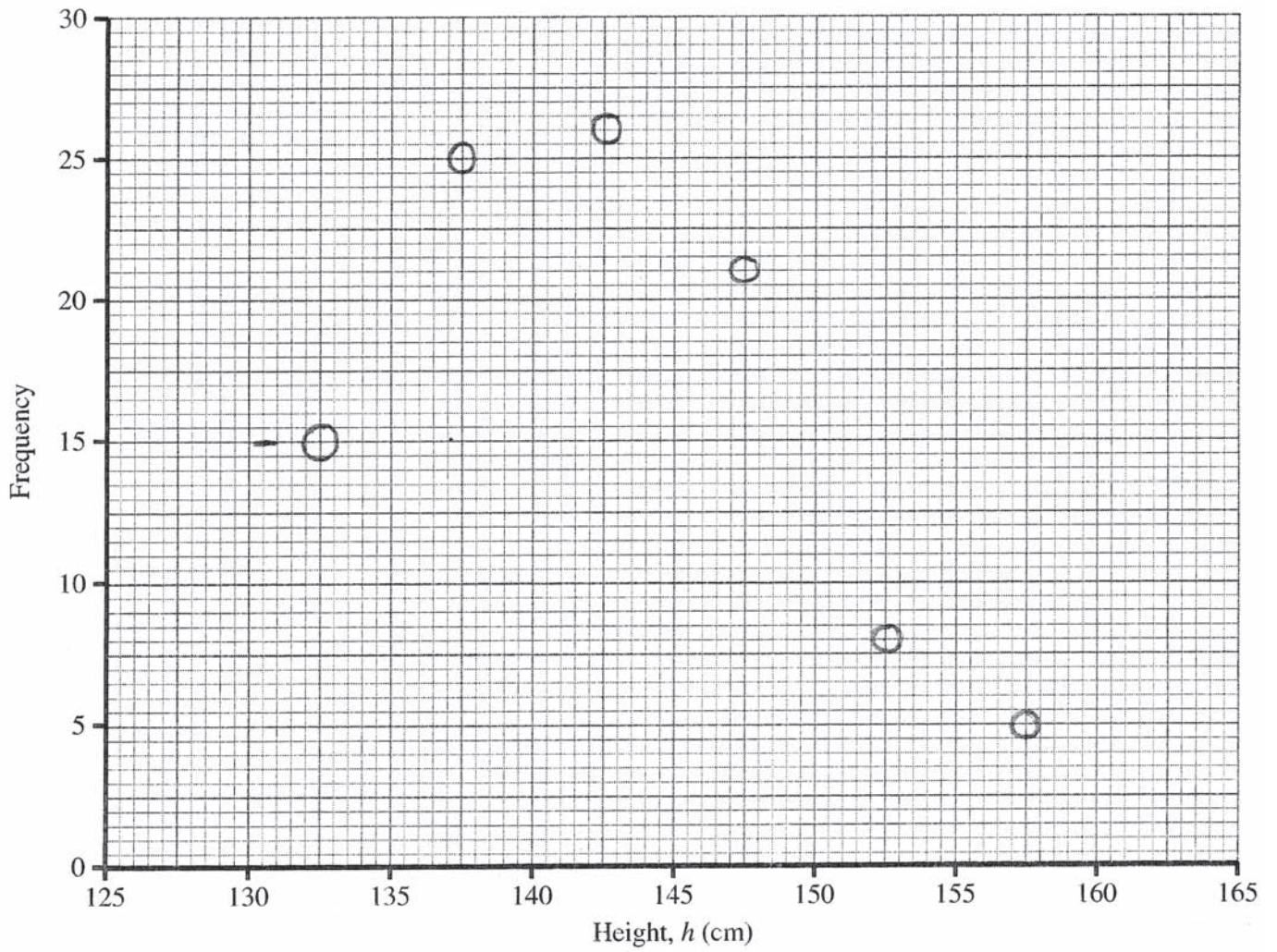
GCSE MATHEMATICS SUMMER 2009
MODULE N2-1
OVERLAY QUESTION 3



GCSE MATHEMATICS SUMMER 2009
MODULE N2-1
OVERLAY QUESTION 6



GCSE MATHEMATICS SUMMER 2009
MODULE N2-1
OVERLAY QUESTION 10





Rewarding Learning

General Certificate of Secondary Education
Summer 2009

Mathematics

Module N2 Paper 2
(With calculator)
Foundation Tier

[GMN22]

MONDAY 18 MAY
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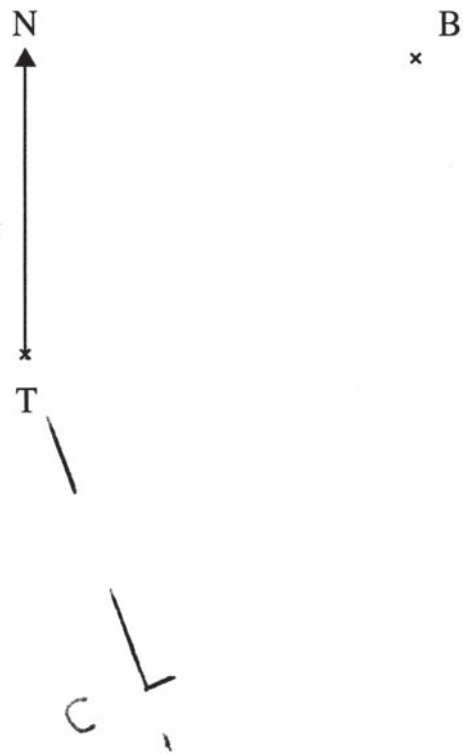
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1	Girls	A1	
	Boys' mean = $\frac{130}{10} = 13$	M1, A1	
	Girls' mean = $\frac{128}{8} = 16$	MA1	4
2	(a) $\frac{1}{4}$ of £600 = £150 or $\frac{1}{4} + \frac{1}{6}$	MA1	
	$\frac{1}{6}$ of £600 = £100 or $\frac{3}{12} + \frac{2}{12} = \frac{5}{12}$	MA1	
	Total = £250		
	Remainder = £600 - £250 = £350 or Remainder = $1 - \frac{5}{12}$	MA1	
	Fraction = $\frac{350}{600}$ or $\frac{7}{12}$	MA1	
	(b) $\left(\frac{2}{10} = \frac{24}{120}\right)$	MA1	
	$\frac{3}{20} = \frac{18}{120}$	(same fractions or decimal form)	
	$\frac{7}{30} = \frac{28}{120}$		
	$\frac{11}{40} = \frac{33}{120}$		
	\therefore Ans $\frac{7}{30}$	MA1	6
		selection/reason	
3	(a) (i) 053° or N 53° E ($\pm 2^\circ$)	A1	
	(ii) distance 4.5 cm (± 2 mm)	A1	
	bearing 160° ($\pm 2^\circ$)	A1	
	(b) (i) 80°	MA1	
	(ii) $180 - 80 = 100$	MA1	
	$100 \div 2 = 50$	MA1	6
4	Suitable answer, e.g. sample is made up totally of young people/teenagers etc. sample does not represent all age groups etc.	A1	1
5	(a) $y = 18$	MA1	
	(b) $8a + 12 - 7$	MA1	
	$= 8a + 5$	A1	3

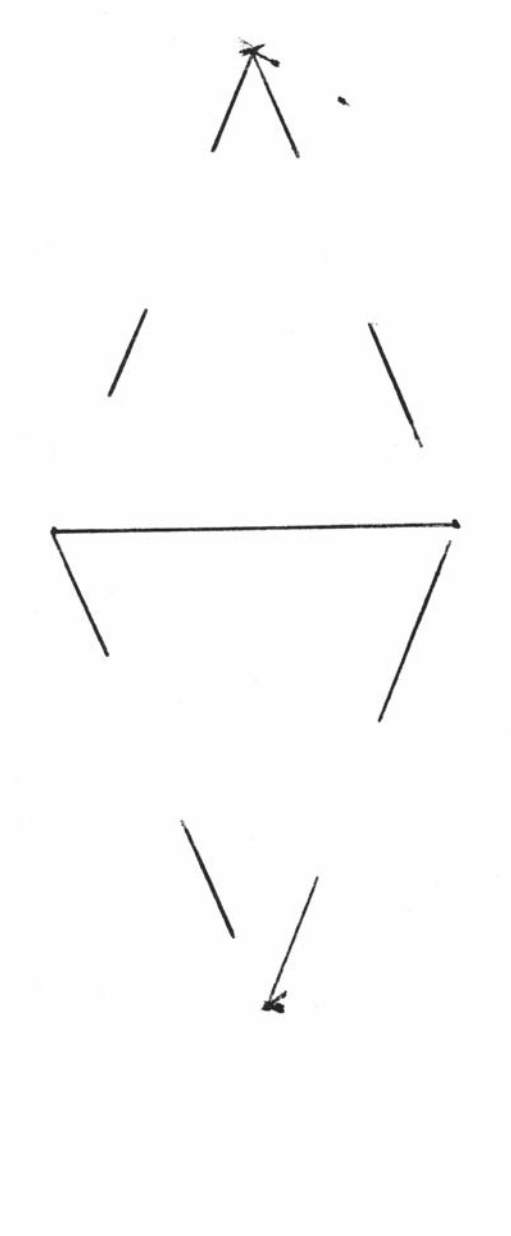
		AVAILABLE MARKS	
6	$\begin{array}{c cccc} 15 & 3 & 7 & 8 & \\ 16 & 2 & 3 & 6 & 7 & 7 & 7 & 8 & 9 \\ 17 & 0 & 1 & 4 & 7 & 8 & 8 & & \\ 18 & 1 & 2 & 5 & & & & & \end{array}$	M1, A1	
	Key: 15 7 means 157 cm	MA1	3
7	diagonal 5 cm (± 2 mm)	A1	
	Arcs 6.5 cm (± 2 mm) above and below diagonal	A1, A1	
	Rhombus completed	A1	4
8	$\frac{35}{100} \times 640$ $= \text{£}224$ $640 - 224 = \text{£}416$	M1 A1 MA1	3
9	$25^2 = 7^2 + x^2$ $625 = 49 + x^2$ $576 = x^2$ $BC = 24 \text{ cm}$	MA1 MA1 MA1	3
10	4 minute 35 sec = 275 seconds	MA1	
	$\frac{275}{25} = 11 \text{ buckets}$	MA1	
	$11 \times 15 = 165 \text{ litres}$	MA1, A1 units	4
11	$\text{1st yr interest} = \frac{4}{100} \times 2500 = \text{£}100$ $\text{value yr 1} = \text{£}2600$ $\text{2nd yr interest} = \frac{4}{100} \times 2600 = \text{£}104$ $\text{value yr 2} = \text{£}2704$ $\text{3rd yr interest} = \frac{4}{100} \times 2704 = \text{£}108.16$ $\text{value yr 3} = \text{£}2812.16$	MA1 MA1 MA1	3

			AVAILABLE MARKS	
12	$x = 4$	56	MA1	
	$x = 3$	21		
	$x = 3.6$	39.456	MA1	
	$x = 3.7$	43.253		
$x = 3.65$	41.327...	MA1		
	$x = 3.6$		A1	4
			Total	44

GCSE MATHEMATICS SUMMER 2009
MODULE N2-2
OVERLAY QUESTION 3



GCSE MATHEMATICS SUMMER 2009
MODULE N2-2
OVERLAY QUESTION 7





Rewarding Learning

**General Certificate of Secondary Education
Summer 2009**

Mathematics

**Module N5 Paper 1
(Non-calculator)
Foundation Tier**

[GMN51]

MONDAY 1 JUNE

9.15 am – 10.15 am

**MARK
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1	(a) sphere	A1	3
	(b) cylinder	A1	
	(c) cone	A1	
2	(a) each line	A1, A1	4
	(b) correct shape and orientation, distance from mirror line	A1, A1	
3	(a) even + suitable reason	A1	3
	(b) (very) unlikely + suitable reason	A1	
	(c) certain + suitable reason	A1	
4	$20 \times 4\frac{1}{2} + 40$	M1	2
	$= 130$	A1	
5	(a) (i) 5390	A1	6
	(ii) 5400	A1	
	(b) (i) $100 \times 5 = 500$	M1, A1	
	(ii) $\frac{18}{4} \rightarrow 4$	M1, A1	
6	(a) $15.00 - 5 = 10.00$ am	A1	2
	(b) $5.00 + 11 = 16.00 = 4.00$ pm	A1	

7 (a) each correct pair

A1, A1

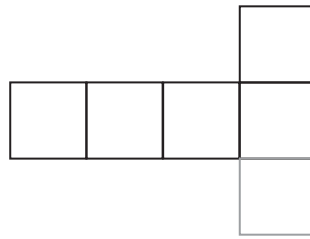
(b) 4

A1

(c)

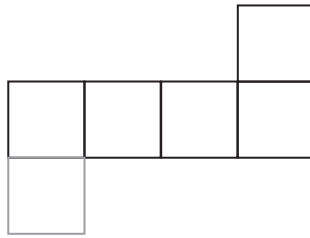


or



A1

(d)



A1

5

8 (a) (i) 11

A1

(ii) 14

A1

(b) 6 and 7

A1

(c) divide 80 by 2 or similar

A1

4

9 (a) 4 points plotted correctly
(2 points plotted correctly A1)
straight line drawn

A2

A1

(b) (i) 86°F

A1

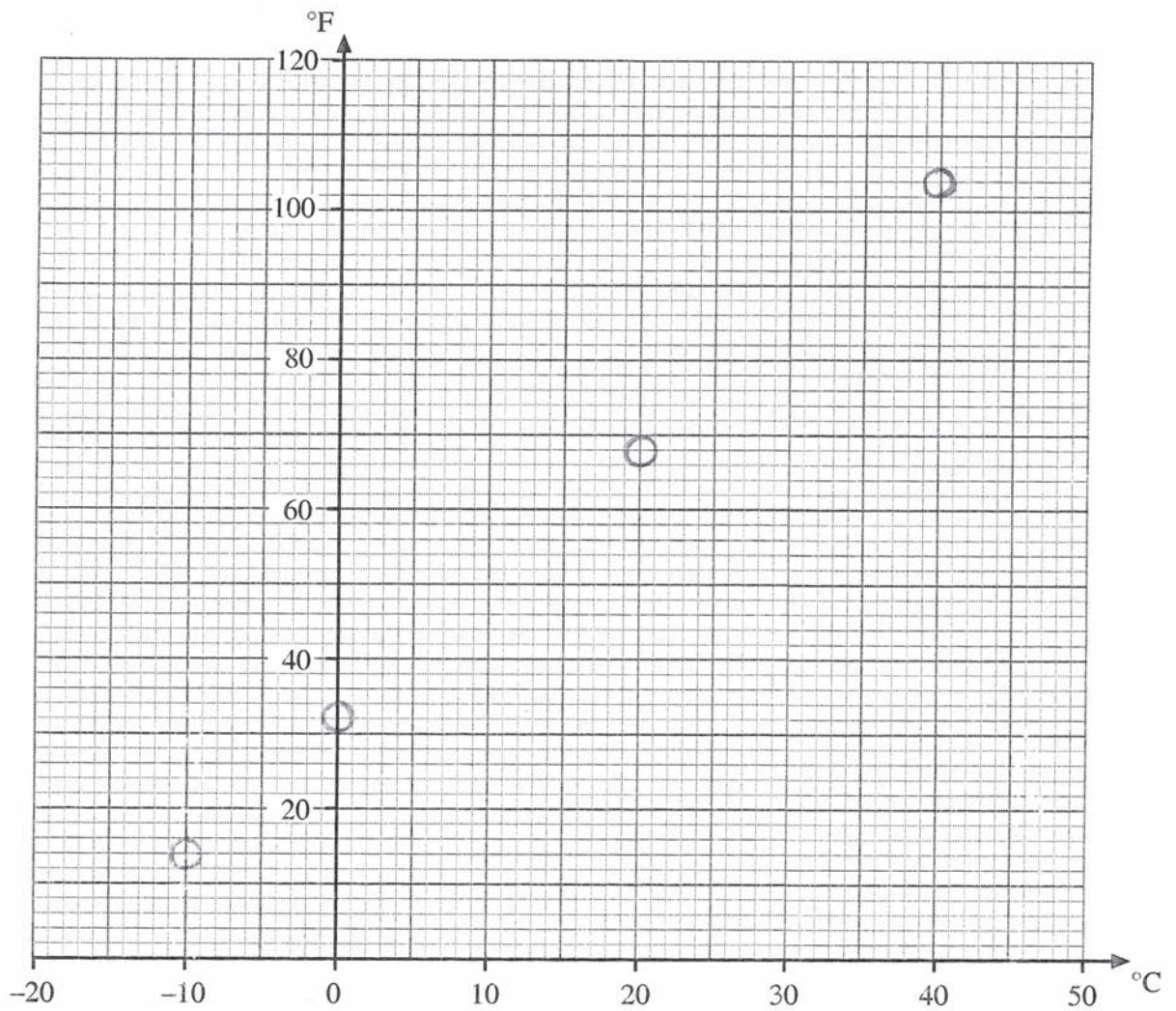
(ii) -7°C

A1

5

		AVAILABLE MARKS
10	(a) correct enlargement	A2
	(b) 9	A2
11	4, 16; 4, 36; 9, 25; etc	A2 (only)
12	(a) black	A1
	(b) red	A1
	(c) $0.15 \times 600 = 90$	M1, A1
13	$2n \times 2n$	MA1
	$= 4n^2$ which can be divided by 4	MA1
14	(a) (i) enlargement scale factor 2 centre (1, 2)	MA3
	(ii) rotation 90° clockwise about (0, -2)	MA3
	(b) image moved 1 unit right and 5 down	MA1 MA1
15	$v - u = gt$	MA1
	$g = \frac{v-u}{t}$	MA1
Total		56

GCSE MATHEMATICS SUMMER 2009
MODULE N5-1
OVERLAY QUESTION 9





Rewarding Learning

**General Certificate of Secondary Education
2009**

Mathematics

Module N5 Paper 2
(With calculator)
Foundation Tier

[GMN52]

MONDAY 1 JUNE

10.45 am – 11.45 am

**MARK
SCHEME**

GCSE MATHEMATICS 2009

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			AVAILABLE MARKS
1	(a) 41	A1	2
	(b) arrow	A1	
2	(a) 8	A1	3
	(b) 5	A1	
	(c) 4	A1	
3	$200 \times 45\text{p} = \text{£}90$	MA1	4
	$80 \times 60\text{p} = \text{£}48$	M1, A1	
	total $\text{£}138$	MA1	
4	$250 + 4 \times 45$	M1	2
	430	A1	
5	(a) $24 \times 5.6 = 134.4$ $\frac{1}{12}$	M1, A1 (accuracy) A1	4
	(b) Suitable reason (real-life)	A1	
6	(a) $1/13$	A1	4
	(b) $12/13$	A1	
	(c) $7/13 + 1/13 = 8/13$	M1, A1	
7	(a) $2 \times 10 + 2 \times 4$ $= 28$	MA1 A1	3
	(b) $10 \times 4 = 40$	MA1	
8	$40 \times \text{£}15.20 = \text{£}608$	MA1	6
	$\text{£}430 + \text{£}608 = \text{£}1038$	M1, A1	
	$\text{£}40 \times 24 = \text{£}960$	M1, A1	
	$\text{£}1038 - \text{£}960 = \text{£}78$	MA1	

- 9 (a) 4 lines correct A3
 (3 lines correct A2)
 (2 lines correct A1)
- (b) $40 \times \frac{5}{8} = 25$ MA1, A1
- (c) 1 litre = 1.75 pints A1
 7 pints = $7/1.75 = 4$ MA1 7
- 10 (a) B A1
- (b) C A1
- (c) G A1 3
- 11 (a) he has stopped A1
- (b) 24 km A1
- (c) $12 \div 1\frac{1}{2}$ M1
 = 8 km/hr A1 4
- 12 (a)
- | | | | | | | |
|--|---|----|----|----|----|----|
| | | | | | | |
| | 3 | 5 | 7 | 9 | 11 | 13 |
| | 5 | 7 | 9 | 11 | 13 | 15 |
| | 7 | 9 | 11 | 13 | 15 | 17 |
| | 9 | 11 | 13 | 15 | 17 | 19 |
- Allow A1 for at least 12 correct entries A2
- (b) 6/24 or 1/4 or 0.25 or 25% M1, A1 4

		AVAILABLE MARKS	
13	$(4/25) \times 200$ 32	MA1 A1	2
14	$1\frac{1}{2} \times 20 = 30$ $1\frac{1}{2} \times 36 = 54$ $1\frac{1}{2} \times 52 = 78$	MA1 MA1 MA1	3
15	(a) t^6	A1	
	(b) r^4	A1	2
16	$\pounds 180 \div 15 = \pounds 12$ (Mikey) $\pounds 12 \times 8 = \pounds 96$ (Lisa) $\pounds 12 \times 6 = \pounds 72$ (Richard)	MA1 MA1 MA1	3
		Total	56



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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			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	$n^2 - 3 = 78$	M1	
	$n^2 = 81$		
	$n = 9$	A1	2
7	polygon, see overlay correct frequencies at mid-points points joined by straight lines	MA1 MA1	2
8	$\begin{array}{r l} 2 & 80 \\ \hline 2 & 40 \\ \hline 2 & 20 \\ \hline 2 & 10 \\ \hline 5 & 5 \\ \hline & 1 \\ & = 2^4 \times 5 \end{array}$	M1 A1 MA1	3

- 9 (a) now: Jack = x Dan = $x - 5$
3 years time $x + 3 + x - 5 + 3 = 15$ (or equivalent)

A1
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
fx products
1890
75.6

MA1
M1
MA1
MA1

4

- 11 (a) $6x^2 + 3x - 4x - 2$
 $= 6x^2 - x - 2$

MA1
A1

(b) $4x = 24$
 $x = 6$
 $y = 2$

MA1
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

14 $5(2x + 1) - 3(x + 1) = 45$
 $10x + 5 - 3x - 3 = 45$
 $7x + 2 = 45$
 $7x = 45 - 2$
 $7x = 43$
 $x = \frac{43}{7}$ or $6\frac{1}{7}$

MA1
MA1
MA1

A1

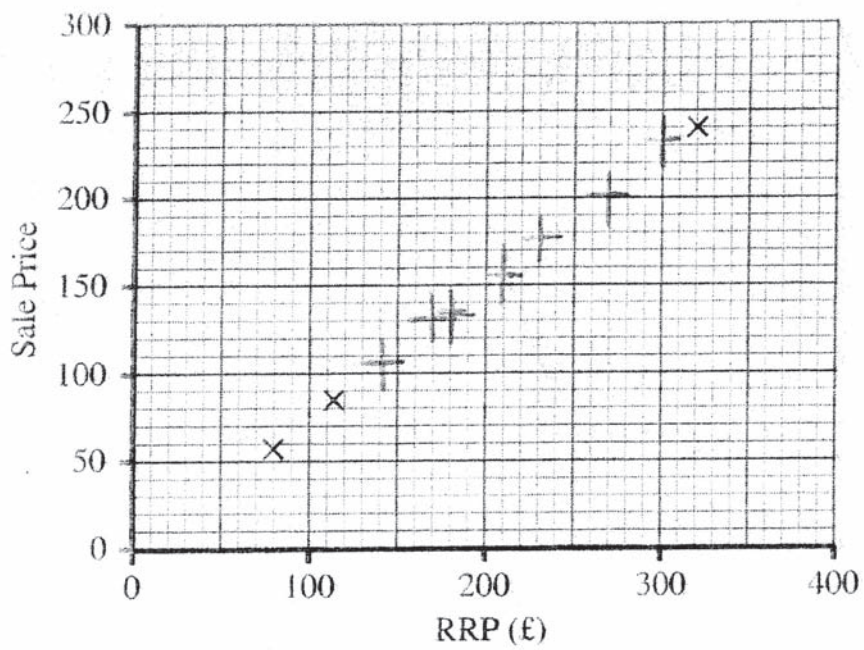
Total

**AVAILABLE
MARKS**

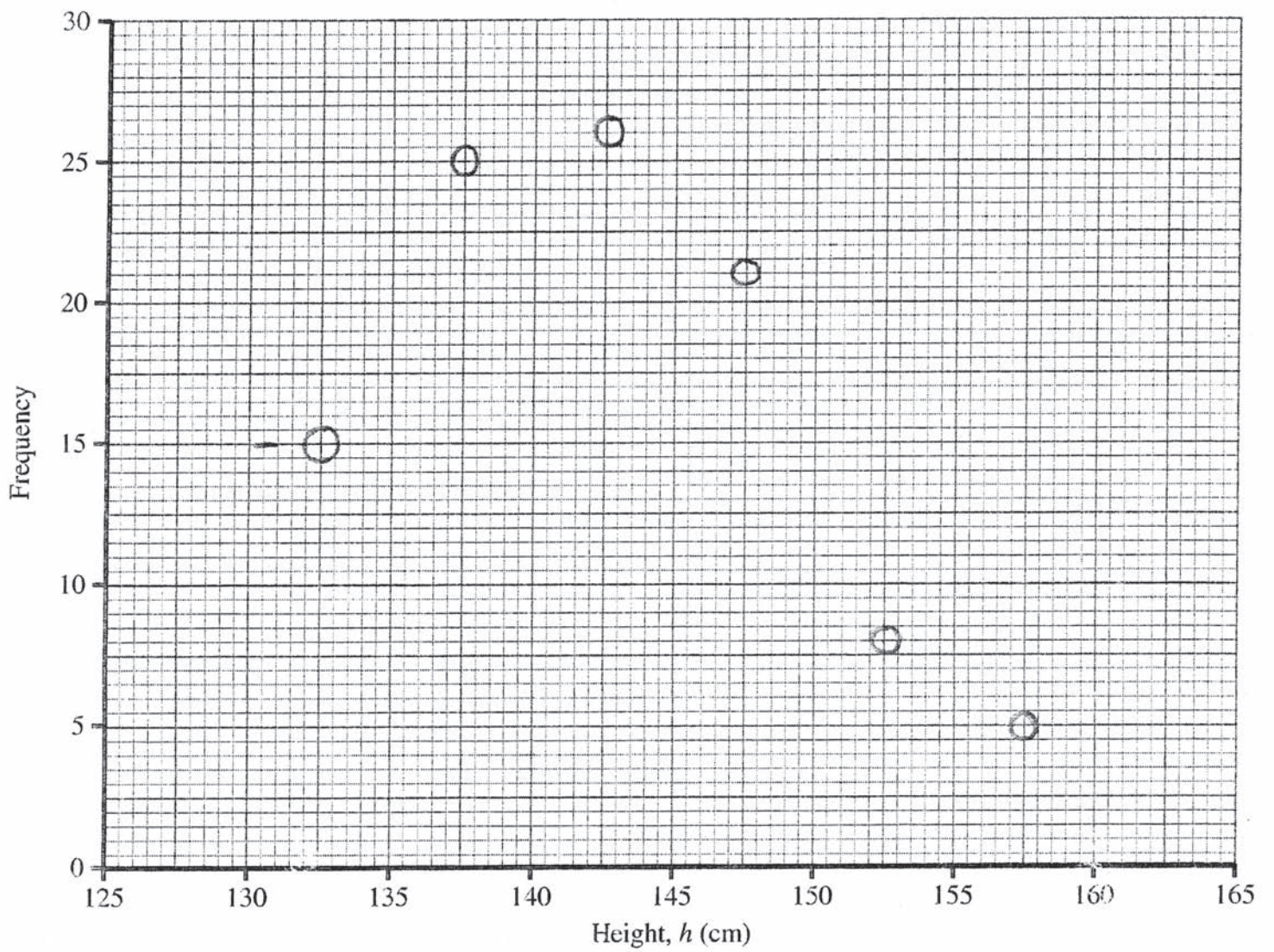
4

44

GCSE MATHEMATICS SUMMER 2009
MODULE N3-1
OVERLAY QUESTION 4



GCSE MATHEMATICS SUMMER 2009
MODULE N3-1
OVERLAY QUESTION 7





Rewarding Learning

**General Certificate of Secondary Education
Summer 2009**

Mathematics

Module N3 Paper 2
(With calculator)

Higher Tier

[GMN32]

MONDAY 18 MAY

2.45 pm – 3.45 pm

**MARK
SCHEME**

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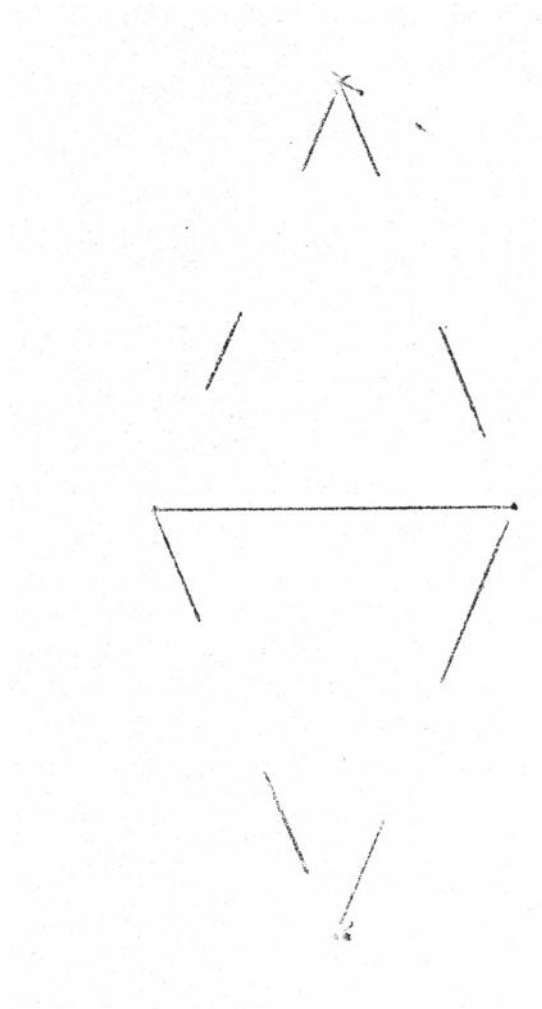
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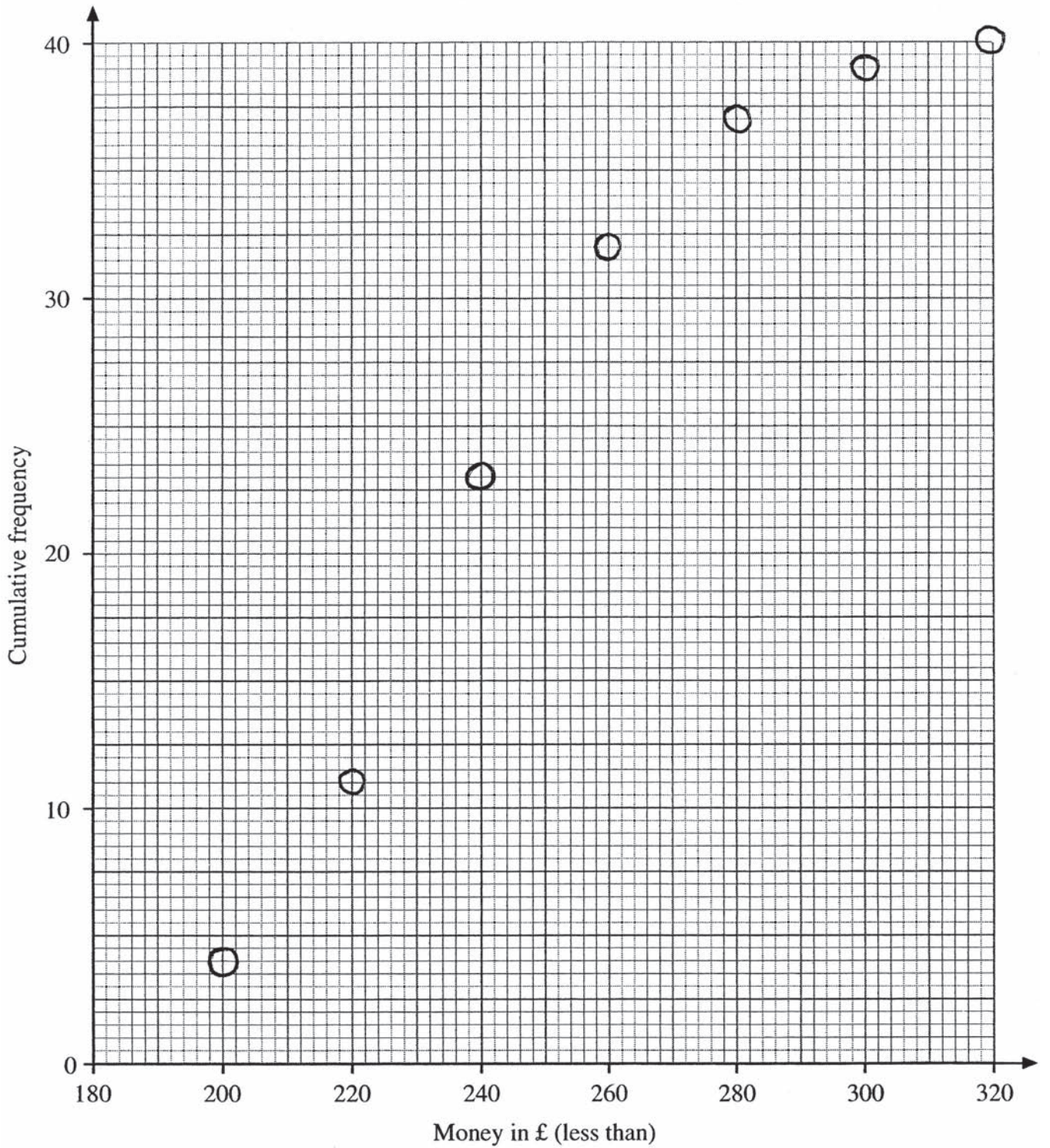
			AVAILABLE MARKS
1	$(\frac{1}{2}, -1)$	A1A1	2
2	$\begin{array}{l l} 15 & 3 \ 7 \ 8 \\ 16 & 2 \ 3 \ 6 \ 7 \ 7 \ 7 \ 8 \ 9 \\ 17 & 0 \ 1 \ 4 \ 7 \ 8 \ 8 \\ 18 & 1 \ 2 \ 5 \end{array}$	M1A1	
	Key: 15 7 means 157 cm	MA1	3
3	$35\% \text{ of } \pounds 640 = \frac{35}{100} \times 640$ $= \pounds 224$ $\text{s.p.}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

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

GCSE MATHEMATICS SUMMER 2009
MODULE N3-2
OVERLAYS QUESTION 4



GCSE MATHEMATICS SUMMER 2009
MODULE N3-2
OVERLAYS QUESTION 12





Rewarding Learning

**General Certificate of Secondary Education
2009**

Mathematics

**Module N4 Paper 1
(Non-calculator)
Higher Tier**

[GMN41]

MONDAY 18 MAY

1.30 pm – 2.30 pm

**MARK
SCHEME**

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1	(a) $6x^2 + 3x - 4x - 2$ $= 6x^2 - x - 2$	MA1 A1	4
	(b) $4x = 24$ $x = 6$ $y = 2$	MA1 A1	
2	$\frac{11}{5} \div \frac{5}{3}$	MA1	3
	$\frac{11}{5} \times \frac{3}{5}$ $\frac{33}{25} \left(= 1 \frac{8}{25} \right)$	MA1 A1	
3	$5(2x + 1) - 3(x + 1) = 45$	MA1	4
	$10x + 5 - 3x - 3 = 45$	MA1	
	$7x + 2 = 45$	MA1	
	$7x = 45 - 2$		
	$7x = 43$ $x = \frac{43}{7}$ or $6 \frac{1}{7}$	A1	
4	0.80 left after 1 yr		2
	0.8^2 left after 2 yrs = 0.64	M1	
	0.8^3 left after 3 yrs = 0.512 \rightarrow 51.2%	A1	
5	(a) 90	MA1	5
	(b) 130	MA1	
	(c) 100	MA1	
	(d) 70	MA2	
6	(a) $(x - 2)(x + 2)$	A1	4
	(b) $\frac{(x - 2)(x + 2)}{(2x + 3)(x - 2)}$ $= \frac{x + 2}{2x + 3}$	MA2 A1	
7	Mode	A1	2
	because it is the one he needs to order most of or other suitable reason	A1	

		AVAILABLE MARKS
8	$y = -\frac{1}{3}x + 2$	A1, A1 2
9	(a) $\frac{(3)^3}{27}$	M1 A1
	(b) $\frac{1}{81^{\frac{1}{2}}}$	M1
	$\frac{1}{9}$	A1 4
10	(a) Frequency per unit interval 18, 56, 68, 8, 8 and correctly drawn, correct vertical scale or key	MA1, A1 A1
	(b) (i) $\frac{20}{80} \times 28$	MA1
	7	A1
	(ii) $\frac{1}{2}(80) = 40$	
	$40 + 16 + 4 = 60$	M1, A1 7
11	$3x + 2(x^2 + 3x - 2) = 22$	MA2
	$3x + 2x^2 + 6x - 4 = 22$	MA1
	$2x^2 + 9x - 26 = 0$	MA1
	$(2x + 13)(x - 2) = 0$	MA1
	$x = -6\frac{1}{2}$ or $x = 2$	MA1
	$y = 20\frac{3}{4}$ or $y = 8$	A1 7
Total		44



Rewarding Learning

**General Certificate of Secondary Education
2009**

Mathematics

Module N4 Paper 2
(With calculator)

Higher Tier

[GMN42]

MONDAY 18 MAY

2.45 pm – 3.45 pm

**MARK
SCHEME**

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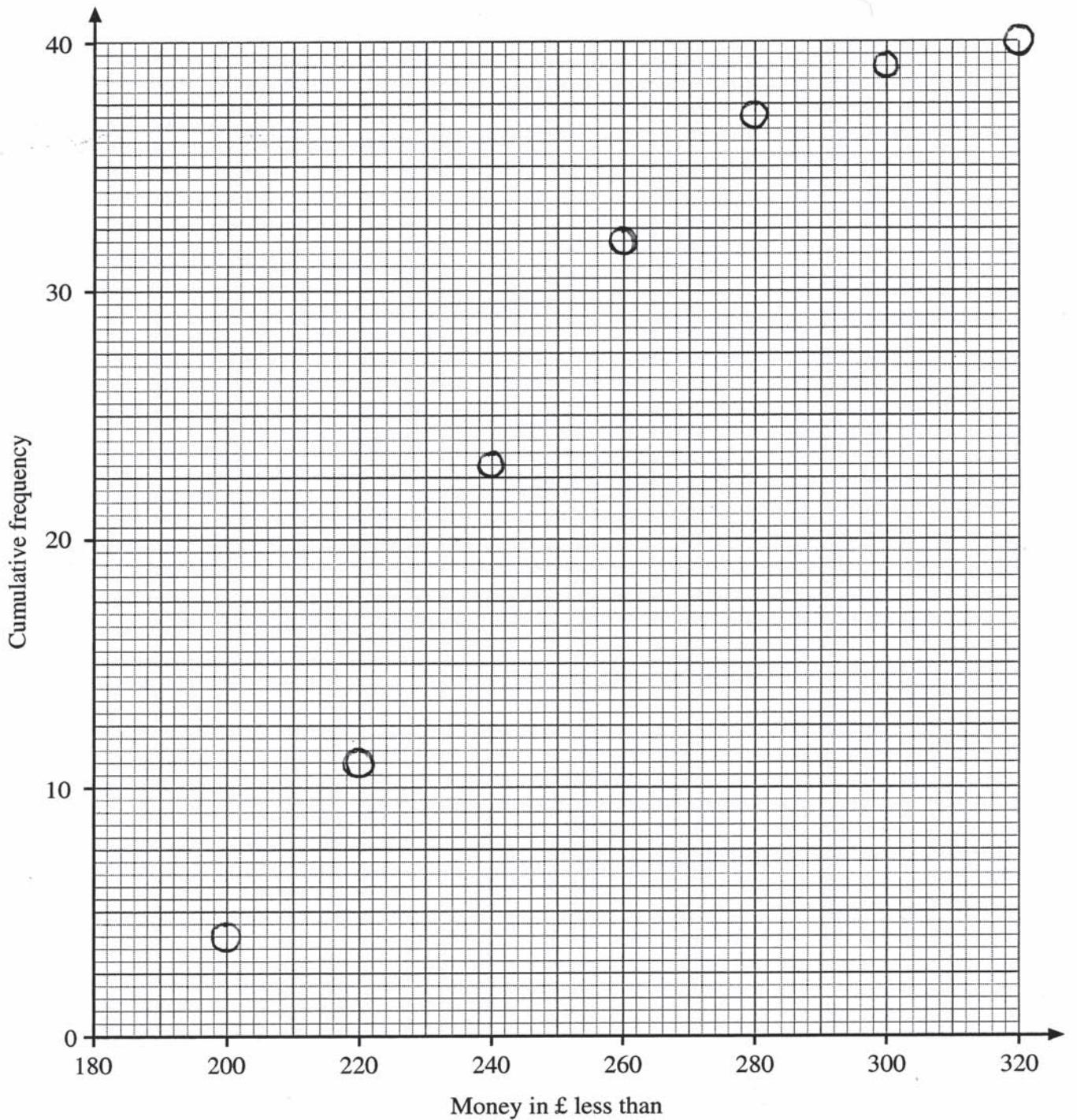
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			AVAILABLE MARKS
1	Volume of sphere = $\frac{4}{3}\pi r^3 = \frac{4}{3}\pi(35)^3$ = 179 594.38 cm ³ (180 000)	MA1 A1, A1 units	3
2	(a) 23 < 260 32 < 280 37 < 300 39 < 320 40	A1	
	(b) points plotted correctly smooth curve/lines	MA2 A1	
	(c) (i) 235 (follow pupil's curve)	MA1	
	(ii) 256 – 217 (follow pupil's curve) 39	MA1 A1	
	(iii) from graph	M1, A1	
	(d) Median at 235 (follow pupil's curve) Quartiles at 217 and 256 (follow pupil's curve) Range: Start 185, End 315	MA1 MA1 MA1	12
3	Discrete data is counted, continuous data is measured etc. Suitable example of each	A1 A1	2
4	(a) $BD^2 = 8^2 + 10^2 - 2 \times 8 \times 10 \cos 80^\circ = 136.216 \dots$ BD = 11.67	M1, A1 MA1	
	(b) Area = $\frac{1}{2} \times 5 \times 11.67 \sin 22^\circ = 10.93$	M1, A1	5
5	(a) $x^2 + (x + 8)^2 = 144$ $x^2 + x^2 + 16x + 64 - 144 = 0$ $2x^2 + 16x - 80 = 0$ $x^2 + 8x - 40 = 0$	MA1 MA1 MA1	
	(b) $x = \frac{-8 \pm \sqrt{64 + 160}}{2}$	MA1	
	$x = \frac{-8 \pm 14.96663}{2}$	A1	
	$x = 3.48$	A1	6

		AVAILABLE MARKS	
6	(a) $\frac{DE}{EB} = \frac{BC}{AC}$		
	$\frac{DE}{14} = \frac{24}{7}$	MA1	
	DE = 48 cm	MA1	
(b)	Volume of original cone = $\frac{1}{3}\pi r^2 h = \frac{1}{3}\pi(21)^2(72)$	MA1	
	Volume of cone removed = $\frac{1}{3}\pi r^2 h = \frac{1}{3}\pi(14)^2(48)$	MA1	
	Volume of frustum = $\frac{1}{3}\pi(21)^2(72) - \frac{1}{3}\pi(14)^2(48)$	M1	
	= 33 251 – 9852 = 23 399	A1	6
7	(a) suitable example, e.g. 3	A1	
	(b) suitable example, e.g. 2	A1	
	(c) suitable example, e.g. –1	A1	3
8	$(x + b)^2 = x^2 + 2bx + b^2$	MA1	
	$2b = -10 \quad b = -5$	MA1	
	$b^2 = c \quad c = 25$	MA1	
			3
9	angle DAJ	M1	
	AD = 40 cm	MA1	
	$\tan^{-1} \frac{30}{40}$	MA1	
	= 36.9	A1	4
Total			44

GCSE MATHEMATICS SUMMER 2009
MODULE N4-2
OVERLAY QUESTION 2





Rewarding Learning

**General Certificate of Secondary Education
Summer 2009**

Mathematics

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

Higher Tier

[GMN61]

MONDAY 1 JUNE

9.15 am – 10.30 am

**MARK
SCHEME**

GCSE MATHEMATICS 2009

Introduction

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

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

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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.

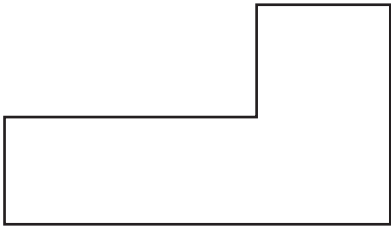
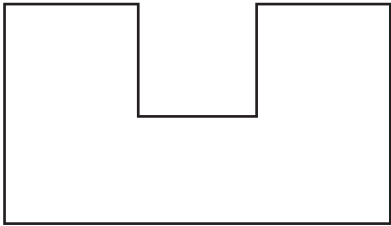
Positive marking:

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;
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		AVAILABLE MARKS	
1	(a) $1 - 0.8 = 0.2$	M1, A1	4
	(b) $0.15 \times 600 = 90$	M1, A1	
2	$\frac{(2 - 12) \times (-4)}{8}$	MA1	3
	$= \frac{40}{8}$	A1	
	$= 5$	A1	
3	(a) 	A2	4
	(b) 	A2	
4	(a) (i) $\frac{5 \times 30}{(9 - 7)} = \frac{5 \times 30}{2} = 75$	MA1, MA1	6
	(ii) $\sqrt{90\,000 / 100} = \sqrt{900} = 30$	M1, A2	
	(b) 15 800	A1	

				AVAILABLE MARKS	
5	(a)	enlargement	scale factor 2 centre (1,2)	MA1, MA1, MA1	8
	(b)	reflection	in the line $y = x$	MA1, MA1	
	(c)	rotation	90° clockwise about (0, -2)	MA1, MA1, MA1	
6	(a)	$v - u = gt$		MA1	6
		$g = \frac{v - u}{t}$		MA1	
	(b)	$-7 < 3n \leq 9$ $-2\frac{1}{3} < n \leq 3$ $n = -2, -1, 0, 1, 2, 3$		MA1 MA1 A2	
7		70°		A1	1
8	(a)	$2n \times 2n$ $4n^2$ which can be divided by 4		MA1 MA1	5
	(b)	any negative number ≤ -1		A1	
	(c)	$n^2 - n + n - 1 + 2n - 2n + 2 - n^2$	along with suitable indication of completion to = 1	A1 A1	
9	(a)	3.6714×10^8		A1	4
	(b)	5.972×10^{-5}		A1	
	(c)	$18 \times 10^{-7} = 1.8 \times 10^{-6}$		A1, A1	
10	(a)	0.3, 0.4, 0.6, 0.4		A1	3
	(b)	$0.7 \times 0.4 + 0.3 \times 0.6 = 0.28 + 0.18 = 0.46$		M1, A1	
11	(a)	$(2\sqrt{2} + 3\sqrt{2})^2$ $= (5\sqrt{2})^2 = 25 \times 2$ 50	or $8 + 6\sqrt{16} + 18$ $8 + 24 + 18$ 50	MA1 A1	5
	(b)	$f = 3.4545\dots$ $100f = 345.4545\dots$ $99f = 342$		M1, A1	
		$f = \frac{342}{99} \left(= \frac{38}{11} \right)$		A1	

12 (a) $\left(\frac{3}{12}\right) \times \left(\frac{2}{11}\right)$

$\frac{6}{132}$ or $\frac{1}{22}$

(b) $\left[\left(\frac{3}{12}\right) \times \left(\frac{2}{11}\right) \times \left(\frac{9}{10}\right)\right] + \left[\left(\frac{7}{12}\right) \times \left(\frac{6}{11}\right) \times \left(\frac{5}{10}\right)\right]$
 $+ \left[\left(\frac{2}{11}\right) \times \left(\frac{1}{11}\right) \times \left(\frac{10}{10}\right)\right]$

$\left(\frac{54}{1320}\right) + \left(\frac{210}{1320}\right) + \left(\frac{20}{1320}\right)$
 $= \frac{284}{1320}$ or $\frac{71}{330}$ or 0.215151...

M1, A1

A1

M1, A1

A2

Total

AVAILABLE
MARKS

7

56



Rewarding Learning

General Certificate of Secondary Education
Summer 2009

Mathematics

Module N6 Paper 2
(With calculator)
Higher Tier

[GMN62]

MONDAY 1 JUNE
10.45 am – 12.00 noon

MARK
SCHEME

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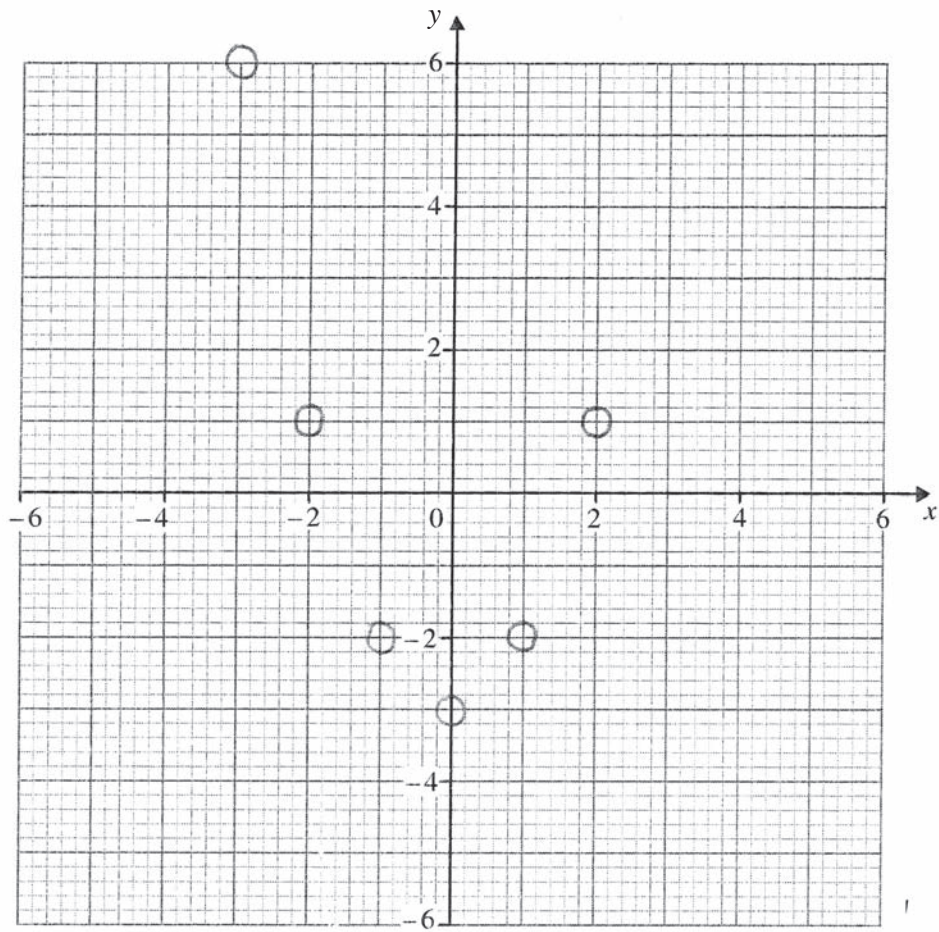
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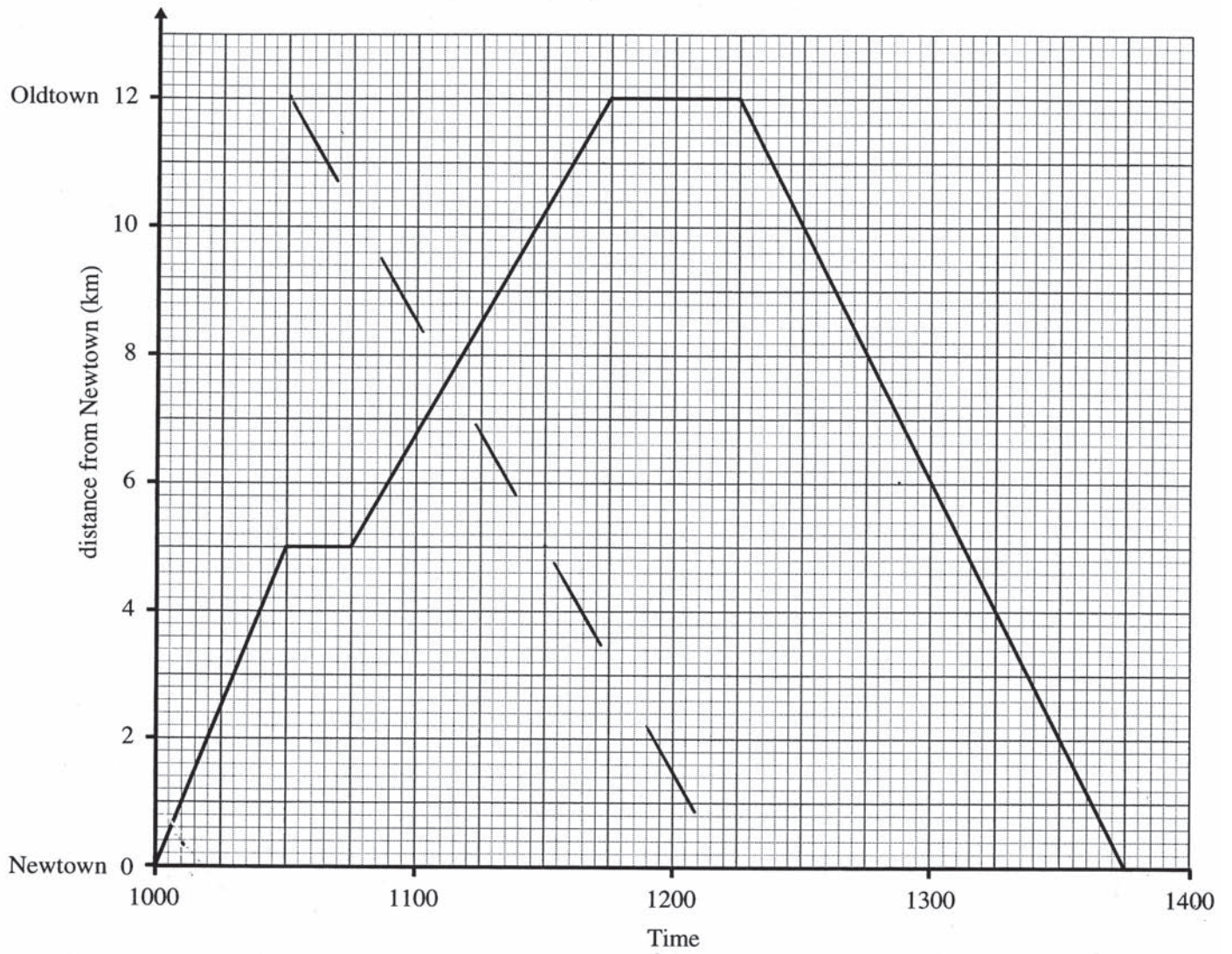
		AVAILABLE MARKS
1	$\left(\frac{4}{25}\right) \times 200$ 32	MA1 A1 2
2	$\frac{1}{2}(8.5 + 12.6) \times 6.1 = 64.355$ Answer 64	M1, A1 A1 (accuracy) 3
3	(a) $1\frac{1}{2} \times 20 = 30$ $1\frac{1}{2} \times 36 = 54$ $1\frac{1}{2} \times 52 = 78$ (b) $\frac{\text{€}42}{\text{€}3} = 14$ $14 \times 5 = \$70 = \text{£} \frac{70}{2}$ $\therefore = \text{£}35$ $\therefore \text{€}42 \text{ camera is cheaper}$	MA1 MA1 MA1 M1, A1 5
4	(a) 1 and -2 (b) plotting points accuracy of curve	A1, A1 A1 A1 4
5	$\frac{2700}{600} = 4.5$	M1, A1 2
6	(a) $12 \div 1\frac{1}{2}$ $= 8\text{km/hr}$ (b) (i) starting point (1030, 12) line passing through (1130, 5) (ii) 1108 or 1107	M1 A1 A1 MA2 A1 6
7	$550 \times 0.3 = 165$ $450 \times 0.18 = 81$ $165 + 81 = 246$	M1, A1 MA1 MA1 4

			AVAILABLE MARKS
8	£12 × 8 = £96 (Lisa) £180 ÷ 15 = £12 (Mikey) £12 × 6 = £72 (Richard)	MA1 MA1 MA1	3
9	(a) t^6 (b) r^4 (c) $8xy^4$	A1 A1 A2 for 3 correct terms (A1 for any two)	4
10	$4\pi \times 9^2 = 1017.876$	M1, A1	2
11	(a) Perpendicular bisector of CD (b) Circular arc centre A, radius 6 cm Shaded area between arc and perp. bisector (upper part)	A2 A1 A1	4
12	length none volume area (3 correct A2, 2 correct A1)	A3	3
13	$pr = 50q + 50r$ $pr - 50r = 50q$ $r(p - 50) = 50q$ $r = \frac{50q}{p - 50}$	MA1 MA1 MA1 MA1	4
14	(a) Arc length = $\frac{216}{360} \times 2\pi \times 20 = 24\pi$ (b) $2\pi r = 24\pi$ $r = 12$	MA1, M1, A1 M1 A1	5
15	(3, -5)	A1, A1	2
16	(a) correct transformation (reflection in x axis) (b) correct transformation (enlargement scale factor $\frac{1}{3}$ on x axis) (c) correct transformation (3 down)	A1 A1 A1	3
Total			56

GCSE MATHEMATICS SUMMER 2009
MODULE N6-2
OVERLAY QUESTION 4



GCSE MATHEMATICS SUMMER 2009
MODULE N6-2
OVERLAY QUESTION 6



GCSE MATHEMATICS SUMMER 2009
MODULE N6-2
OVERLAY QUESTION 11

