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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Foundation Tier

Higher Tier

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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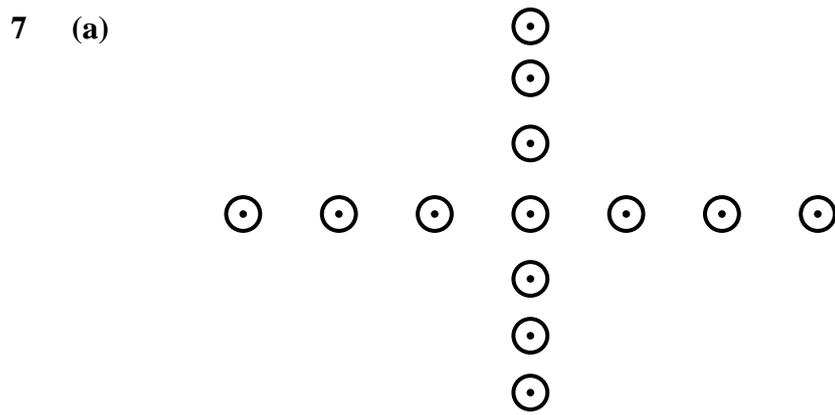
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1 **(a)** 3 and 5   A1

(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) $10 \, \text{cm}^2$ — 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) $\dfrac{2}{15}$ — A1 — 3

13 **(a)** 130 ± 2 — A1

(b) $9.2 \, (\pm \, 0.2)$ — A1

$9.2 \times 5 = 46 \, (\pm \, 1)$ — M1, A1 — 4

| | **Total** | **44** |

GCSE MATHEMATICS JANUARY 2010
MODULE N1-1
OVERLAY QUESTION 11
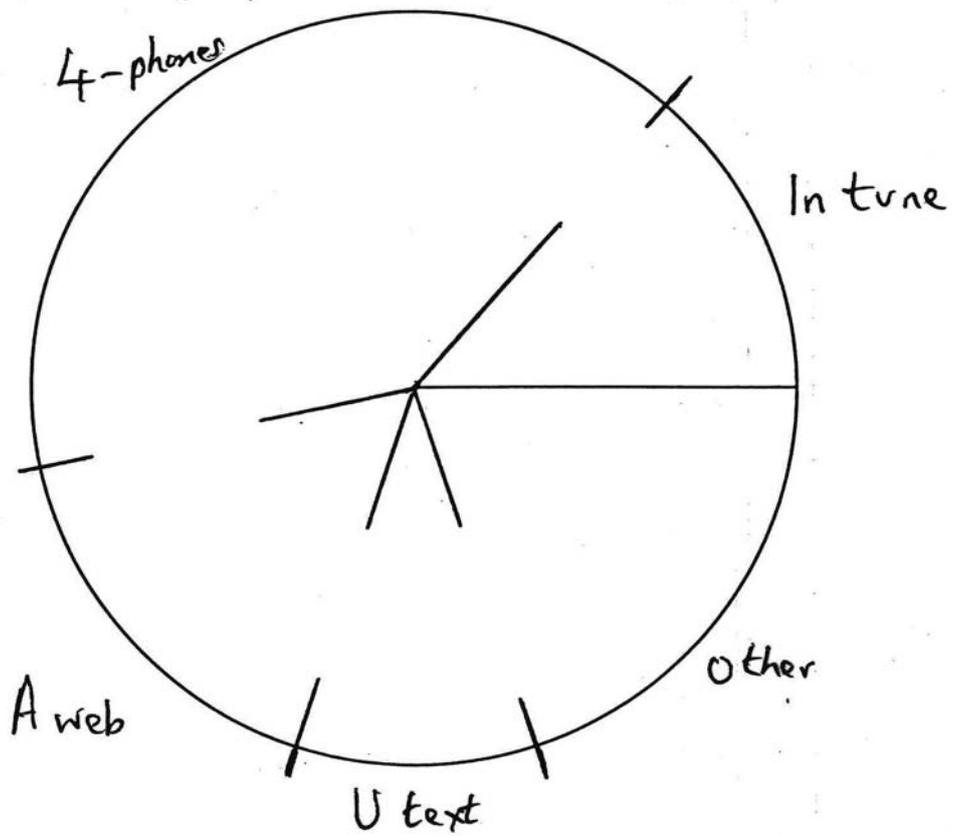
Rewarding Learning

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	$(36 \times 7) \div 4$		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		A1	
	two 4×1 rectangles in correct position		A1	
	two 3×1 rectangles in correct position		A1	3
7	**(a)** 65% of 480			
	$= \dfrac{480}{100} \times 65 = 312$		M1, A1	
	(b) £32.40 ÷ 5.80		M1	
	= 5.586 . . . = 5 Tickets		A1	
	Which means 4 friends		A1	5

9

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   MA2
(5 correct MA1)   2

10 –10   MA1   1

11 $20 + 6 \times 16 = 116$ MA1

$270 – 116 = 154$ MA1

$154 \div 22 = 7$ months   MA1

Answer 13 months   MA1   4

12 **(a)** $(180 – 104)/2 = 38$ MA1, A1

(b) $6.8 \times 2.6 = 17.68$ M1, A1   4

Total   **44**

General Certificate of Secondary Education
January 2010

Mathematics

Module N2 Paper 1
(**Non-calculator**)
Foundation Tier

[GMN21]

TUESDAY 12 JANUARY

9.15am – 10.00am

MARK SCHEME

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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) $\frac{3}{8} = 30\,\text{ft}$ MA1

   $\frac{1}{8} = 10\,\text{ft}$ MA1

   Wall length $= 10 \times 8 = 80$ MA1   6

6 **(a)** 7 points correct   A2
   (A1 for 4 correct)

   (b) Appropriate line   MA1

   (c) Correct reading from candidate's line   MA1   4

	AVAILABLE MARKS

7 Accurate diagonal   A1
    Correct parallelogram   A3   4

8 **(a)** $6, + m$ MA1, MA1

   (b) $\dfrac{9a}{6} + \dfrac{4a}{6}$ MA1, MA1

      $= \dfrac{13a}{6}$ 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 $\dfrac{27}{4} - \dfrac{13}{3}$ **or** $2\dfrac{3}{4} - \dfrac{1}{3}$ MA1

  $\dfrac{81}{12} - \dfrac{52}{12}$ **or** $2\dfrac{9}{12} - \dfrac{4}{12}$ MA1

  $\dfrac{29}{12}$ $(2\dfrac{5}{12})$ **or** $2\dfrac{5}{12}$ A1   3

                       Total   **44**

GCSE MATHEMATICS JANUARY 2010
MODULE N2-1
OVERLAY QUESTION 1
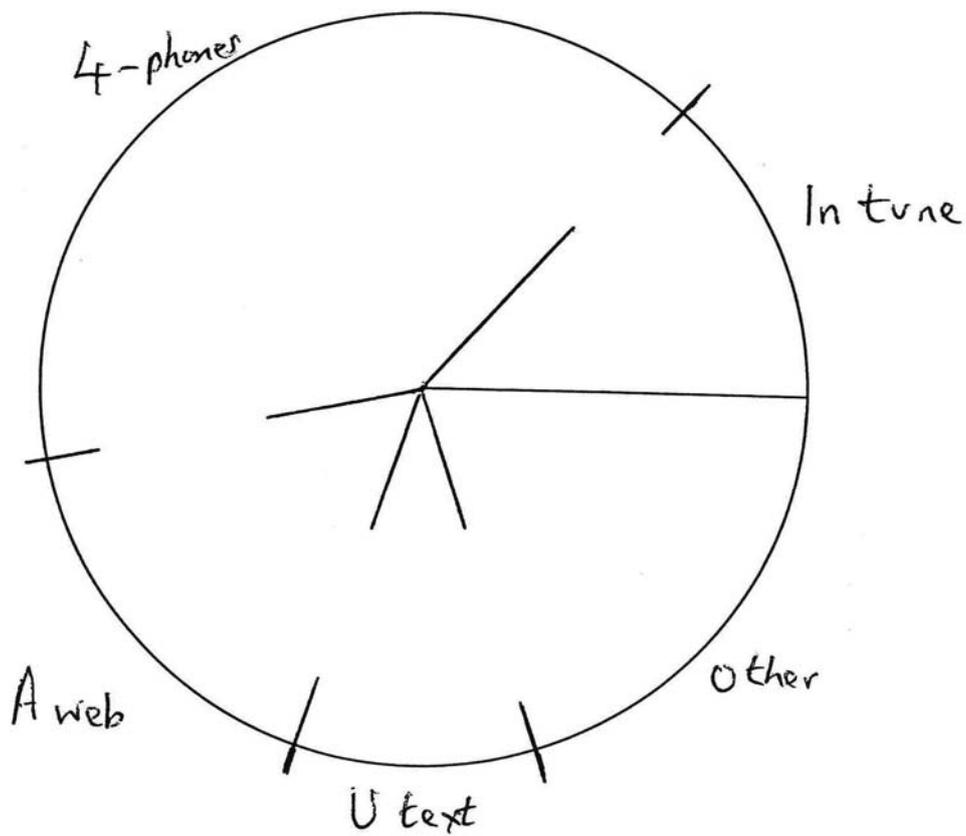
GCSE MATHEMATICS JANUARY 2010
MODULE N2-1
OVERLAY QUESTION 6

16
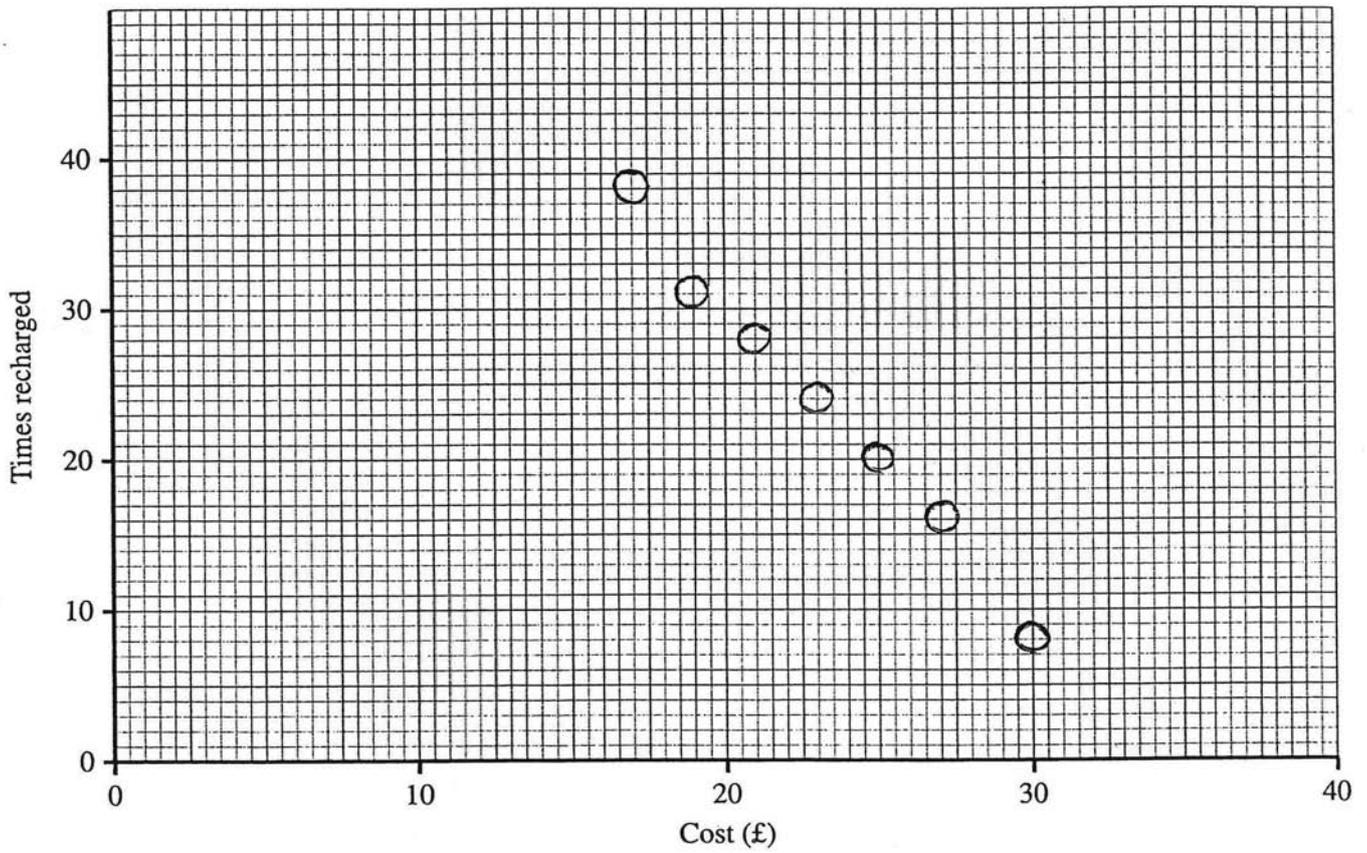
GCSE MATHEMATICS JANUARY 2010
MODULE N2-1
OVERLAY QUESTION 7

6 cm
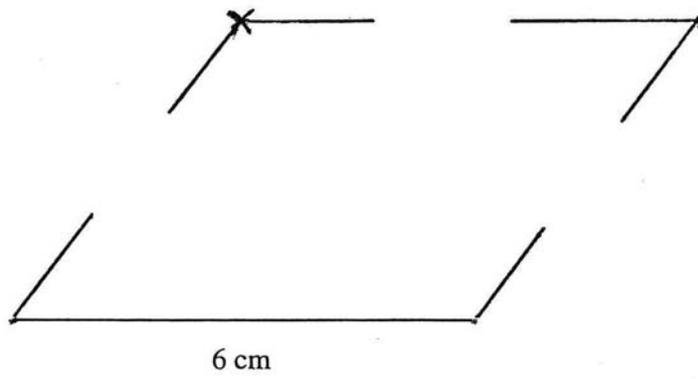
General Certificate of Secondary Education
January 2010

Mathematics

Module N2 Paper 2
(With calculator)
Foundation Tier

[GMN22]

TUESDAY 12 JANUARY

10.30am – 11.15am

MARK
SCHEME

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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 poi nt   MA1
           2nd point   MA1
           line   MA1
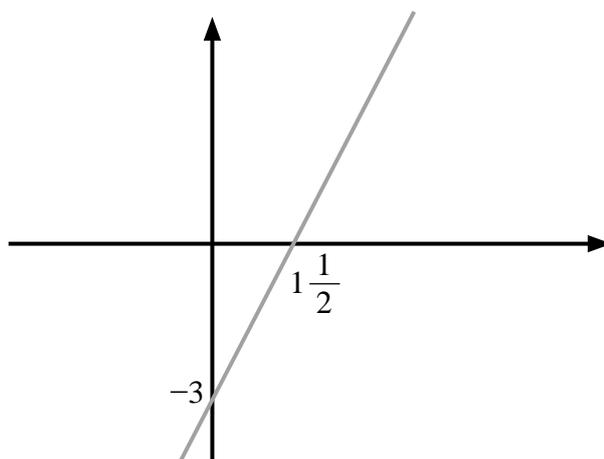
     (b)   36   A1   4

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) $120 < t \le 150$ 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**

General Certificate of Secondary Education
January 2010

Mathematics

Module N5 Paper 1
(Non-calculator)
Foundation Tier

[GMN51]

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			AVAILABLE MARKS

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)   MA1
             Water level marked at 280 ml   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) $12 \div 3$ **or** 3 feet = 1 metre   MA1
             4 (accept 3.6)   A1   5

8   **(a)**   All points plotted correctly   A2
             Straight line graph drawn   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)** $\dfrac{1}{800}$ — 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) $\dfrac{90}{120} = \dfrac{3}{4}$ — A1

$\dfrac{3}{4} \times 72 = 54$ — MA1 — 4

14 625 ml

450 ml

7.5 scoops   MA2 (MA1 for any 1 correct)   2

15 $\dfrac{1}{12} \times 120 = 10$ 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 $\dfrac{45}{200} \times 4000$ MA1

$= 900$ A1   2

Total   **56**

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

100 m   150 m   200 m   250 m

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

GCSE MATHEMATICS JANUARY 2010
MODULE N5-1
OVERLAY QUESTION 8
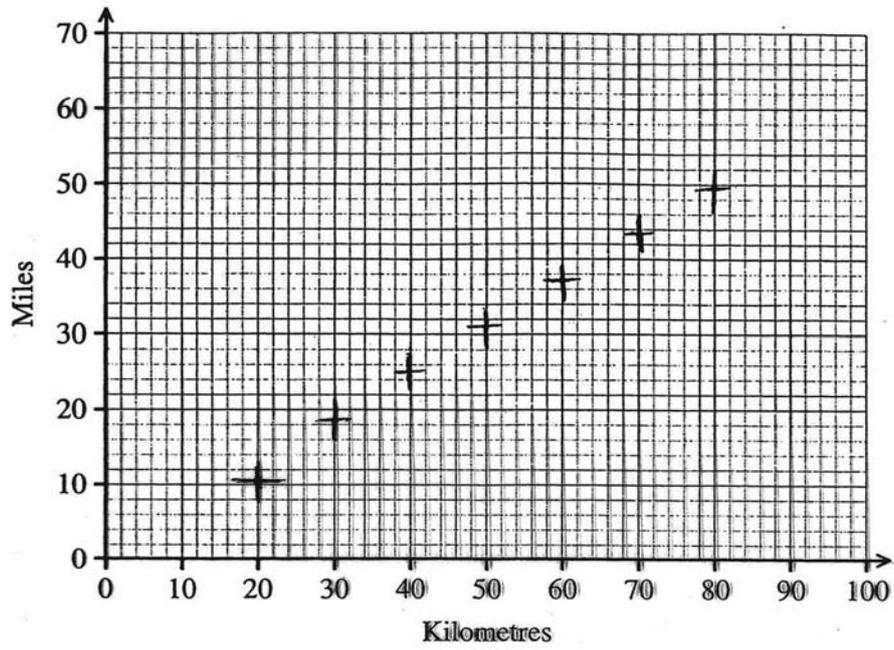
General Certificate of Secondary Education
January 2010

Mathematics

Module N5 Paper 2
(With calculator)
Foundation Tier

[GMN52]

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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)

6 $24 \div 8 = 3$ **or** $8\,\text{km} = 5$ miles   MA1

$3 \times 5 = 15$ MA1   2

7 **(a)** **(i)** unlikely   A1

       (ii) certain   A1

  (b) T labelled approximately $\dfrac{5}{6}$ of scale   A1

        U labelled approximately $\dfrac{1}{4}$ 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 $\dfrac{1}{4} \times 987.20 = €246.80$ 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 $= \dfrac{4}{20}$ **or** $\dfrac{1}{5}$ A1   2

42

		AVAILABLE MARKS

13 (a) 0   A1

  (b) Points plotted correctly   A1

       Smooth curve through points   A1   3

14 (a) 45   A1

  (b) $30 \div 0.75$ MA1

       40 km/hr   A1   3

15 $162\,000 \div 3 = 54\,000$ MA1

     $54\,000 \times 14 = 756\,000$ MA1   2

16 $40 \times 21 = 840$ A1

     $7900 \div 840 = 9.40476$ M1, A1

     9.4 or 9   A1   4

                        Total   **56**

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

       $x = \dfrac{3}{4}$ A1   5

3 **(a)** 7 points correct   A2
       (A1 for 4 correct)

    (b) Appropriate line   MA1

    (c) Correct reading from candidate's line   MA1   4

4 Accurate diagonal   A1
Correct parallelogram   A3   4

5 **(a)** $\dfrac{3}{8} = 30$ ft   MA1

       $\dfrac{1}{8} = 10$ ft   MA1

       Wall length $= 10 \times 8 = 80$ MA1

    (b) $\dfrac{27}{4} - \dfrac{13}{3}$ **or** $2\dfrac{3}{4} - \dfrac{1}{3}$ MA1

       $\dfrac{81}{12} - \dfrac{52}{12}$ **or** $2\dfrac{9}{12} - \dfrac{4}{12}$ MA1

       $\dfrac{29}{12}$ $(2\dfrac{5}{12})$ **or** $2\dfrac{5}{12}$ A1   6

6 $-3n$ A1   1

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)** $\dfrac{9a}{6} + \dfrac{4a}{6}$ MA1, MA1

$= \dfrac{13a}{6}$ MA1

(b) $\dfrac{x + 2}{2}$ 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** $\dfrac{434}{70} \times 100$ 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

6 cm
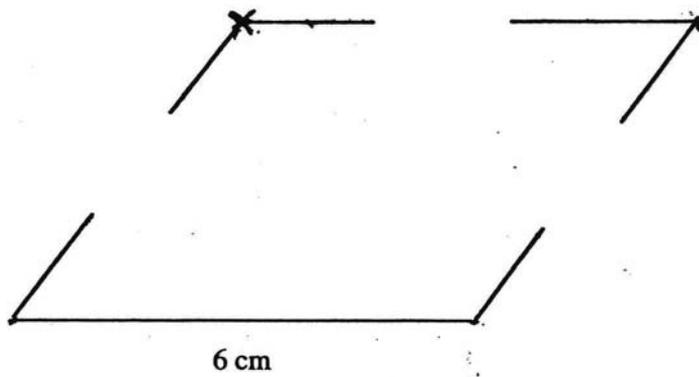
General Certificate of Secondary Education
January 2010

Mathematics

Module N3 Paper 2
(With calculator)
Higher Tier

[GMN32]

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			AVAILABLE MARKS

1   2.8423 .... MA1

   2.8 .... A1 2

2   **(a)**   correct poi nt MA1
      2nd point MA1
      line MA1
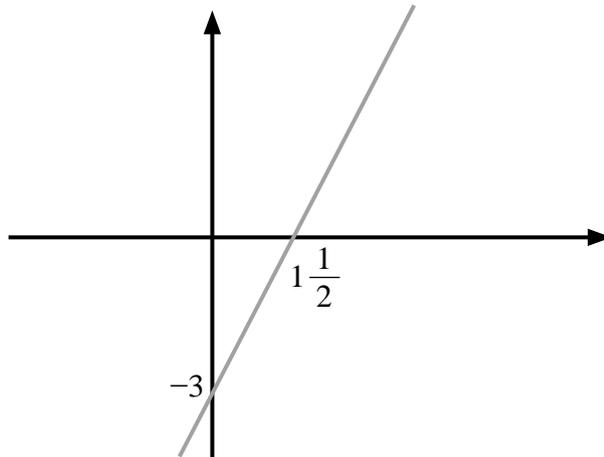
   (b) $2(3 + 5x)$ A1 4

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

$8\% = \dfrac{989}{92} \times 8$ MA1

  $= 86$ absent   A1   3

12 $\text{Tan } 35° = \dfrac{BC}{20}$ MA1

$BC = 20 \text{ Tan } 35°$ MA1

$14(.00415076)$ A1   3

56

	AVAILABLE MARKS

13 **(a)** $12x^2 + 20x - 6x - 10$ MA1

           $12x^2 + 14x - 10$ MA1

     (b) $(x + 5)(x - 8)$ MA2   4
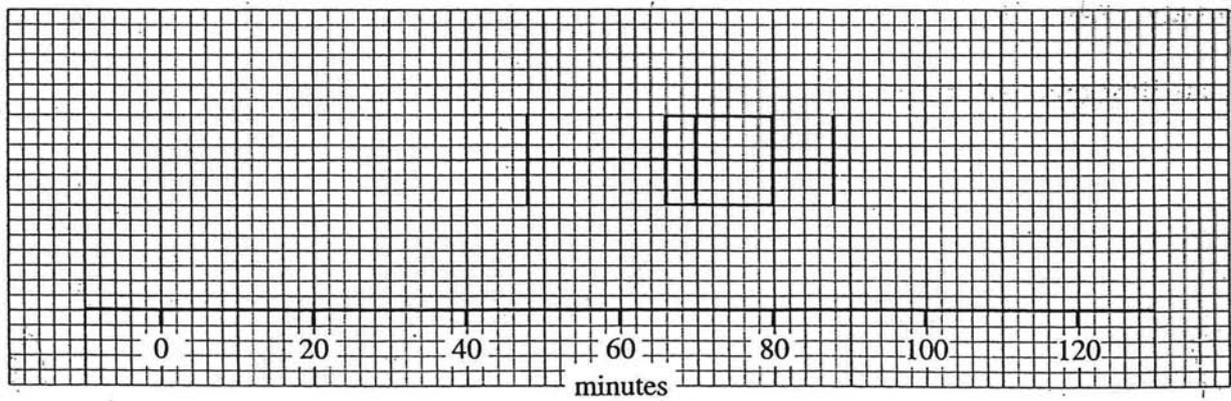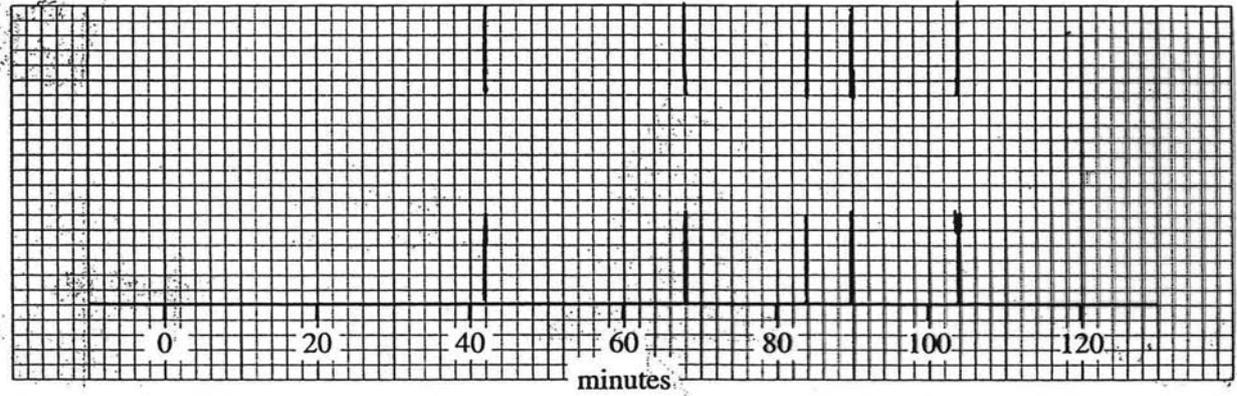
Total   **44**

57

GCSE MATHEMATICS JANUARY 2010
MODULE N3-2
OVERLAY QUESTION 10

General Certificate of Secondary Education
January 2010

Mathematics

Module N4 Paper 1
(Non-calculator)
Higher Tier

[GMN41]

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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

6 **(a)** 2 correct lines and correct shading   MA1

   3rd line drawn and correct shading   MA1

   R correctly positioned   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) $\dfrac{30}{450} = \dfrac{1}{15}$ MA1

   $\dfrac{90}{15} = 6$ 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 MA1
   167 ± 1 MA1   4

12 Vertical axis scale 1cm = 0.25 **or** Key 1cm² = 2.5 MA1

20 < d ≤ 30, 1.3 × 10 = 13 5.2 × 2.5 = 13
60 < d ≤ 90, 0.2 × 30 = 6 2.4 × 2.5 = 6 MA1

30 < d ≤ 40, 16 ÷ 10 = 1.6 16 ÷ 2.5 = 6.4cm²
40 < d ≤ 60, 5 ÷ 20 = 0.25 5 ÷ 2.5 = 2cm² MA1 3

13 (a) 62.3 = 7.893²

6230 = 100 × 7.893² MA1

= 10² × 7.893²

= 78.93²

$\sqrt{6230}$ = 78.93 A1

(b) 3.1̇4̇ A1 3

14 *a* (3*x* − 2*y*) (3*x* − *y*) A1, A1, A1 3

Total **44**

63

General Certificate of Secondary Education
January 2010

Mathematics

Module N4 Paper 2
(With calculator)
Higher Tier

[GMN42]

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    (b) Boys' matches completed quicker – lower median and quartiles   A1
         Greater range of times in girls' matches   A1   4

2 $989 = 92\%$ MA1

     $8\% = \dfrac{989}{92} \times 8$ MA1

       $= 86$ absent   A1   3

3 $\text{Tan } 35° = \dfrac{BC}{20}$ MA1

     $BC = 20 \text{ Tan } 35°$ MA1
     $14(.00415076)$ A1   3

4 $\dfrac{4}{3} \times \pi \times 10^3$ MA1

     $4188.79(0205) \text{ cm}^3$ 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 $y = -\dfrac{1}{4}x - 3$ MA1, MA1   2

7 $\sqrt{(4^2 + 3^2 + 12^2)}$ MA1

     13 A1   2

8 **(a)** $(3m + 2)(2m + 1) = 0$ MA2

$m = -\dfrac{2}{3}, \; m = -\dfrac{1}{2}$ A1

(b) $x = \dfrac{5 \pm \sqrt{37}}{2}$ 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) $\dfrac{6}{18} = \dfrac{1}{3}$ MA1

$\dfrac{1}{3}$ of $66 = 22$

$40 - (22 + 6) = 12$ MA1

$12 = \dfrac{1}{3}$ 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
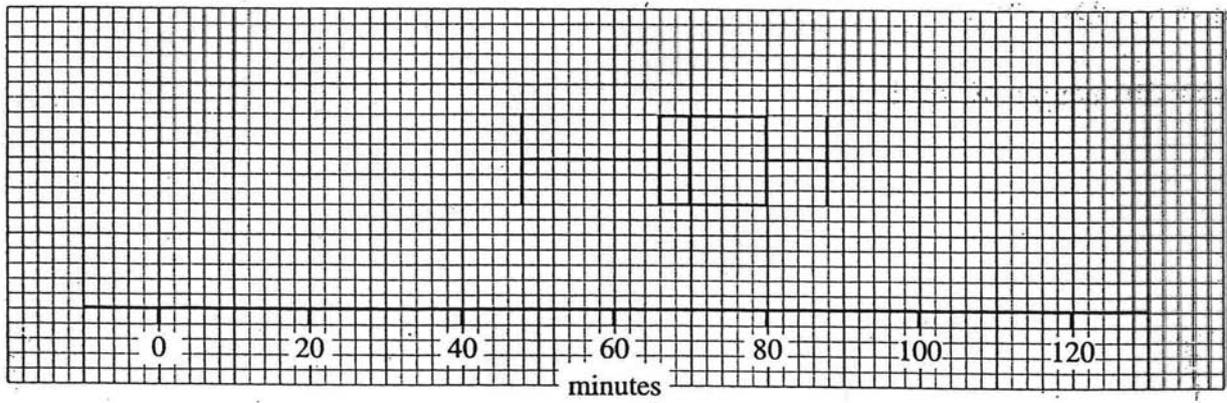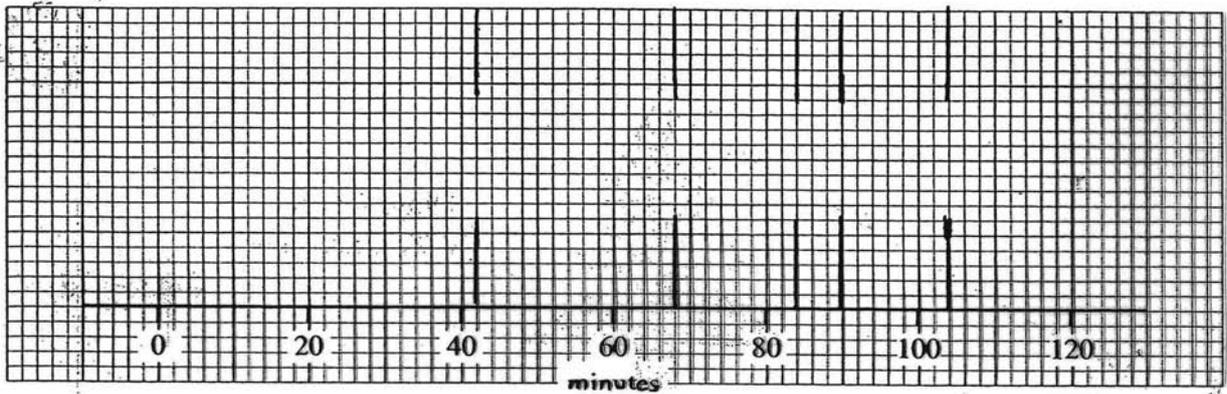
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GCSE MATHEMATICS JANUARY 2010
MODULE N4-2
OVERLAY QUESTION 1

General Certificate of Secondary Education
January 2010

Mathematics

Module N6 Paper 1
(Non-calculator)
Higher Tier

[GMN61]

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

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).

1 **(a)** $\dfrac{90}{120} = \dfrac{3}{4}$ 　　　　　　　　　　　　　　　　　A1

　　　　$\dfrac{3}{4} \times 72 = 54$ 　　　　　　　　　　　　　　　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 　$\dfrac{1}{12} \times 120 = 10$ people £1.50 $\times$ 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) $\dfrac{9(-30 + 8)}{6}$ 　　　　　　　　　　　MA1

　　　　$\dfrac{-198}{6}$ 　　　　　　　　　　　　　MA1

　　　　-33 　　　　　　　　　　　　　　　　A1 　　6

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 $\dfrac{1}{f^5}$ 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 $\dfrac{45}{200} \times 4000$ 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

         $x = \dfrac{213}{990} \ (\dfrac{71}{330})$ A1   4

14 $81x^8 y^{12}$ MA2   2

15 **(a)** $-\mathbf{b}$ MA1

    (b) $\dfrac{1}{2}\mathbf{a} + \mathbf{b}$ MA1

    (c) $\mathbf{b} - \dfrac{1}{2}\mathbf{a}$ MA1   3

16 **(a)** $\mathbf{d} = 8$, $\mathbf{e} = 5$ MA1, MA1

    (b) 5   A1   3

17 $\dfrac{20}{60} \times \dfrac{19}{59} + \dfrac{40}{60} \times \dfrac{39}{59}$ MA2

     $= \dfrac{19}{177} + \dfrac{78}{177}$ **or** $\dfrac{380}{3540} + \dfrac{1560}{3540}$ MA1

     $= \dfrac{97}{177}$ **or** $\dfrac{1940}{3540}$ A1   4

Total	**56**

General Certificate of Secondary Education
January 2010

Mathematics

Module N6 Paper 2
(With calculator)
Higher Tier

[GMN62]

FRIDAY 15 JANUARY

10.45am – 12.00am

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:

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

Some common examples of this occur in the following cases:

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

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

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

			AVAILABLE MARKS

1 **(a)** $30 \div \dfrac{1}{2} = 60$ M1, A1

    (b) 1530, 1600   A1   3

2 Correct centre   A1
    Correct enlargement   A2
    (Award 1 mark for 3 points correct)   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

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 A1
smooth curve 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% MA1
(should **not** be a branch from first attempt as pass)

(b) 0.4×0.75 MA1

30% or 0.3 A1

Answer 90% or 0.9 MA1 5

80

AVAILABLE MARKS

14 $t = \dfrac{k}{w}$

$27 = \dfrac{k}{12}$

$k = 324$ MA1

$t = \dfrac{324}{w}$

$t = \dfrac{324}{t}$

$t^2 = 324$

$t = 18$ 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 $= 36\pi \times \dfrac{80}{360} = 8\pi$ 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

$\dfrac{1}{3} \times \pi \times 4^2 \times 17.54992877$ MA1

294(.051879) A1 6

Total **56**

GCSE MATHEMATICS JANUARY 2010
MODULE N6-2
OVERLAY QUESTION 9