



General Certificate of Secondary Education  
January 2011

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**Mathematics**

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

[GMN61]

FRIDAY 14 JANUARY  
**9.15 am – 10.30 am**

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**MARK  
SCHEME**

## 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	$E = \frac{2 \times 20 + 5}{-9 - 1} = \frac{45}{-10}$	A1	3
	$E = -4.5$	A1	
		A1	
2	(a) (i) B	A1	4
	(ii) 4	A1	
	(b) $\frac{1}{2}(2.3 + 2.7) \times 1.5$	MA1	
	$= 3.75$	A1	
3	$\frac{1}{100} \times 300 = 3 \rightarrow \text{£}9$	MA1	4
	$\frac{1}{20} \times 300 = 15 \rightarrow \text{£}4.50$	MA1	
	$300 \times 5\text{p} = \text{£}15$	MA1	
	Profit $\text{£}1.50$	MA1	
4	$5 - 3 - y = x$	MA1	2
	$2 - y = x$	A1	
5	(a) $\frac{5 \times 20}{6 - 2} = 25$	MA1 A1	6
	(b) $2.2 = \frac{11}{5}$ or $\frac{22}{10}$	MA1	
	$\frac{5}{11}$ or $\frac{10}{22}$	A1	
(c) (i)	29.6078	A1	6
	(ii) 0.0467	A1	
6	(a) (i) Correct reflection	} Overlays to be provided	7
	(ii) Correct translation		
	(b) Rotation, $180^\circ$ , about the point (2,1)	A1 A1	

		AVAILABLE MARKS
7	$\frac{1}{2} \times \frac{3}{6}$ $= \frac{3}{12} \left( \frac{1}{4} \right)$	M1 A1 A1 3
8	<p>(a) (i) <math>m^4</math></p> <p>(ii) <math>a^9</math></p> <p>(iii) <math>p^{12}</math></p> <p>(b) e.g. <math>3^2 - 2^2 = 9 - 4 = 5</math></p> <p>(c) <math>6x</math></p>	A1 A1 A1 MA2 A1 6
9	$V = \frac{1}{6} \pi LW^2$ because its dimensions are $L^3$ which is the only one representing a volume (or similar explanation)	A1 A1 2
10	$3n \geq -5$ $n \geq \frac{-5}{3}$	MA1 A1 2
11	<p>(a)</p> <p>(b) <math>0.6 \times 0.1 + 0.4 \times 0.4</math>  <math>= 0.06 + 0.16 = 0.22</math></p>	A1 MA1 A1 3

		AVAILABLE MARKS
<b>12 (a)</b> $0.\dot{1}4285\dot{7}$	A1	
<b>(b) (i)</b> 5	A1	
<b>(ii)</b> $5 + 20 + 2\sqrt{100} = 25 + 20 = 45$ <b>or</b> $(\sqrt{5} + 2\sqrt{5})^2 = (3\sqrt{5})^2 = 45$	MA1 A1	4
<b>13</b> $tx + cx = c^2 - tc$ $(t + c)x = c^2 - tc$ $x = \frac{c^2 - tc}{t + c}$	MA1 MA1  MA1	3
<b>14</b> $P(RR) = \frac{6}{12} \times \frac{5}{11}$ $= \frac{5}{22}$	$\frac{6}{12}, \frac{5}{11}$ MA1  $\times$ M1 MA1	3
<b>15</b> $\vec{OQ} = \mathbf{b} + 2\mathbf{a}$ $\vec{PT} = -\mathbf{b} + \frac{1}{3}(\mathbf{b} + 2\mathbf{a}) = -\frac{2}{3}\mathbf{b} + \frac{2}{3}\mathbf{a}$ $\vec{TR} = -\frac{1}{3}(\mathbf{b} + 2\mathbf{a}) + \mathbf{a} = -\frac{1}{3}\mathbf{b} + \frac{1}{3}\mathbf{a}$  $PT : TR = 2 : 1$	MA1  MA1  MA1  A1	4
<b>Total</b>		<b>56</b>

GCSE MATHEMATICS JANUARY 2011  
MODULE N6-1  
OVERLAY QUESTION 6

