



*Rewarding Learning*

**General Certificate of Secondary Education  
January 2012**

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**Mathematics**

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

**[GMN41]**

**WEDNESDAY 11 JANUARY  
9.15 am–10.15 am**

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**MARK  
SCHEME**

## GCSE MATHEMATICS

**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:**

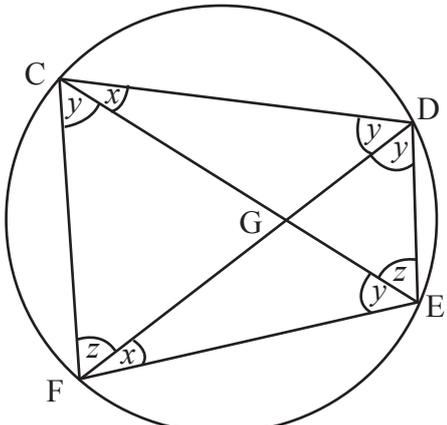
It is our intention to reward candidates for any demonstration of relevant knowledge, skills or understanding. For this reason we adopt a policy of **following through** their answers, that is, having penalised a candidate for an error, we mark the succeeding parts of the question using the candidate's 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	Median Quartiles limits	A1 A1 A1	3										
2	$\frac{4x + 1 + 4x - 6}{12} = \frac{21}{12}$	MA1											
	$4x + 1 + 4x - 6 = 21$	MA1											
	$8x = 26$	MA1											
	$x = \frac{26}{8}$ or $\frac{13}{4}$ or 3.25	MA1	4										
3	$14b; 16g$	A1, A1											
	$\frac{14b + 16g}{30}$	A1	3										
4	(a) $\frac{5}{2}$	MA1											
	(b) $y = \frac{5}{2}x + 2$	MA1, MA1	3										
5	(a) Angle ABE = $32^\circ$	A1											
	(b) Angle BAE = $116^\circ$	A1											
	(c) Angle BCE = $64^\circ$	A1											
	(d) Angle BED = $46^\circ$	A1	4										
6	<table border="1"> <thead> <tr> <th>Rational</th> <th>Irrational</th> </tr> </thead> <tbody> <tr> <td><math>\sqrt[3]{64}</math></td> <td><math>5\pi</math></td> </tr> <tr> <td><math>2.\dot{3}</math></td> <td><math>\sqrt{30}</math></td> </tr> <tr> <td>1.62444</td> <td></td> </tr> <tr> <td><math>\frac{2\pi}{3\pi}</math></td> <td></td> </tr> </tbody> </table>	Rational	Irrational	$\sqrt[3]{64}$	$5\pi$	$2.\dot{3}$	$\sqrt{30}$	1.62444		$\frac{2\pi}{3\pi}$			
Rational	Irrational												
$\sqrt[3]{64}$	$5\pi$												
$2.\dot{3}$	$\sqrt{30}$												
1.62444													
$\frac{2\pi}{3\pi}$													
	6 correct A2 (4 correct A1)	A2	2										

		AVAILABLE MARKS		
7	(a) e.g. Only sampling Year 8 pupils	A1		
	(b) e.g. Pupils at end of list miss out	A1		
	(c) (i) $57 \times \frac{50}{600}$ or using $\frac{1}{12}$	MA1		
	4.75 $\rightarrow$ 5	A1		
	(ii) No, because $82 \times \frac{50}{600} = 6.83 \dots \rightarrow 7$			
	and $41 \times \frac{50}{600} = 3.416 \dots \rightarrow 3$	MA2		
		6		
8	$\frac{-1}{3}$	MA1		
	$y = -\frac{1}{3}x + 4$	MA1		
		2		
9	(a) 70 and 20	A1, A1		
	(b) Two bars drawn to correct heights (6.8 and 9.6)	A1, A1		
	(c) 7.5 + 52.5	MA1		
	60	A1		
	(d) $\frac{x}{60} \times 20$ or $\frac{144}{40} = 3.6, 3.6 \times 20 = 72$	MA1		
	$\frac{x}{3} \quad h = \frac{x}{60} \times 20 = \frac{x}{3}$	A1		
		8		
10	(a) $16^{\frac{1}{4}} = 2 \quad 2^3 = 8$	MA1, MA1		
	(b) $\left(\frac{8}{27}\right)^{-\frac{4}{3}} = \left(\frac{27}{8}\right)^{\frac{4}{3}} = \left(\sqrt[3]{\frac{27}{8}}\right)^4 = \left(\frac{3}{2}\right)^4 = \frac{81}{16}$	MA2		
	$0.25^{-2} = \left(\frac{1}{4}\right)^{-2} = 4^2 = 16$	MA1		
	$\frac{81}{16} \times 16 = 81$	A1		
		6		
11		<p><math>\hat{F}E C = \hat{F}D C (= y)</math> Angles at circumference standing on the same arc</p> <p><math>\hat{F}C E = \hat{F}E G</math> (isosceles <math>\triangle</math>) = y</p> <p><math>\hat{F}C E = \hat{F}D E (= y)</math> Angles on same arc</p> <p><math>\hat{E}F D = \hat{E}C D (= x)</math> Angles on same arc</p> <p><math>\hat{C}G D = 180 - (x + y)</math> (angles of <math>\triangle CGD</math>)</p> <p><math>\hat{F}E D = 180 - (x + y)</math> (angles of <math>\triangle FED</math>)</p> <p><math>\therefore \hat{C}G D = \hat{F}E D</math></p>	<p>MA1</p> <p>MA1</p> <p>MA1</p> <p>MA1</p> <p>Total</p>	<p>3</p> <p><b>44</b></p>

GCSE MATHEMATICS JANUARY 2012  
MODULE N4-1  
OVERLAY QUESTION 9

