



**General Certificate of Secondary Education  
June 2013**

**Mathematics**

**43602H**

**Unit 2 Higher tier**

**Final**

***Mark Scheme***

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## Glossary for Mark Schemes

GCSE examinations are marked in such a way as to award positive achievement wherever possible. Thus, for GCSE Mathematics papers, marks are awarded under various categories.

<b>M</b>	Method marks are awarded for a correct method which could lead to a correct answer.
<b>A</b>	Accuracy marks are awarded when following on from a correct method. It is not necessary to always see the method. This can be implied.
<b>B</b>	Marks awarded independent of method.
<b>Q</b>	Marks awarded for Quality of Written Communication
<b>ft</b>	Follow through marks. Marks awarded for correct working following a mistake in an earlier step.
<b>SC</b>	Special case. Marks awarded within the scheme for a common misinterpretation which has some mathematical worth.
<b>M dep</b>	A method mark dependent on a previous method mark being awarded.
<b>B dep</b>	A mark that can only be awarded if a previous independent mark has been awarded.
<b>oe</b>	Or equivalent. Accept answers that are equivalent. eg, accept 0.5 as well as $\frac{1}{2}$
<b>[a, b]</b>	Accept values between a and b inclusive.
<b>3.14 ...</b>	Allow answers which begin 3.14 eg 3.14, 3.142, 3.149.
<b>Use of brackets</b>	It is not necessary to see the bracketed work to award the marks.

Examiners should consistently apply the following principles

### **Diagrams**

Diagrams that have working on them should be treated like normal responses. If a diagram has been written on but the correct response is within the answer space, the work within the answer space should be marked. Working on diagrams that contradicts work within the answer space is not to be considered as choice but as working, and is not, therefore, penalised.

### **Responses which appear to come from incorrect methods**

Whenever there is doubt as to whether a candidate has used an incorrect method to obtain an answer, as a general principle, the benefit of doubt must be given to the candidate. In cases where there is no doubt that the answer has come from incorrect working then the candidate should be penalised.

### **Questions which ask candidates to show working**

Instructions on marking will be given but usually marks are not awarded to candidates who show no working.

### **Questions which do not ask candidates to show working**

As a general principle, a correct response is awarded full marks.

### **Misread or miscopy**

Candidates often copy values from a question incorrectly. If the examiner thinks that the candidate has made a genuine misread, then only the accuracy marks (A or B marks), up to a maximum of 2 marks are penalised. The method marks can still be awarded.

### **Further work**

Once the correct answer has been seen, further working may be ignored unless it goes on to contradict the correct answer.

### **Choice**

When a choice of answers and/or methods is given, mark each attempt. If both methods are valid then M marks can be awarded but any incorrect answer or method would result in marks being lost.

### **Work not replaced**

Erased or crossed out work that is still legible should be marked.

### **Work replaced**

Erased or crossed out work that has been replaced is not awarded marks.






### **Premature approximation**

Rounding off too early can lead to inaccuracy in the final answer. This should be penalised by 1 mark unless instructed otherwise.

## Unit 2 Higher Tier

Q	Answer	Mark	Comments
1	Sight of 20, 0.5, 10 or 2	M1	
	$\frac{20 \times 0.5}{2}$	M1	oe $\frac{10}{2}$ or $10 \times 0.5$ or $20 \times 0.25$
	5	A1	
2a	$x + 5$ or $5 + x$	B1	
2b	$x (+) x + 5 (+) x + 10 (+) x + 15 (=54)$	B1	oe eg $4x + 30$
	their $4x +$ their $30 = 54$	M1	collecting their four or more different algebraic expressions and equating
	their $4x =$ their $24$	M1	$54 -$ their $30$ correctly evaluated from $ax + b = 54$ with $a > 1$
	6	A1	SC2 6 on answer line with no correct algebraic working
3a	30 p circled	B1	any indication
3b	$4 \times 30 (=120)$ or $5 \times 50 (=250)$ or $4 \times 0.3(0)(=1.20)$ or $5 \times 0.5(0)(=2.50)$	M1	Oe
	their $120 +$ their $250$ or $370$ or their $1.2(0) +$ their $2.5(0)$ or $3.7(0)$	M1	
	(£)3.70	Q1	Strand (i) Do not accept 3.7 or (£)3.70p SC2 (£)3.50 must be supported by $1.50 + 2.00$ SC1 350 must be supported by $150 + 200$

Q	Answer	Mark	Comments
4	$(\frac{1}{4} \text{ and}) \frac{2}{4}$ or $\frac{2}{8} \text{ and } \frac{4}{8}$ or 25(%) and 50(%) or 0.25 and 0.5	M1	oe into equivalent form fractions with common denominator or percentages or decimals
	$\frac{1.5}{4}$	A1	oe eg $\frac{37.5}{100}$ or 37.5% or 0.375
	$\frac{3}{8}$	Q1	oe fraction Strand (ii)
	<b>Alternative method</b>		
	$\frac{1}{4} + \frac{1}{2} (= \frac{3}{4})$	M1	
	$\frac{3}{4} \times \frac{1}{2}$	A1	oe
5a	$6x + 12$ or $2x + 2$	M1	
	$6x + 12 + 2x + 2$	A1	
	$8x + 14$	A1ft	oe ft from their 4 terms
5b	$x(x-11)$ or $(x-11)x$	B1	
6	Meets all 4 criteria $(x =) 64$ and $(y =) 27$ or $(x =) 81$ and $(y =) 64$	B3	B2 Their 2 values meet any 3 criteria B1 Their 2 values meet any 2 criteria B1 Reversed $(x =) 27$ and $(y =) 64$ B1 Reversed $(x =) 64$ and $(y =) 81$ SC2 $(x =) 8^2$ and $(y =) 3^3$ with no working SC2 $(x =) 9^2$ and $(y =) 4^3$ with no working SC1 a two digit square number subtract either 27 or 64 SC1 full list of two digit squares 16,25,36,49,64,81 with 27 and 64

Q	Answer	Mark	Comments	
7a	$4x \leq 13 + 7$ or $x - \frac{7}{4} \leq \frac{13}{4}$	M1	oe	
	$x \leq 5$	A1	SC1 $x < 5$ or $x = 5$ or $x \geq 5$	
7b		B2	B1 for  or  or  — 	
8	$2a + 4b$ or $3a + 6b$	M1		
	$2a + 4b$ and $3a + 6b$	M1		
	$2(a + 2b)$ or $3(a + 2b)$ or $\frac{2}{3}$ with no evidence of incorrect working	A1		
	$\frac{2(a + 2b)}{3(a + 2b)} (=) \frac{2}{3}$	Q1	Strand (ii) must see factorisation	
9	$\frac{35}{100} \times 600 (= 210)$	M1	oe $100 - 35 (= 65)$	
	600 – their 210 (= 390)	M1	oe $600 \times \text{their } \frac{65}{100} (= 390)$	
	their $390 \div 5 (= 78)$	M1	oe	
	312	A1		
	<b>Alternative method</b>			
	$100 - 35 (= 65)$	M1	oe	
	their $65 \div 5 (= 13)$	M1	oe	
	their $65 - \text{their } 13 (= 52)$ or $100 - (35 + \text{their } 13) (= 52)$	M1	oe $\frac{\text{their } 13}{100} \times 600 (= 78)$ or $\frac{\text{their } 48}{100} \times 600 (= 288)$	
	312	A1		

Q	Answer	Mark	Comments
10a	$y = -1.5x + 3$	B3	oe $3x + 2y = 6$  B2 $y = 1.5x + 3$ B2 $-1.5x + 3$ B2 $y = -1.5x + c$  B1 $y = mx + 3$ B1 $y = 1.5x + c$ B1 $1.5x + 3$  B1 $-\frac{3}{2}$ oe
10b	$y = 3x - 9$	B2	oe B1 $y = 3x + c$ ; c not 4 B1 $3x - 9$ B1 $-3 = 3 \times 2 + c$
11	$180 \times 5 (= 900)$ or $180 \times \frac{10}{9} = (200)$	M1	oe
	their 900 is $\frac{9}{10}$ or their $900 \times \frac{10}{9}$ or their $200 \times 5$	M1dep	oe $\frac{9000}{9}$ or $100 \times 10$
	1000	A1	
	<b>Alternative method</b>		
	$\frac{1}{5} \times \frac{9}{10} (= \frac{9}{50})$ or $5 \times \frac{10}{9} (= \frac{50}{9})$	M1	
	their $\frac{9}{50}$ is 180 or 180 $\times$ their $\frac{50}{9}$	M1 dep	
	1000	A1	
12	$w - 3 = \sqrt{t}$	M1	or $\sqrt{t} = w - 3$ or $(w - 3)^2$ or $-\sqrt{t} = 3 - w$
	$t = (w - 3)^2$	A1	oe ignore fw SC1 $t = (w + 3)^2$



Q	Answer	Mark	Comments	
13	$2x + 3y = 53$ $9x - 3y = 57$	$6x + 9y = 159$ $6x - 2y = 38$	M1	oe Allow one error
	$11x = 110$	$11y = 121$	M1	
	$x = 10$ or $y = 11$		A1	
	$x = 10$ and $y = 11$		A1	
	<b>Alternative method</b>			
	$y = 3x - 19$	$x = \frac{y+19}{3}$	M1	oe Allow one error
	$2x+3(3x-19)=53$ $11x - 57 = 53$	$\frac{2(y+19)}{3} + 3y = 53$ $11y + 38 = 159$	M1	
	$x = 10$ or $y = 11$		A1	
	$x = 10$ and $y = 11$		A1	
	14a	1	B1	
14b	$\frac{1}{5^3}$ or $\frac{1}{125}$ or $0.2 \times 0.2 \times 0.2$	M1	$(\frac{1}{5})^3$ or $125^{-1}$ or $0.2^3$	
	0.008 or $\frac{8}{1000}$	A1		
	$8 \times 10^{-3}$	A1 ft	ft Any decimal $0 < x < 1$ correctly converted to standard form	
15	$8x^2 - 12xy - 10xy + 15y^2$	M1	Allow one term error	
	$8x^2 - 12xy - 10xy + 15y^2$	A1		
	$8x^2 - 22xy + 15y^2$	A1 ft	ft their four terms if M1 awarded Do not ignore fw for final mark	

Q	Answer	Mark	Comments
16a	$\sqrt{4}$	M1	$\frac{2\sqrt{2}}{\sqrt{2}}$ or $\frac{\sqrt{8}}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}}$ or $\sqrt{\frac{8}{2}}$ or $\sqrt{\frac{4}{1}}$ or $\frac{\sqrt{16}}{2}$ or $\frac{\sqrt{8}\sqrt{2}}{2}$ or $\frac{2}{1}$
	2	A1	
16b	two correct steps	M1	eg two of: $\sqrt{4} = 2$ or $\sqrt{1} = 1$ or cancels $\sqrt{5}$ or combines any two surds
	$\sqrt{144}$	M1	oe eg $\sqrt{12}\sqrt{12}$ or $\sqrt{4}\sqrt{36}$
	k = 12	A1	
17a	x + 7.5 or 7.5 + x	B1	$x + 7\frac{1}{2}$
17b	$x(x + 7.5) = 2(x + x + 7.5)$	M1	fit their x + 7.5 from (a) in the form x + c for all 4 method marks
	$x^2 + 7.5x = 4x + 15$	M1	
	$x^2 + 3.5x - 15 = 0$ or $2x^2 + 7x - 30 = 0$	M1	
	$(2x - 5)(x + 6) (= 0)$	M1	
	2.5 and 10 <b>and</b> -6 and 1.5	A1	either order but in correct pairs  SC1 one correct pair