GCSE
MATHEMATICS

NEW PRACTICE PAPER SET 2 Higher Tier Paper 1
Mark Scheme (Published November 2015)

8300/1H

Version 1.0

In Spring 2015, students across the country took this set of practice papers as a Mock Examination. Principal Examiners have marked the papers and these mark schemes have, therefore, been through the normal process of standardisation. For some questions, Principal Examiners have written Additional Guidance based on responses seen.

Further copies of this Mark Scheme are available from aqa.org.uk

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.

If a student uses a method which is not explicitly covered by the mark scheme the same principles of marking should be applied. Credit should be given to any valid methods. Examiners should seek advice from their senior examiner if in any doubt.

M	Method marks are awarded for a correct method which could lead to a correct answer.
A	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	Marks awarded independent of method.
ft	Follow through marks. Marks awarded for correct working following a mistake in an earlier step.
SC	Special case. Marks awarded within the scheme for a common misinterpretation which has some mathematical worth.
M dep	A method mark dependent on a previous method mark being awarded.
B dep	A mark that can only be awarded if a previous independent mark has been awarded.
oe	Or equivalent. Accept answers that are equivalent. eg accept 0.5 as well as $\frac{1}{2}$
[*a*, *b*]	Accept values between *a* and *b* inclusive.
3.14 …	Allow answers which begin 3.14 eg 3.14, 3.142, 3.1416
Use of brackets	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 student has used an incorrect method to obtain an answer, as a general principle, the benefit of doubt must be given to the student. In cases where there is no doubt that the answer has come from incorrect working then the student should be penalised.

Questions which ask students to show working

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

Questions which do not ask students to show working

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

Misread or miscopy

Students often copy values from a question incorrectly. If the examiner thinks that the student 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.

Q	Answer	Mark	Comments
1	$x^2 + 3x$	B1	
2	61.6×10^3	B1	
3	$\frac{3}{20}$	B1	
4	$n + 1$	B1	

Q	Answer	Mark	Comments
5	**Alternative method 1**		
	radius = 12 ÷ 4 or 3 or diameter = 12 ÷ 2 or 6 or 12 × 12 or 144	M1	
	$\pi \times$ their 3^2 or 9π	M1	
	$4 \times \pi \times$ their 3^2 or 36π	M1dep	
	$144 - 36\pi$	A1	Ignore attempts at factorisation Do not ignore further work
	Alternative method 2		
	radius = 12 ÷ 4 or 3 or diameter = 12 ÷ 2 or 6 or 6 × 6 or 36	M1	
	$\pi \times$ their 3^2 or 9π	M1	
	$36 - 9\pi$	M1dep	
	$4(36 - 9\pi)$	A1	Ignore attempts at expansion Do not ignore further work
	Additional Guidance		
	$144 - 36\pi = 108\pi$		M1M1M1A0
	$144 - 36\pi = 12(12 - 4\pi)$ (error in factorisation)		M1M1M1A1
	Accept 3.14 or better for π for method marks		

Q	Answer	Mark	Comments
6	$\frac{10}{30}$ or $\frac{8}{20}$ seen	B1	oe 0.33(…) or 0.4 or 33(…)% or 40%
	A correct probability from each bag, with attempt at a comparable form, with at least one correct	M1	eg $\frac{20}{60}$ and $\frac{24}{60}$ or 0.33(…) and 0.4 or 33(…)% and 40%
	No and both probabilities correct and in the same format	A1	eg Incorrect and $\frac{20}{60}$ and $\frac{24}{60}$ seen No and 0.33(…) and 0.4 No and 33(…)% and 40%
	Additional Guidance		
7(a)	130 – 25 or 105	M1	
	25 ÷ 50 or 0.5 or 30 minutes	M1	oe
	their 105 ÷ 70 or 1.5 or 1 hour 30 minutes or 90 minutes	M1dep	Dependent on 1st M1 or subtracting 25 from their distance oe
	2 hours or 120 minutes	A1	
	Additional Guidance		

Q	Answer	Mark	Comments
7(b)	(The journey will) take longer	B1	oe
	Additional Guidance		
	More time		B1
	(The journey will) be slower		B0
8	$\sqrt{98.5} < 10$	B1	oe May be implied by numerator is negative
	negative ÷ negative = positive and No	B1	
	Additional Guidance		
9	A pair of intersecting arcs of equal radii from ends of line with two intersections	M1	oe
	Perpendicular line drawn through points of intersection	A1	1 mm tolerance
	Additional Guidance		

Q	Answer	Mark	Comments
10	210 ÷ 7 or 30 or 7 ÷ 2 or 3.5 or 80 ÷ 2 or 40	M1	
	their 30 × 2 or 210 ÷ 3.5 or 60 or 9 × their 30 or their 40 × 7 or 280	M1dep	
	270 ml	A1	SC1 for 360
	Additional Guidance		
11	$\frac{20}{100}$ × 50 or 10	M1	oe
	2	A1	SC1 for 32
	Additional Guidance		

Q	Answer	Mark	Comments
12	**Alternative method 1**		
	$6^2 + 6^2$ or $36 + 36$ or 72	M1	
	$\sqrt{6^2 + 6^2}$ or $\sqrt{72}$	M1dep	oe
	$\sqrt{72} < 10$	A1	oe eg $\sqrt{72}$ is between 8 and 9
	Alternative method 2		
	$3^2 + 3^2$ or $9 + 9$ or 18	M1	
	$\sqrt{3^2 + 3^2}$ or $\sqrt{18}$	M1dep	oe
	$\sqrt{18} < 5$	A1	oe eg $\sqrt{18}$ is between 4 and 5
	Additional Guidance		
13	50%	B1	
14	1.5	B1	

Q	Answer	Mark	Comments
15	$1\frac{3}{4} \div 5\frac{5}{6}$ or $\frac{7}{4}$ and $\frac{35}{6}$	M1	oe eg $\frac{42}{24}$ and $\frac{140}{24}$
	$\frac{7}{4} \div \frac{35}{6}$ or $\frac{7}{4} \times \frac{6}{35}$ or $\frac{6}{20}$	M1	oe unsimplified correct fraction
	$\frac{3}{10}$	A1	
	Additional Guidance		
16	70 ÷ 5 (× 4) or 14 or 56	M1	oe
	56 in W only and 14 in B only	A1	
	their 56 + x = 3(their 14 + x) or their 56 + x = their 42 + 3x	M1	oe any letter
	7 in W and B	A1ft	ft their 56 and their 14 Award if W total = 3 × B total
	23 not in W or B	B1ft	ft their 56 and their 14 and 7 Award if the four values total 100
	Additional Guidance		

Q	Answer	Mark	Comments
17	$3x^2 - 6x + x - 2$ or $3x^2 - 5x - 2$	M1	4 terms with at least 3 correct
	$3x^2 + (a - \text{their } 5)x - \text{their } 2 + b$ or $a - \text{their } 5 = 8$ or $b - \text{their } 2 = -5$	M1	
	$a = 13$	A1	
	$b = -3$	A1	
	Additional Guidance		
	$a - \text{their } 5 = 8$, $a = 13$		M1A1
	$a - \text{their } 5 = 8$, $a = 13$ and $b - 2 = -5$, $b = -3$		M1A1M1A1
	$13x - 3$		M1A1M1A1

Q	Answer	Mark	Comments
18(a)	Probability of red is not $\frac{1}{3}$ or Probability of red is $\frac{1}{4}$	B1	oe
	He should multiply the fractions, not add them	B1	oe SC1 gives correct answer of $(\frac{1}{4} \times \frac{1}{4}) = \frac{1}{16}$ with no reference to Jack's method
	Additional Guidance		
18(b)	$\frac{1}{\sqrt{25}}$ or $\frac{1}{5}$	M1	
	360 × their $\frac{1}{5}$	M1dep	
	72	A1	
19	$\frac{4x+2}{6}$ or $\frac{15x-6}{6}$	M1	oe
	$\frac{4x+2}{6} + \frac{15x-6}{6} = \frac{19x-4}{6}$	A1	
20	$\frac{1}{2}$	B1	
21	40 sin x	B1	

Q	Answer	Mark	Comments
22	**Alternative method 1**		
	$10x = 1.55…..$ and $9x = 1.4$	M1	oe method $100x = 15.55…$ and $99x = 15.4$
	$\frac{14}{90}$	M1	oe fraction $\frac{154}{990}$
	$\frac{7}{45}$	A1ft	Correct simplification of their fraction and M1 scored
	Alternative method 2		
	$0.1 + 0.055… = \frac{1}{10} + 0.055…$ and $100x = 5.55…$ and $99x = 5.5$	M1	oe method
	$\frac{99}{990} + \frac{55}{990}$ or $\frac{154}{990}$	M1	oe fractions
	$\frac{7}{45}$	A1ft	Correct simplification of their fraction and M1 scored
	Alternative method 3		
	$\frac{1}{10} + \frac{5}{90}$	M1	oe method
	$\frac{9}{90} + \frac{5}{90}$ or $\frac{14}{90}$	M1	oe fractions with common denominator
	$\frac{7}{45}$	A1ft	Correct simplification of their fraction and M1 scored
	Additional Guidance		

Q	Answer	Mark	Comments
23	26 ÷ 1.3 or 20	M1	oe
	their 20 – 4 or 16	M1dep	Dress cost
	4 × 2 or (£)8	M1	26 – 8 = 18
	$\frac{26 - \text{their } 16 - \text{their } 8}{\text{their } 16}$ (× 100) or $\frac{2}{16}$ or $\frac{1}{8}$	M1	$\frac{18 - \text{their } 8}{\text{their } 16}$ (× 100)
	12.5	A1	
	Additional Guidance		
24	2	B1	
	$\frac{1}{5^2}$ or $\frac{1}{25}$ or 0.04	M1	$\frac{2}{25}$ scores B1M1
	0.08	A1	
	Additional Guidance		

Q	Answer	Mark	Comments
25(a)	1 – 1 = 0 and After 1 it's all 0s	B1	oe Do not accept a list of zeros
	Additional Guidance		
25(b)	1 – (–1) = 2	B1	oe
	4 – 2 = 2 and All subsequent values are 2	B1	oe Do not accept a list of twos
	Additional Guidance		
25(c)	$1 - \sqrt{2} - \sqrt{2} + 2$ or $1 - 2\sqrt{2} + 2$ or $3 - 2\sqrt{2}$	M1	Allow one error with four terms
	$2 - \sqrt{2}$	A1	
	Additional Guidance		
26	Angle *ABC* = 90° or angle *BCA* = 30°	M1	Angles may be on diagram
	(*x* =) 60°	A1	
	Angle *DBA* = 36° or Angle *OAD* = 54°	B1	
	(*y* =) 36°	B1ft	ft their angle *DBA* or their angle *OAD*
	Additional Guidance		

Q	Answer	Mark	Comments
27	**Alternative method 1**		
	$\left(\sqrt{12} =\right)\ 2\sqrt{3}$	M1	
	$\left(\frac{15}{\sqrt{3}} =\right)\ \frac{15\sqrt{3}}{\sqrt{3}\sqrt{3}}$ or $\frac{15\sqrt{3}}{3}$ or $5\sqrt{3}$	M1	
	$7\sqrt{3}$ or $a = 7, b = 3$	A1	
	Alternative method 2		
	$\frac{\sqrt{36}+15}{\sqrt{3}}\ \left(=\frac{21}{\sqrt{3}}\right)$	M1	
	$\frac{21}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$ or $\frac{21\sqrt{3}}{3}$	M1	
	$7\sqrt{3}$ or $a = 7, b = 3$	A1	
	Additional Guidance		

Q	Answer	Mark	Comments
28	**Alternative method 1**		
	$y = 5x - 5$	M1	
	$2(5x - 5) - x^2 = 11$ or $10x - 10 - x^2 = 11$	M1	Eliminating a variable oe
	$x^2 - 10x + 21 = 0$	A1	Collecting terms
	$(x - 3)(x - 7)$ (= 0)	M1	Correct and accurate method to solve their 3-term quadratic equation $\frac{10 \pm \sqrt{(-10)^2 - 4 \times 1 \times 21}}{2 \times 1}$
	$x = 3$ and $x = 7$ or $x = 3$ and $y = 10$ or $x = 7$ and $y = 30$	A1	
	$x = 3$, $y = 10$ and $x = 7$, $y = 30$	A1	
	Alternative method 2		
	$10x - 2y = 10$	M1	Equating coefficients
	$10x - x^2 = 21$	M1	Eliminating a variable oe
	$x^2 - 10x + 21 = 0$	A1	Collecting terms
	$(x - 3)(x - 7)$ (= 0)	M1	Correct and accurate method to solve their 3-term quadratic equation $\frac{10 \pm \sqrt{(-10)^2 - 4 \times 1 \times 21}}{2 \times 1}$
	$x = 3$ and $x = 7$ or $x = 3$ and $y = 10$ or $x = 7$ and $y = 30$	A1	
	$x = 3$, $y = 10$ and $x = 7$, $y = 30$	A1	

Q	Answer	Mark	Comments
28	**Alternative method 3**		
	$x = \frac{5+y}{5}$	M1	
	$2y - \left(\frac{5+y}{5}\right)^2 = 11$	M1	Eliminating a variable oe
	$y^2 - 40y + 300 = 0$	A1	Collecting terms
	$(y - 10)(y - 30)$ (= 0)	M1	Correct and accurate method to solve their 3-term quadratic equation $\frac{-(-40) \pm \sqrt{(-40)^2 - 4 \times 1 \times 300}}{2 \times 1}$
	$y = 10$ and $y = 30$ or $x = 3$ and $y = 10$ or $x = 7$ and $y = 30$	A1	
	$x = 3$, $y = 10$ and $x = 7$, $y = 30$	A1	
	Additional Guidance		

SP/03/15