GCSE
MATHEMATICS

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

8300/2H

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	$8n - 3$	B1	
2	$\dfrac{1}{2000}$	B1	
3	-2	B1	
4	$y = \mathrm{k}x$	B1	

5	Obtains an equivalent ratio or writes out multiples of 11 (to 33)	M1	eg 8 : 14 12 : 21 11, 22, 33
	33	A1	
	Additional Guidance		

Q	Answer	Mark	Comments
6(a)	$3x \leqslant 9 \times 2$ or $x \leqslant 9 \times \dfrac{2}{3}$ or $\dfrac{x}{2} \leqslant \dfrac{9}{3}$	M1	
	$x \leqslant 6$	A1	
	Additional Guidance		
	$x \leqslant 6$ in working lines and 6 on answer line		M1A1

Q	Answer	Mark	Comments
6(b)	$x + 2 > 12 \div 4$ or $4x + 8 > 12$	M1	
	$x > 1$	A1	SC1 $\;> 1$ SC1 $\;x \geqslant 1$
	Additional Guidance		
	Working uses = but recovery to $x > 1$		M1A1
	$x > 1$ in working lines and 1 on answer line		M1A1

Q	Answer	Mark	Comments
6(c)		B1ft	Correct or ft their two inequalities from (a) and (b) Condone dotted line

Q	Answer	Mark	Comments
7	**Alternative method 1**		
	$5200 = 0.2(E - 10\,600)$	M1	oe
	$5200 \div 0.2$ or $26\,000$	M1dep	oe 5200×5
	$36\,600$	A1	
	Alternative method 2		
	$5200 = 0.2(E - 10\,600)$	M1	oe
	$5200 + 0.2 \times 10600$ or $5200 + 2120$ or 7320	M1dep	
	$36\,600$	A1	
	Additional Guidance		

Q	Answer	Mark	Comments
8	5.5 and -5.5	B2	oe B1 for each
	Additional Guidance		
	$\pm\,5.5$		B2

Q	Answer	Mark	Comments
9	**Alternative method 1**		
	$10\frac{1}{2} \div \frac{7}{1000}$ or 1500	M1	oe
	their 1500 $\div$ 3 $\times$ 2	M1	oe
	1000	A1	SC1 100 or 10 000
	Alternative method 2		
	$10\frac{1}{2} \div 3 \times 2$ or 7	M1	oe eg $10\frac{1}{2} : 7$
	their 7 $\div \dfrac{7}{1000}$	M1	oe
	1000	A1	SC1 100 or 10 000
	Alternative method 3		
	$\dfrac{1000}{7} \div 3 \times 2$ or [95.2, 95.4]	M1	oe
	10.5 $\times$ their [95.2, 95.4]	M1	
	1000	A1	SC1 100 or 10 000
	Additional Guidance		

10(a)	B and C	B1	

10(b)	SAS	B1dep	Must have (a) correct

Q	Answer	Mark	Comments
11	Enlargement	B1	
	(scale factor) $\dfrac{1}{3}$	B1	oe
	(centre) origin	B1	oe
	Additional Guidance		

Q	Answer	Mark	Comments

Q	Answer	Mark	Comments
12(a)	$\frac{4}{3} \times \pi \times 8^3$	M1	oe
	[2143, 2145] or $\frac{2048}{3}\pi$	A1	
	Additional Guidance		
	$\frac{4}{3} \times 3(.1) \times 8^3$		M0

Q	Answer	Mark	Comments
12(b)	8 × 2 or 16	M1	May be seen on diagram
	8 × 6 or their 16 × 3 or 48	M1	May be seen on diagram
	their 16 × their 16 × their 48	M1	oe
	12288	A1	SC2 1536
	Additional Guidance		

Q	Answer	Mark	Comments
13	$2(3x - 9) = 5x - 11$	M1	oe Must be correct and have x on both sides
	$6x - 18 = 5x - 11$	M1	oe their bracket(s) expanded correctly
	$x = 7$	A1	
	$2 \times$ their $7 + 4$ or 18 and $5 \times$ their $7 - 11$ or 24	M1	Substitutes their value of x in $2x + 4$ and $5x - 11$
	$18 : 24$ and $3 : 4$	A1	oe eg $\dfrac{18}{24}$ and $\dfrac{3}{4}$

Additional Guidance	
$3x - 9 = 2(5x - 11)$	M0
$3x - 9 = 10x - 22$	M1
$x = \dfrac{13}{7}$	A0
$2 \times \dfrac{13}{7} + 4$ and $5 \times \dfrac{13}{7} - 11$	M1 A0
T & I leading to $x = 7$	M1 M1 A1

| **14** | 60 | B1 | |

| **15** | $y = 1$ | B1 | |

Q	Answer	Mark	Comments
16	$\dfrac{1}{2}x^2 = 4$ or $x^2 = 8$	M1	oe any letter May be implied
	$\sqrt{4 \times 2}$ or $\sqrt{8}$ or $2\sqrt{2}$ or 2.8(28...) or 2.83	M1	
	(hypotenuse =) $\sqrt{\left(\sqrt{\text{their } 8}\right)^2 + \left(\sqrt{\text{their } 8}\right)^2}$ or $\sqrt{8 + 8}$ or $\sqrt{16}$ or 4	M1	
	$4 + 2\sqrt{8}$ or $4 + 4\sqrt{2}$ or $4 + (1)\sqrt{32}$	A1	

Additional Guidance	
Condone $\pm\sqrt{8}$ and $\pm\sqrt{16}$ etc for 2nd and/or 3rd M1	

Q	Answer	Mark	Comments
17	**Alternative method 1**		
	17 466 ÷ 1.025 or 17 040	M1	
	their 17 040 + 1000 or 18 040	M1dep	
	their 18 040 ÷ 1.025	M1	
	17 600	A1	SC2 11 978(.25)
	Alternative method 2		
	$1.025x - 1000$	M1	oe
	their $(1.025x - 1000) \times 1.025$ $= 17\ 466$	M1dep	oe
	$1.025 \times 1.025\ x =$ $17\ 466 + 1.025 \times 1000$ or $1.050625x = 18\ 491$	M1	oe
	17 600	A1	SC2 11 978(.25)
	Additional Guidance		

Q	Answer	Mark	Comments
18(a)	0.54	B1	oe
	Additional Guidance		

18(b)	0.9 and 1 – 0.2 or 0.8 or 1 – 0.9 or 0.1 and 0.7	M1	Pairs must be linked eg on a tree diagram
	$0.9 \times (1 - 0.2)$ or 0.72 or $(1 - 0.9) \times 0.7$ or 0.07	M1	May be seen on a tree diagram
	$0.9 \times (1 - 0.2)$ or 0.72 and $(1 - 0.9) \times 0.7$ or 0.07	M1	May be seen on a tree diagram
	0.79	A1	oe
	Additional Guidance		

Q	Answer	Mark	Comments
19(a)	Smooth curve passing through the points (± 0.5 square) (2, 0), (3, 11), (4, 20), (5, 27), (6, 32), (7, 35), (8, 36), (9, 35), (10, 32)	B3	Accept a line drawn from (0,0) to (2,0) Condone no line drawn from (0,0) to (2,0) B2 At least 7 correct points worked out or plotted (± 0.5 square) B1 At least 4 correct points worked out or plotted (± 0.5 square)

	Additional Guidance	
Correct points may be implied by curve passing through the points		
Condone curve continued beyond $t = 10$		

Q	Answer	Mark	Comments
19(b)	$\dfrac{\text{their } 35 - \text{their } 11}{7 - 3}$ or $\dfrac{24}{4}$	M1	
	6	A1ft	ft their points

	Additional Guidance	

Q	Answer	Mark	Comments
20	7.5×0.4536 or 3.402 or $7.5 \times 0.4536 \times 1000$ or 3402	M1	
	2.54^2 or 6.4516	M1	oe
	their $3.402 \times 1000 \div$ their 6.4516 or their $3402 \div$ their 6.4516	M1dep	dep on M1 M1
	$527.(...)$	A1	

	Additional Guidance	

Q	Answer	Mark	Comments
21(a)	**Alternative method 1**		
	$4 + 9 + [1, 12]$ or $[14, 25]$ or $\frac{5}{15} \times 24$ or 8	M1	
	$8400 \times \frac{21}{50}$ or 3528	M1dep	oe
	211 680	A1	
	Alternative method 2		
	$\frac{8400}{50} \times 4$ or 672 and $\frac{8400}{50} \times 9$ or 1512 and $\frac{8400}{50} \times [1, 12]$ or $[168, 2016]$	M1	
	$\frac{8400}{50} \times 4 + \frac{8400}{50} \times 9 \; +$ $\frac{8400}{50} \times \frac{5}{15} \times 24$ or 3528	M1dep	oe
	211 680	A1	
	Additional Guidance		

Q	Answer	Mark	Comments
21(b)	Any appropriate explanation	B1	eg1 this is only a sample eg2 it may not reflect the whole population eg3 it may be different on another day eg4 it may be different at another time
	Additional Guidance		

Q	Answer	Mark	Comments
22(a)	$(x - 5)^2$ or $2a = 10$ or $a = 5$ or $a^2 + b = 29$	M1	
	$(x - 5)^2 + 4$ or $a = 5$ and $b = 4$	A1	
	Additional Guidance		

Q	Answer	Mark	Comments
22(b)	**Alternative method 1**		
	$(x - 3)^2 + 5$	M1	
	$x^2 - 3x - 3x + 9 + 5$ or $x^2 - 6x + 14$	M1	Correct expansion of their $(x + m)^2 + n$
	$c = -6$ and $d = 14$	A1	
	Alternative method 2		
	$\left(x + \dfrac{c}{2}\right)^2 + d - \dfrac{c^2}{4}$	M1	
	$\dfrac{c}{2} = -3$ and $d - \dfrac{c^2}{4} = 5$	M1	Equates coefficients for their $(x + a)^2 + b$
	$c = -6$ and $d = 14$	A1	
	Additional Guidance		
	$9 + 3c + d = 5$		M0

Q	Answer	Mark	Comments
23	**Alternative method 1**		
	$\cos 40° = \dfrac{y}{100}$ or $100 \cos 40°$ or $\sin 50° = \dfrac{y}{100}$ or $100 \sin 50°$ or $76.6(0...)$	M1	Any letter y is the vertical side May be seen on diagram
	$\sin 40° = \dfrac{x}{100}$ or $100 \sin 40°$ or $\cos 50° = \dfrac{x}{100}$ or $100 \cos 50°$ or $\tan 40° = \dfrac{x}{\text{their } y}$ or their $y \times \tan 40°$ or $\tan 50° = \dfrac{\text{their } y}{x}$ or $\dfrac{\text{their } y}{\tan 50}$ or $\sqrt{100^2 - \text{their } y^2}$ or $[64.27, 64.3]$	M1	Any letter x is the horizontal side May be seen on diagram
	their $64.3^2 + 120^2 - 2 \times$ their $64.3 \times$ $120 \times \cos 30°$ or $[5169, 5172.4]$	M1	
	$\sqrt{\text{their } [5169, 5172.4]}$ or $[71.8, 71.92]$	M1dep	dependent on third M1 May be seen on diagram
	$\dfrac{\text{their } 76.6 + \text{their } [64.27, 64.3] + \text{their } [71.8, 71.92] + 100 + 120}{50}$	M1dep	
	9	A1	

Q	Answer	Mark	Comments
	Alternative method 2		
	$\sin 40° = \dfrac{x}{100}$ or $100 \sin 40°$ or $\cos 50° = \dfrac{x}{100}$ or $100 \cos 50°$ or [64.27, 64.3]	M1	Any letter x is the horizontal side May be seen on diagram
	$\cos 40° = \dfrac{y}{100}$ or $100 \cos 40°$ or $\sin 50° = \dfrac{y}{100}$ or $100 \sin 50°$ or $\tan 40° = \dfrac{\text{their } x}{y}$ or $\dfrac{\text{their } x}{\tan 40}$ or $\tan 50° = \dfrac{y}{\text{their } x}$ or or their x × $\tan 50°$ or $\sqrt{100^2 - \text{their } x^2}$ or 76.6(0...)	M1	Any letter y is the vertical side May be seen on diagram
	their $64.3^2 + 120^2 - 2 \times$ their $64.3 \times$ $120 \times \cos 30°$ or [5169, 5172.4]	M1	
	$\sqrt{\text{their } [5169, 5172.4]}$ or [71.8, 71.92]	M1dep	dependent on third M1 May be seen on diagram
	$\dfrac{\text{their } 76.6 + \text{their } [64.27, 64.3] + \text{their } [71.8, 71.92] + 100 + 120}{50}$	M1dep	
	9	A1	
	Additional Guidance		
	First 2 M marks Sides have been transposed		M0 M0
	Third M1 is not dependent		

Q	Answer	Mark	Comments
24	(cf values) 8, 56, 100, 110 and 120	M1	Allow one error but no omission Allow inclusion of 0 May be implied by correct frequencies
	(frequencies) 8 (– 0) or 8 and their 56 – their 8 or 48 and their 100 – their 56 or 44 and their 110 – their 100 or 10 and their 120 – their 110 or 10	M1	ft their cf values Must have 5 frequencies
	(class widths) 20, 20, 40, 40 and 100	M1	All correct
	(frequency densities) 0.4 and 2.4 and 1.1 and 0.25 and 0.1	A1ft	ft their frequencies and their class widths Must have 5 frequency densities Must have first and second M1
	Suitable axes and scaling on grid	B1ft	ft their frequency densities
	Bars of correct width and height	A1	Must be fully correct
	Additional Guidance		
	Ignore any polygon drawn with a histogram		