GCSE
MATHEMATICS

New Specimen Papers published June 2015

Paper 1 Higher – Mark Scheme

8300/1H

Version 1.0

Principal Examiners have prepared these mark schemes for specimen papers. These mark schemes have not, therefore, been through the normal process of standardising that would take place for live papers.

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 …	Accept 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.

AQA

Q	Answer	Mark	Comments
1	400×1.07	B1	
2	3^8	B1	
3	55 000 cm^2	B1	
4	B	B1	
5	Straight ruled line of best fit	B1	Through (1, 9000) to (1, 10 000) and (8, 800) to (8, 1800)
	3400	B1ft	Reads correctly from their straight line of best fit with negative gradient Within $\frac{1}{2}$ square SC1 [3200, 3800] with no straight line of best fit drawn
6	$3 \times 1 - 1^3 = 3 - 1$ $= 2$ and correct	B1	Condone No, they should be 1 and –2 for B1B1 SC1 $w = -2$
	$3 \times (-1) - (-1)^3 = -3 + 1$ $= -2$ and incorrect	B1	
7	$\frac{11}{4}$ $(\times)$ $\frac{12}{7}$	M1	Converts both fractions to improper with at least one correct
	$\frac{\text{their } 11 \times \text{their } 12}{\text{their } 4 \times \text{their } 7}$ or $\frac{132}{28}$ or $4\frac{20}{28}$ or $\frac{33}{7}$	M1dep	oe fraction
	$4\frac{5}{7}$	A1	

Q	Answer	Mark	Comments
8	$5x - 3x > 11 + 2$ or $2x > 13$	M1	
	$x > 6.5$	A1	oe SC1 6.5
9	Lists at least three terms from first sequence between 20 and 40	M1	eg 21, 23, 25, ...
	Lists at least three terms from second sequence between 20 and 40	M1	eg 20, 23, 26,...
	23 29 35	A1	SC2 for any two correct with at most one incorrect SC1 for any one correct with at most two incorrect

Q	Answer	Mark	Comments
10	**Alternative method 1**		
	$18 \div (3 + 2)$ or 3.6	M1	
	their $3.6 \times 3 \times 2.8(0)$ or 30.24(0)	M1dep	
	their $3.6 \times 2 \times 3.5(0)$ or 25.2(0)	M1dep	dep on first M1
	55.44	A1	
	Alternative method 2		
	$3 \times 2.8(0) + 2 \times 3.5(0)$ or 15.4(0)	M1	
	$18 \div (3 + 2)$ or 3.6	M1	
	their $3.6 \times$ their 15.4(0)	M1dep	dep on M1 M1
	55.44	A1	
	Alternative method 3		
	$3 \times 2.8(0) + 2 \times 3.5(0)$ or 15.4(0)	M1	
	their $15.4(0) \div 5$ or 3.08	M1dep	
	their 3.08×18	M1dep	
	55.44	A1	

Q	Answer	Mark	Comments
11	$\frac{29+1}{2}$ or 15th value identified	M1	
	6	A1	

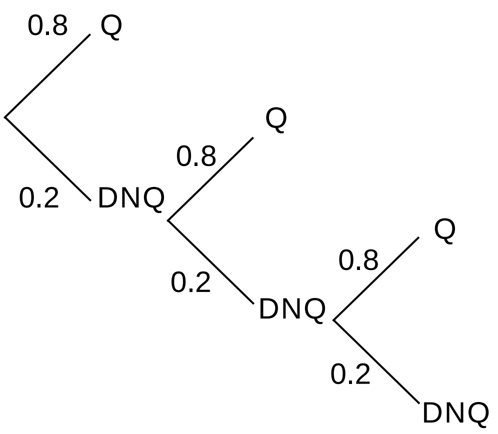
Q	Answer	Mark	Comments
12	**Alternative method 1**		
	$(x + 3)^2$	M1	oe
	$x^2 + 3x + 3x + 9$	A1	oe
	$3 \times (x + 3)$	M1	oe
	$x^2 + 3x + 3x + 9 + 3x + 9 + 9$ $= x^2 + 9x + 27$	A1	
	Alternative method 2		
	$(x + 6)(x + 3)$	M1	oe
	$x^2 + 6x + 3x + 18$	A1	oe
	their $(x^2 + 6x + 3x + 18) + 3 \times 3$	M1	oe
	$x^2 + 6x + 3x + 18 + 9$ $= x^2 + 9x + 27$	A1	
	Alternative method 3		
	$(x + 3)^2$	M1	oe
	$x^2 + 3x + 3x + 9$	A1	oe
	$3 \times (x + 6)$	M1	oe
	$x^2 + 3x + 3x + 9 + 3x + 18$ $= x^2 + 9x + 27$	A1	
	Alternative method 4		
	$(x + 6)^2$	M1	oe
	$x^2 + 6x + 6x + 36$	A1	oe
	$3 \times (x + 3)$	M1	oe
	$x^2 + 6x + 6x + 36 – 3x – 9$ $= x^2 + 9x + 27$	A1	

AQA

Q	Answer	Mark	Comments
13(a)	0.64	B1	
13(b)	$\frac{x}{4} = \cos 50°$ or $\frac{x}{4}$ = their 0.64 or 4 × their 0.64	M1	oe their 0.64 from (a)
	2.6	A1ft	oe ft their 0.64 from (a)
14(a)	0.16 + 0.24 + 0.16 + 0.24 or 0.8(0)	M1	
	0.2	A1	oe
14(b)	0.4(0)	B1	
14(c)	**Alternative method 1**		
	4 ÷ 0.16 or 1 number ↔ 0.04	M1	oe
	25	A1	oe
	Alternative method 2		
	$\frac{0.24}{0.16} \times 4$ or 6 or $\frac{\text{their } x}{0.16} \times 4$ or 5	M1	oe Attempt to work out how many prime numbers in the range $361 \leqslant n < 390$ or $421 \leqslant n < 450$ or $331 \leqslant n < 360$
	25	A1	
15	2.376×10^4	B2	B1 (a =) 2.4 or 24 000 and 240 or 23 760 or value calculated that is correctly converted to standard form

Q	Answer	Mark	Comments
16	**Alternative method 1**		
	$x + 25 + 2x + 35 = 180$	M1	oe
	$x = 40$	A1	
	$2 \times$ their 40 + 35 and $5 \times$ their 40 – 85	M1dep	
	$2 \times 40 + 35 = 115$ and $5 \times 40 - 85 = 115$ and corresponding angles	A1	
	Alternative method 2		
	$5x - 85 = 2x + 35$	M1	oe
	$x = 40$	A1	
	$2 \times$ their 40 + 35 and their 40 + 25	M1dep	
	$2 \times$ their 40 + 35 = 115 and their 40 + 25 = 65 and angles on a straight line	A1	

Q	Answer	Mark	Comments
17(a)	**Alternative method 1**		
	$15 \times \frac{4}{5}$ or 12 or $15 \times \frac{8}{6}$ or 20 or $\frac{4}{5} \times \frac{8}{6}$ or $\frac{32}{30}$ or $\frac{16}{15}$	M1	oe
	their $12 \times \frac{8}{6}$ or their $20 \times \frac{4}{5}$ or their $\frac{16}{15} \times 15$	M1dep	
	16	A1	
	Alternative method 2		
	$4 \times 15 \times 8$ or 480	M1	
	their $480 \div 5 \div 6$	M1dep	
	16	A1	
17(b)	If one person works at a slower rate the answer will be higher or If some of the people work at a faster rate the task will take less time to complete	B1	oe

Q	Answer	Mark	Comments
18	$x \times x \times 2x$ or $2x^3$	M1	oe
	$\frac{x}{2}$ used as radius	M1	eg $\pi \times \frac{x}{2} \times \frac{x}{2}$ seen
	$\frac{1}{2} \times \pi \times \frac{x}{2} \times \frac{x}{2} \times x$ or $\frac{1}{8}\pi x^3$	M1	oe
	$2x^3 + \frac{1}{8}\pi x^3$	A1	Accept $a = 2$ and $b = 8$ Condone if subsequently factorised to $(2 + \frac{1}{8}\pi)x^3$
19	$\cos 30° = \frac{\sqrt{3}}{2}$ or $\tan 60° = \sqrt{3}$	M1	
	$4\sqrt{3}$	A1	
	$\sqrt{48}$ or $k = 48$	B1ft	ft value seen in the form $a\sqrt{b}$ where a and b are integers > 1
20(a)		B2	Q = Qualifies DNQ = Does not qualify B1 0.2 on DNQ branch or All branches included labelled correctly with Q and DNQ but probabilities not all correct

Q	Answer	Mark	Comments
20(b)	**Alternative method 1**		
	their 0.2 × their 0.8 or 0.16	M1	Look on tree diagram for working
	0.96	A1	
	Alternative method 2		
	(their 0.2)^2 or 0.04	M1	Look on tree diagram for working
	0.96	A1	

Q	Answer	Mark	Comments
21	angle *ABC* = x	M1	
	angle *BAC* = x and alternate segment theorem	M1	
	angle *ABC* = x and angle *BAC* = x and alternate segment theorem and two equal angles so isosceles (*AC* = *BC*)	A1	

Q	Answer	Mark	Comments
22	Full evaluation	B2	Either gives a correct solution eg divide area by 6 (to work out area of one face of cube A) calculate the square root of the answer (to work out length of one edge of cube A) halve this length (to work out length of edge on cube B) then cube this answer (to work out the volume of cube B) or states or implies that if Steph's order is maintained eg would need to quarter the surface area (to work out surface area of cube B) B1 for partial evaluation eg order is incorrect or 1st line is incorrect

Q	Answer	Mark	Comments
23(a)	0	B1	
23(b)	1	B1	
23(c)	2	B1	
24(a)	0.6 or $\frac{3}{5}$	B1	oe fraction Accept 36 m/s per min
	m/s^2	B1	oe Accept m/s per min only if their acceleration is 36 m/s per min
24(b)	Chord from (0, 0) to (50, 30) and attempt at tangent to curve that is parallel to chord	M1	
	[11, 14]	A1	Must see working on the graph
25	$2(cx + 5) + c$ or $2cx + 10 + c$	M1	
	their $2cx = 6x$ or their $2c = 6$ or $c = 3$	M1	Must have attempted fg(x)
	13	A1	SC2 for 11

Q	Answer	Mark	Comments
26	$\dfrac{10}{3\sqrt{5}} \times \dfrac{\sqrt{5}}{\sqrt{5}}$ or $\dfrac{10\sqrt{5}}{15}$ $\dfrac{10}{3\sqrt{5}} \times \dfrac{3\sqrt{5}}{3\sqrt{5}}$ or $\dfrac{30\sqrt{5}}{45}$ or $\dfrac{\sqrt{20}}{3}$	M1	oe Must multiply numerator and denominator eg $\dfrac{10}{\sqrt{45}}$ is M0 $\dfrac{10}{\sqrt{45}} \times \dfrac{\sqrt{45}}{\sqrt{45}}$ is M1
	$\dfrac{2\sqrt{5}}{3}$	A1	
27	**Alternative method 1**		
	(n = 0.17272… and) $100n$ = 17.272…	M1	oe eg $10n$ = 1.7272… and $1000n$ = 172.72…
	$99n$ = 17.272… – 0.17272… or $99n$ = 17.1 or $\dfrac{17.1}{990}$ or $\dfrac{171}{990}$ or $\dfrac{57}{330}$	M1dep	oe eg $990n$ = 172.72… – 1.7272… or $990n$ = 171
	$\dfrac{19}{110}$	A1	
	Alternative method 2		
	0.07272… = $\dfrac{72}{990}$	M1	
	$\left(\dfrac{1}{10} + \dfrac{72}{990} =\right) \dfrac{99}{990} + \dfrac{72}{990}$ or $\dfrac{171}{990}$ or $\dfrac{57}{330}$	M1dep	
	$\dfrac{19}{110}$	A1	

Q	Answer	Mark	Comments
28	**Alternative method 1**		
	P (1, 3) or $y = 3$ or grad $OP = 3$	B1	
	grad $PQ = -\dfrac{1}{\text{their } 3}$ or $-\dfrac{1}{3}$	M1	
	$y = (\text{their } -\frac{1}{3})\, x + c$ and substitutes (1, their 3) or $y - \text{their } 3 = (\text{their } -\frac{1}{3})(x - 1)$	M1dep	oe $\dfrac{\text{their } 3}{x-1}$ or $-\dfrac{\text{their } 3}{x-1}$
	Substitutes $y = 0$ in their equation	M1dep	$-\dfrac{\text{their } 3}{x-1} = \text{their } -\dfrac{1}{3}$
	(10, 0)	A1	
	Alternative method 2		
	P (1, 3) or $y = 3$ or grad $OP = 3$	B1	
	$\dfrac{\text{their } 3}{1} = \dfrac{QN}{\text{their } 3}$	M1dep	
	their 3 $\times$ their 3 or 9	M1dep	
	tan $PON = \dfrac{\text{their } 3}{1}$	M1	N is on the x-axis PN is perpendicular to the x-axis
	(10, 0)	A1	