GCSE
MATHEMATICS

Original Specimen Assessment Materials Paper 3 Higher

Mark Scheme

8300/3H

Version 3.0

This mark scheme does not reflect in full the expected standard and requirements for GCSE mathematics in 2017 and is superseded by the new specimen mark scheme published in June 2015

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 …	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 1.2 (1)	$-7 \leqslant x < 6$	B1	
2 1.3a (1)	$\frac{4}{9}$	B1	
3 2.3a (1)	2.5 cm/s	B1	
4 1.3a (1)	x is $\frac{2}{3}$ of y	B1	
5 1.3a (2)	$3a(3a - 2)$	B2	B1 $a(9a - 6)$ or $3(3a^2 - 2a)$
6 1.3a (2)	$+ 8, + 12, + 16$ seen or implied or $40 + 20$	M1	
	60	A1	
7(a) 2.1b (1)	Valid reason Any indication that actual outcomes do not always match theoretical probability	B1	eg It's just chance Might get two of one number
7(b) 1.3b (2)	$7 + 12 + 9$ or $50 - (4 + 5 + 13)$ or 28	M1	oe
	$\frac{28}{50}$ or $\frac{14}{25}$ or 0.56	A1	
8 2.4a (2)	3×180	M1	oe
	540 with correct method shown	A1	SC1 540 without correct method shown

Q	Answer	Mark	Comments
9 1.3b (1) 3.1d (2)	**Alternative method 1**		
	60 × 0.5 or 30	M1	oe
	(100 – 60) × 0.2 or 8	M1	oe
	38	A1	SC2 0.38
	Alternative method 2		
	Implies boys are 40% and works out 50% of their girl total	M1	eg 60 and 40 seen and $\frac{1}{2} \times 60 = 30$ or 120 and 80 seen and $\frac{1}{2} \times 120 = 60$
	Works out 20% of their boy total	M1dep	eg 0.2 × 40 or 8 or 0.2 × 80 or 16
	38	A1	oe
10(a) 1.3a (1)	(2, 16)	B1	
10(b) 2.1a (1)	12	B1	
10(c) 1.3a (1)	–2 and 6	B1	
11 1.3b (1) 3.1d (1) 3.3 (1)	9.83 × 7 or 68.81	M1	
	their 68.81 – 9.75 – 9.79 – 9.80 – 9.88 – 9.94 – 9.98 or 9.67	M1dep	oe
	9.67 and Yes	A1	

Q	Answer	Mark	Comments
12 1.3b (2) 3.1b (2)	$7x - 3 = 3x + 3$	B1	
	$7x - 3x = 3 + 3$ or $4x = 6$	M1	oe isolating x and number terms
	$x = 1.5$	A1	
	7.5 or $7\frac{1}{2}$	B1ft	ft $7 \times$ their $1.5 - 3$ or 3(their $1.5 + 1$)
13 1.3a (1)	2	B1	
14 1.3b (1) 3.1b (2)	Any two sets of $a = 5, b = 3, c = 13$ $a = 7, b = 11, c = 5$ $a = 5, b = 2, c = 17$	B3	B2 for any one set B1 $a = 5, b = 5, c = 5$ or b and c prime and a non-prime integer and $a = \sqrt{4b + c}$
15 1.3b (2)	$64x^6y^{10}$	B2	B1 for two terms correct
16 1.3b (1) 3.1d (4)	20 – 12 or 8 seen	M1	
	$\sqrt{17^2 - 8^2}$ or 15	M1	oe
	$\frac{1}{2}(12 + 20) \times 15$ or 240	M1dep	oe Dependent on 2nd M1
	their $240 \div 90$ or 2.66… or $2\frac{2}{3}$	M1dep	
	$(3 \times 19.25 =)$ 57.75	A1	
17 1.3b (3)	$6x^2 - 16xy + 15xy - 40y^2$	M1	Allow one error
	$6x^2 - 16xy + 15xy - 40y^2$	A1	Fully correct
	$6x^2 - xy - 40y^2$	A1ft	ft their four terms

Q	Answer	Mark	Comments
18 1.3b (1) 3.1d (2)	**Alternative method 1**		
	$a : b$ or $\frac{a}{b}$ equivalent to 3 : 4 with a and $b > 10$ and $a - 6 : b$ or $\frac{a-6}{b}$ seen	M1	
	30 : 48 or $\frac{30}{48}$	A1	
	48	A1	
	Alternative method 2		
	$3x - 6$ and $4x$	M1	
	$\frac{3x-6}{4x} = \frac{5}{8}$ or $x = 12$	M1	oe
	48	A1	
19(a) 2.3a (1) 2.3b (2)	Median at 37	B1	
	Quartiles at 24 and 56	B1	
	Ends at 0 and 107 and correct boxplot presentation	B1	
19(b) 2.1b (2)	Correct comment about average	B1	eg the median age of the population will go up by 7 years, so average age will rise
	Correct comment about spread	B1	eg the inter-quartile range will have increased by 8 years, so ages are more spread out

Q	Answer	Mark	Comments
20(a) 3.4a (1)	Tom is using simple interest instead of compound interest	B1	oe He has assumed the interest is the same each year
20(b) 1.3b (1) 3.1d (2)	Use of 1.025	B1	
	$\frac{11696.67}{1.025^8}$	M1	
	9600	A1	
21(a) 2.4b (2)	511	B1	
	7×73 or 7 is a factor or 73 is a factor	B1	
21(b) 2.5a (1)	Incorrect and $2^5 - 1 : 2^7 - 1 \neq 5 : 7$ or 31 : 127 shown	B1	
22 1.3a (2)	$\frac{y}{\sin 35} = \frac{15}{\sin 70}$	M1	oe
	[9.15, 9.16] or 9.2	A1	Accept 9 with working
23 2.2 (3)	$a = 2$	B1	
	$x^2 - bx - bx + b^2$ or $x^2 - 2bx + b^2$ or $-2ab = -20$ or $-ab = -10$ or $b = 5$	M1	oe
	$2(x - 5)^2 + 15$	A1	

Q	Answer	Mark	Comments
24 2.1a (1) 2.4a (3)	False – angle in semicircle = 90° (not 92)	B1	
	True – opposite angles in cyclic quad total 180°	B1	
	True – alternate angles *ACD* and *CAB* = 50° or 92 + 88 = 180 (allied)	B1	50° angles may be on diagram - need not say angle sum of a triangle = 180°
	False – angle *CAD* = 42°, should be 32° if *DE* is a tangent by alternate segment	B1	
25 1.3a (2) 3.1a (2)	Any one of 155, 165, 7.15, 7.25	B1	
	$\frac{155}{7.25}$ or $\frac{165}{7.15}$	M1	
	21.3.... or 21.4 or 23.0….or 23.1	A1	
	Upper bound is 23.1 Lower bound is 21.4	A1	
26(a) 2.2 (2)	$(x-5)^2+1$	M1	
	$x^2-5x-5x+25+1$ $=x^2-10x+26$	A1	
26(b) 1.3b (1) 3.1b (3)	x^2+1-5 or x^2-4	B1	
	$x^2-10x+26$ = their (x^2-4)	M1	
	$-10x=-4-26$ or $-10x=-30$ or $10x=30$	M1	oe
	3	A1	

Q	Answer	Mark	Comments
27 1.3b (1) 3.1b (5)	$\frac{1}{3} \times 14 \times 8 \times h = 336$	M1	oe
	$h = \frac{336 \times 3}{14 \times 8}$ or $h = 9$	M1	oe
	$BX^2 = 7^2 + 4^2$ or $BD^2 = 14^2 + 8^2$ or $BX = \sqrt{65}$ or $BD = 2\sqrt{65}$ or $VB = \sqrt{146}$	M1	oe
	Identifies $V\hat{B}X$	M1	oe
	$\tan V\hat{B}X = \frac{\text{their } 9}{\text{their } \sqrt{65}}$	M1	$\cos V\hat{B}X = \frac{\text{their } \sqrt{65}}{\text{their } \sqrt{146}}$ or $\sin V\hat{B}X = \frac{\text{their } 9}{\text{their } \sqrt{146}}$
	48 or 48.1…	A1	

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