AQA

GCSE
MATHEMATICS

2023 PRACTICE PAPER SET 1 Higher Tier Paper 3

Mark Scheme

8300/3H

Version 1.2

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	Comment
1	$\frac{4}{3}$	B1	
2	$\frac{2}{5} \times \frac{2}{5}$	M1	oe
	0.16	A1	oe
3	$+1, +3, +5$ seen or implied or $14 + 7$	M1	
	21	A1	
4	$-4 < x \leq 3$	B1	
5	$5a(2a + 5)$	B2	B1 $a(10a + 25)$ or $5(2a^2 + 25a)$
6	**Alternative method 1**		
	60×0.45 or 27	M1	oe
	$(100 - 60) \times 0.75$ or 30	M1	oe
	57	A1	SC2 0.57
	Alternative method 2		
	Implies juniors are 40% and works out 45% of their senior total	M1	eg 60 and 40 seen and 45% of 60 = 27
	Works out 75% of their junior total	M1dep	eg 75% of "their 40". or 30
	57	A1	oe

Q	Answer	Mark	Comment
7	$8x - 5 = 4x + 24$	B1	
	$8x - 4x = 24 + 5$ or $4x = 29$	M1	oe isolating x and number terms
	$x = 7.25$	A1	
	53	B1ft	ft $8 \times$ their $7.25 - 5$ or 4(their $7.25 + 6$)
8(a)	Valid reason Any indication that actual outcomes do not always match theoretical probability	B1	eg It's just chance Might get more than two of one letter
8(b)	$13 + 10 + 7$ or $50 - 20$ or 30	M1	oe
	$\frac{30}{50}$ or $\frac{3}{5}$ or 0.6	A1	
9	4×180	M1	oe
	720 with correct method shown	A1	SC1 720 without correct method shown
10(a)	(3, 16)	B1	
10(b)	7	B1	
10(c)	-1 and 7	B1	
11	16.04×5 or 80.2	M1	
	their $80.2 - 15.2 - 15.9 - 16.1 - 16.8$ or 16.2	M1dep	oe
	16.2 and No	A1	

Q	Answer	Mark	Comment
12	5	B1	
13(a)	$16x^{16}y^{-12}$	B2	B1 for two terms correct
13(b)	$6x^2 - 21xy + 12xy - 42y^2$	M1	Allow one error
	$6x^2 - 21xy + 12xy - 42y^2$	A1	Fully correct
	$6x^2 - 9xy - 42y^2$	A1ft	ft their four terms
14	$a = 11$, $b = 23$, $c = 29$	B3	B2 three trials using correct prime numbers B1 all 4 prime numbers between 15 and 30 seen and at least one trial.
15(a)	Valid statement	B1	eg He has assumed the interest is the same each year He is using simple interest not compound interest Accept It should be 1.035 not 1.35 The 5 should be a power He should divide not multiply
15(b)	1 + 0.035 or 1.035 or 100 + 2.5 or 103.5	M1	
	$\frac{11876.86}{1.035^5}$ or 10000	M1	oe allow 9999.99
	1876.86	A1	

Q	Answer	Mark	Comment
16	16×32 or 512 seen	M1	
	$\sqrt{40^2 - 32^2}$ or 24	M1	oe
	$\frac{1}{2}$(their 24) $\times$ 32 or 384	M1dep	oe Dependent on 2nd M1
	Their $\frac{512 + 384}{2.5}$ or 358.4	M1dep	
	430.80 or 430.08	A1	
17(a)	Median at 40	B1	tolerance $\pm \frac{1}{2}$ square
	Quartiles at 25 and 76	B1	tolerance $\pm \frac{1}{2}$ square
	Ends at 0 and [98 , 99] and correct boxplot presentation	B1	
17(b)	Correct comment about average	B1	eg the median age of the population will go up by 5 years, so average age will rise
	Correct comment about spread	B1	eg the inter-quartile range will have decreased by 11 years, so ages are less spread out
18	$\frac{x}{\sin 55} = \frac{14}{\sin 30}$	M1	oe
	[22.93, 22.94] or 22.9	A1	Accept 23 with working

Q	Answer	Mark	Comment
19	**Alternative method 1**		
	$7x$ and $6x + 14$	M1	
	$\frac{6x+14}{7x} = \frac{8}{7}$ or $x = 7$	M1	oe
	105	A1	
	Alternative method 2		
	$a : b$ or $\frac{a}{b}$ equivalent to 7 : 8 with a and $b > 10$ and a : b + 14	M1	
	49 : 56 or $\frac{49}{56}$	A1	
	105	A1	
20	$ax^2 - abx - abx + ab^2 - 4b$ or $3(x-3)^2 - 27 + c$	M1	oe
	$a = 3$ and $b = 3$	A1	
	15	A1	

Q	Answer	Mark	Comments
21(a)	1023	B1	
	$3 \times 11 \times 31$ or 3 is a factor or 11 is a factor or 31 is a factor	B1	
21(b)	Incorrect and $2^2 - 1 : 2^3 - 1 \neq 2 : 3$ or 3 : 7 shown	B1	
22(a)	$2(x+4)^2 + 3$	M1	
	$2x^2 + 16x + 32 + 3$ $= 2x^2 + 16x + 35$	A1	
22(b)	$2x^2 + 3 + 4$ or $2x^2 + 7$	B1	
	$x^2 + 16x + 35 =$ their $(2x^2 + 7)$	M1	
	$16x = 7 - 35$ or $16x = -28$	M1	
	–1.75	A1	
23	Any one of 195, 205, 7.145, 7.155	B1	
	205×7.155 or 195×7.145	M1	
	1466.775 or 1393.275	A1	
	Upper bound is 1467 Lower bound is 1393	A1	

Q	Answer	Mark	Comments
24	False – angle in semicircle must be 90° and ABC = 105°	B2	B1 for ABD=65° or DBC=40° or ABC=105° or 'must be' 90° (angles may be marked on diagram)
	True – opposite angles in cyclic quad total 180°	B1	
	True – alternate segment theorem or CDE=DAC=40°	B1	
25	$\frac{1}{3} \times 10 \times 16 \times h = 640$	M1	oe
	$h = \frac{640 \text{ x } 3}{10 \text{ x } 16}$ or $h = 12$	M1	oe
	$CX^2 = 5^2 + 8^2$ or $CD^2 = 10^2 + 16^2$ or $CX = \sqrt{89}$ or $CD = 2\sqrt{89}$ or $VC = \sqrt{223}$	M1	oe
	Identifies *VCX*	M1	oe
	$\tan V\hat{C}X = \frac{\text{their } 12}{\text{their } \sqrt{89}}$	M1	$\cos V\hat{C}X = \frac{\text{their}\sqrt{89}}{\text{their}\sqrt{233}}$ or $\sin V\hat{C}X = \frac{\text{their } 12}{\text{their}\sqrt{233}}$
	52 or 51.8268…	A1	