



GCSE MATHEMATICS

2023 PRACTICE PAPER SET 1 Higher Tier Paper 2

Mark Scheme

8300/2H

Version 1.1

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 <i>a</i> and <i>b</i> 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.

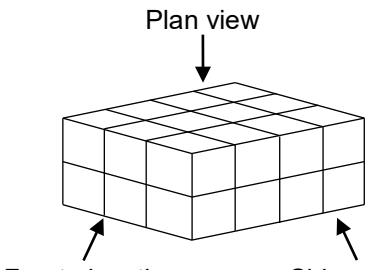
Work replaced

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(a)	80°	B1	
1(b)	Parallelogram or trapezium or rhombus	B1	
2	$\frac{11}{8}$	B1	oe fraction eg $\frac{1375}{1000}$
3	$y = 0$	B1	
4	$2 (\times) 150$ or $3 (\times) 100$ or $5 (\times) 60$	M1	oe Correct product with at least one prime factor
	$2 \times 2 \times 3 \times 5 \times 5$	A1	oe
5	$51 \div 3$	M1	
	34 and 17	A1	
	Fully correct <pre> graph LR 60((60)) -- Pass --> 40((40)) 60 -- Fail --> 20((20)) 40 -- Pass --> 34((34)) 40 -- Fail --> 6((6)) 20 -- Pass --> 17((17)) 20 -- Fail --> 3((3)) style 34 fill:#fff,stroke:#000 style 6 fill:#fff,stroke:#000 style 17 fill:#fff,stroke:#000 style 3 fill:#fff,stroke:#000 </pre>	A1	

Q	Answer	Mark	Comments
6	2, 3 and 4 chosen	M1	May be implied from a diagram Plan view  Front elevation Side
	24	A1	
7(a)	$4 \leq t < 6$	B1	
7(b)	Alternative method 1		
	$18 + 10 + 16 + 12$ or 56 and 60×0.9 or $(18 + 10 + 16 + 12) \div 60 \times 100$ or 93.3...	M1	oe
	56 and 54 and Yes or 93(.33)(%) and Yes	A1	
	Alternative method 2		
	4 and 60×0.1 or $4 \div 60 \times 100$ or 6.66	M1	oe
	4 and 6 and Yes or 6(.66)(%) or 7(%) and Yes	A1	

Q	Answer	Mark	Comments
8(a)	Use of cos, or cos chosen, ie circled in SOHCAHTOA	M1	
	$\cos x = \frac{7}{12}$ or $\sin x = \frac{\sqrt{12^2 - 7^2}}{12}$ or $\tan x = \frac{\sqrt{12^2 - 7^2}}{7}$ $x = \cos^{-1} \left(\frac{7}{12} \right)$ or $x = \sin^{-1} \left(\frac{\sqrt{12^2 - 7^2}}{12} \right)$ or $x = \tan^{-1} \left(\frac{\sqrt{12^2 - 7^2}}{7} \right)$	M1	oe
	54(.3)	A1	
8(b)	Use of tan or tan chosen eg circled TOA in SOHCAHTOA	M1	
	$\tan 42 = \frac{y}{35}$ or $\tan 48 = \frac{35}{y}$ or $y = 35 \tan 42$ or $y = \frac{35}{\tan 48}$	M1	oe $x = 47.1...$ and $35^2 + y^2 = 47.1^2$ 47.1 cos 48 or 47.1 sin 42
	31.5 (...)	A1	
9	$y^2 - 3y + 8y - 24$	M1	Allow 1 error
	$y^2 + 5y - 24$	A1	

Q	Answer	Mark	Comments
10	8 and 80	B1	
	their $8 \times 10 + \text{their } 80 \times 2$ or $80 + 160$ or 240	M1	
	their $240 + 155$ or 395	M1	
	their $395 \div 0.5 - \text{their } 8 - \text{their } 80$ or their $395 \times 2 - \text{their } 8 - \text{their } 80$ or $790 - \text{their } 8 - \text{their } 80$ or 702	M1	
	702	A1	
11	$\pi \times 30^2 \times 160$	M1	452 389.... or $144\,000\pi$ [452 160, 452389]
	their $452\,389 \div 1000$ or their $452\,389 \div 1000 \div 0.1$	M1	452.3... or 144π [452.150, 452.389] 4523.8.... [4521.6, 4524]
	their $4523.89 \div 60 (\div 60)$ or $(60 \times 60) = 3600$ or $0.1 \times 60 \times 60$ or 360	M1dep	75.398... or 1.25... [75.36, 75.4] or [1.25, 1.0526]
	[75.36, 75.4] and Yes or [1.25, 1.0526] and Yes or 3600 and 4523.8.... and Yes or 452.3... and 360 and Yes	A1	oe

Q	Answer	Mark	Comments
12	Gradient is 4	B1	Implied by $y = 4x \dots$
	their $4 \times -1 + c = 1$	M1	
	$y = 4x + 5$ or $4x - y + 5 = 0$ or $y - 4x - 5 = 0$	A1 ft	ft their gradient
13(a)	Fully correct cf diagram using UCBs and 12, 50, 86, 110, 120 (100, 12) (120, 50) (140, 86) (160, 110) (180, 120)	B3	Ignore (80, 0) Ignore before 1st point and after last point B2 for one error eg constant plotting at mid class intervals with line joining points consistent plotting at lower bounds with line joining points One error on cf values eg 12, 50, 86, 110, 121 Points not joined B1 for 12, 50, 86, 110, 120 or for bar chart indicating correct heights with no lines
13(b)	Reads off at 130	B1ft	ft their curve Must be increasing $\pm \frac{1}{2}$ square tolerance

Q	Answer	Mark	Comments
14	140% = £2.66 or $2.66 \div 1.4$ or (£)1.9(0)	M1	oe
	their (£)1.9(0) $\times 1.5$	M1dep	
	2.85	A1	
15	3, 1 and -2	B3	Any order B1 for each
16(a)	$g = 4.5y$ or $g = ky$ and $k = 4.5$	M1	oe
	40.5	A1	
16(b)	$g \propto \frac{1}{x^3}$ or $g = \frac{k}{x^3}$	M1	oe
	$25 = \frac{k}{2^3}$ or $k = 200$ or $g = \frac{200}{x^3}$	M1dep	oe
	0.2	A1	oe
16(c)	A	B1	
17	Bars should not be of equal width or horizontal scale is incorrect	B1	oe
	Vertical axis should be frequency density or heights of bars incorrect	B1	oe

Q	Answer	Mark	Comments
18	Angle $BCD = 2x$	M1	Opposite angles of parallelogram are equal
	Angle $FCE = 360 - 90 - 90 - 2x$ or Angle $FCE = 180 - 2x$	M1	oe Angles at a point sum to 360°
	Angle $CFE = y$ or Angle $FCE = 180 - 2y$	M1	oe eg $2y + FCE = 180$ Isosceles triangle
	$180 - 2x + y + y = 180$	M1	oe Angles in a triangle sum to 180°
	$2y = 2x$ $y = x$	A1	All reasons must be stated
19(a)	$\frac{7^2 + 3}{2 \times 7 - 7}$ or 7.42....	M1	
	Substitutes their answer for x or 7.4052	M1	
	(7.42 and 7.4052 and answer) 7.4051	A1	Accept unrounded values for all but answer
19(b)	-0.00019399 or -1.9399×10^{-4}	B1ft	ft their answer to (a)
	Good approximation as the result is close to 0	B1ft	ft the result of their calculation

Q	Answer	Mark	Comments
20	$x(x - 11) + x + x + 2 + 36 = 150$	M1	
	$x^2 - 9x - 112 = 0$	A1	
	$(x - 16)(x + 7) = 0$	M1	oe $(x + a)(x + b)$ where $ab = -112$ and $a + b = -9$
	their 16 + their 16 + 2 or 34	M1	
	$\frac{16}{34}$	A1	oe SC2 for $\frac{x}{2x+2}$
21(a)	Draws a tangent at $t = 4$	B1	
	$\frac{\text{change in speed}}{\text{change in time}}$ for their tangent	M1	
	Correct answer for their tangent	A1ft	
21(b)	Attempts to work out area below straight lines	M1	eg 4×14 or 56 and $\frac{1}{2} \times 6 \times 14$ or 42
	Attempts to work out estimate of area under the curve	M1	eg $\frac{1}{2} \times 14 \times 14$ or 98 $\frac{1}{2} \times 18 \times 14$ or 126
	their total distance $\div 24$	M1	
	Their answer worked out correctly with no errors in area below straight lines	A1	Their area must be in the range [194, 224]
21(c)	Correct box ticked with suitable comment	B1ft	ft their answer to part (b) eg their (b) 194 Underestimate ticked and triangle less than area under curve their (b) 224 Overestimate ticked and trapezium more than area under curve

Q	Answer	Mark	Comments
22	$(w + 4)(w - 4)$	B1	
	$(w + 1)(w + 3)$	B1	
	$(3w + a)(w + b)$	M1	$ab = 4$ or $a + 3b = -13$
	$(3w - 1)(w - 4)$	A1	
	$\frac{6w - 2}{w + 1}$	A1	

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