GCSE
MATHEMATICS

Practice Papers Set 4
Paper 3 Higher – Mark Scheme

8300/3H

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.
[*a*, *b*)	Accept values $a \leq$ value $< b$
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.

Continental notation

Accept a comma used instead of a decimal point (for example, in measurements or currency), provided that it is clear to the examiner that the candidate intended it to be a decimal point.

Q	Answer	Mark	Comments
1	0.875	B1	
	Additional Guidance		
2	x^{18}	B1	
	Additional Guidance		
3	1 4 9 16	B1	
	Additional Guidance		
4	055°	B1	
	Additional Guidance		
5(a)	1 hour 40 minutes or 100 (minutes) or 1.66… (hours) seen	B1	oe eg 1:40
	450 ÷ 1.66(…) or 450 ÷ 1.67 or 450 ÷ $1\frac{2}{3}$	M1	their distance ÷ their time
	270	A1	
	Additional Guidance		

Q	Answer	Mark	Comments
5(b)	Faster	B1	
	Valid reason	B1dep	eg Travels further (distance) More distance (so faster)
	Additional Guidance		
6	19.5 or 20.5 or 200	M1	
	204	A1	SC1 for 344 or 345 or 545 or 455 or 205
	Additional Guidance		
7(a)	9.82×10^2 9.81×10^3 9812	B1	
	Additional Guidance		
7(b)	Any different example correctly evaluated	M1	eg $2 \times 10^3 \times 4 \times 10^2 = 8 \times 10^5$
	Not correct and correct reason or Not correct and counter example	A1	eg Not correct and $4 \times 10^6 \times 3 \times 10^7 = (4 \times 3) \times 10^{(6+7)}$ $= 12 \times 10^{13}$ Not correct and $a \times c$ might be 10 or greater
	Additional Guidance		

Q	Answer	Mark	Comments
8	**Alternative method 1**		
	8×11.4 or 91.2	M1	
	their $91.2 \div 0.82$ or 111.(2…)	M1dep	
	their $111.(2\ldots) \times 0.65$	M1dep	oe
	72.29 or 72.30 or 72	A1	(72, 72.29) implies M3
	Alternative method 2		
	$11.4 \div 0.82$ or 13.9…	M1	
	their $13.9\ldots \times 0.65$ or 9.0365…	M1dep	
	their 9.0365 …$\times 8$	M1dep	
	72.29 or 72.30 or 72	A1	(72, 72.29) implies M3
	Additional Guidance		
9(a)	$8^2 + 3^2 + 2^2$ or $64 + 9 + 4$ or 77	M1	
	8.77…	A1	
	8.8	B1ft	ft their 3 sf rounded to 2 sf
	Additional Guidance		
9(b)	$2a \times 2a$ or $(2a)^2$ or $4a^2$ seen	M1	
	$9a^2$ or $\sqrt{9a^2}$	M1dep	
	$3a$	A1	
	Additional Guidance		

Q	Answer	Mark	Comments
10	States that powers should be added (not multiplied)	B1	oe eg Should be $2 + 2 + 2$
	4^6	B1	
	Additional Guidance		
11	$\frac{120}{360} \times 2 \times \pi \times 4$ or $\frac{120}{360} \times 2 \times \pi \times 5$	M1	oe
	$\frac{120}{360} \times 2 \times \pi \times 4$ and $\frac{120}{360} \times 2 \times \pi \times 5$	M1	oe
	$\frac{120}{360} \times 2 \times \pi \times 5 - \frac{120}{360} \times 2 \times \pi \times 4$ or [8.37, 8.38] or 8.4 and [10.46, 10.48] or 10.5	M1dep	oe
	2.1	A1	
	Additional Guidance		
12	$2y - -y = 10 - 13$ or $3y = -3$ or $3x + 6x = 10 + 26$ or $9x = 36$	M1	Eliminates a variable
	$y = -1$ or $x = 4$	A1	
	$y = -1$ and $x = 4$	A1	
	Additional Guidance		

Q	Answer	Mark	Comments
13	$P\left(1+\frac{r}{100}\right)^n$	B1	
	Additional Guidance		
14	$v^2 - u^2 = 2as$	M1	
	$s = \frac{v^2 - u^2}{2a}$	A1	$\frac{v^2 - u^2}{2a}$ scores M1
	Additional Guidance		
15	$x_2 = 0.25$	M1	oe
	0.3218… or 0.3222…	A1	oe
	0.32	B1ft	ft their 3 dp value or better
	Additional Guidance		
16(a)	104°	B1	
	Additional Guidance		

Q	Answer	Mark	Comments
16(b)	Angle *SNM* = 48 (alternate segment theorem) or Angle *OSM* = 42 (angle between tangent and radius = 90)	B1	May be on diagram
	Angle *SOM* = 96 (angle at centre is twice the angle at the circumference) or angle *OMS* = 42 (Isosceles triangle)	B1dep	May be on diagram
	Valid reason for not being a diameter and two other reasons given	B1	eg Angle *SOM* is not 90° so not angle in a semicircle
	Additional Guidance		
	For final B2 must have all three reasons		

17	9600 or 0.001 43	B1	
	their 9600 ÷ 1430 or 9.6 ÷ their 0.001 43	M1	
	6.7(13)… (g/cm^3) and 7.75 and Definitely not steel or 6713 or 6700 (kg/m^3) and Definitely not steel	A1	
	Additional Guidance		

18	Comment comparing mean	B1	eg On average treated plant are taller
	Comment comparing IQR	B1	eg Less variation in treated plants Treated plants more consistent (height)
	Additional Guidance		

Q	Answer	Mark	Comments
19(a)	50	B1	
	Additional Guidance		
19(b)	64	B1	
	Additional Guidance		
19(c)	36	B1	
	Additional Guidance		

Q	Answer	Mark	Comments
20	**Alternative method 1**		
	$k = 2s$ or $s = \frac{k}{2}$	M1	
	$8s + 12k$ (= 46.08)	M1	
	$8s + 24s$ (= 46.08) or $4k + 12k$ (= 46.08)	M1dep	
	$32s = 46.08$ or $s = 1.44$ or $16k = 46.08$	M1dep	
	$k = 2.88$	A1	
	Alternative method 2		
	8 spoons = 4 knives or 12 knives = 24 spoons seen or implied	M1	
	4 + 12 (knives) or 8 + 24 (spoons)	M1dep	
	16 (knives) or 32 (spoons)	A1	
	46.08 ÷ 32 or 1.44 or 46.08 ÷ 16	M1	
	2.88	A1	
	Additional Guidance		

21(a)	8 cm	B1	
	Additional Guidance		

Q	Answer	Mark	Comments
21(b)	$\frac{21-13}{11-6}$	M1	oe
	$\frac{8}{5}$ or 1.6	A1	oe
	cm/s or cm s^{-1}	B1	oe eg centimetres per second
	Additional Guidance		
22(a)	Valid reason	B1	eg Broken axis Scale not continuous from zero Heights of bars not in correct proportion
	Additional Guidance		
22(b)	**Alternative method 1**		
	10 × 40 or 400 or 10 × 25 or 250 or 20 × 20 or 400 or 5 × 10 or 50	M1	
	400 + 250 + 400 + 50 or 1100	M1dep	Allow one error
	their 400 + their 250 + $\frac{1}{4}$ × their 400 or 750	M1	
	their 750 ÷ their 1100 (× 100)	M1dep	
	68.(…)	A1	
	Additional Guidance		

Q	Answer	Mark	Comments
22(b)	**Alternative method 2**		
	16 or 10 or 4 or 12 or 2	M1	
	$16 + 10 + 4 (+ 12 + 2)$	M1dep	Allow one error
	30 or 44	M1	
	(their 30/their 44) × 100	M1dep	
	68.(…)	A1	
	Additional Guidance		
23	$\frac{1}{2} \times 2x \times (3x + 1) = 7.5$	M1	oe
	$x \times (3x + 1) = 7.5$ or $x \times (3x + 1) - 7.5 = 0$ or $2x \times (3x + 1) = 15$ or $6x^2 + 2x = 15$ or $6x^2 + 2x - 15 (= 0)$	M1dep	oe
	$\frac{-2 \pm \sqrt{2^2 - 4 \times 6 \times -15}}{2 \times 6}$	M1	oe Allow one error
	$\frac{-2 \pm \sqrt{2^2 - 4 \times 6 \times -15}}{2 \times 6}$ $\frac{-2 \pm \sqrt{364}}{12}$ or $\frac{-1 \pm \sqrt{91}}{6}$ or 1.42(3…)	A1	oe fully correct
	1.4	A1	Answer 1.4 and –1.8 implies M3A1A0
	Additional Guidance		

Q	Answer	Mark	Comments
24	$\cos 36 = \frac{AC}{13.3}$	M1	oe
	$AC = 13.3 \times \cos 36$ or 10.75… or 10.76	M1dep	oe
	$\tan CAT = \frac{9.6}{\text{their } 10.76}$	M1dep	oe
	41.7	A1	Allow 42 with working
	Additional Guidance		
25(a)	$2^0 = 1$	B1	
	Additional Guidance		
25(b)	$2 = 2^{\frac{t}{4}}$ or $\frac{t}{4} = 1$	M1	
	4	A1	
	Additional Guidance		
25(c)	$250 \times 2^{\frac{48}{4}}$	M1	
	1 024 000 and Yes	A1	
	Additional Guidance		