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Mark Scheme
Practice papers

GCSE Mathematics (Pilots)
Paper 5MM2H_01

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NOTES ON MARKING PRINCIPLES

1 All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.

2 Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.

3 All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

4 Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

5 Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

6 Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labeling conventions.

ii*) select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

7 With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.

If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.

If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.

If there is no answer on the answer line then check the working for an obvious answer.

Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.

If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

8 Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.

Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

9 Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect canceling of a fraction that would otherwise be correct

It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.

Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

10 Probability

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).

Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.

If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.

If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

11 Linear equations

Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

12 Parts of questions

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

13 Range of answers

Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

Guidance on the use of codes within this mark scheme
M1 – method mark A1 – accuracy mark B1 – Working mark C1 – communication mark QWC – quality of written communication oe – or equivalent cao – correct answer only ft – follow through sc – special case dep – dependent (on a previous mark or conclusion) indep – independent isw – ignore subsequent working

Question		Working	Answer	Mark	Notes
1		4.30÷5×7	£6.02	2	M1 for 4.30÷5 or 5×4.30 × 7 A1 cao
2			23.5(005..)	2	M1 for 556.962 or 23.7 A1 for 23.5(005..)
3	(a)		-1, 0, 1, 2, 3	2	B2 cao (B1 for 4 correct values and no others ot 5 correct values and one additional incorrect value)
	(b)			1	$x \leq -3$
4		180 – 142 (=38) 180 – 2×'38'	104°	4	M1 for 180 – 142 (=38) M1 for 180 – 2×'38' A1 cao C1 for Angles on a straight line **and** isosceles triangle **and** alternate angles M1 for 180 – 142 (=38) M1 for 142 – 38 A1 cao C1 for Angles on a straight line **and** isosceles triangle **and** alternate angles
5		200÷(3 + 5) (=25) 3×'25' 5×'25'	£75 : £125	3	M1 for 200 ÷ (3 + 5) M1 for '25'×3 or '25'×5 A1 cao
6		π×18.4÷2 + 18.4	47.3 cm	4	M1 for π×18.4 M1 for 'π×18.4'÷2 + 18.4 A1 for 47.28 – 47.31 B1 for cm

Question		Working	Answer	Mark	Notes
7	(a)	$820 + 0.35\times820$	1107	3	M1 for 0.35×820 (=287) M1 for 820 + '287' A1 cao
	(b)	$56\div64\times100$	87.5	2	M1 for $56\div64\times100$ oe A1 cao
	(c)		$^1/_3$,33.4%, 0.3444…, 0.35	2	M1 for attempt to convert all to decimals A1 cao
8	(a)	$5\times5.8 - 2\times3.7$	21.6	2	M1 for $5\times5.8 - 2\times3.7$ A1 cao
	(b)	$3\times(-8)^2 - 5\times-8$	232	2	M1 for $3\times(-8)^2 - 5\times-8$ **or** 192 **or** +40 A1 cao
	(c)	$f = 3c - t$ $f + t = 3c$ $c = (f + t) \div 3$	$(f + t)\div3$	2	M1 for attempt to add t to both sides or divide all terms by 3 A1 cao
9		$25\times16 - \pi\times3^2$	372	4	M1 for $\pi\times3^2$ M1 for 25×16 M1 for $25\times16 - \pi\times3^2$ A1 for answer 371.7 – 372

Question		Working	Answer	Mark	Notes
10	(a)	$2(2x – 3) + 2(3x + 1) < 55$	proof	3	M1 for $2(2x – 3) + 2(3x + 1)$ oe M1 for $2(2x – 3) + 2(3x + 1) < 55$ A1 for correct expansion and simplification to complete proof
	(b)	$10x – 4 < 55$ $10x < 59$ $x < 5.9$	5	3	M1 for attempt to add 4 to both sides of equation A1 for $x < 5.9$ A1 for 5
11		$\sqrt{(11–3)^2 –(7–2)^2}$	9.43	3	M1 for 11 – 3 or 7 – 2 or 8 or 5 M1 for $(11-3)^2 + (7-2)^2$ or $‘8’^2 + ‘5’^2$ A1 9.43 – 9.434
12		360 - 180×(5-2)÷5 -180×(8-2)÷8	117	4	M1 for 360÷8 or 360÷5 M1 for 180 – ‘72’ or 180 – ‘45’ M1 for 360 – ‘135’ – ‘108’ A1 cao **or** M1 for 180×(5-2) or 180×(8-2) M1 for ‘’540’÷5 or ‘1080’÷8 M1 for 360 – ‘135’ – ‘108’ A1 cao **or** M1 for 360÷5 (=72) M1 for 360÷8 (=45) M1 for ‘72’ + ‘45’ A1 cao

Question		Working	Answer	Mark	Notes
13		$8a - 6b = 48$ $21a + 6b = 39$ $29a = 87$ $a = 3$ $12 - 3b = 24$ $-3b = 12$ $b = -4$	$a = 3$, $b = -4$	4	M1 for coefficients of x or y the same followed by correct operation, condone one arithmetic error A1 for one correct answer M1 (dep) for substituting found value in one equation **or** M1 (indep of 1st M1 for a correct process to eliminate the other variable (condone one arithmetic error) A1 cao for both $a = 3$ and $b = -4$
14			Curve through (-3, 15)(-2,5)(-1,-1) (0,-3)(1,-1)(2,5)(3,15)	4	B2 for at least 5 coordinates evaluated correctly (may be implied by points plotted) (B1 for at least 2 points correctly evaluated) B1ft for at least 6 points plotted correctly A1 for correct smooth curve
15		$243 \div 1.35$	180	3	M1 for 135% or 1.35 M1 for $243 \div 1.35$ oe A1 cao
16	(ai) (aii) (aiii) (b)	 $m = \sqrt{\dfrac{6\times10^6 - 5\times10^5}{6\times10^6 \times 5\times10^5}}$	5.68×10^{10} 0.09034 4.82×10^{-5} 1.4×10^{-3}	3 3	 B3 for $1.35\times10^{-3} - 1.4\times10^{-3}$ (B2 for 0.00000183… or $^{11}/_{6000000}$ oe) (B1 for 3×10^{12} oe or 5500000 oe)

Question		Working	Answer	Mark	Notes
17		$f^2 = \frac{4-k}{k+3}$ $f^2k + 3f^2 = 4 - k$ $f^2k + k = 4 - 3f^2$ $k(f^2 + 1) = 4 - 3f^2$ $k = (4 - 3f^2)/(f^2 + 1)$	$k = \frac{4-3f^2}{f^2+1}$	4	M1 for $f^2 = \frac{4-k}{k+3}$ M1 for $f^2(k + 3) = 4 - k$ M1 for isolating terms in k correctly A1 for $k = \frac{4-3f^2}{f^2+1}$ oe
18		$m = -\frac{1}{4}$ $y - 1 = -\frac{1}{4}(x - 8)$	$y = -\frac{x}{4} + 3$	3	M1 for gradient = 4 or gradient = $-\frac{1}{4}$ M1 for correct attempt to calculate value of c A1 for $y = -\frac{x}{4} + 3$ oe
19	(a)	$\tan 47 = \frac{x}{9.3}$ 9.3 × tan47	9.97	3	M1 for $\tan 47 = \frac{x}{9.3}$ M1 for 9.3 × tan47 A1 for 9.95 - 9.974
	(b)	$\cos^{-1}(6.5 \div 8.2)$	37.6	3	M1 for $\cos y = \frac{6.5}{8.2}$ M1 for $\cos^{-1}(6.5 \div 8.2)$ A1 for 37.5-37.6
20		$\sqrt{(5^2 + 12^2)}$ (=13) $\pi \times 5 \times$'13' + $4 \times \pi \times 5^2 \div 2$	361	5	M1 for $\sqrt{(5^2 + 12^2)}$ A1 for 13 M1 for $\pi \times 5 \times$'13' or $4 \times \pi \times 5^2 \div 2$ oe M1 for $\pi \times 5 \times$'13' + $4 \times \pi \times 5^2 \div 2$ A1 for 361 - 361.3

Question		Working	Answer	Mark	Notes
21		$100x = 56.76767\ldots$ $x = 0.56767\ldots$ $99x = 56.2$ $x = 56.2 \div 99$ $x = \frac{281}{495}$	proof	3	M1 for valid method (eg, $100x = 56.76767\ldots$ and $x = 0.56767..$ and subtract) M1 for division by 99 A1 for conclusion of proof
22		$\frac{--1 \pm \sqrt{(-1)^2 - 4 \times 3 \times -6}}{2 \times 3}$	1.59, -1.26	3	M1 for $\frac{--1 \pm \sqrt{(-1)^2 - 4 \times 3 \times -6}}{2 \times 3}$ allow substitution of ±1 for b and ±6 for c M1 for $\frac{1 \pm \sqrt{73}}{6}$ A1 for 1.59 and -1.26
23		n is an integer $2n + 2n + 2 + 2n + 4$ $= 6n + 6$ $= 6(n + 1)$	proof	3	M1 for algebraic expressions for 3 consecutive even integers (eg $2n$, $2n + 2$ or $2n + 4$) M1 for sum and simplification (eg. $2n + 2n + 2 + 2n + 4 = 6n + 6$) C1 for conclusion and statement that n is an integer

Question		Working	Answer	Mark	Notes
*24		Angle DAC = angle ACB (alternate angles) Angle ACD = Angle CAB (alternate angles) AC common Therefore triangles ABC and CDA are congruent AAS	proof	3	M1 for any 1 correct statement with reason, for example, Angle DAC = angle ACB (alternate angles) M1 for two further correct statements with reasons eg. Angle ACD = Angle CAB (alternate angles) AC common C1 for conclusion eg. triangles ABC and CDA are congruent AAS
25		$\frac{q}{\sin 86} = \frac{25}{\sin(180-125)}$ $q = \frac{25}{\sin'55'} \times \sin 86$ (=30.4) $SP^2 = 18^2 + \text{'}30.4\text{'}^2 - 2\times 18\times\text{'}30.4\text{'}\times\cos(125)$	43.4	6	M1 for $\frac{q}{\sin 86} = \frac{25}{\sin(180-125)}$ oe M1 for $q = \frac{25}{\sin'55'} \times \sin 86$ A1 for q = 30.4(4..) M1 for $SP^2 = 18^2 + \text{'}30.4\text{'}^2 - 2\times 18\times\text{'}30.4\text{'}\times\cos(125)$ M1 for correct order of evaluation or 1875.8(…) A1 for 43.3 – 43.4

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