Mark Scheme (Results)

November 2013

Pearson Edexcel GCSE
Linked Pair Pilot in Mathematics
Application of Mathematics (2AM01)
Higher Paper 1H

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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 QWC is 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 labelling 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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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 cancelling 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	(a)		500	2	M1 for $\dfrac{1}{20} \times 10000$ oe A1 cao
	(b)		6400	2	M1 for $4000 \div 5 \times 8$ oe. A1 cao
2		Conversion to miles BH: 4048 ÷ 1760 2.3 × 85 = 195.5 S: 3.67 × 60 = 220.2 Conversion to yards S: 3.67 × 1760 6459.2 × 60 = 387,552 BH: 4048 × 85 = 344,080 Comparison of 60 laps (eg in yards) (3.67 × 1760 – 4048) × 60 = 144,672 4048 × (85 – 60) = 101,200	Silverstone	4	M1 for method to calculate length of one lap at BH in miles M1 for method to find total length of race at each track in miles A1 for 195.5 and 220.2 or M1 for method to calculate length of one lap at S in yards M1 for method to find total length of race at each track in yards A1 for 387,552 and 344,080 or M1 for method to calculate length of one lap at S in yards M1 for method to compare the difference in the total length of 60 laps at each track with the length of 25 laps at BH A1 for 144,672 and 101,200 C1 (dep on at least M1) for a statement deducing the longer race, but figures used for the comparison must also be stated somewhere, and a clear association with the name of each racing track.

Question		Working	Answer	Mark	Notes
3	(a)		(0, 5, 4)	1	B1 cao
	(b)		(3, 0, 2)	1	B1 cao
	(c)	Trapezium OR Triangle + rectangle (5+2)×3÷2 0.5×3×3 + 3×2 (= 4.5 + 6)	10.5	2	M1 for complete method to find area of ABCD A1 for 10.5 oe
4	*(a)	(I cost per nail) 1.36÷20=0.068, 3.30÷50=0.066, 6.03÷90=0.067 (II e.g. number of nails for £1) 20÷1.36=14.7, 50÷3.30=15.1, 90÷6.03=14.9 (III e.g. cost for 20 nails) 3.30÷50×20=1.32, 6.03÷90×20=1.34 (IV using multipliers) 50 ÷ 20 = 2.5 and 3.30 ÷ 1.36 = 2.42 90 ÷ 50 = 1.8 and 6.03 ÷ 3.30 = 1.82	Medium + reason	4	M1 for correct method to work out a unit cost for 2 boxes M1 for correct method to work out a unit cost for all 3 boxes A1 for (£)0.068 and (£)0.066 and (£)0.067 oe C1 for correct conclusion based on their figures (consistent units) (dep on at least one M1 scored) or M1 for correct method to work out the number of nails for £1oe from 2 boxes M1 for correct method to work out the number of nails for £1oe from all 3 boxes A1 for 14.7 and 15.1 and 14.9 C1 for correct conclusion based on their figures (consistent units) (dep on at least one M1 scored) or M1 for correct method to work out the cost of 50 nails using the 20 nails cost oe M1 for correct method to work out the cost of 50 nails using the 20 nails cost and 90 nails using the 20 nail cost A1 for (£1.36), (£)1.32, (£)1.34 oe C1 for correct conclusion based on their figures (dep on at least one M1 scored) (consistent units)

Question		Working	Answer	Mark	Notes
4 (cont)	*(a)				or M1 for correct method to compare multipliers for cost and number for 1 pair of boxes M1 for correct method to compare multipliers for cost and number for correct 2 pairs of boxes A1 for 2.5 and 2.42, 1.8 and 1.82 C1 for correct conclusion based on their figures (dep on at least one M1 scored) (consistent units)
	(b)	<table><tr><td>2</td><td>0 5 8</td></tr><tr><td>3</td><td>0 0 0 5 7 9</td></tr><tr><td>4</td><td>0 5 7 9</td></tr><tr><td>5</td><td>0 5</td></tr></table>	S&L diagram with key	3	M1 for correct stem and unordered leaves (condone two errors or omissions) A1 cao B1 for key, e.g. 2│0 means 20mm
	(c)		37	1	B1 cao
5	(a)	$(1 - 0.15)\times54$	45.90	3	M1 for 0.15×54 (=8.1) or $1 - 0.15$(=0.85) M1 for $54 - 0.15\times54$ or 0.85×54 A1 cao
	(b)		175	3	M1 for $1 - 0.35$(=0.65) M1 for $113.75\div(1 - 0.35)$ A1 cao

Paper: 5AM1H_01					
Question		Working	Answer	Mark	Notes
*6		400 ÷59.99=6.6(7) rolls 6 rolls cover 6×1.5×5=45m^2 Floor area 4.5×6+4.5×3=40.5m^2 (<45) 3÷1.5=2 (4.5+4.5+9+9)÷5=5.4 5.4→6rolls 6×59.99=£359.94 (< £400)	Yes with correct figures	4	M1 for correct method to find number of rolls for £400 M1 for correct method to work out coverage for found number of rolls. M1 for correct method to find area of floor C1 for yes with 40.5 and 45 or M1 for an attempt to fit widths M1 for a correct method to find total number of rolls M1 for correct method to find total cost of rolls C1 for yes with (£)359.94
7	(a)		$0 < x \le 5$	1	B1 cao
	(b)	35×2.5+20×7.5+12×12.5+8×17.5=527.5 527.5÷75	7.03	4	M1 for $f \times$ consistent part of interval (allow 1 error) M1 for $f \times$ mid interval (allow 1 error) M1 (dep on at least M1 scored) for '527.5'÷75 A1 for 7 – 7.04
	(c)		Frequency polygon- points plotted at (2.5, 35) (7.5, 20) (12.5,12) (17.5,8)	2	B2 for correct plotting of 4 points (±0.5 sq) and joining with line segments (B1 for points plotted correctly at mid points of intervals OR joining points with line segments at the correct heights and consistent within the class interval (including end values) OR correct frequency polygon with first and last points joined) NB Ignore any histogram drawn and any part of frequency polygon outside range of first and last points plotted

Question		Working	Answer	Mark	Notes
8	(i)		=0.4*B3	3	B1 for (=)0.4*B3 oe, eg C3*B3
	(ii)		=SUM(B2:B6)		B1 for (=)SUM(B2:B6) oe, e.g. (=)B2+B3+B4+B5+B6 B1 for using correct spreadsheet notation; condone missing "=" throughout.
9			Correct flow chart	5	B1 for > 100 (allow in words) B1 for 'yes' (consistent) leading to $C - 8$ oe (allow in words) B1 for output box following 'no' or '$C-8$' B1 for end box (stop) B1 for fully correct (condone omission of END box and of 'Amount to pay' = C box) **or** B1 for ≤ 100 (allow in words) B1 for 'no' (consistent) leading to $C - 8$ oe (allow in words) B1 for output box following 'no' or '$C-8$' B1 for end box (stop) B1 for fully correct (condone omission of END box and of 'Amount to pay' = C box)

Paper: 5AM1H_01					
Question		Working	Answer	Mark	Notes
10	(a)		0.05	2	M1 for method shown to work out gradient A1 for 0.05 oe
	(b)		2.50	2	M1 for '0.05' × 50 A1 for 2.5(0) or M1 for using graph to find the cost of 50 km, eg (35 − 30) ÷ 2 A1 for 2.5(0)
11			44.625	3	M2 for (51 ÷ 40) × 35 (M1 for 51 ÷ 40 or 40 ÷ 51 or 40 ÷ 35 or 35 ÷ 40 or ratio, e.g. 51:40 = x:35) A1 for 44 − 45
12		$2x + 2x = 10$, $x = 2.5$ $10 + 5 + 5 + 7.5 + 5 + 12.5$	45	3	M1 for correct equation to find the value of x or ($x =$) 2.5 M1 for correct method to find the perimeter, $10 + 5 + 2x + 3x + 2x + 5x$ oe, e.g. 2×10 + 2×5x A1 cao

Paper: 5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
13	(a)	1500×1.05^2	1653.75	3	M1 for 1500×1.05 (= 1575) oe or 1500×0.05 (= 75) oe M1 for '1575' $\times$ 1.05 oe A1 for cao
	(b)		3.04	3	M1 for 2000×1.0025^{12} (= 2060.83(2) M1 for (− 2000) ÷ 2000 × 100 A1 for 3.04 OR M1 for 1.0025^{12} (= 1.0304) M1 for $(1.0025^{12} - 1) \times 100$ A1 for 3.04
14	(a)		(Median =) 23 (IQR =) 14	2	B1 for (median =) 23 B1 for (IQR =) 14
	(b)		Median=26 Greatest value = 45	2	B1 for boy's median drawn at 26 B1 for girl's whisker drawn to 45
	(c)		Comparison	2	B1 for comparison of a specific value (e.g. comparing max values or medians) B1 for comparison of spread e.g. range of one is greater than range of other or interquartile range of one is greater than other (if seen can accept comparison of skewness, e.g. both positively skewed, as an alternative to spread)

Question		Working	Answer	Mark	Notes
15		$50(2x - 10) - 35(x + 20) = 1725$ $100x - 500 - 35x - 700 = 1725$ $65x - 1200 = 1725$ $65x = 1725 + 1200 = 2925$ $x = 2925 \div 65 = 45$ (A=) $50 \times 80 = 4000$	4000	4	M1 for $50(2x - 10) - 35(x + 20) = 1725$ oe M1 for an attempt to reducing to the form $65x = b$, $b > 0$ or ($x =$) 45 M1 for $50 \times (2 \times$ '45' $- 10)$ or $35 \times ($'45' $+ 20) + 1725$ A1 cao
16	(a)		0.000125	1	B1 cao
	(b)		1.125×10^{-4}	2	M1 for $1.25 \times 9 \times 10^{-5}$ oe or 11.25×10^{-5} or 0.0001125 oe A1 cao
17		let number of acrobat kites $= x$, let number of dragon kites $= y$ $2x + 3y = 575$ $3x + y = 390$ $2x + 3y = 575$ <u>$9x + 3y = 1170$</u> $7x \qquad = 595$ $x = 595 \div 7 = 85$ $y = 390 - 3 \times 85 = 135$ OR let number of acrobat kites $= x$, let number of dragon kites $= y$ $y = 390 - 3x$ $2x + 3(390 - 3x) = 575$ $7x = 595$; $x = 85$ $y = 390 - 3 \times 85 = 135$	85, 135	4	M1 for attempt to derive equations, eg $2x + 3y = 575$ or $3x + y = 390$ M1 for full method to eliminate x or y; allow one error in calculation M1 (dep) for substitution of one variable into one of the equations, or by appropriate method after starting again A1 for 85 and 135 OR M1 for attempt to derive equations, eg $2x + 3y = 575$ or $3x + y = 390$ M1 for full method to rearrange and substitute to eliminate x or y, allow one error in calculation M1 (dep) for substitution of one variable into one of the equations, or by appropriate method after starting again A1 for 85 and 135

Question		Working	Answer	Mark	Notes
18	(a)		12	4	B1 for $\dfrac{18}{15}$ or $\dfrac{15}{18}$ oe M1 for $25 \times (1.2)^3$ oe M1 for $400 \div (25 + \text{'}43.2\text{'})$ A1 for 12 or 6 of each oe
	(b)		144	2	M1 for $100 \times \left(\dfrac{18}{15}\right)^2$ A1 cao
19	(a)		Reason	1	B1 for correct reason, e.g. not representative, biased oe
	(b)		12 or 13	3	M1 for $(235 \div 692) \times N = 20$ or $(N =) 58.8(9)$ M1 for $(148 \div 692) \times \text{'}59\text{'}$ A1 for 12 or 13 or M1 for $(20 \div 235) \times 100$ or 8.5(%) seen M1 for $(8.5 \div 100) \times 148$ A1 for 12 or 13 or M2 for $20 \div 235 \times 148$ (M1 for ratio, e.g. $20:235 = N : 148$) A1 for 12 or 13

Paper: 5AM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
20	(a)		$x + y \leq 10$	1	B1 for $x + y \leq 10$ oe (accept $x + y < 10$)
	(b)(i)	$24x+16y \leq 192$ (÷8), $3x+2y \leq 24$ as required	$3x+2y \leq 24$	4	M1 for attempting to combine $24x$, $16y$ and 192 into a single inequality A1 for completing the algebra correctly
	(ii)		Inequality shaded		M1 for line drawn through (0,12) and (8,0) A1 for region shaded above line
	(c)(i)		$1000x + 750y$	3	B1 for $1000x + 750y$ oe
	(ii)	$1000 \times 4 + 750 \times 6 = £8500$	4 and 6		M1 for attempt to evaluate $1000x + 750y$, where x and y are integers and $x >0$, $y >0$ A1 for (type A=) 4 and (type B=) 6 oe or greatest profit=(£)8500
21		e.g. $1 \times 7.6 + 3 \times 9.4 + 2 \times 5.6 + 6 \times 1.4 = 55.4$ $55.4 \div 2 = 27.7$ $27.7-7.6 = 20.1$ $20.1 \div 9.4 = 2.138…$ Median $= 55 + 2.138…\times 2.5 = 60.345…$	60.3	4	M1 for attempt to find the area of one bar M1 for attempt to find total area ÷ 2 (condone one error) M1 for correct attempt to locate median in second bar (condone one arithmetic error) A1 for 60.3(4...)