Mark Scheme (Results)

November 2014

Pearson Edexcel GCSE
Linked Pair Pilot in Mathematics
Methods in Mathematics
Foundation: (Non-Calculator) Unit 1

PEARSON

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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.

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. Note that in some cases a correct answer alone will not score marks unless supported by working; these situations are made clear in the mark scheme. Examiners should 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 award marks for the quality of written communication (QWC).
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.

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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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

Partial answers shown (usually indicated in the ms by brackets) can be awarded the method mark associated with it (implied).

Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks; transcription errors may also gain some credit. Send any such responses to review for the Team Leader to consider.

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.

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.

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 (embedded answers).

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)

14 The detailed notes in the mark scheme, and in practice/training material for examiners, should be taken as precedents over the above notes.

Guidance on the use of codes within this mark scheme

M1 – method mark for appropriate method in the context of the question
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

PAPER: 5MM1F_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
1	(a)		three million	1	B1 for three million (accept 3 million or 3 thousand thousand)
	(b)		2 tens or 20	1	B1 for 2 tens or 20 or twenty
	(c)		1274	2	M1 for $1060 + 214$ or $1000 + 60 + 200 + 14$ A1 for 1274
	(d)		1200	1	B1 cao
	(e)		8.14	1	B1 cao
2	(a)		impossible	1	B1 cao
	(b)		even	1	B1 cao
3	(a)		$4m$	1	B1
	(b)		$3a$	1	B1
	(c)		$4xy$	1	B1
4	(a)(i)		(2, 4)	2	B1 cao
	(ii)		(-3, -1)		B1 cao
	(b)		$\times$ at (2, -1)	1	B1 for $\times$ at (2, -1)

Question		Working	Answer	Mark	Notes
5	(a)		500	1	B1 cao
	(b)		348	2	M1 for a complete method to subtract 152 from 500 or 8 seen in the units column of a calculation or the answer A1 cao
	(c)		10.56	2	M1 for setting out the addition with digits in the correct columns oe A1 cao
	(d)		200 (or 190)	2	M1 for 20 or 10 A1 for 200 or 190
	(e)		5.8	1	B1 cao
6	(a)		obtuse	1	B1 for obtuse.
	(b)		reflex	2	M1 for 4×50 ($= 200$) A1 for reflex or ft "200"
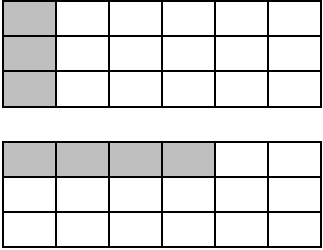
Question		Working	Answer	Mark	Notes
7	(a)		8 or 38 or 72	1	B1 for 8 or 38 or 72
	(b)		9	1	B1 cao
	(c)		5 or 11	1	B1 for 5 or 11
8	(a)		● ● ● ● ● ● ● ● ●	1	B1 cao
	(b)(i)		19	2	B1 cao
	(ii)		Add 2 each time or $2 \times 9 + 1$		B1 for 'add 2' oe or $2 \times 9 + 1$ oe
	(c)		14	2	M1 for $(29 - 1) \div 2$ or for listing terms to include 29 A1 cao

Question		Working	Answer	Mark	Notes
9			500 cm^2	4	M1 for method to find the area of the square or rectangle or either dimension of the large rectangle. M1 for a complete method to find the total area of the large rectangle A1 cao B1 (indep) for units of cm^2 Note: Areas may be just shown on diagrams
10	(i)		58°	3	M1 for 180 – 42 – 80 A1 for $x = 58^o$ (this may be just seen on the diagram in the correct place)
	(ii)		the sum of the angles on a straight line is 180°		B1 for the sum of the <u>angles</u> on a straight <u>line</u> is <u>180</u>^{o}

Question		Working	Answer	Mark	Notes
11	(a)		$\times$ at 1	1	B1 cao
	(b)		$\times$ at $\frac{1}{2}$	1	B1 cao
	(c)		$\times$ at $\frac{1}{6}$	1	B1
*12		$\frac{1}{6} = \frac{3}{18}$, $\frac{2}{9} = \frac{4}{18}$ OR OR $\frac{1}{6}$ of $100 = 100 \div 6 = 16.6$ …. $\frac{2}{9}$ of $100 = 200 \div 9 = 22.2$ ….	$\dfrac{1}{6}$	3	M1 for an attempt to convert both fractions to fractions with a common denominator, with at least one correct; 18, 36, etc. A1 for both equivalent fractions being correct C1 (dep on M1) for $\frac{1}{6}$ is the smaller fraction, oe OR M1 for diagrams of the same size, 18,36, etc. squares with correct shading on at least one of them A1 for both diagrams being correct C1 (dep on M1) for $\frac{1}{6}$ is the smaller fraction, oe OR M1 for $\frac{1}{6}$ and $\frac{2}{9}$ of a quantity A1 for Two correct answers for their chosen quantity. C1 (dep on M1) for $\frac{1}{6}$ is the smaller fraction, oe

Question		Working	Answer	Mark	Notes
13			A 1,B 1,C 1,A 2,B 2, C 2,A 3,B 3,C 3	2	M1 for at least 3 correct pairs A1 for all 9 correct pairs (no repeats and no extras)
14	(a)		-3 -1 0 2	1	B1 cao
	(b)		2	1	B1 cao
	(c)		7	1	B1 cao
	(d)		$2\times(3+8) - 4 = 18$	1	B1 for one pair of brackets around 3+8. Ignore further brackets drawn if the calculation is still correct
	(e)		17	2	M1 for $5^2 = 25$ or $2^3 = 8$ A1 for 17
15		3 8 13 18 23 28 33 38 4 7 10 13 16 19 22 25 28	28	2	M1 for correctly finding the next term (23 or 16) in either sequence A1 for 28

Question		Working	Answer	Mark	Notes
16	(a)(i)		2	3	B1 cao
	(ii)		Correct shape drawn		M1 for one side enlarged correctly A1 for a fully correct enlargement
	(b)		Triangle with vertices (1,4), (3,3) and (2,1)	1	B1 for triangle with vertices (1,4), (3,3) and (2,1)
17	(a)		5	1	B1 cao
	(b)		7	1	B1 cao
	(c)		2.5	2	M1 for a clear intention to add 7 to both sides or divide all terms by 4 A1 for 2.5 oe
18	(a)		$\frac{1}{4}$	2	M1 for $\frac{6}{24}$ oe, for example 25% or 0.25 A1 for $\frac{1}{4}$ cao
	(b)		$\frac{10}{24}$	2	M1 for $24 - 8 - 6$ (=10) or $1 - '\frac{6}{24}' - \frac{8}{24}$ A1 for $\frac{10}{24}$ oe
	(c)		$\frac{16}{24}$	1	B1 for $\frac{16}{24}$ oe or ft $\frac{'10'}{24} + \frac{6}{24}$

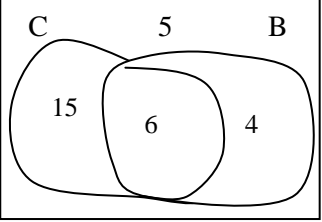| PAPER: 5MM1F_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
*19			The area of the trapezium is greater than the area of the triangle	4	M1 for a complete method to find the area of the triangle M1 for a complete method to find the area of the trapezium A1 for 12 and 15 C1 ft (dep on M1) for comparison of their figures eg the area of the trapezium is greater or the difference is 3 OR M1 for the complete method of the area of the triangle or trapezium M1 for superimposing the area of the triangle on to the trapezium or the area of the trapezium on to the area of the triangle A1 for a difference of 3 C1 ft (dep on M1) for comparison of their figures eg the area of the trapezium is greater or the difference is 3

Question		Working	Answer	Mark	Notes
*20			Angle $APQ = 56$	5	M1 for $180 - 90 - 22 (= 68)$ M1 $(180 - '68') \div 2 (= 56)$ A1 for angle $APQ = 56$ C2 (dep on M2) for 'sum of the <u>angles</u> in a <u>triangle</u> is $\underline{180^o}$' oe and 'base <u>angles</u> of an <u>isosceles</u> triangle are <u>equal</u>' oe (C1(dep on M1) for one correct reason in the correct context) OR M1 for $360 - 22 - 90 (= 248)$ M1 for $(360 - '248') \div 2 (= 56)$ A1 for angle $APQ = 56$ C2 (dep on M2) for 'sum of the <u>angles</u> in an quadrilateral is $\underline{360^o}$' and 'base <u>angles</u> of an <u>isosceles</u> triangle are <u>equal</u>' and 'sum of the <u>angles</u> on a <u>straight line</u> is $\underline{180^o}$ oe (C1 (dep on M1) for one correct reason in the correct context)
21	(a)	1, 2, 3, 4, 6, 9, 12, 18, 36	4 and 9 or 1 and 6	2	M1 for listing at least 2 factors of 36 A1 for 4 and 9 or 1 and 6
	(b)		3 or 6 or 15 or 30	2	M1 for $30 \div 2$ or $30 \div 5$ or $30 \div (2 \times 5)$ or for any factors of 30 other than 2 or 5 A1 for 3 or 6 or 15 or 30

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Question		Working	Answer	Mark	Notes
*22			$y = 2x - 1$ has the greater gradient	4	M1 for plotting at least 2 unambiguous correct points satisfying $y = 2x - 1$; ignore any incorrect points M1 for correct points plotted with no incorrect points A1 for a single straight line segment of $y = 2x - 1$ C1 (dep on M1) for "$y = 2x - 1$ has the greater gradient" or ft their single line **(Alternative method)** M1 for a correct method to find gradient of **L** A1 for gradient of 1.5 M1 for gradient of $y = 2x - 1$ is 2 C1 (dep on M1) for "$y = 2x - 1$ has the greater gradient" oe or ft their gradients [SC: B1 for a single line segment drawn of gradient 2 if M0 scored]

Question		Working	Answer	Mark	Notes
23			7	4	M1 for $1 - 0.4 - 0.3 - 0.16$ or $100 - 40 - 30 - 16$ A1 for 0.14 oe M1 for "0.14" $\times$ 50 oe A1 for 7 or ft "0.14" $\times$ 50 OR M1 for $0.4 \times 50 (= 20)$ or $0.3 \times 50 (= 15)$ or $0.16 \times 50 (= 8)$ A1 for 20 and 15 and 8 M1 for $50 -$ "20" $-$ "15" $-$ "8" A1 for 7 or ft from "20", "1" or "8"
24	(a)			4	M1 for two intersecting circles with 6 labelled in the intersection M1 for $21 - 6 (=15)$ or $10 - 6 (=4)$ M1 for $30 - 15 - 6 - 4 (=5)$ A1 for a fully correct and labelled Venn diagram; condone a missing outer rectangle
	(b)		$\dfrac{4}{30}$	2	M1 (ft from (a)) for $\dfrac{"4"}{a}$, $a >$ "4" or $\dfrac{b}{30}$, $b < 30$ with $b \neq 0$ A1 for $\dfrac{4}{30}$ oe

Question	Working	Answer	Mark	Notes
*25		Proof	4	M1 for setting up a correct equation in x, eg. $3x - 2 = x + 1$ M1 (dep) for a fully correct method to solve their equation or for $x = 1.5$ M1 (dep) for ("1.5" + 1) × 4 or (3 × "1.5" – 2) × 4 or (3 × "1.5" – 2) × 2 + ("1.5"- 1) × 2 C1 (dep on M3) for a completing the proof resulting in a perimeter of 10 OR M1 for setting up a correct equation in x, Eg. $2(3x - 2) + 2(x + 1) = 10$ M1 (dep) for a fully correct method to solve their equation or for $x = 1.5$ M1 (dep) for "1.5" + 1 and 3× "1.5" – 2 C1 (dep on M3) for a completing the proof resulting in a justification that the shape is a square

Modifications to the mark scheme for Modified Large Print (MLP) papers.

Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme.

The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:
Angles: ±5°
Measurements of length: ±5 mm

PAPER: 5MM1F_01			
Question		**Modification**	**Notes**
3	(b)	MLP a changed to y	
	(c)	MLP x changed to e y changed to f	
4		Grid enlarged Crosses changed to black circles.	
6		MLP x changed to w	
8		First 3 patterns laid out vertically. Pattern number 4 is started and candidates asked to complete. (Pattern number 3 is repeated & labelled Pattern number 4)	
9		Shapes based on a 2 cm square.	
11		Probability scales extended.	

Question		Modification	Notes
13		Spinners straightened up No spike just a black circle at the centre.	
16	(a)	Enlarged grid Shape P moved down to 1 square up from the bottom.	
	(b)	Enlarged grid	
19		Enlarged grid. Centimetre' removed from the 1st line. Wording added to question paper and diagram: 'Each square on the grid represents a one centimetre square'.	
25		MLP x changed to y	