Mark Scheme (Results)

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Pearson Edexcel GCSE
Linked Pair Pilot in Mathematics
Methods in Mathematics (2MM01)
Foundation Paper 2F

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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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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	(a)		53.8	1	B1 cao
	(b)		11.5758....	1	B1 for 11.5 - 11.6
	(c)		900.1	1	B1 cao
	(d)		22.09	1	B1 cao
	(e)		48.6	1	B1 cao
2	(i)		Pentagon	2	B1
	(ii)		Decagon		B1
3	(a)		The pair of parallel lines marked on diagram	1	B1 cao
	(b)		Two angles of the same size marked	1	B1 cao
4	(a)		0.25	1	B1 cao
	(b)		8	1	B1 cao
	(c)		90	2	M1 a fully correct method to find 30% of £300 A1 cao

Question		Working	Answer	Mark	Notes
5	(ai)		1000	2	B1 cao
	(aii)		100		B1 cao
	(b)		0.05	2	M1 for a fully complete method containing a correct addition or subtraction A1 cao
6	(a)		8	1	B1 for 8 or –8
	(b)		–17	1	B1 cao
	(c)		2	1	B1 cao
	(d)		13	2	M1 identification of 6 or –7 A1 for 13 or –13
7	(a)		Triangle drawn	1	B1 for drawing of the triangle this could be on original shape.
	(b)		30	1	B1 cao
8	(a)		11	1	B1 cao
	(b)		18	2	M1 for subtracting 13 and multiplying 6 in any order A1 cao

Question		Working	Answer	Mark	Notes
9	(a)		0.03, 0.05,0.4,0.48,0.5	1	B1 cao
	(b)		$\dfrac{9}{16}, \dfrac{3}{5}, \dfrac{5}{8}, \dfrac{13}{20}, \dfrac{3}{4}$	2	M1 attempt to convert at least 3 fractions to decimals or to fractions with common denominator A1 oe SC: B1 for 4 fractions in the correct order or for all fractions in correct reverse order
10	(a)		$\dfrac{17}{100}$	1	B1 for $\dfrac{17}{100}$ oe
	(b)		0.84	1	B1 cao
	(c)		8 squares shaded	1	B1 oe (part and whole squares acceptable)
	(d)		$\dfrac{2}{3}$	2	M1 for $\dfrac{36}{54}$ oe A1 cao
11			14 9	2	B1 cao B1 cao
	(b)		$\times 2$	1	B1 oe
12	(a)		15	2	B2 for 15 B1 for 13 or 3×5
	(b)		18	2	M1 for use of 27 or $3 + 6 + 9$ or $8 + 7 + 3$ or 3 by 3 cube drawn A1 cao (ignore units) SC B2 for 17, 19 or 20 if M0 scored

Question		Working	Answer	Mark	Notes
13	(a)		24	1	B1 cao
	(b)		26	2	M1 for 2×3 + 5×4 oe A1 cao
	(c)		7	2	M1 for 3× 5 + 4 × –2 oe A1 cao
14	(a)		2160	2	M1 for (14–2) × 180; (condone missing brackets) A1 cao
	(b)		18	3	M1 for 2880 ÷ 180 (=16) M1 for "16" + 2 A1 cao or M1 for 2880 = (x–2)×180 or equivalent reverse flowchart M1 for an attempt to rearrange A1 cao
*15			85	3	M1 for a fully correct method e.g. 360 – 135 – 140 A1 cao C1 (dep M1 for appropriate reason) <u>Exterior angles</u> of a <u>polygon</u> add up to <u>360</u>^{o} or <u>Angles</u> on a <u>straight line</u> add up to <u>180</u>^{o} **and** <u>an</u>gles in a <u>triangle</u> add up to <u>180</u>^{o}

Question		Working	Answer	Mark	Notes
16	(a)		5 : 8	1	B1 cao
	(b)		37.5	2	M1 for $\dfrac{3}{8} \times 100$ oe A1 cao
	(c)		0.35	2	M1 for $7 \div 20$ or $\dfrac{35}{100}$ A1 cao
17			Correct tessellation	2	B2 for at least 6 correct tessellating shapes, including the initial shape, and no incorrectly drawn shapes or gaps. (B1 for at least 3 correctly tessellating shapes, (meeting at a point) including initial shape; ignore any additional shapes attempted, gaps or incorrect shapes)
*18			card A gives largest answer	4	M1 for a correct method for finding 35% of 80 M1 for a correct method for finding $\dfrac{3}{8}$ of 80 A1 for 32, 28 and 30 C1 (dep on M1) for statement correctly identifying the card with the largest answer from their three results. .

Question	Working	Answer	Mark	Notes
19		30	4	M2 for correct method to find fraction of blue counters, eg $-$ $-$ or $\frac{6}{10}$ seen (M1 for correct method to add $\frac{3}{10}, \frac{1}{10}$ or $\frac{4}{10}$ seen) M1 (dep on M2) for equating "$\frac{6}{10}$" with 60 blue counters (may be implied by correct answer) A1 cao OR (starting with *n* counters in bag stated, eg *n* = 100) M2 for correct method to find number of blue counters in bag, eg $-$ $-$ (=60) (M1 for $-$ (=30) and $-$ (=10) or $-$ (=40)) M1 (dep on M2) for equating $-$ (=60) with 60 blue counters (may be implied by correct answer) A1 cao [NB accept equivalent calculations involving percentages or decimals]

Question		Working	Answer	Mark	Notes
20			216	3	M2 for a correct method to increase 180 by 20% (M1 for a correct method to find 20% of 180) A1 cao
21	(a)		−1,0,1,2,3	2	B2 for −1, 0, 1, 2, 3 (B1 for one error or one omission or one addition)
	(b)		$x < 2.5$	2	M1 for subtracting 3 from both sides or dividing both sides by 2, condone equality or incorrect inequality signs or ($x=$) 2.5 A1 for $x < 2.5$ oe
22			480	3	M1 for correct method to find the area of cross-section, eg $9 \times 7 - (9 - 6) \times (7 - 2)$ (= 48) M1 (dep) for their cross-section × 10 A1 cao or M1 for a correct method to find volume of any cuboid, eg $9 \times 7 \times 10$ (= 630) M1 (dep) for correct method to find total volume eg $9 \times 7 \times 10$ (= 630) $- 5 \times 3 \times 10$ (= 150) A1 cao
23			308	5	M1 $50^2 + 40^2$ or 2500 + 1600 or 4100 M1 for $\sqrt{2500+1600}$ or $\sqrt{4100}$ A1 for 64 (.03…) seen or implied by correct answer M1(dep on M1) for $2 \times 50 + 2 \times 40 + 2 \times$ "64(.03…)" A1 for 308 – 308.1

Question		Working	Answer	Mark	Notes
24	(a)		$\dfrac{5}{14}$	1	B1 for $\dfrac{5}{14}$ oe fraction
	(b)		54	3	M1 for $84 \div (5 + 9)$ $(= 6)$ or $1 - \text{"(a)"}$ $(= \dfrac{9}{14})$ M1 for $84 \div (5 + 9) \times 9$ oe or for " $\dfrac{9}{14}$ " $\times 84$ A1 cao
	*(c)		eg 6 green	3	M1 for correct method to find twice as many green beads as red beads, eg 2×30 (=60) or $2 \times (84 - \text{"54"})$ or "54" + "6" (=60) A1 for 6 (green) OR if n reds are added then $2n + 6$ (greens), where n and $2n$ could be numbers OR 30 (red) and 60 (green) C1 (dep on M1) for showing correct relevant working and clear conclusion stating number of green beads or stating total numbers of red beads and green beads
25			376 cm^2	4	M1 for finding the area of one face Eg 8×10, 8×6 or 6×10 M1 for a correct method to find the sum of the correct areas of at least 5 faces A1 for 376 B1 (indep) cm^2 Note: Any attempt to find the volume gets NO marks

Question	Working	Answer	Mark	Notes
*26		110°	4	M1 for identifying *EBC* = 35 or *AFC* = 75 M1 (dep) for (*ECB* =) 180 – 75 – 35 (= 70) or (*EDC* =) 35 + 75 C2 for *x* = 110 oe from correct working and all reasons stated clearly (see below) (C1 (dep on M1) for appropriate reason) OR M1 for identifying *EBA* = 180 – 35 (= 145) M1 (dep) for (*ECB* =) "145" – 75 (=70) C2 for *x* = 110 oe from correct working and all reasons stated clearly (see below) (C1 (dep on M1) for appropriate reason) Correct reasons: *EBC* = 35 or *AFC* = 75 (<u>corresponding</u> <u>angles</u> are equal) *ECB* = 180 – 75 – 35 (<u>angles</u> in a <u>triangle</u> add up to <u>180</u>°) *x* = 110 (<u>angles</u> on a straight <u>line</u> add up to <u>180</u>°) OR *EBC* = 35 or *AFC* = 75 (<u>corresponding</u> <u>angles</u> are equal) *x* = 110 (<u>exterior angle</u> of a triangle is <u>equal</u> to the <u>sum</u> of the <u>interior opposite angles</u>) OR *EBA* = 145 (<u>allied angles</u> / <u>co-interior</u> <u>angles</u> add up to <u>180</u>°) *ECB* = "145" – 75 (=70) (<u>exterior angle</u> of a triangle is <u>equal</u> to the <u>sum</u> of the <u>interior opposite angles</u>) *EDC* = 110 (<u>angles</u> on a straight <u>line</u> add up to <u>180</u>°)