

Mark Scheme (Results)

November 2014

Pearson Edexcel GCSE
Linked Pair Pilot in Mathematics
Methods in Mathematics
Foundation: (Calculator) Unit 2

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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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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 as 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: 5MM2F_01

Question		Working	Answer	Mark	Notes
1	(a)		0.16	1	B1 cao
	(b)		1.92	1	B1 cao
	(c)		0.8	1	B1 accept $\frac{4}{5}$
	(d)		0.52	1	B1
	(e)		2.6	1	B1
2	(a)		64	2	M1 for adding the 5 given numbers $5+8+6+4+9 (= 32)$ A1 cao or M1 for doubling at least one of the numbers given A1 cao
	(b)		18	2	M1 for 146 or 128 indicated or a gap value of 2 shown A1 cao

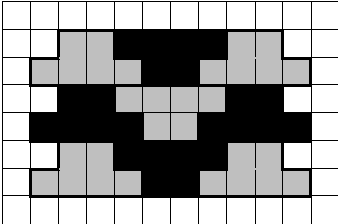
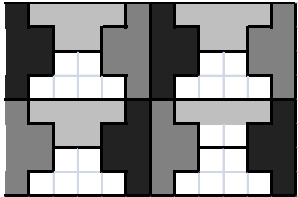
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Question		Working	Answer	Mark	Notes
3	(a)		50%	1	B1 cao
	(b)		$\frac{1}{4}$	1	B1 or equivalent fraction
	(c)		0.07	1	B1 cao
	(d)		$\frac{43}{100}$	1	B1
4	(a)		60	2	M1 for $5 \times 17 - 25$ A1 cao
	(b)		41.4	2	M1 for $3 \times 4.2 (= 12.6)$ and $4 \times 7.2 (= 28.8)$ A1 cao
5	(a)		12	1	B1 cao
	(b)		16	2	M1 for $96 \div 2 (= 48)$ or $96 \div 3 (= 32)$ or $96 \div 6$ oe A1 cao
6	(a)		0.22	1	B1
	(b)		5.46	1	B1
	(c)		4600	1	B1

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Question		Working	Answer	Mark	Notes
7	(a)		14	1	B1 cao
	(b)		22	2	M1 for $6 \times 5 (= 30)$ or $6 \times 5 - 8$ A1 cao
*8	(a)	A $10 + 7 - 4 = 13$ B $10 \div 2 + 7 = 12$	Machine A with supportive working	3	M1 for $17 - 4 (= 13)$ or $5 + 7 (= 12)$ A1 for 13 and 12 C1ft (dep on M1 and two suitable answers to compare) Machine A gives the greater answer
	(b)		+ 6 or $\times 1.75$	1	B1 for + 6 or $\times 1.75$
9	(a)		42	2	M1 $7 \times 12 \div 2$ oe A1 cao
	(b)		14	3	M1 $35 \times 2 (= 70)$ or $35 \div 5 (= 7)$ M1 (dep) " 35×2 " $\div 5$ or " $35 \div 5$ " $\times 2$ A1 cao or M1 $\frac{5x}{2} = 35$ oe M1 $5x = 70$ oe or $\frac{x}{2} = 7$ oe A1 cao

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Question		Working	Answer	Mark	Notes
10	(a)(i)		pentagon	2	B1
	(ii)		hexagon		B1
	(b)	<p>e.g.</p>  <p>e.g.</p>  <p>etc</p>	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 correct tessellating shapes, including initial shape; ignore any additional shapes attempted, gaps or incorrect shapes]

PAPER: 5MM2F_01

Question		Working	Answer	Mark	Notes
11	(a)		0.053, 0.305, 0.35, 3.05, 5.03	1	B1 cao
	(b)	0.75, 0.60, 0.7(0), 0.65 or 75%, 60%, 70%, 65%	60%, 0.65, $\frac{7}{10}$, $\frac{3}{4}$	2	M1 for writing all numbers in the same format eg as decimals or percentages (condone one omission or conversion error) A1 for a correctly ordered list [SC: B1 three values only in the correct order or all values in the correct reverse order if M1 not scored]
12		8, 7, 3 8, 7, 4 8, 6, 4 8, 6, 5 7, 6, 5	Any correct combination	2	M1 for correctly adding 3 whole numbers < 9 or correctly adding 3 whole numbers whose sum is 18 or 19 A1
13	(i)		24	2	B1 cao
	(ii)		4		B1 cao

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Question		Working	Answer	Mark	Notes
14	(a)		20	1	B1 cao
	(b)		45	2	M1 for $27 \div 3 (= 9)$ or $27 \times 5 (= 135)$ A1 cao
	(c)		1	2	M1 for $8 - -6 (= 14)$ or a numberline with -6 and 8 clearly indicated A1 cao
15	(i)		-2 and 12	2	B1 cao (any order)
	(ii)		-9 and -6		B1 cao
16			99	2	M1 for $360 - (53 + 116 + 92)$ A1 cao
17		$P = a + a + b + b + b + b$	$P = 2a + 4b$	3	B3 for $P = 2a + 4b$ or equivalent (B2 for $2a + 4b$ oe or $P = 2a + kb$ $k \neq 0$ oe or $P = ka + 4b$ $k \neq 0$ oe) (B1 for $2a$ or $4b$ or $P = kb$ $k \neq 0$ or $P = ka$ $k \neq 0$ oe or $P = a + b$)

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Question		Working	Answer	Mark	Notes
*18			$\frac{3}{10}$ of 40 is smaller with supportive working	4	<p>M1 for a method to find 35% of 36 (= 12.6)</p> <p>M1 for a method to find $\frac{3}{10}$ of 40 (= 12)</p> <p>A1 12 and 12.6</p> <p>C1 ft (dep M1) for a statement identifying the smaller consistent with their two calculated figures</p>
*19			122 and reasons	3	<p>M1 for a complete method to find the required angle</p> <p>A1 for $x = 122(^{\circ})$ cao (Can be shown on the diagram)</p> <p>C1 (dep M1) for the fully correct reasons relating to the working shown.</p> <p>Reasons from:</p> <p>'sum of the <u>angles</u> on a straight line is <u>180</u>'</p> <p>'<u>exterior angle</u> of a triangle is equal to the sum of the <u>interior opposite angles</u>'</p> <p>'<u>exterior angles</u> of a polygon add up to <u>360</u>'</p> <p>'<u>angles</u> in a <u>triangle</u> add up to <u>180</u>'</p>

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Question		Working	Answer	Mark	Notes
20			60	3	M1 for $6 \times 8 \times 10 (= 480)$ or $2 \times 2 \times 2 (= 8)$ M1 (dep) for " $480 \div 8$ " A1 cao OR M1 for attempting one division (eg $6 \div 2$) may be implied by marks or numbers on a side of the cuboid M1 (dep) for " $3 \times 4 \times 5$ " A1 cao
21	(a)		73.1	3	M1 for a method to find circumference of the circle; eg. $\pi \times 16$ or $50.26\dots\dots$ M1 for a fully complete method, eg. $\pi \times 16 \div 2 + 3 \times 16$ A1 for answer in range 73.1 to 73.2
	(b)		60.7	4	M1 for $16 \times 16 (= 256)$ M1 for a correct method to find the area of the circle; eg. $\pi \times 8 \times 8 (= 64\pi$ or $201.06\dots)$ M1(dep on M1) for a fully complete method to find the required percentage; eg. $(256 - "64\pi \div 2") \div "256" \times 100$ A1 for answer in range 60.7 to 60.8

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Question	Working	Answer	Mark	Notes
*22		Rectangular face is greater with supporting working	6	<p>M1 for a correct method to find 12% of 600; eg. 0.12×600 (= 72), the area of each rectangle M1 (dep) for the total area of the 4 rectangles, eg. $4 \times "72"$ (= 288) M1 (indep) for the total area of the 4 triangles, eg. 4×62 (= 248) M1 for $600 - 4 \times "72" - "4 \times 62"$ A1 for 64 C1 ft (dep M3) for a clear statement that the area of the rectangle is greater</p> <p>OR</p> <p>M1 for $62 \div 600 \times 100$ (= $10\frac{1}{3}$ (%)) M1 (dep) for $4 \times "10\frac{1}{3}"$ (= $41\frac{1}{3}$ (%)) M1 (indep) for 4×12 or 48(%) M1 for $100 - ("4 \times 12" + 4 \times "10\frac{1}{3}")$ A1 for $10\frac{2}{3}$ (%) C1 ft (dep M3) for a clear statement that the area of the rectangle is greater</p>

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Question	Working	Answer	Mark	Notes
23		-2, -1, 0, 1, 2, 3	3	M1 for $-\frac{9}{4} < n$ or $n \leq \frac{12}{4}$ or $-9 \div 4, -8 \div 4, \dots, 12 \div 4$ (dividing at least three numbers between -9 and 12 by 4) or -2.25, -2, ... , 3 seen (at least three values seen) A2 for all six integers given (A1 for a list containing at least 4 correct integers, condone no more than 1 incorrect integer)
24		146	3	M1 for a complete method to find another angle on the diagram M1 for a complete method to the angle x A1 cao OR M2 for $56 + 90$ as part of a corresponding angle method (M1 for splitting angle x into a right angle and an acute angle) A1 cao
25		$x = \frac{y - 6}{3}$ or $x = \frac{y}{3} - 2$	2	M1 $3x + 6 = y$ or $x + 2 = \frac{y}{3}$ A1 $x = \frac{y - 6}{3}$ or $x = \frac{y}{3} - 2$

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Question		Working	Answer	Mark	Notes									
26	(a)		160	3	M1 for a correct method to find the area of the cross section; eg. $\frac{5}{2}(7 + 9) (= 40)$ or for a correct method to find the volume of an appropriate prism, eg. $5 \times 7 \times 4 (= 140)$ or $5 \times 9 \times 4 (= 180)$ M1 (dep) for a fully correct method to find the required volume; eg. "40" \times 4 or "140" + $0.5 \times 2 \times 5 \times 4$ or "180" - $0.5 \times 2 \times 5 \times 4$ A1 cao									
	(b)		5.39	4	M1 for $9 - 7 (= 2)$ M1 for $5^2 + "2"'^2$ M1 for $\sqrt{5^2 + "2"'^2} (= \sqrt{"29"})$ A1 in the range 5.3 - 5.4									
27	(a)	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td>x</td> <td>-2</td> <td>-1</td> <td>0</td> </tr> <tr> <td>y</td> <td>18</td> <td>7</td> <td>0</td> </tr> </table>	x	-2	-1	0	y	18	7	0	18, 0, -3, -2, 12	2	B2 all correct (B1 any three correct)	
	x	-2	-1	0										
y	18	7	0											
(b)	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td>x</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> <tr> <td>y</td> <td>-3</td> <td>-2</td> <td>3</td> <td>12</td> </tr> </table>	x	1	2	3	4	y	-3	-2	3	12	Correct graph	2	M1 for 5 or more "points" plotted correctly, provided at least B1 scored in (a) A1 cao for the correct curve
x	1	2	3	4										
y	-3	-2	3	12										

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: $\pm 5^\circ$

Measurements of length: ± 5 mm

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Question	Modification	Notes
2	(b) 2 cm gaps. Arrows put above the line	
4	(b) MLP x changed to e y changed to f	
5	Models for both parts for all candidates MLP also provided with diagrams. Both text & diagrams inform that each cube represents a one centimetre cube.	
10	(a) Polygons labelled (i) & (ii)	
	(b) 2 cm grid 5 shapes asked for instead of 6 cut out shape provided	

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Question		Modification	Notes
13	(i) and (ii)	Question has been reworded but the answer has not been altered.	
20		2 models for all. MLP: diagram also provided. Measurements on the diagram of the cube have been moved to match the positioning of measurements on the cuboid.	
22		1 model for all. MLP: diagram also provided.	
24		Wording added: 'There are two pairs of parallel lines. Three angles are marked: 56° , x and a right angle'.	
25		MLP x changed to e y changed to f	
26	(a)	Model provided for all.	
		MLP diagram also provided. Wording added: 'Angle $ABC = \text{angle } BAD = 90^\circ$ '	
27		y axis: 1 square for 1. y axis stopped at 20. x axis: 1 square for 0.5	

