



Pearson

# Mark Scheme (Results)

Summer 2017

Pearson Edexcel GCSE  
Linked Pair Pilot in Mathematics  
Methods in Mathematics (2MM01)  
Foundation: (Calculator) Unit 2

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Publications Code 5MM2F\_01\_1706\_MS

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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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

**PAPER: 5MM2F\_01**

Question		Working	Answer	Mark	Notes
1	(a)		323.8	1	B1 for 323.8 oe
	(b)		22.7	1	B1 for 22.7 oe (accept -22.7)
	(c)		663	1	B1 cao
	(d)		1.5	1	B1 for 1.5 oe
	(e)		-1.728	1	B1 cao
	(f)		Proof	2	M1 for $4.2 \times 2.9 = 12.18$ and $5.7 \times 2.1 = 11.97$ A1 for concluding that $12.18 > 11.97$  OR M1 for $4.2 \times 2.9 = 2.1 \times 5.8$ A1 for concluding that $5.8 > 5.7$
2	(a)		Triangle drawn	1	B1 for drawing the triangle. This could be on the original grid
	(b)		<i>b</i>	1	B1 cao

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Question		Working	Answer	Mark	Notes
3	(a)		7	1	B1 cao
	(b)		>> on both horizontal lines	1	B1 for >> on a pair of parallel lines
	(c)		hexagon	1	B1 cao
	(d)		Reason, eg. not all angles/sides are equal	1	B1 for any correct reason that relates to the specific hexagon in this question
4	(a)		12	1	B1 for 12 or -12
	(b)		-2	2	M1 for a correct first step using two of the given figures; eg $-4 + 11 (=7)$ , $-4 - 9 (= -13)$ , $11 - 9 (= 2)$ , $9 - 11 (= -2)$ A1 cao OR M1 for using a number line correctly to carry out at least one calculation. (may be simply seen by arcs on a number line) A1 cao
5	(a)		16	1	B1 cao
	(b)		12	2	M1 for $96 \div 4 (= 24)$ or $96 \div 2 (= 48)$ or $96 \div 8$ oe A1 cao

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Question		Working	Answer	Mark	Notes
6	(a)		$\frac{1}{5}$	1	B1 for $\frac{1}{5}$ oe
	(b)		25	1	B1 cao
	(c)		$\frac{4}{5}$	2	M1 for $\frac{8}{10}$ oe A1 cao
	(d)		36	1	B1 cao
	(e)		74	2	M1 for $\frac{37}{50} \times 100$ oe or $\frac{74}{100}$ A1 cao
	(f)		0.09	1	B1 cao
7			A correct diagram	2	M1 for covering the grid with any number of the given tiles A1 for correctly covering the grid with the 8 given tiles
8	(a)		30	1	B1 cao
	(b)		80	2	M1 for $32 \div 2 (= 16)$ or $32 \times 5 (= 160)$ A1 cao
	(c)		120	2	M1 for a fully correct method to find 20% of £600 A1 cao





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Question		Working	Answer	Mark	Notes
11	(a)		36	1	B1 cao
	(b)		38	2	M1 for $2 \times 4 + 5 \times 6$ oe A1 cao
	(c)		17	2	M1 for $3 \times 7 + 4 \times -1$ oe A1 cao
12	(a)	9, 8, 4 9, 8, 5 9, 8, 6 9, 7, 6 8, 7, 6 5, 7, 9	Any correct combination	2	M1 for correctly adding 3 whole numbers $< 10$ or correctly adding 3 whole numbers whose sum is 21, 22 or 23 A1
	(b)		0.5	2	M1 for $6 - -5 (= 11)$ or $6 + -5 (= 1)$ a number line with -5 and 6 clearly indicated A1 for 0.5 oe

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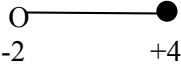
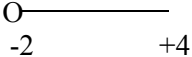
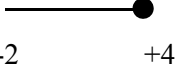
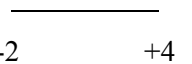

Question	Working	Answer	Mark	Notes
13 (a)		44	2	M1 $8 \times 11 \div 2$ oe A1 cao
(b)		16	3	M1 $40 \times 2 (= 80)$ or $40 \div 5 (= 8)$ M1 (dep) " $40 \times 2$ " $\div 5$ or " $40 \div 5$ " $\times 2$ A1 cao  OR M1 $\frac{5x}{2} = 40$ oe  M1 $5x = 80$ oe or $\frac{x}{2} = 8$ oe A1 cao
14 (a)		60	1	B1 cao
(b)		23	2	M1 for $51 + 18$ or 69 seen or $51 + 18 \div 3$ seen in working or $3x - 18 = 51$ or first step correct of a reversed flow chart. A1 cao
15		8	3	M1 for $12 \times 6 \times 5$ or 360 seen M1 for " $360$ " $\div (15 \times 3)$ oe A1 cao

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Question	Working	Answer	Mark	Notes
*16		$x = 155^\circ$	5	<p>M1 for <math>180 - 125 (=55)</math>                      C1 (dep on this M1) for “sum of the <u>angles</u> on a <u>straight line</u> is <u><math>180^\circ</math></u>                      M1 for <math>360 - 70 - 80 = “55”</math>                      C1 (dep on this M1) for ‘the sum of the <u>exterior angles</u> of a polygon is <u><math>360^\circ</math></u>                      A1 for <math>x = 155(^\circ)</math></p> <p>OR</p> <p>M1 for <math>180 - 70 (=110)</math> or <math>180 - 80 (=100)</math>                      C1 (dep on this M1) for “sum of the <u>angles</u> on a <u>straight line</u> is <u><math>180^\circ</math></u>”                      M1 for <math>360 - 125 - “110” = “100” (=25)</math>                      and <math>180 - “25”</math>                      C1 (dep on this M1) for ‘the sum of the <u>angles</u> of a <u>quadrilateral</u> is <u><math>360^\circ</math></u>                      A1 for <math>x = 155(^\circ)</math>                      Note: 155 seen without the ‘<math>x =</math> (or <math>ABE=</math>)’ gets A0                      and 155 seen without any working gets B1only (not M2A1)</p>

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Question	Working	Answer	Mark	Notes
*17		$\frac{27}{120} < \frac{30}{120}$ or $22.5\% < 25\%$ or $0.225 < 0.25$	4	<p>M1 for a method for finding 40% of 120                      eg. <math>\frac{40}{100} \times 120 (= 48)</math></p> <p>M1 for a method for finding <math>\frac{3}{8}</math> of 120                      eg. <math>120 \div 8 (= 15)</math>, <math>"15" \times 3 (= 45)</math></p> <p>M1 for a method to find the proportion of green counters, eg. <math>\frac{120-48-"45"}{120} (= \frac{27}{120})</math></p> <p>C1 (dep on M3) for a correct value for the proportion of green counters compared correctly with one quarter, eg. <math>\frac{27}{120} &lt; \frac{30}{120}</math></p> <p>OR</p> <p>M1 for a correct method to convert 40% or <math>\frac{3}{8}</math> to a common form, eg. <math>40\% = \frac{40}{100}</math> or <math>\frac{3}{8} \times 100 (= 37.5\%)</math>                      or <math>40 \div 100 (= 0.4)</math> and <math>3 \div 8 (= 0.375)</math></p> <p>M1 for method to find sum of red and yellow,                      eg. <math>\frac{16}{40} + \frac{15}{40}</math> or <math>40\% + "37.5\%"</math></p> <p>M1 for a method to find the proportion of green counters, eg. <math>1 - \frac{31}{40}</math> or <math>100 - "77.5"</math></p> <p>C1 (dep on M3) for a correct value for the proportion of green counters compared correctly with one quarter,                      eg. <math>\frac{9}{40} &lt; \frac{10}{40}</math> or <math>22.5\% &lt; 25\%</math></p>

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Question	Working	Answer	Mark	Notes
18 (a)		$x \geq -3$	1	B1 for $x \geq -3$ or $-3 \leq x$
(b)		 <p>A number line with an open circle at -2 and a closed circle at +4. A horizontal line segment connects the two circles.</p>	2	<p>M1 for:</p>  <p>Accept this line drawn with any length</p> <p>OR</p>  <p>Accept this line drawn with any length</p> <p>OR</p>  <p>OR</p>  <p>A1 for a fully correct diagram</p>
(c)		-1, 0, 1, 2, 3, 4	2	B2 for all 6 values and no others (B1 for 5 correct values and no others or all 6 correct values and one additional incorrect value)

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Question	Working	Answer	Mark	Notes
19 (a)	$x + x + 5 + 4x = T$	$T = 6x + 5$ oe	3	B3 for $T = 6x + 5$ oe (B2 for $6x + 5$ oe or $T = 6x + a$ oe, $a \neq 0$ or $T = bx + 5$ oe, $b \neq 0$ B1 for $x + 5$ or $4x$ or $T =$ a linear expression in $x$ or $6x + a$ oe, $a \neq 0$ or $bx + 5$ oe, $b \neq 0$ )
(b)	$p - q = 3e$  $\frac{p - q}{3} = e$	$e = \frac{p - q}{3}$	2	M1 for subtracting $q$ from both sides as a first step or for dividing all terms by 3 as a first step A1 for $e = \frac{p - q}{3}$ oe  <b>SC:</b> B1 for $p - q \div 3$ if M0 scored

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Question	Working	Answer	Mark	Notes
*20		120° with reasons	4	<p>M1 for <math>180 - 90 - 30</math> or an angle correctly identified as 60 (could be on the diagram)</p> <p>M1 for <math>180 - "60"</math> oe (could be on the diagram)</p> <p>C2 for <math>120(^{\circ})</math> and all reasons clearly given  <b>e.g.</b>  <math>ABG = 90</math> (<u>corresponding angles are equal</u>)  <math>AGB = 180 - 90 - 30 = 60</math> (<u>angles in a triangle</u> add to <u>180</u>)  <math>FGD = 60</math> (<u>vertically opposite</u> angles equal)  <math>x = 180 - 60</math> (<u>allied angles</u> or <u>co-interior angles</u>) add to <u>180</u></p> <p>OR</p> <p><math>ADC = 180 - 90 - 30 = 60</math> (<u>angles in a triangle</u> add to <u>180</u>)  <math>FGD = 60</math> (<u>alternate angles</u> are equal)  <math>x = 180 - 60</math> (<u>allied angles</u> or <u>co-interior angles</u>) add to <u>180</u></p> <p>(C1 for one appropriate reason for candidates working)</p> <p>QWC: Reasons written out clearly with correct geometrical language used</p>



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Question	Working	Answer	Mark	Notes
21 (a)		-1, -5, -4, 4	2	B2 for all correct (B1 for 2 or 3 correct)
21 (b)		Correct graph	2	B2 for fully correct graph OR M1 ft for 6 or 7 of their points plotted correctly A1 for correct graph
21 (c)		2.2, -2.2	2	B1ft graph for 2 to 2.4 B1ft graph for -2.4 to -2  <b>SC:</b> B1 ft for (2.2, 0), (-2.2, 0)
22	$\pi \times (10 \div 2)^2 - 0.5 \times 8 \times 6$	54.5	5	M1 for $10 \div 2$ (=5) M1 for $\pi \times 5^2$ (=78.539...) M1 for $0.5 \times 8 \times 6$ (=24) M1(dep on at least one previous M1) for '78.539...' - '24' [ie their area of the circle - their area of the triangle] A1 for an answer in the range 54 to 55





