

Mark Scheme (Results)

November 2012

GCSE Mathematics Linked Pair Pilot
Methods in Mathematics (2MM01)
Foundation (Non Calculator) Paper 1F

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications come from Pearson, the world's leading learning company. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk for our BTEC qualifications.

Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

If you have any subject specific questions about this specification that require the help of a subject specialist, you can speak directly to the subject team at Pearson. Their contact details can be found on this link: www.edexcel.com/teachingservices.

You can also use our online Ask the Expert service at www.edexcel.com/ask. You will need an Edexcel username and password to access this service.

Pearson: helping people progress, everywhere

Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

November 2012

Publications Code UG033876

All the material in this publication is copyright

© Pearson Education Ltd 2012

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

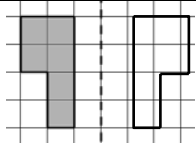
Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

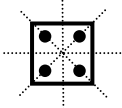
13 Range of answers

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

5MM1F_01					
Question		Working	Answer	Mark	Notes
1	(a)		4736	1	B1 cao
	(b)		23 600	1	B1 cao
2			Correct shape in correct position	2	B2 for correct shape in correct position (B1 for a correct reflection in a line parallel to the mirror line)
3	(a)		kite	1	B1
	(b)(i)		acute	2	B1
	(b)(ii)		reflex		B1
4			$\frac{3}{4}$	2	M1 for $\frac{9}{12}$ or $\frac{6}{8}$ or for an attempt to divide numerator and denominator by a common factor A1 $\frac{3}{4}$ cao
5	(a)		Likely	1	B1
	(b)		Unlikely	1	B1
	(c)		Impossible	1	B1

5MM1F_01					
Question		Working	Answer	Mark	Notes
6	(a)		9 or 16	1	B1
	(b)		18 or 24	1	B1
	(c)		8	1	B1
7	(a)		10	1	B1 cao
	(b)		5	1	B1 cao
	(c)		17	1	B1 cao
8	(a)		A, E	1	B1 cao
	(b)		G, K	1	B1 cao
9	(a)		4 correct lines	2	M1 for 1 correct line with no incorrect lines A1 for 4 correct lines with no errors
	(b)		4	1	B1 cao

5MM1F_01																																									
Question	Working	Answer	Mark	Notes																																					
10	(a) (b) (c) (d) $\begin{array}{r} 561 \\ \underline{34} \\ 2244 \\ \underline{16830} \\ 19074 \end{array}$ <table border="1" data-bbox="427 707 752 847"> <tr><td></td><td>5</td><td>6</td><td>1</td><td></td></tr> <tr><td>1</td><td>1</td><td>1</td><td>1</td><td>3</td></tr> <tr><td>9</td><td>2</td><td>2</td><td>3</td><td>4</td></tr> <tr><td></td><td>0</td><td>4</td><td>4</td><td></td></tr> <tr><td></td><td>0</td><td>7</td><td>4</td><td></td></tr> </table> <table border="1" data-bbox="427 916 786 1023"> <tr><td></td><td>500</td><td>60</td><td>1</td></tr> <tr><td>30</td><td>15000</td><td>1800</td><td>30</td></tr> <tr><td>4</td><td>2000</td><td>240</td><td>4</td></tr> </table> $15000+1800+30+2000+240+4$		5	6	1		1	1	1	1	3	9	2	2	3	4		0	4	4			0	7	4			500	60	1	30	15000	1800	30	4	2000	240	4	1200	1	B1 cao
	5	6	1																																						
1	1	1	1	3																																					
9	2	2	3	4																																					
	0	4	4																																						
	0	7	4																																						
	500	60	1																																						
30	15000	1800	30																																						
4	2000	240	4																																						
		16	1	B1 cao																																					
		2	1	B1 cao																																					
		19074	3	M1 for complete method with relative place value correct. Condone 1 multiplication error, addition not necessary. OR M1 for a complete grid. Condone 1 multiplication error, addition not necessary. OR M1 for sight of a complete partitioning method, condone 1 multiplication error. Final addition not necessary. M1 (dep) for addition of all the appropriate elements of the calculation A1 for 19074 cao (SC B1 for addition of 34 lots of 561)																																					

5MM1F_01					
Question		Working	Answer	Mark	Notes
11	(a)		x marked at $\frac{1}{8}$	1	B1 for x at $\frac{1}{8}$, within tolerance on overlay
	(b)		x marked at 0	1	B1 for x at 0, within tolerance on overlay
	(c)		x marked at $\frac{1}{2}$	1	B1 for x at $\frac{1}{2}$, within tolerance on overlay
12	(a)		3467	1	B1 cao
	(b)		7634	1	B1 cao
	(c)		$\frac{4}{6}$	1	B1 for $\frac{4}{6}$ cao
	(d)		$\frac{3}{4}$ or $\frac{4}{6}$ or $\frac{4}{7}$ or $\frac{6}{7}$	1	B1 for $\frac{3}{4}$ or $\frac{4}{6}$ or $\frac{4}{7}$ or $\frac{6}{7}$

5MM1F_01					
Question		Working	Answer	Mark	Notes
13	(a)(i)		$\frac{1}{6}$	3	B1 for $\frac{1}{6}$ oe
	(a)(ii)		$\frac{3}{6}$		B1 for $\frac{3}{6}$ oe
	(a)(iii)		$\frac{2}{6}$		B1 for $\frac{2}{6}$ oe
	(b)(i)		H1, H2, H3, H4, H5, H6 T1, T2, T3, T4, T5, T6	3	M1 for any 6 different combinations A1 for all 12 correct combinations seen with no incorrect combinations, ignore duplicates
	(b)(ii)		$\frac{1}{12}$		B1 for $\frac{1}{12}$ or ft from (b)(i)
14	(a)		-5, -3, 2, 6, 17	1	B1 cao
	(b)		0.078, 0.6, 0.67, 0.705, 0.75	1	B1 cao
	(c)	$\frac{18}{60}, \frac{24}{60}, \frac{30}{60}, \frac{45}{60}$ Or 0.3, 0.4, 0.5, 0.75 or 30%, 40%, 50%, 75%	$\frac{3}{10}, \frac{2}{5}, \frac{1}{2}, \frac{3}{4}$	2	M1 for attempt to convert all numbers to equivalent fractions or decimals or percentages A1 cao (SC B1 for only one fraction in wrong position if M0 scored)

5MM1F_01					
Question		Working	Answer	Mark	Notes
15	(a)		$4b$	1	B1 cao
	(b)		$3cd$	1	B1 cao
	(c)		$7h + 5r$	2	B2 cao (B1 for $7h$ or $5r$)
16	(a)		$\frac{5}{8}$	1	B1 for $\frac{5}{8}$ oe
	(b)	$\frac{7}{10} - \frac{6}{10}$	$\frac{1}{10}$	2	M1 for a correct common denominator and at least one fraction correct (must be $\frac{6}{10}$ if 10 used as common denominator) A1 for $\frac{1}{10}$ oe
	(c)	$\frac{5}{8} \times \frac{3}{4}$	$\frac{20}{24}$	2	M1 for $\times \frac{4}{3}$ A1 for $\frac{20}{24}$ oe

5MM1F_01					
Question		Working	Answer	Mark	Notes
17	(a)		27	1	B1 cao
	(b)		42	1	B1 cao
	(c)		$5n + 2$	2	B2 for $5n + 2$ (oe, including un-simplified) (B1 for $5n + k$, $k \neq 2$ or k is absent, or $n = 5n + 2$)
	(d)	$60 - 2 = 58$ $58 \div 5 = 11.6$ (or 11 r3)	11	2	M1 for $(60 - 2) \div 5$ ft evidence of using formula from part (c) or repeated addition of 5 (at least 3) or 57 seen A1 for 11 cao
18	(a)		12	1	B1 cao
	(b)		6	1	B1 cao
	(c)	$7y = 16 + 5$	3	2	M1 for attempt to rearrange equation eg $+ 5$ on both sides or $7y = 16 + 5$ oe A1 for 3 cao
19		$2^6 = 64$ $6^2 = 36$ $64 > 36$	2^6	3	B1 for $6^2 = 36$ M1 for $2 \times 2 \times 2 \times 2 \times 2 \times 2 (= 64)$ C1 for 36 and 64 with 2^6 (or 64) clearly identified

5MM1F_01					
Question		Working	Answer	Mark	Notes
20	(a)		Factors	1	B1 cao
	(b)		2, 3	1	B1 cao
	(c)		$\frac{9}{15}$	2	M1 for $\frac{n}{15}$ where n is integer and $n < 15$ or $\frac{9}{n}$ where n is integer and $n > 9$ A1 for $\frac{9}{15}$ oe
21	(a)		(7, 3)	1	B1 cao
	(b)		(3, 1) or (-1, 5) or (11, 5)	1	B1 for (3, 1) or (-1, 5) or (11, 5)
	(c)		(3, 9)	2	M1 for correct point <i>E</i> plotted or $3 + 2(6 - 3)$ or $1 + 2(2 - 1)$ A1 for (3, 9) cao (SC B1 for (3, <i>m</i>) where $m \neq 9$ or (<i>n</i> , 9) where $n \neq 3$)
22	(a)	$28 - (2 \times 4) = 20$ $20 \div 2 = 10$ $4 \times 10 = 40$	40	3	M1 for $(28 - 2 \times 4)/2$, can be implied by 10 marked on rectangle M1 (dep) for '10' \times 4 A1 for 40 cao
	(b)	$\sqrt{81} = 9$ $9 \times 4 = 36$	36	3	M1 for $\sqrt{81}$ or 9 M1 for 9×4 A1 for 36 cao

5MM1F_01					
Question		Working	Answer	Mark	Notes
23	(a)	$1 - 0.37$	0.63	1	B1 for 0.63 oe
	(b)	0.37×500	185	2	M1 for 0.37×500 A1 cao (SC B1 for answer of 200)

5MM1F_01				
Question	Working	Answer	Mark	Notes
*24 QWC	$10 - 4 = 6$ $8 \times 4 = 32$ $(6 \times 3)/2 = 9$ $32 + 9$ $8 - 3 = 5$ $\frac{1}{2}(10 + 4) \times 3 = 21$ $4 \times 5 = 20$ $21 + 20$	41cm ²	4	<p>M1 for $8 \times 4 (= 32)$ or $(6 \times 3)/2 (= 9)$ M1 for $8 \times 4 (= 32)$ and $(6 \times 3)/2 (= 9)$ A1 for 41 C1 (dep on M1) for '41' cm²</p> <p>OR</p> <p>M1 for $4 \times 5 (= 20)$ or $\frac{1}{2}(10 + 4) \times 3 (= 21)$ M1 for $4 \times 5 (= 20)$ and $\frac{1}{2}(10 + 4) \times 3 (= 21)$ A1 for 41 C1 (dep on M1) for '41' cm²</p> <p>OR</p> <p>M1 for $10 \times 8 (= 80)$ or $\frac{1}{2}(5 + 8) \times 6 (= 39)$ M1 for $10 \times 8 (= 80)$ and $\frac{1}{2}(5 + 8) \times 6 (= 39)$ A1 for 41 C1 (dep on M1) for '41' cm²</p> <p>OR</p> <p>M1 for $4 \times 5 (= 20)$ or $3 \times 4 (= 12)$ or $(6 \times 3)/2 (= 9)$ M1 for $4 \times 5 (= 20)$ and $3 \times 4 (= 12)$ and $(6 \times 3)/2 (= 9)$ A1 for 41 C1 (dep on M1) for '41' cm²</p>

5MM1F_01																				
Question	Working					Answer	Mark	Notes												
25	<table border="1"> <tr> <td>x</td> <td>-2</td> <td>-1</td> <td>0</td> <td>1</td> <td>2</td> </tr> <tr> <td>y</td> <td>-1</td> <td>1</td> <td>3</td> <td>5</td> <td>7</td> </tr> </table>					x	-2	-1	0	1	2	y	-1	1	3	5	7	$y = 2x + 3$ drawn	4	<p>(Table of values) C1 for axes scaled and labelled (condone zero omitted at origin) M1 for at least 2 correct attempts to find points by substituting values of x. M1 ft for plotting at least 2 of their points (any points plotted from their table must be plotted correctly) A1 for correct line</p> <p>(No table of values) C1 for axes scaled and labelled (condone zero omitted at origin) M2 for at least 2 correct points (and no incorrect points) plotted OR line segment of $y = 2x+3$ drawn (ignore any additional incorrect segments) (M1 for at least 3 correct points with no more than 2 incorrect points) A1 for correct line</p> <p>(Use of $y=mx+c$) C1 for axes scaled and labelled (condone zero omitted at origin) M2 for at least 2 correct points (and no incorrect points) plotted OR line segment of $y = 2x+3$ drawn (ignore any additional incorrect segments) (M1 for line drawn with gradient of 2 OR line drawn with a y intercept of 3 and a positive gradient) A1 for correct line</p>
x	-2	-1	0	1	2															
y	-1	1	3	5	7															

5MM1F_01				
Question	Working	Answer	Mark	Notes
26* QWC	$180 - 150 = 30$ $180 - 90 - 35 = 30$ OR $180 - 150 = 30$ $180 - 35 - 90 = 55$ $180 - 55 = 125$ $180 - 30 = 125$ OR $150 - 90 = 35$	25	4 ,	M1 for $180 - 150 (= 30)$ M1 (dep) for $180 - 90 - 35 = '30'$ A1 for 25 cao C1 for <u>angles</u> on a straight <u>line</u> total <u>180°</u> AND <u>angles</u> in a <u>triangle</u> total <u>180°</u> OR M1 for $180 - 150 (= 30)$ M1 (dep) for $180 - 35 - 90 (= 55)$, $180 - '55' (=125)$ and $180 - '30' - '125'$ A1 for 25 cao C1 for <u>angles</u> on a straight <u>line</u> total <u>180°</u> AND <u>angles</u> in a <u>triangle</u> total <u>180°</u> OR M2 for $150 - 90 = 35$ A1 for 25 cao C1 for <u>exterior</u> angle of a triangle is <u>equal</u> to the sum of the <u>interior opposite angles</u>
27		Rotation Centre (0,0) 90° clockwise	3	B1 for rotation B1 for 90°clockwise or 270° anti clockwise B1 for (0,0) or O or origin NB: a combination of transformations gets B0

Further copies of this publication are available from
Edexcel Publications, Adamsway, Mansfield, Notts, NG18 4FN

Telephone 01623 467467

Fax 01623 450481

Email publication.orders@edexcel.com

Order Code UG033876 November 2012

For more information on Edexcel qualifications, please visit our website
www.edexcel.com

Pearson Education Limited. Registered company number 872828
with its registered office at Edinburgh Gate, Harlow, Essex CM20 2JE

Ofqual




Llywodraeth Cynulliad Cymru
Welsh Assembly Government

