edexcel

Mark Scheme (Results)

Summer 2013

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

Summer 2013
Publications Code UG037237

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.

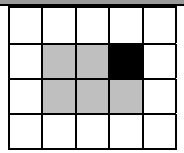
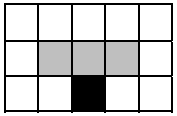
13 Range of answers

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: 5MM1F_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
1	(a)		Three thousand, five hundred and six	1	B1 accept thirty five hundred and six
	(b)		1425	1	B1 cao
	(c)		83 000	1	B1 cao
	(d)		3.7	1	B1 cao
2	(a)		18 45 53 84 138	1	B1 cao
	(b)		0.56 0.65 5.06 5.6 6.5	1	B1 cao
3	(a)		impossible	1	B1 cao
	(b)		even	1	B1 cao
	(c)		likely	1	B1 cao
4	(a)		Acute angle marked	1	B1
	(b)		Right angle marked	1	B1

Paper: 5MM1F_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
5	(a)	367 + 128	495	2	M1 for correct method to add the numbers, evidence of correct carrying used at least once A1 cao
	(b)	15.6 – 4.37	11.23	2	M1 for correct method to subtract the numbers with evidence of borrowing from 6 **or** evidence of counting on from 7 (NB. decimal points must be correctly lined up) A1 cao
	(c)	3.8 4× **or** 3.8+3.8+3.8+3.8	15.2	2	M1 for valid method to multiply 38 by 4 (ignore decimals, condone one multiplication error) **or** the digits 152 in the answer **or** 3.8+3.8+3.8+3.8 A1 cao
	(d)		2	1	B1 cao
	(e)		− 30	1	B1 cao

Paper: 5MM1F_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
6	(a)			1	B1 One extra square shaded to make a shape with rotational symmetry order 2
	(b)			1	B1 One extra square shaded to make a shape with one line of symmetry only

Paper: 5MM1F_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
7			0.6 is bigger than $\frac{2}{5}$	3	M1 for 0.4 **or** 40% **or** fraction equivalent to $\frac{2}{5}$ with denominator =10,15,20... **OR** 60% **or** $\frac{3}{5}$ **or** a fraction equivalent to $\frac{3}{5}$ with denominator = 10,15,20... A1 for two comparable figures eg. (0.6) ,0.4 **or** 40% , 60% **or** $\frac{3}{5}, \left(\frac{2}{5}\right)$ **or** $\frac{6}{10}, \frac{4}{10}$ etc C1 (dep on M1) ft for correct statement from their figures **OR** M1 for a correct method involving shading **or** calculation Eg. drawing a rectangle 2 by 5 and shading 6 squares or 4 squares **or** correct method to find $\frac{2}{5}$ or 0.6 of a number A1 correct comparable figures. Eg. Two 2×5 rectangles, one with 4 squares shaded, one with 6 squares shaded **or** $\frac{2}{5} \times 20 = 8$ **and** $0.6 \times 20 = 12$ C1 (dep on M1) ft for correct statement from their figures **OR** M1 $\frac{2}{5}$ < half **or** 0.6 > half A1 $\frac{2}{5}$ < half **and** 0.6 > half C1 (dep on M1) ft for correct statement from their figures

Paper: 5MM1F_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
8	(i)		Equilateral or isosceles	2	B1 use professional judgement for spelling
	(ii)		Right angled or scalene		B1 use professional judgement for spelling
9		.....11, 13, 15, 17, 19, 21,..... .....15, 18, 21, ...	Any odd multiple of 3 greater than 14	3	M1 for finding the next number in either sequence M1 for finding the next number in both sequences **or** extending either sequence by two more terms A1 15 **or** any odd multiple of three >14
10	(a)		10	1	B1 cao
	(b)		35	1	B1 cao
	(c)		8	1	B1 cao
11	(i)		33 and 17	4	B1 both 17 and 33 needed
	(ii)		6, 16 or 24		B1
	(iii)		24		B1 cao
	(iv)		16		B1 cao

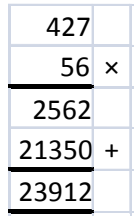
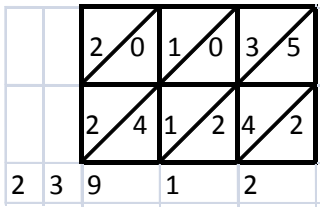
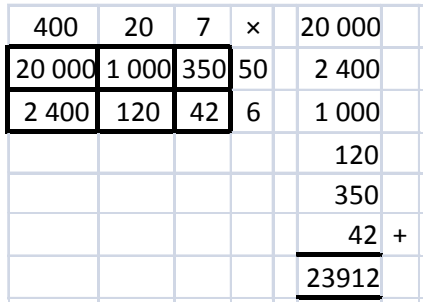
Paper: 5MM1F_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
*12		14 + 19 = 33 57 – 29 = 28 (or -28) 9 × 4 = 36	the **product** of 9 and 4 has the **greatest** value	3	M1 for evidence of one correct operation Eg. 14 + 19 **or** 33 **OR** 57 – 29 **or** 28 **or** 29 – 57 **or** –28 **OR** 9 × 4 **or** 36 A1 33, 28 (or –28) **and** 36 C1 (dep on M1) ft for a statement identifying the correct calculation (not the biggest answer) from three calculated values
13	(a)		(3, 2)	1	B1 cao
	(b)		point plotted at (–2,1)	1	B1 cao
14	(a)		$\frac{3}{5}$	1	B1 cao
	(b)		$3\frac{5}{8}$	1	B1 cao
	(c)	$\frac{4}{9}+\frac{3}{9}$	$\frac{7}{9}$	2	M1 $\frac{4}{9}+\frac{3}{9}$ or another common denominator used with at least one correct numerator eg $\frac{"8"}{18}+\frac{6}{18}$ or $\frac{8}{18}+\frac{"6"}{18}$ A1 oe

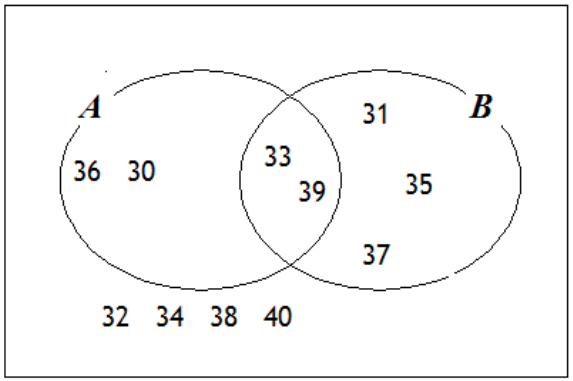
Paper: 5MM1F_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
15	(a)		37	1	B1 cao
	(b)		reason	1	B1 for a correct reason Eg. the sequence contains only odd numbers and 200 is even ; all numbers in the sequence end in 1, 3, 5, 7, 9 ; sight of 197 and 201 with statement; Use of $4n+5$ to show that 200 is not in sequence
16	(a)		$\frac{1}{4}$	1	B1 0.25 or $\frac{1}{4}$ oe
	(b)		(red, blue) (red,green) (red,yellow) (blue,green) (blue,yellow) (green,yellow)	2	M1 for at least 3 correct pairs A1 for 6 correct pairs, no extras or repeats
17	(a)		$2w$	1	B1 oe
	(b)		$5de$	1	B1 oe simplified algebraic form
	(c)		$7a + 2b$	2	B2 for $7a + 2b$ oe (B1 for $7a$ or $2b$ seen)

Paper: 5MM1F_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
18	(a)		reason	1	B1 Eg. **yes** and any sentence that indicates that the number of outcomes for each letter is not evenly distributed **or** **no** and any sentence that indicates that the number of outcomes for each letter could have come from a fair spinner as there are only 40 outcomes **or** **don't know** and any sentence that indicates that there are insufficient outcomes (only 40) to be able to tell or don't know if the sides of the spinner are the same length
	(b)		$\frac{2}{40}$	2	M1 for $\frac{2}{n}$ for $n > 2$ or $\frac{n}{40}$ for $n < 40$ A1 $\frac{2}{40}$ oe

Paper: 5MM1F_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
19	(a)		7	1	B1 cao
	(b)		14	1	B1 cao
	(c)	$5x + 6 - 6 = 21 - 6$ **or** $x + \frac{6}{5} = \frac{21}{5}$	3	2	M1 for $5x = 15$ or $5x = 21 - 6$ **or** clear intention to subtract 6 from both sides **or** clear intention to divide all terms by 5, A1 cao
	(d)		$3e(2f + 3e)$	2	M1 $3(2ef + 3e^2)$ or $e(6f + 9e)$ A1 $3e(2f + 3e)$ cao

Paper: 5MM1F_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
20			72	3	M1 24÷4 or 6 seen M1 “6”×12 A1 cao **OR** M1 24×5 or 120 or 24×2 or 48 M1 “120”–“48” A1 cao **OR** M1 24÷4×3 or 18 seen M1 “18”×4 A1 cao **OR** M2 24×3 A1 cao

Paper: 5MM1F_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
21		   	23912	3	M1 for a complete method with relative place value correct. Condone 1 multiplication error, addition not necessary. M1 (dep) for addition of all the appropriate elements of the calculation. A1 cao M1 for a complete grid with not more than 1 multiplication error, addition not necessary M1 (dep) for addition of all the appropriate elements of the calculation A1 cao M1 for sight of a complete partitioning method, condone 1 multiplication error, addition not necessary. M1 (dep) for addition of all the appropriate elements of the calculation. A1 cao

Paper: 5MM1F_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
22	(a)	see last page	correct reflection drawn	1	B1
	(b)	see last page	correct enlargement drawn	2	M1 for drawing at least one side double in length A1 fully correct enlargement (drawn in any orientation) SC B1 correct enlargement scale factor 3 or correct enlargement scale factor 4
23	(a)			4	B1 33 and 39 and no other numbers placed in the intersection B1 30 and 36 in set *A* or 31, 35 and 37 in set *B* B1 at least two of 32, 34, 38 40 placed correctly B1 fully correct diagram
	(b)		$\frac{2}{11}$ oe	1	B1 ft from candidate's Venn diagram
	(c)		$\frac{7}{11}$ oe	1	B1 ft from candidate's Venn diagram

<table>
<tr><th colspan="5">Paper: 5MM1F_01</th></tr>
<tr><th colspan="2">Question</th><th>Working</th><th>Answer</th><th>Mark</th><th>Notes</th></tr>
<tr><td>24</td><td>(a)</td><td>$y = 3x + 5$
<table><tr><td>x</td><td>-2</td><td>-1</td><td>0</td><td>1</td><td>2</td><td>3</td></tr><tr><td>y</td><td>-1</td><td>2</td><td>5</td><td>8</td><td>11</td><td>14</td></tr></table></td><td>Correct line from (-2,-1) to (3,14)</td><td>3</td><td>(Table of values / calculation of values)
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 correctly plotted)
A1 for correct line between $x = –2$ and $x = 3$

(No table of values)
M1 for at least 2 correct points with no more than 2 incorrect points
M1 for at least 2 correct points (and no incorrect points) plotted OR line segment of $y = 3x + 5$ drawn
A1 for correct line between $x = –2$ and $x = 3$

(Use of y=mx+c)
M1 for line drawn with gradient of 3 OR line drawn with a y intercept of 5
M1 for line drawn with gradient of 3 AND line drawn with a y intercept of 5
A1 for correct line between $x = –2$ and $x = 3$

SC : B2 for the correct line from $x = 0$ to $x = 3$</td></tr>
<tr><td></td><td>(*b)</td><td>$3 \times 6 + 5$
$= 18 + 5$
or
$24 – 5 = 19$
$19 \div 3$</td><td>Correct explanation</td><td>2</td><td>M1 $3 \times 6 + 5$ or “18” + 5 or (6, 23)
C1 for 23 seen and correct conclusion
or
M1 24 – 5 or “19” ÷ 3
C1 for $\frac{19}{3}$ oe or 6.3... seen and correct conclusion</td></tr>
<tr><td>25</td><td>(a)</td><td></td><td>84 320</td><td>1</td><td>B1 cao</td></tr>
<tr><td></td><td>(b)</td><td></td><td>8.432</td><td>1</td><td>B1 cao</td></tr>
<tr><td></td><td>(c)</td><td></td><td>4216</td><td>1</td><td>B1 cao</td></tr>
</table>

Paper: 5MM1F_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
26	(i)	+ | **1** **2** **3** **4** **5** **6** **1** | 2 3 4 5 6 7 **3** | 4 5 6 7 8 9 **5** | 6 7 8 9 10 11 **7** | 8 9 10 11 12 13 **or** $\frac{1}{4}\times\frac{1}{6}$	$\frac{1}{24}$	3	M1 for identifying 5 and 7 **or** 5 + 7 (= 12) M1 for 24 seen OR an attempt to get the 24 outcomes or an attempt at a sample space or a list of possibilities or a list of ordered pairs [at least 12 correct; outcomes , possibilities, ordered pairs must be shown (ignore incorrect extras)] A1 for $\frac{1}{24}$ oe **OR** M2 for $\frac{1}{4}\times\frac{1}{6}$ (M1 for $\frac{1}{4}$ or $\frac{1}{6}$ seen) A1 for $\frac{1}{24}$ oe
	(ii)		$\frac{4}{24}=\frac{1}{6}$	2	M1 ft from their ordered list from part (i) for identifying at least one possible score from; 1+1(=2), 1+2(=3), 1+3(=4), 3+1(=4), condone the inclusion of pairs reversed [accept the inclusion of 1+4 or 4+1 (=5) as a misread] [accept an answer of $\frac{5}{24}$, for M1, only if the 5 outcomes are selected in either part (i) or part (ii)] A1 for $\frac{4}{24}$ oe

Paper: 5MM1F_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
27			$42cm^2$	4	M1 for a correct method to find area of one triangle M1 for a fully correct method to find the shaded area A1 cao B1 (indep) for cm^2

Paper: 5MM1F_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
*28			"**two** angles are **equal** so the triangle is **isosceles**"	5	M1 for $6x - 10 + 4x + 8 + 5x + 2$ **or** $15x$ M1 for $6x - 10 + 4x + 8 + 5x + 2 = 180$ **or** $15x = 180$ **or** $(x =)\ 180 \div 15$ A1 $x = 12$ M1 (ft from '12' if M2 scored) for $5\times$'12'$+2$ **or** $6\times$'12'-10 **or** $62(^o)$ **or** $4\times$'12'$+8$ **or** $56(^o)$ C1 both base angles as 62 **and two** angles are **equal** so the triangle is **isosceles** NB. $x = 12$ with no working scores M0M0A0 ; correct value of x from clear trial and improvement could gain M1M1A1 **OR** M1 $5x + 2 = 6x - 10$ **or** $2 + 10 = 6x - 5x$ A1 $x = 12$ M1 $5\times12+2$ **or** $6\times12-10$ **or** $62(^o)$ **or** $4\times12+8$ **or** $56(^o)$ M1 checking their angles add to 180^o, "62"+"62"+"56"=180 C1 both base angles as 62 **and two** angles are **equal** so the triangle is **isosceles** **OR** M1 $4x + 8 = 5x + 2$ oe or $4x + 8 = 6x - 10$ A1 $x = 6$ **or** $x = 9$ M1 (dep) for substituting 'x' into one of the angles oe M1 for showing their angles do not sum to 180^o C0

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 UG037237 Summer 2013

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

cea
Rewarding Learning