

Mark Scheme (Results)

November 2013

Pearson Edexcel GCSE  
Linked Pair Pilot in Mathematics  
Methods in Mathematics (2MM01)  
Foundation Paper 1F

## **Edexcel and BTEC Qualifications**

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. 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](http://www.edexcel.com) or [www.btec.co.uk](http://www.btec.co.uk). Alternatively, you can get in touch with us using the details on our contact us page at [www.edexcel.com/contactus](http://www.edexcel.com/contactus).

## **Pearson: helping people progress, everywhere**

Pearson aspires to be the world's leading learning company. 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](http://www.pearson.com/uk)

November 2013

Publications Code UG037516

All the material in this publication is copyright

© Pearson Education Ltd 2013

## 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**

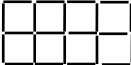
Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

**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) |         | Six thousand (and) fifty | 1    | B1 cao  |
|          | (b) |         | 16                       | 1    | B1 cao  |
|          | (c) |         | 5700                     | 1    | B1 cao  |
|          | (d) |         | 80                       | 1    | B1 (accept in words)  |
| 2        | (a) |         | × at $\frac{1}{4}$       | 1    | B1 for cross at $\frac{1}{4}$ (accept between $\frac{1}{8}$ and $\frac{3}{8}$ ) |
|          | (b) |         | impossible               | 1    | B1 cao  |
|          | (c) |         | × at $\frac{1}{2}$       | 1    | B1 for cross at $\frac{1}{2}$   |
| 3        | (a) |         | 85, 93, 102, 107, 111    | 1    | B1 cao  |
|          | (b) |         | - 6, - 1, 2, 4, 7        | 1    | B1 cao  |
|          | (c) |         | 0.95                     | 2    | M1 for a complete correct method to find the halfway point<br>A1 for 0.95 oe    |

| Question |        | Working | Answer   | Mark | Notes  |
|----------|--------|---------|--|------|--|
| 4        | (a)    |         |  | 1    | B1 for correct diagram   |
|          | (b)    |         | 22, 27   | 1    | B1 cao   |
|          | (c)    |         | No + explanation   | 1    | C1 for no + explanation, eg number of sticks in pattern number 6 is 32 <u>and</u> the number of sticks in pattern number 3 is 17, $2 \times 17$ is not 32 or ft from (b) |
| 5        | (a)(i) |         | Acute  | 2    | B1   |
|          | (ii)   |         | 45   |      | B1 for value in the range 40 to 50   |
|          | (b)    |         | No with explanation  | 1    | B1 for no with explanation, eg it is $220^\circ$ , it is reflex, it is greater than $180^\circ$  |
| 6        | (a)    |         | $x - 5$  | 1    | B1 for $x - 5$ oe  |
|          | (b)    |         | $2x$   | 1    | B1 for $2x$ oe   |

| PAPER: 5MM1F_01 |     |         |                |      |  |
|-----------------|-----|---------|----------------|------|--|
| Question        |     | Working | Answer         | Mark | Notes  |
| 7               | (a) |         | 8              | 1    | B1 for 8   |
|                 | (b) |         | tangent drawn  | 1    | B1 for any tangent drawn   |
| 8               |     |         | 60             | 2    | M1 for $15 + 25 + t = 100$ oe<br>A1 cao  |
| 9               | (a) |         | D              | 1    | B1 cao   |
|                 | (b) |         | $\frac{1}{10}$ | 1    | B1 for $\frac{1}{10}$ or 0.1 or 10%  |
| *10             |     |         | 40 and reasons | 4    | M1 for $180 - (75 + 65)$ oe<br>A1 for 40<br>C2 (dep M1) for $x = 40$ <b>and</b><br><u>Vertically opposite</u> angles are equal<br><b>and</b><br><u>Angles on a straight line</u> add up to $180^\circ$<br>(C1 (dep M1) for 1 correct reason)<br>or<br>M1 for $(360 - 2 \times (75 + 65)) \div 2$ oe<br>A1 for 40<br>C2 (dep M1) for $x = 40$ <b>and</b><br><u>Vertically opposite</u> angles are equal<br><b>and</b><br><u>Angles at a point</u> add up to $360^\circ$<br>(C1 (dep M1) for 1 correct reason) |



PAPER: 5MM1F\_01

| Question |        | Working | Answer  | Mark | Notes   |
|----------|--------|---------|---|------|---|
| 11       | (a)(i) |         | (1, 3)  | 2    | B1 cao  |
|          | (ii)   |         | (-4, -2)  |      | B1 cao  |
|          | (b)    |         | (-3, 0) plotted                                   | 1    | B1 for (-3, 0)  |
|          | (c)    |         | (1, -5)   | 2    | M1 for $-1 - 4 (= -5)$ or $(1, y)$<br>or $(1, -5)$ plotted on the diagram<br>A1 for $(1, -5)$               |
| 12       | (a)    |         | 2   | 1    | B1 cao  |
|          | (b)    |         | Completed shape                                   | 1    | B1 for completing the given shape to give any correct shape which has rotational symmetry of order 4        |
| 13       | (a)    |         | -2, 2 or -1, 1                                    | 1    | B1 cao  |
|          | (b)    |         | 0, -2 or 0, -1 or 0, 1 or 0, 2<br>or 0, 3 or 0, 4 | 1    | B1 cao  |
|          | (c)    |         | -2, 3, 2 or -1, 3, 4                              | 2    | M1 for any three numbers from the list whose product is a negative number or 12 (condone repeats)<br>A1 cao |
| 14       | (a)    |         | Emma + reason                                     | 1    | C1 for Emma with reason, eg 0.2 is greater than 0.05  |
|          | (b)    |         | 0.8   | 2    | M1 for $1 - 0.2$ oe<br>A1 for 0.8 oe  |

PAPER: 5MM1F\_01

| Question |      | Working | Answer                                     | Mark | Notes  |
|----------|------|---------|--|------|--|
| 15       | (a)  |         | $2p$                                       | 1    | B1 for $2p$ (accept $p^2$ )  |
|          | (b)  |         | $t^2$                                      | 1    | B1 for $t^2$   |
|          | (c)  |         | $x + 4y$                                   | 2    | M1 for $2x - x (= x)$ or $3y + y (= 4y)$<br>A1 for $x + 4y$ oe   |
| 16       | (a)  |         | 1 or 2 or 3 or 5 or 6<br>or 10 or 15 or 30 | 1    | B1 for 1 or 2 or 3 or 5 or 6 or 10 or 15 or 30   |
|          | (b)  |         | any multiple of 6                          | 1    | B1 for any multiple of 6   |
|          | (c)  |         | any square number                          | 1    | B1 for any square number   |
|          | *(d) |         | No and explanation                         | 2    | M1 for $2 \times$ prime number $- 1$<br>C1 (dep) for no and a counter example                                |
| 17       | (a)  |         | isosceles                                  | 1    | B1   |
|          | (b)  |         | shape drawn                                | 1    | B1 for sketch of trapezium (do not accept a parallelogram)   |
|          | *(c) |         | 60 + Reason                                | 3    | M1 for $180 - 80 - 40$<br>A1 for $x = 60$<br>C1 for <u>Angles</u> in a <u>triangle</u> add up to <u>180°</u> |

PAPER: 5MM1F\_01

| Question |     | Working | Answer         | Mark | Notes   |
|----------|-----|---------|----------------|------|---|
| 18       | (a) |         | 3, 6, 9, 12    | 2    | M1 for writing down at least two numbers from set $Q$ with no incorrect responses.<br>A1 cao                              |
|          | (b) |         | 2, 4, 8, 10    | 1    | B1 cao  |
|          | (c) |         | 6, 12          | 1    | B1 cao  |
|          | (d) |         | $\frac{8}{12}$ | 2    | M1 for $\frac{x}{12}, x \neq 8, x < 12$ or $\frac{8}{x}, x \neq 12, x > 8$<br><br>A1 for $\frac{8}{12}$ oe or ft from (a) |
| 19       | (a) |         | $1\frac{2}{5}$ | 1    | B1 for $1\frac{2}{5}$ oe  |
|          | (b) |         | $\frac{3}{11}$ | 1    | B1 cao  |

PAPER: 5MM1F\_01

| Question     |      | Working | Answer        | Mark | Notes  |
|--------------|------|---------|---------------|------|--|
| 19<br>(cont) | *(c) |         | $\frac{1}{6}$ | 4    | <p>M1 for attempting to write at least two fractions expressed with a suitable common denominator (multiple of 24) and at least one of the two fractions correct</p> <p>M1 for attempting to write all three fractions with a common denominator and at least two of the three fractions correct</p> <p>A1 for three fully correct fractions</p> <p>C1 for correct conclusion including comparisons to <math>\frac{1}{4}</math></p> <p>(dep M2 and comparison of 3 fractions with a correct common denominator)</p> <p>OR</p> <p>M1 for writing <math>\frac{3}{8}</math> as 0.375 or 37.5% or <math>\frac{1}{6}</math> as 0.16(...) or 16(.66...)%) or <math>\frac{1}{4}</math> as 0.25 or 25%</p> <p>M1 for attempting to write all three fractions as decimals or percentages and at least two of the three correct</p> <p>A1 for fully correct decimals or percentages</p> <p>C1 for correct conclusion including comparisons to 0.25/25%</p> <p>(dep M2 and comparison of 3 decimals or 3 percentages)</p> |

PAPER: 5MM1F\_01

| Question |        | Working | Answer            | Mark | Notes   |
|----------|--------|---------|-------------------|------|---|
| 20       | (a)    |         | 10                | 1    | B1 cao  |
|          | (b)    |         | 8                 | 2    | M1 for an attempt to subtract 7 from both sides or divide both sides by 2 as a first step<br>A1 cao |
| 21       | (a)(i) |         | $\frac{25}{100}$  | 3    | B1 for $\frac{25}{100}$ oe  |
|          | (ii)   |         | $\frac{36}{100}$  |      | M1 for $12 + 13 + 11 (=36)$<br>A1 for $\frac{36}{100}$ oe   |
|          | (b)    |         | Martha and reason | 1    | B1 for Martha and statement that implies more trials gives a more accurate probability oe           |

| Question | Working   | Answer | Mark | Notes |   |    |      |      |     |   |      |     |    |  |   |   |   |  |  |   |   |   |   |  |   |   |   |  |  |   |   |   |   |  |   |   |   |  |    |   |   |   |  |       |   |   |
|----------|---|--------|------|-------|---|----|------|------|-----|---|------|-----|----|--|---|---|---|--|--|---|---|---|---|--|---|---|---|--|--|---|---|---|---|--|---|---|---|--|----|---|---|---|--|-------|---|---|
| 22       | $\begin{array}{r} 365 \\ 28 \times \\ \hline 2920 \\ 7300 + \\ \hline 10220 \end{array}$ <table border="1" data-bbox="488 738 866 842"> <tr> <td>×</td> <td>300</td> <td>60</td> <td>5</td> </tr> <tr> <td>20</td> <td>6000</td> <td>1200</td> <td>100</td> </tr> <tr> <td>8</td> <td>2400</td> <td>480</td> <td>40</td> </tr> </table> <p>6000+2400+1200+480+100+40</p> <table border="1" data-bbox="488 962 866 1216"> <tr> <td></td> <td>3</td> <td>6</td> <td>5</td> <td></td> </tr> <tr> <td></td> <td>0</td> <td>1</td> <td>1</td> <td>2</td> </tr> <tr> <td></td> <td>6</td> <td>2</td> <td>0</td> <td></td> </tr> <tr> <td></td> <td>2</td> <td>4</td> <td>4</td> <td>8</td> </tr> <tr> <td></td> <td>4</td> <td>8</td> <td>0</td> <td></td> </tr> <tr> <td>10</td> <td>2</td> <td>2</td> <td>0</td> <td></td> </tr> </table> | ×      | 300  | 60    | 5 | 20 | 6000 | 1200 | 100 | 8 | 2400 | 480 | 40 |  | 3 | 6 | 5 |  |  | 0 | 1 | 1 | 2 |  | 6 | 2 | 0 |  |  | 2 | 4 | 4 | 8 |  | 4 | 8 | 0 |  | 10 | 2 | 2 | 0 |  | 10220 | 3 | <p>M1 for a complete method with relative place value correct- condone one multiplication error addition not necessary<br/> M1 (dep) for addition of all relevant elements.<br/> A1 cao</p> <p>OR</p> <p>M1 for complete grid. Condone one multiplication error, addition not necessary<br/> M1 (dep) for addition of all relevant elements.<br/> A1 cao</p> <p>OR</p> <p>M1 for sight of complete partitioning method. Condone one multiplication error. Final addition not necessary.<br/> M1 (dep) for addition of all relevant elements.<br/> A1 cao</p> <p>(SC B1 for attempting to add 28 lots of 365 if M0 scored)</p> |
| ×        | 300   | 60     | 5    |       |   |    |      |      |     |   |      |     |    |  |   |   |   |  |  |   |   |   |   |  |   |   |   |  |  |   |   |   |   |  |   |   |   |  |    |   |   |   |  |       |   |   |
| 20       | 6000  | 1200   | 100  |       |   |    |      |      |     |   |      |     |    |  |   |   |   |  |  |   |   |   |   |  |   |   |   |  |  |   |   |   |   |  |   |   |   |  |    |   |   |   |  |       |   |   |
| 8        | 2400  | 480    | 40   |       |   |    |      |      |     |   |      |     |    |  |   |   |   |  |  |   |   |   |   |  |   |   |   |  |  |   |   |   |   |  |   |   |   |  |    |   |   |   |  |       |   |   |
|          | 3   | 6      | 5    |       |   |    |      |      |     |   |      |     |    |  |   |   |   |  |  |   |   |   |   |  |   |   |   |  |  |   |   |   |   |  |   |   |   |  |    |   |   |   |  |       |   |   |
|          | 0   | 1      | 1    | 2     |   |    |      |      |     |   |      |     |    |  |   |   |   |  |  |   |   |   |   |  |   |   |   |  |  |   |   |   |   |  |   |   |   |  |    |   |   |   |  |       |   |   |
|          | 6   | 2      | 0    |       |   |    |      |      |     |   |      |     |    |  |   |   |   |  |  |   |   |   |   |  |   |   |   |  |  |   |   |   |   |  |   |   |   |  |    |   |   |   |  |       |   |   |
|          | 2   | 4      | 4    | 8     |   |    |      |      |     |   |      |     |    |  |   |   |   |  |  |   |   |   |   |  |   |   |   |  |  |   |   |   |   |  |   |   |   |  |    |   |   |   |  |       |   |   |
|          | 4   | 8      | 0    |       |   |    |      |      |     |   |      |     |    |  |   |   |   |  |  |   |   |   |   |  |   |   |   |  |  |   |   |   |   |  |   |   |   |  |    |   |   |   |  |       |   |   |
| 10       | 2   | 2      | 0    |       |   |    |      |      |     |   |      |     |    |  |   |   |   |  |  |   |   |   |   |  |   |   |   |  |  |   |   |   |   |  |   |   |   |  |    |   |   |   |  |       |   |   |

| Question |     | Working | Answer | Mark | Notes   |
|----------|-----|---------|--------|------|---|
| 23       | (a) |         | 8      | 1    | B1 cao  |
|          | (b) |         | 6.5 cm | 4    | M1 for $31 - 9 - 9 (=13)$<br>M1 for " $13$ " $\div 2$<br>A1 for 6.5 oe<br>C1 for units (cm)<br>or<br>M1 for $x + 9 + x + 9 = 31$ oe (do not accept cm in equation)<br>M1 for $\frac{31 - 9 - 9}{2}$<br>A1 for 6.5 oe<br>C1 for units (cm) |

| Question |  | Working | Answer | Mark | Notes  |
|----------|--|---------|--------|------|--|
| 24       |  |         | 78     | 4    | <p>M1 for a correct method to find the area of a relevant rectangle.</p> <p>M1 for a correct method to find the area of a relevant triangle.</p> <p>M1 for a complete and correct method to find the total area</p> <p>A1 cao</p> <p>or</p> <p>M2 for splitting the shape into two trapeziums and using a correct method to find the area of the trapezium</p> <p>M1 for 2 x 'area of trapezium'</p> <p>A1 cao</p> |



| Question |      | Working   | Answer   | Mark | Notes   |   |   |   |   |    |   |   |    |    |   |   |    |    |               |  |
|----------|------|---|--|------|---|---|---|---|---|----|---|---|----|----|---|---|----|----|---------------|--|
| 25       | (i)  | $(\frac{1}{3} \times \frac{1}{3}) + (\frac{1}{3} \times \frac{1}{3})$   | $\frac{2}{9}$  | 5    | M1 for identifying there are 9 possible outcomes<br>or $(\frac{1}{3} \times \frac{1}{3})$<br>M1 for clearly identifying the two outcomes (1, 6) and (3, 2)<br>or $(\frac{1}{3} \times \frac{1}{3}) + (\frac{1}{3} \times \frac{1}{3})$<br>A1 for $\frac{2}{9}$ oe |   |   |   |   |    |   |   |    |    |   |   |    |    |               |  |
|          | (ii) | <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>×</td> <td>1</td> <td>3</td> <td>5</td> </tr> <tr> <td>2</td> <td>2</td> <td>6</td> <td>10</td> </tr> <tr> <td>4</td> <td>4</td> <td>12</td> <td>20</td> </tr> <tr> <td>6</td> <td>6</td> <td>18</td> <td>30</td> </tr> </table> | ×  | 1    | 3   | 5 | 2 | 2 | 6 | 10 | 4 | 4 | 12 | 20 | 6 | 6 | 18 | 30 | $\frac{5}{9}$ |  |
| ×        | 1    | 3   | 5  |      |   |   |   |   |   |    |   |   |    |    |   |   |    |    |               |  |
| 2        | 2    | 6   | 10   |      |   |   |   |   |   |    |   |   |    |    |   |   |    |    |               |  |
| 4        | 4    | 12  | 20   |      |   |   |   |   |   |    |   |   |    |    |   |   |    |    |               |  |
| 6        | 6    | 18  | 30   |      |   |   |   |   |   |    |   |   |    |    |   |   |    |    |               |  |
| 26       | (a)  |   | reflection in $x = 5$                                  | 2    | B1 for reflection<br>B1 for $x = 5$   |   |   |   |   |    |   |   |    |    |   |   |    |    |               |  |
|          | (b)  |   | rectangle with vertices (1, 3), (1, 6), (7, 6), (7, 3) | 2    | M1 for enlargement sf 3<br>A1 for fully correct answer  |   |   |   |   |    |   |   |    |    |   |   |    |    |               |  |
|          | (c)  |   | 90° clockwise, centre (0, 0)                           | 3    | B2 90° clockwise or 270° anticlockwise (B1 90° or 270° stated without direction or with incorrect direction or correct translation of S shown)<br>B1 centre (0,0)   |   |   |   |   |    |   |   |    |    |   |   |    |    |               |  |





Ofqual



Llywodraeth Cynulliad Cymru  
Welsh Assembly Government



Rewarding Learning