



GCSE MARKING SCHEME

SUMMER 2016

**GCSE MATHEMATICS LINKED PAIR APPLICATIONS
UNIT 2 HIGHER
4362-02**

INTRODUCTION

This marking scheme was used by WJEC for the 2016 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

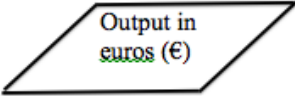
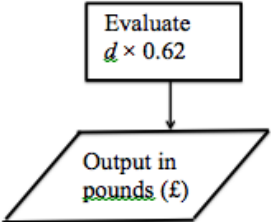
WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

**APPLICATIONS OF MATHEMATICS
UNIT 2 (HIGHER TIER) SUMMER 2016**

Applications of Mathematics Unit 2 Higher Tier	Mark	Comments
<p>1. 0.09×349 or equivalent (£)31.41 AND any choice of 1 D & 1 flexible lock</p> <p>Lock 1 AND lock 6 selected</p>	<p>M1 A1 A1 3</p>	<p>Needs to show attempt to price 1 D and 1 flexible lock</p> <p>Accept 'Lock 1 and 2(nd) flexible lock' provided it is clear that 2(nd) refers to a flexible lock</p>
<p>2(a) $126 \text{ (m}^2\text{)}$</p> <p>(b) Wilf's scatter graph selected with a reason, e.g. 'Wilf, the points are closer together', 'Wilf, points not spread as much', 'Wilf's graph as most points show as area increases so does the energy cost', 'Wilf's as Rowena's is more random'</p> <p>(c) Straight line of best fit on Rowena's scatter diagram following the trend with some points above and below the line</p> <p>(d)(i) Wilf's scatter diagram selected with a reason, e.g. 'Wilf's as costs are lower', 'Wilf's as no high costs', 'Wilf's because (for the same area) the heating costs (per annum) are much lower'</p> <p>(ii) States or implies that headline is (possibly) not true with a reason, e.g. 'not true, larger flats save more', 'no, costs fall more for the larger flats', 'not necessarily true as the smallest flat in both have roughly the same costs'</p>	<p>B1</p> <p>E1</p> <p>B1</p> <p>E1</p> <p>E1</p> <p>5</p>	<p>Do not accept 'Wilf as it has the strongest (positive) correlation'</p> <p>Allow 'Wilf's is a more obvious correlation', 'Wilf's is a better correlation'</p> <p>Do not accept a line passing through (80, 400), the line of best fit must intersect the vertical $>£400$ and ≤ 800 when area = 80m^2</p> <p>Accept reference to 'costs fallen', 'Wilf's shows lower results (for energy bills)', 'Wilf's costs are put lower'</p> <p>Allow 'Wilf's as the highest costs are greater on Rowena's scatter diagram'</p> <p>Do not accept 'true' unless unambiguously contradicted by the reason given</p> <p>Accept 'they may be the same' with a valid reason</p> <p>Accept answers based on the gradient of the line</p>

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4(a)(i) 180.75 and 69.25	B2	B1 for either entry correct, or for the total of their 2 entries 250
(ii) (D5=) D4 + B5 – C5	B2	B1 for (D5=) D4 + B5, (D5=) D4 – C5, or (D5=) B5 – C5 or equivalent (ignoring the 3 rd incorrect cell reference)
(E5=) 250 – D5 or (E5=) E4 – B5 + C5 or equivalent	B1	FT 'their D5', watch for correct operations, do not accept any missing brackets
(b)(i) H ₂ O payments (25×12 =) (£)300 H ₂ O after cash back	B1	
(25×12 × 0.9 or equivalent) (£)270	B1	FT 0.9×their '25×12'
Scoot ³ (100 + 10×17.95 =) (£) 279.5(0)	B1	
Conclusion, e.g. 'H ₂ O cheaper if monthly payments are made on time', 'Scoot ³ cheaper than H ₂ O if payments are not made on time',	E1	Must FT for equivalent level decision making provided at least B1 previously awarded Do not accept 'H ₂ O as it is cheaper'
QWC2: Candidates will be expected to	QWC 2	QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar.
<ul style="list-style-type: none"> present work clearly, maybe with diagrams and words explaining process or steps 		
AND		
<ul style="list-style-type: none"> make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer 		
QWC1: Candidates will be expected to		QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar
<ul style="list-style-type: none"> present work clearly, maybe with diagrams and words explaining process or steps 		OR
OR		
<ul style="list-style-type: none"> make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer 		evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar.
		QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar.
(ii) Scoot ³ % increase $\frac{279.5(0) - 250}{250} (\times 100)$	M1	FT 'their 279.5(0)' OR sight of $250 \times 1.118 (= 279.50)$
or $\frac{279.5(0)}{250} (\times 100) - 1 (\times 100)$		
11.8(%)	A1	Accept 12(%) from correct working shown Do not accept 11(%)
	13	

Applications of Mathematics Unit 2 Higher Tier	Mark	Comments								
<p>5(a) (Medium if) greater than 5g and less than or equal to 22.5g (per 100g)</p> <p>(b) Low, Low, Low</p> <p>(c)(i)</p> <table border="1" data-bbox="240 537 768 655"> <tbody> <tr> <td>0.4g</td> <td>0.8 g</td> </tr> <tr> <td>0.2g</td> <td>0.4 g</td> </tr> <tr> <td>5.7g</td> <td>11.7g</td> </tr> <tr> <td>0.9g</td> <td>1.85g</td> </tr> </tbody> </table> <p>(ii) $2.05 \times 100 (\times 2)$ or $100 \times (0.8 \times 2) \div 0.4$</p> <p>410(.5...g) or 411(...g) or 400(g)</p>	0.4g	0.8 g	0.2g	0.4 g	5.7g	11.7g	0.9g	1.85g	<p>E3</p> <p>B1</p> <p>B3</p> <p>M1</p> <p>A1 9</p>	<p>E2 for indication of between 5g and 22.5g but <u>one</u> of the exclusive/inclusive bounds is not correct, e.g. 'greater than 5g and less than 22.5g', 'between 5g and 22.5g'</p> <p>E1 for giving description with indication of 'greater than 5g' or 'less than or equal to 22.5g', or, '5g - 22.5g'</p> <p><u>Ignore 17.5g also stated for E2 and E1 only</u></p> <p>All 3 entries correct to 1 decimal place</p> <p>B2 for any 2 entries correct to 1 decimal place, or for 3 correct entries not given to 1 d.p. (e.g. 0.82, 0.41, 0901)</p> <p>OR</p> <p>B1 for any 1 entry correct to 1 d.p. or sight of or implication of '$\times 2.05(26\dots)$', or equivalent</p> <p>Or equivalent e.g. $100 \times (0.4 \times 2) \div 0.2$, $100 \times (11.7 \times 2) \div 5.7$, $100 \times (1.85 \times 2) \div 0.9$, '0.4g total fat is 100g, 0.8g in $\frac{1}{2}$ tin, therefore 1.6g in full tin is 400g'</p> <p>CAO</p>
0.4g	0.8 g									
0.2g	0.4 g									
5.7g	11.7g									
0.9g	1.85g									

Applications of Mathematics Unit 2 Higher Tier	Mark	Comments
<p>6(a) Example, 'conversion of dollars', 'exchange dollars to € (and/or £)'</p> <p>(b) Parallelogram symbol Statement, e.g. 'Output in euros', 'amount in €'</p> <p>(c) Rectangle followed by a parallelogram 1st statement, e.g. 'Evaluate $d \times 0.62$' 2nd statement, e.g. 'Output in pounds', 'amount in £'</p> <p>(d) $280 \div 0.8$ 350 (US\$)</p>	<p>E1</p> <p>B1 B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>M1 A1 8</p>	<p>Accept statement converting \$ to £ or converting \$ to € Allow 'converting money', or converting \$ to \$, or 'converting to £ or €'</p> <p>Accept 'euros' or '€' alone provided inside a parallelogram</p> <p>For B2:</p>  <p>Accept 'pounds' or '£' alone provided inside a parallelogram</p> <p>For B3:</p> 

Applications of Mathematics Unit 2 Higher Tier	Mark	Comments
7(a) (i) $\tan R = 12/28$ 23.2(°) or 23(.19859...°) (ii) (rise \Rightarrow) $34 \times \tan 23.19859...(^{\circ})$ or $34 \times 12/28$ 14.6(cm) or 14.5714...(mm) (b) $x/30 = 12/20$ or $x = 12 \times 30/20$ or $x = 1.5 \times 12$ or equivalent 18 (mm)	 M1 A2 M2 A1 M1 A1 8	<u>Trigonometry must be used in (a)(i) and (ii)</u> A1 for $\tan^{-1} 0.42857...$ FT 'their derived 23.2°' M1 for $\tan 23.2 = r/34$ Must show ratio or similar triangle working, not use of 'tan' MUST FT from working
8. $4p + 35r = 18(.06)$ AND $7p + 88r = 37(.49)$ Method to solve simultaneous equation, allow an error but not in the equated variable with an attempt to subtract First variable correct Method to calculate second variable Second variable correct (£25 - (3p+62r) =) (£)3.59 or 359(p)	B1 M1 A1 m1 A1 B1 6	Or equivalent FT provided at least one equation is correct and consistent place value Accept in £ or p poles £2.59 rings 22 pence Accept in £ or p (An answer of £21.41 is the cost of 3p+62r) FT 'their p' and 'their r' provided M1 and m1 previously awarded and both are >0
9. Use of $n = 4$ $(1 + 0.026/4)^4 - 1$ AER 2.63(%)	B1 M1 A2 4	Accept sight of an index of 4, irrespective of the fraction denominator within the bracket Correct substitution in the formula given A1 for 0.0262546... rounded or truncated, or incorrect rounding or truncation of the AER percentage. Mark final answer (box takes priority)

Applications of Mathematics Unit 2 Higher Tier	Mark	Comments
<p>10(a) 104×7.45 or 3000×7.45 or equivalent 775 (kg) 22400 (silkworms)</p> <p>(b) ($1 \mu\text{m} =$) $\frac{1}{1\,000\,000}$ or $1\,000\,000^{-1}$ or 0.000001 (m) 1×10^{-6} (m)</p>	<p>M1 A1 A1</p> <p>M1</p> <p>A1 5</p>	<p>If neither A mark awarded also award SC1 for sight of 774(.8) and 22350 (i.e. M1 and SC1), or M1 only for either of these answers</p>
<p>10(c) (i) Sight of any country comparison of Production value US\$÷Production in 1000kg</p> <p>Most valuable Korea 3.37(26... US\$) Least valuable Iran 3.32(375... US\$)</p> <p>(ii) Reason, e.g. ‘information was not all to the same accuracy in the table’, ‘some values in the table may be approximate’, ‘some values in the table may have been rounded’</p> <p>(iii) 1% is $\frac{290\,003}{54}$ (1000kg) or 1% is $\frac{978\,013}{54}$ (US\$) India % is $77000 \div \frac{290\,003}{54}$ or $259\,679 \div \frac{978\,013}{54}$ 14(.3...%)</p> <p>(iv) 100% should be either 537042.593... (1000kg) or 1811135.19... (US\$)</p> <p>Table totals actually 410591 (1000kg) or 1 384 394 (US\$) Conclusion, NO</p>	<p>M1</p> <p>A1 A1</p> <p>E1</p> <p>M1 m1 A1</p> <p>M1</p> <p>M1</p> <p>A1</p> <p>10</p>	<p>China 3.3724..., India 3.3724..., Uzbekistan 3.3724..., Brazil 3.3724..., Iran 3.32375..., Thailand 3.3724, Vietnam 3.3723..., Korea 3.3726...</p> <p>Accept ‘as not all countries are shown in the table’ Do not accept ‘tax not included’, ‘shipping not included’</p> <p>(1% is 5370.42593... or 18111.3519...)</p> <p>CAO <i>If no marks, award SC1 for an answer of 18.765... (%) rounded or truncated (from $100 \times 77000/410591$)</i></p> <p>CAO. Depends on M2 previously awarded</p> <p><i>Alternatives include:</i></p> <p><i>(China) $(100 \times) 290003/410591$ M1</i> <i>= 70.6(%) A1</i> <i>NO (as not 54%) A1</i> <i>(Depends on M1, A1 previously awarded)</i></p> <p><i>OR</i> <i>410591×0.54 (or equivalent) M1</i> <i>= 221719(.14) A1</i> <i>NO (as not 290 003) A1</i> <i>(Depends on M1, A1 previously awarded)</i></p> <p><i>If no calculations, e.g.</i> <i>(Countries other than China in table) 120588 M1</i> <i>Is less than 46% without working A0</i> <i>No A0</i></p>

Applications of Mathematics Unit 2 Higher Tier	Mark	Comments												
<p>11(a) 5.4×1.18 or equivalent 6.37(2 cm)</p> <p>(b) Risk, e.g. ‘snaps’, ‘it may over stretch and not be able to return to the original length’</p> <p>(c) Axes labelled with appropriate values for the experiment with a fibre of length 100cm considering stretches from (inclusive) 108% to (exclusive) 130%</p> <p>At least 2 appropriate points plotted All correct points joined with a straight line</p>	<p>M1 A1</p> <p>E1</p> <p>B1</p> <p>M1 A1</p> <p>6</p>	<p>Accept 6.4(cm) from correct working</p> <p>Idea that this is a limit for the stretch experiment Allow ‘too big a stretch’, ‘won’t stretch that far’</p> <p>One axis total stretched length (cm), other axis released length (cm) or similar (including for stretch length (cm) and return length (cm)). Allow axes from (0, 0) Allow as percentage increase (rather than in cm)</p> <p>Must be within the required range Allow provided at least from 110% to 125% shown</p> <p><i>If M0, A0 award SC1 for a graph showing stretch not full stretched length with the original</i></p> <table border="1" data-bbox="894 705 1382 873"> <tr> <td>Total stretch length (cm)</td> <td>108</td> <td>120</td> <td>130</td> </tr> <tr> <td>Return length (cm)</td> <td>100</td> <td>112</td> <td>122</td> </tr> <tr> <td>Stretch length (cm) (SC1)</td> <td>8</td> <td>20</td> <td>30</td> </tr> </table>	Total stretch length (cm)	108	120	130	Return length (cm)	100	112	122	Stretch length (cm) (SC1)	8	20	30
Total stretch length (cm)	108	120	130											
Return length (cm)	100	112	122											
Stretch length (cm) (SC1)	8	20	30											
<p>12(a) $C > 100$ $125D + 50C \leq 8000$</p> <p>(b) (Dotted) line $C = 100$ shown (Solid) line $125D + 50C = 8000$ shown Region between the lines indicated</p> <p>(c) Using their graph: False True</p>	<p>B1 B1</p> <p>B1 B1 B1</p> <p>B1</p> <p>6</p>	<p>FT from (a)</p> <p>Allow a solid line Allow a dotted line FT their inequality if possible from a slip Accept FT from either line correct but for a similar region</p> <p>MUST be a FT from their graph in (b) provided at least 1 line is correct. Must be evidence to support the answers in the table Do not accept numerical explanations. Accept unambiguous unlabelled plots provided the table is completed correctly</p>												

