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# **GCSE MARKING SCHEME**

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**SUMMER 2016**

**GCSE MATHEMATICS - LINEAR PAPER 1  
FOUNDATION TIER**

**4370/03**

## **INTRODUCTION**

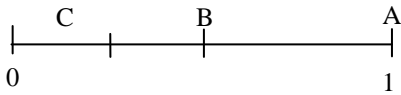
This marking scheme was used by WJEC for the 2016 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' 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.

**GCSE Mathematics - Linear Paper 1 Foundation Tier**  
**Summer 2016 Mark Scheme**

<b>Summer 2016 Linear Paper 1 (Non calculator) Foundation Tier</b>	<b>Marks</b>	<b>Comments</b>
1. (a) (i) 46 <u>(.)</u> 008	B1	B0 for 46.008
1. (a) (ii) eight million (and) six hundred thousand	B1	<b><u>Accept eight point six million</u></b> eighty six hundred thousand' gets B0
1. (b) (i) 38 and 52	B1	Accept either order OR $38 + 52 = 90$
1. (b) (ii) 42 and 24	B1	Accept $24 + 18 = 42$ OR equivalent
1. (b) (iii) 24	B1	<b><u><math>6 \div 4 = 24</math> gets B0</u></b>
1. (b) (iv) 64	B1	Accept $8^2$ , $8 \times 8$ but NOT 8
1. (c) 6700	B1	Accept written in words
1. (d) 1, 7, 11, 77 <b><u>Accept <math>1 \times 77</math>, <math>7 \times 11</math>.</u></b>	B2	B1 for any 3 correct factors and up to 1 incorrect <b><u>OR B1 for all 4 correct and 1 incorrect.</u></b>
1. (e) (i) 7652	B1	Do NOT allow commas e.g. 7, 6, 5, 2 gets B0. But B1 for 7,652.
1. (e) (ii) 2576	B1	Do NOT allow commas e.g. 2,5,7, 6 gets B0. But B1 for 2,576.
Parts (i) and (ii) marked together 2. (a) (i) 51 (ii) 18	B2	For both correct. B1 for either 51 OR 18 correct
2. (b) 80 OR 8 ten(s) OR tens OR eighty	B1	B0 for 1 ten OR B0 for 10
2. (c) (0) 52( <u>%</u> ) (0) 51( <u>%</u> ) (0) .51, $\frac{13}{25}$ , 55(%)	B1 B1 B1	Accept equivalent. F.T. their values.
2. (d) $40 \times 10$ OR $42 \cdot 2 \times 10$ OR $40 \times 11$ OR $42 \times 11$ OR $42 \times 10$ 400, 422, 440, 462, 420	M1  A1	F.T their estimates for simple calculations SC1 for unsupported 400 only Penalise extra working (towards actual answer) M0A0
3. (£)9.35 + (£)8.85 = (£)18.2(0) Sam and Nick pay (£) 21.8(0)  Nick pays ((£) 21.8(0) – £1.50)/2 = (£)10.15  Look for (in the most part)  Strand 1: For 1 mark Candidates will be expected to • present their response in a structured way • explain to the reader what they are doing at each step of their response • lay out their explanations and working in a way that is clear and logical • write a conclusion that draws together their results and explains what their answer means  Strand 2: For 1 mark Candidates will be expected to • show all their working • make few, if any, errors in spelling, punctuation and grammar • use correct mathematical form in their working • use appropriate terminology, units, etc	✓ B1 B1  M1 A1 QWC 2	OR B1 for $(40 - 9.35) = (£) 30.65$ F.T. £40 – 'their £18.2(0)' OR F.T. 'their (£)30.65' – (£)8.85 evaluated correctly. Any correct method. F.T. 'their £21.8(0)'  <b><u>Nick pays (£)21.80/2 + (£)1.50/2 gets M1</u></b>  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.  QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar OR 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

Summer 2016 Linear Paper 1 (Non calculator) Foundation Tier	Marks	Comments	
4. (a) 	B1 B1 B1	A should be at 1. B should be at the middle. C should be between 0 (exclusive) and 0.25 (exclusive). English: The $\frac{1}{4}$ mark is to the left of the 't' in '...the result..' Welsh: The $\frac{1}{4}$ mark is to the left of the 'i' in '...mai' Letters must be seen on scale (i.e. not probabilities) <b>Accept 5 for A, 2 for B and 3 for C</b>	
4. (b) likely	B1		
5. (a) 3c	B1		
5. (b) ( $T =$ ) 7	B2	B1 for either (21 AND -12) OR -2 B0 for 21A, (-)12B and/or (-)2C	
5. (c) y is 4 times x OR 'y = 4 times x' OR $y = 4x$ OR x is $\frac{1}{4}$ times y OR 'x = $\frac{1}{4}$ times y' OR $x = y/4$ OR 'x = $\frac{1}{4}$ of y' OR (x,4x) OR ( $\frac{1}{4}y$ ,y)	B2	B1 for $\times 4$ OR 'times 4' <b>OR <math>y=x4</math></b> OR B1 for $\div 4$ OR 'divide by 4'	
5. (d) ( $x =$ ) 6	B1	Accept embedded answers, e.g. $10 - 6 = 4$	
5. (e) 21	B1		
6. A(5, -5), B(-2, 4) and C(-4, -3) plotted.	B3	B1 for each. Reversed coordinates get B0 every time. Letters A,B,C not needed as long as the point is identified.	
7. (Hours worked $\Rightarrow$ ) $6 \times 75$ OR $6 \times 1\frac{1}{4}$ = 450 (mins) OR = $7\frac{1}{2}$ (hours) OR 7 hours 30 minutes OR 6 hours 90 minutes <b>OR 7:30</b> (Charge $\Rightarrow$ ) (£) $40 \times 7\frac{1}{2}$ + (£)87  = (£) 387	✓ M1 A1  M1  A1	Allow M1 for $6 \times 1.15$ OR 6.90 OR 7.3(0) Hours not required at this stage.  <b>M1 for</b> <b><u><math>40 \times 7.3(0) + (£)87</math> OR</u></b> <b><u><math>40 \times 7\text{hrs } 30 \text{ mins} + (£)87</math></u></b>  FT 'their derived $7\frac{1}{2}$ '. Hours required. Must be some conversion attempt. M0 for use of 'their 450/100'. If no marks, SC1 for (£)137. ( $\frac{1}{4} \times 40 + 87$ )	<ul style="list-style-type: none"> <li>• 7hrs 30mins' with no method shown gets M1A1.</li> <li>• '7 hours 30' with no method shown gets M1,A1</li> <li>• 1hour 15mins x 6 gets M1, but A0 unless answer is <math>7\frac{1}{2}</math> or equivalent.</li> </ul>
<b>Alternative Method</b> <b>(Cost of 1 machine <math>\Rightarrow</math>) <math>(40 \times (£)1.25) = 50</math></b> <b>(Cost of 6 machines <math>\Rightarrow</math>) <math>(50 \times 6) = (£) 300</math></b> <b>(Total cost <math>\Rightarrow</math>) <math>(£) 300 + (£) 87</math></b> <b>(£) 387</b>	<b>M1</b> <b>A1</b> <b>M1</b> <b>A1</b>	<ul style="list-style-type: none"> <li>• 1hr 15mins x 6 = 7 hours M1A0 then <math>40 \times 7 + 87 = £367</math> M1,A0 (The whole number, 7, is over simplifying)</li> </ul>	
8. (a) (i) 10:00	B1	Accept 10.00 OR 10 (a.m.) (Decimal point is acceptable in a specific time)	
8. (a) (ii) 00:30	B1	Accept (0)0.30 OR 12:30 am	
8. (b) $16:59 - 04:32$ = 12 hours 27 minutes OR 12:27	M1 A1	M1, A0 for 12.27 (Decimal point is NOT acceptable in a time interval)	
8. (c) $09:39 - 03:07$ = 6 hours 32 minutes OR (0)6:32	M1 A1	M1, A0 for (0)6.32	
8. (d) (0)9:21 (on 11th March)	B1	Accept (0)9.21	
8. (e) $10.43 - 5.78$ = 4.65 (m)	M1 A1	SC1 for 4.45 (m) ( $10.43 - 5.98$ )	

Summer 2016 Linear Paper 1 (Non calculator) Foundation Tier	Marks	Comments
9. S (OR triangular prism) T (OR hexagon) Q (OR cone) P (OR cuboid)	B3	All correct B2 for any 3 correct B1 for any 2 correct.
10. (a) Missing inside segments = <b>2 or 3 (and 6)</b> Perimeter = $6+3+3+2+6+3+6+3+8$ <b><u>If the sum of their figures is 40 then M1</u></b>  $= 40 \text{ (cm)}$	S1 M1  A1	One of 2 or 3 in correct place gets S1 Attempt to add ALL sides of the shape FT 'their 2' for possible M1 The M1, A0 can be implied by their answer. If the 2 is not shown on diagram but is in the sum of sides for the perimeter then award S1 here. C.A.O.
10. (b) Area = $6 \times 3 + 2 \times 3 + 9 \times 3$ OR $3 \times 3 + 3 \times 8 + 6 \times 3$ OR $4 \times 3 \times 3 + 3 \times 5$ $= 51$ <b><u>If the sum of their areas is 51 then M1</u></b> $\text{cm}^2$	M1 A1 U1	Attempt to add a correct set of areas of the shape (You may need to scroll up to see the diagram) F.T. if missing sides (even incorrect) are clearly indicated Independent of all other marks.
11. Parts (a) and (b) marked together With diagram (a) $(x = ) \quad 180 - 53$ $(x = ) = 127(^{\circ})$	M1 A1	Look at diagram <b>also</b> , but written work takes precedence. For any correct method that finds x
(b)(y =) $180 - 53 - 48$ OR $(y =) \quad 127(^{\circ}) - 48$ $= 79(^{\circ})$	M1 A1	For any correct method that finds y F.T. 'their $127(^{\circ})$ ' provided M1 awarded in part (a).
12. (a) 50 (miles)	B1	
12. (b) (Before stopping,) slope is steeper OR after stopping slope is less steep 'The steeper the line the faster the speed'.	B1	Do not accept 'More miles in less time'.
12. Parts (c) and (d) marked together (c) Line starting at (13:00,120) passing through (14:00,90) and intersecting John's journey.	B2	B1 for a line starting at (13:00, 120) going to at least the point (14:00, 90). OR for line starting at (12:00,120) ending at least through (13:00,90) Award SC1 for a line starting at (13:00, 0) going to at least the point (14:00, 30).
12. (d) $18 \pm 3$ (mins)	B1	FT their line from Cardigan starting at <b>(13:00,120)</b> provided the lines cross after John has left the cafe.
13. (a) 7.0 (cm) $7.0 \times 15$ $= 105 \text{ (km)}$	B1 M1 A1	Allow $6.8 - 7.2$ FT 'their $7.0 \times 15$ Unsupported answers in the range 102–108 get 3 marks
13. (b) $024(^{\circ})$	B1	Allow $\pm 2^{\circ}$ .
14. $105(^{\circ})$	B3	Allow even if contradicted on the diagram  B2 for sight of $75(^{\circ})$ (including as a final response or incorrectly placed on the diagram) B2 for sight of $105(^{\circ})$ in working not as an answer or contradicted as a final response in the answer space B2 for working: $38 + 67$ or $180 - 75$ , or the intention of either calculation, allowing missing brackets $180 - (180 - 38 - 67) (= 38 + 67)$ or $180 - (180 - 38 - (180 - 113)) (= 180 - 75)$ , or  OR  B1 for any further unambiguous correct angle indicated on the diagram: $113(^{\circ})$ , $67(^{\circ})$ , $38(^{\circ})$ or $142(^{\circ})$ , or B1 for working: $180 - 38 - 67$ or $113 - 38$ or $180 - 38 - (180 - 113)$ , or equivalent

H1

Summer 2016 Linear Paper 1 (Non calculator) Foundation Tier	Marks	Comments															
<p>15. <math>400 \times 7 \div 10</math> or <math>400 - 400 \times 3 \div 10</math> or equivalent 280(cm)</p> <p><math>280 \times \frac{3}{5}</math> or <math>280 - 280 \times 2 \div 5</math> or <math>280 - 112</math> 168(cm)</p> <p>56 (cm)</p>	<p>M1 A1</p> <p>M1 A1</p> <p>B1</p>	<p>May be implied in further calculation <i>Incorrect working leading to 280 is M0 A0, e.g.</i> <math>3/10 \times 400 + 2/5 \times 400 = 120 + 160 = 280</math></p> <p>FT 'their 280' provided &lt; 400 May be implied in further calculation</p> <p>FT 'their 168' <math>\div 3</math> correctly evaluated (rounded or truncated) provided <b>either</b> at least M1 previously awarded <b>or</b> 'their two stages of calculations' previously attempted (However if <math>3/10</math> &amp; <math>2/5</math> used throughout SC marks may be awarded instead of possible B1 if a higher mark can be awarded)</p> <p><i>For consistent use of <math>3/10</math> and <math>2/5</math> award:</i> <i>SC3 for an answer of 16(cm from <math>400 \times 3/10 \times 2/5 \div 3</math>), or</i> <i>SC2 for workings equivalent to <math>400 \times 3/10 \times 2/5 \div 3</math> (may be in stages), or</i> <i>SC1 for an answer of 48(cm from <math>400 \times 3/10 \times 2/5</math>)</i></p>															
16. (a) Descriptions of no correlation, e.g. 'no relationship', 'no correlation', 'none', 'no connection'	B1	<p>Do not accept '(all) scattered (about)', or 'random', or 'neutral', 'no pattern'</p> <p>Allow if a correct response is given with one of the phrases listed above. Do not allow a correct response with an incorrect response, e.g. 'none but slightly positive'</p>															
<p>16.(b)</p> <table border="1"> <thead> <tr> <th>Name</th><th>Height (cm)</th><th>Mark</th></tr> </thead> <tbody> <tr> <td>Dewi</td><td>145</td><td>80</td></tr> <tr> <td>Charlotte</td><td>163</td><td>80</td></tr> <tr> <td>Henri</td><td>176</td><td>92</td></tr> <tr> <td>Gareth</td><td>145</td><td>34</td></tr> </tbody> </table>	Name	Height (cm)	Mark	Dewi	145	80	Charlotte	163	80	Henri	176	92	Gareth	145	34	B3	<p>All entries correct <b><u>Accept mark entries as a fraction of 100, or written as a percentage</u></b></p> <p>B2 for any 5, 6 or 7 entries correct, or if the correct entries in the table but they are in reversed columns, OR</p> <p>B1 for any 3 or 4 entries correct, or for any 5, 6 or 7 reversed entries in the table</p>
Name	Height (cm)	Mark															
Dewi	145	80															
Charlotte	163	80															
Henri	176	92															
Gareth	145	34															

Summer 2016 Linear Paper 1 (Non calculator) Foundation Tier	Marks	Comments
17. (% of daily calories 25% of 1920 = ) 480 (calories)	✓ B1	
(Number of bags needed) 480÷160	M1	FT 'their 480' provided attempt at $1920 \times 25 \div 100$ or $1920 \div 4$ or equivalent is seen or implied
(=) 3	A1	May be implied in later working
(Number of almonds eaten $3 \times 20$ ) 60 (almonds)	m1 A1	FT 'their 3'×20 evaluated provided attempt to find 25% of 1920 and M1, m1 previously awarded
		<u>Alternatives</u> (% of daily calories 25% of 1920 = ) 480 (calories) B1
		$160 \div 20$ M1 = 8 (calories per almond) A1 (May be implied in later working)
		(Number of almonds) 480÷8 m1 (FT 'their 25% of 1920'÷ 'their 160÷20')
		60 (almonds) A1 (FT provided attempt to find 25% of 1920 and M1, m1 previously awarded)
		<u>or</u> (Number of bags in a full daily allowance is) $1920 \div 160$ M1 = 12 (bags) A1 (May be implied in later working)
		(Number of bags 25% of allowance is $\frac{1}{4} \times 12 =$ ) 3 (bags) B1 (FT 'their $\frac{1}{4} \times 1920 \div 160$ provided M1 previously awarded)
		(Number of almonds eaten) $3 \times 20$ m1 (FT 'their $\frac{1}{4} \times 1920 \div 160$ '×20 provided M1 previously awarded)
		<u>(Previous B1 &amp; m1 calculations may be seen in either order)</u> 60 (almonds) A1 (FT provided attempt to find 25% of $1920 \div 160$ and M1, m1 previously awarded)
		<u>or</u> 20 (almonds) with 160 (calories) used as a ratio M1 e.g. sight of 40 almonds is 320 calories or similar Use of ratio or multiples that lead to 1920 (calories) m1 240 (almonds is 1920 calories) A1
		(Number of almonds is) $\frac{1}{4} \times 240$ M1 (FT provided M1, m1 previously awarded)
		60 (almonds) A1 (FT provided M1, m1 previously awarded AND attempt to find the number of almonds in 1920 calories)
		<u>If no marks, and no incorrect logic seen, then award SC2 for an answer of 60 almonds</u>
H7		

Summer 2016 Linear Paper 1 (Non calculator) Foundation Tier	Marks	Comments
18.(a) $5x - 3x = 65 - 17$ $2x = 48$ $x = 24$ <b>H8a</b>	B1 B1 B1	FT until 2 <sup>nd</sup> error, then stop marking  Must be simplified if possible for this final B1 mark
18(b) $x/4 = 28 - 12$ or $x/4 = 16$ or $x + 12 \times 4 = 28 \times 4$ $x = 64$ <b>H8b</b>	M1 A1	Mark final answer <i>Accept embedded answer, e.g. <math>64/4 + 12 = 28</math></i>
18(c) $y^2 + 8y$ <b>H8c</b>	B2	$y \times y$ must be written as $y^2$ & $8 \times y$ as $8y$ for B2 B1 for $y \times y + 8 \times y$ , or B1 for 1 correct term, e.g. $2y + 8y = 10y$ or $y + 8y = 9y$ BUT do not accept from incorrect working, e.g. B0 for ' $y + 8 = 8y$ '  Mark final answer, e.g. B1 only for ' $y^2 + 8y = 8y^3$ '
18.(d) $10x < 34$ or $10x < 42 - 8$ $x < 34/10$ or $x < 3.4$ or $x < 3\frac{4}{10}$ or $x < 3\frac{2}{5}$ or equivalent <b>H8e</b>	B1 B1	Do not accept '=' FT from 1 error only. ISW <i>If '=' used but replaced by '&lt;' to give final correct answer, allow B2</i>  <i>Note: <math>10x &lt; 42 + 8</math> must lead to <math>x &lt; 5</math> to be awarded B0,B1</i>