



# **GCSE MARKING SCHEME**

**MATHEMATICS - UNITISED**

**JANUARY 2015**

## INTRODUCTION

The marking schemes which follow were those used by WJEC for the January 2015 examination in GCSE MATHEMATICS - UNITISED. They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were 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 conferences was to ensure that the marking schemes were 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' conferences, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about these marking schemes.

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<p style="text-align: center;"><b>January 2015</b> <b>UNIT 1 Foundation</b></p>	<p style="text-align: center;"><b>Mark</b></p>	<p style="text-align: center;"><b>Final Mark Scheme</b> <b>Comments</b></p>
<p>9 (a) Uniform scale on vertical axis. Plotting (12,340).  Correct line drawn from (0,0) to (12,340±5)</p> <p>(b) (50 lb =) 800 (oz) Any correct strategy, e.g. 100 times their value at 8oz. OR <math>\frac{340}{12} \times 800</math> A correct answer <u>for their line</u> OR 22666(.6..) (gm)  = 22.667 (kg)</p>	<p>B1 P1  L1  B1 M1  A1  B1</p> <p style="text-align: center;">7</p>	<p><i>P0, L0 if no <u>attempt</u> at uniform scaling.</i> <i>± '½ a small square'.</i> Allow P1 if attempt made at uniform scaling. Allow line starting at (2,57±1). Correct line implies P1L1.</p> <p>B0 for incorrect units e.g. 800 lb or 800 kg. F.T. 'their graph' and also F.T. 'their 800oz'.</p> <p>If using their graph allow ± '½ a small square' in reading of grams at 8oz. F.T. 'their answer in grams' / 1000 Accept unsupported answers between 22.5 and 22.8. Similarly with F.T. answers. <i>Alternative method:</i> <math>1\text{kg} \approx 2.2\text{lb}</math>      <i>B1</i> <math>50 \div 2.2</math>      <i>M1</i> <math>= 22.7(\dots)</math> <i>ISW A2</i></p>
<p>10. <math>9 \times 24</math> (= 216) <math>\frac{9 \times 24}{45}</math> 5 (tins)</p>	<p>M1 M1  A1</p> <p style="text-align: center;">3</p>	<p>C.A.O. M1,M1,A0 for an answer of 4-8. Allow <u>unambiguous</u> embedded <u>final</u> answer e.g. <math>5 \times 45 = 225(\text{m}^2)</math> for all three marks.</p>
<p>11. Position at 035° from Aberdeen. Position at 290° from Stavanger. Position marked OR two intersecting lines.</p>	<p>M1 M1 A1</p> <p style="text-align: center;">3</p>	<p>± 2° (use overlay). Allow the M marks for dots, crosses or any unambiguous indication that the correct bearings have been offered. F.T. if at least M1 and two intersecting lines. (Lines must originate from Aberdeen and Stavanger respectively)</p>
<p>12. <math>0.2 \times 800</math> OR <math>0.3 \times 300</math> = 160  = 90  <math>\frac{90 \times 100}{250}</math>  = 36(%)</p>	<p>M1 A1 A1  M1  A1 5</p>	<p>F.T. 'their 90' and 'their 160 + 90'. Do not F.T. 300 / 1100.</p>
<p>13. <math>5 \times 4</math> (+) <math>\frac{10 \times 5}{2}</math> (+) <math>\frac{\pi \times 2^2}{2}</math>  = 20 (+) 25 (+) 6.28(...)  = 51.3(m<sup>2</sup>)</p>	<p>M2  A2  A1  5</p>	<p>M1 for one or two correct.</p> <p>A1 for 20 AND 25, A1 for 6.28(...) or 6.3</p> <p>F.T. provided M1A1 gained and three values added with an answer given to 1 d.p.</p>
<p>14. Least Value      Greatest Value  7.5                      8.5  15                        25</p>	<p>B4  4</p>	<p>B1 for each correct entry. Accept 8.49 recurring but not 8.49.  Accept 24.9 recurring but not 24.9.</p>

## UNIT 1 - HIGHER TIER

January 2015 UNIT 1 Higher	Mark	Final Mark Scheme Comments
<p>1. (Fuel cost =) <math>\frac{160}{40} \times (\pounds)6.24</math>  <math>= (\pounds)24.96</math>                      (Total cost of travel =) <math>(\pounds)48.71</math> or <math>(\pounds)49</math></p> <p>(Cost of computer in pounds =) <math>\frac{1500}{1.18}</math>  <math>= (\pounds)1271.18(\dots)</math> or <math>(\pounds)1271.19</math> or <math>(\pounds)1271</math>                      (Total spent =) <math>(\pounds)1319.89(\dots)</math> or <math>(\pounds)1319.90</math> or <math>(\pounds)1320</math></p> <p>(Amount saved to the nearest <math>\pounds</math> =) <math>(\pounds)330</math></p> <p>Look for</p> <ul style="list-style-type: none"> <li>• spelling</li> <li>• clarity of text explanations and correct units shown</li> <li>• the use of notation (watch for the use of '=', '+', and '-' being appropriate)</li> </ul> <p>QWC2: Candidates will be expected to</p> <ul style="list-style-type: none"> <li>• present work clearly, with words explaining process or steps</li> </ul> <p>AND</p> <ul style="list-style-type: none"> <li>• make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer</li> </ul> <p>QWC1: Candidates will be expected to</p> <ul style="list-style-type: none"> <li>• present work clearly, with words explaining process or steps</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer</li> </ul>	<p>M1</p> <p>A1</p> <p>B1</p> <p>M1</p> <p>A1</p> <p>B1</p> <p>B1</p> <p>QWC</p> <p>2</p> <p>9</p>	<p>SC1 for <math>(\pounds)12.48</math>                      F.T. 'their <math>\pounds 24.96</math> '+ <math>\pounds 23.75</math>.</p> <p>F.T. 'their derived <math>\pounds 48.71</math>' + 'their derived <math>\pounds 1271.18</math>'</p> <p>F.T. <math>\pounds 1650</math> – 'their <math>\pounds 1319.89(\dots)</math>'.                      B0 if not given to the nearest pound.  <i>Alternative method</i>  <math>M1A1B1</math> then (Total in euros) = <math>48.71 \times 1.18 + 1500</math> M1  <math>= 1557.48</math> A1                      (Total in <math>\pounds</math>) = <math>(1557.48 \div 1.18 =) (\pounds)1319.20</math> B1                      (Amount saved to the nearest <math>\pounds</math> =) <math>(\pounds)330</math> B1</p> <p>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.</p> <p>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 weakness in organisation of material but using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar.</p> <p>QWC0. Evident weakness in organisation of material and errors in use of mathematical form, spelling, punctuation and grammar.</p>
<p>2.</p> <p>Position at <math>035^\circ</math> from Aberdeen.                      Position at <math>290^\circ</math> from Stavanger.                      Position marked OR two intersecting lines.</p>	<p>M1</p> <p>M1</p> <p>A1</p> <p>3</p>	<p><math>\pm 2^\circ</math> (use overlay).                      Allow the M marks for dots, crosses or any unambiguous indication that the correct bearings have been offered.                      F.T. if at least M1 and two intersecting lines. (Lines must originate from Aberdeen and Stavanger respectively)</p>
<p>3.</p> <p><math>0.2 \times 800</math> OR <math>0.3 \times 300</math>  <math>= 160</math></p> <p><math>= 90</math></p> <p><math>\frac{90}{250} \times 100</math>  <math>= 36(\%)</math></p>	<p>M1</p> <p>A1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>5</p>	<p>F.T. 'their 90' and 'their 160 + 90'.                      Do not F.T. <math>300 / 1100</math>.</p>

January 2015 UNIT 1 Higher	Mark	Final Mark Scheme Comments										
4. <table border="1" data-bbox="236 282 619 445"> <thead> <tr> <th>Points</th> <th>No. Games</th> </tr> </thead> <tbody> <tr> <td>(0)</td> <td>12</td> </tr> <tr> <td>(1)</td> <td>6</td> </tr> <tr> <td>(2)</td> <td>30</td> </tr> <tr> <td>(3)</td> <td>24</td> </tr> </tbody> </table> Attempt at $\sum f \times x$ (138) Division by $\sum f$ (72)  (Mean =) 1.9 (points) ISW	Points	No. Games	(0)	12	(1)	6	(2)	30	(3)	24	B2   M1 m1  A1 5	B2 for all four correct. B1 for 2 or 3 correct. If no marks gained allow B1 for indicating that 1 game is equivalent to 5°.  F.T. their completed table. <i>Or 690 (M1) ÷ 360 (m1)</i>  C.A.O. for 'their table'.
Points	No. Games											
(0)	12											
(1)	6											
(2)	30											
(3)	24											
5(a) 3.71 (b) $4\frac{4}{5}$	B2 B1  3	B1 for 3.7(05.....) Accept equivalent such as $4\frac{48}{60}$ . B0 for 4.8.										
6. $5440 \times (7/8)^2$ or equivalent = 4165	M2 A1  3	M1 for $5440 \times (7/8)$ or equivalent. M1, A1 for sight of 4760. Treat increase as a mis-read.										
7(a) (i) A statement that indicates that the company started to make a profit. (ii) A statement that indicates that the profit made by the company has 'levelled out'. (iii) A statement that indicates that the company was losing money.  (b) $\frac{1220 + 0.18 \times 650 + 247}{2.75} = 576$	B1  B1  B1  M1  A1 5	Accept any equivalent statement that shows an understanding of the nature of the curve drawn from year 4 onwards. Allow use of the word 'profit' in e.g. 'the profits are getting less' or 'the profits are plummeting'.  M1 awarded at this stage.										
8 $10 \times \frac{150}{100} \times \frac{3}{5} = 9 \text{ (hours)}$	M1  M1  A1 3	M2 for the correct use of the '10' with all four of the numbers 150, 100, 3 and 5. M1 for the correct use of the '10' with any two of the numbers 150, 100, 3 and 5. C.A.O.										
9. 108% $\equiv$ 69.93 (Previous best throw) $\frac{69.93}{108} \times 100 = 64.75 \text{ (m)}$	B1 M1  A1 3	Accept any indication. Or equivalent.										







2015 January UNIT 2 (non-calculator) Foundation Tier	Mark	Final Mark Scheme Comments
<p>6. Suitable method for comparison, such as: (Using £1 for 170g) <math>4 \times 170</math> (g)</p> <p style="text-align: right;">680 (g)</p> <p>OR (Using £4 per kg) <math>1000 \div 4</math> 250 (g)</p> <p>Statement equivalent to <math>680 \neq 1000</math> (g) OR <math>170 \neq 250</math> (g)</p> <p>Look for</p> <ul style="list-style-type: none"> <li>relevance of work shown</li> <li>generally correct spelling</li> <li>clarity of text explanation</li> <li>use of notation (appropriate use of '=', '×', '÷', £, g, kg)</li> </ul> <p>QWC2: Candidates will be expected to</p> <ul style="list-style-type: none"> <li>present work clearly, with words explaining process or steps</li> </ul> <p>e.g. state clearly which quantities are being compared AND</p> <ul style="list-style-type: none"> <li>make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their working</li> </ul> <p>QWC1: Candidates will be expected to</p> <ul style="list-style-type: none"> <li>present work clearly, with words explaining process or steps</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>make few if any mistakes in mathematical form, spelling, punctuation and grammar, and include units in their working.</li> </ul>	<p>M1</p> <p>A1</p> <p>E1</p> <p>QWC2</p> <p>5</p>	<p>For a correct method to compare two quantities</p> <p>For a numerically correct answer to their calculation</p> <p>Accept approximations for all marks e.g. £6 buys <math>6 \times 170\text{g} = 1020\text{g}</math> So £6 buys about 1 kg, not £4</p> <p>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.</p> <p>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.</p> <p>QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar.</p> <p>A final unsupported statement only gets QWC0</p>
<p>7. Angle of <math>35^\circ</math> drawn in correct place AT drawn 7 cm long OR a point T marked 7 cm from A</p>	<p>B1</p> <p>B1</p> <p>2</p>	<p>Use overlay</p> <p><math>\pm 2^\circ</math></p> <p><math>\pm 2</math> mm</p>
<p>8. <math>32.8 \div 8 (= 4.1)</math> <math>(4.1) \times 3</math> 12.3 (g)</p>	<p>M1</p> <p>M1</p> <p>A1</p> <p>3</p>	<p>OR <math>32.8 \times 3 (= 98.4)</math> <math>(98.4) \div 8</math> CAO</p>

2015 January UNIT 2 (non-calculator) Foundation Tier	Mark	Final Mark Scheme Comments
9. $1 - (0.3 + 0.15)$ 0.55	M1 A1 2	If M0A0 then SC1 for $(1 - 0.18 =) 0.82$
10. Enlargement scale factor 3	B2  2	B1 for at least 3 lines correct B1 for consistent use of wrong scale factor
11. (a) $5x = 45$ $x = 9$  (b) (i) – 1 and 7 (ii) Suitable axes drawn and labelled with $x$ , $y$ and numbers 2 or 3 points plotted correctly, with no incorrect points plotted Correct straight line drawn	B1 B1  B1 B1  P1  L1 6	Accept embedded answer.  FT ‘their $5x = a$ ’. Integer answers must be expressed as integers.  FT ‘their table’  CAO. L1 implies P1.
12. ( $\angle BAE =$ ) $180^\circ - 108^\circ - 33^\circ$ or equivalent $= 39^\circ$ $(x =) 60^\circ - 39^\circ$ $= 21^\circ$	M1 A1 M1 A1  4	Check diagram for sight of $39^\circ$ FT ‘their angle $BAE$ ’ (provided $< 60^\circ$ )  ALTERNATIVE SOLUTION e.g. Angle $CBA = 120^\circ$ (interior angles) Angle $CBD = 120^\circ - 33^\circ = 87^\circ$ M1 Angle $BDA = 87^\circ$ (alternate angles) A1 Angle $AED = 72^\circ$ (straight line) $(x =) 180^\circ - 72^\circ - 87^\circ$ M1 $= 21^\circ$ A1
13. Correct translation	B1 1	
14. (Reduced cost of first cottage =) $620 \times 0.85$ OR $620 - 620 \times 0.15$ OR $620 - 93$ (= £)527  (Cost of second cottage =) $(=£)69 \times 7$ (= £)483  Considers £60 cancellation charge in an appropriate calculation  Interpretation: e.g. ‘No, more expensive to pay for the second cottage’	M1 A1  M1 A1  S1  E1  6	Or equivalent full method  Complete method for finding $69 \times 7$ CAO  e.g. ‘their 527’ – 60 (= 467) or ‘their 483’ + 60 (= 543)  (either $483 > 467$ or $543 > 527$ ) FT for a correct conclusion from ‘their numbers’. Award of E1 depends on at least M1 and S1, no error in adding or subtracting 60, and no error in finding a price difference.

2015 January UNIT 2 (non-calculator) Foundation Tier	Mark	Final Mark Scheme Comments															
<p>15(a)</p> <table border="1" data-bbox="284 293 549 546"> <tr> <td>(30)</td> <td>(40)</td> <td>(50)</td> </tr> <tr> <td><b>15</b></td> <td><b>18</b></td> <td><b>20</b></td> </tr> <tr> <td><u>15</u></td> <td><u>18</u></td> <td><u>20</u></td> </tr> <tr> <td><b>30</b></td> <td><b>40</b></td> <td><b>50</b></td> </tr> <tr> <td><b>0.5</b></td> <td><b>0.45</b></td> <td><b>0.4</b></td> </tr> </table> <p>(b) All 5 points plotted correctly</p> <p>(c) ‘No’ with reason e.g. <u>best</u> estimate of the probability is 0.4, or <u>final</u> relative frequency value is 0.4</p>	(30)	(40)	(50)	<b>15</b>	<b>18</b>	<b>20</b>	<u>15</u>	<u>18</u>	<u>20</u>	<b>30</b>	<b>40</b>	<b>50</b>	<b>0.5</b>	<b>0.45</b>	<b>0.4</b>	<p>B1 B1 B1</p> <p>P2</p> <p>E1</p> <p>6</p>	<p>CAO</p> <p>FT their <u>cumulative</u> 1<sup>st</sup> line, provided fractions are &lt; 1, and denominators are 30, 40, 50.</p> <p>FT their <u>cumulative</u> fractions as decimals, provided &lt; 1, with accuracy to 2 d.p. where appropriate.</p> <p>FT for their decimals (provided &lt; 1). Ignore joining points, tolerance should show intention to be on grid lines. P1 for 3 or 4 points plotted accurately, must be from cumulative results. Do not award if bars are drawn (unless <u>with</u> points plotted).</p> <p>FT their final column entry in (a), fraction or decimal, provided final entry &lt; 1. E0 for e.g. only 2 of the 5 trials gives a result less than 0.5.</p>
(30)	(40)	(50)															
<b>15</b>	<b>18</b>	<b>20</b>															
<u>15</u>	<u>18</u>	<u>20</u>															
<b>30</b>	<b>40</b>	<b>50</b>															
<b>0.5</b>	<b>0.45</b>	<b>0.4</b>															
<p>16. 200 (seconds) AND 168 (seconds) OR sight of 32 (seconds)</p> <p><math>[200 - 168] \div 200 (\times 100\%)</math> OR <math>[1 - 168/200] (\times 100\%)</math> OR equivalent method.</p> <p style="text-align: right;">16%</p>	<p>B1</p> <p>M1</p> <p>A1 3</p>	<p>Both times correct OR correct time difference.</p> <p>FT from ‘their times’ (with at least one correct).</p>															

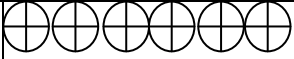
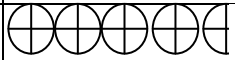
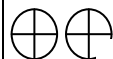
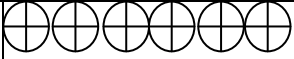
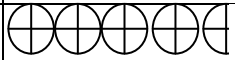
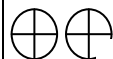
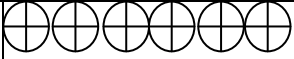
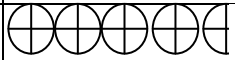
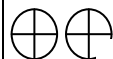
## UNIT 2 - HIGHER TIER

January 2015 Unit 2 Higher Tier	M a r k	Final Mark Scheme Comment
<p>1. <math>4x + 4 = 3</math> <math>4x = -1</math> <math>x = -1/4</math> or <math>-0.25</math></p>	<p>B1 B1 B1  3</p>	<p>Correctly expanding brackets (FT until 2<sup>nd</sup> error). Collecting terms. Do not accept 1/-4. Mark final answer. Accept embedded answer.</p>
<p>2. (Reduced cost of first cottage =) <math>620 \times 0.85</math> OR <math>620 - 620 \times 0.15</math> OR <math>620 - 93</math> (= £)527</p> <p>(Cost of second cottage =) (= £)69 × 7  (= £)483</p> <p>Considers £60 cancellation charge in an appropriate calculation.</p> <p>Interpretation: e.g. ‘No, more expensive to pay for the second cottage’.</p> <p>Look for:</p> <ul style="list-style-type: none"> <li>• accuracy of spelling</li> <li>• clarity of labels</li> <li>• correct units shown (£)</li> <li>• the use of notation (appropriate use of “=”, “+”, “-”, “x”).</li> </ul> <p>QWC2: Candidates will be expected to</p> <ul style="list-style-type: none"> <li>• present work clearly, with words explaining process or steps</li> </ul> <p>AND</p> <ul style="list-style-type: none"> <li>• make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer.</li> </ul> <p>QWC1: Candidates will be expected to</p> <ul style="list-style-type: none"> <li>• present work clearly, with words explaining process or steps</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units (£) in their final answer.</li> </ul>	<p>M1 A1  M1 A1 S1 E1  Q W C 2  8</p>	<p>Or equivalent full method.</p> <p>Complete method for finding <math>69 \times 7</math>.</p> <p>CAO</p> <p>e.g. ‘their 527’ – 60 (= 467) or ‘their 483’ + 60 (= 543)</p> <p>(either <math>483 &gt; 467</math> or <math>543 &gt; 527</math>) FT for a correct conclusion from ‘their numbers’. Award of E1 depends on at least M1 and S1, no error in adding or subtracting 60, and no error in finding a price difference.</p> <p>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.</p> <p>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.</p> <p>QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar.</p>
<p>3. (a) Correct rotation.</p> <p>(b) Correct translation.</p>	<p>B2  B1 3</p>	<p>B1 for clockwise rotation about (0, 1) OR anticlockwise rotation about (1, 0) OR 2 correct vertices. Clear intention shown.</p>

<p style="text-align: center;"><b>January 2015</b> <b>Unit 2 Higher Tier</b></p>	<p style="text-align: center;"><b>M</b> <b>a</b> <b>r</b> <b>k</b></p>	<p style="text-align: center;"><b>Final Mark Scheme</b> <b>Comment</b></p>															
<p>4. (Angle <math>BAE =</math>) <math>180^\circ - 108^\circ - 33^\circ</math> or equivalent  <math>= 39^\circ</math>  <math>(x =) 60^\circ - 39^\circ</math>  <math>= 21^\circ</math></p>	<p>M1 A1 M1 A1         4</p>	<p>Check diagram for sight of <math>39^\circ</math>.  FT 'their angle <math>BAE</math>' (provided <math>&lt; 60^\circ</math>)</p> <p>ALTERNATIVE SOLUTION e.g.  Angle <math>CBA = 120^\circ</math> (interior angles)  Angle <math>CBD = 120^\circ - 33^\circ = 87^\circ</math> M1  Angle <math>BDA = 87^\circ</math> (alternate angles) A1  Angle <math>AED = 72^\circ</math> (straight line)  <math>(x =) 180^\circ - 72^\circ - 87^\circ</math> M1  <math>= 21^\circ</math> A1</p>															
<p>5. (a) <math>8x + 12 - 3x - 6</math>  <math>= 5x + 6</math></p> <p>(b) <math>10n - 7</math></p> <p>(c) <math>4x &gt; 2</math>  <math>x &gt; \frac{1}{2}</math> (or <math>x &gt; 2/4</math>)</p>	<p>B1 B1  B2  B1 B1  6</p>	<p>Correctly removing brackets.  Collecting terms. FT for one error only. Mark final answer.</p> <p>B1 for sight of <math>10n</math></p> <p>FT from <math>4x &gt; a</math>. Mark final answer.  B0 for use of <math>=</math> sign, unless replaced in final answer.</p>															
<p>6. (a)</p> <table border="1" data-bbox="300 862 566 1010"> <tr> <td>(30)</td> <td>(40)</td> <td>(50)</td> </tr> <tr> <td><b>15</b></td> <td><b>18</b></td> <td><b>20</b></td> </tr> <tr> <td><b>15</b></td> <td><b>18</b></td> <td><b>20</b></td> </tr> <tr> <td><b>30</b></td> <td><b>40</b></td> <td><b>50</b></td> </tr> <tr> <td><b>0.5</b></td> <td><b>0.45</b></td> <td><b>0.4</b></td> </tr> </table> <p>(c) All 5 points plotted correctly.</p> <p>(d) 'No' with reason e.g. <u>best</u> estimate of the probability is 0.4, or <u>final</u> relative frequency value is 0.4.</p>	(30)	(40)	(50)	<b>15</b>	<b>18</b>	<b>20</b>	<b>15</b>	<b>18</b>	<b>20</b>	<b>30</b>	<b>40</b>	<b>50</b>	<b>0.5</b>	<b>0.45</b>	<b>0.4</b>	<p>B1 B1 B1  P2    E1  6</p>	<p>CAO  FT their <u>cumulative</u> 1<sup>st</sup> line, provided fractions are <math>&lt; 1</math>, and denominators are 30, 40, 50.  FT their <u>cumulative</u> fractions as decimals, provided <math>&lt; 1</math>, with accuracy to 2 d.p. where appropriate.</p> <p>FT for their decimals (provided <math>&lt; 1</math>).  Ignore joining points, tolerance should show intention to be on grid lines.  P1 for 3 or 4 points plotted accurately, must be from cumulative results.  Do not award if bars are drawn (unless <u>with</u> points plotted).</p> <p>FT their final column entry in (a), fraction or decimal, provided final entry <math>&lt; 1</math>.  E0 for e.g. only 2 of the 5 trials gives a result less than 0.5.</p>
(30)	(40)	(50)															
<b>15</b>	<b>18</b>	<b>20</b>															
<b>15</b>	<b>18</b>	<b>20</b>															
<b>30</b>	<b>40</b>	<b>50</b>															
<b>0.5</b>	<b>0.45</b>	<b>0.4</b>															
<p>7. 200 (seconds) AND 168 (seconds)  OR sight of 32 (seconds)  <math>[200 - 168] \div 200 (\times 100\%)</math> OR <math>[1 - 168/200] (\times 100\%)</math> OR equivalent method.  16%</p>	<p>B1  M1  A1 3</p>	<p>Both times correct OR correct time difference.</p> <p>FT from 'their times' (with at least one correct).</p>															
<p>8. (a) <math>9.7 \times 10^{-5}</math></p> <p>(b) <math>4.78 \times 10^9</math></p>	<p>B1    B1  2</p>																
<p>9. Sight of <math>y = 4x + 5</math> for 2<sup>nd</sup> line OR finding both gradients  Statement that 'gradient = 4' for both AND 'Yes'.</p>	<p>B1 B1     2</p>	<p>Equations must be correctly re-arranged.  Allow statement that 'gradients are equal' provided 4 already seen.  Allow second B1 after 1 error in re-arranging (provided no error in finding coefficient of <math>x</math>).  (Award B0 for an unsupported statement of 'equal gradients'.)</p>															

<p style="text-align: center;"><b>January 2015 Unit 2 Higher Tier</b></p>	<p style="text-align: center;"><b>M a r k</b></p>	<p style="text-align: center;"><b>Final Mark Scheme Comment</b></p>
<p>10. <math>b + 4c = 310, 2b + 3c = 345</math></p> <p>Method to find first variable Correct first variable Correct second variable</p> <p>(£)455 AND 'No'</p>	<p>B1 M1 A1 A1 B1 5</p>	<p>Strategy of forming a pair of equations. (Do not penalise for not defining variables.) FT for equations of equivalent difficulty. <math>b = (£)90, c = (£)55</math> OR <math>(£)345 + 2 \times (£)55</math>. FT 'their first variable' for second A1. FT 'their derived b and c'. An unsupported answer gets 0 marks.</p>
<p>11. (a) All correct entries.</p> <p>(b) Sight of <math>\frac{1}{5} \times \frac{1}{3}</math> or <math>\frac{4}{5} \times \frac{2}{3}</math> <math>\frac{1}{5} \times \frac{1}{3} + \frac{4}{5} \times \frac{2}{3}</math> <math>= 9/15 (= 3/5)</math></p>	<p>B2 B1 M1 A1 5</p>	<p>B1 for three correct entries. FT from their tree, probabilities must be <math>&lt; 1</math> but not equal to <math>\frac{1}{2}</math>.</p>
<p>12. <math>5h + 3k = 2h + 8</math> <math>5h - 2h = 8 - 3k</math> <math>3h = 8 - 3k</math> <math>h = (8 - 3k)/3</math> or equivalent</p>	<p>B1 B1 B1 B1 4</p>	<p>Includes correct expansion. FT until 2<sup>nd</sup> error. Mark final answer.</p>
<p>13. (a) (Angle <math>COA \Rightarrow 2 \times 67^\circ (= 134^\circ)</math> <math>[180^\circ - 134^\circ] / 2</math> or equivalent (Angle <math>OAC \Rightarrow 23^\circ)</math></p> <p>(b) <math>36^\circ</math> Alternate segment theorem</p>	<p>M1 M1 A1 B1 E1 5</p>	<p>Check diagram. FT 'their angle <math>COA</math>'. Accept a correctly worded equivalent e.g. 'the angle between a tangent and a chord is equal to the angle in the alternate segment'. E1 is dependent on B1 having been awarded.</p>
<p>14. (a) <math>x = 0.2747474\dots</math> <math>100x = 27.47474\dots</math> <u>with</u> an attempt to subtract <math>272/990</math> or <math>136/495</math></p> <p>(b) (i) 1 (ii) <math>1/9</math> or <math>0.111\dots</math></p> <p>(c) <math>25 + 15\sqrt{2} - 15\sqrt{2} - 18</math> or equivalent <math>= 7</math></p>	<p>M1 A1 B1 B2 M1 A1 7</p>	<p>Or <math>10x</math> and <math>100x</math>, or equivalent. Or an alternative method. An answer of <math>27.2/99</math> gains M1 only. Mark final answer. Do not ignore incorrect cancelling. B1 for <math>9^{-1}</math> or <math>1/3^2</math> or <math>1/3\sqrt{729}</math> or <math>1/729^{1/3}</math> or <math>(1/729)^{1/3}</math> or <math>\sqrt[3]{1/729}</math> Mark final answer. Do not ignore subsequent working. If no marks awarded, SC1 for 3 of the 4 terms correct. NB <math>25 + \sqrt{30} - \sqrt{30} - 18 = 7</math> counts as 2 errors and gets 0 marks.</p>
<p>15. (a) Sketch with reflection in <math>x</math>-axis. Vertex must touch the <math>x</math> axis.</p> <p>(b) Sketch with horizontal compression towards <math>y</math>-axis. Must pass through <math>(0,1)</math>.</p>	<p>B1 B1 2</p>	<p>Clear intention shown (to draw curve of same size and shape). Must be a convex <u>curve</u>. Clear intention shown. Must be a convex <u>curve</u>.</p>

**UNIT 3 - FOUNDATION TIER**

January 2015 UNIT 3 (calculator allowed) Foundation	Mark	Final Mark Scheme Comments						
1. (a) (£)26.5(0) (£)2.97 (£)3.6(0) Total = (£)33.07  1 (b) 40-(£)33.07 (£)6.93  1 (c) Two free tickets identified (£) 10.6(0) ISW.	B1 B1 B1 B1  M1 A1  M1 A1  8	FT if at least B1 awarded.  FT candidate's total.  FT 'their (£)33.07' Sc1 for ('their (£)33.07' - (£)15.9(0) =)(£)17.17 where drinks and sweets have not been considered.						
2. (a) 7240	B1 1							
2. (b) 37	B1 1							
3. Evidence of counting squares 24-28 inclusive (cm <sup>2</sup> )	M1 A1 2							
4. 5(p) and 2(p) coins	B2  2	B1 if candidate identifies 14(p) as the difference OR identifies 7(p) needs to be given.						
5. (a) All letters correctly placed Regular Polygon C, E, F Irregular Polygon B,G,H Not a Polygon A, D  (b) indicates B and H  (c) indicates F and C	B3  B1  B1 5	B2 for six or seven shapes correctly placed. B1 for four or five shapes correctly placed. Duplication of letters counts as an error.  Sc1 for three shapes correctly placed with one in each box with no shapes incorrectly placed.						
6(a) (lemon lush=) 24  (b) difficult to show a part of the diagram with accuracy. e.g. the symbol needs to be easily divided into 8 pieces. .  (c) One row represented in symbols consistent with the key. Two rows represented in symbols consistent with the key. Three rows represented in symbols consistent with the key.	B2  E1  B1 B1  B1  B1  6	B1 for one can = 8 Alternative: 3/10 of 80 (=8×3)=24  e.g. the data for Tuesday's sales needs to be a multiple of 8  <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Cool cola</td> <td align="center"></td> </tr> <tr> <td>Orange Fizz</td> <td align="center"></td> </tr> <tr> <td>Lemon Lush</td> <td align="center"></td> </tr> </table>	Cool cola		Orange Fizz		Lemon Lush	
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<p style="text-align: center;"><b>January 2015</b> <b>UNIT 3 (calculator allowed) Foundation</b></p>	<p style="text-align: center;"><b>Mark</b></p>	<p style="text-align: center;"><b>Final Mark Scheme</b> <b>Comments</b></p>
<p>18. <math>(x^2 =) \quad 12.3^2 + 5.9^2</math>  <math>x^2 = 186.1</math> OR <math>(x =) \quad \sqrt{186.1}</math>  <math>(x =) 13.6(418\dots\text{cm})</math></p>	<p>M1 A1 A1 3</p>	
<p>19. (Area of semi-circle <math>=) \pi \times 6 \cdot 3^2 / 2</math>  <math>= 62.3</math> to <math>62.4</math> (<math>\text{m}^2</math>)          (Number of tins of paint needed <math>=) (\pi \times 6 \cdot 3^2 / 2) \div 15</math>  <math>= 5</math>(tins)</p>	<p>M1 A1 M1 A1  4</p>	<p>FT 'their area' provided <math>\pi</math> used in the calculation.          Provided of equivalent difficulty.</p>
<p>20. Perpendicular bisector of line joining Aber and Bont drawn.          Correct 2 points identified.</p>	<p>B1  B2  3</p>	<p>Use overlay with tolerances included.           B1 for 1 point identified Or correct circle or arc drawn within tolerance.          If no marks awarded, SC1 for complete method but outside tolerances.</p>

**UNIT 3 - HIGHER TIER**

January 2015 UNIT 3 Higher	Mark	Final Mark Scheme Comments																																																																								
1. $\frac{27}{18}$ or equivalent. $= 1.5$	B2  B1  3	B1 for sight of 27 or 18.  FT provided B1 already awarded. If no marks awarded, allow SC1 for answers of 18.72 (not used brackets) or 0.5 (used squared instead of cubed) as evidence of a correct numerator or denominator.																																																																								
2. $252 \div 6 (= 42)$ 210 (kg) AND 42 (kg)	M1 A1 2																																																																									
3. (a) $x(x - 9)$ (b) $3x - 21 = 21$ OR $x - 7 = 21/3$ $3x = 42$ OR $x = 7 + 7$ $x = 14$ (c) $9y - 5y = 12 + 2$ $4y = 14$ $y = 3.5$	B1 B1 B1 B1 B1 B1 7	Accept embedded answer. FT until 2 <sup>nd</sup> error.  FT until 2 <sup>nd</sup> error.  Accept 7/2. Mark final answer.																																																																								
4. (Distance =) $\frac{90 \times 1000}{3600} \times 10$ $= 250$ (m)	M2 A1 3	M1 for a distance conversion into m OR a speed conversion into 'per second' OR speed $\times$ time. CAO. Allow M1 SC1 for 0.25 km.																																																																								
5. One correct evaluation $2 \leq x \leq 3$ 2 correct evaluations $2.25 \leq x \leq 2.4$ one either side of 0 2 correct evaluations $2.25 \leq x \leq 2.35$ one either side of 0 <i>If evaluations not seen, accept 'too high' or 'too low'.</i>  $x = 2.3$	B1  B1  M1    A1   4	<table border="1"> <thead> <tr> <th><math>x</math></th> <th><math>5x^3 - 2x - 60</math></th> <th><math>x</math></th> <th><math>5x^3 - 2x - 60</math></th> <th><math>x</math></th> <th><math>5x^3 - 2x - 60</math></th> </tr> </thead> <tbody> <tr><td>2</td><td>-24</td><td>2.25</td><td>-7.547</td><td>2.36</td><td>1.001</td></tr> <tr><td>2.1</td><td>-17.895</td><td>2.26</td><td>-6.804</td><td>2.37</td><td>1.820</td></tr> <tr><td>2.2</td><td>-11.16</td><td>2.27</td><td>-6.055</td><td>2.38</td><td>2.646</td></tr> <tr><td>2.3</td><td>-3.765</td><td>2.28</td><td>-5.298</td><td>2.39</td><td>3.480</td></tr> <tr><td>2.4</td><td>4.32</td><td>2.29</td><td>-4.535</td><td>2.4</td><td>4.320</td></tr> <tr><td>2.5</td><td>13.125</td><td>2.3</td><td>-3.765</td><td></td><td></td></tr> <tr><td>2.6</td><td>22.68</td><td>2.31</td><td>-2.988</td><td></td><td></td></tr> <tr><td>2.7</td><td>33.015</td><td>2.32</td><td>-2.204</td><td></td><td></td></tr> <tr><td>2.8</td><td>44.16</td><td>2.33</td><td>-1.413</td><td></td><td></td></tr> <tr><td>2.9</td><td>56.145</td><td>2.34</td><td>-0.615</td><td></td><td></td></tr> <tr><td>3</td><td>69</td><td>2.35</td><td>0.189</td><td></td><td></td></tr> </tbody> </table>	$x$	$5x^3 - 2x - 60$	$x$	$5x^3 - 2x - 60$	$x$	$5x^3 - 2x - 60$	2	-24	2.25	-7.547	2.36	1.001	2.1	-17.895	2.26	-6.804	2.37	1.820	2.2	-11.16	2.27	-6.055	2.38	2.646	2.3	-3.765	2.28	-5.298	2.39	3.480	2.4	4.32	2.29	-4.535	2.4	4.320	2.5	13.125	2.3	-3.765			2.6	22.68	2.31	-2.988			2.7	33.015	2.32	-2.204			2.8	44.16	2.33	-1.413			2.9	56.145	2.34	-0.615			3	69	2.35	0.189		
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6. $(x^2 =) 12.3^2 + 5.9^2$ $x^2 = 186.1$ OR $(x =) \sqrt{186.1}$ $(x =) 13.6(418\dots\text{cm})$	M1 A1 A1 3																																																																									
7. (a) (Angle inside pentagon =) $540/5$ $= 108$ ( $^\circ$ ) (b) Sight of $60$ ( $^\circ$ ) as an angle in an equilateral triangle. $360 - 60 - 60 - 108$ ( $= 132$ ) $y = (180 - 132)/2$ $y = 24$ ( $^\circ$ )	M1 A1 B1 M1 m1 A1 6	OR $180 - (360/5)$  FT 'their 108' for all remaining marks.																																																																								

January 2015 UNIT 3 Higher	Mark	Final Mark Scheme Comments
<p>8. (Area of semi-circle =) <math>\pi \times 6 \cdot 3^2 / 2</math>  <math>= 62 \cdot 3</math> to <math>62 \cdot 4</math> (m<sup>2</sup>)            (Number of tins of paint needed =) <math>(\pi \times 6 \cdot 3^2 / 2) \div 15</math>  <math>= 5</math> (tins)</p> <p>QWC:            Look for</p> <ul style="list-style-type: none"> <li>• spelling in at least 1 statement/sentence</li> <li>• clarity of working</li> <li>• correct units used i.e. m<sup>2</sup>, tins</li> </ul> <p>QWC2: Candidates will be expected to</p> <ul style="list-style-type: none"> <li>• present work clearly, with words or quantities shown for clarity of process or steps</li> </ul> <p>AND</p> <ul style="list-style-type: none"> <li>• make few if any mistakes in mathematical form, spelling, punctuation and grammar in their answer</li> </ul> <p>QWC1: Candidates will be expected to</p> <ul style="list-style-type: none"> <li>• present work clearly, with words or quantities shown for clarity of process or steps</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• make few if any mistakes in mathematical form, spelling, punctuation and grammar in their answer</li> </ul>	<p>M1 A1 M1 A1</p> <p>QWC 2</p> <p>6</p>	<p>FT ‘their area’ provided <math>\pi</math> used in the calculation.            Provided of equivalent difficulty.</p> <p>QWC2 Presents material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar.</p> <p>QWC1 Presents 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.</p> <p>QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar.</p>
<p>9. (a) Mid-points 10, 30, 50, 70, 90, 110            Frequencies 32, 30, 23, 11, 3, 1            Sum of mid-points <math>\times</math> freq (= 3520)</p> <p style="text-align: center;"><math>\div 100</math>  <math>= (\pounds) 35 \cdot 2(0)</math></p> <p>(b) Points plotted at mid-points of groups, and straight lines connecting the points.</p> <p>(c) Appropriate comment that compares purchases made on Monday and Saturday.</p>	<p>B1 B1 M1 m1 A1 B2</p> <p>E1</p> <p>8</p>	<p>FT their mid-points and frequencies. Mid-points need to be within the limits of each group, including the limits themselves. Dividing by 100 or their total frequency.</p> <p>B1 at least 4 points plotted and joined correctly,            OR for all points plotted correctly but not joined,            OR consistent horizontal translation within the limits of the groups.            Accept intention of straight lines. Ignore any lines outside the first and last points.            e.g. ‘More low value purchases on a Monday morning.’            ‘More money is spent on a Saturday afternoon.’</p>
<p>10. Perpendicular bisector of line joining Aber and Bont drawn.            Correct 2 points identified.</p>	<p>B1 B2</p> <p>3</p>	<p>Use overlay with tolerances included.</p> <p>B1 for 1 point identified Or correct circle or arc drawn within tolerance.            If no marks awarded, SC1 for complete method but outside tolerances.</p>
<p>11. (a) <math>6 \times 10^2</math>            (b) <math>2 \times (1 \cdot 66 \times 10^{-24}) + 2 \cdot 66 \times 10^{-23}</math>  <math>= 2 \cdot 99 \times 10^{-23}</math></p>	<p>B2 M1 A2</p> <p>5</p>	<p>B1 for 600 or <math>0 \cdot 6 \times 10^3</math>.            Or equivalent.            A1 for <math>2 \cdot 992 \times 10^{-23}</math> or equivalent.            SC1 for a correct answer to their calculation written instandard form to 3 s.f., provided rounding required.</p>
<p>12. <math>(x + 15)(x - 3)</math>  <math>x = -15</math> or <math>x = 3</math></p>	<p>B2 B1 3</p>	<p>B1 for <math>(x \dots 15)(x \dots 3)</math>.            FT for their pair of brackets. Both solutions needed for this B1.            B0 for solutions obtained from the quadratic formula.</p>
<p>13. <math>\frac{1}{3} \times 5^2 \times 9</math>  <math>= 75</math>  <math>\text{cm}^3</math></p>	<p>M1 A1 U1 3</p>	<p>Independent mark.</p>
<p>14. (a) 3, 7, 15, 21, 23, 24            (b) Idea, plotting the upper class boundary consistently with the corresponding cumulative frequency.            At least 4 points plotted correctly.            All points correct and joined by straight lines or a curve, including to zero.            (c) A correct reading from their graph.            (d) Pupils got quicker AND suitable reason            e.g. ‘upper quartile is now less than the median from the start of the week’, ‘both quartiles have come down in time’.</p>	<p>B1 M1 A1 A1 B1 E2</p> <p>7</p>	<p>FT, for all marks, their cumulative frequencies, provided an attempt made to be cumulative.</p> <p>If no marks awarded, SC1 if points plotted at mid-points.            MOA0A0 for bars with or without plots.            Answers are likely to be in the range 27·5 to 29.            E1 for ‘pupils got quicker’ OR            E1 for valid statement e.g. ‘the spread of marks has not changed much from start of the week.’            If the quartiles from the start of the week are quoted, they need to be correct. LQ=23 to 24·5, UQ=32 to 33·5.</p>

January 2015 UNIT 3 Higher	Mark	Final Mark Scheme Comments
15. Use of scale factor of (12/10) or (10/12) Area ACD/24 = (12/10) <sup>2</sup> Area ACD = 24 x 1.44 = 34.56 (cm <sup>2</sup> ) Area of trapezium = 10.56 (cm <sup>2</sup> )	B1 M1 A1 A1  4	Sight of 1.2 or 0.8333... Or equivalent. FT 'their 34.56' provided M1 awarded. <i>Alternative method:</i> <i>Ratio of lengths 10:12 or 5:6</i> <span style="float:right">B1</span> <i>Ratio of areas 100:144 = 25:36</i> <span style="float:right">B1</span> <i>Area of trapezium = 11/25 x 24</i> <span style="float:right">M1</span> <i>Area = 10.56 (cm<sup>2</sup>)</i> <span style="float:right">A1</span>
16. (a) $c = k \times d^2$ or $c \propto d^2$ $18 = k \times 1.5^2$ $c = 8d^2$ (b) 42.3(2) (c) $98 = 8d^2$ $(d =) \pm 3.5$	B1 M1 A1 B1 M1 A1 6	FT for their non-linear expression from (a), in (b) and (c). FT for their non-linear expression from (a) provided positive and negative roots required.
17. (Area of 1 triangle =) $\frac{1}{2} \times 6 \times 11 \times \sin 130^\circ$ $\times 2$ (Area of kite =) 50.5(58...cm <sup>2</sup> ) or 51 (cm <sup>2</sup> )	M1 m1 A1 3	An answer of 25(.279...) gets M1m0A0.
18. (Angle inside triangle at A =) 72° $BP^2 = 147^2 + 95^2 - 2 \times 147 \times 95 \times \cos 72^\circ$ $BP^2 = 22003(.15535)$ or $(BP =) \sqrt{22003(.15535)}$ $(BP =) 148(.334... \text{km})$	B1 M1 A1 A1 4	FT 'their 72°' providing it's less than 122°. FT their 22003(.15535) provided M1 awarded.
19. "Area under a v-t graph gives the distance travelled." $(\frac{1}{2} \times 5 \times 8) + (5 \times 8)$ C	M1 A1 A1 3	Could be implied by their calculations. OR Distance A = $\frac{1}{2} \times 10 \times 6$ AND Distance B = $\frac{1}{2} \times 10 \times 8$ .
20. (a) $(3x^2 - 2)\sin 30^\circ = 3x$ $3x^2 - 6x - 2 = 0$  (b) $\frac{-(-6) \pm \sqrt{(-6)^2 - 4 \times 3 \times -2}}{2 \times 3}$ $\frac{6 \pm \sqrt{60}}{6}$ $x = 2.29(\dots) \text{ or } 2.3 \quad (\text{or } x = -0.29 \text{ or } -0.3)$ BC = 6.9 (cm)	M2 A1  M1 A1 A1 B1 7	M1 for $\sin 30^\circ = 3x/(3x^2 - 2)$ Convincing work needed. <i>Alternative method:</i> <i>M2 for <math>6x = 3x^2 - 2</math> with convincing argument for an equilateral triangle.</i> <i>A1 for <math>3x^2 - 6x - 2 = 0</math>.</i> Allow 1 slip in substitution for M1 only. Do not accept a partial and improvement method. CAO. CAO. If no workings shown, SC1 for $x = 2.29$ or $2.3$ . FT their value of $x$ , provided M1 or SC1 awarded, and BC is positive.



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