



# **GCSE MARKING SCHEME**

**METHODS OF MATHEMATICS  
(LINKED PAIR PILOT)**

**SUMMER 2013**

## **INTRODUCTION**

The marking schemes which follow were those used by WJEC for the Summer 2013 examination in GCSE METHODS OF MATHEMATICS (LINKED PAIR PILOT). 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.

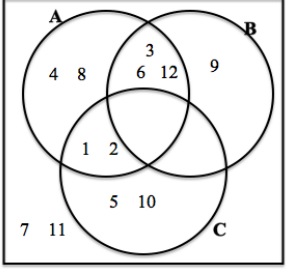
It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conferences, teachers may have different views on certain matters of detail or interpretation.

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

## UNIT 1 (FOUNDATION TIER)

Methods Unit 1 Foundation June 2013		Final									
1. (a) 8039 (b) forty eight thousand seven hundred and two (c) 4 16 7 (d) 3000 or 3 thousand (e) 51700 (f) Sensible estimates, that would lead to single digit multiplication Correct answer from their estimates	B1 B1 B3  B1 B1 M1  A1  9	Award B1 for each correct answer.  Accept thousand(s) but not 1000. Eg $50 \times 4$ or $50 \times 3.9$ or $51 \times 4$  Award M1 A1 for unsupported answers of 200, 195 or 204 Award M1 A1 for unsupported answer of 195 - 204 Award M0 A0 for $(51 \times 3.9 =) 198.9$									
2. (a) 524 (b) 279 (c) 36 (d) 516 × 82 1032 41280 42312  (e) 9 (f) Explanation given AND Sian given as incorrect (stated or implied)	B1 B1 B1 M1  A1 A1  B1 E1  8	Any correct method for the multiplication of 516 by 82  For either 1032 or 41280 (Apply 'one error' in other methods) CAO Place value errors get M0 A0 Watch out for an incorrect answer of -9 Eg Sian incorrect because 6 coaches would be just over 300 people, so 10 coaches would be far too many. Or 530 is a lot more. Do not award E1 for statement incorrect only.									
3. <table border="1" style="margin-left: 20px; margin-top: 10px;"> <tr> <td style="text-align: center;">6</td> <td style="text-align: center;">1</td> <td style="text-align: center;"><b>8</b></td> </tr> <tr> <td style="text-align: center;"><b>7</b></td> <td style="text-align: center;">5</td> <td style="text-align: center;"><b>3</b></td> </tr> <tr> <td style="text-align: center;"><b>2</b></td> <td style="text-align: center;"><b>9</b></td> <td style="text-align: center;">4</td> </tr> </table>	6	1	<b>8</b>	<b>7</b>	5	<b>3</b>	<b>2</b>	<b>9</b>	4	B3        3	Award B3 for all correct Award B2 for 3 or 4 correct entries Award B1 for 1 correct row or column or the other diagonal or 2 correct only if working to a total of 15.
6	1	<b>8</b>									
<b>7</b>	5	<b>3</b>									
<b>2</b>	<b>9</b>	4									
4. (a) A at $\frac{1}{2}$ B at 1 C at 0 D at or near $\frac{1}{3}$ (b) $\frac{5}{7}$ $\frac{3}{7}$  (c) Explanation given and neither more likely or both equally likely (stated or implied)	B1 B1 B1 B1 B2  E1  7	For position of 'D' accept $>1/4$ but $<1/2$ Award B1 for each correct answer. Penalise -1 once only if consistent use of incorrect notation.  Eg. Both have the same chance as they each have 5 tickets with different numbers. Each number has the same probability.									
5.(a) 81 Multiplying previous term by three (b) $4x - 3$  (c) Workings for Jenny $(0 + 2) \times 2 = 4$ AND Steve $0 \times 2 + 2 = 2$ AND Steve correct stated or implied by correct working (d) $27 = 12 + n$ $n = 15$ (e) $5x$ (f) $12x - 21$	B1 B1 B2  B2  B1 B1 B1 B1 10	Accept "times by 3" or " $\times 3$ " Award B1 for either $4x - 3$ within an expression. Award B1 for $4x + - 3$ Award B1 for workings for Jenny $(0 + 2) \times 2 = 4$ OR Steve $0 \times 2 + 2 = 2$ Accept embedded answers  Mark final answer									
6. (a) For 2 correct in a form which allows comparison. For all 3 correct in a form, or steps, that will allow comparison of all 3 $\frac{35}{100}, 0.37, \frac{2}{5}$ or equivalent (b) 200	B1 B1  B1 B2 5	CAO. Correct answer only award B0 B0 B1 B1 for either 8 or 25.									



<p>12. Venn diagram correct</p> 	<p>B4</p> <p>4</p>	<p>No extra number &gt;12  Mark unique placements of numbers, for duplicates mark the incorrect number then award as follows:  B3 for any 9, 10 or 11 numbers correctly placed with no more than 1 extra number &gt;12  B2 for any 6, 7 or 8 numbers correctly placed with no more than 2 extra numbers &gt;12  B1 for any 3, 4 or 5 numbers correctly placed and ignore any extra numbers  If no marks awarded SC1 for sight of sets A, B and C correct (including any extra numbers), shown in working or within Venn diagram</p>
<p>13.(a) Strategy to find at least one 4<sup>th</sup> vertex, e.g. axes with 3 plots of given points <b>and</b> show understanding of parallel side requirement, OR a correct arithmetic method</p> <p>Any 2 of: (5, 6) (9, -2) (1, -2)</p>	<p>M2</p> <p>A2</p> <p>4</p>	<p>M1 axes and plot the 3 points given, OR a reasonable attempt at an arithmetic method, OR axes and plot the 2 of the 3 points given with an attempt draw 2 appropriate parallel lines</p> <p>A1 for one correct, or for 2 indicated but coordinates not given or given incorrectly  If one correct, this implies M2 (and A1)</p> <p>If no marks, award SC1 for evidence that the 3 coordinates have been reversed but a strategy to draw an appropriate parallel line is attempted. Do not penalise reverse coordinates if SC1 awarded.</p> <p><i>Candidates clearly and consistently working with reverse coordinates should be penalised -1 only</i></p>
<p>14. (i) At least 2 correct points found or plotted  Correct straight line shown  (ii) At least 2 correct points found or plotted  Correct straight line shown</p>	<p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>4</p>	
<p>15. (a) <math>10n - 7</math>  (b) <math>-10n + 60</math> or equivalent</p>	<p>B2</p> <p>B2</p> <p>4</p>	<p>B1 for sight of <math>10n</math>  For B2 mark final answer. B1 for sight of <math>-10n</math></p>



<p>7. An example of a tessellation covering a space having an element of a <b>repeating</b> pattern with at least one 360° point formed by using both of the shapes of tiles</p> <p>Use of angles at a point is 360(°)</p> <p>Shows sum to 360(°) including at least one 90(°) and at least one 60(°)</p>	<p>B2</p> <p>B1</p> <p>B1</p> <p>4</p>	<p>B1 for an example of a tessellation covering a space with at least one 360° point formed by using <b>both</b> of the shapes of tiles.</p> <p>Accept sight of knowledge that angles at a point is 360(°)</p> <p>Accept if implied, e.g. '2 squares 180° and 3 (isosceles) triangles 180°'</p>
<p>8. (Sum of the three angles given is 300(°)) (Each of other two exterior angles is) <math>360 - 300 \div 2</math> (Each of the other exterior angles is) 30(°) Use of 'interior angle + exterior angle = 180(°)' Interior angles 75(°), 65(°), 100(°), 150(°), 150(°)</p> <p>QWC2: Candidates will be expected to</p> <ul style="list-style-type: none"> <li>present relevant 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 spelling, punctuation and grammar</li> </ul> <p>QWC1: Candidates will be expected to</p> <ul style="list-style-type: none"> <li>present work clearly which is mostly relevant, with words explaining process or steps</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>make few if any mistakes in spelling, punctuation and grammar and include units in their final answer</li> </ul>	<p>M1</p> <p>m1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>QWC</p> <p>2</p> <p>7</p>	<p>FT their 300, sum of the three angles given</p> <p>FT their 300, sum of the three angles given</p> <p>CAO</p> <p>Or use of 'interior = 180 – exterior'</p> <p>FT 180 – their 30 provided M1 awarded</p> <p>OR Alternatively: (Use of interior angle + exterior angle = 180°)</p> <p>Interior angles 75(°), 65(°), 100(°) <span style="float: right;">B1</span></p> <p>Sum of the interior angles = <math>3 \times 180(°)</math> (= 540(°)) <span style="float: right;">M1</span></p> <p>Remaining interior angles = <math>540 - (75 + 65 + 100)</math> = 300(°) <span style="float: right;">m1</span></p> <p>Each of the remaining angles = 150(°) <span style="float: right;">A1</span></p> <p><i>If no marks, SC1 for answers of 120° and 120° from incorrectly using 540° as exterior sum of the angles</i></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</p> <p>OR</p> <p>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. <math>180 \div 36 = 5</math> and <math>180 \div 60 = 3</math>, OR  <math>36 = 2 \times 2 \times 3 \times 3</math>, <math>60 = 2 \times 2 \times 3 \times 5</math>,  and <math>180 = 2 \times 2 \times 3 \times 3 \times 5</math>, OR  36, 72, 108, 144, 180, ... with 60, 120, 180, ...</p> <p>HCF of 36 &amp; 60 is <math>2 \times 2 \times 3</math> or 12</p> <p>Conclusion, e.g. 'this common factor of 12 is a factor of 180 so Jack is not correct (for this part of his statement)'</p>	<p>B1</p> <p>B1</p> <p>E1</p> <p>3</p>	<p>Must <u>check</u> 1<sup>st</sup> part of Jack's statement</p> <p>Depends on 2<sup>nd</sup> B1</p>
<p>10.(a) (i) At least 2 correct points found or plotted  Correct straight line shown  (ii) At least 2 correct points found or plotted  Correct straight line shown  (b) No AND a reason, e.g. 'they don't intersect (meet) at 90° (right angles)'</p>	<p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>E1</p> <p>5</p>	<p>Do not accept 'No they are not perpendicular'  FT provided one of their lines is correct  Also FT provided one of their lines is correct, but then the incorrect line happens to be perpendicular, then 'Yes' with the reason 'intersect at 90°'</p>
<p>11.(a) <math>3t - 3g = hf - ht</math>  <math>3t + ht = hf + 3g</math>  <math>t(3 + h) = hf + 3g</math>  <math>t = \frac{hf + 3g}{h + 3}</math></p> <p>(b)(i) <math>10n - 7</math>  (ii) <math>-10n + 60</math> or equivalent  (iii) <math>2n^2 + 6</math> or equivalent</p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B2</p> <p>B2</p> <p>B2</p> <p>10</p>	<p>Incorrect expansions is 1 error <b>FT until 2<sup>nd</sup> error</b>  Collection of t terms, or all negative  Factorise t  Division. Mark final answer</p> <p>B1 for sight of 10n  For B2 mark final answer. B1 for sight of -10n  For B2 mark final answer. B1 for sight of <math>2n^2</math> (or equivalent)</p>
<p>12.(a)(i) Correct sketch  (ii) Correct sketch  (b)(i) Correct sketch through (0,0)  (ii) Sketch of any vertical translation  Correct sketch with  either (0,3) stated or 3 indicated on the y-axis  (iii) Correct sketch through (0,0)</p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>6</p>	<p><i>Throughout this question mark intention in the 2 correct quadrants</i></p>
<p>13. <math>2x^2 + 7x - 8x - 28 + x^2 + x + 4</math> OR <math>2x^2 - x - 28 + x^2 + x + 4</math>  <math>3x^2 - 24 = 3(x^2 - 8)</math>, i.e. both steps shown</p>	<p>M2</p> <p>A1</p> <p>3</p>	<p>M1 if 1 slip or error  CAO</p>
<p>14.(a) <math>5 \times 10^3</math>  (b) <math>2.4 \times 10^9</math>  (c) <math>3.36 \times 10^8</math></p>	<p>B2</p> <p>B2</p> <p>B2</p> <p>6</p>	<p>B1 for <math>0.5 \times 10^4</math> or <math>\frac{1}{2} \times 10^4</math> or 5000  B1 for <math>24 \times 10^8</math> or 2 400 000 000  B1 for attempt to match addition of numbers, e.g. breaking down to <math>3.24 \times 10^7 \times 10</math> or alternative strategy, or sight of 336 000 000</p>
<p>15.(a) 60  (b) 324</p>	<p>B2</p> <p>B3</p> <p>5</p>	<p>B1 for sight of <math>\sqrt{5} \times \sqrt{5} = 5</math>  B2 for <math>(3\sqrt{2})^4</math> with an attempt to evaluate, <math>81 \times \dots</math> or <math>\dots \times 4</math>, OR <math>18 \times 18</math>  B1 for <math>(3\sqrt{2})^4</math> OR multiply pair brackets to 18</p>
<p>16.(a) <math>b = cd/a</math>  (b)(i) 90° or right angle  Reason 'tangent meets radius (at 90°)'  (ii) 2x  x</p>	<p>B2</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>6</p>	<p>B1 for <math>a \times b = c \times d</math>  May be indicated on the diagram</p>



<p>17.(a) Sight of 6, 12, 18 (as winning tickets) or realising there are 3 winning tickets Idea to calculate <math>P(\text{win}) \times P(\text{win})</math> <math>3/20 \times 2/19</math> <math>6/380 (=3/190)</math></p> <p>(b) Sight of 1, 2, 3, 6, 9, 18 or realising that there are 6 winning tickets Considers <math>P(\text{win}) \times P(\text{win})</math>, <math>P(\text{win}) \times P(\text{lose})</math>, <math>P(\text{lose}) \times P(\text{win})</math></p> <p><math>6/20 \times 5/19 + 6/20 \times 14/19 + 14/20 \times 6/19</math> <math>(30/380 + 84/380 + 84/380)</math> <math>198/380 (= 99/190)</math></p>	<p>B1</p> <p>S1</p> <p>M1</p> <p>A1</p> <p>B1</p> <p>S1</p> <p>M1</p> <p>A1</p> <p>8</p>	<p>Accept from incorrect replacement idea FT their 3 if clear that an attempt to find multiples of 6 ISW</p> <p>OR <math>1 - P(\text{not winning})</math>. Accept from incorrect replacement idea</p> <p>FT their factors, provided clearly shown at least 4 of them OR <math>1 - 14/20 \times 13/19 (= 1 - 182/380)</math> ISW</p>
<p>18.(a) <math>(x + 9)(x - 9)</math> <math>(2x - 5)(x + 9)</math> <math>\frac{x-9}{2x-5}</math></p> <p>(b)(i) <math>a = 6</math> <math>x^2 + 12x + 36</math> (-22) OR method to find b <math>b = -22</math></p> <p>(ii) <math>(x + 6)^2 - 22 = 0</math> <math>(x + 6)^2 = 22</math> <math>x + 6 = (\pm)\sqrt{22}</math> <math>x = \pm\sqrt{22} - 6</math></p>	<p>B1</p> <p>B2</p> <p>B1</p> <p>B1</p> <p>M1</p> <p>A1</p> <p>B1</p> <p>M1</p> <p>M1</p> <p>A1</p> <p>11</p>	<p>B1 for <math>(2x \dots 5)(x \dots 9)</math> FT if possible for similar level of difficulty Mark final answer, do not ISW</p> <p>Accept embedded answers Use of completing the square from (i), FT</p> <p>Must show <math>\pm</math></p>



5. 5 -3 6 - -6 = 12	B1 B1 B2  4	Award B1 for 6 OR -6 in the correct place, provided 1 <sup>st</sup> is positive AND 2 <sup>nd</sup> negative, with their correct answer given e.g. 6 - - 1 = 7 or 5 - - 6 = 11
6. (a) $x = 7$ (b) $x = 9$ (c) $5x = 35$ $x = 7$	B1 B1 B1 B1  4	Accept embedded answers throughout question  FT "their 35" $\div 5$ . If this leads to a whole number it must be correctly evaluated. Mark final answer.
7. For a trial that gives an area of $30 \text{ cm}^2$  For a trial that gives an area of $30 \text{ cm}^2$ and the value of the perimeter stated. (Length) 6(cm) and (width) 5(cm) (Perimeter =) 22 (cm)	B1  B1  B1 B1  4	Accept non-whole number trial eg $4 \times 7.5$ <i>Maybe seen on a diagram</i> Accept non-whole numbers with the correct perimeter  Accept (width) 6(cm) and (length) 5(cm)  1 by 30 62cm 2 by 15 34cm 3 by 10 26cm 5 by 6 22cm
8. (a) For all 4 correct as fractions that allows comparison  $7/12, 2/3, 3/4, 5/6$ or equivalent fractions (e.g. $7/12, 8/12, 9/12, 10/12$ )  (b) $390 \div 3$  .... $\times 5$ 650	M2  A1  M1  m1 A1 6	Award M1 for any two correct in a fraction that allows comparison  <i>If no marks awarded, award SC1 for correct order without using equivalent fractions</i>  Accept in either order $\times 5 \div 3$ . Award M1 for sight of 130 or 1950 CAO
9. (a) 7 AND 5 multiplied by 0.8 5.6 AND 4 (m) $5.6 \times 4$ $= 22.4$ $\text{m}^2$ (b) $35 \times 45 \times 20$ 31500 $31500 \div (100 \times 15)$ 21 (cm)	M1 A1 M1 A1 U1 M1 A1 M1 A1 A1 9	Accept equivalent in cm  Seen or implied FT their 5.6 AND 4 but not $7 \times 5$  Independent mark  Seen or implied in further calculations FT their 31500
10. (a) $(28416/38400) \times 100$ 74(%) (b) $766 + 766 \times 12/100$ OR $766 \times 1.12$ (£)857.92 (c) 2/5 or equivalent fraction	M1 A1 M1 A1 B1 5	Or equivalent full method  Or equivalent full method  CAO
11. (a) Enlargement scale factor 2 Correct position  (b) Correct reflection in $y = x$  (c) Correct translation  (d) Correct rotation	B2 B1  B2  B1  B2  8	B1 for any 3 lines correct, or consistent incorrect scale At least 2 points are needed to indicate the correct position B1 for a reflection in $y = -x$ , OR for sight of the line $y = x$  B1  B1 near miss, OR 90° clockwise rotation about (2, 1), OR 90° anticlockwise rotation about (1, 2)

<p>12. (a) <math>9x - 4 = 7x + 14</math>  <math>9x - 7x = 14 + 4</math> or <math>2x = 18</math>  <math>x = 9</math></p> <p>(b) <math>10x &gt; 40</math>  <math>x &gt; 4</math></p>	<p>B1  B1  B1  M1  A1</p> <p>5</p>	<p><i>FT until 2<sup>nd</sup> error</i></p> <p>No marks for use of "=", unless finally replaced to give <math>x &gt; 4</math> then award M1 A1.  SC1 for <math>x &gt; 5</math> from <math>10x &gt; 50</math>  OR sight of <math>9 \times 6 = 54</math> AND <math>9 \times 7 = 63</math></p>
<p>13. (a) <math>4.5 \times 12.4</math>  55.8 (cm<sup>2</sup>)</p> <p>(b) <math>x + x + 2 + 2x + 3x + 5 + 4x (= \dots)</math>  <math>11x + 7 = 95</math> or <math>11x = 88</math>  <math>x = 8</math></p>	<p>M1  A1  M1  m1  A1</p> <p>5</p>	<p>Accept 56(cm<sup>2</sup>) from correct working  For the expression with intention to sum the terms given</p> <p>CAO.  Unsupported <math>x=8</math> is awarded no marks</p>



<p>4(a) <math>x = 60 \times 5/8</math> <math>x = 37.5</math></p> <p>(b) <math>x = 1/4</math> or 0.25 or equivalent</p> <p>(c) <math>9x - 4 = 7x + 14</math> <math>9x - 7x = 14 + 4</math> or <math>2x = 18</math> <math>x = 9</math></p> <p>(d) <math>10x &gt; 40</math> <math>x &gt; 4</math></p> <p>(e) <math>x &gt; 60/9</math> or <math>x &gt; 6.6(666)</math> <math>7</math></p>	<p>B1 B1 B1 B1 B1 B1 M1 A1 M1 A1 10</p>	<p><i>FT until 2<sup>nd</sup> error</i> Accept 300/8 or equivalent. Mark final answer Accept 3/12. Mark final answer <i>FT until 2<sup>nd</sup> error</i></p> <p>No marks for use of “=”, unless finally replaced to give <math>x &gt; 4</math> then award M1 A1. SC1 for <math>x &gt; 5</math> from <math>10x &gt; 50</math> OR sight of <math>9 \times 6 = 54</math> AND <math>9 \times 7 = 63</math> Do not accept final answer of <math>(x) &gt; 7</math>. Do not penalise use of ‘=’ if 7 is given as a final response, award M1, A1</p>
<p>5(a) <math>4.5 \times 12.4</math> <math>55.8 \text{ (cm}^2\text{)}</math></p> <p>(b) <math>34.6 = \pi \times r^2</math> <math>r^2 = 34.6/\pi</math> <math>r = 3.3(186\dots \text{ cm})</math></p> <p>(c) <math>x + x + 2 + 2x + 3x + 5 + 4x (= \dots)</math> <math>11x + 7 = 95</math> or <math>11x = 88</math> <math>x = 8</math></p>	<p>M1 A1 M1 A1 A1 M1 m1 A1 8</p>	<p>Accept <math>56 \text{ (cm}^2\text{)}</math> from correct working</p> <p>Accept 3(cm) or 3.3(cm) from correct rearrangement For the expression with intention to sum the terms given</p> <p>CAO. Unsupported <math>x=8</math> is awarded no marks</p>
<p>6(a) 4.4</p> <p>(b) <math>637 \text{ (} \times \dots\text{)}</math> <math>(\dots \times) 3192</math> <math>= 2033304</math></p>	<p>B2 B1 B1 B1 5</p>	<p>B1 for 4.38(13...) or 4.3</p> <p>FT correct evaluation of product from 1 correct value <i>If no marks then SC1 for interpretation of ‘product’ and ‘of’ e.g. by sight of <math>2 \frac{1}{3} \times 273 \times 4 \frac{1}{5} \times 760</math></i></p>
<p>7. Strategy: use of Pythagoras’ Theorem <b>and</b> <math>C = \pi d</math> or <math>C = 2\pi r</math></p> <p><math>h^2 = 4.2^2 + 4.2^2</math> <math>h = \sqrt{35.28}</math> diameter = 5.9(39...cm) or radius = 2.9698...(cm)</p> <p><math>C = \pi \times 5.939\dots</math> OR <math>C = 2 \times \pi \times 2.9698\dots</math>  18.5 (cm) to 18.7(cm)</p>	<p>S1 M1 A1 A1 m1 A1 6</p>	<p>OR alternative full correct strategy</p> <p>OR alternative <u>complete</u> method</p> <p>Accept diameter = 6(cm) or radius = 3(cm), do not accept radius = 2.9. Clarification of diameter or radius may be implied in further work, penalise here with A0, then FT</p> <p>FT their radius or diameter as appropriate provided M1 awarded, including use of <math>r = 5.9(39\dots)</math> (<math>r = 5.9(39\dots)</math>) leads to 37(. 4..cm)</p>
<p>8(a) Method to clear fractions, all 3 terms <math>3(3x - 1) - 4(x + 6) = 3 \times 6</math></p> <p><math>9x - 3 - 4x - 24 = 18</math> OR <math>5x - 27 = 18</math> OR <math>5x = 45</math> <math>x = 9</math></p> <p>(b) <math>\sin x = 28.7/34.2</math> <math>57(.0537\dots^\circ)</math> or <math>57(.1^\circ)</math></p> <p>(c) <math>1.5 \times 10^{11}</math></p>	<p>M2 A1 A1 M1 A2 B2 9</p>	<p>Intention, i.e. brackets may be missing M1 for clearing fractions 2 terms Fractions must be cleared before M marks can be awarded, not for quotients FT from M1 or M2 FT provided M1 awarded <i>If no marks SC1 sight of <math>(5x - 27)/12</math></i></p> <p>A1 for <math>x = \sin^{-1} 0.839(181\dots)</math> B1 for <math>1.54(347\dots) \times 10^{11}</math></p>
<p>9. (x =) <math>8.4 \times 6/5</math> <math>= 10(.08 \text{ cm})</math> or <math>10.1 \text{ (cm)}</math></p> <p>(y =) <math>4.32 / 6/5</math> or (y =) <math>4.32 \times 5/6</math> <math>= 3.6 \text{ (cm)}</math></p>	<p>M1 A1 M1 A1 4</p>	<p>Or equivalent calculation that could lead to correct answer Or equivalent calculation that could lead to correct answer</p>

<p>10.(a) Any two points correct, with no incorrect points</p> <p>Correct straight line drawn from ( but not beyond) (30,40) inclusive to (0,10) exclusive (b) Explanation of implied NO, e.g. ‘not possible to have a rectangle with zero lengths’</p>	<p>M2</p> <p>A1</p> <p>E1</p> <p>4</p>	<p>Accept (0, 10) as one of the points with 1 other point, provided no other incorrect points plotted M1 any one point correct provided no incorrect points plotted, do not accept (0, 10), OR M1 for any 2 correct points not including (0,10)</p> <p>Accept indication for lots and lots of points between. Accept to (0, 10) but not beyond</p>								
<p>11(a) Two <b>different</b> corresponding sides and an included angle indicated. (b) Right angle, hypotenuse and a corresponding <b>different</b> side indicated OR Right angle, hypotenuse and a corresponding <b>different</b> angle indicated</p>	<p>B2</p> <p>B2</p> <p>4</p>	<p>B1 Two corresponding sides not marked as different and the included angle indicated B1 Right angle, hypotenuse and a corresponding different length indicated but not marked as different B1 Right angle, hypotenuse and a corresponding angle indicated but angles not marked as different, or Right angle, hypotenuse &amp; the both of 2 corresponding sides marked differently as appropriate <i>Accept right angles indicated either as 90° or <math>\square</math> at vertex</i></p>								
<p>12.</p> <table border="1" data-bbox="312 719 627 797"> <thead> <tr> <th rowspan="2">Amount</th> <th colspan="2">After a decrease of</th> </tr> <tr> <th>40%</th> <th>2%</th> </tr> </thead> <tbody> <tr> <td>£820</td> <td>£492</td> <td>£803.6(0)</td> </tr> </tbody> </table>	Amount	After a decrease of		40%	2%	£820	£492	£803.6(0)	<p>B4</p> <p>4</p>	<p>B3 for 820, or B2 for <math>492 \times 100/60</math>, or B1 for ‘60% is 492’, or B1 for <math>0.98 \times</math> ‘their 820’ correctly evaluated to nearest penny or unrounded</p>
Amount		After a decrease of								
	40%	2%								
£820	£492	£803.6(0)								
<p>13.</p> <p>(a) <math>-7x + 10y</math> (b)(i) <math>-6x - 3y</math> or factorised equivalent (ii) <math>-6x + 7y</math></p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>3</p>	<p>Mark final answer in each part</p> <p>FT (b)(i) + 10y simplified correctly If (i) and (ii) both correct but left in unsimplified form allow SC1</p>								
<p>14. Strategy: Use of <math>\frac{1}{2} ab \sin C</math> and cosine rule <math>42.8 = \frac{1}{2} \times BC \times 17.8 \times \sin 34</math> <math>BC = 8.59987\dots</math> <math>AB^2 = BC^2 + 17.8^2 - 2 \times BC \times 17.8 \times \cos 34</math> <math>AB^2 = 136.98\dots</math> <math>AB = 11.7(\dots \text{ cm})</math></p>	<p>S1</p> <p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>A1</p> <p>6</p>	<p>Or equivalent full strategy</p> <p>FT their BC, but not as 17.8</p> <p>Accept 12(cm) from correct working. CAO</p> <p><i>Alternative:</i> <i>S1 complete strategy, e.g. with perpendicular with appropriate trigonometry for both triangles</i> <i>M1, A1 for the RHS triangle</i> <i>M1, A1, A1 for the LHS triangle</i></p>								
<p>15. Volume sphere = <math>4 \times \pi \times 6.7^3 / 3</math> (=1259(.833 cm<sup>3</sup>)) Volume cone = <math>\pi \times r^2 \times 10.4 / 3</math> <math>r^2 = \frac{\text{Volume sphere} \times 3}{\pi \times 10.4}</math>  <math>r^2 = 115.678\dots</math> <math>r = 10.8(\text{cm})</math></p>	<p>B1</p> <p>B1</p> <p>M1</p> <p>A1</p> <p>A1</p> <p>5</p>	<p>FT their volume sphere provided dimensions cm<sup>3</sup> for M1 only Or equivalent rearrangement to isolate r<sup>2</sup></p> <p>CAO. Must be to 1d.p.</p> <p><i>Alternatively:</i> <math>4/3 \times \pi \times R^3 = 1/3 \times \pi \times r^2 \times h</math> B1 <math>4 \times R^3 = r^2 \times h</math> B1 <math>4 \times 6.7^3 = r^2 \times 10.4</math> M1 <math>r^2 = 115.678\dots</math> A1 <math>r = 10.8(\text{cm})</math> A1 CAO</p>								







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