



# **GCSE MARKING SCHEME**

## **APPLICATIONS 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 APPLICATIONS 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.



<p>4. (a) <math>2/3 \times 8652</math> = 5768 (b) <math>4120/8</math> (=515) 2575 (c) Correct explanation</p>	<p>M1 A1 M1 A1 E1  5</p>	<p>Eg. “because 8652 rounded to the nearest 1000 is 9000” or “because this is a good estimate” or “it’s about 9000”</p>															
<p>5.</p> <table border="1" data-bbox="114 371 719 674"> <thead> <tr> <th>Event</th> <th>Probability</th> </tr> </thead> <tbody> <tr> <td>A. Getting a head on a single throw of a coin.</td> <td><math>1/2</math></td> </tr> <tr> <td>B. Rolling a 4 on a single roll of an ordinary dice.</td> <td><math>1/6</math></td> </tr> <tr> <td>C. Choosing Friday when selecting a day at random from the days of the week.</td> <td><math>1/7</math></td> </tr> <tr> <td>D. Choosing a letter <i>t</i> when selecting a letter at random from the word <i>stamp</i>.</td> <td><math>1/5</math></td> </tr> </tbody> </table> <p>C B D A</p>	Event	Probability	A. Getting a head on a single throw of a coin.	$1/2$	B. Rolling a 4 on a single roll of an ordinary dice.	$1/6$	C. Choosing Friday when selecting a day at random from the days of the week.	$1/7$	D. Choosing a letter <i>t</i> when selecting a letter at random from the word <i>stamp</i> .	$1/5$	<p>B2          B1  3</p>	<p>Accept equivalent percentages or decimals <i>(Do not accept words used to describe probabilities)</i></p> <p>Award B1 if 2 or 3 are correct Penalise -1 once only for consistent use of incorrect notation</p> <p>Accept probabilities to represent the events (<math>1/7</math>, <math>1/6</math>, <math>1/5</math>, <math>1/2</math>) FT their probabilities</p>					
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A. Getting a head on a single throw of a coin.	$1/2$																
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<p>6. (a) (i) Correctly labelled axes and uniform scales used</p> <p>Points plotted <b>Correct</b> graph drawn with points joined with straight lines (ii) Explanation of graph given</p> <p>(b) Adding numbers (= 92)</p> <p><math>92 \div 8</math> Mean = 11.5 (mph) Put in order 3, 5, 10, 11, 14, 15, 15, 19 Median = 12.5 (mph) Mode = 15 (mph) Range = 16 (mph)</p>	<p>B2   P1 L1 E1   M1  m1 A1 M1 A1 B1 B1 12</p>	<p>Award B1 for either both axes labelled correctly or uniform scales on both axes or one axis labelled correctly with a uniform scale. Penalise -1 if axes are reversed.</p> <p>Allow 1 error CAO. Accept solid or dotted lines Eg. The wind speed increases through the morning (and dies down slightly after 1500.) Accept partial explanations.</p> <p>Attempt to add numbers. Accept sight of values from 73 – 111 as evidence of attempting to add FT ‘their 92’ CAO Sight of 11 and 14 only would gain M1</p>															
<p>7.</p> <table border="1" data-bbox="114 1256 699 1599"> <thead> <tr> <th>Person</th> <th>Could donate blood today? Yes or No</th> <th>Reason</th> </tr> </thead> <tbody> <tr> <td>Charlotte</td> <td>Yes</td> <td>(Meets all requirements)</td> </tr> <tr> <td>Aaron</td> <td>No</td> <td>Is over age limit</td> </tr> <tr> <td>Sian</td> <td>No</td> <td>Is under weight</td> </tr> <tr> <td>Alun</td> <td>No</td> <td>Gave blood less than 16 wks ago</td> </tr> </tbody> </table>	Person	Could donate blood today? Yes or No	Reason	Charlotte	Yes	(Meets all requirements)	Aaron	No	Is over age limit	Sian	No	Is under weight	Alun	No	Gave blood less than 16 wks ago	<p>B4          4</p>	<p>Award B1 for each correct response AND valid reason. If Charlotte ‘Yes’ accept blank space for reason</p> <p>Aaron is 66. Accept ‘age’.</p> <p>Sian weighs 48kg. Accept ‘weight’.</p> <p>14 weeks since last gave blood or too soon to give blood. Accept ‘time’ (since last donation)</p>
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<p>8. (a) Derek (b) Petra <b>and</b> reason (c) (i) Uniform scale on kilometre axis Plotting at least two correct points <b>Correct</b> straight line through points (ii) Full explanation given</p> <p>Approximately 112 (km)</p>	<p>B1 E1 B1 P1 L1 E1  B1 7</p>	<p>Accept reason implying Petra, e.g. Petra because graph goes flat</p> <p>Eg use of graph or arithmetic method, eg “he could find what 35 miles is in km and then double it”. FT their graph Accept answers in the range 110 – 113(km)</p>															

<p>9.(a) <math>223(^{\circ}) \pm 2^{\circ}</math>  (b) Indication of bearing from Palma <math>073^{\circ} \pm 2^{\circ}</math>  Indication of bearing from Alcudia <math>130^{\circ} \pm 2^{\circ}</math>  Arta indicated (by a cross or name) on the map</p> <p>(c) 108  72  <math>180 = 90 + z + 72</math>, or <math>z = x - 90</math>, or <math>z = 90 - y</math>, or equivalent  18</p>	<p>B1  B1  B1  B1</p> <p>B1  B1  M1  A1  11</p>	<p>FT provided at least one correct bearing and Arta is on land</p> <p>FT <math>y = 180 - x</math>  Provided <math>x</math> is obtuse and <math>y</math> is acute, and neither is <math>90^{\circ}</math>  CAO</p>
<p>10.(a) Value between 3 (metres) and 5 (metres) inclusive  (b) Circle (intention) with radius <math>4 \text{ cm} \pm 2\text{mm}</math> drawn</p>	<p>B1  B2</p> <p>3</p>	<p>Accept a suitable sketch where clearly the branches are drawn to scale of <math>4\text{cm} \pm 2\text{mm}</math>  Many branches (covering much of the region) shown within tolerance is sufficient – circumference may not be shown  B1 for circle with radius other than <math>4\text{cm} \pm 2\text{mm}</math>, or suitable sketch with overall idea of <math>4\text{cm} \pm 2\text{mm}</math> radius, or a few branches shown within the tolerance</p>
<p>11. (a) 5.5 (metres)  (b) Intention to read horizontal scale for depth of 3m filling  36 (minutes)  (c)(i) Use of the 5 hour period  Looking 3 hours into the period or equivalent  Depth is 6(m), or statement that the tank is full  (ii) Strategy to work out how many hours between 0700 Monday and a time on Friday  96 hours to 0700 Friday or 108 hours to 1900 Friday or another correct number of hours from 0700 Monday to a time on Friday</p> <p>Interpretation of a stop time, e.g. ‘3 hours into the process’, or ‘2 more hours’  (Finish time for process is ) 21(:)00 or 9pm</p>	<p>B1  M1  A1  S1  B1  E1  S1</p> <p>B1</p> <p>B1  B1</p> <p>10</p>	<p>Accept answers in the range 5.4 to 5.6 inclusive</p> <p>e.g. ‘2 cycles and 3 hours’  Accept e.g. ‘ready for emptying into tanker’, etc</p> <p>e.g. 0700 Mon to 0700 Friday, 4 lots of 24 hours  OR working with multiples of 5 hours, or other suitable multiples of hours</p> <p>Allow from 1 slip in adding on time.  Or other appropriate correct statement  CAO. Or other appropriate correct statement  Final B1 implies previous B1  Award all 4 marks for a response of 2100 only if no incorrect working seen, i.e. not a lucky correct answer</p> <p><i>If no marks, award SC1 for an answer of 2200 (10pm) by starting at 0700 each day</i></p>

## UNIT 1 (HIGHER TIER)

Applications Unit 1 June 2013 Higher Tier		Final
<p>1.(a) 9cm, 8cm and 5cm lines in correct orientation</p> <p><math>60^\circ \pm 2^\circ</math> constructed using the appropriate arcs</p> <p><math>90^\circ \pm 2^\circ</math> by appropriate compasses construction</p>	<p>B1</p> <p>B2</p> <p>B2</p> <p>5</p>	<p><math>\pm 2\text{mm}</math> on all lengths <i>No arcs no marks!</i></p> <p>B1 for appropriate arcs but angle slightly outside the tolerance, or for at least one arc correct with the other slightly outside of tolerance together with angle attempted, or for full method clearly attempted</p> <p>B1 for appropriate arcs but angle slightly outside the tolerance, or for full method clearly attempted</p> <p>If no construction arcs shown, then B0 apart from first B1 for the lengths</p>
<p>2.(a) <math>223^\circ \pm 2^\circ</math></p> <p>(b) Indication of bearing from Palma <math>073^\circ \pm 2^\circ</math> Indication of bearing from Alcudia <math>130^\circ \pm 2^\circ</math> Arta indicated (by a cross or name) on the map</p> <p>(c) <math>6\text{ cm} \pm 2\text{ mm}</math> measured <math>54 \div 6</math> or <math>9</math> (km) or <math>1\text{cm} : 9(\text{km})</math> <math>(1\text{cm} : ) 9000</math> (m)</p> <p>(d) 108 72 <math>180 = 90 + z + 72</math>, or <math>z = x - 90</math>, or <math>z = 90 - y</math>, or equivalent 18</p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>M1</p> <p>A1</p> <p>B1</p> <p>B1</p> <p>M1</p> <p>A1</p> <p>11</p>	<p>FT provided at least one correct bearing and Arta is on land</p> <p>FT <math>54 \div</math> 'their 6'. Accept method with incorrect place value</p> <p>FT <math>y = 180 - x</math> Provided <math>x</math> is obtuse and <math>y</math> is acute, and neither is <math>90^\circ</math> CAO</p>
<p>3(a) Value between 3 (metres) and 5 (metres) inclusive</p> <p>(b) Circle (intention) with radius <math>4\text{ cm} \pm 2\text{mm}</math> drawn</p>	<p>B1</p> <p>B2</p> <p>3</p>	<p>Accept a suitable sketch where clearly the branches are drawn to scale of <math>4\text{cm} \pm 2\text{mm}</math></p> <p>Many branches (covering much of the region) shown within tolerance is sufficient – circumference may not be shown</p> <p>B1 for circle with radius other than <math>4\text{cm} \pm 2\text{mm}</math>, or suitable sketch with overall idea of <math>4\text{cm} \pm 2\text{mm}</math> radius, or a few branches shown within the tolerance</p>
<p>4(a) 8 mm</p> <p>(b) (i) Method, e.g. increase in L / increase in W  e.g. <math>12/150 (= 0.08)</math></p> <p>(ii) Full explanation, e.g. 'rate of change length with weight', 'for every 1g increase 0.08mm increase'</p> <p>(c) Explanation, e.g. 'no more data recorded', 'spring snaps', 'broken spring', 'spring now completely straight', etc</p> <p>(d) <math>L = 2W + 35</math></p>	<p>B2</p> <p>M1</p> <p>A1</p> <p>E2</p> <p>E1</p> <p>B3</p> <p>10</p>	<p>B1 for an answer of 8, or for an answer between 6 and 9 inclusive (excluding 8) with mm given Or idea of alternative complete method Accept sight of quotient based on misread of the scale for M1 only. Or alternative complete method with accurate values Mark final answer.</p> <p>E1 for mention of 'rate of change' without being specific, e.g. '1g gives 0.08mm'. Allow 'length increases as weight increases' for E1 only</p> <p>B2 for either of 2 or 35 correctly placed, or B1 for a correct interpretation of data given, e.g. sketch shows start (0,35) and end (100, 235)</p>
<p>5(a) <math>210 \div 30 (=7)</math> 14, 56, 140 in this order</p> <p>(b) <math>T = 15x</math></p> <p>(c) <math>8P/30 (= 4P/15)</math></p>	<p>M1</p> <p>A2</p> <p>B3</p> <p>B2</p> <p>8</p>	<p>OR using <math>1:4:10</math> to find <math>210 \div 15 (=14)</math></p> <p>A1 for any one answer correct, or for 14, 56 and 140 in an incorrect order</p> <p>B2 for <math>(T=) x + 4x + 10x</math>, or B1 for sight of <math>4x</math> or <math>10x</math> OR 4 and 10</p> <p>Mark final answer. B1 for <math>8/30</math> or <math>P \div 30</math> or <math>P/30</math> or from simplified ratio <math>P \div 15</math> or <math>P/15</math> <i>If no marks, SCI for sight of 'P = 3.75 × variable' or equivalent</i></p>
<p>6.A uniform scale used (shown) at least 30 to 140 with idea of box-and-whisker plot AND with label '£'</p> <p>Range of whiskers correct</p> <p>Lower and upper quartiles used as ends of the box</p> <p>Median shown correctly within the box</p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>4</p>	<p>Award B4 for a correct response</p>

<p>7(a) 5.5 (metres)  (b) Intention to read horizontal scale for depth of 3m filling  36 (minutes)  (c)(i) Use of the 5 hour period  Looking 3 hours into the period or equivalent  Depth is 6(m), or statement that the tank is full  (ii) Strategy to work out how many hours between 0700  Monday and a time on Friday  96 hours to 0700 Friday or 108 hours to 1900 Friday or another  correct number of hours from 0700 Monday to a time on Friday</p> <p>Interpretation of a stop time, e.g. ‘3 hours into the process’, or  ‘2 more hours’  (Finish time for process is ) 21(:)00 or 9pm</p> <p>Look for</p> <ul style="list-style-type: none"> <li>relevance</li> <li>spelling</li> <li>clarity/flow of text explanations</li> </ul> <p>QWC2: Candidates will be expected to</p> <ul style="list-style-type: none"> <li>present work clearly, with words explaining choices</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 explaining choices</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>B1  M1  A1  S1  B1  E1  S1  B1  B1  QWC  2  12</p>	<p>Accept answers in the range 5.4 to 5.6 inclusive</p> <p>e.g. ‘2 cycles and 3 hours’  Accept e.g. ‘ready for emptying into tanker’, etc</p> <p>e.g. 0700 Mon to 0700 Friday, 4 lots of 24 hours  OR working with multiples of 5 hours, or other suitable  multiples of hours</p> <p>Allow from 1 slip in adding on time.  Or other appropriate correct statement</p> <p>CAO. Or other appropriate correct statement  Final B1 implies previous B1  Award all 4 marks for a response of 2100 only if no incorrect  working seen, i.e. not a lucky correct answer</p> <p><i>If no marks, award SC1 for an answer of 2200 (10pm) by  starting at 0700 each day</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  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>8(a) The last reading (0.44)  E.G. “more potatoes” checked  (b) Use of 0.4 or sight of 40  <math>40 \times 0.15</math> or equivalent  (£) 6 or 600(p)  (c) 0.44  <math>\times 900 \times (0.0)2</math>  792(p) or (£)7.92  <math>9 \times 4.5(0)</math>  (£)40.5(0)  (£)32.58 or 3258(p)</p>	<p>M1  A1  B1  M1  A1  B1  M1  A1  M1  A1  B1  11</p>	<p>Not from an incorrect calculation</p> <p>Ignore incorrect place value  Accept 600 without units but not with incorrect unit  CAO. Not from an incorrect method  FT ‘their 0.44’ or (a), provided within the range 0.36 to 0.52  inclusive, excluding 0.5  Ignore incorrect place value  FT from M1</p> <p>CAO</p>
<p>9(a) <math>3.40 \times 10^3</math> and <math>3.39 \times 10^3</math>  (b) <math>4.87 \times 10^{24} \div 3.30 \times 10^{23}</math>  = 14.7575.....  15  (c)(i) Explanation, e.g. ‘First table 3 sig. figs. and 2<sup>nd</sup> table 2 sig  figs’, or ..  (ii) <math>6.42 \times 10^{23} - 6.4 \times 10^{23}</math>  = <math>2.(0) \times 10^{21}</math></p>	<p>B3  M1  A1  A1  E2  M1  A1  10</p>	<p>Do not accept <math>3.4 \times 10^3</math> for <math>3.40 \times 10^3</math>  B2 for either answer correct, OR  B1 for <math>3.397 \times 10^3</math> or <math>3.4 \times 10^3</math> <u>and</u> <math>3.394 \times 10^3</math>, or 3400 and  3390  MR-1 if data used from the other website, which leads to 15  from 14.8484...</p> <p>E1 for mention of significant figures but no accuracy stated, e.g.  ‘one is more accurate than the other’  Do not accept reference to decimal places, e.g. 2 or 3 d.p.  Allow M1 for an answer of <math>0.02 \times 10^{23}</math> or equivalent</p>

<p>10(a) <math>2^{-3}</math>  (b) <math>2^{0.12}</math>  (c) <math>2^9</math></p>	<p>B1  B1  B2</p> <p>4</p>	<p>Accept <math>2^{12/100}</math> or equivalent  B1 for sight of <math>8^{12/4}</math> or <math>8^{1/4 \times 12}</math> or <math>8^3</math> or <math>(2^3)^3</math> or <math>(2^3)^{1/4 \times 12}</math> or equivalent  If a candidate writes only the index, penalise -1 once only on the first occasion</p>
<p>11. Idea to find 4 areas of strip width <math>\frac{1}{2}</math> hour</p> <p><math>2 + 4.75 + 5 + 4</math></p> <p>15.75</p> <p>km</p>	<p>B1</p> <p>M2</p> <p>A1</p> <p>U1</p> <p>5</p>	<p>M1 for any 2 of the 4 areas correct, or '2 of their areas' correctly evaluated from an incorrect interpretation of the scale or of the <math>\frac{1}{2}</math> strip requirement, e.g. use of 4 or 30 for the horizontal  Other A marks are included by sight of 15.75  Only award A1 for correct calculation based on 4 strips to 14:00  Independent mark.  Accept other units from appropriate calculations</p>
<p>12(a) Entries in frequency table: 32 and 28  Histogram: 12 to 16 f.d. <b>10</b>, 20 to 30 f.d. <b>2</b>  (b) 8 (light bulbs)  (c) Identifying that the answer is in the range <math>&gt;8</math> and <math>\leq 12</math></p> <p>Realise need 8 of the 32 (<math>8 &lt; t \leq 12</math>)  or <math>\frac{1}{4}</math> of the entry for <math>8 &lt; t \leq 12</math></p> <p>(y =) 9 or 9 hundred hours or equivalent</p>	<p>B2</p> <p>B2</p> <p>B1</p> <p>M1</p> <p>M1</p> <p>A1</p> <p>8</p>	<p>B1 for each correct entry  B1 for each correct bar</p> <p>Maybe shown on the histogram. FT from their 32 entry, provided it is <math>&gt;8</math>  Maybe shown on the histogram. FT from their 32 entry, provided it is <math>&gt;8</math></p> <p>CAO</p>
<p>13(a) Suitable strategy to find b, e.g. attempt to sketch or by some substitution  Either <math>0 = -5^2 + b \times 5</math> or <math>6.25 = -2.5^2 + b \times 2.5</math>  <math>b = 5</math>  <math>y = -x^2 + 5x</math>  (b) Method to find c, e.g. <math>0 = -6^2 + c \times 6</math>  <math>c = 6</math>  Use <math>y = -x^2 + 6x</math> when <math>x = 3</math>  (Max height found) <math>y = 9</math> (metres)  Correct sketch with the 3(m across to max ht.) and 9(m height)</p>	<p>S1</p> <p>M1</p> <p>A1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>B1</p> <p>9</p>	<p>Accept substitution with use of at least one of the values given but with incorrect interpretation  Accept interpretation of <math>-x^2</math> as <math>(-x)^2</math> for M1 only</p> <p>FT their b provided M1 awarded</p> <p>Do not award previous 4 marks for a correct sketch based on spurious or incorrect working.</p>





<p>3.</p> <p>Identifying/sight of when Chloe can(/cannot) go Identifying/sight of when Gethin can go</p> <p>Identifying /sight of when Martyn can(/cannot) go</p> <p>Identifying common dates – 23<sup>rd</sup> Feb, 23<sup>rd</sup> &amp; 30<sup>th</sup> March, 22<sup>nd</sup> &amp; 29<sup>th</sup> June Latest date = 29<sup>th</sup> June</p>	<p>B1 B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>5</p>	<p><i>Look at calendar for indication throughout the question</i> e.g. Sept, Oct, Nov, Dec crossed out Look for focus on Sundays</p> <p>(26<sup>th</sup> Jan), 23<sup>rd</sup> Feb, 23<sup>rd</sup> &amp; 30<sup>th</sup> March, 27<sup>th</sup> April, 25<sup>th</sup> May, 22<sup>nd</sup> &amp; 29<sup>th</sup> June, 27<sup>th</sup> July, 24<sup>th</sup> &amp; 31<sup>st</sup> Aug, 28<sup>th</sup> Sept, 26<sup>th</sup> Oct, (23<sup>rd</sup> Nov &amp; 28<sup>th</sup> Dec)</p> <p>Sight of common dates triggers 1<sup>st</sup> 4 marks</p> <p>Award full marks for an unsupported correct answer</p>
<p>4. (Perimeter=) <math>12 + 9 + 12 + 9</math> = 42 (m)</p> <p>Number of panels (<math>42 \div 3 =</math>) 14 Cost <math>14 \times (\pounds)21.98</math> (<p>(<math>\pounds</math>)307.72</p></p>	<p>M1 A1</p> <p>B1 M1 A1</p> <p>5</p>	<p>FT their perimeter FT their number of panels</p> <p><i>Alternative method: dividing by 3 to get no.of panels on 1 side</i>    B1 <math>4 + 3 + 4 + 3</math>    M1 (Number of panels = )14    A1 Cost <math>14 \times (\pounds)21.98</math>    M1 (<math>\pounds</math>)307.72    A1</p> <p>Award SC3 for unsupported answer of (<math>\pounds</math>)153.86</p>
<p>5. A = 14 B = 15 2C = 12 C = 6</p>	<p>B1 B1 M1 A1 4</p>	

<p>6. (a) (Cost of Adults=) <math>2 \times 498</math> (£)996 (Cost of children=) <math>2 \times 219</math> (£)438 Sea View <math>4 \times 4 \times 7</math> or All Inclusive <math>4 \times 25 \times 7</math> (£)112 (£)700 (Total cost=) (£)2246</p> <p>Look for</p> <ul style="list-style-type: none"> <li>• spelling</li> <li>• clarity of labels</li> <li>• the use of notation (watch for the use '=' '£' 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 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 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 in their final answer</li> </ul> <p>(b) 3 or 4 angles correct and correctly labelled.</p> <p>3 or 4 angles correct, labels not fully correct. 2 angles correct and correctly labelled. 2 angles correct, labels not fully correct. 1 angle correct and correctly labelled.</p> <p>OR</p> <p><u>If 0 OR 1 for their diagram or no diagram.</u></p> <p>360/240</p> <p>Angles are 93, 81, 60, 126.</p> <p>(c) 93.4(%)</p>	<p>M1 A1 M1 A1 M1 A1 A1 A1 B1</p> <p>Q W C 2</p> <p>B4 OR (B3) (B2) (B1) (B1)</p> <p>(M1)</p> <p>(A1)</p> <p>B2 16</p>	<p><i>Penalise any <u>consistent</u> misreads of dates and number of children -1 each</i></p> <p>FT provided at least 2 M1 marks awarded <i>An answer of £1550 gets M1 A1 M1 A1 M0 A0 B1</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 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>Use the correct overlay and allow <math>\pm 2^\circ</math>. Correct labels (Words NOT the frequency OR angle)</p> <p>3 correct labels are enough.</p> <p>If only B1 is scored for the diagram and all the angles given correctly, then cancel the B1 and award M1, A1 for 2 marks.</p> <p>If B0 scored for the diagram, check the angles and the method to see if the M1 and the A1 can be awarded. (1 is) <math>1.5^\circ</math> gets the M1 OR SC1 for all the correct percentages 25.8%, 22.5%, 16.7%, 35%.</p> <p>Award B1 for 93.(38235....).</p>
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<p>5(a) All three stages of the appropriate calculation  <math>560 \times (4.55 \div 37.8) \times 1.48</math></p> <p>(£)99.76</p> <p>Look for</p> <ul style="list-style-type: none"> <li>• spelling</li> <li>• clarity</li> <li>• the use of notation (watch for the use of '=', £, 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>(b)(i) <math>560 / 10.75</math> or <math>560 / 10 \frac{3}{4}</math>  52(.093 mph)</p> <p>(ii) C selected or implied with a reason, e.g. 'C because 52mph average means travels fast'</p>	<p>M3</p> <p>A2</p> <p>QWC 2</p> <p>M2</p> <p>A1</p> <p>E1</p> <p>11</p>	<p>M2 for sight of <math>560 \times 4.55 \div 37.8</math>, OR  M1 for sight of <math>560 \div 37.8, 4.55 \div 37.8, 37.8 \div 4.55</math>, or <math>4.55 \times 1.48</math></p> <p><i>Note:</i>  <math>560 \div 37.8</math> (= 14.814814... gallons)  <math>\times 4.55</math> (= 67.407... litres)  Use of 14.8 gives 67.34, use of 15 gives 68.25</p> <p>Depend s on M3  A1 for (£)99.7629.. or 99.6632 or 101.01 or other amount from premature approximation</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>M1 for 560/10.45 or 560/675 or 560/645  CAO  Only FT provided their answer in <math>70 \geq (b)(i) \geq 50</math></p>												
<p>6(a) <math>0.5 \times 6 \times 8 \times 130</math></p> <p>3120 (cm<sup>3</sup>)</p> <p>(b) Greater (by) 120 (cm<sup>3</sup>)</p>	<p>M2</p> <p>A1</p> <p>B1</p> <p>4</p>	<p>M1 for <math>0.5 \times 6 \times 8 \times 1.3(0)</math> or for <math>\frac{1}{2} \times 6 \times 8 \times</math> 'digits 13 with incorrect place value'  Do not accept <math>0.5 \times 6 \times 8 \times 10</math> as area cross section  CAO  FT difference between 'their 3120' and 3000 correctly evaluated with appropriate statement of greater or less</p>												
<p>7(a)</p> <table border="1" data-bbox="263 1547 655 1637"> <thead> <tr> <th></th> <th>Median</th> <th>Range</th> <th>Mode</th> </tr> </thead> <tbody> <tr> <td>Internet</td> <td>4</td> <td>39</td> <td>2</td> </tr> <tr> <td>Town</td> <td>16</td> <td>20</td> <td>14</td> </tr> </tbody> </table> <p>(b) Statement, e.g 'not typical', 'the town centre shops are actually in need of more help rather than the internet businesses', 'mode for businesses is actually only twice'</p>		Median	Range	Mode	Internet	4	39	2	Town	16	20	14	<p>B3</p> <p>E1</p> <p>4</p>	<p>B2 for 4 or 5 correct entries  B1 for 2 or 3 correct entries</p>
	Median	Range	Mode											
Internet	4	39	2											
Town	16	20	14											

<p>8(a) Method to calculate costs, e.g. 14 portions is <math>2(.19 + 14 \times (0.)12</math> or equivalent calculation in pence</p> <p>(Cost of making 14 portions) (£)3.87</p> <p>(Sales from 9 bowls of soup = ) <math>9 \times 2.95</math> (= £26.55)</p> <p>(Profit) (£)22.68</p> <p>(% profit = ) <math>\frac{22.68}{\text{'their costs'}}</math> <math>\times 100</math> 586(.046%)</p> <p>(b) <math>(x - 1) \times 1.6 + 13.4 = 35.8</math> OR <math>x = \frac{35.8 - 13.4}{1.6} + 1</math></p> <p>15 (cartons)</p> <p>(c) <math>2c + 4.5s = 3(.69</math> and <math>5c + 7.5s = 6(.90</math></p> <p>Method to solve, e.g. equal coefficients</p> <p>Correct first value Method to find the second variable Correct second value</p>	<p>M1</p> <p>A1</p> <p>M1</p> <p>B1</p> <p>M1</p> <p>A1</p> <p>M2</p> <p>A1</p> <p>B2</p> <p>M1</p> <p>A1</p> <p>m1</p> <p>A1</p> <p>15</p>	<p>OR for 1 portion, <math>2.19 \div 14 + 0.12</math> (£0.2764...) or equivalent calculation in pence. Units must be consistent</p> <p>Allow B1 (instead of M1, A1) for costs (£)3.27 (considering <math>9 \times 0.12 + 2.19</math>)</p> <p>Do not accept for <math>(2.95 \pm \dots) \times 9</math> unless used appropriately in further working CAO</p> <p>FT provided M1 awarded and profit is (£)22.68</p> <p>CAO</p> <p>M1 for <math>1.6 \times x + 13.4 = 35.8</math>, or <math>x = (35.8 - 13.4) / 1.6</math>, OR M1 for equation would be correct apart from missing brackets, OR M1 for correct equation expressed in words</p> <p>Accept missing brackets if implied by a correct response</p> <p>If no marks allow SC1 for 15 (cartons)</p> <p>Accept 'carrots' and 'swede' written in full within an equation B1 for either equation, or inconsistent place value for money</p> <p>FT provided at least 1 equation is correct and equivalent level of difficulty Allow 1 slip in non equated variable</p> <p>FT from their first value Carrots 45(p) per kg, Swede 62(p) per kg Accept 0.45 and 0.62. If units are given they need to be correct for A1</p> <p>Do not accept unsupported answers or use of trial &amp; improvement methods. No marks</p>
<p>9. Any 2 correct separate reason based on risk: Reason: Females (pay less) longer life expectation Reason: 'Smokers life expectation shorter than non smokers (of same age)' Reason: 'Premiums increase with age as risk increases' Reason: 'Older people pay more as shorter time to make payments'</p>	<p>E2</p> <p>2</p>	<p>E1 for one correct reason Do not accept a statement without giving reason, Do not accept e.g. 'premiums increase with age', or 'smokers pay more' within statement of why.</p>
<p>10(a) Idea to divide by 2 or a power of 2 <math>2.3 \times 10^{30} / 2^5</math> or equivalent <math>7.2 \times 10^{28}</math> (b) <math>r = 0.75^t \times x</math></p>	<p>M1</p> <p>m1</p> <p>A2</p> <p>B3</p> <p>7</p>	<p>Dividing their <math>2.3 \times 10^{30}</math> by <math>2^5</math> or equivalent A1 for <math>7.1875 \dots \times 10^{28}</math> B2 for correct expression <math>0.75^t \times x</math> B1 for <math>0.75x</math>, <math>x^{-1/4} x</math>, <math>0.75^2 x</math>, ... SC2 for <math>r = 0.25^t \times x</math> or SC1 for <math>0.25^t \times x</math> or equivalent</p>

<p>11. Idea of ratio or length scale factor, e.g. sight of 0.8 or 1.25 Area scale factor used correctly <math>\div 0.8^2</math> or <math>\times 1.25^2</math> or equivalent</p> <p>1 cartridge to make 38281(.25) smaller bubbles <math>15\ 000\ 000 \div 38281(.25)</math></p> <p>391.8... or 392 cartridges needed Cost (£)9800</p>	<p>M1 M1 A1 M1 A1 A1 6</p>	<p>Evidence of this implies also the first M1 FT their linear scale factor squared used correctly for all further marks</p> <p>FT ‘their 38281.25’ number of smaller bubbles provided both M1 awarded</p> <p>CAO. FT for the cost of a whole number of cartridges rounded up. (Note 9795.92 is A0)</p> <p><i>Allow M1 and SC1 for linear calculation with answer (£)12 250</i></p>
<p>12(a) <math>3.24 \times 0.8</math> OR <math>3.24 \times 0.60</math> 2.59(%) AND 1.94(%)</p> <p>(b)(i) Oak AND a reason showing understand of AER</p> <p>(ii) Oak (Total amount after 2 years = £)25000 <math>\times 1.023^4</math></p> <p>(Total amount £)27380.57(37... ) OR (Interest £)2380.57(3696...)</p> <p>Sycamore (Total amount after 2 years = £)25000 <math>\times 1.046^2</math></p> <p>(Total amount £)27352.9(0) OR (Interest £)2352.9(0)</p> <p>(Difference in interest is £) 27.67</p>	<p>M1 A3 E1 M2 A1 M1 A1 B1 11</p>	<p>Or other complete method A2 for 2.59(2) AND 1.94(4) A1 for either 2.59(2) OR 1.94(4) <i>If no marks SC1 for sight of digits 2592 and 1944 (incorrect place value), OR for 0.65 and 1.3(0)</i></p> <p>Reason must say about comparing annually Accept ‘Oak, because they give more interest (annually)’</p> <p>Or for alternative complete method compounding 4 times, or M1 for <math>2.3\% \times 25000</math> (= £575) Do not accept other rounding or truncation</p> <p>Or alternative complete method</p> <p>Do not accept other rounding or truncation</p> <p>FT provided M mark(s) for Oak or Sycamore awarded, with all this answer to nearest penny</p>
<p>13. Density = <math>\frac{21.4 \times 10.13}{19.3}</math> = 11.2(322...troy ounces/cubic inch)</p>	<p>M1 A1 2</p>	
<p>14(a) <math>R + P &lt; 45</math> <math>40R + 65P &gt; 1560</math></p> <p>(b) Line <math>R + P = 45</math> shown Line <math>40R + 65P = 1560</math> shown Region between the lines indicated</p> <p>(c) <b>Using their graph</b> to show Iwan’s statement outside the region with ‘No’ in the table AND shown on the graph <b>Using their graph</b> to show Sid’s statement inside the region with ‘Yes’ in the table AND shown on the graph</p>	<p>B1 B1 B1 B1 B1 B1 7</p>	<p><i>If no marks, SC1 for <math>R+P \dots 45</math> and <math>40R + 65P \dots 1560</math>, with the gaps here both being inequalities</i></p> <p>FT their inequalities if possible from a slip</p> <p>Accept FT from either line correct but for a similar region</p> <p><b>MUST</b> be a FT from their graph in (c) provided at least 1 line is correct. Do not accept numerical explanations. Accept unambiguous unlabelled plots provided the table is completed correctly</p>



<p>15. Sight of 3.45, 3.55, 4.75 and 4.85  <math>\tan x = 3.55/4.75</math> and <math>\tan x = 3.45/4.85</math></p> <p>Greatest <math>x = 36.77(3..^\circ)</math> or <math>36.8(^\circ)</math> or <math>37(^\circ)</math>  Least <math>x = 35.4(25...^\circ)</math> or <math>35.43(^\circ)</math> or <math>35(^\circ)</math></p>	<p>B1  M1    A1  A1    4</p>	<p>FT their least and greatest provided <math>&gt;</math> <math>&lt;</math> or <math>&gt;</math> then values given in the question for M1 only  From correct working  From correct working</p>
<p>16. Volume hemisphere = <math>\frac{1}{2} \times \frac{4}{3} \times \pi \times 0.9^3</math>  = <math>1.5(268... \text{ cm}^3)</math></p> <p>Volume cylinder = <math>8.6 - \text{volume hemisphere correctly evaluated ( } 7.1 \text{ cm}^3)</math>  <math>7.1 = \pi \times 0.9^2 \times h</math>  <math>h = 7.1 / (\pi \times 0.9^2)</math>  Answers in the range 2.77 to 2.8 (cm)  Overall height = 3.7 (cm)</p> <p>Rod length = <math>3.7/\sin 68^\circ</math></p> <p>Answers in the range 3.96 to 4 (cm)</p>	<p>M1  A1  B1    M1  M1  A1  B1    M2    A1    10</p>	<p>Accept rounded or truncated 1.53 or 1.52  FT their volume hemisphere</p> <p>CAO  CAO</p> <p>FT provided all M marks awarded  FT their 3.7 provided <math>&gt;0.9</math>  M1 for <math>\sin 68^\circ = 3.7/\text{rod}</math>  CAO</p>



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