

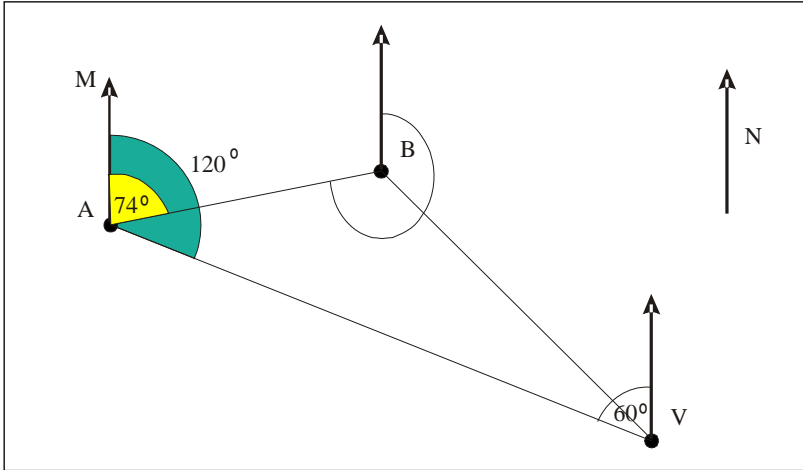
Question No	WORKING	CRITERIA	Marks	Total Mark
<p>1a</p> <p>1b</p>	<p>Sandra paid: 20% of €2150 = €430 €51 × 36 = €1836 Total €2266</p> <p>Sandra paid €16 more than Karl</p> <p>(i) 105% ≡ 113,000 100% ≡ $\frac{113000 \times 100}{105} = 107619 = 108000$ (to nearest thousand)</p> <p>(ia) 112500 (ib) 113499</p>	<p>Works out 20% of €2150 €430 Works out 51 × 36 Adds instalments and deposit €16</p> <p>Considers 113, 000 to be 105% Uses appropriate reasoning to calculate 100% 108000</p> <p><i>For responses below award marks:</i> $\frac{113000 \times 100}{95} \rightarrow 1 \text{ mark}$ 95% of 113,000 $\rightarrow 0 \text{ mark}$</p> <p>112500 113499</p>	<p>M1 A1 M1 M1 A1</p> <p>M1 M1 A1</p> <p>B1 B1</p>	<p>10</p>

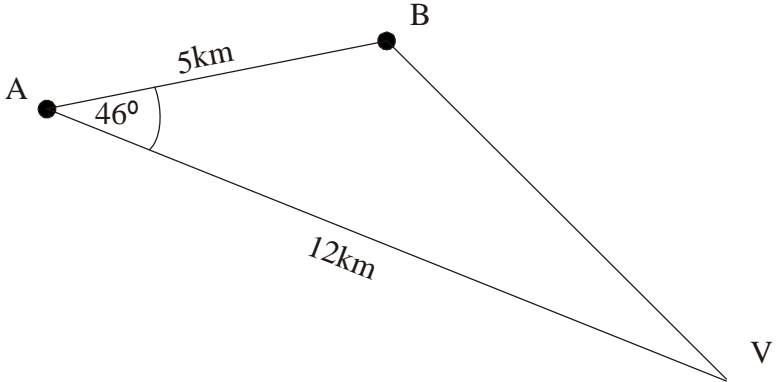
Question No	WORKING	CRITERIA	Marks	Total Mark																
2i	$\text{Mean} = \frac{1}{60} \times (72.5 \times 2 + 7 \times 77.5 + 17 \times 82.5 + 24 \times 87.5 + 9 \times 92.5 + 97.5)$ $= \frac{1}{60} (145 + 542.5 + 1402.5 + 2100 + 832.5 + 97.5) = \frac{1}{60} \times 5120 = 85.33333$	Uses middle point of the intervals for working out mean Correct process for working out mean 85 or more accurate	M1 M1 A1	14 3FNW*																
2ii	<table border="1" data-bbox="371 478 1317 595"> <tr> <td>Height</td> <td>≤ 70</td> <td>≤ 75</td> <td>≤ 80</td> <td>≤ 85</td> <td>≤ 90</td> <td>≤ 95</td> <td>≤ 100</td> </tr> <tr> <td>CF</td> <td>0</td> <td>2</td> <td>9</td> <td>26</td> <td>50</td> <td>59</td> <td>60</td> </tr> </table> <p data-bbox="271 671 1317 707">CF plot – see transparency. A copy of this transparency is given on page 10.</p>	Height	≤ 70	≤ 75	≤ 80	≤ 85	≤ 90	≤ 95	≤ 100	CF	0	2	9	26	50	59	60	<p data-bbox="1487 478 1854 547">TABLE: 3 entries correct TABLE: all entries correct</p> <p data-bbox="1328 568 1854 638">Marks are awarded for plot (<i>only when CF table makes sense</i>) as follows.</p> <p data-bbox="1458 659 1854 729">Three points correctly plotted All points correctly plotted</p>	B1 B1 B1 B1	
Height	≤ 70	≤ 75	≤ 80	≤ 85	≤ 90	≤ 95	≤ 100													
CF	0	2	9	26	50	59	60													
2iii	Median height corresponds to 30 th or 30.5 th toddler: 85.8cm	Correct method 85.8 ± 0.5 cm	M1 A1																	
2iv	First quartile corresponds to 15 th and 3 rd quartile to 45 th toddler First quartile corresponds to 82cm Third quartile corresponds to 88.5cm Inter quartile range – 6.5 cm	First quartile corresponds to 15 th OR 3 rd quartile corresponds to 45 th toddler 1 st quartile or 3 rd quartile correct: 82 ± 0.5 cm OR 88.5 ± 0.5 cm Uses Inter quartile range = 3 rd – 1 st quartile	M1 A1 M1																	
2v	When height = 87, CF = 36 Required probability is $\frac{36}{60}$	Uses CF corresponding to height 87 $\frac{36}{60}$	M1 A1ft*																	

* FNW stands for “full marks no working” and ft stands for “follow through”.

Question No	WORKING	CRITERIA	Marks	Total Mark
<p>3a</p>	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{3 \pm \sqrt{129}}{4}$ <p>$x = 3.5894$ or -2.08945 $x = 3.59$ or $x = -2.09$</p>	<p>Uses appropriate eqt with correct values of a, b and c</p> $\frac{3 \pm \sqrt{129}}{4}$ <p>Both solutions correct (3.5894 & -2.08945) Correct rounding ($x = 3.59$ & $x = -2.09$)</p>	<p>M1 A1 A1 A1</p>	<p>12</p>
<p>3bi</p>	<p>Xandru's working is correct – Division by 5 is done last, so this needs to be reversed first</p>	<p>Xandru's working is correct Explanation</p>	<p>B1 A1</p>	
<p>3bii</p>	<p>$f(10) = 6$ and $f^{-1}(4) = 0$</p>	<p>$f(10) = 6$ $f^{-1}(4) = 0$</p>	<p>A1 A1</p>	
<p>3biii</p>	<p>$f(x) = \frac{x+20}{5}$ and $f^{-1}(x) = 5x - 20$</p>	<p>$f(x) = \frac{x+20}{5}$ or equivalent $f^{-1}(x) = 5x - 20$ or equivalent</p>	<p>B2 B2</p>	
<p>4</p>	<p>Volume of a cone is $\frac{\pi r^2 h}{3}$</p> <p>Volume of frustum is $\frac{\pi \times 8^2 \times 24}{3} - \frac{\pi \times 4^2 \times 12}{3} = 1608.4954 - 201.0619 = 1407.4335$ $= 1407 \text{ cm}^3$</p>	<p>Correct eqt for vol of cone or frustum Correct substitution for r and h for both cones Subtracts vol of small cone from that of large cone</p> <p>Volume of frustum = 1407 or more accurate</p> <p>Rounds appropriately – and does not round prematurely– 1407</p>	<p>M1 M1 M1 A1 A1</p>	<p>5</p>

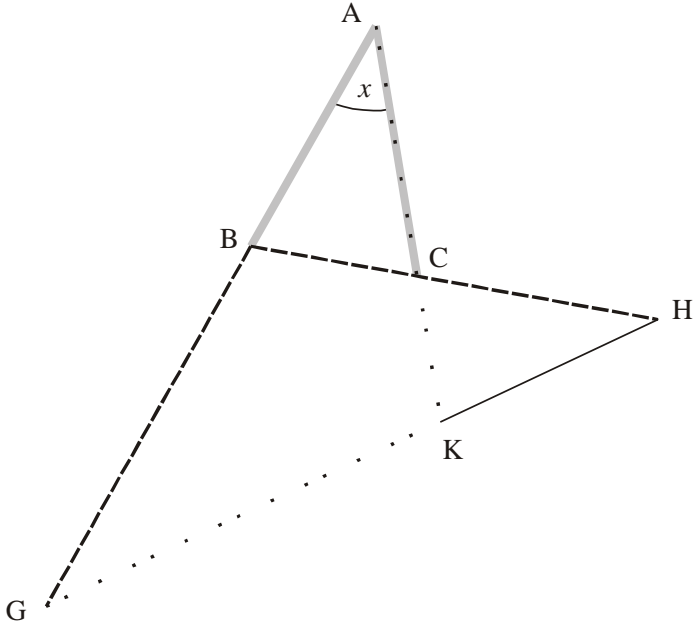
Question No	WORKING	CRITERIA	Marks	Total Mark														
<p>5a</p>	<p>$x - y = 4$ gives $y = x - 4$</p> <p>$\frac{1}{x} + \frac{1}{y} = \frac{2}{3}$ gives $\frac{y+x}{xy} = \frac{2}{3}$</p> <p>$3(y+x) = 2xy$ Substituting for y gives $3(2x-4) = 2x(x-4)$</p> <p>$2x^2 - 8x - 6x + 12 = 0$ or $2y^2 + 2y - 12 = 0$</p> <p>$x^2 - 7x + 6 = 0$ or $y^2 + y - 6 = 0$ $(x-6)(x-1) = 0$. So $x = 1$ or 6 or $(y+3)(y-2) = 0$. So $y = 2$ But $y = x - 4$ is only positive when $x = 6$</p> <p>So $x = 6$ and $y = 2$</p>	<p>Writes two equations that sufficiently describe the two given constraints, one mark allowed for each equation</p> <p>Uses correct strategy to eliminate one of the unknowns</p> <p>Correct manipulation of algebraic fractions</p> <p>Factorises/ uses formula for quadratic appropriately</p> <p>Correct solution for quadratic</p> <p>Correct value for other unknown</p> <p><i>Do not penalise if two solutions for (x, y) are given, i.e. (6, 2) and (1, -3)</i></p> <p><i>For trial & error correct solution with or without equations, award 3 marks</i></p>	<p>M2</p> <p>M1</p> <p>M1</p> <p>M1</p> <p>A1</p> <p>A1</p>	<p>12</p>														
<p>5b</p>	<table border="1" data-bbox="331 1077 1173 1189"> <tr> <td>q</td> <td>0</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>10</td> </tr> <tr> <td>p</td> <td>0</td> <td>0.2</td> <td>0.8</td> <td>1.8</td> <td>3.2</td> <td>20</td> </tr> </table>	q	0	1	2	3	4	10	p	0	0.2	0.8	1.8	3.2	20	<p>One mark, each correct value. Accept also $q = \pm 10$ in the last column</p>	<p>B5</p>	
q	0	1	2	3	4	10												
p	0	0.2	0.8	1.8	3.2	20												

Question No	WORKING	CRITERIA	Marks	Total Mark
6i	<p>$p = 50^\circ$ (AB= AD, tangents meeting at a point are equal)</p> <p>$q = 80^\circ$ (Sum of angles of a triangle = 180°)</p> <p>$r = 50^\circ$ (\angle in the alternate segment)</p> <p>$s = 65^\circ$ (Sum of angles of a triangle = 180° & $\triangle BCD$ isosceles)</p>	<p>$p = 50^\circ$ appropriate reason</p> <p>$q = 80^\circ$ appropriate reason</p> <p>$r = 50^\circ$ appropriate reason</p> <p>$s = 65^\circ$ appropriate reason</p>	<p>B1 M1 B1 M1 B1 M1</p>	<p>10</p>
6ii	<p>Joanna is right. The opposite angles of the quadrilateral do not add up to 180°</p>	<p>Joanna is right. Appropriate reason</p>	<p>B1 M1</p>	
7i	 <p>$\angle BAV = 120^\circ - 74^\circ = 46^\circ$</p>	<p><i>Proper interpretation of the foll bearings:</i> The bearing of A from V is 300° B is on a bearing of 074° from A</p> <p>Indicates that $\angle MAV$ is 120°</p> <p>$\angle BAV = 120^\circ - 74^\circ = 46^\circ$</p> <p>Uses appropriate method to find the bearing of A from B</p>	<p>M1 M1 M1 A1 M1 A1</p>	<p>11</p> <p>FNW</p>
7ii	<p>Bearing of A from B is the indicated reflex angle at B Obtuse unmarked angle at B equals $180^\circ - 74^\circ = 106^\circ$ (required angle and 74° are interior angles between parallel lines) Bearing of A from B is $360^\circ - 106^\circ = 254^\circ$</p>			

Question No	WORKING	CRITERIA	Marks	Total Mark
7iii	 <p> $BV^2 = 12^2 + 5^2 - 2 \times 12 \times 5 \cos 46^\circ = 144 + 25 - 120 \cos 46^\circ = 144 + 25 - 83.359^\#$ $= 169 - 83.359 = 85.641$ </p> <p>BV = 9.254m</p> <p>Total distance to be travelled: (12 + 5 + 9.254) km = 26.254km</p> <p>No, rescue ship does not have enough fuel</p> <p>OR Uses a scale diagram</p>	<p>Uses cosine formula to find BV Makes correct substitutions in cosine formula</p> <p>Correct arithmetic for working out BV up to [#]</p> <p>BV = 9.254m or more accurate</p> <p>Makes suitable comparison between total distance of VA, AB and BV and 25 km</p> <p>OR Scale diagram method</p> <p>5 km drawn to scale 12km drawn to scale 46° drawn accurately BV = 9.2 ± 0.2 m</p> <p>Makes suitable comparison between total distance of VA, AB and BV and 25 km</p>	<p>M1 M1</p> <p>M1</p> <p>A1</p> <p>M1</p> <p>M1 M1 M1 A1 M1</p>	

Question No	WORKING	CRITERIA	Marks	Total Mark
<p>8i</p> <p>8ii</p> <p>8iii</p> <p>8iv</p>	<p>Eqn of line: $y = 15x$</p> <p>$A = 50$</p> <p>x coordinates at the points of intersection of the two graphs are: $-3.4, 2.4, 5.9$</p> <p>Equation satisfied at points of intersection is $y = x^3 - 5x^2 + 50 = 15x$</p> <p>When $x^3 - 5x^2 > 10$, then $x^3 - 5x^2 + 50 > 60$ From graph this is satisfied when $x > 5.2$</p>	<p>Eqn of line: $y = 15x$</p> <p>$A = 50$</p> <p><i>For the x-values accept:</i> $-3.4 \pm 0.05, 2.45 \pm 0.05, 5.95 \pm 0.05$</p> <p>$y = x^3 - 5x^2 + 50 = 15x$ or equivalent</p> <p>Relates inequality $x^3 - 5x^2 > 10$ to the cubic function displayed on graph appropriately</p> <p>Looks up the value of x when $y = 60$</p> <p>Correct answer: Accept inequalities in the range $x > 5.15$ and $x > 5.2$</p> <p><i>For a sensible trial and error solution award 1 mark provided the final answer is within the range $x > 5.1$ and $x > 5.3$</i></p>	<p>B1</p> <p>B1</p> <p>A3</p> <p>A1ft</p> <p>M1</p> <p>M1</p> <p>A1</p>	<p>9</p>

Question No	WORKING	CRITERIA	Marks	Total Mark
<p>9i</p>	<p>Method 1 Interest over second year = €1749.6 – €1620 = €129.6 % interest over the yr = $\frac{129.6}{1620} \times 100 = 8\%$</p> <p>Method 2 $1620(1 + \frac{r}{100}) = 1749.6$ giving $(1 + \frac{r}{100}) = 1.08$ and $r = 8\%$</p> <p>Method 3 $P(1 + \frac{r}{100}) = 1620$ and $P(1 + \frac{r}{100})^2 = 1749.60$ Dividing the second equation by the first gives that $1 + \frac{r}{100} = 1.08$ So the yearly rate of interest is 8%</p>	<p>Method 1 Finds interest over 2nd year Divides interest above by 1620 Obtains 0.08 or 8% 8%</p> <p>Method 2 Use of formula $A = P(1 + \frac{r}{100})$ Correct substitution in formula $(1 + \frac{r}{100}) = 1.08$ $r = 8\%$</p> <p>Method 3 Use of formula $P(1 + \frac{r}{100}) = 1620$ Use of formula $P(1 + \frac{r}{100})^2 = 1749.60$ Eliminates one unknown from the two eqts $r = 8\%$</p>	<p>M1 M1 M1 A1</p> <p>M1 M1 M1 A1</p> <p>M1 M1 M1 A1</p>	<p>8</p>
	<p>9ii</p>	<p>$1.08P = 1620$ gives that $P = 1500$</p>	<p>Use of $1.08P = 1620$ or other suitable eqt to find P $P = 1500$</p>	<p>M3 A1</p>

Question No	WORKING/CRITERIA	Marks	Total Mark
10i		<p>A1</p> <p>A1</p> <p>A1</p>	<p>9</p>
10ii	<p>$\angle AGH = x$ OR $\angle AGH = \frac{180-x}{4}$</p> <p>So $x = \frac{180-x}{4}$ and $4x = 180 - x$</p> <p>$5x = 180$ and</p> <p>$x = 36^\circ$</p>	<p>M2</p> <p>A1</p>	<p>$x = 36^\circ$</p>
10iii	<p>$\angle HCK = \angle ACB = \angle ABC = 2x = 72^\circ$</p> <p>$\angle CKH = 180 - \angle HCK - \angle CHK =$</p> <p>$180 - \angle HCK - \angle BHG = 180^\circ - (72^\circ + 36^\circ) = 72^\circ$</p> <p>But $\angle HCK$ and $\angle CKH$ are base \angles of triangle CHK</p> <p>Therefore $CH = CK$</p>	<p>1M</p> <p>1M</p> <p>1M</p>	<p>For 10iii, no marks are awarded when candidate seeks to prove two triangles congruent</p>

Transparency for Q2

