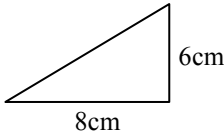


	Give 1 mark for each •	Illustration(s) for awarding each mark
1.	<b>ans: 15·1</b> <b>2 KU</b> • <sup>1</sup> know order of calculations • <sup>2</sup> carry out calculations	• <sup>1</sup> $1 \cdot 9 \times 4 = 7 \cdot 6$ • <sup>2</sup> answer
2.	<b>ans: <math>2\frac{2}{15}</math></b> <b>2KU</b> • <sup>1</sup> adds bracket correctly • <sup>2</sup> answer	• <sup>1</sup> $\frac{3}{15} + \frac{10}{15} = \frac{13}{15}$ • <sup>2</sup> $2\frac{2}{15}$
3.(a)	<b>ans: -12</b> <b>2 KU</b> • <sup>1</sup> interpret functional notation • <sup>2</sup> evaluate	• <sup>1</sup> $13 - (-5)^2$ • <sup>2</sup> answer
3.(b)	<b>ans: <math>a = \pm 3</math></b> <b>3KU</b> • <sup>1</sup> correct strategy • <sup>2</sup> attempt to solve for $a$ • <sup>3</sup> states two solutions	• <sup>1</sup> $13 - a^2 = 4$ • <sup>2</sup> $a^2 = 9$ • <sup>3</sup> answer
4.	<b>ans: <math>x = 10</math></b> <b>3 KU</b> • <sup>1</sup> removing brackets • <sup>2</sup> collecting like terms • <sup>3</sup> stating solution	• <sup>1</sup> $2x - 4x + 12 = -8$ • <sup>2</sup> $-2x = -20$ • <sup>3</sup> answer
5.	<b>ans: 600g</b> <b>3KU</b> • <sup>1</sup> identifies ratio problem • <sup>2</sup> attempts to calculate weight • <sup>3</sup> correct calculations	• <sup>1</sup> 120% : 100% <b>OR</b> 120% $\rightarrow$ 720g • <sup>2</sup> $\frac{5}{6} \times 720g$ 1% $\rightarrow \frac{720}{120} = 6g$ • <sup>3</sup> answer answer

	Give 1 mark for each •	Illustration(s) for awarding each mark
6.	<b>ans: 10cm</b> <span style="float: right;"><b>4RE</b></span> <ul style="list-style-type: none"> <li>•<sup>1</sup> assembles facts in rt.ang.triangle</li> <li>•<sup>2</sup> knows to use Pythagoras Theorem</li> <li>•<sup>3</sup> uses Pythagoras correctly</li> <li>•<sup>4</sup> answer</li> </ul>	 <ul style="list-style-type: none"> <li>•<sup>1</sup></li> <li>•<sup>2</sup> evidence</li> <li>•<sup>3</sup> <math>DM^2 = 8^2 + 6^2</math></li> <li>•<sup>4</sup> 10cm</li> </ul>
7.	<b>ans: -1, 7/2</b> <span style="float: right;"><b>4RE</b></span> <ul style="list-style-type: none"> <li>•<sup>1</sup> interprets rule</li> <li>•<sup>2</sup> forms quadratic equation</li> <li>•<sup>3</sup> rearrange to quadratic</li> <li>•<sup>4</sup> solves to answer</li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>a + a + 2a^2 = 2a^2 + 2a</math></li> <li>•<sup>2</sup> <math>2a^2 + 2a = 7(a + 1); 2a^2 - 5a - 7 = 0</math></li> <li>•<sup>3</sup> <math>(2a - 7)(a + 1) = 0</math></li> <li>•<sup>4</sup> <math>a = -1</math> or <math>7/2</math></li> </ul>
8.	<b>ans: 1/4</b> <span style="float: right;"><b>2KU</b></span> <ul style="list-style-type: none"> <li>•<sup>1</sup> correct numerator</li> <li>•<sup>2</sup> simplified answer</li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> 100/</li> <li>•<sup>2</sup> 1/4</li> </ul>
9.	<b>ans: <math>n = 6</math></b> <span style="float: right;"><b>3KU</b></span> <ul style="list-style-type: none"> <li>•<sup>1</sup> knows how to find <math>k</math></li> <li>•<sup>2</sup> calculates value of <math>k</math></li> <li>•<sup>3</sup> finds value of <math>n</math></li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>T = \frac{kA}{n}; 3 = \frac{k \times 15}{10}</math></li> <li>•<sup>2</sup> <math>k = \frac{30}{15} = 2</math></li> <li>•<sup>3</sup> <math>T = \frac{2A}{n}; 4 = \frac{2 \times 12}{n}; n = 6</math></li> </ul>

	Give 1 mark for each •	Illustration(s) for awarding each mark
10.	<p>ans : <math>y = 4 - 3x - x^2</math> <span style="float: right;">4RE</span></p> <ul style="list-style-type: none"> <li>•<sup>1</sup> interprets information correctly</li> <li>•<sup>2</sup> creates quadratic factors</li> <li>•<sup>3</sup> substitutes and calculates multiplier</li> <li>•<sup>4</sup> answer</li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>(x + 4)(x - 1)</math></li> <li>•<sup>2</sup> <math>x^2 + 3x - 4</math></li> <li>•<sup>3</sup> <math>0^2 + 3(0) - 4 = -4</math> ; MF = -1</li> <li>•<sup>4</sup> answer</li> </ul>
11.	<p>ans : <b>Proof</b> <span style="float: right;">4RE</span></p> <ul style="list-style-type: none"> <li>•<sup>1</sup> correct strategy</li> <li>•<sup>2</sup> uses Cosine Rule</li> <li>•<sup>3</sup> evaluates side</li> <li>•<sup>4</sup> simplifies answer</li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> angle RPQ = <math>80^\circ</math></li> <li>•<sup>2</sup> <math>RQ^2 = 4^2 + 4^2 - 2 \times 4 \times 4 \times \cos 80^\circ</math></li> <li>•<sup>3</sup> <math>RQ^2 = 32 - 32 \cos 80^\circ</math></li> <li>•<sup>4</sup> answer</li> </ul>

**Total: KU 20 RE 16**

	Give 1 mark for each •	Illustration(s) for awarding each mark
1.	<b>ans: <math>2.79 \times 10^6</math> m</b> <b>4KU</b> <ul style="list-style-type: none"> <li>•<sup>1</sup> substitutes into formula and evaluates</li> <li>•<sup>2</sup> answer rounded to 3 sig. figs</li> <li>•<sup>3</sup> volume of hemisphere given</li> <li>•<sup>4</sup> answer in standard form</li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>\frac{4}{3} \times \pi \times 110^3 = 5\,575\,279.763\dots</math></li> <li>•<sup>2</sup> 5 580 000</li> <li>•<sup>3</sup> 2 790 000</li> <li>•<sup>4</sup> <math>2.79 \times 10^6</math></li> </ul>
2.	<b>ans: <math>3280.5\text{cm}^2</math></b> <b>3RE</b> <ul style="list-style-type: none"> <li>•<sup>1</sup> interpret ratio</li> <li>•<sup>2</sup> calculate width</li> <li>•<sup>3</sup> calculate area</li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>\frac{72.9}{\text{width}} = 1.62</math></li> <li>•<sup>2</sup> width = 45cm</li> <li>•<sup>3</sup> Area = <math>45 \times 72.9</math></li> </ul>
3.	<b>ans: <math>6x^2 - 5x - 6</math></b> <b>2KU</b> <ul style="list-style-type: none"> <li>•<sup>1</sup> removes brackets</li> <li>•<sup>2</sup> simplifies</li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>6x^2 + 4x - 9x - 6</math></li> <li>•<sup>2</sup> <math>6x^2 - 5x - 6</math></li> </ul>
4.	<b>ans: <math>y = \frac{1}{3}x - 2</math></b> <b>3KU</b> <ul style="list-style-type: none"> <li>•<sup>1</sup> finds gradient</li> <li>•<sup>2</sup> states <math>y</math> – intercept</li> <li>•<sup>3</sup> substitutes into <math>y = mx + c</math></li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>m = \frac{1}{3}</math></li> <li>•<sup>2</sup> <math>c = -2</math></li> <li>•<sup>3</sup> <math>y = \frac{1}{3}x - 2</math></li> </ul>
5.(a)	<b>ans: <math>3x + 2y = 510</math></b> <b>1KU</b> <ul style="list-style-type: none"> <li>•<sup>1</sup> states equation</li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>3x + 2y = 510</math></li> </ul>
5.(b)	<b>ans: <math>2x + y = 315</math></b> <b>1KU</b> <ul style="list-style-type: none"> <li>•<sup>1</sup> states equation</li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>2x + y = 315</math></li> </ul>
5.(c)	<b>ans: <math>\text{£}7.05</math></b> <b>4RE</b> <ul style="list-style-type: none"> <li>•<sup>1</sup> knows to use sim. equations</li> <li>•<sup>2</sup> prepares equations</li> <li>•<sup>3</sup> finds value for <math>x</math> and <math>y</math></li> <li>•<sup>4</sup> calculates cost</li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> evidence</li> <li>•<sup>2</sup> equates <math>x</math> or <math>y</math> coefficients</li> <li>•<sup>3</sup> <math>x = 120; y = 75</math></li> <li>•<sup>4</sup> <math>\text{£}1.20 \times 4 + 0.75 \times 3 = \text{£}7.05</math></li> </ul>

	Give 1 mark for each •	Illustration(s) for awarding each mark
6.(a)	<b>ans: 230g and SD = 2.5</b> <b>4KU</b> <ul style="list-style-type: none"> <li>•<sup>1</sup> calculating mean</li> <li>•<sup>2</sup> knowing how to calculate SD</li> <li>•<sup>3</sup> correctly calculating SD</li> <li>•<sup>4</sup> rounding</li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>1840 \div 8 = 230\text{g}</math></li> <li>•<sup>2</sup> <math>\sum x = 1840, \sum x^2 = 423244</math></li> <li>•<sup>3</sup> <math>sd = \sqrt{\frac{423244 - \frac{1840^2}{8}}{7}}</math></li> <li>•<sup>4</sup> 2.5</li> </ul>
6.(b)	<b>ans: Burtlets. Both have same mean but Burtlets mangoes much closer to 230g.</b> <b>2RE</b> <ul style="list-style-type: none"> <li>•<sup>1</sup> compares mean</li> <li>•<sup>2</sup> compares SD</li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> same mean</li> <li>•<sup>2</sup> interpret SD as spread of weights</li> </ul>
7.(a)	<b>ans: <math>3(2p - 1)(2p + 1)</math></b> <b>2KU</b> <ul style="list-style-type: none"> <li>•<sup>1</sup> identifies common factor</li> <li>•<sup>2</sup> identifies difference of squares</li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>3(4p^2 - 1)</math></li> <li>•<sup>2</sup> <math>3(2p - 1)(2p + 1)</math></li> </ul>
7.(b)	<b>ans: <math>(3t + 1)(2t - 9)</math></b> <b>2KU</b> <ul style="list-style-type: none"> <li>•<sup>1</sup> one factor correct</li> <li>•<sup>2</sup> second factor correct</li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>(3t + 1)(2t - 9)</math></li> <li>•<sup>2</sup></li> </ul>
8.	<b>ans: <math>61^\circ</math></b> <b>4RE</b> <ul style="list-style-type: none"> <li>•<sup>1</sup> correct strategy for calculating arc length</li> <li>•<sup>2</sup> calculates arc length</li> <li>•<sup>3</sup> correct strategy for calculating angle</li> <li>•<sup>4</sup> calculates angle</li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>\frac{82}{360} \times \pi \times 310</math></li> <li>•<sup>2</sup> 222cm</li> <li>•<sup>3</sup> <math>\frac{x}{360} \times \pi \times 420 = 222</math></li> <li>•<sup>4</sup> <math>61^\circ</math></li> </ul>
9.	<b>ans: <math>109.5^\circ</math>; <math>250.5^\circ</math></b> <b>3KU</b> <ul style="list-style-type: none"> <li>•<sup>1</sup> rearranges to <math>\cos x^\circ</math></li> <li>•<sup>2</sup> finds 1<sup>st</sup> solution</li> <li>•<sup>3</sup> finds 2<sup>nd</sup> solution</li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>\cos x = -\frac{1}{3}</math></li> <li>•<sup>2</sup> <math>109.5^\circ</math></li> <li>•<sup>3</sup> <math>250.5^\circ</math></li> </ul>

	Give 1 mark for each •	Illustration(s) for awarding each mark
10.(a)	<b>ans: £81</b> 2RE • <sup>1</sup> interprets table correctly • <sup>2</sup> answer	• <sup>1</sup> $(300 \times 0.21) + (150 \times 0.12)$ • <sup>2</sup> £81
10.(b)	<b>ans: <math>C = 27 + 0.12b</math></b> 3RE • <sup>1</sup> finds expression for extra booklets • <sup>2</sup> applies appropriate strategy • <sup>3</sup> simplifies to required formula	• <sup>1</sup> $(b - 300)$ • <sup>2</sup> $(300 \times 0.21) + 0.12(b - 300)$ • <sup>3</sup> $C = 27 + 0.12b$
11.	<b>ans: 2.4m</b> 5RE • <sup>1</sup> equates areas • <sup>2</sup> knows to use quadratic formula • <sup>3</sup> evaluates discriminant • <sup>4</sup> finds values of $x$ • <sup>5</sup> discards	• <sup>1</sup> $2x(3x - 1) = 32; 6x^2 - 2x - 31 = 0$ • <sup>2</sup> evidence – could list values of $a, b$ and $c$ • <sup>3</sup> $b^2 - 4ac = (-2)^2 - (4 \times 6 \times -31) = 748$ • <sup>4</sup> 2.4 or -2.1 • <sup>5</sup> $x = 2.4m$
12.	<b>ans: 12.7 metres/min</b> 6RE • <sup>1</sup> finds third angle • <sup>2</sup> knows to use sine rule • <sup>3</sup> calculates side correctly • <sup>4</sup> attempts to calculate height • <sup>5</sup> calculates height correctly • <sup>6</sup> calculates speed	• <sup>1</sup> $\Delta$ side 80m, angles $26^\circ, 135^\circ, 19^\circ$ • <sup>2</sup> evidence of Sine Rule • <sup>3</sup> $\frac{80}{\sin 19} = \frac{BO}{\sin 26} \Rightarrow BO = 108m$ • <sup>4</sup> $\sin 45 = \frac{x}{108}$ • <sup>5</sup> $BX = 76.4m$ • <sup>6</sup> $\frac{76.4}{6} = 12.7m/min$ <div style="border: 1px solid black; padding: 5px; width: fit-content; margin-left: auto; margin-right: auto;">             Pupils may find the length of BP           </div>
13.	<b>ans: <math>F \rightarrow \frac{1}{4}F</math></b> 3RE • <sup>1</sup> correctly interprets change • <sup>2</sup> incorporates change • <sup>3</sup> identifies change in $F$	• <sup>1</sup> $r \rightarrow 2r$ • <sup>2</sup> $F = \left( \frac{GM_x M_y}{(2r)^2} \right)$ • <sup>3</sup> answer