

Detailed Marking Instructions for each question

Question		Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •										
1.		<p>Ans: No, supported by working</p> <ul style="list-style-type: none"> <li>•<sup>1</sup> Process: calculate fraction of</li> <li>•<sup>2</sup> Communication: state conclusion</li> </ul>	2	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>3/8 \times 280 = 105</math></li> <li>•<sup>2</sup> <math>105 &lt; 110</math></li> </ul>										
<p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>• Correct method with incorrect answer → 'correct' conclusion award 1/2</li> <li>• Use of 'km' in conclusion instead of 'miles' award 2/2</li> <li>• Incorrect fraction used eg: <math>4/9 \times 280 = 124(.444..)</math> → 'enough fuel' award 1/2</li> <li>• <math>3/9 \times 280 = 93(.333..)</math> → 'not enough fuel' award 1/2</li> <li>• Correct conclusion with no working shown award 1/2</li> <li>• <math>1/2 \times 280 = 140</math> → enough fuel (working significantly eased) award 0/2</li> </ul>														
2.		<p>Ans: 0310/3·10am</p> <ul style="list-style-type: none"> <li>•<sup>1</sup> Strategy: knows how to deal with time zone, flight time and security clearance</li> <li>•<sup>2</sup> Process/communication: state time</li> </ul>	2	<ul style="list-style-type: none"> <li>•<sup>1</sup> Evidence of adding all three times in the question on to 1845</li> <li>•<sup>2</sup> 0310</li> </ul>										
<p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>• If any two out of the three times are added correctly award 1/2</li> <li>• An answer of 'pick up from 0310 to 0315' award 2/2</li> </ul> <p><b>Special case:</b> Candidate subtracts 4 hour time difference instead of adding → pick Usain up at 1910 award 1/2</p>														
3.		<p>Ans:</p> <table border="1" style="width: 100%;"> <tr><td>A, D or F</td></tr> <tr><td>B, G, F or D</td></tr> <tr><td>C, E</td></tr> <tr><td>H, K</td></tr> <tr><td>I, J, L</td></tr> </table> <ul style="list-style-type: none"> <li>•<sup>1</sup> Strategy: attempt to re-arrange existing packages and add new packages</li> <li>•<sup>2</sup> Communication: arrange boxes on shelves</li> </ul>	A, D or F	B, G, F or D	C, E	H, K	I, J, L	2	<ul style="list-style-type: none"> <li>•<sup>1</sup> Rearrange old stock onto 3 shelves</li> <li>•<sup>2</sup> Arrange new stock onto remaining 2 shelves</li> </ul>					
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C, E														
H, K														
I, J, L														
<p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>• If new and old stock are mixed on the same shelf and all shelves hold <math>\leq 10m</math> award 1/2</li> <li>• Common incorrect answer: award 1/2</li> </ul> <table border="1" style="width: 100%;"> <tr><td>Shelf 1</td><td>A J</td></tr> <tr><td>Shelf 2</td><td>B I</td></tr> <tr><td>Shelf 3</td><td>C D L</td></tr> <tr><td>Shelf 4</td><td>E H</td></tr> <tr><td>Shelf 5</td><td>G F K</td></tr> </table>					Shelf 1	A J	Shelf 2	B I	Shelf 3	C D L	Shelf 4	E H	Shelf 5	G F K
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4.		<b>Ans: No, supported by working</b> <ul style="list-style-type: none"> <li>•<sup>1</sup> Strategy: know to use upper/ lower limits</li> <li>•<sup>2</sup> Process: calculate % within tolerance</li> <li>•<sup>3</sup> Communication: state conclusion</li> </ul>	3	<ul style="list-style-type: none"> <li>•<sup>1</sup> Evidence of 2.35 and 2.45 (may be implied in <sup>2</sup>)</li> <li>•<sup>2</sup> 17/20 = 85%</li> <li>•<sup>3</sup> No, as 85% &lt; 88%</li> </ul>
		<b>Alternative Strategy 1:</b> <ul style="list-style-type: none"> <li>•<sup>1</sup> Strategy: know to use upper/ lower limits</li> <li>•<sup>2</sup> Process: calculate % outwith tolerance</li> <li>•<sup>3</sup> Communication: state conclusion</li> </ul>		<ul style="list-style-type: none"> <li>•<sup>1</sup> Evidence of 2.35 and 2.45 (may be implied in <sup>2</sup>)</li> <li>•<sup>2</sup> 3/20 = 15%</li> <li>•<sup>3</sup> No, as 15% &gt; 12%</li> </ul>
		<b>Alternative Strategy 2:</b> <ul style="list-style-type: none"> <li>•<sup>1</sup> Strategy: know to use upper/ lower limits</li> <li>•<sup>2</sup> Process: calculate minimum number needed for batch to be accepted</li> <li>•<sup>3</sup> Communication: state conclusion</li> </ul>		<ul style="list-style-type: none"> <li>•<sup>1</sup> Evidence of 2.35 and 2.45 (may be implied in <sup>2</sup>)</li> <li>•<sup>2</sup> 88% of 20 = 17.6, ie need 18</li> <li>•<sup>3</sup> No, as only 17 in tolerance, so batch fails</li> </ul>
<b>Notes:</b> <ul style="list-style-type: none"> <li>• Limits need not be stated explicitly if the 3 washers out of tolerance are clearly shown</li> <li>• If incorrect limits are <b>stated</b>, follow through to possibility of 2/3</li> <li>• If limits are stated as 1.9 and 2.9 (<math>\pm 0.5</math>) <math>\rightarrow</math> 100% within tolerance so batch accepted (working significantly eased) <span style="float: right;">award 1/3</span></li> <li>• Numerical comparison is not needed for 3<sup>rd</sup> mark</li> </ul>				

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5.		<b>Ans: £2(·00)/200p per litre</b>  • <sup>1</sup> Strategy: know to use proportion  • <sup>2</sup> Process: price per litre	2	• <sup>1</sup> $\frac{66}{330} \times 1000$  • <sup>2</sup> $200p = £2(·00)$
		<b>Alternative Strategy:</b>  • <sup>1</sup> Strategy: know to use proportion  • <sup>2</sup> Process: price per litre		• <sup>1</sup> $3 \times 330\text{ml} + 10\text{ml} \rightarrow 3 \times 66p + ?$ , where ? < 66p  • <sup>2</sup> $198p + 2p = 200p = £2(·00)$
<b>Notes:</b> <ul style="list-style-type: none"> <li>• <math>3 \times 330\text{ml} = 1 \text{ litre} \rightarrow £1.98</math> (working significantly eased) award 0/2</li> <li>• Correct answer with no working award 2/2</li> </ul>				
6.		<b>Ans: £163.75</b>  • <sup>1</sup> Process: calculate selling price of the shares  • <sup>2</sup> Process: calculate 2½% of selling price  • <sup>3</sup> Process: calculate amount she receives  • <sup>4</sup> Process: calculate loss	4	• <sup>1</sup> $200 \times £2.75 = £550$  • <sup>2</sup> $2\frac{1}{2}\% \text{ of } £550 = £13.75$  • <sup>3</sup> $£550 - £13.75 = £536.25$  • <sup>4</sup> $£700 - £536.25 = £163.75$
		<b>Alternative Strategy: single share basis:</b>  • <sup>1</sup> Process: calculate price per shares  • <sup>2</sup> Process: calculate loss  • <sup>3</sup> Process: calculate fee  • <sup>4</sup> Process: calculate loss		• <sup>1</sup> $£700 \div 200 = £3.50$  • <sup>2</sup> $200 \times £0.75 = £150$  • <sup>3</sup> $2.5\% \text{ of } (£700 - £150) = £13.75$  • <sup>4</sup> Calculate total loss: $£150 + £13.75 = £163.75$
<b>Notes:</b> <ul style="list-style-type: none"> <li>• For: <math>£700 - (£550 + £13.75) = £136.25</math> award 3/4</li> <li>• For: <math>£700 - £550 = £150</math> award 2/4</li> </ul>				
<b>Some common answers for Alternative Strategy:</b> <ul style="list-style-type: none"> <li>• Candidate calculates <math>2.5\% \text{ of } £150 = £3.75 \rightarrow £150 + £3.75 = £153.75</math> award 3/4</li> <li>• Candidate calculates the fee per share to be £0.06875 then rounds to £0.07 leading to a loss of £164 (premature rounding penalised) award 3/4</li> </ul>				

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7.	<p>Ans: Yes, since <math>3.5m &gt; 320cm</math></p> <ul style="list-style-type: none"> <li>•<sup>1</sup> Strategy: Know to use correct form of Pythagoras' Theorem</li> <li>•<sup>2</sup> Process: Calculate half of third side of scarf</li> <li>•<sup>3</sup> Process: Calculate perimeter</li> <li>•<sup>4</sup> Communication: Yes with justification</li> </ul>	4	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>c^2 = 100^2 - 80^2</math> or <math>c^2 + 80^2 = 100^2</math></li> <li>•<sup>2</sup> <math>\sqrt{3600} = 60</math></li> <li>•<sup>3</sup> <math>100 + 100 + 2 \times 60 = 320</math></li> <li>•<sup>4</sup> Yes, since <math>3.5m &gt; 320cm</math> Or she will have 30cm extra</li> </ul>
<p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>• If candidate finds <math>100^2 + 80^2 \rightarrow</math> an answer of 456cm, so not enough ribbon, award 3/4</li> <li>• Minimum working for 3<sup>rd</sup> mark: Correct answer to <math>100 + 100 + (2 \times \text{their 'length' of half the base})</math></li> <li>• For: <math>3 \times 100 = 300cm \rightarrow</math> enough ribbon as <math>300cm &lt; 3.5m</math> award 1/4</li> <li>• For a conclusion of, eg, 'enough ribbon as <math>3.5m &gt; 3.2m</math>, so she has 3m extra', disregard the subsequent incorrect calculation of extra length of ribbon</li> </ul>			
8.	<p>Ans: Rule 1: Yes as 640 is upper limit of tolerance</p> <p>Ans: Rule 2: No as <math>17/30 &gt; \frac{1}{2}</math></p> <ul style="list-style-type: none"> <li>•<sup>1</sup> Strategy: know to check both rules</li> <li>•<sup>2</sup> Process: find <math>2 \times \text{riser} + \text{tread}</math></li> <li>•<sup>3</sup> Communication: within tolerance, so passes rule 1</li> <li>•<sup>4</sup> Process: calculate gradient</li> <li>•<sup>5</sup> Communication: shows that <math>\text{gradient} &gt; \frac{1}{2}</math>, so fails rule 2</li> </ul>	5	<ul style="list-style-type: none"> <li>•<sup>1</sup> evidence</li> <li>•<sup>2</sup> <math>2 \times 170 + 300 = 640</math></li> <li>•<sup>3</sup> <math>625 \pm 15</math>; range 610 - 640; 640 is within this range</li> <li>•<sup>4</sup> <math>170/300</math> or equivalent</li> <li>•<sup>5</sup> <math>170/300 &gt; \frac{1}{2}</math>, so fails rule 2</li> </ul>
<p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>• For 3<sup>rd</sup> mark, limits do not need to be stated explicitly</li> <li>• For 3<sup>rd</sup> mark, do not penalise error in calculation of <b>lower</b> limit</li> <li>• <math>G = V/H</math> or equivalent is not sufficient to show that rule 2 has been considered</li> </ul>			
<p><b>Special case: When candidate only considers one of the rules.</b></p>			
<p><b>A:</b> If candidate has correctly found the gradient and correctly used equivalent fractions to compare it with <math>\frac{1}{2}</math>. In this case if the conclusion states: 'Fails rule 2 so <b>both</b> rules not met' award 5/5 'Fails rule 2.' (no mention of both rules) award 2/5</p> <p><b>B:</b> If candidate only considers <math>2 \times \text{tread} + \text{height}</math>, but miscalculates so that the answer is outwith tolerance. In this case if conclusion states: 'Fails rule 1, so <b>both</b> rules not met' award 4/5 'Fails rule 1' (no mention of both rules) award 1/5</p>			

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9.	(a)	<b>Ans: £360</b> • <sup>1</sup> Process: correct total	1	• <sup>1</sup> Total = £360
<b>Notes:</b>				
	(b)	<b>Ans: £165.50</b> • <sup>1</sup> Strategy: knows how to calculate finance package • <sup>2</sup> Process: calculate deposit • <sup>3</sup> Process: find total finance package • <sup>4</sup> Communicate: state extra cost	4	• <sup>1</sup> Evidence of attempt to find deposit <b>and</b> attempt to find total finance package • <sup>2</sup> 10% of (40 + 120 + 180 + 10 + 105) = £45.50 • <sup>3</sup> £45.50 + 12 × £40 = £525.50 • <sup>4</sup> £525.50 - £360 = £165.50
<b>Notes:</b>				
<ul style="list-style-type: none"> <li>If candidate finds 10% of answer to (a), instead of 10% of £455 then a maximum of 3/4 is available                Eg <math>12 \times £40 + 10\% \text{ of } £360 = £516</math>  <math>£516 - £360 = £156</math></li> </ul>				
10.	(a)	<b>Ans: 237.12m<sup>2</sup></b> • <sup>1</sup> Strategy: find radius of semi-circle • <sup>2</sup> Process: calculate area of semi-circle • <sup>3</sup> Process: calculate remaining area • <sup>4</sup> Process: calculate total area	4	• <sup>1</sup> $r = 4$ • <sup>2</sup> $A = \frac{1}{2} \times 3.14 \times 4^2 = 25.12$ • <sup>3</sup> $A = 18 \times 12 - 2 \times 2 = 212$ • <sup>4</sup> $A = 212 + 25.12 = 237.12$
<b>Notes:</b>				
<ul style="list-style-type: none"> <li>•<sup>1</sup> may be implied by •<sup>2</sup></li> </ul> <b>A common incorrect response:</b> If radius taken as 3m $\rightarrow A = \frac{1}{2} \times 3.14 \times 3^2 = 14.13 \rightarrow 212 + 14.13 = 226.13\text{m}^2$ award 3/4				
	(b)	<b>Ans: £4077</b> • <sup>1</sup> Strategy: find minimum number of packs • <sup>2</sup> Process: calculate cost	2	• <sup>1</sup> $237.12 \div 4 = 59.28$ Therefore 60 packs required • <sup>2</sup> $60 \times £67.95 = £4077$
<b>Notes:</b>				
<ul style="list-style-type: none"> <li>If answer to (a) is a multiple of 4, the 1<sup>st</sup> mark is not available</li> <li>If answer to (a) is <math>226.13\text{m}^2</math>, correct follow through would be <math>57 \times £67.95 = £3873.15</math></li> </ul>				

[END OF MARKING INSTRUCTIONS]

Detailed Marking Instructions for each question

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1.	(a)	<p>Ans: Logo is 24·5/28(cm) base/ height</p> <ul style="list-style-type: none"> <li>•<sup>1</sup> Strategy: interprets ratio and attempts to find dimensions of the logo</li> <li>•<sup>2</sup> Process: calculate both dimensions of the logo</li> </ul>	2	<ul style="list-style-type: none"> <li>•<sup>1</sup> Evidence eg <math>8 \times 7 \div 2</math></li> <li>•<sup>2</sup> 24·5cm by 28cm</li> </ul>
<p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>• Where candidates have used Pythagoras' Theorem to find the height, the correct scaled dimensions are 24·5cm and 25·2cm</li> <li>• Correct answer without working award 2/2</li> <li>• If the ratio is correctly applied to the dimensions of the rectangle, giving an answer of 77cm by 56cm award 1/2</li> <li>• Ratio calculation must include multiply and divide for award of mark 2</li> <li>• When candidate calculates <math>8 \div 7 \times 2 = 2\cdot28\dots</math> and <math>7 \div 7 \times 2 = 2</math> award 1/2</li> </ul>				

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	(b)	<p><b>When 8cm is taken as the height of the triangle.</b></p> <p><b>Ans: No, supported by working</b></p> <ul style="list-style-type: none"> <li>•<sup>1</sup> Strategy: attempt to express area of logo as a percentage of area of rectangle</li> <li>•<sup>2</sup> Process: calculate areas of rectangle and triangle</li> <li>•<sup>3</sup> Process: calculation of percentage</li> <li>•<sup>4</sup> Communication: conclusion consistent with working</li> </ul>	4	<ul style="list-style-type: none"> <li>•<sup>1</sup> Evidence</li> <li>•<sup>2</sup> <math>22 \times 16 = 352</math> <math>\frac{1}{2} \times 7 \times 8 = 28</math></li> <li>•<sup>3</sup> <math>28 \div 352 \times 100 = 7.9545\dots</math></li> <li>•<sup>4</sup> No, logo is 8% which is less than the necessary 9%</li> </ul>
		<p><b>When 8cm is taken as the sloping side of triangle</b></p> <p><b>Ans: No, supported by working</b></p> <ul style="list-style-type: none"> <li>•<sup>1</sup> Strategy: attempt to express area of logo as a percentage of area of rectangle</li> <li>•<sup>2</sup> Process: calculate areas of rectangle and triangle</li> <li>•<sup>3</sup> Process: calculation of percentage</li> <li>•<sup>4</sup> Communication: conclusion consistent with working</li> </ul>		<ul style="list-style-type: none"> <li>•<sup>1</sup> Evidence</li> <li>•<sup>2</sup> <math>22 \times 16 = 352</math>, Height = <math>\sqrt{8^2 - 3 \cdot 5^2} = 7.19\dots</math> <math>\frac{1}{2} \times 7 \times 7.2 = 25.2</math></li> <li>•<sup>3</sup> <math>25.2 \div 352 \times 100 = 7.159\dots</math></li> <li>•<sup>4</sup> No, logo is 7% which is less than the necessary 9%</li> </ul>
		<p><b>Alternative Strategy 1: Dimensions of poster are used instead of the flier:</b></p> <ul style="list-style-type: none"> <li>•<sup>1</sup> Strategy: attempt to express area of logo as a percentage of area of rectangle</li> <li>•<sup>2</sup> Process: calculate areas of rectangle and triangle</li> <li>•<sup>3</sup> Process: calculation of percentage</li> <li>•<sup>4</sup> Communication: conclusion consistent with working</li> </ul>		<ul style="list-style-type: none"> <li>•<sup>1</sup> Evidence</li> <li>•<sup>2</sup> <math>77 \times 56 = 4312</math> <math>\frac{1}{2} \times 24.5 \times 28 = 343</math></li> <li>•<sup>3</sup> <math>343 \div 4312 \times 100 = 7.9545\dots</math></li> <li>•<sup>4</sup> No, logo is 8% which is less than the necessary 9%</li> </ul>

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		<p><b>Alternative Strategy 2: Comparing areas on flier:</b></p> <ul style="list-style-type: none"> <li>•<sup>1</sup> Strategy: attempt to compare area of logo with required limits</li> <li>•<sup>2</sup> Process: calculate areas of rectangle and triangle</li> <li>•<sup>3</sup> Process: calculation of percentage</li> <li>•<sup>4</sup> Communication: conclusion consistent with working</li> </ul>		<ul style="list-style-type: none"> <li>•<sup>1</sup> Evidence</li> <li>•<sup>2</sup> <math>22 \times 16 = 352</math> <math>\frac{1}{2} \times 7 \times 8 = 28</math></li> <li>•<sup>3</sup> 12% of 352 = 42.24 9% of 352 = 31.68</li> <li>•<sup>4</sup> No, as area is 28cm<sup>2</sup>, which is less than 9% of the total area.</li> </ul>
		<p><b>Alternative Strategy 3: Comparing areas on poster:</b></p> <ul style="list-style-type: none"> <li>•<sup>1</sup> Strategy: attempt to compare area of logos with required limits</li> <li>•<sup>2</sup> Process: calculate areas of rectangle and triangle</li> <li>•<sup>3</sup> Process: calculation of percentage</li> <li>•<sup>4</sup> Communication: consistent conclusion</li> </ul>		<ul style="list-style-type: none"> <li>•<sup>1</sup> Evidence</li> <li>•<sup>2</sup> <math>77 \times 56 = 4312</math> <math>\frac{1}{2} \times 24.5 \times 28 = 343</math></li> <li>•<sup>3</sup> 12% of 4312 = 517.44 9% of 4312 = 388.08</li> <li>•<sup>4</sup> No, as area is 343cm<sup>2</sup>, which is less than 9% of the total area.</li> </ul>
<p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>• In alternative strategies 2 &amp; 3, the value of 12% of the area need not be stated explicitly</li> </ul>				



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2.	(a)	<p>Ans: Answer consistent with working eg add 4 (psi) or lose 5kg in weight or add more air so it reads 109psi</p> <ul style="list-style-type: none"> <li>•<sup>1</sup> Communication: reading from gauge</li> <li>•<sup>2</sup> Communication: identify correct psi from graph</li> <li>•<sup>3</sup> Communication: state conclusion</li> </ul>	3	<ul style="list-style-type: none"> <li>•<sup>1</sup> 105</li> <li>•<sup>2</sup> 109</li> <li>•<sup>3</sup> Add 4 or add more air so it reads 109(psi)</li> </ul>
		<p><b>Alternative strategy:</b></p> <ul style="list-style-type: none"> <li>•<sup>1</sup> Communication: reading from gauge</li> <li>•<sup>2</sup> Communication: identify weight for 105psi from graph</li> <li>•<sup>3</sup> Communication: state conclusion</li> </ul>		<ul style="list-style-type: none"> <li>•<sup>1</sup> 105</li> <li>•<sup>2</sup> 68kg</li> <li>•<sup>3</sup> Lose 5kg weight</li> </ul>
<p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>• For 2<sup>nd</sup> mark, accept any reading from 106psi to 112psi</li> <li>• For 3<sup>rd</sup> mark, air added must be consistent with reading given in 2<sup>nd</sup> mark</li> <li>• Accept a clear line drawn onto the graph as indication of required pressure</li> </ul> <p><b>Alternative strategy:</b></p> <ul style="list-style-type: none"> <li>• For 2<sup>nd</sup> mark accept any reading from 66kg to 71kg</li> <li>• For 3<sup>rd</sup> mark, weight loss must be consistent with reading given in 2<sup>nd</sup> mark</li> </ul>				

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	(b)	<p>Ans: 2099 (mm)</p> <ul style="list-style-type: none"> <li>•<sup>1</sup> Strategy/process: calculate the diameter</li> <li>•<sup>2</sup> Process: calculate circumference</li> <li>•<sup>3</sup> Communication: round to nearest millimetre</li> </ul>	3	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>23 + 622 + 23 = 668</math></li> <li>•<sup>2</sup> <math>C = \pi \times 668 = 2098.58\dots</math></li> <li>•<sup>3</sup> 2099</li> </ul>

**Notes:**

- Accept legitimate variations for value of  $\pi$
- Unrounded answer need not be stated
- 2099mm with no working award 3/3
- 2098mm with no working award 2/3
- 2097mm with no working award 2/3

**Some common answers: (incorrect diameter used)**

**Working must be shown**

- $d = 645$  (only one tyre width added)  $\rightarrow C = 2026\text{mm}$  award 2/3
- $d = 622$  (no tyre width added)  $\rightarrow C = 1954\text{mm}$  award 2/3
- $d = 334$  (radius of wheel plus tyre)  $\rightarrow C = 1049\text{mm}$  award 2/3
- $d = 311$  (radius of wheel only)  $\rightarrow C = 977\text{mm}$  award 1/3

Question		Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •										
3.	(a)	<b>Ans:£1100</b>  • <sup>1,2</sup> Strategy/Process: extract information and calculate cost of slates (Award 1/2 if there is 1 missing or incorrect step)  • <sup>3</sup> Communication: round to nearest £100	<b>3</b>	• <sup>1,2</sup> $(5 \times 3) \times 2 \times 2 \times 16 \times 1.15 \times 0.97 = 1070.88$  • <sup>3</sup> 1100										
<b>Notes:</b> <ul style="list-style-type: none"> <li>• Correct answer with no working <span style="float: right;">award 0/3</span></li> <li>• Unrounded answer need not be shown</li> </ul>														
	(b)	<b>Ans: £836</b>  • <sup>1</sup> Strategy: know how to calculate total  • <sup>2</sup> Process: calculate labour costs	<b>2</b>	• <sup>1</sup> $(8 \times 22) + (15 \times 2 \times 22)$  • <sup>2</sup> 836										
<b>Notes:</b> <ul style="list-style-type: none"> <li>• 2<sup>nd</sup> mark is only available if there is clear evidence that ‘strip and clean’ and ‘replace slates’ have been considered</li> <li>• <math>8 \times 22 = £176</math> <span style="float: right;">award 0/2</span></li> <li>• <math>8 \times 22 + 1 \times 22 = 198</math> (only 1 hour to replace the tiles) <span style="float: right;">award 0/2</span></li> </ul>														
	(c)	<b>Ans: Yes, supported by working</b>  • <sup>1</sup> Process: complete estimate  • <sup>2</sup> Communication: yes, supported by working	<b>2</b>	• <sup>1</sup> <table border="1" style="margin-left: 20px;"> <tr> <td>Slates</td> <td>1100</td> </tr> <tr> <td>Labour</td> <td>836</td> </tr> <tr> <td>Sub-total</td> <td>1936</td> </tr> <tr> <td>VAT</td> <td>387.20</td> </tr> <tr> <td>Total</td> <td>2323.20</td> </tr> </table> • <sup>2</sup> Yes, supported by working	Slates	1100	Labour	836	Sub-total	1936	VAT	387.20	Total	2323.20
Slates	1100													
Labour	836													
Sub-total	1936													
VAT	387.20													
Total	2323.20													
<b>Notes:</b>														

Question		Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
4.	(a)	<p><b>Ans: Route correctly drawn</b></p> <ul style="list-style-type: none"> <li>•<sup>1</sup> Process: calculate distance for legs</li> <li>•<sup>2</sup> Process: calculate scale distance</li> <li>•<sup>3</sup> Process/communication: correct bearing measured &amp; correct length drawn</li> <li>•<sup>4</sup> Process/communication: 2nd bearing and length correctly drawn</li> </ul>	4	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>170 \times 0.6 = 102</math> <math>170 \times 1.2 = 204</math></li> <li>•<sup>2</sup> <math>102 \div 20</math> rep by 5.1 cm <math>204 \div 20</math> rep by 10.2 cm</li> <li>•<sup>3</sup> Bearing of <math>050^0 (\pm 2^0)</math> measured correctly and 51(<math>\pm 2</math>)mm line drawn</li> <li>•<sup>4</sup> Bearing of <math>190^0 (\pm 2^0)</math> measured correctly and 102(<math>\pm 2</math>) mm line drawn</li> </ul>
		<p><b>Alternative award of marks</b></p> <ul style="list-style-type: none"> <li>•<sup>1</sup> Process: calculate distance and scaled distance for first leg</li> <li>•<sup>2</sup> Process: calculate distance and scaled distance for second leg</li> <li>•<sup>3</sup> Process/communication: both bearings drawn correctly</li> <li>•<sup>4</sup> Process/communication: 2nd bearing and length correctly drawn</li> </ul>		<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>170 \times 0.6 = 102 \rightarrow 102 \div 20</math> rep by 5.1 cm</li> <li>•<sup>2</sup> <math>170 \times 1.2 = 204 \rightarrow 204 \div 20</math> rep by 10.2 cm</li> <li>•<sup>3</sup> Both bearings of <math>050^0 (\pm 2^0)</math> and <math>190^0 (\pm 2^0)</math> measured correctly</li> <li>•<sup>4</sup> Both distances of 51(<math>\pm 2</math>) mm and 102(<math>\pm 2</math>)mm drawn correctly</li> </ul>
<p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>• The third leg of the journey need not be actually drawn</li> </ul>				
	(b)	<p><b>Ans: <math>342^0</math>, 142 miles</b></p> <ul style="list-style-type: none"> <li>•<sup>1</sup> Process: correct bearing</li> <li>•<sup>2</sup> Process: correct distance in miles</li> </ul>	2	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>342^0</math></li> <li>•<sup>2</sup> 142 miles</li> </ul>
<p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>• It must be <b>clear</b> from the diagram which line represents the third leg of the journey</li> </ul>				

Question		Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
	(c)	<b>Ans: £172.03</b>  • <sup>1</sup> Process: calculates total distance  • <sup>2</sup> Process: calculates total time taken as a decimal  • <sup>3</sup> Strategy: knows how to find total cost of fuel used  • <sup>4</sup> Process: calculates fuel cost	4	• <sup>1</sup> $102 + 204 + 142 = 448$ miles  • <sup>2</sup> $448 \div 170 = 2.6352\dots$ hours  • <sup>3</sup> evidence of time $\times 32 \times \text{£}2.04$  • <sup>4</sup> $2.6352\dots \times 32 \times 2.04 = 172.03$
		<b>Alternative Strategy:</b>  • <sup>1</sup> Process: calculates time for final leg  • <sup>2</sup> Process: calculates total time taken as a decimal  • <sup>3</sup> Strategy: knows how to find total cost of fuel used  • <sup>4</sup> Process: calculates fuel cost		• <sup>1</sup> $142 \div 170 = 0.8352\dots$ hours  • <sup>2</sup> $0.6 + 1.2 + 0.8235\dots = 2.6352\dots$ hours  • <sup>3</sup> evidence of time $\times 32 \times \text{£}2.04$  • <sup>4</sup> $2.6352\dots \times 32 \times 2.04 = 172.03$
<b>Notes:</b> <ul style="list-style-type: none"> <li>• Where a candidate rounds their time to fewer than 2 decimal places, the final mark is not available</li> <li>• <b>Special case:</b> Where the candidate's answer to (b) leads to a decimal time that is <b>exact</b> to 1 decimal place, all 4 marks are still available</li> </ul>				

Question			Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
5.	(a)	(i)	<b>Ans: <math>Q_2 = (£)17.50</math>  <math>Q_1 = (£)9.50, Q_3 = (£)21</math></b> <ul style="list-style-type: none"> <li>•<sup>1</sup> Communication: correct median</li> <li>•<sup>2</sup> Communication: upper and lower quartiles</li> </ul>	2	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>Q_2 = 17.50</math></li> <li>•<sup>2</sup> <math>Q_1 = 9.50, Q_3 = 21</math></li> </ul>
		(ii)	<b>Ans: Boxplot drawn correctly showing 5-fig summary</b> <ul style="list-style-type: none"> <li>•<sup>1</sup> Communication: correct end points</li> <li>•<sup>2</sup> Communication: correct box</li> </ul>	2	<ul style="list-style-type: none"> <li>•<sup>1</sup> end points at 5 and 34</li> <li>•<sup>2</sup> box showing <math>Q_1, Q_2, Q_3</math></li> </ul>
<b>Notes:</b> <ul style="list-style-type: none"> <li>• The box plot must be drawn to a consistent scale</li> </ul>					
	(b)	(i)	<b>Ans: <math>\bar{x} = (£)20</math></b> <ul style="list-style-type: none"> <li>•<sup>1</sup> Process: calculate mean</li> </ul>	1	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>\bar{x} = 20</math></li> </ul>
		(ii)	<b>Ans: <math>s = (£)3.16</math></b> <ul style="list-style-type: none"> <li>•<sup>1</sup> Process: calculate <math>(x - \bar{x})^2</math></li> <li>•<sup>2</sup> Process: substitute into formula</li> <li>•<sup>3</sup> Process: calculate standard deviation</li> </ul>	3	<ul style="list-style-type: none"> <li>•<sup>1</sup> 4,16,25,1,4,0</li> <li>•<sup>2</sup> <math>\sqrt{\frac{50}{5}}</math></li> <li>•<sup>3</sup> 3.16</li> </ul>
			<b>Use of alternative formula:</b> <ul style="list-style-type: none"> <li>•<sup>1</sup> Process: calculate <math>\Sigma x</math> and <math>\Sigma x^2</math></li> <li>•<sup>2</sup> Process: substitute into formula</li> <li>•<sup>3</sup> Process: calculate standard deviation</li> </ul>		<ul style="list-style-type: none"> <li>•<sup>1</sup> 120 and 2450</li> <li>•<sup>2</sup> <math>\sqrt{\frac{2450 - \frac{(120)^2}{6}}{5}}</math></li> <li>•<sup>3</sup> 3.16</li> </ul>
<b>Notes</b> <ul style="list-style-type: none"> <li>• For correct answer without working <span style="float: right;">award 0/3</span></li> </ul>					

Question		Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
	(c)	<b>Ans: 2 valid comments</b>  • <sup>1</sup> Communication: comment regarding the mean  • <sup>2</sup> Communication: comment regarding the s.d.	<b>2</b>	• <sup>1</sup> On average there is more profit being made this year  • <sup>2</sup> There is more variation in profit this year
<b>Notes</b>				
	(d)	<b>Ans: No, as 23% &lt; 25%</b>  • <sup>1</sup> Process: calculate percentage change  • <sup>2</sup> Communication: state increase	<b>2</b>	• <sup>1</sup> $20 - 16 \cdot 25 = 3 \cdot 75$  $\frac{3 \cdot 75}{16 \cdot 25} \times 100 = 23\%$  • <sup>2</sup> No, as 23% < 25%
		<b>Alternative Strategy:</b> <b>Ans: No, as £20·31 &gt; £20</b>  • <sup>1</sup> Process: calculate 25% increase in mean  • <sup>2</sup> Communication: conclusion		• <sup>1</sup> $16 \cdot 25 \times 1 \cdot 25 = 20 \cdot 31$  • <sup>2</sup> No, as 20·31 > 20
<b>Notes</b>				
<ul style="list-style-type: none"> <li>If the candidate incorrectly finds that the mean has increased by more than 25% and makes the conclusion 'no as it is more than 25% increase' award 1/2</li> </ul>				

Question		Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •	
6.	(a)	<p><b>Ans: It is higher (<math>16.8 &gt; 16.5</math>)</b></p> <ul style="list-style-type: none"> <li>•<sup>1</sup> Strategy: selects correct row and discards highest and lowest scores</li> <li>•<sup>2</sup> Process: calculate mean</li> <li>•<sup>3</sup> Process: calculate final score</li> <li>•<sup>4</sup> Communication: compare</li> </ul>	4	<ul style="list-style-type: none"> <li>•<sup>1</sup> Evidence</li> <li>•<sup>2</sup> <math>43 \div 5 = 8.6</math></li> <li>•<sup>3</sup> <math>8.6 \times 3/5 \times 3.2 = 16.5</math></li> <li>•<sup>4</sup> <math>16.8 &gt; 16.5</math></li> </ul>	
<p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>• If candidate uses the scores in the bottom row of the table 'correctly' and concludes that both divers have equal final scores award 3/4</li> </ul>					
	(b)	(i)	<p><b>Ans: 3.3</b></p> <ul style="list-style-type: none"> <li>•<sup>1</sup> Strategy: know to divide by 8.6</li> <li>•<sup>2</sup> Strategy: know to divide by 3/5</li> <li>•<sup>3</sup> Communication: state level of difficulty</li> </ul>	3	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>16.9 \div 8.6</math></li> <li>•<sup>2</sup> <math>\dots \div 3/5</math></li> <li>•<sup>3</sup> 3.3</li> </ul>
			<p><b>Alternative Strategy: Trial and improvement:</b></p> <ul style="list-style-type: none"> <li>•<sup>1</sup> Strategy: consider at least 2 possible values</li> <li>•<sup>2</sup> Process: consider at least 2 more possible values</li> <li>•<sup>3</sup> Communication: state level of difficulty</li> </ul>		<ul style="list-style-type: none"> <li>•<sup>1</sup> evidence of any 2 attempts to find difficulty</li> <li>•<sup>2</sup> evidence of at least 2 further attempts to find difficulty which are better than the first 2</li> <li>•<sup>3</sup> Find correct difficulty of 3.3</li> </ul>
<p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>• For final answer of 3.27 or 3.275 award 3/3</li> <li>• When a trial and improvement method has been used and the candidate finds the correct answer at the first attempt eg <math>8.6 \times 3/5 \times 3.3 = 17.028</math> leading to 3.3 with no further 'trials' award 3/3</li> </ul>					



Question		Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
	(ii)	<b>Ans: 8.3</b> <ul style="list-style-type: none"> <li>•<sup>1</sup> Strategy: know order of calculations</li> <li>•<sup>2</sup> Process: calculate score before difficulty factor</li> <li>•<sup>3</sup> Process: find the mean score</li> </ul>	<b>3</b>	<ul style="list-style-type: none"> <li>•<sup>1</sup> evidence of <math>\div 3.4 \times 5/3</math></li> <li>•<sup>2</sup> <math>16.9 \div 3.4 = 4.97\dots</math></li> <li>•<sup>3</sup> <math>4.97 \times 5/3 = 8.3</math></li> </ul>
		<b>Alternative Strategy: Trial and improvement:</b> <ul style="list-style-type: none"> <li>•<sup>1</sup> Strategy: consider at least 2 possible values</li> <li>•<sup>2</sup> Process: consider at least 2 more possible values</li> <li>•<sup>3</sup> Communication: state level of difficulty</li> </ul>		<ul style="list-style-type: none"> <li>•<sup>1</sup> evidence of any 2 attempts to find mean</li> <li>•<sup>2</sup> evidence of at least 2 further attempts to find difficulty which are better than the first 2</li> <li>•<sup>3</sup> Find correct mean of 8.3</li> </ul>
<b>Notes:</b> <ul style="list-style-type: none"> <li>• When a trial and improvement method has been used and the candidate finds the correct answer at the first attempt eg <math>8.3 \times 3/5 \times 3.4 = 16.932</math> leading to 8.3 with no further 'trials' award 3/3</li> <li>• If candidate chooses any mean from 8.3 to 10 inclusive and demonstrates that this would give Cheryl a winning score eg <math>3 \div 5 \times 8.5 \times 3.4 = 17.34</math>, so 8.5 is enough award 3/3</li> </ul>				
	(c)	<b>Ans: Yes as <math>7 &gt; 6.75</math></b> <ul style="list-style-type: none"> <li>•<sup>1</sup> Strategy: attempt to calculate the volume of a prism</li> <li>•<sup>2</sup> Process: set up calculation</li> <li>•<sup>3</sup> Process: calculate volume</li> <li>•<sup>4</sup> Communication: state conclusion</li> </ul>	<b>4</b>	<ul style="list-style-type: none"> <li>•<sup>1</sup> evidence of cuboid + prism or Ah</li> <li>•<sup>2</sup> <math>3 \times 6 \times 0.25 + \frac{1}{2} \times 6 \times 0.25 \times 3</math> or <math>(\frac{1}{2} \times 6 \times 0.25 + 6 \times 0.25) \times 3</math></li> <li>•<sup>3</sup> <math>6.75\text{m}^3</math></li> <li>•<sup>4</sup> Yes as <math>7 &gt; 6.75</math></li> </ul>
<b>Notes:</b> <ul style="list-style-type: none"> <li>• <b>If total surface area is calculated:</b> 2<sup>nd</sup> mark can be awarded for correct areas of any 4 faces 3<sup>rd</sup> mark can be awarded for the correct areas of the remaining 2 faces and the total (<math>42.78\text{m}^2</math>) 4<sup>th</sup> mark can be awarded for valid comparison of the calculated area and <math>7\text{m}^3</math></li> </ul>				

[END OF MARKING INSTRUCTIONS]