

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

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

Question	Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
	<p>Alternative Strategy 2: Comparing areas on flier:</p> <ul style="list-style-type: none"> •¹ Strategy: attempt to compare area of logo with required limits •² Process: calculate areas of rectangle and triangle •³ Process: calculation of percentage •⁴ Communication: conclusion consistent with working 		<ul style="list-style-type: none"> •¹ Evidence •² $22 \times 16 = 352$ $\frac{1}{2} \times 7 \times 8 = 28$ •³ 12% of 352 = 42.24 9% of 352 = 31.68 •⁴ No, as area is 28cm², which is less than 9% of the total area.
	<p>Alternative Strategy 3: Comparing areas on poster:</p> <ul style="list-style-type: none"> •¹ Strategy: attempt to compare area of logos with required limits •² Process: calculate areas of rectangle and triangle •³ Process: calculation of percentage •⁴ Communication: consistent conclusion 		<ul style="list-style-type: none"> •¹ Evidence •² $77 \times 56 = 4312$ $\frac{1}{2} \times 24.5 \times 28 = 343$ •³ 12% of 4312 = 517.44 9% of 4312 = 388.08 •⁴ No, as area is 343cm², which is less than 9% of the total area.
<p>Notes:</p> <ul style="list-style-type: none"> • In alternative strategies 2 & 3, the value of 12% of the area need not be stated explicitly 			

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

Question		Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
	(b)	<p>Ans: 2099 (mm)</p> <ul style="list-style-type: none"> •¹ Strategy/process: calculate the diameter •² Process: calculate circumference •³ Communication: round to nearest millimetre 	3	<ul style="list-style-type: none"> •¹ $23 + 622 + 23 = 668$ •² $C = \pi \times 668 = 2098.58\dots$ •³ 2099

Notes:

- Accept legitimate variations for value of π
- 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)	Ans:£1100 • ^{1,2} Strategy/Process: extract information and calculate cost of slates (Award 1/2 if there is 1 missing or incorrect step) • ³ Communication: round to nearest £100	3	• ^{1,2} $(5 \times 3) \times 2 \times 2 \times 16 \times 1.15 \times 0.97 = 1070.88$ • ³ 1100										
Notes: <ul style="list-style-type: none"> • Correct answer with no working award 0/3 • Unrounded answer need not be shown 														
	(b)	Ans: £836 • ¹ Strategy: know how to calculate total • ² Process: calculate labour costs	2	• ¹ $(8 \times 22) + (15 \times 2 \times 22)$ • ² 836										
Notes: <ul style="list-style-type: none"> • 2nd mark is only available if there is clear evidence that ‘strip and clean’ and ‘replace slates’ have been considered • $8 \times 22 = £176$ award 0/2 • $8 \times 22 + 1 \times 22 = 198$ (only 1 hour to replace the tiles) award 0/2 														
	(c)	Ans: Yes, supported by working • ¹ Process: complete estimate • ² Communication: yes, supported by working	2	• ¹ <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> • ² Yes, supported by working	Slates	1100	Labour	836	Sub-total	1936	VAT	387.20	Total	2323.20
Slates	1100													
Labour	836													
Sub-total	1936													
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Total	2323.20													
Notes:														

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

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

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

Question		Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
	(c)	Ans: 2 valid comments • ¹ Communication: comment regarding the mean • ² Communication: comment regarding the s.d.	2	• ¹ On average there is more profit being made this year • ² There is more variation in profit this year
Notes				
	(d)	Ans: No, as 23% < 25% • ¹ Process: calculate percentage change • ² Communication: state increase	2	• ¹ $20 - 16 \cdot 25 = 3 \cdot 75$ $\frac{3 \cdot 75}{16 \cdot 25} \times 100 = 23\%$ • ² No, as 23% < 25%
		Alternative Strategy: Ans: No, as £20·31 > £20 • ¹ Process: calculate 25% increase in mean • ² Communication: conclusion		• ¹ $16 \cdot 25 \times 1 \cdot 25 = 20 \cdot 31$ • ² No, as 20·31 > 20
Notes				
<ul style="list-style-type: none"> 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 				

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

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

[END OF MARKING INSTRUCTIONS]