

Detailed marking instructions for each question

Question		Generic scheme	Illustrative scheme	Max mark
1.		<p>Ans: 2309 cm³ or 2309 ml or 2.309 l</p> <ul style="list-style-type: none"> •¹ Strategy: know how to calculate the volume of half a cylinder •² Strategy: substitute into formula •³ Process: calculate the volume and state units 	<ul style="list-style-type: none"> •¹ evidence •² $\frac{1}{2} \times \pi \times 7^2 \times 30$ •³ 2309.07...cm³ 	3
		<p>Alternative Strategy:</p> <ul style="list-style-type: none"> •¹ Strategy: know to calculate the area of the semi-circle and multiply it by 30 •² Strategy: substitute into semi-circle formula •³ Process: calculate the volume and state units 	<ul style="list-style-type: none"> •¹ evidence •² $\frac{1}{2} \times \pi \times 7^2$ •³ $76.96... \times 30 = 2309.07... \text{ cm}^3$ 	

Question	Generic scheme	Illustrative scheme	Max mark
Notes:			
1. ● ² only available when 7 is used as radius.			
2. Accept legitimate variations of π .			
3. For the final answer accept any legitimate rounding or truncation to at least 2 significant figures.			
4. Correct answer with no working			award 0/3
5. $V = Ah$ on its own is not sufficient evidence for ● ¹ .			
6. ● ³ is only available for calculations involving π , a power and at least one other number to find a volume.			
7. If formula does not involve π then			award 0/3
8. If $V = \frac{1}{3}\pi r^2 h \div 2$ is used, approximations of $\frac{1}{3}$ must be expressed to at least 2 decimal places. ● ² and ● ³ are available.			
9. If $V = \frac{4}{3}\pi r^3 \div 2$ is used, approximations of $\frac{4}{3}$ must be expressed to at least 2 decimal places. ● ² and ● ³ are available.			

Question	Generic scheme	Illustrative scheme	Max mark
Commonly Observed Responses:			
Working must be shown			
1. For $\frac{1}{2} \times 3 \cdot 14 \times 7^2 \times 30 = 2307 \cdot 9 \text{ cm}^3$		award 3/3 ✓✓✓	
2. For $\frac{1}{2} \times \pi \times 7^2 \times 14 = 1077 \cdot 56 \dots \text{cm}^3$		award 2/3 x✓✓	
3. For $\frac{1}{2} \times \pi \times 7^2 \times 30 \times 14 = 32326 \cdot 99 \dots \text{cm}^3$		award 2/3 x✓✓	
4. For $\pi \times 7^2 \times 30 = 4618 \cdot 14 \dots \text{cm}^3$		award 2/3 x✓✓	
5. For $3 \cdot 14 \times 7^2 \times 30 = 4615 \cdot 8 \text{ cm}^3$		award 2/3 x✓✓	
6. For $\frac{1}{2} \times \pi \times 14^2 \times 30 = 9236 \cdot 28 \dots \text{cm}^3$		award 2/3 ✓x✓	
7. For $\frac{1}{2} \times 3 \cdot 14 \times 14^2 \times 30 = 9231 \cdot 6 \text{ cm}^3$		award 2/3 ✓x✓	
8. For $\pi \times 7^2 = 153 \cdot 9 \dots \text{cm}^3$		award 1/3 x✓x	
9. For $\pi \times 14^2 \times 30 = 18472 \cdot 56 \dots \text{cm}^3$		award 1/3 xx✓	
10. For $3 \cdot 14 \times 14^2 \times 30 = 18463 \cdot 2 \text{ cm}^3$		award 1/3 xxx	
11. For $14 \times 7 \times 30 = 2940 \text{ cm}^3$		award 0/3 xxx	

Question		Generic scheme	Illustrative scheme	Max mark
2.	(a)	<p>Ans: (£)6150·64</p> <ul style="list-style-type: none"> •¹ Process: work out the cost of 8000 shares •² Strategy: know how to calculate percentage decrease •³ Strategy: know how to calculate percentage increase •⁴ Strategy: identify power •⁵ Process: calculate the value of the shares 	<ul style="list-style-type: none"> •¹ $8000 \times 0.73 = 5840$ •² Evidence of 0.97 •³ Evidence of 1.042 •⁴ ...² •⁵ 6150.64 	5
		<p>Alternative Strategy 1:</p> <ul style="list-style-type: none"> •¹ Strategy: know how to calculate percentage decrease •² Strategy: know how to calculate percentage increase •³ Strategy: identify power •⁴ Process: calculate value of 1 share •⁵ Process: calculate the value of 8000 shares 	<ul style="list-style-type: none"> •¹ Evidence of 0.97 •² Evidence of 1.042 •³ ...² •⁴ 0.768... •⁵ 6150.64 	
<p>Notes:</p> <ol style="list-style-type: none"> When working in pounds, where rounding or truncation has taken place, working must be given to at least 2 decimal places. Final answer must be given to 2 decimal places where necessary. 				
<p>Commonly Observed Responses:</p> <ol style="list-style-type: none"> For 6150.63 supported by working. award 5/5 ✓✓✓✓✓ For 6160 (percentage calculations on individual share price, rounded to nearest penny at each step) supported by working. award 5/5 ✓✓✓✓✓ For $1.054 \times 5840 = 6155.36$ award 2/5 ✓×××✓ For $5840 \times 0.97 \times 1.042 = 5902.72$ award 4/5 ✓✓✓×✓ For $5664.80 + 5664.80 \times (0.042 \times 2) = 6140.64$ award 3/5 ✓✓✓×× 				

Question		Generic scheme	Illustrative scheme	Max mark
2.	(b)	<p>Ans: (£)4087.05</p> <ul style="list-style-type: none"> •¹ Strategy: know to calculate $\frac{5}{8}$ of 6560 and subtract commission •² Process: calculate amount received 	<ul style="list-style-type: none"> •¹ evidence •² 4087.05 	2

Notes:

1. Where •¹ is not awarded •² can be awarded for a calculation of the form $\frac{a}{b} \times \dots \pm 12.95$, where $\frac{a}{b}$ is equivalent to either $\frac{5}{8}$ or $\frac{8}{5}$.

Commonly Observed Responses:

1. $\frac{5}{8}$ of $6560 + 12.95 = 4112.95$ award 1/2×✓

Question	Generic scheme	Illustrative scheme	Max mark
3.	<p>Ans: (£)92·60</p> <ul style="list-style-type: none"> •¹ Process: calculate new price •² Process: calculate the deposit •³ Process: calculate amount still payable •⁴ Communication: state how much each monthly payment is 	<ul style="list-style-type: none"> •¹ $1260 + 151 \cdot 20 = 1411 \cdot 20$ •² $\frac{1}{3}$ of $1411 \cdot 20 = 470 \cdot 40$ •³ $470 \cdot 40 + 200 = 670 \cdot 40$ $1411 \cdot 20 - 670 \cdot 40 = 740 \cdot 80$ •⁴ $740 \cdot 80 \div 8 = 92 \cdot 60$ 	4

Notes:

1. Must have 0 at the end of 92·60 to gain final mark.
2. •⁴ is not available where candidate has divided their deposit by 8 - see COR 9 and 10

Commonly Observed Responses:

1. For $\frac{1}{3}$ of 1260 leading to 98·90 award 3/4 ✓x✓✓
2. Not subtracting 200 leading to 117·60 award 3/4 ✓✓x✓
3. Not subtracting deposit leading to 151·40 award 3/4 ✓✓x✓
4. $1411 \cdot 20$ leading to $1211 \cdot 20$ leading to $\frac{1}{3}$ of $1211 \cdot 20$ leading to 807·46
 $807 \cdot 46 \div 8 = 100 \cdot 93$ award 3/4 ✓x✓✓
5. For $\frac{1}{3}$ of 1260 leading to $(1260 - 420 - 200) \div 8 = 80$ award 2/4 xx✓✓
6. 12% of 1260 leading to 1411·20
 $\frac{1}{3}$ of 1260 = 420
 $1260 - 620 = 640$
 $640 \div 8 = 80$ award 2/4 ✓xxx
7. $1411 \cdot 20 \div 8 = 176 \cdot 40$ award 2/4 ✓xxx
8. $1260 \div 8 = 157 \cdot 50$ award 1/4 xxx✓
9. $470 \cdot 40 \div 8 = 58 \cdot 80$ award 2/4 ✓xx
10. $420 \div 8 = 52 \cdot 50$ award 0/4 xxxx

Question		Generic scheme	Illustrative scheme	Max mark
4.	(a)	Ans: 71 <ul style="list-style-type: none"> •¹ Communication: calculate the most common heart rate 	<ul style="list-style-type: none"> •¹ 71 	1
Notes:				
Commonly Observed Responses:				
	(b)	Ans: 10 <ul style="list-style-type: none"> •¹ Communication: calculate either median •² Communication/process: calculate other median and difference 	<ul style="list-style-type: none"> •¹ 61 or 71 •² calculate other median and difference $71 - 61 = 10$ 	2
Notes:				
1. • ² can be awarded if difference is found using incorrect medians. 2. Correct answer with no working. award 2/2				
Commonly Observed Responses:				
1. $71 - 66 = 5$ (incorrect median for “before”) award 1/2 ✓ x 2. $74 \cdot 73 - 62 \cdot 6 = 12 \cdot 13$ (difference of means) award 1/2 x ✓ 3. $71 - 66 = 5$ (difference of modes) award 1/2 x ✓ 4. $36 - 29 = 7$ (difference of ranges) award 1/2 x ✓				

Question		Generic scheme	Illustrative scheme	Max mark
	(c)	<p>Ans: correct boxplot</p> <ul style="list-style-type: none"> •¹ Process: calculate lower quartile •² Process: calculate upper quartile •³ Communication: correct end points drawn •⁴ Communication: consistent box drawn 	<ul style="list-style-type: none"> •¹ $Q_1 = 67$ •² $Q_3 = 84$ •³ 59 and 95 •⁴ Box showing Q_1, Q_2 and Q_3 	4

Notes:

1. The boxplot must be drawn to a reasonable scale.
2. If an unsuitable scale is used a maximum of 3/4 is available.
3. If the boxplot is drawn for “before exercise” a maximum of 3/4 is available.
4. If no working is shown and the boxplot is correct award 4/4.
5. If no working is shown and Q_1 and Q_3 are both incorrect, •⁴ is still available if consistent median is shown on boxplot.
6. If no working is shown and only one of Q_1 or Q_3 is correct, award •¹.
•⁴ is still available if consistent median is shown on boxplot.

Commonly Observed Responses:

Question		Generic scheme	Illustrative scheme	Max mark
5.	(a)	Ans: 240(km) <ul style="list-style-type: none"> •¹ Process: calculate the distance from a scale drawing •² Process/communication: give answer in kilometres 	<ul style="list-style-type: none"> •¹ $8 \times 3000000 = 24000000$ •² $24000000 \div 100 \div 1000 = 240$ 	2

Notes:

1. Tolerance $\pm 1\text{mm}$ on candidate measurement

Commonly Observed Responses:

1. For 2·4, 24, 2400, 24000 etc..., with or without working award 1/2✓x

	(b)	Ans: 17 (knots) <ul style="list-style-type: none"> •¹ Strategy: know how to calculate average speed and to change hours and minutes to hours •² Strategy: know how to convert average speed into knots •³ Process/communication: calculate average speed to 2 significant figures 	<ul style="list-style-type: none"> •¹ $\frac{240}{7.5} = \dots$ •² $\dots \times 0.54 = \dots$ •³ $17.28 = 17$ (2 sig fig) 	3
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Notes:

1. Candidates must work to at least 3 significant figures throughout where appropriate.
2. •² can only be awarded for multiplying an average speed by 0.54 or equivalent.
3. •³ can only be awarded for a two-step calculation and rounding.

Commonly Observed Responses:

1. For $\frac{240}{450} \times 0.54 = 0.288 = 0.29$ award 2/3x✓✓
2. For $\frac{240}{7.3} \times 0.54 = 17.75\dots = 18$ award 2/3x✓✓

Question		Generic scheme	Illustrative scheme	Max mark	
5.	(c)	Ans: 139 (euro) <ul style="list-style-type: none"> •¹ Strategy: know how to calculate amount of euro •² Process: calculate remaining euro 	<ul style="list-style-type: none"> •¹ 55% of 2400×1·15... •² 1518 – 1379 = 139 	2	
Notes: 1. Where • ¹ is lost • ² is still available for a 3 step process.					
Commonly Observed Responses:					
	(d)	(i)	Ans: 7/32 <ul style="list-style-type: none"> •¹ Communication: state probability 	<ul style="list-style-type: none"> •¹ 7/32 	1
Notes: 1. 7:32 is not acceptable for • ¹					
Commonly Observed Responses:					
		(ii)	Ans: 1/28 <ul style="list-style-type: none"> •² Strategy/process: calculate denominator •³ Communication: state probability 	<ul style="list-style-type: none"> •² denominator of 28 •³ 1/28 	2
Notes: 1. If the answer to part (d)(i) is written as a ratio then 1:28 is acceptable for • ³ .					
Commonly Observed Responses:					
1. For $\frac{1}{27}$ award 1/2 x✓ 2. For $\frac{28}{1}$ award 0/2 xx					

Question		Generic scheme	Illustrative scheme	Max mark
6.	(a)	<p>Ans: 102 (cages)</p> <ul style="list-style-type: none"> •¹ Strategy: know to calculate two arrangements •² Process: calculate one arrangement. •³ Process/communication: calculate second arrangement and make consistent conclusion 	<ul style="list-style-type: none"> •¹ Evidence •² $2 \cdot 25\text{m} \div 0.75 = 3$ cages $15\text{m} \div 0.85 = 17$ cages Total = $3 \times 17 \times 2 = 102$ cages •³ $2 \cdot 25\text{m} \div 0.85 = 2$ cages $15\text{m} \div 0.75 = 20$ cages exactly Total = $20 \times 2 \times 2 = 80$ 	3
<p>Notes:</p> <ol style="list-style-type: none"> When a candidate calculates two versions for one level and only doubles the larger, all three marks are still available. Where a candidate considers more than two arrangements do not award •¹. 				
<p>Commonly Observed Responses:</p> <ol style="list-style-type: none"> For volume of truck \div volume of cage = 109 award 0/3××× 				

Question		Generic scheme	Illustrative scheme	Max mark
6.	(b)	<p>Ans: (£) 1026</p> <ul style="list-style-type: none"> •¹ Process: calculate basic pay •² Process: calculate overtime Pay •³ Process: calculate weekly gross pay 	<ul style="list-style-type: none"> •¹ $1\frac{1}{2} \times 14 \cdot 40 = 21 \cdot 60$ •² $8\frac{1}{2} \times 14 \cdot 40 \times 1 \cdot 5 = 183 \cdot 60$ •³ $(183 \cdot 60 + 21 \cdot 60) \times 5$ $= 205 \cdot 20 \times 5$ $= 1026$ 	3
		<p>Alternative Strategy 1:</p> <ul style="list-style-type: none"> •¹ Process: calculate 10 hours basic pay •² Process :calculate $8\frac{1}{2}$ hours at $\frac{1}{2}$ time •³ Process: calculate weekly gross pay 	<ul style="list-style-type: none"> •¹ $10 \times 14 \cdot 40 = 144$ •² $8\frac{1}{2} \times 7 \cdot 20 = 61 \cdot 20$ •³ $(144 + 61 \cdot 20) \times 5 = 1026$ 	
<p>Notes:</p> <p>1. •³ is available for adding basic pay, overtime pay and multiplying them by 5</p>				
<p>Commonly Observed Responses:</p>				

Question			Generic scheme	Illustrative scheme	Max mark
7.	(a)	(i)	Ans: 19.5(°) • ¹ Process: calculate mean	• ¹ $(24+22+19+18+17+17) \div 6 = 19.5$	1
Notes: 1. Correct answer with no working. award 1/1					
Commonly Observed Responses: 1. $24+22+19+18+17+17 = 19.5$ award 0/1					
		(ii)	Ans: 2.88 • ² Process: calculate $(x - \bar{x})^2$ • ³ Strategy: substitute into formula • ⁴ Process: calculate standard deviation	• ² 20.25, 6.25, 0.25, 2.25, 6.25, 6.25 • ³ $\sqrt{(41.5 \div 5)}$ • ⁴ 2.88	3
Notes: 1. Alternative method Mark 2 - $\sum x = 117$ and $\sum x^2 = 2323$ 2. Where rounding or truncation has taken place, working must be given to at least 2 decimal places. 3. Accept rounding or truncation to at least one decimal place for the final answer. 4. Mark 4 can only be awarded when a 2 step calculation has taken place.					
Commonly Observed Responses:					
	(b)		Ans: two valid comments • ¹ Communication: comment regarding mean • ² Communication: comment regarding standard deviation	• ¹ eg on average Durban's temperatures are higher • ² eg Durban's temperatures are less consistent	2
Notes: 1. Examples of unacceptable comments: The weather is warmer in Durban compared to Cape Town (no mention of average) The weather varies more in Durban compared to Cape Town (no mention of temperature)					
Commonly Observed Responses:					

Question		Generic scheme	Illustrative scheme	Max mark
7.	(c)	<p>Ans: New York and London</p> <ul style="list-style-type: none"> •¹ Strategy/process : calculate one local time •² Strategy/process: calculate the other two local times •³ Communication: state offices which can take part 	<ul style="list-style-type: none"> •¹ Mumbai 9:00pm London 1:30pm New York 8:30am •² calculate remaining two local times •³ New York and London 	3
		<p>Alternative Strategy 1:</p> <ul style="list-style-type: none"> •¹ Strategy/process: calculate one time difference •² Strategy/process :calculate remaining two time differences •³ Communication: state offices which can take part 	<ul style="list-style-type: none"> •¹ Mumbai +5 hrs 30 mins London –2 hrs New York –7 hrs •² calculate remaining two differences •³ New York and London 	
		<p>Alternative Strategy 2:</p> <ul style="list-style-type: none"> •¹ Strategy/process: calculate how long until 3:30pm •² Strategy/process :calculate all three of the local times •³ Communication: state offices which can take part 	<ul style="list-style-type: none"> •¹ 22 hours 5 minutes •² Mumbai 9:00pm London 1:30pm New York 8:30am •³ New York and London 	
<p>Notes:</p> <ol style="list-style-type: none"> 1. Correct answer with no working award 0/3. 2. Converting between 12 and 24 hour time with no other working and the correct conclusion award 0/3. 				
<p>Commonly Observed Responses:</p>				

Question		Generic scheme	Illustrative scheme	Max mark
8.	(a)	<p>Ans: 707 (mm)</p> <ul style="list-style-type: none"> •¹ Strategy: calculate short sides of triangle •² Strategy: evidence of the correct form of Pythagoras' theorem •³ Process: calculate length of hypotenuse of triangle 	<ul style="list-style-type: none"> •¹ 500 •² $500^2 + 500^2$ •³ 707·1068... 	3

Notes:

Commonly Observed Responses:

	(b)	<p>Ans: 685000(mm²)</p> <ul style="list-style-type: none"> •¹ Strategy: evidence of calculating the area of the square encasing pentagonal shower base and subtract area of missing triangle •² Process: calculate area of pentagonal base 	<ul style="list-style-type: none"> •¹ $900^2 - \frac{1}{2} \times 500 \times 500$ •² $810000 - 125000 = 685000$ 	2
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Notes:

1. If the candidate converts units incorrectly do not award •².

Commonly Observed Responses:

Question		Generic scheme	Illustrative scheme	Max mark
8.	(c)	<p>Ans: Zuzanna should pick the offset quadrant (since $732743 \text{ mm}^2 > 685000 \text{ mm}^2$)</p> <ul style="list-style-type: none"> •¹ Strategy: evidence of quarter circle added to rectangles •² Process: calculate the area of the quarter circle •³ Process: calculate area of shower tray •⁴ Communication: conclusion consistent with working 	<ul style="list-style-type: none"> •¹ Evidence •² $\frac{1}{4} \times \pi \times 600 \times 600 = 282743$ •³ $282743 + 450000 = 732743$ •⁴ Zuzanna should pick the offset quadrant (since $732743 \text{ mm}^2 > 685000 \text{ mm}^2$) 	4
		<p>Alternative Strategy 1:</p> <ul style="list-style-type: none"> •¹ Strategy: evidence of whole square minus area that is not part of the base. •² Process: calculate the area of the quarter circle •³ Process: calculate area of shower tray •⁴ Communication: conclusion consistent with working 	<ul style="list-style-type: none"> •¹ Evidence •² $\frac{1}{4} \times \pi \times 600 \times 600 = 282743$ •³ $810000 - (360000 - 282743) = 732743$ •⁴ Zuzanna should pick the offset quadrant (since $732743 \text{ mm}^2 > 685000 \text{ mm}^2$) 	

Question	Generic scheme	Illustrative scheme	Max mark
<p>Notes:</p> <ol style="list-style-type: none"> ●² is available for finding area of a whole circle or any fraction of a circle with radius 600. If the candidate uses the same incorrect unit conversion in part (c) as in part (b) do not penalise again. ●³ is only available for adding to 450000 (does not apply to the alternative strategy). In alternative strategy, ●³ is only available for subtracting from 810000. Disregard incorrect numerical comparison in conclusion. 			
<p>Commonly Observed Responses:</p> <p>In the following cases: ●⁴ is also available for consistent conclusion.</p> <ol style="list-style-type: none"> For $\frac{1}{4} \times 3.14 \times 600 \times 600 = 282600$ leading to answer of 732600 award ●¹, ●² and ●³. For $\frac{1}{4} \times 3.14 \times 300 \times 300 = 70650$ leading to answer of 520650 award ●¹ and ●³. For $810000 - 282743 = 527257$ award ●² and ●³. (Whole square minus quarter circle). 			

[END OF MARKING INSTRUCTIONS]