Question			Answer	Marks	Part Marks and Guidance	
1	(a)		$360 \div 5$ [=72] or $72 \times 5 = 360$	1	Or $180 - \frac{540}{5}$ oe	
	(b)		540	2	M1 for 108 seen in correct context or other valid method	
	(c)		192	3	M2 for 360 – (108 + 60) or 120 + 72 OR M1 for 120 or 72 or 60 seen in correct context	eg on diagram

2	**(a)**	(i)	**2**	**B1** for 4^3 seen		
		(ii)	**1**			
		(iii) 2	**3**	**B2** for $(\sqrt[3]{8})^4 \times \frac{1}{8}$ or $16 \times \frac{1}{8}$ or $2^4 \times \frac{1}{8}$	Correct answer, no working scores 3	
				Or **B1** for $(8^{-1}) = \frac{1}{8}$ or $8^{\frac{4}{3}} = (\sqrt[3]{8})^4$ or $\sqrt[3]{8^4}$		
				or $(8^{\frac{4}{3}}) = 2^4$ or 16	If decimals used, 0.33, 1.33 or better.	
				Or $8^{\frac{4}{3}} \times 8^{-1} = 8^{\frac{1}{3}}$ **M1** $= \sqrt[3]{8}$ **A1**		
	(b)	10	**1**	cao		

3	**(a)**		$T + 2R = 658$ [so OK]	B1	Or may use one of given values to find limits for the other	Using $T = 222$, $164 \leq R \leq 239$ Using $R = 218$, $114 \leq T \leq 264$
			$\tan g = \frac{R}{T}$ or $\frac{218}{222}$ Inverse trig fn seen or used	M1 M1	Condone poor notation FT *their* trig statement even if sin or cos used; may be implied by answer	May find hypotenuse =311.(1...) and then use sin or cos If using sine rule, need to get to $\sin g = \frac{218 \times \sin 90}{311(.1...)}$ for **M1**, and a similar stage for use of cos rule
			44 or 44.4 to 44.5 [so doesn't satisfy]	A1	**A0** if say 'does satisfy' oe or: **M2** for $R = 222 \times \tan 42$ or $T = \frac{218}{\tan 42}$ Or **M1** for $\tan 42 = \frac{R}{222}$ or $\tan 42 = \frac{218}{T}$ **A1** for R = 199.8-200 so no or for T = 242(.1...) so no (may be as inequalities but not required) If M0, allow **SC1** for scale drawing finding angle as 44 to 45·[and 'so No']	

	(b)		Valid checking of all conditions and final conclusion max $R = 215$	4	Condone omission of explicitly checking conditions 'T must be at least 220 mm' and 'R must be at most 220 mm' **M1** for $[R =]270\tan 42$ or $\tan 42 = \frac{R}{270}$ or correct trig statement using $T = 270$ and R = 215 or 220 **M1** for $2R + 270 = 700$ seen or used Allow **A1** for one of [R =] 243(.1...) or R = 215 or g = 38.5... Or allow **M1A1** for $2R + T$ oe = 710 from using $R = 220$ and $T = 270$	May find hyp and use sin or cos but need to go on to have used T and R eg **M1** for $2R$ = [280 to] 430 accept inequalities These values will imply the relevant **M1** if not already earned; allow **M1A1** for 2 × 215 + 270 = 700, allow amongst other trials if identified as correct **M0** for just trials with other values of R; **M0** for scale drawing instead of trig (but may earn other M1)

4	**(a)**		Trapezium	1		
	(b)		126 Alternate angles	B1 B1	Condone 'Z' but not 'alternating'	Not with contradictory comments
	(c)		144	3	**B1** for $g + h = 180$ soi **M1** for $180 \div 5$ or 36 seen	eg by ADC = 54°

5			100	3	**M2** for $540 - (90 + 70 + 130 + \textit{their}\ 150)$ or $180 - [360 - (30 + 110 + 50 + 90)]$ Or **M1** for $360 - 210$ soi by 150 or $[360 - (30 + 110 + 50 + 90)]$ or (method leading to) 540	*Their* 150 $\neq$ 210 If exterior angles used Could be on diagram If exterior angles used

6	**(a**		54 Opp(osite) angles (in a) cyclic quad(rilateral) add to 180°	1 1	'Add to 180°' can be implied (eg by correct answer) but not by 126°	Both marks are independent Condone reasonable abbreviations and poor spelling
	(b)		81			

7			20	3	**M2** for 360 ÷ *their* (180 – 162) Or **M1** for 180 – 162 seen or 18 seen or $\frac{(n-2)\times 180}{n} = 162$	**M2** for other complete methods