

Question	Answer	Mark	Mark scheme	Additional guidance
21	Result shown	P1	for process to find the length of half a side or a side or the perimeter of the smaller hexagon $PQRSTU$ , eg $r \sin 30 (= \frac{r}{2})$ oe or $2r \sin 30 (= r)$ oe or $6 \times 2r \sin 30 (= 6r)$ oe	May use Sine Rule or $\cos 60$ instead of $\sin 30$
		P1	for process to find the length of half a side or a side or the perimeter of the larger hexagon $ABCDEF$ eg Length of half side = $r \tan 30$ or $\frac{r}{\tan 60} (= \frac{\sqrt{3}r}{3})$ oe  or Length of side = $2r \tan 30$ or $\frac{2r}{\tan 60}$ or $\frac{r}{\sin 60}$ or $\frac{r}{\cos 30} (= \frac{2\sqrt{3}r}{3})$ oe  or Length of perimeter = $6 \times 2r \tan 30$ or $6 \times \frac{2r}{\tan 60}$ oe	May use Sine Rule Note this mark is not for just the sight of $\frac{\sqrt{3}r}{3}$ or $\frac{2\sqrt{3}r}{3}$ or $\frac{12\sqrt{3}r}{3}$ oe, they need to be associated with the correct length Perimeter = $4\sqrt{3}r$ alone does not get this mark
		P1	(dep P2) for process of forming a correct inequality, eg using half lengths eg $\frac{r}{2} < \frac{2\pi r}{12} < r \tan 30$ oe or using lengths eg $r < \frac{2\pi r}{6} < 2r \tan 30$ oe or using perimeters eg $6 \times r < 2\pi r < 6 \times 2r \tan 30$ oe	
		C1	(dep P2) correct algebra leading to given result, $3 < \pi < 2\sqrt{3}$	