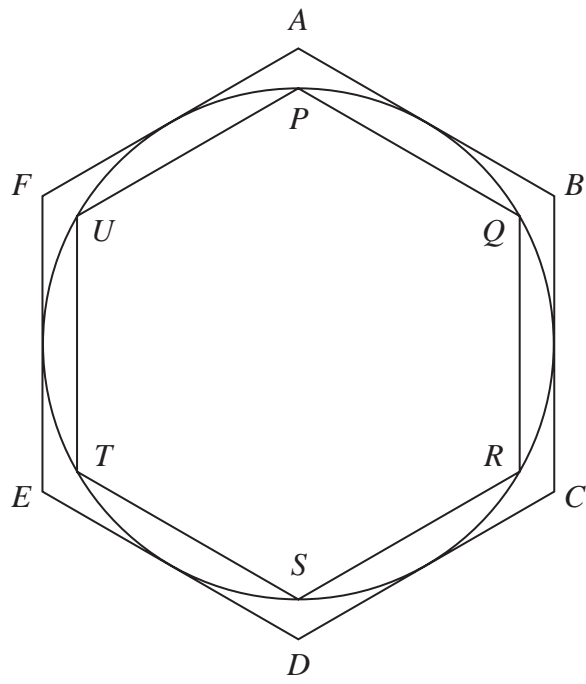**21** The diagram shows a circle, radius $r$ cm and two regular hexagons.



Each side of the larger hexagon *ABCDEF* is a tangent to the circle.
Each side of the smaller hexagon *PQRSTU* is a chord of the circle.

By considering perimeters, show that

$$3 < \pi < 2\sqrt{3}$$