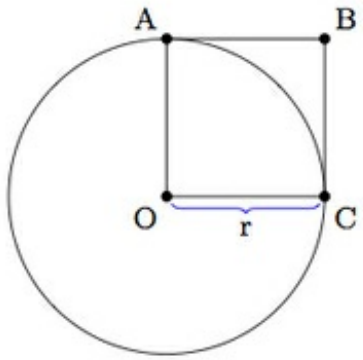
7.G Approximating the area of a circle

Task

Below is a picture of a circle of radius r and a square of side length r:



a. Show that

$$2 \leq \frac{\text{Area(Circle)}}{\text{Area(Square)}} \leq 4.$$

b. How can we find a more accurate estimate of $\frac{\text{Area(Circle)}}{\text{Area(Square)}}$ than the one in part (a)?

c. Explain why the quotient $\frac{\text{Area(Circle)}}{\text{Area(Square)}}$ does not depend on the radius r.