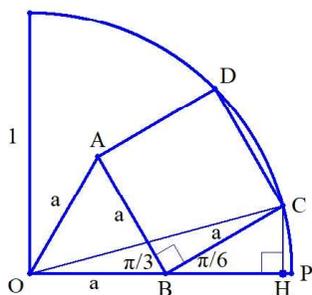


問題 1 .



図のように、点O、P、A、B、C、Dを定め、CからOPに垂線CHを下ろす.

$$OA = OB = AB = BC = a$$

とすると、

$$\angle ABO = \frac{\pi}{3}, \angle ABC = \frac{\pi}{2} \text{より}, \angle CBH = \frac{\pi}{6}$$

$$\text{より}, BH = BC \cdot \frac{\sqrt{3}}{2} = \frac{\sqrt{3}}{2} a, CH = \frac{1}{2} a$$

$$\therefore OH = OB + BH = \left(1 + \frac{\sqrt{3}}{2}\right) a$$

直角三角形OCHにおいて、 $OC^2 = OH^2 + CH^2$

$$\therefore 1 = \left(1 + \frac{\sqrt{3}}{2}\right)^2 a^2 + \left(\frac{1}{2}\right)^2 a^2$$

$$\therefore a^2 = \frac{1}{1 + \sqrt{3} + \frac{3}{4} + \frac{1}{4}} = \frac{1}{2 + \sqrt{3}} = 2 - \sqrt{3} = \frac{4 - 2\sqrt{3}}{2} = \frac{(\sqrt{3} - 1)^2}{2}$$

$$a > 0 \text{より}, a = \frac{\sqrt{3} - 1}{\sqrt{2}} = \frac{\sqrt{6} - \sqrt{2}}{2} \dots \text{(答)}$$

