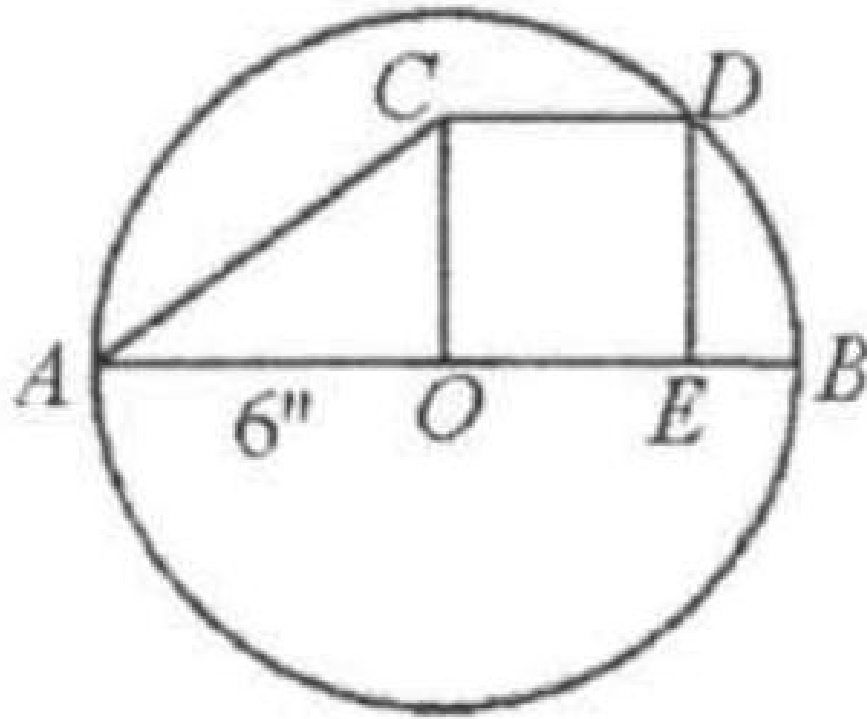


Problem 7

Problem

(2000 Mathcounts State Sprint) In the diagram shown, $COED$ is a square. The radius of circle O is 6 in. What is the number of inches in AC ? Express your answer in simplest radical form.



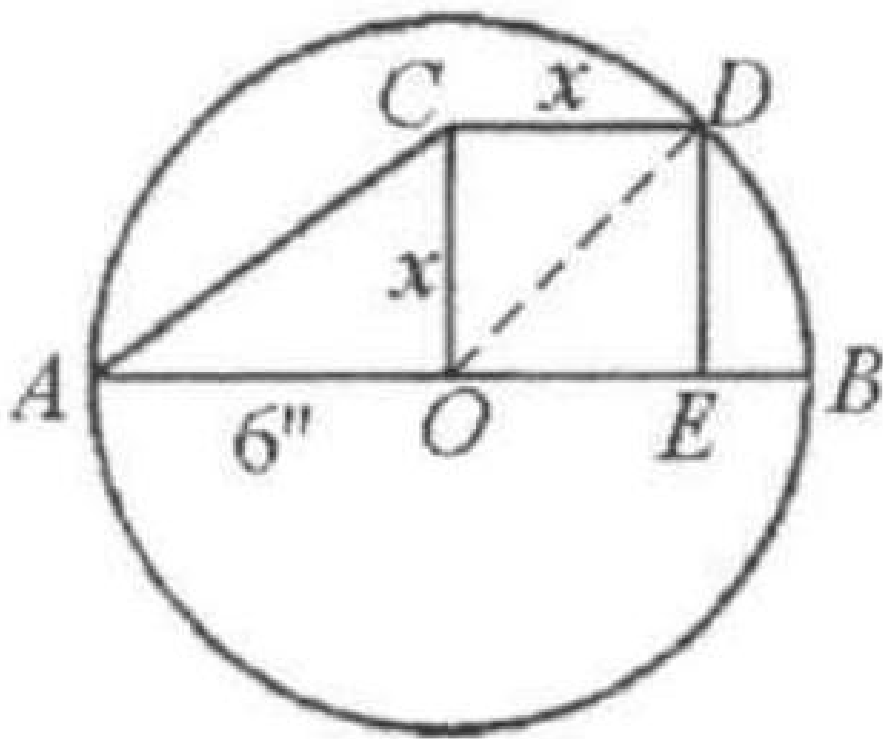
Solution

$$3\sqrt{6}.$$

Connect OD . As shown in the figure below, $OD = OA = 6$. They are both radii of the circle.

Applying Pythagorean Theorem to right triangle OCD yields:

$$\begin{aligned}
 x^2 + x^2 &= 6^2 \Rightarrow 2x^2 = 36 \Rightarrow x^2 = 18 \\
 &\Rightarrow x = 3\sqrt{2}.
 \end{aligned}$$



Applying Pythagorean Theorem to right triangle OCA yields:
 $AC^2 = (3\sqrt{2})^2 + 6^2 = 18 + 36 = 54 = (3\sqrt{6})^2 \Rightarrow AC = 3\sqrt{6}.$