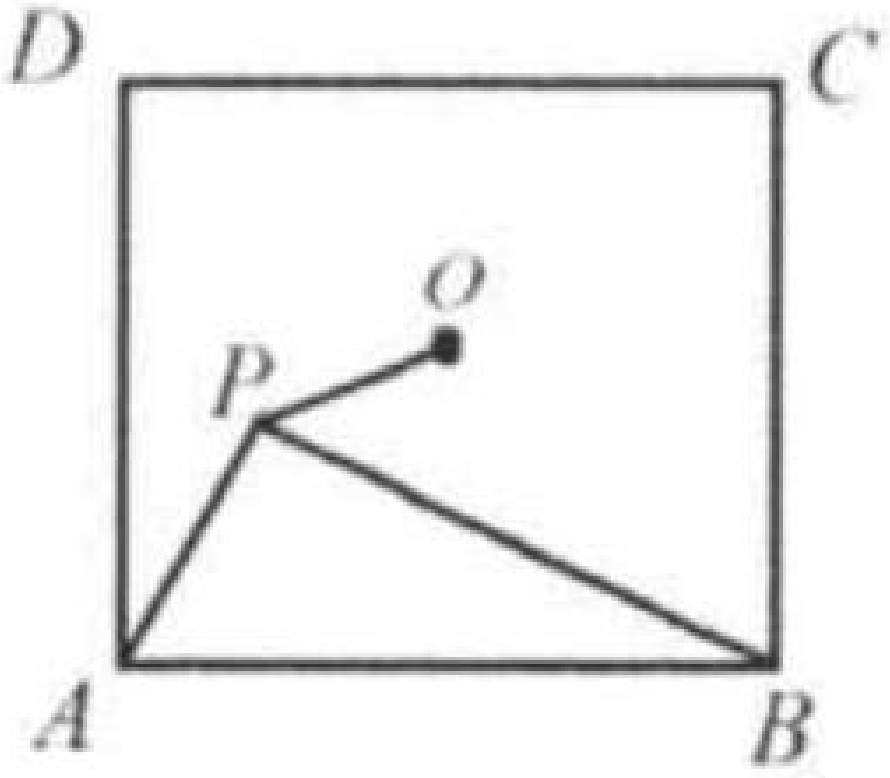
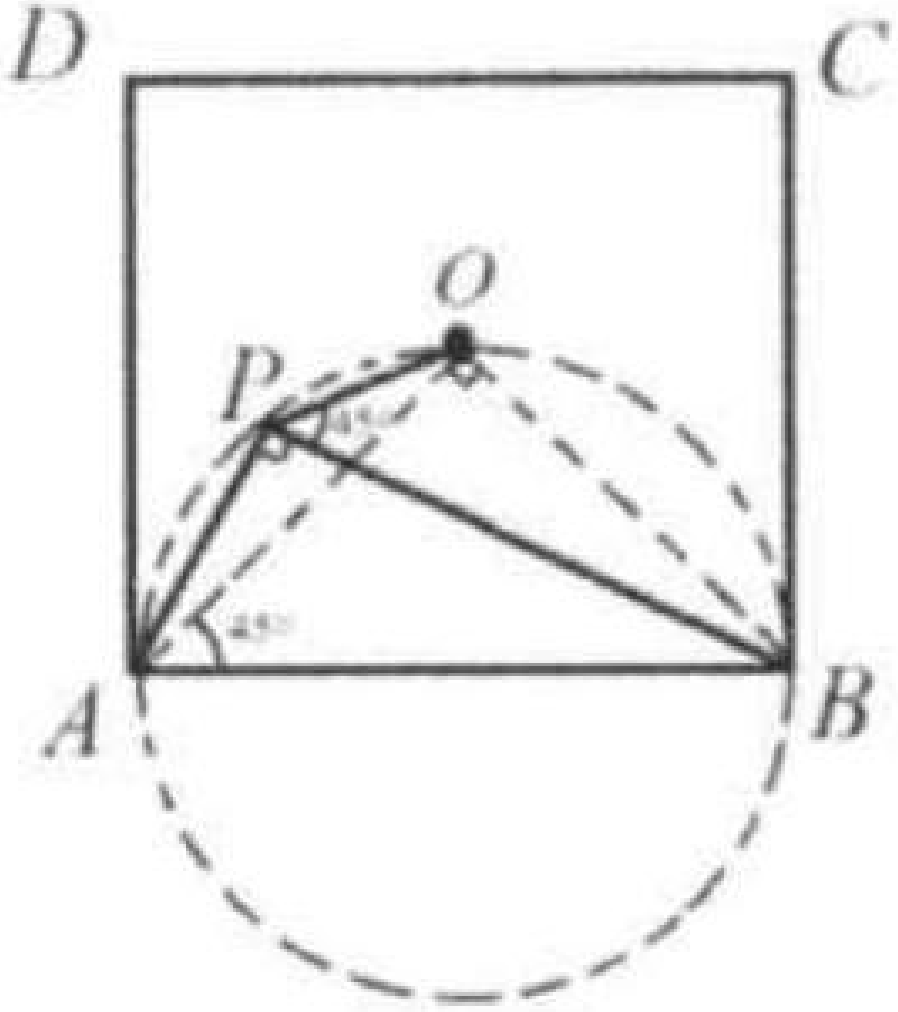
Example 11

(1989 China Middle School Math Contest) As shown in the figure, the area of square $ABCD$ is 1989 cm^2.O is the center, P is a point inside $ABCD$.$\angle OPB = 45°$.$PA : PB = 5 : 14$. Find the length of PB.

Solution: 42.



Connect OA, OB.
Since $\angle OPB = \angle OAB = 45°$, points A, B, O, and P are concyclic.
So $\angle APB = \angle AOB = 90°$.
Let $PA = 5x, PB = 14x$.
Applying Pythagorean Theorem to right triangle APB :
$(5x)^2 + (14x)^2 = 1989 \Rightarrow \quad x = 3$ and $PB = 42$.


D
C
O
P
A
B