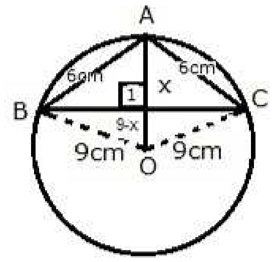
ex 9.4, exemplar x

(13) given - In fig. $AB = AC = 6\,cm$
$OB = OC = OA = 9\,cm$



to find - $ar(\triangle ABC)$

Sol. $AB = AC$ (each 6 cm)
$OB = OC$ (radii)
$\square ABOC$ is a kite
$\therefore AO \perp BC$ (diagonals of a kite are $\perp$ to each other)
$\angle 1 = \angle 2 = 90°$

In rt $\triangle ABO$
$AB^2 = AD^2 + BD^2$ (pythagoras theorem)
$\Rightarrow BD^2 = \cancel{AB^2} - \cancel{AD^2} = AB^2 - AD^2$
$= 6^2 - x^2 = 6^2 - x^2$
$= 36 - x^2 \quad \ldots (i)$

$\Rightarrow BD^2 = 36 - x^2$

In rt $\triangle BDO$
$BD^2 = BD^2 - OD^2$

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$\Rightarrow BD^2 = 9^2 - (9-x)^2 \quad \ldots (ii)$

From (i), (ii)
$36 - \cancel{x^2} = \cancel{81} - \cancel{81} - \cancel{x^2} + 18x$
$\Rightarrow 18x = 36$
$\Rightarrow x = 2$

Substituting in (i)
$BD^2 = 36 - 2^2$
$= 36 - 4$
$= 32$

$\Rightarrow BD = \sqrt{32}$
$= 4\sqrt{2}\,cm$

Similarly
$CD = 4\sqrt{2}\,cm$

$BC = BD + CD$
$= 4\sqrt{2} + 4\sqrt{2}$
$= 8\sqrt{2}\,cm$

$ar(\triangle ABC) = \frac{1}{2} BC \times x$
$= \frac{1}{2} \times 8\sqrt{2} \times 2$
$= 8\sqrt{2}\,cm^2$