

The sides of a right angled triangle are in A.P. If the triangle has area 24, then what is the length of its smallest side?
(JEE Advanced 2017)

Solution:

Let the sides be given by $a-d, a, a+d$
where $(a, d > 0)$, also $d < a$

\therefore in a right angled triangle

$$a^2 + (a-d)^2 = (a+d)^2$$

$$\Rightarrow a^2 = (a+d)^2 - (a-d)^2$$

$$\Rightarrow a^2 = 4ad$$

$$\boxed{\therefore a = 4d}$$

\therefore The sides are $3d, 4d, 5d$

$$\text{as area} = 24 \Rightarrow \frac{1}{2} \times 3d \times 4d = 24$$

$$\Rightarrow \boxed{d = 2}$$

\therefore The sides are 6, 8 and 10