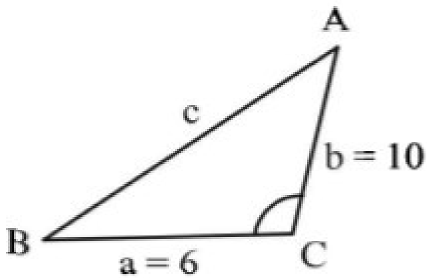
2. Consider a triangle ABC and let a, b and c denote the lengths of the sides opposite to vertices A, B and C respectively. Suppose $a=6$, $b=10$ and the area of the triangle is $15\sqrt{3}$, if $\angle ACB$ is obtuse and if r denotes the radius of the incircle of the triangle, then r^2 is equal to ***(2010)***

Solution: -

2. **(3)**



We know that area of $\Delta = \frac{1}{2} ab \sin C$

$\Rightarrow \frac{1}{2} \times 6 \times 10 \times \sin C = 15\sqrt{3}$

$\Rightarrow \sin C = \frac{\sqrt{3}}{2}$

$\Rightarrow C = 120°$ as C is obtuse angle.

Now using $\cos C = \frac{a^2 + b^2 - c^2}{2ab}$,

we get $\cos 120° = \frac{36 + 100 - c^2}{120}$

$\Rightarrow c^2 = 196$ or $c = 14$

$\therefore s = \frac{a + b + c}{2} = 15$

There radius of incircle, $r = \frac{\Delta}{s} = \frac{15\sqrt{3}}{15} = \sqrt{3}$

$\therefore r^2 = 3$