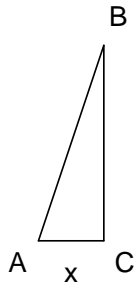**Question #44043 – Math – Geometry**

The lengths of two sides of a right triangle containing the right angle differ by $6\ cm$. If the area of the triangle is $36\ cm^2$, find the perimeter of the triangle.

Solution:

Let x is the length of AC, then $CB = x + 6$ is the length of a base.

The area of the triangle is:

$$S = \frac{AC \cdot BC}{2} = \frac{x(x+6)}{2}$$

Given $S = 36$.

$$\frac{x(x+6)}{2} = 36$$

Expanding:

$$x^2 + 6x - 72 = 0$$

$$x = -3 \pm \sqrt{9 + 72} = -3 \pm 9$$

$x > 0$, so $x = 6$

$$AC = 6\ cm$$

$$CB = x + 6 = 6 + 6 = 12\ cm$$

Using Pythagoras' theorem:

$$AC^2 + CB^2 = AB^2$$

$$AB = \sqrt{AC^2 + CB^2} = \sqrt{12^2 + 6^2} \approx 13$$

The perimeter of the triangle:

$$\boldsymbol{P = AB + AC + CB = 6 + 12 + 13 = 31\ cm}$$