Solve

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

a) $\overset{a}{1}x^2 \overset{b}{-6}x \overset{c}{-91} = 0$

$$x = \frac{6 \pm \sqrt{36 - 4(1)(-91)}}{2}$$

$$x = \frac{6 \pm \sqrt{400}}{2}$$

$$x = \frac{6 \pm 20}{2}$$

$$x_1 = \frac{6+20}{2} = \frac{26}{2} = 13 \qquad x_2 = \frac{6-20}{2} = -\frac{14}{2} = -7$$

b) $\overset{a}{9}x^2 + \overset{b}{30}x + \overset{c}{25} = 0$

$$x = \frac{-30 \pm \sqrt{900 - 4(9)(25)}}{2(9)}$$

$$x = \frac{-30 \pm \sqrt{0}}{18}$$

$$x = \frac{-30 \pm 0}{18}$$

$$x = -\frac{30}{18} = \frac{-5}{3}$$

c) $5x^2 + 9x + 12 = 0$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-9 \pm \sqrt{81 - 4(5)(12)}}{2(5)}$$

$$x = \frac{-9 \pm \sqrt{81 - 240}}{10}$$

$$x = \frac{-9 \pm \sqrt{-159}}{10}$$

$x = \varnothing$ No Real Solution

The Discriminant (Δ)

- the portion under the root sign: $\Delta = b^2 - 4ac$

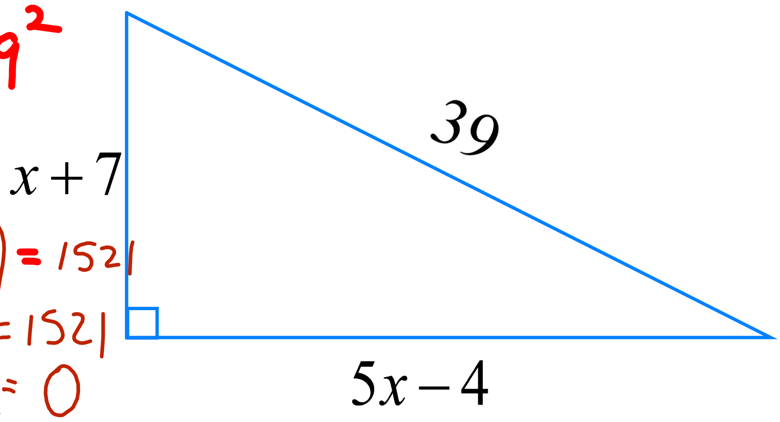
If ...

$b^2 - 4ac > 0$ (+) there are 2 real answers

$b^2 - 4ac = 0$ there is one real answer

$b^2 - 4ac < 0$ (−) there are no real answers

Determine the value of x



$$(5x-4)^2 + (x+7)^2 = 39^2$$

$$(25x^2 - 40x + 16) + (x^2 + 14x + 49) = 1521$$

$$26x^2 - 26x + 65 = 1521$$

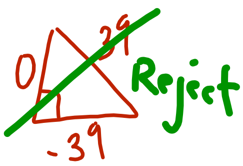
$$\frac{26x^2 - 26x - 1456}{26} = \frac{0}{26}$$

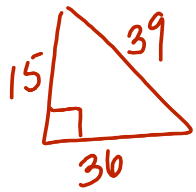
$$x^2 - x - 56 = 0$$

$$(x+7)(x-8) = 0$$

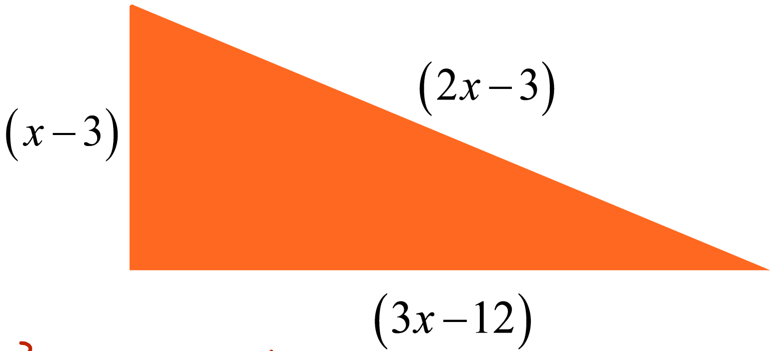
$x + 7 = 0$ or $x - 8 = 0$

$x = -7$ $\qquad$ $x = 8$





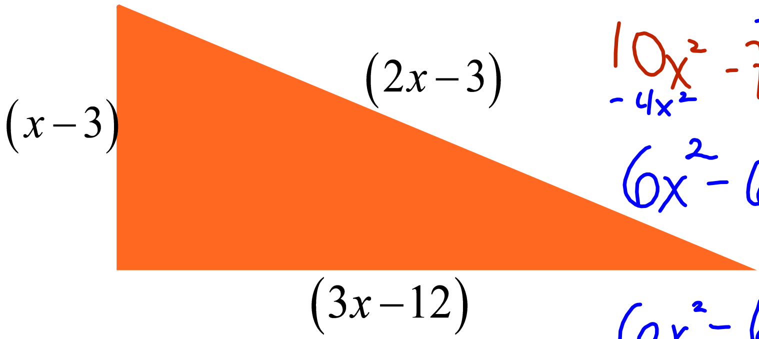
Determine the numerical perimeter of the right triangle shown below. All measurements are in centimetres.



$(3x-12)^2 + (x-3)^2 = (2x-3)^2$

$(9x^2-72x+144) + (x^2-6x+9) = (4x^2-12x+9)$

$10x^2-78x+154 = 4x^2-12x+9$



$$\underset{-4x^2}{10x^2} \overset{+12x}{-78x} + 154 = \underset{-4x^2}{4x^2} \underset{+12x}{-12x} + \overset{-9}{9}$$

$$6x^2 - 66x + 144 = 0$$ ← factor / quad form

$$\frac{6x^2 - 66x + 144}{6} = \frac{0}{6}$$

$$x^2 - 11x + 24 = 0$$

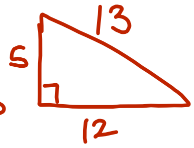
$$x = \frac{11 \pm \sqrt{121 - 4(1)(24)}}{2}$$

$$x = \frac{11 \pm \sqrt{25}}{2}$$

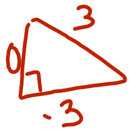
$$x = \frac{11 \pm 5}{2}$$

$$x_1 = \frac{11+5}{2} = \frac{16}{2} \quad \text{or} \quad x_2 = \frac{11-5}{2} = \frac{6}{2}$$

$x_1 = 8$



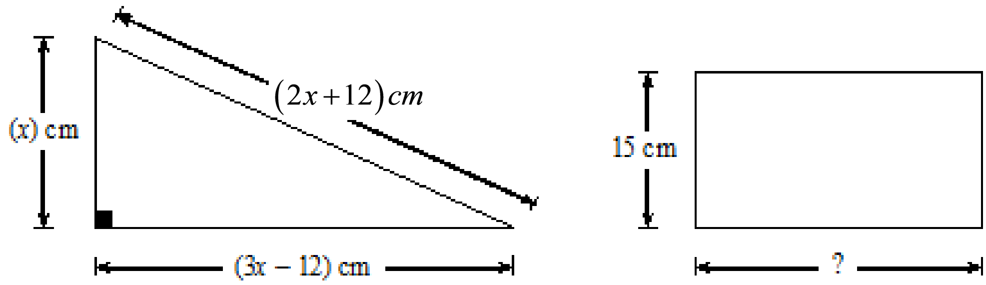
$x_2 = 3$ →



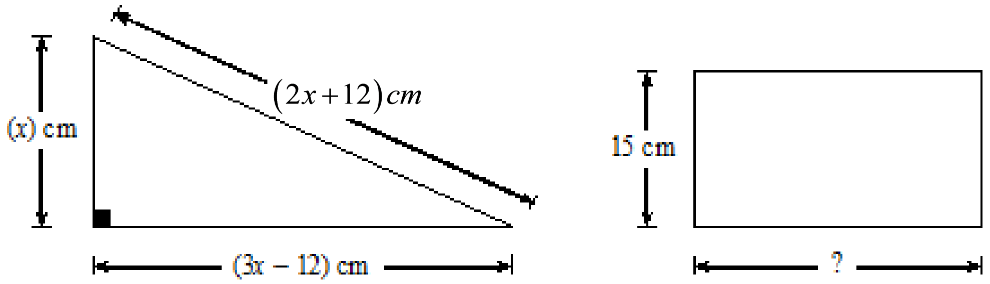
X

Answer:
$P = 5 + 12 + 13 = 30\text{ cm}$

The right triangle and the rectangle given below are equivalent. The sides of the right angle of the triangle measure (x) cm and ($3x - 12$) cm respectively and the hypotenuse measures ($2x + 12$) cm. The height of the rectangle is 15 cm.



What is the numerical length of the base of the rectangle?



What is the numerical length of the base of the rectangle?

$$x^2 + (3x-12)^2 = (2x+12)^2$$

$$x^2 + 9x^2 - 72x + 144 = 4x^2 + 48x + 144$$

$$10x^2 - 72x + \cancel{144} = \cancel{4x^2} + \cancel{48x} + \cancel{144}$$

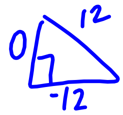
$$-4x^2 \quad -48x$$

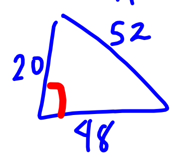
$$6x^2 - 120x = 0$$

$$6x(x-20) = 0$$

$6x = 0$ or $x - 20 = 0$

$x = 0$ $\qquad$ $x = 20$





Equivalent

$$A_\Delta = \frac{48 \cdot 20}{2} = 480\,cm^2$$

$$\therefore A_\square = 480\,cm^2$$

15 $\boxed{A = L \times W}$?

$$L = \frac{A}{W} = \frac{480}{15} = \underline{32\,cm}$$