

Solve $2x^2 - 50 = 0$

$$2x^2 - 50 = 0$$

$$2x^2 = 50$$

$$\div 2 \quad \div 2$$

$$x^2 = 25$$

$$\sqrt{x^2} = \sqrt{25}$$

$$x = \pm 5$$

$$2(x^2 - 25) = 0$$

$$2(x - 5)(x + 5) = 0$$

$$x - 5 = 0 \quad \text{or} \quad x + 5 = 0$$

$$x = 5 \quad \text{or} \quad x = -5$$

$$x = \{-5, 5\}$$

Solve $5x^2 - 35 = 0$

$$5x^2 - 35 = 0$$

$$\begin{array}{l} +35 \quad +35 \\ 5x^2 = 35 \\ \div 5 \quad \div 5 \\ x^2 = 7 \end{array}$$

$$x = \pm\sqrt{7}$$

$$5(x^2 - 7) = 0$$

$$\begin{array}{l} x^2 - 7 = 0 \\ +7 \quad +7 \end{array}$$

$$x^2 = 7$$

$$x = \pm\sqrt{7}$$

$$\therefore x = \{-\sqrt{7}, \sqrt{7}\}$$

Example: Solve $14x^2 + 28 = 0$

$$14x^2 = -28$$

$$x^2 = -2$$

$$x = \pm \sqrt{-2}$$

$$14(x^2 + 2) = 0$$

$$x^2 + 2 = 0$$

$$x^2 = -2$$

$$x = \pm \sqrt{-2}$$

You can't calculate the square root of a negative number.

No Real solution.

Example:

Solve $10x^2 - 4x - 7 = 4x^2 - 11x + 13$
 $-4x^2 + 11x - 13$
 make one side equal to 0

$6x - 20 = mx + n = -120$
 $m + n = 7$
 $+15, -8$ Factor

$$6x^2 + 7x - 20 = 0$$

$$6x^2 - 8x + 15x - 20 = 0$$

$$2x(3x - 4) + 5(3x - 4) = 0$$

$$(3x - 4)(2x + 5) = 0$$

$$3x - 4 = 0 \text{ or } 2x + 5 = 0$$

$$3x = 4 \qquad 2x = -5$$

$$x = \frac{4}{3} \qquad x = -\frac{5}{2}$$

$$X = \left\{ -\frac{5}{2}, \frac{4}{3} \right\}$$

Example: The length of a rectangle is 5cm longer than its width. If the area is equal to 150cm^2 , what is the numerical value of the perimeter of the rectangle?

width: x

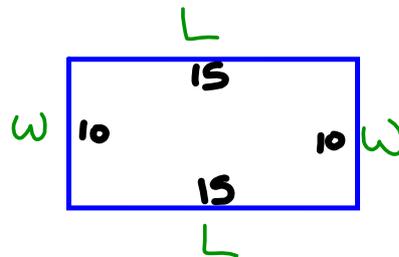
length: $x+5$

Area: $x(x+5)$ or x^2+5x

$$\boxed{x^2 + 5x = 150}$$

$$x^2 + 5x - 150 = 0$$

$$(x+15)(x-10) = 0$$



$$x+15=0 \text{ or } x-10=0$$

$$\underline{x=-15} \text{ or } \underline{x=10}$$

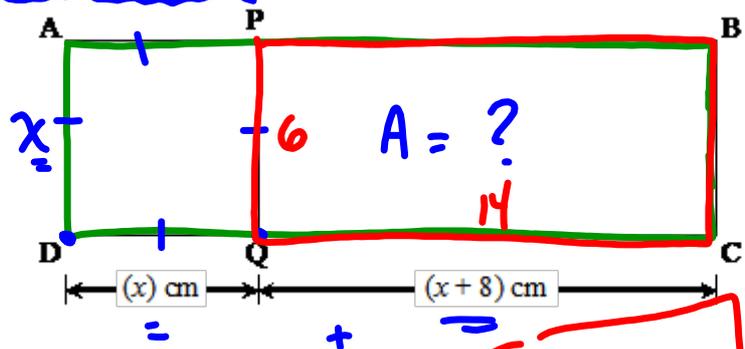
width cannot be (-)

$$\therefore \boxed{x=10}$$

Perimeter = 50 cm

Example: In the figure, \overline{PQ} divides rectangle $ABCD$ into two quadrilaterals: square $APQD$ and rectangle $PBCQ$. The area of rectangle $ABCD$ is 120cm^2 . In addition, $mDQ = (x)\text{cm}$ and $mQC = (x+8)\text{cm}$.

What is the numerical area of rectangle $PBCQ$?



$$L \times W = 120$$

$$B \cdot H = 120$$

$$(2x+8)x = 120$$

$$2x^2 + 8x = 120$$

$$2x^2 + 8x - 120 = 0$$

$$2(x^2 + 4x - 60) = 0$$

$$x^2 + 4x - 60 = 0$$

$$x^2 + 4x - 60 = 0$$

$$(x+10)(x-6) = 0$$

$$x+10=0 \text{ or } x-6=0$$

$$x = -10$$

Reject

$$x = 6$$

$$\text{Area} = 6 \times 14 = 84 \text{ cm}^2$$

Today, a father is 2 years older than triple his son's age.
 Five years ago, the product of their ages was 420. How old is the father now?

present
past
 multiply
 ① 2 variables (unknowns)
 ② 2 times (present, past)

Father is 47

	Present	Past
father's age	$3x + 2 = 47$	$3x + 2 - 5 = 3x - 3$
son's age	$x = 15$	$x - 5$

$$(3x - 3)(x - 5) = 420$$

$$3x^2 - 15x - 3x + 15 = 420$$

$$3x^2 - 18x + 15 = 420$$

$$3x^2 - 18x - 405 = 0$$

$$\frac{3}{3}(x^2 - 6x - 135) = \frac{0}{3}$$

$$x^2 - 6x - 135 = 0$$

$m+n = -135$
 $m+n = -6$

$$(x+9)(x-15) = 0$$

$$x+9=0 \text{ or } x-15=0$$

$$x = \{-9, 15\}$$