

Solve:  $2x^2 - x = 6$  $-6 \quad -6$ *Make the equation equal to 0, then factor the LHS.*

$$\begin{array}{l} mxn = -12 \\ m+n = -1 \\ \hline -4, 3 \end{array}$$

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

$$2x^2 - 4x + 3x - 6 = 0$$

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

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

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

$$x=2$$

$$2x = -3$$

$$x = -1.5$$

$$x = \{-1.5, 2\}$$

Solve  $\underline{4x^2 - 36 = 0}$

① Isolate  $x$

$$4x^2 - 36 + 36 = 0 + 36$$

$$4x^2 = 36$$

$$\div 4 \quad \div 4$$

$$x^2 = 9$$

$$\sqrt{x^2} = \sqrt{9}$$

$$x = \pm 3$$

$$-3 \times -3$$

or

$$+ 3 \times 3$$

② Difference of squares (factor)

$$(2x + 6)(2x - 6) = 0$$

$$2x + 6 = 0 \quad \text{or} \quad 2x - 6 = 0$$

$$2x = -6$$

$$x = -3$$

$$2x = 6$$

$$x = 3$$

$$x = \{-3, +3\}$$

Solve  $2x^2 - 50 = 0$

① Isolate  $x$

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

$$2x^2 = 50$$

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

$$x^2 = 25$$

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

$$x = \pm 5$$

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

Factor

②  $2(\underbrace{x^2 - 25}_{\text{D.O.S}}) = 0$

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

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

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

Solve  $5x^2 - 35 = 0$

$+35 \quad +35$

$5x^2 = 35$

$\div 5 \quad \div 5$   
 $x^2 = 7$

$x = \pm\sqrt{7} \quad \text{or } \pm 2.65$

factor

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

$x^2 - 7 = 0$

$x^2 = 7$

$\sqrt{x^2} = \sqrt{7}$

$x = \pm\sqrt{7}$

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

Example: Solve

$$14x^2 + 28 = 0$$

$$-28 \quad -28$$

$$14x^2 = -28$$

$$\div 14 \quad \div 14$$

$$x^2 = -2$$

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

$$\boxed{+} \times \boxed{-} = -2$$

no solution

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

Example:

$$\text{Solve } 10x^2 - 4x - 7 = 4x^2 - 11x + 13$$

$-4x^2$      $+11x$      $-13$     pick a side     $-4x^2$      $+11x$      $-13$

$$\begin{array}{l} m \times n = -120 \\ m + n = 7 \\ \hline -8, 15 \end{array}$$

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

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

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

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

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

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

$$x = \frac{4}{3}$$

$$x = \frac{-5}{2} \text{ or } -2.5$$

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

⇒ width:  $x$

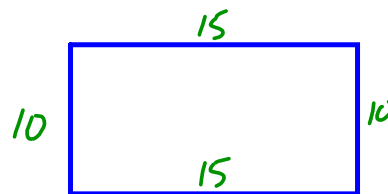
length:  $x+5$

Area:  $x(x+5) = 150\text{cm}^2$   
 $W \times L$

$$x(x+5) = 150$$

multi:  $x(x+5) - 150 = 0$

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



factor

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

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

$$\begin{aligned} m \times n &= -150 \\ m+n &= 5 \end{aligned}$$

$$x+15=0$$

$$\underline{x = -15}$$

reject

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

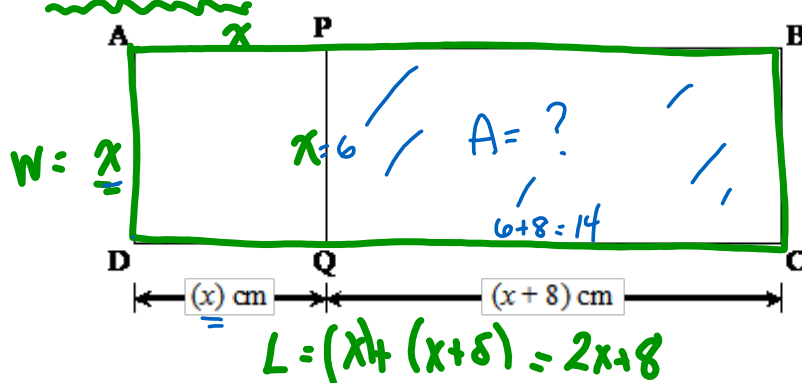
$$\underline{x = 10}$$

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  $120\text{cm}^2$ . In addition,  $mDQ = (x)\text{cm}$  and  $mQC = (x+8)\text{cm}$ .

What is the numerical area of rectangle  $PBCQ$ ?

$$\begin{aligned} \text{Area } ABCD &= 120 \\ \text{Area } ABCD &= (2x+8)(x) \\ (2x+8)(x) &= 120 \\ (2x+8)(x) - 120 &= 0 \\ 2x^2 + 8x - 120 &= 0 \\ 2(x^2 + 4x - 60) &= 0 \\ 2(x+10)(x-6) &= 0 \\ x+10=0 &\text{ or } x-6=0 \\ \text{S. } \boxed{x=10} &\quad \underline{\underline{x=6}} \end{aligned}$$



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