Zero Product Property

If we are told that $(x+1)(x+8)=0$

By the zero product property we know:

$(x+1)=0$ OR $(x+8)=0$

And we know that

$x=-1$ OR $x=-8$

② If we are told that $(3x-1)(3x-5)=0$

By the zero product property we know

$3x-1=0$ OR $3x-5=0$

And therefore we know that:

$\frac{3x}{3}=\frac{1}{3}$ OR $\frac{3x}{3}=\frac{5}{3}$

$x=\frac{1}{3}$ OR $x=\frac{5}{3}$.

3) We want to solve the equation

$x^2 - 3x - 4 = 0$.

First factor $x^2 - 3x - 4$:

$P = -4 \quad S = -3 \quad N.O = -4, 1$

Factoring: $\Leftrightarrow (x-4)(x+1) = 0$.

By the zero product property we know

$x - 4 = 0$ OR $x + 1 = 0$.

And therefore we know that

$x = 4$ OR $x = -1$

4 We want a solve the equation.

$3x^2 + 14x - 24 = 0$

First, factor ~~$x^2 - 3x - 4$~~ $3x^2 + 14x - 24$ $P = -72, S = 14$ NO: 18,

$\Leftrightarrow 3x^2 + 18x - 4x - 24 = 0 \Leftrightarrow 3x(x+6) - 4(x+6) = 0$.

$\Leftrightarrow (3x - 4)(x + 6) = 0$.

By the zero property we know

$3x - 4 = 0$ OR $x + 6 = 0$.

And therefore we know that

$x = \frac{4}{3}$ OR $x = -6$.

(5) We want to solve the equation
$25x^2 - 20x + 3 = 0$.

First, factor $25x^2 - 20x + 3$:

$P = 75, \; S = -20 \quad N \cdot 0 = -15, -5.$

$25x^2 - 5x - 5x + 3 = 0$.

$5x(5x-3) - 1(5x-3) = 0$.

$\therefore (5x-1)(5x-3) = 0$.

By the zero product property we know
$5x - 1 = 0$ OR $5x - 3 = 0$.

And therefore we know that
$x = \frac{1}{5}$ OR $x = \frac{3}{5}$.

Square Root Property.

(1) $w^2 - 7w + \frac{49}{4}$

$= w^2 - 7w + \left(\frac{7}{2}\right)^2$.

$= \left(w - \frac{7}{2}\right)^2 = 0$

$\Leftrightarrow \left(w - \frac{7}{2}\right)\left(w - \frac{7}{2}\right) = 0$.

② Solve the equation for x.

$x^2 + 10x + 21 = 0$.

Step 1:

$$x^2 + 10x = -21$$

Step 2:

$$x^2 + 10x + (5)^2 = -21 + (5)^2$$

$$(x+5)^2 = -21 + 25$$

Step 3:

$$(x+5)^2 = 4.$$

Step 4:

$$\sqrt{(x+5)^2} = \sqrt{4}$$

$$x + 5 = \pm\sqrt{4}$$

$$x + 5 = \pm 2.$$

Step 5:

$$x + 5 = 2 \quad \text{OR} \quad x + 5 = -2.$$

$$x = -3 \quad \text{OR} \quad x = -7$$

(3) $x^2 + 8x + 6 = 0$.

Step 1:

$x^2 + 8x = -6$.

Step 2:

$x^2 + 8x + (4)^2 = -6 + (4)^2$.

$x^2 + 8x + 4^2 = -6 + 16$.

Step 3:

$(x+4)^2 = 10$.

Step 4:

$\sqrt{(x+4)^2} = \pm\sqrt{10}$

$x + 4 = \pm\sqrt{10}$.

Step 5:

$x + 4 = \sqrt{10}$ OR $x + 4 = -\sqrt{10}$.

~~$x = \sqrt{10} - 4$~~ OR $x = -\sqrt{10} - 4$

$x = \sqrt{10} - 4$