

MORE SOLVING EQUATIONS BY FACTORING

Example 1

Solve $m^2 - 8m - 33 = 0$.

sum -8 product -33

$$\underline{(m-11)} \underline{(m+3)} = 0 \quad \begin{array}{c} -11 \\ \hline 1 \end{array} \quad \begin{array}{c} 3 \\ \hline 1 \end{array}$$

$$\begin{array}{r} m-11=0 \\ +11 \quad +11 \\ \hline \end{array}$$

$$\boxed{m=11}$$

$$\begin{array}{r} m+3=0 \\ -3 \quad -3 \\ \hline \end{array}$$

$$\boxed{m=-3}$$

Example 2

Solve $r^2 = 5r + 24$.

$$\begin{array}{r} -5r-24 \quad -5r-24 \\ \hline \end{array}$$

$$r^2 - 5r - 24 = 0$$

sum -5 product -24

$$\underline{(r-8)} \underline{(r+3)} = 0 \quad \begin{array}{c} -8 \\ \hline 1 \end{array} \quad \begin{array}{c} 3 \\ \hline 1 \end{array}$$

$$\begin{array}{r} r-8=0 \\ +8 \quad +8 \\ \hline \end{array}$$

$$\boxed{r=8}$$

$$\begin{array}{r} r+3=0 \\ -3 \quad -3 \\ \hline \end{array}$$

$$\boxed{r=-3}$$

Example 3

$$\text{Solve } 12 \cdot \left(\frac{x^2}{12} - \frac{2x}{3} - 4 \right) = 0 \cdot 12$$

LCD = 12

$$\cancel{12} \cdot \frac{x^2}{\cancel{12}} - \cancel{12} \cdot \frac{2x}{\cancel{3}} - 12 \cdot 4 = 12 \cdot 0$$

$$x^2 - 8x - 48 = 0$$

$$(x-12)(x+4) = 0$$

$$x-12=0$$

$$\boxed{x=12}$$

$$x+4=0$$

$$\boxed{x=-4}$$

$$\begin{array}{r|l} s-8 & p-48 \\ \hline -12 & 4 \\ \hline 1 & 1 \end{array}$$

Example 4

$$\text{Solve } 10 \cdot \left(\frac{x^2}{5} - \frac{x}{2} - \frac{3}{10} \right) = 0 \cdot 10$$

LCD = 10

$$\cancel{10} \cdot \frac{x^2}{\cancel{5}} - \cancel{10} \cdot \frac{x}{\cancel{2}} - \cancel{10} \cdot \frac{3}{\cancel{10}} = 10 \cdot 0$$

$$2x^2 - 5x - 3 = 0$$

$$(x-3)(2x+1) = 0$$

$$x-3=0$$

$$\boxed{x=3}$$

$$2x+1=0$$

$$\boxed{x=-\frac{1}{2}}$$

$$\begin{array}{r|l} s-5 & p-6 \\ \hline -6 & 1 \\ \hline 2 & 2 \\ \downarrow & \downarrow \\ -3 & -1 \\ \hline 1 & 1 \end{array}$$

Example 5

Solve $h^3 + 2h^2 = 15h$.

$$\begin{array}{r} h^3 + 2h^2 - 15h = 0 \\ \underline{-15h \quad -15h} \end{array}$$

$$h(h^2 + 2h - 15) = 0$$

$$h(h-3)(h+5) = 0$$

$$\boxed{h=0} \quad h-3=0 \quad h+5=0$$

$$\boxed{h=3}$$

$$\boxed{h=-5}$$

$$\begin{array}{r} s \quad 2 \quad p \quad -15 \\ \hline -3 \quad 5 \\ \hline 1 \quad 1 \end{array}$$

Example 6

Solve $7x^2 = 70x - 175$.

$$\begin{array}{r} 7x^2 - 70x + 175 = 0 \\ \underline{-70x + 175 \quad -70x + 175} \end{array}$$

$$7x^2 - 70x + 175 = 0$$

$$7(x^2 - 10x + 25) = 0$$

$$7(\underline{x-5})(\underline{x-5}) = 0$$

$$x-5=0$$

$$\boxed{x=5}$$

$$\begin{array}{r} s \quad -10 \quad p \quad 25 \\ \hline -5 \quad -5 \\ \hline 1 \quad 1 \end{array}$$

Example 7 FOIL/dist:
prop:

Solve $(x + 8)(x + 1) = -12$.

$$\begin{array}{r} x^2 + x + 8x + 8 = -12 \\ +12 +12 \end{array}$$

$$x^2 + 9x + 20 = 0$$

$$(x + 4)(x + 5) = 0$$

$$x + 4 = 0$$

$$x = -4$$

$$x + 5 = 0$$

$$x = -5$$

$$\begin{array}{r} \overline{50 \quad p20} \\ 4 \quad 5 \\ \hline 1 \quad 1 \end{array}$$

Example 8 FOIL

Solve $(x + 1)(2x + 1) = 28$.

$$\begin{array}{r} 2x^2 + x + 2x + 1 = 28 \\ -28 -28 \end{array}$$

$$2x^2 + 3x - 27 = 0$$

$$(2x + 9)(x - 3) = 0$$

$$2x + 9 = 0$$

$$x = -\frac{9}{2}$$

$$x - 3 = 0$$

$$x = 3$$

$$\begin{array}{r} \overline{53 \quad p-54} \\ 9 \quad -6 \\ \hline 2 \quad 2 \\ \downarrow \quad \downarrow \\ 9 \quad -3 \\ \hline 2 \quad 1 \end{array}$$