

Name: _____

Date: _____

Learning Goal 4.2

Given a quadratic equation, find the values of solution(s) by factoring, completing the square or using the quadratic formula.

Solve the following quadratic equations using factoring.

a. $30 = x^2 - x$
 $x^2 - x - 30 = 0$

$$\begin{aligned} -6 \times 5 &= 30 \\ -6 + 5 &= -1 \end{aligned}$$

$$\begin{aligned} x^2 - 6x + 5x - 30 &= 0 \\ x(x - 6) + 5(x - 6) &= 0 \\ (x - 6)(x + 5) &= 0 \end{aligned}$$

$$\begin{aligned} x - 6 &= 0 & x + 5 &= 0 \\ x &= 6 & x &= -5 \end{aligned}$$

b. $12x = x^2 + 36$
 $x^2 - 12x + 36 = 0$

$$\begin{aligned} -6 \times -6 &= 36 \\ -6 + (-6) &= -12 \end{aligned}$$

$$\begin{aligned} x^2 - 6x - 6x + 36 &= 0 \\ x(x - 6) - 6(x - 6) &= 0 \\ (x - 6)^2 &= 0 \end{aligned}$$

$$\begin{aligned} x - 6 &= 0 \\ x &= 6 \end{aligned}$$

c. $-12 = 2x^2 - 11$
 $2x^2 - 11x + 12 = 0$

$$\begin{aligned} -8 \times -3 &= 24 \\ -8 + (-3) &= -11 \end{aligned}$$

$$\begin{aligned} 2x^2 - 8x - 3x + 12 &= 0 \\ 2x(x - 4) - 3(x - 4) &= 0 \\ (x - 4)(2x - 3) &= 0 \end{aligned}$$

$$\begin{aligned} x - 4 &= 0 & 2x - 3 &= 0 \\ x &= 4 & 2x &= 3 \\ & & x &= \frac{3}{2} \end{aligned}$$

d. $9x^2 - 0.64 = 0$
 $9x^2 - \frac{64}{100} = 0$

Difference of Squares, so

$$\left(3x - \frac{8}{10}\right)\left(3x + \frac{8}{10}\right) = 0$$

$$\begin{aligned} 3x - \frac{8}{10} &= 0 & 3x + \frac{8}{10} &= 0 \\ 3x &= \frac{8}{10} & 3x &= -\frac{8}{10} \\ 3x &= \frac{4}{5} & 3x &= -\frac{4}{5} \\ x &= \frac{4}{15} & x &= -\frac{4}{15} \end{aligned}$$

$$e. 12(x + 2)^2 = -24(x + 2) - 9$$

$$\text{Let } y = x + 2$$

$$12y^2 = -24y - 9$$

$$12y^2 + 24y + 9 = 0$$

$$3(4y^2 + 8y + 3) = 0$$

$$3(4y^2 + 8y + 3) = 0$$

$$6 \times 2 = 12$$

$$6 + 2 = 8$$

$$3(4y^2 + 6y + 2y + 3) = 0$$

$$3(2y(2y + 3) + (2y + 3)) = 0$$

$$3(2y + 3)(2y + 1) = 0$$

$$2y + 3 = 0$$

$$2y = -3$$

$$y = -\frac{3}{2}$$

$$x + 2 = -\frac{3}{2}$$

$$x = -\frac{3}{2} - 2$$

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

$$x = -\frac{7}{2}$$

$$2y + 1 = 0$$

$$2y = -1$$

$$y = -\frac{1}{2}$$

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

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

$$x = -\frac{1}{2} - \frac{4}{2}$$

$$x = -\frac{5}{2}$$