

MAC1105 College Algebra
1.4 Practice Problems

Solve the quadratic equation by factoring.

1. $x^2+3x-40=0$

$$(x+8)(x-5)=0$$

$$\begin{array}{l} x+8=0 \quad x-5=0 \\ -8 \quad -8 \quad +5 \quad +5 \\ x=-8 \quad x=5 \end{array}$$

2. $10x^2+7x-12=0$

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

$$\begin{array}{l} 5x-4=0 \quad 2x+3=0 \\ +4 \quad +4 \quad -3 \quad -3 \\ 5x=4 \quad 2x=-3 \\ \frac{5x}{5}=\frac{4}{5} \quad \frac{2x}{2}=\frac{-3}{2} \\ x=4/5 \quad x=-3/2 \end{array}$$

3. $x^2-16=0$

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

$$\begin{array}{l} x+4=0 \quad x-4=0 \\ -4 \quad -4 \quad +4 \quad +4 \\ x=-4 \quad x=4 \end{array}$$

Solve the quadratic equation using the square root method.

4. $\frac{9x^2}{9}=\frac{25}{9}$

$$x^2=\frac{25}{9}$$

$$\sqrt{x^2}=\sqrt{\frac{25}{9}}$$

$$x=\pm\frac{5}{3}$$

5. $(x-2)^2-9=0$

$$+9 \quad +9$$

$$(x-2)^2=9$$

$$\sqrt{(x-2)^2}=\sqrt{9}$$

$$x-2=\pm 9$$

$$+2 \quad +2$$

$$x=2\pm 9$$

$$2+9=11$$

$$-2-9=-7$$

Solve the quadratic equation by completing the square.

6. $x^2 + 4x + 6 = 0$

$$\begin{aligned} x^2 + 4x &= -6 \\ x^2 + 4x + 4 &= -6 + 4 \\ (x+2)(x+2) &= -2 \\ (x+2)^2 &= -2 \end{aligned}$$

$$\begin{aligned} \sqrt{(x+2)^2} &= \sqrt{-2} \\ x+2 &= \pm i\sqrt{2} \\ -2 & \quad -2 \\ x &= -2 \pm i\sqrt{2} \end{aligned}$$

7. $x^2 - 6x - 7 = 0$

$$\begin{aligned} x^2 - 6x &= 7 \\ x^2 - 6x + 9 &= 7 + 9 \\ (x-3)(x-3) &= 16 \\ (x-3)^2 &= 16 \end{aligned}$$

$$\begin{aligned} \sqrt{(x-3)^2} &= \sqrt{16} \\ x-3 &= \pm 4 \\ +3 \quad +3 & \quad \begin{matrix} 3+4=7 \\ 3-4=-1 \end{matrix} \\ x &= 3 \pm 4 \end{aligned}$$

8. $2x^2 - 4x - 5 = 0$

$$\begin{aligned} \frac{2x^2}{2} - \frac{4x}{2} &= \frac{5}{2} \\ x^2 - 2x &= \frac{5}{2} \\ x^2 - 2x + 1 &= \frac{5}{2} + 1 \\ (x-1)^2 &= \frac{7}{2} \end{aligned}$$

$$\begin{aligned} \sqrt{(x-1)^2} &= \sqrt{\frac{7}{2}} \\ x-1 &= \pm \sqrt{\frac{7}{2}} \\ +1 \quad +1 & \\ x &= 1 \pm \sqrt{\frac{7}{2}} \end{aligned}$$

Solve the quadratic equation using the quadratic formula.

9. $3x^2 - 4x - 9 = 0$

$a=3 \quad b=-4 \quad c=-9$

$$\begin{aligned} x &= \frac{-(-4) \pm \sqrt{(-4)^2 - 4(3)(-9)}}{2(3)} \\ &= \frac{4 \pm \sqrt{16 + 108}}{6} \end{aligned}$$

$$\begin{aligned} &= \frac{4 \pm \sqrt{124}}{6} \\ &= \frac{4 \pm \sqrt{4 \cdot 31}}{6} \\ &= \frac{4 \pm 2\sqrt{31}}{6} = \frac{2 \pm \sqrt{31}}{3} \end{aligned}$$

10. $2x^2 + x + 6 = 0$

$a=2 \quad b=1 \quad c=6$

$$\begin{aligned} x &= \frac{-1 \pm \sqrt{1^2 - 4(2)(6)}}{2(2)} \\ &= \frac{-1 \pm \sqrt{1 - 48}}{2} \\ &= \frac{-1 \pm \sqrt{-47}}{2} \end{aligned}$$

$$= \frac{-1 \pm i\sqrt{47}}{2}$$