



N:

D: P: 1 2 3 4 5 6

Solving Quadratics // Practice 4

A. Simplify the following square roots:

$$1) \sqrt{8}$$

$$\begin{array}{r} \sqrt{4} \sqrt{2} \\ 2 \sqrt{2} \end{array}$$

$$\boxed{2\sqrt{2}}$$

$$2) \sqrt{12}$$

$$\begin{array}{r} \sqrt{4} \sqrt{3} \\ 2 \sqrt{3} \end{array}$$

$$\boxed{2\sqrt{3}}$$

$$3) \sqrt{32}$$

$$\begin{array}{r} \sqrt{16} \sqrt{2} \\ 4 \sqrt{2} \end{array}$$

$$\boxed{4\sqrt{2}}$$

$$4) \sqrt{40}$$

$$\begin{array}{r} \sqrt{4} \sqrt{10} \\ 2 \sqrt{10} \end{array}$$

$$\boxed{2\sqrt{10}}$$

$$5) \sqrt{20}$$

$$\begin{array}{r} \sqrt{4} \sqrt{5} \\ 2 \sqrt{5} \end{array}$$

$$\boxed{2\sqrt{5}}$$

B. Solve each quadratic equation by using square roots or by factoring.

$$1) \frac{2x^2}{2} = \frac{32}{2}$$

$$\sqrt{x^2} = \sqrt{16}$$

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

$$2) \frac{3x^2}{3} = \frac{27}{3}$$

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

$$\boxed{x = \pm 3}$$

$$3) x^2 - 4x - 12 = 0$$

$$\begin{array}{r} 1 \quad -6 \\ 1 \quad -2 \end{array}$$

$$\begin{array}{r} 1 \cdot -12 \\ 2 \cdot -6 \end{array}$$

$$\begin{array}{r} 1 \quad -4 \quad -12 \\ (x-6)(x+2) = 0 \end{array}$$

$$\begin{array}{l} x-6=0 \\ +6 \quad +6 \\ \hline x=6 \end{array}$$

$$\begin{array}{l} x+2=0 \\ -2 \quad -2 \\ \hline x=-2 \end{array}$$

$$\boxed{x=6} \quad \boxed{x=-2}$$

$$4) 3x^2 - 15x - 72 = 0$$

$$3(x^2 - 5x - 24) = 0$$

$$\begin{array}{r} 1 \quad -8 \\ 1 \quad 3 \end{array}$$

$$\begin{array}{r} 1 \cdot -24 \\ 3 \cdot -8 \end{array}$$

$$\begin{array}{r} 1 \quad -8 \quad -24 \\ (x-8)(x+3) = 0 \end{array}$$

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

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

$$\boxed{x=8} \quad \boxed{x=-3}$$

$$5) 4x^2 - 5 = 9$$

$$\frac{4x^2}{4} = \frac{14}{4}$$

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

$$\boxed{x = \pm \sqrt{\frac{7}{2}}}$$

$$6) x^2 + 7x + 12 = 0$$

$$\begin{array}{r} 1 \quad 3 \\ 1 \quad 4 \end{array}$$

$$\begin{array}{r} 1 \cdot 12 \\ 3 \cdot 4 \end{array}$$

$$\begin{array}{r} 1 \quad 7 \quad 12 \\ (x+3)(x+4) = 0 \end{array}$$

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

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

$$\boxed{x=-3} \quad \boxed{x=-4}$$

$$7) \frac{1}{2}x^2 - 5 = 13$$

$$\frac{1}{2}x^2 = 18$$

$$\sqrt{x^2} = \sqrt{36}$$

$$\boxed{x = \pm 6}$$

$$8) x^2 + 4x = -3$$

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

$$\begin{array}{r} 1 \quad 1 \\ 1 \quad 3 \end{array}$$

$$\begin{array}{r} 1 \cdot 3 \\ 1 \cdot 3 \end{array}$$

$$\begin{array}{r} 1 \quad 1 \quad 3 \\ (x+1)(x+3) = 0 \end{array}$$

$$\begin{array}{l} x+1=0 \\ -1 \quad -1 \\ \hline x=-1 \end{array}$$

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

$$\boxed{x=-1} \quad \boxed{x=-3}$$

$$9) x^2 + 8x + 16 = 0$$

$$\begin{array}{r} 1 \quad 4 \\ 1 \quad 4 \end{array}$$

$$\begin{array}{r} 1 \cdot 16 \\ 4 \cdot 4 \end{array}$$

$$\begin{array}{r} 1 \quad 8 \quad 16 \\ (x+4)(x+4) = 0 \end{array}$$

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

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

$$10) x^2 = 5x$$

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

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

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

$$\boxed{x=0} \quad \boxed{x=5}$$

$$11) -x^2 + 9 = 2x^2 - 6$$

$$-3x^2 + 15 = 0$$

$$\frac{-3x^2}{-3} = \frac{-15}{-3}$$

$$\sqrt{x^2} = \sqrt{5}$$

$$\boxed{x = \pm \sqrt{5}}$$

$$12) \frac{3}{2}x^2 = 6 \cdot \frac{3}{2}$$

$$x^2 = \frac{18}{2}$$

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

$$\boxed{x = \pm 3}$$

$$13) x^2 - x - 6 = 0$$

$$\begin{array}{r} 1 \cdot 1 \quad 1 \cdot -6 \quad 2 \cdot -3 \\ \hline 1 \quad -1 \quad -6 \end{array}$$

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

$$\begin{array}{l} x-3=0 \rightarrow x+2=0 \\ \underline{+3 \quad +3} \quad \underline{-2 \quad -2} \end{array}$$

$$\boxed{x=3} \quad \boxed{x=-2}$$

$$14) 3x^2 - 7 = 2(x^2 + 3)$$

$$\begin{array}{r} 3x^2 - 7 = 2x^2 + 6 \\ -2x^2 + 7 \quad -2x^2 + 7 \\ \hline x^2 = 13 \end{array}$$

$$\boxed{x = \pm \sqrt{13}}$$

$$15) \frac{2}{3}x^2 + 6 = 18$$

$$\begin{array}{r} \frac{2}{3}x^2 + 6 = 18 \\ -6 \quad -6 \\ \hline \left(\frac{3}{2}\right) \frac{2}{3}x^2 = \frac{12}{1} \left(\frac{3}{2}\right) \\ x^2 = \frac{36}{2} \\ \sqrt{x^2} = \sqrt{18} \end{array}$$

$$\boxed{x = \pm 3\sqrt{2}}$$

$\sqrt{18}$
 $\sqrt{9} \sqrt{2}$
 $3\sqrt{2}$

$$16) x^2 - 2x = 48$$

$$\begin{array}{r} x^2 - 2x - 48 = 0 \\ -48 \quad -48 \end{array}$$

$$\begin{array}{r} 1 \cdot 1 \quad 1 \cdot -48 \quad 3 \cdot -16 \\ \hline 1 \quad -2 \quad -48 \end{array}$$

$$(x+6)(x-8) = 0$$

$$\begin{array}{l} x+6=0 \rightarrow x-8=0 \\ \underline{-6 \quad -6} \quad \underline{+8 \quad +8} \end{array}$$

$$\boxed{x=-6} \quad \boxed{x=8}$$

$$17) \frac{1}{3}x^2 = 4 \left(\frac{3}{1}\right)$$

$$\begin{array}{r} \frac{1}{3}x^2 = 4 \\ \sqrt{\frac{1}{3}x^2} = \sqrt{12} \\ x^2 = 12 \end{array}$$

$$\boxed{x = \pm 2\sqrt{3}}$$

$\sqrt{12}$
 $\sqrt{4} \sqrt{3}$
 $2\sqrt{3}$

$$18) 9x^2 = 9$$

$$\begin{array}{r} 9x^2 = 9 \\ \sqrt{9x^2} = \sqrt{9} \\ x^2 = 1 \end{array}$$

$$\boxed{x = \pm 1}$$

$$19) x^2 + 14x = 33$$

$$\begin{array}{r} x^2 + 14x - 33 = 0 \\ -33 \quad -33 \end{array}$$

$$a=1 \quad b=14 \quad c=-33$$

$$x = \frac{-14 \pm \sqrt{14^2 - 4(1)(-33)}}{2(1)}$$

$$= \frac{-14 \pm \sqrt{196 + 132}}{2} = \frac{-14 \pm \sqrt{328}}{2}$$

$$= \frac{-14 \pm 2\sqrt{82}}{2} = \boxed{-7 \pm \sqrt{82}}$$

$\sqrt{328}$
 $\sqrt{4} \sqrt{82}$
 $2\sqrt{82}$

$$20) x^2 = -9x - 14$$

$$\begin{array}{r} x^2 + 9x + 14 = 0 \\ +9x + 14 \quad +9x + 14 \end{array}$$

$$a=1 \quad b=9 \quad c=14$$

$$x = \frac{-9 \pm \sqrt{9^2 - 4(1)(14)}}{2(1)} = \frac{-9 \pm \sqrt{81 - 56}}{2}$$

$$= \frac{-9 \pm \sqrt{25}}{2} = \frac{-9 \pm 5}{2}$$

$$\textcircled{1} \frac{-9+5}{2} = \frac{-4}{2} = \boxed{x=-2}$$

$$\textcircled{2} \frac{-9-5}{2} = \frac{-14}{2} = \boxed{x=-7}$$

$$21) 2x^2 + 11x = -12$$

$$\begin{array}{r} 2x^2 + 11x + 12 = 0 \end{array}$$

$$\begin{array}{r} 2 \quad 3 \\ \hline 1 \quad 4 \end{array}$$

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

$$\begin{array}{l} 2x+3=0 \rightarrow x+4=0 \\ \underline{-3 \quad -3} \quad \underline{-4 \quad -4} \end{array}$$

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

$$22) 3x^2 = 6x$$

$$\begin{array}{r} 3x^2 - 6x = 0 \\ -6x \quad -6x \end{array}$$

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

$$\begin{array}{l} 3x=0 \rightarrow x-2=0 \\ \underline{3 \quad 3} \quad \underline{-2 \quad -2} \end{array}$$

$$\boxed{x=0} \quad \boxed{x=2}$$

$$23) 5x^2 + 10x = 40$$

$$\begin{array}{r} 5x^2 + 10x - 40 = 0 \\ -40 \quad -40 \end{array}$$

$$5(x^2 + 2x - 8) = 0$$

$$\begin{array}{r} 1 \quad 4 \\ \hline 1 \quad -2 \end{array}$$

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

$$\begin{array}{l} x+4=0 \rightarrow x-2=0 \\ \underline{-4 \quad -4} \quad \underline{+2 \quad +2} \end{array}$$

$$\boxed{x=-4} \quad \boxed{x=2}$$

$$24) x^2 + 100 = 0$$

$$\begin{array}{r} x^2 + 100 = 0 \\ -100 \quad -100 \end{array}$$

$$\sqrt{x^2} = \sqrt{-100}$$

No Real Solution