Solving Equations

Emphasis on Quadratic Equations by Quadratic Formula – Additional Practice

Solve each of the following.

1. $-6x = 3x^2 - 18$

$+6x \quad +6x$

$0 = 3x^2 + 6x - 18$

$a = 3$

$b = 6$

$c = -18$

$x = \dfrac{-6 \pm \sqrt{(6)^2 - 4(3)(-18)}}{2(3)}$

$x = \dfrac{-6 \pm \sqrt{252}}{6}$

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

$a = 1$

$b = 6$

$c = 0$

$x = \dfrac{-6 \pm \sqrt{(6)^2 - 4(1)(0)}}{2(1)}$

$x = \dfrac{-6 \pm \sqrt{36}}{2}$

$x = \dfrac{-6 \pm 6}{2}$

$\dfrac{-6+6}{2} = \dfrac{0}{2} = 0 \qquad \dfrac{-6-6}{2} = \dfrac{-12}{2} = -6$

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

$a = 1$

$b = -3$

$c = -1$

$x = \dfrac{3 \pm \sqrt{(-3)^2 - 4(1)(-1)}}{2(1)}$

$x = \dfrac{3 \pm \sqrt{13}}{2}$

4. $x^2 - 5x - 6 = 18$

$-18 \quad -18$

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

$a = 1$

$b = -5$

$c = -24$

$x = \dfrac{5 \pm \sqrt{(-5)^2 - 4(1)(-24)}}{2(1)}$

$x = \dfrac{5 \pm \sqrt{121}}{2}$

$x = \dfrac{5 \pm 11}{2}$

$\dfrac{5+11}{2} = \dfrac{16}{2} = 8 \qquad \dfrac{5-11}{2} = \dfrac{-6}{2} = -3$

5. $4x^2 = -8x - 3$

$+8x+3 \quad +8x+3$

$4x^2 + 8x + 3 = 0$

$a = 4$

$b = 8$

$c = 3$

$x = \dfrac{-8 \pm \sqrt{(8)^2 - 4(4)(3)}}{2(4)}$

$x = \dfrac{-8 \pm \sqrt{16}}{8}$

$x = \dfrac{-8 \pm 4}{8}$

$\dfrac{-8+4}{8} = \dfrac{-4}{8} = \dfrac{-1}{2} \qquad \dfrac{-8-4}{8} = \dfrac{-12}{8} = \dfrac{-3}{2}$

6. $x^2 + 3x = 2 - 2x$

$+2x-2 \quad -2 \quad +2x$

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

$a = 1$

$b = 5$

$c = -2$

$x = \dfrac{-5 \pm \sqrt{(5)^2 - 4(1)(-2)}}{2(1)}$

$x = \dfrac{-5 \pm \sqrt{33}}{2}$

7. $x^2 + 10x = 5$

$-5 \quad -5$

$x^2 + 10x - 5 = 0$

$a = 1$

$b = 10$

$c = -5$

$x = \dfrac{-10 \pm \sqrt{(10)^2 - 4(1)(-5)}}{2(1)}$

$x = \dfrac{-10 \pm \sqrt{120}}{2}$

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

$a = 1$

$b = -2$

$c = -3$

$x = \dfrac{2 \pm \sqrt{(-2)^2 - 4(1)(-3)}}{2(1)}$

$x = \dfrac{2 \pm \sqrt{16}}{2}$

$x = \dfrac{2 \pm 4}{2}$

$\dfrac{2+4}{2} = \dfrac{6}{2} = 3 \qquad \dfrac{2-4}{2} = \dfrac{-2}{2} = -1$

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

$a = -1$

$b = -3$

$c = 1$

$x = \dfrac{3 \pm \sqrt{(-3)^2 - 4(-1)(1)}}{2(-1)}$

$x = \dfrac{3 \pm \sqrt{13}}{-2}$

10. $-14 = x^2 + 9x$

$+14 \quad +14$

$0 = x^2 + 9x + 14$

$a = 1$

$b = 9$

$c = 14$

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

$x = \dfrac{-9 \pm \sqrt{25}}{2}$

$x = \dfrac{-9 \pm 5}{2}$

$\dfrac{-9+5}{2} = \dfrac{-4}{2} = -2 \qquad \dfrac{-9-5}{2} = \dfrac{-14}{2} = -7$

11. $4x - 4 = -15x^2$

$+15x^2$

$15x^2 + 4x - 4 = 0$

$a = 15$

$b = 4$

$c = -4$

$x = \frac{-4 \pm \sqrt{(4)^2 - 4(15)(-4)}}{2(15)}$

$x = \frac{-4 \pm \sqrt{256}}{30}$

$x = \frac{-4 \pm 16}{30}$

$\frac{-4+16}{30} = \frac{12}{30} = \boxed{\frac{2}{5}}$ $\frac{-4-16}{30} = \frac{-20}{30} = \boxed{-\frac{2}{3}}$

12. $2x^2 - 15 = -7x$

$+7x \quad +7x$

$2x^2 + 7x - 15 = 0$

$a = 2$

$b = 7$

$c = -15$

$x = \frac{-7 \pm \sqrt{(7)^2 - 4(2)(-15)}}{2(2)}$

$x = \frac{-7 \pm \sqrt{169}}{4}$

$x = \frac{-7 \pm 13}{4}$

$\frac{-7+13}{4} = \frac{6}{4} = \boxed{\frac{3}{2}}$ $\frac{-7-13}{4} = \frac{-20}{4} = \boxed{-5}$

13. $x^2 - 36 = 0$

$a = 1$

$b = 0$

$c = -36$

$x = \frac{0 \pm \sqrt{(0)^2 - 4(1)(-36)}}{2(1)}$

$x = \frac{0 \pm \sqrt{144}}{2}$

$x = \frac{0 \pm 12}{2}$

$\frac{0+12}{2} = \frac{12}{2} = \boxed{6}$ $\frac{0-12}{2} = \frac{-12}{2} = \boxed{-6}$

14. $x^2 - 2x + 1 = 0$

$a = 1$

$b = -2$

$c = 1$

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

$x = \frac{2 \pm \sqrt{0}}{2}$

$x = \frac{2 \pm 0}{2}$

$\frac{2+0}{2} = \frac{2}{2} = \boxed{1}$ $\frac{2-0}{2} = \frac{2}{2} = \boxed{1}$

15. $9x^2 = -6x - 1$

$+6x+1 \quad +6x+1$

$9x^2 + 6x + 1 = 0$

$a = 9$

$b = 6$

$c = 1$

$x = \frac{-6 \pm \sqrt{(6)^2 - 4(9)(1)}}{2(9)}$

$x = \frac{-6 \pm \sqrt{0}}{18}$

$x = \frac{-6 \pm 0}{18}$

$\frac{-6+0}{18} = \frac{-6}{18} = \boxed{\frac{-1}{3}}$ $\frac{-6-0}{18} = \frac{-6}{18} = \boxed{\frac{-1}{3}}$

16. $-4 + 20x - 25x^2 = 0$

$-25x^2 + 20x - 4 = 0$

$a = -25$

$b = 20$

$c = -4$

$x = \frac{-20 \pm \sqrt{(20)^2 - 4(-25)(-4)}}{2(-25)}$

$x = \frac{-20 \pm \sqrt{0}}{-50}$

$x = \frac{-20 \pm 0}{-50}$

$\frac{-20+0}{-50} = \frac{-20}{-50} = \boxed{\frac{2}{5}}$ $\frac{-20-0}{-50} = \frac{-20}{-50} = \boxed{\frac{2}{5}}$

17. $64 + 16x = -x^2$

$+x^2 \quad +x^2$

$x^2 + 16x + 64 = 0$

$a = 1$

$b = 16$

$c = 64$

$x = \frac{-16 \pm \sqrt{(16)^2 - 4(1)(64)}}{2(1)}$

$x = \frac{-16 \pm \sqrt{0}}{2}$

$x = \frac{-16 \pm 0}{2}$

$\frac{-16+0}{2} = \frac{-16}{2} = \boxed{-8}$ $\frac{-16-0}{2} = \frac{-16}{2} = \boxed{-8}$

18. $x^2 = -8x - 16$

$+8x+16 \quad +8x+16$

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

$a = 1$

$b = 8$

$c = 16$

$x = \frac{-8 \pm \sqrt{(8)^2 - 4(1)(16)}}{2(1)}$

$x = \frac{-8 \pm \sqrt{0}}{2}$

$x = \frac{-8 \pm 0}{2}$

$\frac{-8+0}{2} = \frac{-8}{2} = \boxed{-4}$ $\frac{-8-0}{2} = \frac{-8}{2} = \boxed{-4}$

19. $-32 = -x^2 - 4x$

$+x^2+4x \quad +x^2+4x$

$x^2 + 4x - 32 = 0$

$a = 1$

$b = 4$

$c = -32$

$x = \frac{-4 \pm \sqrt{(4)^2 - 4(1)(-32)}}{2(1)}$

$x = \frac{-4 \pm \sqrt{144}}{2}$

$x = \frac{-4 \pm 12}{2}$

$\frac{-4+12}{2} = \frac{8}{2} = \boxed{4}$ $\frac{-4-12}{2} = \frac{-16}{2} = \boxed{-8}$

20. $x^2 - 24 = 10x$

$-10x \quad -10x$

$x^2 - 10x - 24 = 0$

$a = 1$

$b = -10$

$c = -24$

$x = \frac{10 \pm \sqrt{(-10)^2 - 4(1)(-24)}}{2(1)}$

$x = \frac{10 \pm \sqrt{196}}{2}$

$x = \frac{10 \pm 14}{2}$

$\frac{10+14}{2} = \frac{24}{2} = \boxed{12}$ $\frac{10-14}{2} = \frac{-4}{2} = \boxed{-2}$