Quadratic Formula

Solve each equation by using the Quadratic Formula. Round to the nearest **tenth** if necessary.

1. $x^2 - 49 = 0$ $a=1, b=0, c=-49$

$x = \dfrac{-(0) \pm \sqrt{0^2 - 4(1)(-49)}}{2(1)} = \dfrac{0 \pm \sqrt{196}}{2}$

$x = \dfrac{0 \pm 14}{2} \Rightarrow \dfrac{0+14}{2} = 7, \dfrac{0-14}{2} = -7$ $\boxed{x = 7, -7}$

2. $x^2 - x - 20 = 0$ $a=1, b=-1, c=-20$

$x = \dfrac{-(-1) \pm \sqrt{(-1)^2 - 4(1)(-20)}}{2(1)} = \dfrac{1 \pm \sqrt{81}}{2}$

$x = \dfrac{1 \pm 9}{2} \rightarrow \dfrac{1+9}{2} = 5, \dfrac{1-9}{2} = -4$ $\boxed{x = 5, 4}$

3. $x^2 - 7x = -3$

$x^2 - 7x + 3 = 0 \rightarrow a=1, b=-7, c=3$

$x = \dfrac{7 \pm \sqrt{(-7)^2 - 4(1)(3)}}{2(1)} = \dfrac{7 \pm \sqrt{37}}{2} = \dfrac{7 \pm 6.1}{2}$

$x = \dfrac{7+6.1}{2} = \boxed{6.55}$ $x = \dfrac{7-6.1}{2} = \boxed{.45}$

4. $x^2 + 4x = -1 \rightarrow x^2 + 4x + 1 = 0 \rightarrow a=1, b=4, c=1$

$x = \dfrac{-4 \pm \sqrt{4^2 - 4(1)(1)}}{2(1)} = \dfrac{-4 \pm \sqrt{12}}{2} = \dfrac{-4 \pm 3.4}{2}$

$x = \dfrac{-4+3.4}{2} = \boxed{-.3}$ $x = \dfrac{-4-3.4}{2} = \boxed{-3.7}$

5. $2x^2 + 5x - 7 = 0 \rightarrow$ $a=2, b=5, c=-7$

$x = \dfrac{-5 \pm \sqrt{5^2 - 4(2)(-7)}}{2(2)} = \dfrac{-5 \pm \sqrt{81}}{4} = \dfrac{-5 \pm 9}{4}$

$x = \dfrac{-5+9}{4} = \boxed{1}$ $x = \dfrac{-5-9}{4} = \boxed{-3.5}$

6. $2x^2 - 3x = -1 \rightarrow a=2, b=-3, c=1$

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

$x = \dfrac{3+1}{4} = \boxed{1}$ $x = \dfrac{3-1}{4} = \boxed{.5}$

7. $3x^2 + 2x - 3 = 0$ $a=3, b=2, c=-3$

$x = \dfrac{-2 \pm \sqrt{2^2 - 4(3)(-3)}}{2(3)} = \dfrac{-2 \pm \sqrt{40}}{6} = \dfrac{-2 \pm 6.3}{6}$

$x = \dfrac{-2+6.3}{6} = \boxed{.72}$ $x = \dfrac{-2-6.3}{6} = \boxed{-1.38}$

8. $3x^2 - 7x - 6 = 0 \rightarrow a=3, b=-7, c=-6$

$x = \dfrac{+7 \pm \sqrt{(-7)^2 - 4(3)(-6)}}{2(3)} = \dfrac{7 \pm \sqrt{121}}{6}$

$x = \dfrac{7+11}{6} = \boxed{3}$ $x = \dfrac{7-11}{6} = \boxed{-.6}$

State the value of the **discriminant** for each equation. Then determine the **number of real solutions** of the equation.

9. $x^2 + 4x + 3 = 0 \rightarrow a=1, b=4, c=3$

$4^2 - 4(1)(3) = 16 - 12 = \boxed{4}$

<u>2 real roots</u>

10. $x^2 + 2x + 1 = 0$ $a=1, b=2, c=1$

$2^2 - 4(1)(1) = 4 - 4 = \boxed{0}$

<u>1 real root</u>

11. $x^2 - 2x - 7 = 0$ $a=1, b=-2, c=-7$

$(-2)^2 - 4(1)(-7) = 4 + 28 = \boxed{32}$

<u>2 real roots</u>

12. $x^2 - 10x + 25 = 0$ $a=1, b=-10, c=25$

$(-10)^2 - 4(1)(25) = 100 - 100 = \boxed{0}$

<u>1 real root</u>

13. $2x^2 - 4x + 10 = 0$

$a=2, b=-4, c=10$

$(-4)^2 - 4(2)(10) = 16 - 80 = \boxed{-64}$

<u>no real roots</u>

14. $3x^2 + 7x + 3 = 0$

$a=3, b=7, c=3$

$(7)^2 - 4(3)(3) = 49 - 36 = \boxed{13}$

<u>2 real roots</u>