Name:_____ Class: Key Date:_____

4-6: The Quadratic Formula and the Discriminant (Practice)

Solve each equation by using the Quadratic Formula.

1. $4x^2 - 9 = 0$

$a=4$, $b=0$, $c=-9$

$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

$x = \frac{0 \pm \sqrt{0^2-4(4)(-9)}}{2(4)} \Rightarrow \frac{0 \pm \sqrt{144}}{8}$

$= \frac{\pm 12}{8} \rightarrow \pm 3/2$

2. $x^2 - 21 = 4x$

$x^2 - 4x - 21 = 0$

$a=1$, $b=-4$, $c=-21$

$x = \frac{4 \pm \sqrt{16-4(1)(-21)}}{2(1)}$

$x = \frac{4 \pm \sqrt{100}}{2}$ $x = \frac{4+10}{2}$ $x = \frac{4-10}{2}$

$x = 7$ $x = -3$

3. $3x^2 - 13x + 4 = 0$

$a=3$, $b=-13$, $c=4$

$x = \frac{13 \pm \sqrt{169-4(3)(4)}}{2(3)}$

$x = \frac{13 \pm \sqrt{121}}{6}$ $x = \frac{13+11}{6}$ or $x = \frac{13-11}{6}$

$x = 4$ $x = \frac{1}{3}$

4. $x^2 - 14x + 53 = 0$

$a=1$, $b=-14$, $c=53$

$x = \frac{14 \pm \sqrt{196-4(1)(53)}}{2(1)}$

$x = \frac{14 \pm \sqrt{-16}}{2} = \frac{14 \pm 4i}{2}$

$x = \frac{14}{2} \pm \frac{4i}{2}$

$x = 7 \pm 2i$

5. $3x^2 = -54$

$3x^2 + 0x + 54 = 0$

$x = \frac{0 \pm \sqrt{0-4(3)(54)}}{2(3)} = \frac{\pm\sqrt{-648}}{6}$

$x = \frac{\pm\sqrt{324 \cdot 2}\, i}{6} = \frac{\pm 18\sqrt{2}\, i}{6}$

$= \pm 6\sqrt{2}\, i$

6. $4x^2 - 4x + 17 = 0$

$a=4$, $b=-4$, $c=17$

$x = \frac{4 \pm \sqrt{16-4(4)(17)}}{2(4)} = \frac{4 \pm \sqrt{-256}}{8}$

$x = \frac{4 \pm 16i}{8} = \frac{1}{2} \pm 2i$

7. $8x - 1 = 4x^2$

$4x^2 - 8x + 1 = 0$

$a=4$, $b=-8$, $c=1$

$x = \frac{8 \pm \sqrt{64-4(4)(1)}}{2(4)} \Rightarrow \frac{8 \pm \sqrt{48}}{8}$

$x = \frac{8 \pm \sqrt{16 \cdot 3}}{8} = \frac{8 \pm 4\sqrt{3}}{8} = 1 \pm \frac{\sqrt{3}}{2}$

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

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

$a=1$, $b=-4$, $c=15$

$x = \frac{4 \pm \sqrt{16-4(1)(15)}}{2(1)}$

$x = \frac{4 \pm \sqrt{16-60}}{2} = \frac{4 \pm \sqrt{-44}}{2}$

$x = \frac{4 \pm \sqrt{4 \cdot 11}\, i}{2}$

$x = \frac{4 \pm 2i\sqrt{11}}{2} \Rightarrow \frac{4}{2} \pm \frac{2i\sqrt{11}}{2}$

$x = 2 \pm i\sqrt{11}$

Quad Form: $x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

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4-6: The Quadratic Formula and the Discriminant (Practice) ← b^2-4ac = expression under radical

Complete parts a–c for each quadratic equation.

a. Find the value of the discriminant.
b. Describe the number and type of roots.
c. Find the exact solutions by using the Quadratic Formula.

9. $x^2 - 16x + 64 = 0$

b^2-4ac

$= 256 - 4(1)(64)$

$= 256 - 256 = 0$

1 real rational sol.

10. $x^2 = 3x$

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

$b^2-4ac = 9 - 4(1)(0)$

$= 9$ ← perfect square

2 real rational solutions

11. $9x^2 - 24x + 16 = 0$

$b^2-4ac = 576 - 4(9)(16)$

$= 576 - 576$

$= 0$

1 real rational sol.

12. $x^2 - 3x = 40$

$x^2 - 3x - 40 = 0$

$b^2-4ac = 9 - 4(1)(-40)$

$= 169$ ← perfect square

2 real rational solutions

13. $5x^2 - 2x + 4 = 0$

$b^2-4ac = 4 - 4(5)(4)$

$= -76$

2 non-real sol.

14. $6x^2 - 2x - 1 = 0$

$b^2-4ac = 4 - 4(6)(-1)$

$= 28$ ← not perfect sq

2 real irrational sol.

15. $x^2 + 3x + 6 = 0$

$b^2-4ac = 9 - 4(1)(6)$

$= -15$

2 non-real solutions

16. **STOPPING DISTANCE** The formula $d = 0.05s^2 + 1.1s$ estimates the minimum stopping distance d in feet for a car traveling s miles per hour. If a car stops in 200 feet, what is the fastest it could have been traveling when the driver applied the brakes?

$d = .05s^2 + 1.1s + 0$

$200 = .05s^2 + 1.1s$

$0 = .05s^2 + 1.1s - 200$

$x = \frac{-1.1 \pm \sqrt{(1.1)^2 - 4(.05)(-200}}{2(.05)}$

$= \frac{-1.1 \pm \sqrt{41.21}}{}$

$x = 53.2$ mph