

Name: Answer key

Date: _____

Lesson: Quadratic Formula

Solve the following equations using the quadratic formula.

1. $v^2 + v - 20 = 0$

$$\frac{-1 \pm \sqrt{1^2 - 4(1)(-20)}}{2(1)} = \frac{-1 \pm \sqrt{1+80}}{2}$$

$$= \frac{-1 \pm \sqrt{81}}{2} = \frac{-1 \pm 9}{2}$$

$$\frac{-1+9}{2} \quad \text{and} \quad \frac{-1-9}{2}$$

$$\frac{8}{2} \quad \frac{-10}{2}$$

$$\{4, -5\}$$

2. $n^2 - 3n - 88 = 0$

$$\frac{-(-3) \pm \sqrt{(-3)^2 - (4)(1)(-88)}}{2(1)} = \frac{3 \pm \sqrt{9+352}}{2}$$

$$= \frac{3 \pm \sqrt{361}}{2} = \frac{3 \pm 19}{2}$$

$$\frac{3+19}{2} \quad \text{and} \quad \frac{3-19}{2}$$

$$\frac{22}{2} \quad \frac{-16}{2}$$

$$\{11, -8\}$$

3. $6v^2 - 7v - 143 = 0$

$$\frac{-(-7) \pm \sqrt{(-7)^2 - 4(6)(-143)}}{2(6)} = \frac{7 \pm \sqrt{49+3432}}{12}$$

$$= \frac{7 \pm \sqrt{3481}}{12} = \frac{7 \pm 59}{12}$$

$$\frac{7+59}{12} \quad \text{and} \quad \frac{7-59}{12}$$

$$\frac{66}{12} \quad \frac{-52}{12}$$

$$\left\{\frac{11}{2}, -\frac{13}{3}\right\}$$

4. $3n^2 - 3n - 15 = 3$

$$3n^2 - 3n - 15 - 3 = 0$$

$$3n^2 - 3n - 18 = 0$$

$$\frac{-(-3) \pm \sqrt{(-3)^2 - 4(3)(-18)}}{2(3)} = \frac{3 \pm \sqrt{9+216}}{6}$$

$$\frac{3 \pm \sqrt{225}}{6} = \frac{3 \pm 15}{6}$$

$$\frac{3+15}{6} = \frac{18}{6} \quad \frac{3-15}{6} = \frac{-12}{6}$$

$$\{3, -2\}$$

5. $5p^2 - 86 = -6$

$$5p^2 - 86 + 6 = 0$$

$$5p^2 - 80 = 0$$

$$\frac{-0 \pm \sqrt{0^2 - 4(5)(-80)}}{2(5)} = \frac{\pm \sqrt{1600}}{10}$$

$$\frac{+40}{10} \quad \text{and} \quad \frac{-40}{10}$$

$$\{4, -4\}$$

6. $x^2 - 3x + 8 = 12$

$$x^2 - 3x + 8 - 12 = 0$$

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

$$\frac{-(-3) \pm \sqrt{(-3)^2 - 4(1)(-4)}}{2(1)} = \frac{3 \pm \sqrt{9+16}}{2}$$

$$\frac{3 \pm \sqrt{25}}{2} = \frac{3 \pm 5}{2}$$

$$\frac{3+5}{2} = \frac{8}{2} \quad \frac{3-5}{2} = \frac{-2}{2}$$

$$\{4, -1\}$$

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7. $4a^2 - 144 = 0$

$$\frac{-0 \pm \sqrt{0^2 - 4(4)(-144)}}{2(4)} = \frac{\pm \sqrt{2304}}{8}$$

$$= \frac{\pm 48}{8} \quad \frac{+48}{8} \quad \text{and} \quad \frac{-48}{8}$$

$$\{6, -6\}$$

8. $3a^2 = a + 24$

$$\frac{-(-1) \pm \sqrt{(-1)^2 - 4(3)(-24)}}{2(3)} = \frac{1 \pm \sqrt{1+288}}{6}$$

$$\frac{1 \pm \sqrt{289}}{6} = \frac{1 \pm 17}{6}$$

$$\frac{1+17}{6} \quad \text{and} \quad \frac{1-17}{6}$$

$$\frac{18}{6} \quad \frac{-16}{6}$$

$$\{3, -\frac{8}{3}\}$$

9. $4p^2 - 85 = -3p$

$$\frac{-(-3) \pm \sqrt{(-3)^2 - 4(4)(-85)}}{2(4)} = \frac{-3 \pm \sqrt{9+1360}}{8}$$

$$= \frac{-3 \pm \sqrt{1369}}{8} = \frac{-3 \pm 37}{8}$$

$$\frac{-3+37}{8} \quad \text{and} \quad \frac{-3-37}{8}$$

$$\frac{34}{8} \quad \frac{-40}{8}$$

$$\{\frac{17}{4}, -5\}$$

10. $-2x^2 - 4x - 54 = -x - 7x^2$

$$-2x^2 - 4x - 54 + x + 7x^2 = 0$$

$$5x^2 - 3x - 54 = 0$$

$$-(-3) \pm \sqrt{(-3)^2 - 4(5)(-54)} =$$

$$\frac{3 \pm \sqrt{9+1080}}{10} = \frac{3 \pm \sqrt{1089}}{10} = \frac{3 \pm 33}{10} =$$

$$\frac{3+33}{10} \quad \text{and} \quad \frac{3-33}{10}$$

$$\frac{36}{10} \quad \frac{-30}{10}$$

$$\{\frac{18}{5}, -3\}$$

11. $3a^2 - 3a - 10 = -a^2$

$$3a^2 - 3a - 10 + a^2 = 0$$

$$4a^2 - 3a - 10 = 0$$

$$\frac{-(-3) \pm \sqrt{(-3)^2 - 4(4)(-10)}}{2(4)} = \frac{3 \pm \sqrt{9+160}}{8}$$

$$= \frac{3 \pm \sqrt{169}}{8} = \frac{3 \pm 13}{8}$$

$$\frac{3+13}{8} \quad \text{and} \quad \frac{3-13}{8}$$

$$\frac{16}{8} \quad \{2, -\frac{5}{4}\}$$

12. $3n^2 - 10n = 33 - 12n$

$$3n^2 - 10n - 33 + 12n = 0$$

$$3n^2 + 2n - 33 = 0$$

$$\frac{-2 \pm \sqrt{2^2 - 4(3)(-33)}}{2(3)} = \frac{-2 \pm \sqrt{4+396}}{6}$$

$$= \frac{-2 \pm \sqrt{400}}{6} = \frac{-2 \pm 20}{6}$$

$$\frac{-2+20}{6} \quad \frac{-2-20}{6}$$

$$\frac{18}{6} \quad \{3, -\frac{11}{3}\}$$