

## ALGEBRA QUIZ – SOLVING QUADRATICS (FINDING THE ROOTS/ZEROS)

- A. Simplifying Radicals (12.1)
- B. Solve by **FACTORING** (9.8 in text)  
\* Get all terms to one side – solve by A-C method, product-sums & grouping
- C. Solve by **SQUARE ROOTS** (10.2 in text)  
\* Remember there are 2 roots ( $\pm$ ) when taking the square root of a number
- D. Solve by **COMPLETING THE SQUARE** (10.4 in text)  
\* Keep quadratic and linear term on left side, constant on right  
\* Coefficient of quadratic term, a, should equal 1  
\* Half and Square with coefficient of linear term  
\* Add same number to both sides  
\* Solve just like solving by square roots
- E. Solve by **QUADRATIC FORMULA:** (10.5 in text)

$$\text{Using } ax^2 + bx + c = 0, \quad X = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\text{Discriminant} = b^2 - 4ac$$

If  $b^2 - 4ac > 0$ , 2 real roots (parabola touches x-axis in 2 places)

If  $b^2 - 4ac = 0$ , 1 real roots (parabola touches x-axis in 1 place)

If  $b^2 - 4ac < 0$ , NO real roots (no solution)

(parabola does not touch x-axis)

# Extra Problems

## Algebra Review Solving Quadratics

Name \_\_\_\_\_

### PROBLEM SOLVING

I. Solve by Factoring

1.)  $x^2 - 64 = 0$

2.)  $x^2 - 6x - 16 = 0$

3.)  $x^2 + 3x = 40$

4.)  $2x^2 + 3x + 1 = 0$

5.)  $x^2 - 100 = 0$

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

II. Solve by Square Roots

7.)  $x^2 = 64$

8.)  $4x^2 = 81$

9.)  $x^2 + 7 = -300$

10.)  $(x - 5)^2 = 36$

III. Solve by using the **quadratic formula**:

11.  $x^2 + 3x + 2 = 0$

12.  $4x^2 - 8x = 1$

13.  $x^2 + 8x = 0$

The quadratic formula is:

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

Solve each equation any way you want. Show your work.

14.  $x^2 + 11x + 18 = 0$

15.  $x^2 + 2x + 1 = 15$

16.  $7x^2 - 9x + 1 = 0$

17.  $(x + 2)^2 = 36$

18.  $x^2 - 10x + 25 = 0$

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

20.  $x^2 = 36$

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

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

**REASONING:** \_\_\_\_\_20.) Explain why  $x^2 = -81$  DOES NOT have a solution.21.) Which method can't you use to solve this problem?  $x^2 - 47 = 0$ 

Circle one:      Factoring                  Square Roots                  Quadratic Formula

*Completing  
the square*

Explain why:

22.) Which method can't you use to solve this problem?

$x^2 + 7x = 0$

Circle one:      Factoring                  Square Roots                  Quadratic Formula

*Completing  
the square*

Explain why:

23.) Which method can you use to solve all quadratic equations?

Circle one:      Factoring                  Square Roots                  Quadratic Formula

*Completing  
the square*

Explain why:

24.) What are the **two mistakes** in setting up the quadratic formula:

Solve:  $2x^2 - x - 6 = 0$

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

## Solving Quadratics - All Methods

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Date \_\_\_\_\_ Period \_\_\_\_\_

## Solve using the Quadratic Formula - Level 2

1)  $n^2 + 9n + 11 = 0$   $\left\{ \frac{-9 \pm \sqrt{37}}{2} \right\}$

3)  $m^2 + 5m + 6 = 0$   $\{-3, -2\}$

2)  $5p^2 - 125 = 0$   $\{5, -5\}$

4)  $2x^2 - 4x - 30 = 0$   $\{-3, 5\}$

## Solve using the Quadratic Formula - Level 3

5)  $b^2 - 12b + 10 = -10$   $\{2, 10\}$

7)  $7x^2 - 16 = 6$   $\left\{ \pm \frac{\sqrt{154}}{7} \right\}$

6)  $6r^2 - 5r - 4 = 7$   $\left\{ \frac{11}{6}, -1 \right\}$

8)  $6n^2 - 10n - 16 = 3$   $\left\{ \frac{5 \pm \sqrt{139}}{6} \right\}$

## Solve using the Quadratic Formula - Level 4

9)  $4a^2 - 22 = -10a$   $\left\{ \frac{-5 \pm \sqrt{113}}{4} \right\}$

11)  $5v^2 - 2 - v = -v$   $\left\{ \pm \frac{\sqrt{10}}{5} \right\}$

10)  $n^2 - 45 = 12n$   $\{-3, 15\}$

12)  $4x^2 - 5x - 3 = 2x^2$   $\left\{ -\frac{1}{2}, 3 \right\}$

## Solve by Factoring - Level 2

13)  $p^2 + 6p + 5 = 0$   $\{-5, -1\}$

15)  $x^2 - 7x = 0$   $\{0, 7\}$

14)  $k^2 - 8k = 0$   $\{8, 0\}$

16)  $a^2 + 5a = 0$   $\{-5, 0\}$

## Solve by Factoring - Level 3

17)  $6n^2 + 5n - 25 = 0$   $\left\{ -\frac{5}{2}, \frac{5}{3} \right\}$

19)  $10r^2 + 75r + 140 = 0$   $\left\{ -4, -\frac{7}{2} \right\}$

18)  $2x^2 - 11x - 21 = 0$   $\left\{ -\frac{3}{2}, 7 \right\}$

20)  $60m^2 + 4m - 160 = 0$   $\left\{ -\frac{5}{3}, \frac{8}{5} \right\}$

## Solve by Factoring - Level 4

21)  $4x^2 - 17x + 10 = -5$   $\left\{ \frac{5}{4}, 3 \right\}$

23)  $5v^2 + 3 = -16v$   $\left\{ -3, -\frac{1}{5} \right\}$

22)  $2n^2 + 13n + 19 = 4$   $\left\{ -5, -\frac{3}{2} \right\}$

24)  $20b^2 - 40b = 25$   $\left\{ -\frac{1}{2}, \frac{5}{2} \right\}$

## Solve by completing the square - Level 2

25)  $a^2 + 8a + 11 = 0$   $\{-4 \pm \sqrt{5}\}$

27)  $n^2 + 16n - 17 = 0$   $\{-17, 1\}$

26)  $k^2 - 14k - 19 = 0$   $\{7 \pm 2\sqrt{17}\}$

28)  $x^2 - 20x + 64 = 0$   $\{16, 4\}$

## Solve by completing the square - Level 3

29)  $x^2 + 20x + 70 = 6$   $\{-16, -4\}$

31)  $7n^2 - 14n - 73 = 9$   $\left\{ \frac{7 \pm \sqrt{623}}{7} \right\}$

30)  $x^2 + 12x + 30 = -5$   $\{-7, -5\}$

32)  $9m^2 + 18m - 8 = 5$   $\left\{ \frac{-3 \pm \sqrt{22}}{3} \right\}$

## Solve by completing the square - Level 4

33)  $6x^2 - 48 = -12x$   $\{-4, 2\}$

35)  $5n^2 + 19n = 3n + 92 - 3n^2$   $\left\{ \frac{-2 \pm 5\sqrt{2}}{2} \right\}$

34)  $3p^2 = -12p - 9$   $\{-3, -1\}$

36)  $2b^2 + 17b = 14 + 5b$   $\{-7, 1\}$

$$\textcircled{2} 5p^2 - 125 = 0$$

$$a=5, b=0, c=-125$$

$$X = \frac{-0 \pm \sqrt{0^2 - 4(5)(-125)}}{2(5)}$$

$$X = \frac{\pm \sqrt{2500}}{10} = \frac{\pm 50}{10}$$

$$X = \{-5, 5\}$$

$$\textcircled{4} 2x^2 - 4x - 30 = 0$$

$$a=2, b=-4, c=-30$$

$$X = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(2)(-30)}}{2(2)}$$

$$X = \frac{4 \pm \sqrt{16 - (-240)}}{4}$$

$$X = \frac{4 \pm \sqrt{256}}{4} = \frac{4 \pm 16}{4}$$

$$X = \frac{-12}{4} = -3 \quad X = \frac{20}{4} = 5$$

$$X = \{-3, 5\}$$

$$\textcircled{6} 6r^2 - 5r - 4 = 7$$

$$6r^2 - 5r - 11 = 0$$

$$a=6, b=-5, c=-11$$

$$X = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(6)(-11)}}{2(6)}$$

$$X = \frac{5 \pm \sqrt{25 - (-264)}}{12}$$

$$X = \frac{5 \pm \sqrt{289}}{12} = \frac{5 \pm 17}{12}$$

$$X = \frac{-12}{12} = -1 \quad X = \frac{22}{12} = \frac{11}{6}$$

$$X = \left\{-1, \frac{11}{6}\right\}$$

$$\textcircled{8} 6n^2 - 10n - 16 = 3$$

$$6n^2 - 10n - 19 = 0$$

$$a=6, b=-10, c=-19$$

$$X = \frac{-(-10) \pm \sqrt{(-10)^2 - 4(6)(-19)}}{2(6)}$$

$$X = \frac{10 \pm \sqrt{100 - (-456)}}{12}$$

$$X = \frac{10 \pm \sqrt{556}}{12} = \frac{10 \pm 2\sqrt{139}}{12}$$

$$X = \frac{2(5 \pm \sqrt{139})}{2(6)} = \frac{5 \pm \sqrt{139}}{6}$$

$$X = \frac{5 \pm \sqrt{139}}{6}$$

$$\textcircled{10} n^2 - 45 = 12n$$

$$n^2 - 12n - 45 = 0$$

$$a=1, b=-12, c=-45$$

$$X = \frac{-(-12) \pm \sqrt{(-12)^2 - 4(1)(-45)}}{2(1)}$$

$$X = \frac{12 \pm \sqrt{144 - (-180)}}{2}$$

$$X = \frac{12 \pm \sqrt{324}}{2} = \frac{12 \pm 18}{2}$$

$$X = \frac{-6}{2} = -3 \quad X = \frac{30}{2} = 15$$

$$X = \{-3, 15\}$$

$$(2) \quad 4x^2 - 5x - 3 = 2x^2$$

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

$$a=2 \quad b=-5 \quad c=-3$$

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

$$x = \frac{5 \pm \sqrt{25 - (-24)}}{4}$$

$$x = \frac{5 \pm \sqrt{49}}{4} = \frac{5 \pm 7}{4}$$

$$x = \frac{-2}{4} = -\frac{1}{2} \quad x = \frac{12}{4} = 3$$

$$x = \left\{ -\frac{1}{2}, 3 \right\}$$

$$(14) \quad k^2 - 8k = 0$$

$$k(k-8) = 0$$

$$k=0 \quad k-8=0$$

$$k=0 \quad k=8$$

$$(16) \quad a^2 + 5a = 0$$

$$a(a+5) = 0$$

$$a=0 \quad a+5=0$$

$$a=0 \quad a=-5$$

$$(18) \quad 2x^2 - 11x - 21 = 0$$

$$\begin{array}{r|l} 2x^3 & P \quad S \\ 1x^{-7} & -42 \quad -11 \end{array} \quad (2x^2+3x)(14x-21)=0$$

$$3:14 \quad X(2x+3) - 7(2x+3) = 0$$

$$(2x+3)(x-7) = 0$$

$$2x+3=0 \quad x-7=0$$

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

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

$$x = \left\{ -\frac{3}{2}, 7 \right\}$$

$$(20) \quad 60m^2 + 4m - 160 = 0$$

$$\begin{array}{r} 3x \quad 5 \\ 5x \quad 8 \end{array} \quad 4(15m^2 + m - 40) = 0$$

$$4(3x+5)(5x-8) = 0$$

$$3x+5=0$$

$$3x = -5$$

$$x = -\frac{5}{3}$$

$$5x-8=0$$

$$5x = 8$$

$$x = \frac{8}{5}$$

$$(22) \quad 2n^2 + 13n + 19 = 4$$

$$2n^2 + 13n + 15 = 0 \quad \begin{array}{r|l} P & S \\ 30 & 13 \\ \hline & 10 \cdot 3 \end{array}$$

$$(2n^2 + 10n) + 3n + 15 = 0$$

$$2n(n+5) + 3(n+5) = 0$$

$$(n+5)(2n+3) = 0$$

$$n+5=0$$

$$n = -5$$

$$2n+3=0$$

$$n = -\frac{3}{2}$$

$$(24) \quad 20b^2 - 40b = 25$$

$$20b^2 - 40b - 25 = 0 \quad \begin{array}{r|l} P & S \\ -20 & -8 \\ \hline & -10 \cdot 2 \end{array}$$

$$5(4b^2 - 8b - 5) = 0$$

$$5((4b^2 - 10b) + (2b - 5)) = 0$$

$$5(2b(2b-5) + 1(2b-5)) = 0$$

$$5(2b-5)(2b+1) = 0$$

$$2b-5=0$$

$$b = \frac{5}{2}$$

$$2b+1=0$$

$$b = -\frac{1}{2}$$

$$(26) \quad k^2 - 14k - 19 = 0$$

$$k^2 - 14k + 49 = 19 + 49$$

$$-\frac{14}{2} = (-7)^2 = 49$$

$$(k-7)^2 = 68$$

$$\sqrt{(k-7)^2} = \sqrt{68}$$

$$k-7 = \pm 2\sqrt{17}$$

$$k = 7 \pm 2\sqrt{17}$$

$$(28) \quad x^2 - 20x + 64 = 0$$

$$x^2 - 20x + \underbrace{100}_{-64 \quad -64} = \underbrace{64 + 100}$$

$$\frac{-20}{2} = (-10)^2 = 100$$

$$(x-10)^2 = 164$$

$$\sqrt{(x-10)^2} = \sqrt{164}$$

$$x-10 = \pm 2\sqrt{41}$$

$$x = 10 \pm 2\sqrt{41}$$

$$(30) \quad x^2 + 12x + 30 = -5$$

$$x^2 + 12x + \underbrace{36}_{-30 \quad -30} = -35 + 36$$

$$\frac{12}{2} = (6)^2 = 36$$

$$(x+6)^2 = 1$$

$$\sqrt{(x+6)^2} = \sqrt{1}$$

$$x+6 = \pm 1$$

$$x = -6 \pm 1$$

$$x = \{-7, -5\}$$

$$(32) \quad 9m^2 + 18m - 8 = 5$$

$$9m^2 + 18m + 8 = 13$$

\* Coeff must be one

$$\frac{9m^2 + 18m}{9} = \frac{13}{9}$$

$$m^2 + 2m + 1 = \frac{13}{9} + 1$$

$$\left(\frac{2}{2}\right)^2 = 1$$

$$(m+1)^2 = \frac{22}{9}$$

$$\sqrt{(m+1)^2} = \sqrt{\frac{22}{9}}$$

$$m+1 = \pm \frac{\sqrt{22}}{3}$$

$$m+1 = \pm \frac{\sqrt{22}}{3}$$

$$m = -1 \pm \frac{\sqrt{22}}{3}$$

$$(34) \quad 3p^2 = -12p - 9$$

$$\frac{3p^2 + 12p}{3} = \frac{-9}{3}$$

$$p^2 + 4p + 4 = -3 + 4$$

$$\left(\frac{4}{2}\right)^2 = 4$$

$$(p+2)^2 = 1$$

$$\sqrt{(p+2)^2} = \sqrt{1}$$

$$p+2 = \pm 1$$

$$p = -2 \pm 1$$

$$p = \{-3, -1\}$$

$$(36) \quad 2b^2 + 17b = 14 + 5b$$

$$2b^2 + 12b = 14 - 5b$$

$$\frac{2b^2 + 12b}{2} = \frac{14}{2}$$

$$b^2 + 6b + 9 = 7 + 9$$

$$\left(\frac{6}{2}\right)^2 = 9$$

$$(b+3)^2 = 16$$

$$\sqrt{(b+3)^2} = \sqrt{16}$$

$$b+3 = \pm 4$$

$$b = -3 \pm 4$$

$$b = \{-7, 1\}$$

Solve by completing the square.

1.  $x^2 - 16x + 50 = 2$

$$x^2 - 16x + 64 = -48 + 64$$

$$(x - 8)^2 = 16$$

$$\sqrt{(x-8)^2} = \sqrt{16}$$

$$x - 8 = \pm 4$$

$$x = 8 \pm 4$$

$$x = \{4, 12\}$$

Solve by the quadratic formula.

3.  $2x^2 - 4x - 5 = 0$

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

$$x = \frac{4 \pm \sqrt{16 + 40}}{4}$$

$$x = \frac{4 \pm \sqrt{56}}{4} = \frac{4 \pm 2\sqrt{14}}{4}$$

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

Solve by square roots.

4.  $x^2 - 48 = 0$

$$\sqrt{x^2} = \sqrt{48}$$

$$x = \pm 4\sqrt{3}$$

2.  $3x^2 - 14 = 12x$

$$\frac{3x^2}{3} - \frac{12x}{3} = \frac{21}{3}$$

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

$$\sqrt{(x-2)^2} = \sqrt{11}$$

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

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

$$\begin{aligned} a &= 2 \\ b &= -4 \\ c &= -5 \end{aligned}$$

$$\begin{aligned} 56 \\ 4 \sqrt{14} \end{aligned}$$

5.  $3(2x - 5)^2 + 4 = 112$

$$\frac{3(2x-5)^2}{3} = \frac{108}{3}$$

$$\sqrt{(2x-5)^2} = \sqrt{36}$$

$$2x - 5 = \pm 6$$

$$2x = 5 \pm 6$$

$$x = \left\{ \frac{1}{2}, \frac{11}{2} \right\}$$



Solve by any method.

$$\begin{aligned} a &= 4 \\ b &= -9 \\ c &= 4 \end{aligned}$$

$$6. 4x^2 - 9x + 4 = 0$$

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

$$x = \frac{9 \pm \sqrt{81 - 64}}{8} = \frac{9 \pm \sqrt{17}}{8}$$

$$7. 48x^3 - 3x = 0$$

$$3x(16x^2 - 1) = 0$$

$$3x(4x+1)(4x-1) = 0$$

$$3x = 0 \quad 4x+1 = 0 \quad 4x-1 = 0$$

$$x = 0 \quad x = -\frac{1}{4} \quad x = \frac{1}{4}$$

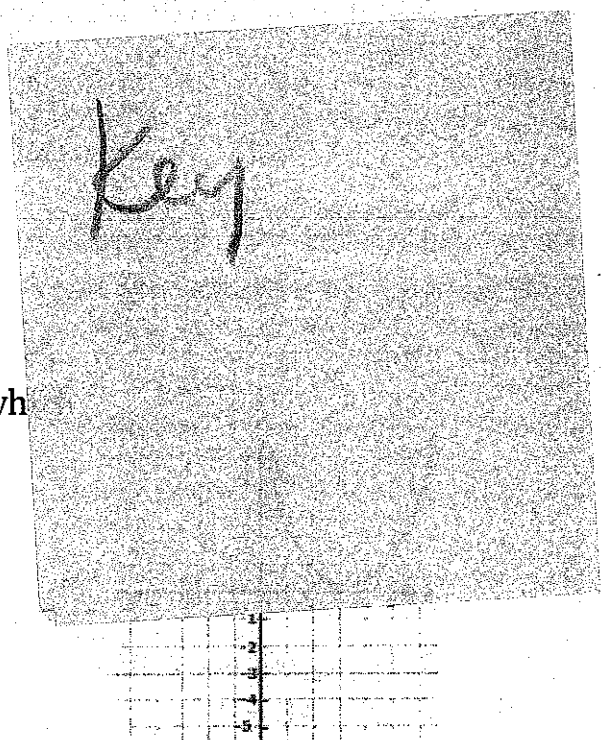
$$8. 25r^2 + 4 = -20r$$

$$25r^2 + 20r + 4 = 0$$

$$(5r + 2)(5r + 2) = 0$$

$$r = -\frac{2}{5}$$

9. Sketch a graph of a quadratic function which has only one solution.



10. Write the equation of a quadratic function with only one solution.

$$16x^2 + 24x + 9 = 0$$