Name: _____ **Date:** _____ **Period:** _____

Quadratic Equations Practice Worksheet

Instructions: Solve each quadratic equation. Show all work clearly. For word problems, define a variable, write an equation, solve, and answer in a complete sentence. Simplify all answers completely (exact form, no decimals unless specified).

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1. Solve by factoring: $x^2 - 5x - 24 = 0$.

2. Solve by factoring: $2x^2 + 7x - 15 = 0$.

3. Solve using the quadratic formula: $x^2 + 6x + 3 = 0$. Write answers in simplest radical form.

4. Solve using the quadratic formula: $3x^2 - 2x - 4 = 0$. Write answers in simplest radical form.

5. Solve by completing the square: $x^2 - 8x + 1 = 0$.

6. Solve by completing the square: $2x^2 + 12x - 5 = 0$.

7. The product of two consecutive positive integers is 132. Find the integers.

8. A rectangular garden has a length that is 4 feet longer than its width. The area of the garden is 96 square feet. Find the dimensions of the garden.

9. A ball is thrown upward from a height of 6 feet with an initial velocity of 40 feet per second. The height h (in feet) after t seconds is given by $h = -16t^2 + 40t + 6$. How long does it take for the ball to hit the ground? Round to the nearest hundredth of a second.

10. Solve the equation: $x^4 - 13x^2 + 36 = 0$. (Hint: Use substitution $u = x^2$.)

Answer Key

1. $x^2 - 5x - 24 = 0$
   Factoring: $(x-8)(x+3) = 0$
   $x = 8$ or $x = -3$

2. $2x^2 + 7x - 15 = 0$
   Factoring: $(2x-3)(x+5) = 0$
   $x = \frac{3}{2}$ or $x = -5$

3. $x^2 + 6x + 3 = 0$
   Quadratic formula: $x = \frac{-6 \pm \sqrt{36-12}}{2} = \frac{-6 \pm \sqrt{24}}{2} = \frac{-6 \pm 2\sqrt{6}}{2} = -3 \pm \sqrt{6}$
   $x = -3 + \sqrt{6}$ or $x = -3 - \sqrt{6}$

4. $3x^2 - 2x - 4 = 0$
   Quadratic formula: $x = \frac{2 \pm \sqrt{4+48}}{6} = \frac{2 \pm \sqrt{52}}{6} = \frac{2 \pm 2\sqrt{13}}{6} = \frac{1 \pm \sqrt{13}}{3}$
   $x = \frac{1+\sqrt{13}}{3}$ or $x = \frac{1-\sqrt{13}}{3}$

5. $x^2 - 8x + 1 = 0$
   Completing the square: $x^2 - 8x = -1$
   $x^2 - 8x + 16 = 15$
   $(x-4)^2 = 15$
   $x - 4 = \pm\sqrt{15}$
   $x = 4 \pm \sqrt{15}$

6. $2x^2 + 12x - 5 = 0$
   Divide by 2: $x^2 + 6x - \frac{5}{2} = 0$
   $x^2 + 6x = \frac{5}{2}$
   $x^2 + 6x + 9 = \frac{5}{2} + 9 = \frac{23}{2}$
   $(x+3)^2 = \frac{23}{2}$
   $x + 3 = \pm\sqrt{\frac{23}{2}} = \pm\frac{\sqrt{46}}{2}$
   $x = -3 \pm \frac{\sqrt{46}}{2} = \frac{-6 \pm \sqrt{46}}{2}$

7. Let the integers be n and $n+1$.
   $n(n+1) = 132$
   $n^2 + n - 132 = 0$
   $(n+12)(n-11) = 0$
   $n = -12$ or $n = 11$ (positive, so $n = 11$)
   The integers are 11 and 12.

8. Let width $= w$, length $= w + 4$.
   $w(w+4) = 96$
   $w^2 + 4w - 96 = 0$
   $(w+12)(w-8) = 0$
   $w = -12$ or $w = 8$ (positive, so $w = 8$)
   Dimensions: width = 8 ft, length = 12 ft.

9. Set $h = 0$: $-16t^2 + 40t + 6 = 0$
   Divide by -2: $8t^2 - 20t - 3 = 0$
   Quadratic formula: $t = \frac{20 \pm \sqrt{400+96}}{16} = \frac{20 \pm \sqrt{496}}{16} = \frac{20 \pm 4\sqrt{31}}{16} = \frac{5 \pm \sqrt{31}}{4}$
   Positive root: $t = \frac{5+\sqrt{31}}{4} \approx \frac{5+5.5678}{4} \approx 2.64$ seconds.

10. Let $u = x^2$. Then $u^2 - 13u + 36 = 0$
    $(u-4)(u-9) = 0$
    $u = 4$ or $u = 9$

$x^2 = 4 \Rightarrow x = \pm 2$
$x^2 = 9 \Rightarrow x = \pm 3$
Solutions: $x = 2, -2, 3, -3$