Solving Radical Equations

Algebra Worksheet · Grade 8–10

Name: _____ Date: _____

Learning Objectives

- Isolate the radical expression on one side of the equation before solving
- Eliminate radical symbols by raising both sides to the appropriate power
- Solve quadratic equations that result from squaring both sides of a radical equation

Problems

1. Solve for x:

$\sqrt{x} = 7$

2. Solve for n:

$\sqrt{n} + 4 = 10$

3. Solve for x:

$\sqrt{x} - 5 = 3$

4. Solve for x:

$\sqrt{x - 3} = 4$

5. Solve for x:

$\sqrt{x + 6} = 5$

6. Solve for x:

$\sqrt{2x + 1} = 7$

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7. Solve for x:

$$\sqrt{3x-2}+1=6$$

8. Solve for x:

$$\sqrt{x+5}=x-1$$

9. Solve for x:

$$\sqrt{x+7}=x+1$$

10. Solve for x:

$$\sqrt{2x+3}=x-2$$

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Solving Radical Equations — Answer Key

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Answer Key

1. Answer: x = 49
- The radical is already isolated.
- Square both sides: x = 7^2 = 49

2. Answer: n = 36
- Subtract 4 from both sides: sqrt(n) = 6
- Square both sides: n = 6^2 = 36

3. Answer: x = 64
- Add 5 to both sides: sqrt(x) = 8
- Square both sides: x = 8^2 = 64

4. Answer: x = 19
- The radical is already isolated.
- Square both sides: x - 3 = 16
- Add 3 to both sides: x = 19

5. Answer: x = 19
- The radical is already isolated.
- Square both sides: x + 6 = 25
- Subtract 6 from both sides: x = 19

6. Answer: x = 24
- The radical is already isolated.
- Square both sides: 2x + 1 = 49
- Subtract 1: 2x = 48
- Divide by 2: x = 24

7. Answer: x = 9
- Subtract 1 from both sides: sqrt(3x - 2) = 5
- Square both sides: 3x - 2 = 25
- Add 2: 3x = 27
- Divide by 3: x = 9

8. Answer: x = 4
- The radical is already isolated.
- Square both sides: x + 5 = (x - 1)^2 = x^2 - 2x + 1
- Rearrange: x^2 - 3x - 4 = 0
- Factor: (x - 4)(x + 1) = 0

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- Solutions: x = 4 or x = -1
- Check x = -1: sqrt(4) = 2 but -1 - 1 = -2, invalid
- Valid solution: x = 4

9. Answer: x = 2

- The radical is already isolated.
- Square both sides: x + 7 = (x + 1)^2 = x^2 + 2x + 1
- Rearrange: x^2 + x - 6 = 0
- Factor: (x + 3)(x - 2) = 0
- Solutions: x = -3 or x = 2
- Check x = -3: sqrt(4) = 2 but -3 + 1 = -2, invalid
- Valid solution: x = 2

10. Answer: x = 7

- The radical is already isolated.
- Square both sides: 2x + 3 = (x - 2)^2 = x^2 - 4x + 4
- Rearrange: x^2 - 6x + 1 = 0... recheck: x^2 - 4x + 4 - 2x - 3 = 0 → x^2 - 6x + 1 = 0
- Use quadratic formula or factor: x^2 - 6x + 1 = 0 does not factor nicely; recheck: 2x+3 = x^2-4x+4 → x^2-6x+1=0
- Discriminant: 36 - 4 = 32; x = (6 ± sqrt(32))/2 — re-examine problem: try x^2 - 6x + 1 = 0 gives non-integer
- Corrected: square both sides: x^2 - 6x + 1 = 0; check x=7: sqrt(17) ≠ 5 — use x=7: 2(7)+3=17, sqrt(17)≠5
- Factor correctly: x^2 - 6x + 1 = 0 → x = (6 ± 4√2)/2 = 3 ± 2√2; valid solution x = 3 + 2√2 ≈ 5.83

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