

Multistep Equations with Square Roots and Powers

Solve each equation. Show all steps clearly. Express your answers in simplest form.

1. Solve for x : $2\sqrt{x} + 5 = 17$

2. Solve for y : $y^2 - 8y + 15 = 0$

3. Solve for x : $\sqrt{3x + 4} = x - 2$

4. Solve for p : $p^2 = 49$

5. Solve for x : $\sqrt{x + 6} = 3$

6. Solve for x : $x^2 + 5x + 6 = 0$

7. Solve for x : $2x^2 - 18 = 0$

8. Solve for y : $\sqrt{y - 1} + 2 = 7$

9. Solve for x : $x^2 = 2x + 15$

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10. Solve for x : $\sqrt{2x - 3}$

Answer Key

1. $2\sqrt{x} + 5 = 17$

$$2\sqrt{x} = 12 \Rightarrow \sqrt{x} = 6 \Rightarrow x = 36$$

2. $y^2 - 8y + 15 = 0$

$$\text{Factor: } (y - 5)(y - 3) = 0 \Rightarrow y = 5 \text{ or } y = 3$$

3. $\sqrt{3x + 4} = x - 2$

$$\text{Square both sides: } 3x + 4 = (x - 2)^2$$

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

$$0 = x^2 - 7x$$

$$x(x - 7) = 0 \Rightarrow x = 0 \text{ or } x = 7$$

$$\text{Check: } x = 0 \text{ gives } \sqrt{4} = -2 \text{ (extraneous)}$$

$$x = 7 \text{ gives } \sqrt{21 + 4} = 7 - 2 \Rightarrow 5 = 5 \checkmark$$

$$\text{Answer: } x = 7$$

4. $p^2 = 49$

$$p = 7 \text{ or } p = -7$$

5. $\sqrt{x + 6} = 3$

$$x + 6 = 9 \Rightarrow x = 3$$

6. $x^2 + 5x + 6 = 0$

$$\text{Factor: } (x + 2)(x + 3) = 0 \Rightarrow x = -2 \text{ or } x = -3$$

7. $2x^2 - 18 = 0$

$$2x^2 = 18 \Rightarrow x^2 = 9 \Rightarrow x = 3 \text{ or } x = -3$$

8. $\sqrt{y - 1} + 2 = 7$

$$\sqrt{y - 1} = 5 \Rightarrow y - 1 = 25 \Rightarrow y = 26$$

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

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

Factor: $(x - 5)(x + 3) = 0 \Rightarrow x = 5 \text{ or } x = -3$

10. $\sqrt{2x - 3} = 5$

$$2x - 3 = 25 \Rightarrow 2x = 28 \Rightarrow x = 14$$