

5.8 Solving Radical Equations

Radical Equation: an equation that contains radical expressions and/or rational exponents

To Solve: eliminate radicals or rational exponents and then solve resulting equation. Remember - check your solution(s)! It (they) may be extraneous!!

Examples

Solve each equation. SHOW ALL WORK!! Remember to check for extraneous solutions.

1. $5 - \sqrt[4]{x} = 0$

$$(5)^4 = (\sqrt[4]{x})^4$$

$$625 = x$$

Examples

Solve each equation. SHOW ALL WORK!! Remember to check for extraneous solutions.

2. $3x^{4/3} = 243$

$$x = 27$$

$$\left(x^{4/3}\right)^{3/4} = \left(81\right)^{3/4}$$

$$x = 81^{3/4}$$

Examples

Solve each equation. SHOW ALL WORK!! Remember to check for extraneous solutions.

3. $\sqrt{2x+8} - 4 = 6$

$$\left(\sqrt{2x+8}\right)^2 = (10)^2$$

$$2x + 8 = 100$$

$$2x = 92$$

$$x = 46$$

Examples

Solve each equation. SHOW ALL WORK!! Remember to check for extraneous solutions.

$$4. \quad 3(x+1)^{4/3} = 48$$

$$\left[(x+1)^{4/3} \right]^{3/4} = \left[16 \right]^{3/4}$$

$$x+1 = 8$$

$$x = 7$$

Examples

Solve each equation. SHOW ALL WORK!! Remember to check for extraneous solutions.

$$5. \quad \sqrt{3x+2} - 2\sqrt{x} = 0$$

$$\sqrt{8} - 2\sqrt{2} = 0$$

$$\left(\sqrt{3x+2} \right)^2 = \left(2\sqrt{x} \right)^2$$

$$3x+2 = 4x$$

$$x = 2$$

Examples

Solve each equation. SHOW ALL WORK!! Remember to check for extraneous solutions.

$$6. \left(\sqrt{x^2 + 5}\right)^2 = (x + 3)^2$$

$$\sqrt{\frac{49}{9}} = \frac{7}{3}$$

$$\frac{7}{3} = \frac{7}{3} \checkmark$$

$$x^2 + 5 = x^2 + 6x + 9$$

$$5 = 6x + 9$$

$$6x = -4$$

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

$$\textcircled{1} \sqrt{-3-4x} - \sqrt{-2-2x} = 1$$

$$\left(\sqrt{-3-4x}\right)^2 = \left(1 + \sqrt{-2-2x}\right)^2$$

$$-3-4x = (1 + \sqrt{-2-2x})(1 + \sqrt{-2-2x})$$

$$-3-4x = 1 + 2\sqrt{-2-2x} + (-2-2x)$$

$$-3-4x = -1 - 2x + 2\sqrt{-2-2x}$$

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

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

$$1 + 2x + x^2 = -2 - 2x$$

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

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

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