

3.2 - Day 1 - Solving Radical Equations



Objective To solve square root and other radical equations

Essential Understanding Solving a square root equation may require that you square each side of the equation. This can introduce extraneous solutions.

To solve a radical equation, isolate the radical on one side of the equation. Then raise each side to the power suggested by the index.

Ex. Solve for x.

$$3\sqrt{x} + 5 = 20$$

$$3\sqrt{x} = 15$$

$$\sqrt{x} = 5$$

$$x = 25$$

$$6 - 4\sqrt[3]{x} = -18$$

$$-4\sqrt[3]{x} = -24$$

$$\sqrt[3]{x} = 6$$

$$x = 216$$

Problem 1 Solving a Square Root Equation

What is the solution of $3 + \sqrt{2x - 3} = 8$?

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

$$2x - 3 = 25$$

$$2x = 28$$

$$x = 14$$

Problem 2 Solving Other Radical Equations

What does this mean?

$$(7v - 3)^2 + 2 = 7$$

-2 -2

$$\sqrt{7v - 3} = 5$$

$$7v - 3 = 25$$

$$7v = 28$$

$$\boxed{v = 4}$$

Rational Exponent Rule:

$$a^{\frac{m}{n}} = \sqrt[n]{a^m} \quad \text{OR} \quad (\sqrt[n]{a})^m$$

Ex.

$$36^{\frac{1}{2}} = \sqrt{36} = \boxed{6}$$

$$125^{\frac{1}{3}} = \sqrt[3]{125} = \boxed{5}$$

$$x^{\frac{3}{4}} = \sqrt[4]{x^3} \quad \text{OR} \quad (\sqrt[4]{x})^3$$

$$27^{\frac{2}{3}} = \sqrt[3]{27^2}$$

$$(\sqrt[3]{27})^2$$

$$(3)^2$$

$$\boxed{9}$$

Problem 2 Solving Other Radical Equations

What is the solution of $\frac{3(x+1)^{\frac{3}{5}}}{3} + 1 = 25$?

-1 -1 / 3

$$(x+1)^{\frac{3}{5}} = 8$$

$$\sqrt[5]{(x+1)^3} = 8$$

$$\sqrt[3]{(x+1)^5} = \sqrt[3]{32768}$$

$$x+1 = 32$$

$$\boxed{x = 31}$$

Problem 2 Solving Other Radical Equations

What is the solution of $\frac{3(x+1)^{\frac{2}{3}}}{3} = \frac{12}{3}$

$$(x+1)^{\frac{2}{3}} = 4$$

$$\sqrt[3]{(x+1)^2} = 4^{\frac{3}{3}}$$

$$\sqrt{(x+1)^2} = \sqrt{64}$$

$$x+1 = 8$$

$$x = 7$$

$$x+1 = -8$$

$$x = -9$$

when you...
take an even-root
of both sides of
an equation.
"±"

Problem 3 Using Radical Equations **STEM**

Earth Science For Meteor Crater in Arizona, the formula $d = 2\sqrt[3]{\frac{V}{0.3}}$ relates the diameter d of the rim (in meters) to the volume V (in cubic meters). What is the volume of Meteor Crater? (All values are approximate.)



$$1200 = 2\sqrt[3]{\frac{V}{0.3}}$$

$$600^3 = \sqrt[3]{\frac{V}{0.3}}^3$$

$$216000000 = \frac{V}{0.3}$$

$$V = 64,800,000 \text{ m}^3$$

ANS to 3.2 Day 1 p.395: 9 - 25 all, 60**9.** 16**10.** 1**11.** 22**12.** 15**13.** 5**14.** 2**15.** 4**16.** 23**17.** $\frac{2}{3}$ **18.** 3, -13**19.** -29, 25**20.** 18**21.** 78**22.** 8**23.** 0**24.** about 25.8 ft**25.** about 4 in.**60.** $d = \frac{v^2}{64}$