

Lesson 2.03 Equations with Exponents

Students will be able to:

- Content Objective: Solve equations containing rational exponents.
- Language Objective: Discuss how to manipulate a radical expression to find an unknown value.



Warm Up

What exponent can we raise x^3 to get an outcome of x^1 ?



Vocabulary Review

Reciprocal: a mathematical expression/function related to another such that their product is

_____.

Example: $\frac{2}{3} \cdot \frac{3}{2} = 1$ $5 \cdot \frac{1}{5} = 1$



Graphic Organizer

Steps for Solving Equations Using the Reciprocal Method

1. Use inverse operations to isolate the base.
2. Raise the exponential expression to the reciprocal of the exponent shown. Do this on both sides.
3. Write your final answer.



Skill 1: Solving One-Step Equations Using Reciprocals

Solve each of the following equations below for the given variable.

a. $x^7 = 128$

b. $a^{\frac{1}{2}} = 16$



Exercise 1: Solving One-Step Equations Using Reciprocals

Solve each of the following equations below for the given variable. Round to the nearest tenth if necessary.

a. $x^{\frac{2}{3}} = 4$

b. $y^5 = 200$



Skill 2: Solving Multi-Step Equations Using Reciprocals

Solve the equation below for x .

$$5\left(x^{\frac{1}{2}}\right)^3 + 7 = 142$$



Exercise 2: Solving Multi-Step Equations Using Reciprocals

1. Solve the equation below for r .

$$-5 - 5r^{\frac{3}{2}} = -3650$$

2. Solve the equation below for w . Round to the *nearest tenth*.

$$w^{\frac{4}{3}} + 30 = 130$$

3. Solve the equation below for x .

$$3x^{\frac{3}{4}} + 5 = 86$$



Talk it Out

Given the equal terms $\sqrt[3]{x^5}$ and $y^{\frac{5}{6}}$, determine and state y in terms of x . Discuss with a partner.



Check Point

Which of the following is the solution to the equation $x^{\frac{1}{4}} = 16$?

(1) 4

(2) 2

(3) 65,536

(4) 8



2.03 Problem Set

Name: _____

1. The expression $(x + 5)^{\frac{a}{2}}$ is equivalent to

(1) $(\sqrt{x + 5})^a$

(3) $(\sqrt[a]{x + 5})^2$

(2) $\frac{1}{(\sqrt{x+5})^a}$

(4) $\frac{1}{(\sqrt[a]{x+5})^2}$

2. Solve algebraically for g . Round to the *nearest tenth* if necessary.

$$g^5 + 3 = 16,810$$

3. Solve the equation below algebraically for x . Round to the *nearest tenth* if necessary.

$$3x^2 - 15 = 30$$

4. Justify why $4^{\frac{3}{2}} = 8$. Show all work.