

# WARM UP!

Simplify completely and be careful with even roots.

$$\sqrt[4]{81x^4}$$

$$\sqrt[5]{2x} \cdot \sqrt[5]{16x^5}$$

$$\frac{x}{\sqrt[4]{x}}$$

$$3|x|$$

$$2x\sqrt{x}$$

$$\sqrt[4]{x^3}$$

# 6-4 Rational Exponents

## Square Roots

A square root is equivalent to an exponent of one-half.

$$\sqrt{x} = x^{\frac{1}{2}}$$

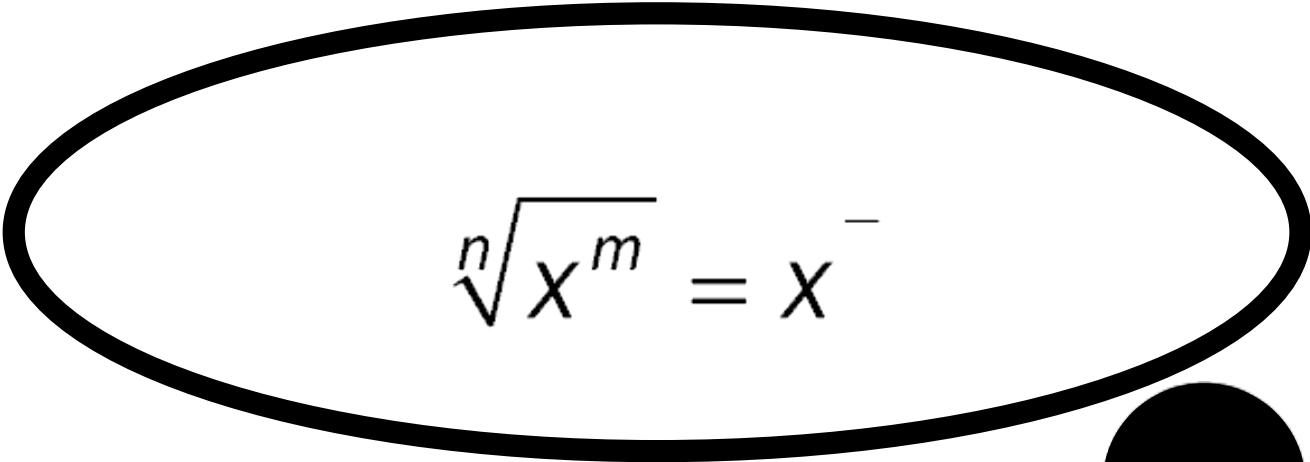
Why? \_\_\_\_\_

Erase the blue oval to check your explanation.

## Pull for Teacher's Notes

**nth Roots**

What exponent is equivalent to an nth root?


$$\sqrt[n]{x^m} = x^{\frac{m}{n}}$$



Use the magnifying glass to reveal the answer.

## Converting Practice

Write using rational exponents.

$$\sqrt{x^3}$$

\_\_\_\_\_

$$\sqrt[3]{x^2}$$

\_\_\_\_\_

$$\sqrt[3]{x^4}$$

\_\_\_\_\_

$$\sqrt{x^5}$$

\_\_\_\_\_

Press tiles to reveal solutions.

## Reducing Practice

Write using rational exponents. Then reduce.

$$\sqrt[5]{x^{10}}$$

\_\_\_\_\_

$$\sqrt[3]{x^9}$$

\_\_\_\_\_

$$\sqrt[4]{x^2}$$

\_\_\_\_\_

$$\sqrt{x^4}$$

\_\_\_\_\_

Press tiles to reveal solutions.

## Pull for Teacher's Notes

## Number Cube Practice

Use number cubes to generate values of  $m$  and  $n$ .

Write as a rational exponent. Reduce if necessary.

$m$ :

5

$n$ :

3

$$\sqrt[n]{x^m} = x^{-} = x$$

Convert and simplify numerically and check with your calculator.

1.  $\sqrt{25} =$

2.  $64^{1/2} =$

3.  $\sqrt[3]{27} =$

4.  $\sqrt[3]{-8} =$

5.  $(81)^{3/4} =$

6.  $-(\sqrt[4]{256})^0 =$

7.  $(-64)^{2/3} =$

8.  $-16^{5/4} =$



1 What is the index of a square root?

A  $-\frac{1}{2}$

B  $\frac{1}{2}$

C  $\sqrt{2}$

D 2

2 Which exponent is equivalent to a square root?

A  $-2$

B  $-\frac{1}{2}$

C  $\frac{1}{2}$

D  $\sqrt{2}$

3 Which exponent is equivalent to a cube root?

A  $-3$

B  $-\frac{1}{3}$

C  $\frac{1}{3}$

D  $\sqrt{3}$

4 What is  $\sqrt{x^3}$  written using rational exponents?

A  $x^{-\frac{3}{2}}$

B  $x^{\frac{3}{2}}$

C  $x^{-\frac{2}{3}}$

D  $x^{\frac{2}{3}}$

5 What is  $\sqrt[3]{x^4}$  written using rational exponents?

A  $x^{-\frac{4}{3}}$

B  $x^{-\frac{3}{4}}$

C  $x^{\frac{3}{4}}$

D  $x^{\frac{4}{3}}$

6 What is  $\sqrt{x^4}$  written using rational exponents?

- A  $x^{-2}$
- B  $x^{-\frac{1}{4}}$
- C  $x^{\frac{1}{4}}$
- D  $x^2$

7 What is  $\sqrt[3]{x^9}$  written using rational exponents?

- A  $x^{-3}$
- B  $x^{-\frac{1}{3}}$
- C  $x^3$
- D  $x^{\frac{1}{3}}$

## 8 How do you reduce a rational exponent?

- A Cancel common factors in the numerator and denominator.
- B Subtract common factors in the numerator and denominator.
- C Take the square root of common factors in the numerator and denominator.
- D Subtract the square root of common factors in the numerator and denominator.



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$$\frac{a^{-2} \cdot 2a^{-3}}{(3a^2)^2}$$

A)  $\frac{3}{2a^6}$

B)  $6a^2$

C)  $\frac{2}{9a^9}$

D)  $\frac{8a^8}{3}$