$\frac{-12}{2}$

Algebra 1 7.3

Evaluate and rewrite expressions involving rational exponents

Solve equations with rational exponents

rational fraction form

inverse operation $\times \div + - ( )^2 = \sqrt{\ }$

radical sign $\sqrt{\ }$

square root (8th grade standard)

cube root

nth root

exponential equation

whiteboards

Irrational $\sqrt{25} = 5$ $\sqrt{17}$

Quiz 7.1-7.2 on Wed.

Square root $\sqrt{}$

$(\ ?\ )^2$

$\sqrt{25} = 5$

$\sqrt{49} = 7$

$\sqrt{36} = 6$

$\sqrt{17} = 4\ldots5$

↑ irrational

8th grade standard
perfect square
irrational

You have to know the code:

KeyConcept $b^{\frac{1}{2}}$

Words	For any nonnegative real number b, $b^{\frac{1}{2}} = \sqrt{b}$.
Examples	$16^{\frac{1}{2}} = \sqrt{16}$ or 4 $\qquad$ $38^{\frac{1}{2}} = \sqrt{38}$

$\sqrt{(25)} = (25)^{\frac{1}{2}}$ $\qquad$ $\sqrt{(29)} = (29)^{\frac{1}{2}}$

5... 6

$\sqrt{(49)} = (49)^{\frac{1}{2}}$

Example 1 Radical and Exponential Forms

Write each expression in radical form, or write each radical in exponential form.

a. $25^{\frac{1}{2}}$ $= \sqrt{25}$

b. $\sqrt{18}$ $(18)^{\frac{1}{2}}$

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

c. $5x^{\frac{1}{2}}$ $5 \cdot \sqrt{x}$

d. $\sqrt{8p}$ $(8p)^{\frac{1}{2}}$

$( )^{y}$

Reminder: radical $\sqrt[3]{}$ $\sqrt[4]{}$ $\sqrt{}$ is also a grouping symbol

$( )^{3}$ $\sqrt[3]{( )}$ $\sqrt[4]{( )}$ $\sqrt{\ }$

$\sqrt{\ }$ $( )^{2}$

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1A. $a^{\frac{1}{2}}$ **1B.** $\sqrt{22}$ **1C.** $(7w)^{\frac{1}{2}}$ **1D.** $2\sqrt{x}$

$\sqrt{a}$ $(22)^{\frac{1}{2}}$ $\sqrt{7w}$ $2\cdot(x)^{\frac{1}{2}}$

Grouping symbol

KeyConcept *n*th Root

Words For any real numbers a and b and any positive integer n, if $a^n = b$, then a is an nth root of b.

$\sqrt[4]{625} = (\ \ )^4$

5

Example Because $2^4 = 16$, 2 is a fourth root of 16; $\sqrt[4]{16} = 2$.

index

$\sqrt{25} = (5)^2$

5

$\sqrt[3]{8} = (2)^3$

2

index

Example 2 *n*th roots

Simplify.

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

b. $\sqrt[5]{32}$

guess & check

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2A. $\sqrt[3]{64}$ = 4

4^3

2B. $\sqrt[4]{10{,}000}$ = 10

if 1/2 means square root...

KeyConcept $b^{\frac{1}{n}}$

Words	For any positive real number b and any integer $n > 1$, $b^{\frac{1}{n}} = \sqrt[n]{b}$.
Example	$8^{\frac{1}{3}} = \sqrt[3]{8} = \sqrt[3]{2 \cdot 2 \cdot 2}$ or 2

Might be easier to see if written in radical form first...

Simplify.

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

$(\quad)^3$

Groups of 3...
(triplets)

b. $1296^{\frac{1}{4}} = \sqrt[4]{1296} = 6$

Groups of 4
(quads)

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3A. $27^{\frac{1}{3}} = 3$

3B. $256^{\frac{1}{4}} = 4$

*2 different ways...

Example 4 Evaluate $b^{\frac{m}{n}}$ Expressions

Simplify.

a. $64^{\frac{2}{3}}$

b. $36^{\frac{3}{2}}$

*root first

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4A. $27^{\frac{2}{3}}$

4B. $256^{\frac{5}{4}}$