Algebra 1   7.3

$\sqrt{}$ $\overset{\leftharpoonup}{\quad} x^2 \overset{\rightharpoonup}{\quad}$ $(\quad)^{\frac{1}{2}}$

Evaluate and rewrite expressions involving rational exponents
Solve equations with rational exponents
rational
inverse operation
radical sign $\sqrt{}$ $\sqrt[3]{}$ $\sqrt[4]{}$
square root (8th grade standard)
cube root
nth root
exponential equation
whiteboards

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

$(25)^{\frac{1}{2}} = 5$

Quiz 7.1-7.2

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 $\qquad\qquad$ $38^{\frac{1}{2}} = \sqrt{38}$

4 $\qquad$ 4

1A. $a^{\frac{1}{2}}$

1B. $\sqrt{22}$

1C. $(7w)^{\frac{1}{2}}$

1D. $2\sqrt{x}$

$\sqrt{a}$

$\downarrow$ $(22)^{\frac{1}{2}}$

$\sqrt{7w}$

$2(x)^{\frac{1}{2}}$

$7w^{\frac{1}{2}}$

$7 \cdot \sqrt{w}$

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

index

$?^4 = 16$

index

Example 2 *n*th roots

Simplify.

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

$(\,?\,)^3 = 27$

b. $\sqrt[5]{32}$ = 2

$(\,?\,)^5 = 32$

guess & check

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

$$\left(?\right)^3 = 64$$

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

$$\left(\right)^4 = 10{,}000$$

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

Simplify.

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

$\left(? \right)^{3} = 125$

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

$\left(? \right)^{4} = 1296$

Groups of 3...
(triplets)

Groups of 4
(quads)

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

$(\quad)^3 = 27$

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

$(?)^4 = 256$

*2 different ways...

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

Simplify.

a. $64^{\frac{2}{3}}$ $\frac{1}{3}$

b. $36^{\frac{3}{2}}$ $\frac{1}{2}$ $= 216$

$64^{\frac{1}{3}}$ $(?)^3 = 64$

$4^2 = 16$

$(\quad)^2 = 36$

$6^3 =$

*root first

4A. $27^{\frac{2}{3}}$ ←

$?^3 = 27$

$3^2 = 9$

4B. $256^{\boxed{5}4}$ ← $= 1024$

$?^4 =$

$4^5 =$

$$49^{\frac{3}{2}} =$$

$$7^3 = 343$$

$$81^{\frac{3}{4}}$$

$$?^4 = 81$$

$$3^3 = 27$$

$$625^{\frac{5}{4}} \qquad \frac{1}{4}$$

$$?^4 = 625$$

$$5^{\frac{5}{1}} = 3125$$