Algebra 2 6.4

Simplify radicals

Use a calculator to approximate roots **vs**

Simplify expression for exact answer

$\sqrt[3]{125} = 5$

inverse operation

x^2

$\sqrt{x}$

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

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

x^n $\sqrt[n]{\ }$

index

radical sign

radicand

principal root

simplify vs. evaluate

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

$x = \pm 5$

$\sqrt{25} = 5$

$-\sqrt{25} = -5$

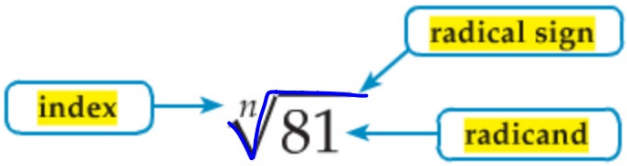
$\pm\sqrt{25} = \pm 5$

$\sqrt{16} = 4$

$x^2 = 16$

$x = \pm 4$

$x = 4$


radical sign
index
$\sqrt[n]{81}$
radicand

How many pairs of...

Example 1 Find Roots

Simplify.

a. $\pm\sqrt{16y^4} = \pm 4yy$

$= \pm 4y^2$

b. $-\sqrt[2]{(x^2-6)^8} = -(x^2-6)^4$

Note: "simplify" is not asking for a (calculator) decimal answer...
(often has some variable(s) in the answer too)

How many pairs, triples, quads, quints, etc....

c. $\sqrt[5]{243a^{20}b^{25}}$ = +

3 ^ 81

9 ^ 9

3 ^ 3 ^ 3 ^ 3

$\sqrt[5]{3^5 a^{20} b^{25}} = +3a^4b^5$

$a^{\frac{20}{5}}\ b^{\frac{25}{5}}$

d. $\sqrt[2]{-16x^4y^8}$

$\sqrt{16x^4y^8}$

$x^{\frac{4}{2}}\ y^{\frac{8}{2}}$

i

$+4x^2y^4i$

GuidedPractice

1A. $\pm\sqrt{36x^{10}}$ $\pm 6x^5$

1B. $-\sqrt{(y+7)^{16}}$

$-(y+7)^8$

Example 2 Simplify Using Absolute Value

Simplify.

a. $\sqrt[4]{y^4}$ $|y|$

y

b. $\sqrt[6]{64(x^2-3)^{18}}$ $|2(x^2-3)^3|$

$2(x^2-3)^3$

Technically: even powers can't be negative so answer key will use | |
don't worry about it :)

GuidedPractice

2A. $\sqrt{48y^6}$

$+|6y^3|$

$8 = 4 \cdot 2$, $4 = 2^2$, 2^5

$48 = 16 \cdot 3$, $16 = 4^2$

$4y^3$

$4\sqrt{3}y^3$

$4y^3\sqrt{3}$

2B. $\sqrt[4]{32(x-3)^{15}}$

$2(x-3)^3\sqrt[4]{2(x-3)^3}$

$(x-3)^{\frac{15}{4}}$

Simplify vs approximate: different questions
(follow directions)

Use a calculator to approximate each value to three decimal places.

7. $\sqrt{58}$ **8.** $-\sqrt{76}$ **9.** $\sqrt[5]{(-43)}$ **10.** $\sqrt[4]{71}$

≈ 7.616 ≈ -8.718 $(-43)^{\frac{1}{5}}$ $(2.903)^4$

≈ -2.122 2.903

inverse functions:

Powers	Factors	Words	Roots
$x^3 = 64$	$4 \cdot 4 \cdot 4 = 64$	4 is a cube root of 64.	$\sqrt[3]{64} = 4$
$x^4 = 625$	$5 \cdot 5 \cdot 5 \cdot 5 = 625$	5 is a fourth root of 625.	$\sqrt[4]{625} = 5$
$x^5 = 32$	$2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 32$	2 is a fifth root of 32.	$\sqrt[5]{32} = 2$
$a^n = b$	$\underbrace{a \cdot a \cdot a \cdot \ldots \cdot a}_{n \text{ factors of } a} = b$	a is an nth root of b.	$\sqrt[n]{b} = a$

6.4 e00

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