Algebra 2 6.4

Simplify radicals

Use a calculator to approximate roots **vs**

Simplify expression for exact answer

inverse operation

x^2

$\sqrt[2]{x}$

index

radical sign

radicand

principal root

simplify vs. evaluate

x^3 x^4 x^n

$\sqrt[3]{27}$ $\sqrt[4]{\ }$ $\sqrt[n]{\ }$

not calc

Calc. dec. ans.

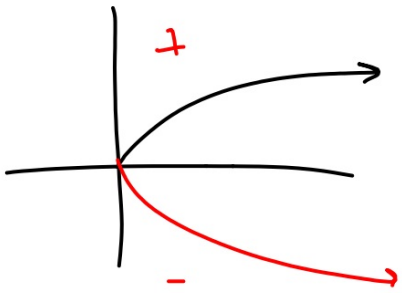
$\sqrt{25} = 5$

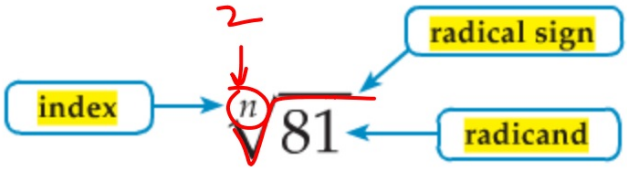
$-\sqrt{25} = -5$

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

$(5)^2 = 25$

$(-5)^2 = 25$





$\sqrt{(\quad)}$

$\sqrt{(25-9)}$ $\sqrt{16} = 4$

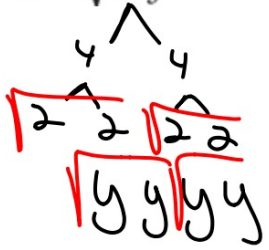
How many pairs of...

Example 1 Find Roots

Simplify.

a. $\pm\sqrt{16y^4} = \pm 2 \cdot 2 y y$

$\pm 4y^2$



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

$(x^2-6)(x^2-6)(x^2-6)(x^2-6)(x^2-6)(x^2-6)(x^2-6)(x^2-6)$

$(x^2-6)(x^2-6)(x^2-6)(x^2-6)$

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

243
3 ^ 5 1

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

a ^ 4

c. $\sqrt[5]{243a^{20}b^{25}} = 3a^4b^5$

33333 aaaaaaaaaa bbbbbbbbbb

d. $\sqrt[2]{-16x^4y^8}$ 11

$4i\,x^2y^4$

GuidedPractice

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

1B. $-\sqrt[2]{(y+7)^{6}}$ $= -(y+7)^{3}$

Example 2 Simplify Using Absolute Value

Simplify.

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

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

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

GuidedPractice

2A. $\sqrt{36y^6}$

$6y^3$

2B. $\sqrt[4]{16(x-3)^{12}}$

$2(x-3)^3$

Simplify vs approximate: different questions
(follow directions)

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

7. $\sqrt{58}$

7.616

8. $-\sqrt{76}$

-8.718

9. $\sqrt[5]{-43}$

$(-43)^{\frac{1}{5}}$

-2.122

10. $\sqrt[4]{71}$

$(71)^{\frac{1}{4}}$

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.	$\sqrt[n]{b} = a$

$\sqrt[16]{2x^2}$ 6.4 13-45.