What's Going On?

Checking In	Solutions from Last Time
Minds on	Applying the Laws
Action!	Exploring Rational Exponents
Consolidation	We are all the same

Learning Goal - I will be able to simplify powers with rational exponents.

Checking In

Solutions from Last Time

a. $(6^8 \div 6^4)^3$

subtract exponents (dividing)

$= (6^4)^3$

multiply exponents (power of a power)

$= 6^{12}$

b. $(8^2 \times 8^3)^4 \times (8^6 \div 8^5)^2$

add exponents (multiplying)

$= (8^5)^4 \times (8^1)^2$

$= 8^{20} \times 8^2$

$= 8^{22}$

Checking In

Solutions from Last Time

c. $(5^9 \div 5^4)^3 \times (5^5 \div 5^8)^2$

$= (5^5)^3 \times (5^{-3})^2$

$= 5^{15} \times 5^{-6}$

$= 5^9$

d. $(4^7 \div 4^3)^6 \div (4^3 \times 4^4)^2$

$= (4^4)^6 \div (4^7)^2$

$= 4^{24} \div 4^{14}$

$= 4^{10}$

Checking In

Solutions from Last Time

e. $(3^6 \times 3^{-3}) \div (3^3)^3$

$= (3^3) \div 3^9$ subtract

$= 3^{-6}$

$= \frac{1}{3^6}$ negative exponent... put in denominator and change the sign

f. $(7^9 \div 7^{10}) \div (7^{13} \div 7^{-5})^{-2}$

$= (7^{-1}) \div (7^{18})^{-2}$

$= 7^{-1} \div 7^{-36}$

$= 7^{35}$

Minds on

Applying the Laws

$$4^{\frac{1}{2}} \times 4^{\frac{1}{2}} = 4^{1} = 4$$

$$9^{\frac{1}{2}} \times 9^{\frac{1}{2}} = 9^{1} = 9$$

Action!

Exploring Rational Exponents

$16^{\frac{1}{2}} = 4$

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

$36^{\frac{1}{2}} = 6$

$49^{\frac{1}{2}} = 7$

$144^{\frac{1}{2}} = 12$

$100^{\frac{1}{2}} = 10$

Action!

Exploring Rational Exponents

What's another way of writing $x^{\frac{1}{2}}$ *?*

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

Action!

Exploring Rational Exponents

$8^{\frac{1}{3}} = 2$

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

$(-125)^{\frac{1}{3}} = -5$

$64^{\frac{1}{3}} = 4$

$1000^{\frac{1}{3}} = 10$

Action!

Exploring Rational Exponents

What's another way of writing $x^{\frac{1}{3}}$ *?*

$x^{\frac{1}{3}} = \sqrt[3]{x}$

What number to the power of 3 equals x

Action!

Exploring Rational Exponents

What's another way of writing $x^{\frac{1}{n}}$ *?*

$x^{\frac{1}{n}} = \sqrt[n]{x}$

$\sqrt[5]{1024} = 4$

$\sqrt[7]{-2187} = -3$

$\sqrt[4]{-16} = \text{error}$

There is no number, that when multiplied by itself 4 times gives a negative.

Action!

Exploring Rational Exponents

$$4^{\frac{3}{2}} = 8$$

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

$$16^{\frac{3}{4}} = 8$$

$$(\sqrt[4]{16})^3$$

$$27^{\frac{2}{3}} = 9$$

$$= (\sqrt[3]{27})^2$$

$$(-8)^{\frac{5}{3}} = -32$$

$$= (\sqrt[3]{-8})^5$$

Action!

Exploring Rational Exponents

What's another way of writing $x^{\frac{m}{n}}$ *?*

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

$$(-64)^{\frac{7}{3}}$$

$$= \sqrt[3]{-64}^{7}$$

$$= (-4)^{7}$$

$$= -16384$$

Consolidation

We are all the same!

$$4^{\frac{3}{2}} = \left(\sqrt{4}\right)^3$$

$$= (2)^3$$

$$= 8$$

a. Come up with four **other** rational powers that are equal to 8.

b. Come up with four rational powers that are equal to -27.

Power Form	Radical Form	Eval.
$81^{\frac{3}{4}}$	$= \sqrt[4]{81}^{3}$	$= 27$
$27^{\frac{5}{3}}$	$= \sqrt[3]{27}^{5}$	$= 243$
$(-4)^{\frac{4}{3}}$	$= \sqrt[3]{-4}^{4}$	$= 256$
$(-32)^{\frac{4}{5}}$	$= \sqrt[5]{-32}^{4}$	$= 16$
$(-1024)^{\frac{3}{5}}$	$= \sqrt[5]{-1024}^{3}$	$= -64$