



Warm Up

Test Mar 2 ???

Warm Up quiz today

$$(\sqrt{\quad})^{2 \times \text{power}}$$

Express each as a radical then evaluate:

a) $(1728)^{\frac{2}{3}}$ exponent 2, index 3 $(\sqrt[3]{1728})^2 = (12)^2 = 144$

Express each as a power:

a) $(\sqrt[6]{128})^7 = 128^{\frac{7}{6}}$

Express each in simplest radical form: Entire \rightarrow Mixed

a) $\sqrt{180}$
 $\sqrt{36 \times 5}$
 $\sqrt{36} \sqrt{5}$
 $6\sqrt{5}$

b) $\sqrt[3]{1024}$
 $\sqrt[3]{512 \times 2}$
 $\sqrt[3]{512} \sqrt[3]{2}$
 $8\sqrt[3]{2}$

Write the reciprocal for each: flip fraction

a) (7^3)
 $= \left(\frac{1}{7}\right)^3$
 $= \frac{1^3}{7^3}$
 $= \frac{1}{7^3}$
 $= \frac{1}{343}$

b) $\frac{242}{1}$
 $\frac{1}{242}$
 or
 242^{-1}

c) $\frac{1}{6} = 6^{-1}$
 Rec
 6^1

d) 8^2 8^{-2}
 Rec
 or $\frac{1}{8^2}$
 $\frac{1}{64}$

Homework Questions

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3a) $\frac{1}{3^3} = \frac{1}{27}$ b) $(\frac{1}{2})^{-3} = \frac{-2^3}{1} = -8$

c) $\frac{1}{3^3} = 3^3$ d) $\frac{1}{4^2} = 4^2$

4a) $4^2 = 16$ $4^{-2} = \frac{1}{4^2} = \frac{1}{16}$

c) $6^1 = 6$ $6^{-1} = \frac{1}{6}$

d) $2^{-3} = \frac{1}{2^3}$ b) $3^{-3} = \frac{1}{3^3}$ c) $(-1)^{-2} = \frac{1}{1}$

7) a) $(\frac{1}{2})^{-2} = (\frac{2}{1})^2 = 2^2 = 4$

b) $(\frac{2}{3})^{-3} = (\frac{3}{2})^3 = \frac{27}{8}$

c) $(\frac{4}{5})^{-4} = (\frac{5}{4})^4 = \frac{625}{256}$

8) a) $4^{\frac{1}{2}} = \frac{1}{4^{\frac{1}{2}}}$

$(\frac{1}{4})^{\frac{1}{2}} = \frac{1}{\sqrt{4}} = \frac{1}{2}$

9) c) $(\frac{27}{1})^{\frac{1}{3}} = \frac{1}{27^{\frac{1}{3}}}$

$(\frac{1}{27})^{\frac{1}{3}} = \frac{1}{\sqrt[3]{27}}$

$\frac{\sqrt[3]{1}}{\sqrt[3]{27}} \rightarrow \frac{1}{3}$

9) c) $(-0.027)^{\frac{2}{3}}$ or use calculator $(\frac{1}{-0.027})^{\frac{2}{3}}$

$(\frac{-27}{1000})^{\frac{2}{3}}$ $(\frac{1}{\sqrt[3]{-0.027}})^{\frac{2}{3}}$

$= (\frac{-1000^{\frac{2}{3}}}{27^{\frac{2}{3}}})$ $= (\frac{1}{(-0.3)^2})$

$= (\frac{\sqrt[3]{-1000}^2}{(\sqrt[3]{27})^2})$ $= (\frac{1}{(0.3)^2})$

$= (\frac{-10}{3})$ $= \frac{1}{0.09}$

$= \frac{100}{9}$ $= 11.11$

10) a) $\frac{1}{9} = (3^{-1})^{-2} = 3^2$

c) $4 = 2^2$
 $4^{\frac{1}{2}} = \frac{1}{4^{\frac{1}{2}}} = \frac{1}{2}$

Didn't flip fraction when you put it up of neg exponent

12) $(\frac{-64}{125})^{\frac{2}{3}}$ $= (\frac{-125}{64})^{\frac{2}{3}}$

$= \frac{(\sqrt[3]{-125})^2}{(\sqrt[3]{64})^2}$

$= \frac{(5)^2}{(4)^2}$

$= \frac{25}{16}$

13) a) $(\frac{27}{1})^{\frac{4}{3}}$

$= \frac{1}{27^{\frac{4}{3}}}$

$= \frac{1}{(\sqrt[3]{27})^4}$

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

$= \frac{1}{81}$

b) $16^{-1.5}$

$= \frac{1}{16^{1.5}}$

$= \frac{1}{16^{\frac{3}{2}}}$

$= \frac{1}{(\sqrt{16})^3}$

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

c) $30^{-2.5}$
 $= 30^{-\frac{5}{2}}$
 $= \frac{1}{30^{\frac{5}{2}}}$
 $= \frac{1}{(\sqrt{30})^5}$
 $= \frac{1}{(\frac{1}{2})^5}$

13) a) $(\frac{-8}{27})^{\frac{3}{4}}$

$= (\frac{-27}{8})^{\frac{3}{4}}$

$= \frac{(\sqrt[4]{-27})^3}{(\sqrt[4]{8})^3}$

$= \frac{(3)^3}{(2)^3}$

$= \frac{27}{8}$

b) $(\frac{81}{16})^{\frac{3}{4}}$

$= (\frac{16}{81})^{\frac{3}{4}}$

$= \frac{(\sqrt[4]{16})^3}{(\sqrt[4]{81})^3}$

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

$= \frac{8}{27}$

Use laws of exponent notes

Simplify the following (Leave your answer with positive exponents):

a) $(3xy^{-2})^4$

power to power law

$$3^4 x^4 y^{-8}$$

$$= \frac{81 x^4}{y^8}$$

b) $\frac{(12r^6t^3)}{(3r^{10}t^2)}$

Quotient Law

$$4 r^{6-10} t^{3-2}$$

$$4 r^{-4} t^1$$

$$\frac{4t^1}{r^4}$$

Example 2**Simplifying Algebraic Expressions with Integer Exponents**

Simplify. Explain the reasoning.

a) $(x^3y^2)(x^2y^{-4})$

$$\begin{aligned}
 &= \underbrace{x^3 x^2}_{x^5} \underbrace{y^2 y^{-4}}_{y^{-2}} \\
 &= x^5 y^{-2} \\
 &= \frac{x^5}{y^2}
 \end{aligned}$$

$$\begin{aligned}
 &b) (x^5 y^3) (x^4 y^{-2})^5 \\
 &= (x^5 y^3) x^{20} y^{-10} \\
 &= x^{25} y^{-7} \\
 &= \frac{x^{25}}{y^7}
 \end{aligned}$$



CHECK YOUR UNDERSTANDING

$$b) \frac{10a^5b^3}{2a^2b^{-2}}$$

$$5a^{5-2} b^{3+2}$$

add opp

$$5a^3 b^5$$

Simplify by rewriting the following using a single power

$$\left[\left(-\frac{3}{2} \right)^{-4} \right]^2 \cdot \left[\left(-\frac{3}{2} \right)^2 \right]^3$$

Step 1: Power of a power law

Step 2: Product of a power law

Step 3: Rewrite with positive exponent

What is the value of $\left(\frac{a^6b^9}{a^5b^8}\right)^{-2}$ when ~~$a = 3$~~ and ~~$b = 2$~~ ?

$$\left(\frac{a^6b^9}{a^5b^8}\right)^{-2}$$

Flip fractional base to make exponent \oplus

$$\left(\frac{1}{a^6b^9}\right)^2$$

power to power \hookrightarrow

$$= \frac{1^2}{a^2b^2}$$

$$= \frac{1}{a^2b^2}$$

you try

$$\left(\frac{8}{2} \cdot \frac{a^5}{a^9} \cdot \frac{1}{b^{-1/3}} \right)^{\frac{1}{2}}$$

Sheet
1 to 10

Solutions on next page

Laws of exponents Practice Worksheet

Simplify. Your answer should contain only positive exponents.

$$1) \frac{2u^3v^3 \cdot (3u^2)^2}{2u^2}$$

$9u^5v^3$

$$2) \frac{(4xy^2)^3}{(4y^3)^4 \cdot 2y^3} \cdot \frac{x^3}{8y^4}$$

$$3) \frac{(4uv^2)^2}{3u^2v^4 \cdot 3v^2} \cdot \frac{16}{9v^2}$$

$$4) \left(\frac{4a^4b^3}{3a^4b^3 \cdot 4a^3b^4} \right)^3$$

$\frac{1}{27a^6b^2}$

$$5) \left(\frac{3y^3 \cdot 3x^3y^4}{4x^4y^2} \right)^4 \cdot \frac{6561y^{20}}{256x^4}$$

$$6) \left(\frac{3xy^4 \cdot 3x^3y^2}{yx^4} \right)^3$$

$729y^{15}$

$$7) \frac{2ba^2}{4a(2a^3b^4)^3} \cdot \frac{1}{16a^8b^{11}}$$

$$8) \frac{(2x^2y^2)^4}{(2x^2 \cdot (yx^2)^3)^2} \cdot \frac{4y^2}{x^8}$$

$$9) \frac{(m^2n^2)^2}{3m^4n^2 \cdot 2m^3n^2} \cdot \frac{1}{6m^3}$$

$$10) \frac{x^2}{4x^4y^2 \cdot (3x^4y^2)^2}$$

$$11) \left(\frac{n}{m \cdot 2m^4n^4} \right)^4 \cdot \frac{1}{16m^{20}n^{12}}$$

$$12) \left(\frac{3x^2y^3 \cdot 4x^3y^2}{3xy^3} \right)^4$$

$256x^{16}y^8$

$$13) \left(\frac{3x^2y^4 \cdot x^3y^3}{(2x^2y^3)^4} \right)^2 \cdot \frac{9}{256x^6y^{10}}$$

$$14) \left(\frac{2u^4v^3 \cdot 2uv^3}{4u^3} \right)^4$$

u^8v^{24}

$$15) \frac{3uv^2}{2u^3v^2 \cdot (2v^2)^2} \cdot \frac{3}{8u^2v^4}$$

$$16) \frac{(4y)^3}{4y \cdot 3y^2} \cdot \frac{16}{3}$$

Attachments

grade_10_nrf_worksheet_exponent_laws_assignment_1_pdf.pdf

Laws of Exponents Day 2.pdf