



Warm Up

Test Mar 1

Warm Up quiz tomorrow

Express each as a radical then evaluate:

$$\begin{aligned} \text{a) } (1728)^{\frac{2}{3}} &= \left(\sqrt[3]{1728} \right)^2 \\ &= (12)^2 \\ &= 144 \end{aligned}$$

Express each as a power:

$$\begin{aligned} \text{a) } \left(\sqrt[6]{128} \right)^7 &= 128^{\frac{7}{6}} \end{aligned}$$

Express each in simplest radical form:

$$\begin{aligned} \text{a) } \sqrt{180} &= \sqrt{36 \times 5} \\ &= \sqrt{36} \sqrt{5} \\ &= 6\sqrt{5} \end{aligned}$$

$$\begin{aligned} \text{b) } \sqrt[3]{1024} &= \sqrt[3]{512 \times 2} \\ &= \sqrt[3]{512} \times \sqrt[3]{2} \\ &= 8 \sqrt[3]{2} \end{aligned}$$

Write the reciprocal for each:

$$\begin{aligned} \text{a) } 7^{-3} & \\ \text{Rec } 7^{+3} & \end{aligned}$$

$$\begin{aligned} \text{b) } 242^1 & \\ \frac{1}{242} \text{ or } & \\ \text{Rec } 242^{-1} & \end{aligned}$$

$$\begin{aligned} \text{c) } \frac{1}{6} = 6^{-1} & \\ \text{OR Rec } & \\ 6^1 & \end{aligned}$$

$$\begin{aligned} \text{d) } 8^2 & \\ 8^{-2} \text{ is Rec} & \end{aligned}$$

Homework Questions

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

c) $\frac{1}{3^3} = 3^2$ 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) $(-7)^{-2} = \frac{1}{7^2}$

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

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

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

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

9c) $27^{\frac{1}{3}} = \frac{1}{27^{\frac{1}{3}}} = \frac{1}{\sqrt[3]{27}} = \frac{1}{3}$

9e) $(-0.027)^{\frac{2}{3}}$ or use calculator $(\frac{1}{-0.027})^{\frac{2}{3}}$
 $\frac{(-27)^{-2 \cdot 3}}{1000^2} = \frac{(-1000)^{\frac{2}{3}}}{(\sqrt[3]{27})^2} = \frac{(\sqrt[3]{1000})^2}{(\sqrt[3]{27})^2} = \frac{(-10)^2}{(3)^2} = \frac{100}{9} = 11.11$
 $\frac{(\frac{1}{\sqrt[3]{0.027}})^2}{(\frac{1}{\sqrt[3]{0.027}})^2} = \frac{(0.3)^2}{(0.3)^2} = \frac{1}{0.09}$

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

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

Didn't flip fraction when you got rid of exp

12) $(\frac{-64}{125})^{\frac{2}{3}}$ *Correct answer*
 $= \frac{(-125)^{\frac{2}{3}}}{(\sqrt[3]{64})^2} = \frac{(\sqrt[3]{125})^2}{(\sqrt[3]{64})^2} = \frac{(5)^2}{(4)^2} = \frac{3125}{1624}$

13a) $27^{\frac{4}{3}} = \frac{1}{27^{\frac{4}{3}}} = \frac{1}{(\sqrt[3]{27})^4} = \frac{1}{3^4} = \frac{1}{81}$
 b) $16^{-1.5} = \frac{1}{16^{1.5}} = \frac{1}{16^{\frac{3}{2}}} = \frac{1}{(\sqrt{16})^3} = \frac{1}{4^3} = \frac{1}{64}$
 c) $30^{-2.5} = \frac{1}{30^{2.5}} = \frac{1}{30^{\frac{5}{2}}} = \frac{1}{(\sqrt{30})^5} = \frac{1}{(\frac{1}{2})^5} = \frac{1}{\frac{1}{32}} = 32$

13b) $(\frac{-6}{27})^{\frac{2}{3}} = \frac{(-27)^{\frac{2}{3}}}{(\sqrt[3]{8})^2} = \frac{(\sqrt[3]{27})^2}{(\sqrt[3]{8})^2} = \frac{(3)^2}{(2)^2} = \frac{9}{4}$
 c) $(\frac{81}{16})^{\frac{3}{4}} = \frac{(16)^{\frac{3}{4}}}{(\sqrt[4]{81})^3} = \frac{(\sqrt[4]{16})^3}{(\sqrt[4]{81})^3} = \frac{(2)^3}{3^3} = \frac{8}{27}$

Use laws of exponent notes

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

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

*(power of product)
↓
mult each exponent inside*

$$= \frac{3^4 x^4 y^{-8}}{y^8}$$

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

*quotient law
↓
subtract exponents*

divide coefficients

$$= \frac{12}{3} \frac{r^6}{r^{10}} \frac{t^3}{t^2}$$

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

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

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

Example 2

Simplifying Algebraic Expressions with Integer Exponents

Simplify. Explain the reasoning.

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

product law → add exponents on like bases

$$\begin{aligned}
 &= x^3 x^2 y^2 y^{-4} \\
 &= x^{3+2} y^{2+(-4)} \\
 &= x^5 y^{-2} \\
 &= \frac{x^5}{y^2}
 \end{aligned}$$

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

Quotient law
subtracted exponents of like bases

$$\begin{aligned}
 &= 5 a^{5-2} b^{3-(-2)} \\
 &= 5 a^3 b^{3+2} \\
 &= 5 a^3 b^5
 \end{aligned}$$

watch sign

CHECK YOUR UNDERSTANDING

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

$$\left(\frac{-3}{2} \right)^{-8} \quad \left(\frac{-3}{2} \right)^6$$

Step 2: Product of a power law

$$\begin{aligned} & \left(\frac{-3}{2} \right)^{-2} \\ & \swarrow \text{Flip} \quad \searrow \text{apply Power of quotient} \\ & \left(\frac{-2}{3} \right)^2 \quad \left(\frac{-3}{2} \right)^{-2} \quad \leftarrow \text{neg exponent switch pos.} \\ & \frac{(-2)^2}{(3)^2} \quad = \frac{2^2}{(-2)^2} \\ & = \frac{4}{9} \quad = \frac{4}{9} \end{aligned}$$

Step 3: Rewrite with positive exponent

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

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

$$= (a^1 b^1)^{-2}$$

$$= a^{-2} b^{-2}$$

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

quotient
law

Complete inside bracket
first

you try

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

$$\left(4 \cdot a^{-4} \cdot b^{+1/3} \right)^{\frac{1}{2}}$$

$$4^{\frac{1}{2}} \cdot a^{-\frac{4}{2}} \cdot b^{\frac{1}{6}}$$

$$\sqrt{4}$$

$$= 2 \cdot a^{-2} \cdot b^{1/6}$$

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

Homework

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3ac, 4ac, 5ac, 6ac,

8aceg, 9aceg, 10 a,c,e,g

Quiz Tomorrow

Do Tomorrow
Sheet



Remind App

(647)496-1055 ← Number to Text to

@oknfr2018 ← message to send to
join

Attachments

Laws of Exponents Day 2.pdf