



Warm Up

Test Feb. 22

Warm Up quiz tomorrow

Express each as a radical then evaluate:

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

Express each as a power:

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

denominator (pointing to 6) *numerator* (pointing to 7)

Express each in simplest radical form:

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

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

Write the reciprocal for each:

a) 7^{-3} 7^{+3}
 $\frac{1}{7^3}$ Rec $\frac{1}{7^3}$

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

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

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

Homework Questions

Page 233-234

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

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

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 $(\frac{1}{-0.027})^{\frac{2}{3}}$
 $\frac{(-27)^{\frac{2}{3}}}{(1000)^{\frac{2}{3}}} = \frac{(-1000)^{\frac{2}{3}}}{(27)^{\frac{2}{3}}} = \frac{(\sqrt[3]{-1000})^2}{(\sqrt[3]{27})^2} = \frac{(-10)^2}{(3)^2} = \frac{100}{9} = 11.11$
 $\frac{(\sqrt[3]{-0.027})^2}{(\sqrt[3]{1000})^2} = \frac{(-0.3)^2}{(10)^2} = \frac{0.09}{100} = 0.0009$

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

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

Didn't flip fraction when you got rid of exp

12) $(\frac{-64}{125})^{\frac{2}{3}}$ *Correct answer*
 $= \frac{(-125)^{\frac{2}{3}}}{(64)^{\frac{2}{3}}} = \frac{(\sqrt[3]{-125})^2}{(\sqrt[3]{64})^2} = \frac{(5)^2}{(4)^2} = \frac{25}{16}$

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) $(\frac{-8}{27})^{\frac{3}{4}}$ e) $(\frac{81}{16})^{\frac{3}{4}}$
 $= \frac{(-27)^{\frac{3}{4}}}{(8)^{\frac{3}{4}}} = \frac{(\sqrt[4]{-27})^3}{(\sqrt[4]{8})^3} = \frac{(\frac{3}{2})^3}{(\frac{3}{2})^3} = \frac{27}{27} = 1$
 $= \frac{(\frac{81}{16})^{\frac{3}{4}}}{1} = \frac{(\sqrt[4]{81})^3}{(\sqrt[4]{16})^3} = \frac{(3)^3}{(2)^3} = \frac{27}{8}$

Use laws of exponent notes

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

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

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

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

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

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

Simplify. Explain the reasoning.

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

$$= x^3 \cdot x^2 \cdot y^2 \cdot y^{-4}$$

$$= x^5 y^{-2}$$

product law (add exponents)
of like bases

$$= \frac{x^5}{y^2}$$

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

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

add opp

$$= 5a^3b^5$$



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

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

Same bases
product law

Step 2: Product of a power law

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

$$\left(-\frac{3}{2} \right)^{-2} \leftarrow \text{flip fraction}$$

Step 3: Rewrite with positive exponent

$$\left(\frac{-3}{2} \right)^{-2} \text{ OR } \text{quotient}$$

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

$$\frac{-3^{-2}}{2^{-2}} \leftarrow \text{switch posit}$$

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

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

$$\begin{aligned} & \text{quotient law} \\ & (a^1 b^1)^{-2} \text{ power law} \\ & = a^{-2} b^{-2} \\ & = \frac{1}{a^2 b^2} \text{ sub in } a=-3, b=2 \\ & = \frac{1}{(-3)^2 (2)^2} \\ & = \frac{1}{9 \cdot 4} \\ & = \frac{1}{36} \end{aligned}$$

you try

$$\begin{aligned} & \left(\frac{8 \cdot a^5 \cdot 1}{2 \cdot a^9 \cdot b^{-1/3}} \right)^{\frac{1}{2}} \\ &= \left(4 \cdot a^{-4} \cdot b^{1/3} \right)^{1/2} \\ &= 4^{1/2} \cdot a^{-4/2} \cdot b^{1/6} \\ &= \sqrt{4} \cdot a^{-2} \cdot b^{1/6} \\ &= \frac{2 \cdot b^{1/6}}{a^2} \end{aligned}$$

Homework

Page 241 - 242

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

8aceg, 9aceg, 10 a, ~~10 b~~

Quiz Tomorrow

Do Tomorrow
Sheet



Attachments

Laws of Exponents Day 2.pdf