

Unit 2 Extra Practice

1. Simplify, using the exponent laws, then evaluate. Give your final answer as an integer or fraction.

a. $4^{-3} \div 4^{-2}$

$$\begin{aligned}
 &= 4^{-3--2} \\
 &= 4^{-3+2} \\
 &= 4^{-1} \\
 &= \frac{1}{4}
 \end{aligned}$$

b. $3^{-2} \times 3^5 \times 3^{-2}$

$$\begin{aligned}
 &= 3^{-2+5-2} \\
 &= 3^{-4+5} \\
 &= 3^1 \\
 &= 3
 \end{aligned}$$

c. $(5^{-2})^{-1}$

$$\begin{aligned}
 &= 5^{(-2)(-1)} \\
 &= 5^2 \\
 &= 25
 \end{aligned}$$

d. $[(10^{-3})(10^0)]^{-1}$

$$\begin{aligned}
 &= (10^{-3+0})^{-1} \\
 &= 10^{(-3)(-1)} \\
 &= 10^3 \\
 &= 1000
 \end{aligned}$$

e. $\frac{6^{-3} \times 6^2}{(6^4)^{-2}}$

$$\begin{aligned}
 &= \frac{6^{-3+2}}{6^{(4)(-2)}} \\
 &= \frac{6^{-1}}{6^{-8}} \\
 &= 6^{-1--8} = 6^7 = 279936
 \end{aligned}$$

f. $\frac{2^7 \times 2^{-9}}{(2^{-4})^{-3}}$

$$\begin{aligned}
 &= \frac{2^{7-9}}{2^{(-4)(-3)}} \\
 &= \frac{2^{-2}}{2^{12}} \\
 &= 2^{-2-12} \\
 &= 2^{-14} \\
 &= \frac{1}{2^{14}} = \frac{1}{16384}
 \end{aligned}$$

2. Simplify. Write your answer as a power with a positive exponent.

a. $(x^2)(x^{-6})(x^4)$

$$\begin{aligned}
 &= x^{2-6+4} \\
 &= x^{-4+4} \\
 &= x^0 \\
 &= 1
 \end{aligned}$$

b. $\frac{w^{-2}}{w^0}$

$$\begin{aligned}
 &= w^{-2-0} \\
 &= w^{-2} \\
 &= \frac{1}{w^2}
 \end{aligned}$$

c. $(ab^3)^{-2}$

$$\begin{aligned}
 &= a^{-2} b^{(3)(-2)} \\
 &= a^{-2} b^{-6} \\
 &= \frac{1}{a^2 b^6}
 \end{aligned}$$

d. $\left(\frac{uv^4}{u^4v}\right)^{-1}$

$$\begin{aligned}
 &= (u^{1-4} v^{4-1})^{-1} \\
 &= (u^{-3} v^3)^{-1} \\
 &= u^{(-3)(-1)} v^{(3)(-1)} \\
 &= u^3 v^{-3} = \frac{u^3}{v^3}
 \end{aligned}$$

e. $\frac{p^{-4}q^3}{p^2q^{-2}}$

$$\begin{aligned}
 &= p^{-4-2} q^{3--2} \\
 &= p^{-6} q^5 \\
 &= \frac{q^5}{p^6}
 \end{aligned}$$

f. $(x^{-1}y^2) \div (x^{-4}y^{-3})$

$$\begin{aligned}
 &= x^{-1--4} y^{2--3} \\
 &= x^3 y^5
 \end{aligned}$$

3. Evaluate, if possible. If not possible, explain why.

a. $\sqrt[3]{-8}$

$$= -2$$

b. $\sqrt[4]{625}$

$$= 5$$

c. $\sqrt[5]{243}$

$$= 3$$

d. $27^{\frac{4}{3}}$

$$= \sqrt[3]{27^4}$$
$$= 81$$

e. $(-1)^{\frac{7}{8}}$

NOT POSSIBLE
can't take even
root of a negative
number!

f. $(\frac{8}{125})^{\frac{2}{3}}$

$$= \frac{\sqrt[3]{8^2}}{\sqrt[3]{125^2}}$$
$$= \frac{2^2}{5^2} = \frac{4}{25}$$

4. Express in radical form, then evaluate, if possible. If not possible, explain why.

a. $81^{\frac{1}{2}}$

$$= \sqrt{81}$$
$$= 9$$

b. $81^{\frac{1}{4}}$

$$= \sqrt[4]{81}$$
$$= 3$$

c. $(-125)^{\frac{2}{3}}$

$$= \sqrt[3]{(-125)^2}$$
$$= (-5)^2$$
$$= 25$$

d. $100^{\frac{3}{2}}$

$$= \sqrt{100^3}$$
$$= 10^3$$
$$= 1000$$

e. $(-36)^{\frac{1}{2}}$

$$= \sqrt{-36}$$

NOT POSSIBLE
CAN'T TAKE
even root of a
negative number

f. $(-27)^{\frac{5}{3}}$

$$= \sqrt[3]{(-27)^5}$$
$$= (-3)^5$$
$$= -243$$

5. Write each power as a power with base 9.

a. 81^3

$$= (9^2)^3$$
$$= 9^6$$

b. 3^4

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

c. 27^6

$$= (3^3)^6$$
$$= 3^{18}$$
$$= \boxed{3^{2 \times 9}} = 9^9$$

d. 18^0

$$= 9^0$$

(both = 1)

e. $\frac{1}{9^3}$

$$= 9^{-3}$$

f. 3^{-10}

$$= (9^{\frac{1}{2}})^{-10}$$
$$= 9^{-5}$$