

Name KEY Date _____ Period _____**Worksheet 1.1—Exponents****No Calculator****I. Multiple Choice: Show all work on MC questions. No work, No credit.**E 1. Which of the following is equivalent to $x^{3/4}$?

- (A) $\frac{1}{x^{4/3}}$ (B) $x^{-4/3}$ (C) $x^{4/3}$ (D) $\sqrt[3]{x^4}$ (E) $\sqrt[4]{x^3}$

$$\begin{aligned}
 &= x^{3/4} \\
 &= (x^3)^{1/4} \\
 &= \sqrt[4]{x^3} \text{ or } (\sqrt[4]{x})^3
 \end{aligned}$$

A 2. What is the value of $\left(-\frac{1}{2}\right)^{-4}$?

- (A) 16 (B) 2 (C) 8 (D) -8 (E) -16

$$\begin{aligned}
 &\left(-\frac{1}{2}\right)^{-4} \\
 &= (-2)^4 \\
 &= 16
 \end{aligned}$$

E 3. Which of the following is the simplified form of $\frac{x^6}{x^{-2}}$, $x \neq 0$?

- (A) x^{-4} (B) x^2 (C) x^3 (D) x^4 (E) x^8

$$\begin{aligned}
 &\frac{x^6}{x^{-2}} \\
 &= x^6 \cdot x^2 \\
 &= x^{6+2} \\
 &= x^8
 \end{aligned}$$

C 4. Simplify $(-3x^2y^5)^{-4}$ using only positive exponents.

- (A) $81x^8y^{20}$ (B) $\frac{x^8y^{20}}{81}$ (C) $\frac{1}{81x^8y^{20}}$ (D) $\frac{-1}{81x^8y^{20}}$ (E) $\frac{81}{x^8y^{20}}$

$$\begin{aligned}
 &(-3x^2y^5)^{-4} \\
 &= (-3)^{-4} (x^2)^{-4} (y^5)^{-4} \\
 &= \left(-\frac{1}{3}\right)^4 x^{-8} y^{-20} \\
 &= \frac{1}{81} \cdot \frac{1}{x^8} \cdot \frac{1}{y^{20}} \\
 &= \frac{1}{81x^8y^{20}}
 \end{aligned}$$

- A 5. Evaluate $-625^{1/4}$
- (A) -5 (B) 5 (C) $-\frac{1}{5}$ (D) $\frac{1}{5}$ (E) DNE, "Does Not Exist"

$$\begin{aligned}
 & -625^{1/4} \\
 & (-1)(625)^{1/4} \\
 & -\sqrt[4]{625} \\
 & -5
 \end{aligned}$$

- B 6. Evaluate $\left(\frac{36}{25}\right)^{-3/2}$
- (A) $\frac{6}{5}$ (B) $\frac{125}{216}$ (C) $\frac{216}{125}$ (D) $\frac{5}{6}$ (E) $-\frac{216}{125}$

$$\begin{aligned}
 & \left(\frac{36}{25}\right)^{-3/2} \\
 & \left(\frac{25}{36}\right)^{3/2} \\
 & \frac{25^{3/2}}{36^{3/2}} \\
 & \frac{(\sqrt{25})^3}{(\sqrt{36})^3}
 \end{aligned}
 \quad \left\{ \begin{array}{l} \frac{5^3}{6^3} \\ \frac{125}{216} \end{array} \right.$$

- D 7. If $x = -2$ and $y = -3$, what is the value of the expression $\frac{c^x}{c^y} - \frac{c^y}{c^x}$, for $c \neq 0$.

- (A) 0 (B) $\frac{c^2+1}{c}$ (C) $2c$ (D) $\frac{c^2-1}{c}$ (E) $\frac{c}{1-c^2}$

$$\begin{aligned}
 & \frac{c^{-2}}{c^{-3}} - \frac{c^{-3}}{c^{-2}} \\
 & \left(\frac{c}{c}\right) \frac{c^3}{c^2} - \frac{c^2}{c^3} \\
 & \frac{c^4-c^2}{c^3}
 \end{aligned}
 \quad \left\{ \begin{array}{l} \frac{c^2(c^2-1)}{c^3} \\ \frac{c^2-1}{c} \end{array} \right.$$

- B 8. The expression $\frac{3^{1/3}}{3^{-2/3}}$ is equivalent to which of the following?

- (A) 1 (B) 3 (C) $\sqrt{3}$ (D) $\frac{1}{\sqrt[3]{3}}$ (E) $\frac{1}{\sqrt{3}}$

$$\begin{aligned}
 & \frac{3^{1/3}}{3^{-2/3}} \\
 & 3^{1/3} \cdot 3^{2/3} \\
 & 3^{3/3} \\
 & 3^1 \\
 & 3
 \end{aligned}$$

II. Short answer

9. Find any and all mistakes, explain what they are, then work the problem correctly

(a) $(-4ab^5)^7 = -28a^7b^{12}$

$(-1)^7(4^7)a^7b^{35}$
 $-4^7a^7b^{35}$

* $4^7 \neq 4 \cdot 7 = 28$
 * $(b^5)^7 \neq b^{5+7} = b^{12}$

(b) $(3x^2y^{1/2})(7x^{10}y^8) = -21x^{20}y^4$

$21x^{12}y^{17/2}$

* $21 \neq -21$
 * $x^{12} \neq x^{2 \times 10} = x^{20}$
 * $y^{17/2} \neq y^{8 \times 2} = y^4$

10. Simplify each the expressions as much as possible (if possible). **For each term, you should have only one representative factor of each type.** Practice writing your final answer without any fractional or negative exponents. *Sequences will vary*

(a) $\frac{(x^{-3}y^2)^{-4}}{(\sqrt{y^6}x^{-4})^{-2}}$

$\frac{x^{12}y^{-8}}{y^{-6}x^8}$
 $\frac{x^4}{y^2}$

(b) $\left(\frac{4a^3b}{\sqrt[3]{a^2b^3}}\right)\left(\frac{2a^2b^4}{3b^2}\right)^{-1}$

$\frac{4a^3b}{a^{2/3}b} \cdot \frac{3b^2}{2a^2b^4}$

$\frac{12a^3b^3}{2a^{8/3}b^5}$

$6a^{1/3}b^{-2}$

$\frac{6a^{1/3}}{b^2}$

$\frac{6\sqrt[3]{a}}{b^2}$

(c) $2x^4y^{-3}x^{-19} + y^3y^{-\frac{3}{4}}$

$2x^{-15}y^{-3} + y^{-5/4}$

$\frac{2}{x^{15}y^3} + \frac{1}{y^{5/4}}$

(d) $\frac{x^{\frac{3}{5}}x^2x^{-\frac{1}{2}}}{x^{10}}$

$x^{\frac{3}{5}+2-\frac{1}{2}-10}$

$x^{\frac{6}{10}-\frac{20}{10}-\frac{5}{10}-\frac{1}{10}}$

x^2

(e) $\left(\frac{2x^{-2}x^{\frac{4}{5}}y^6}{x+y}\right)^{-3}$

$\frac{2^{-3}x^{-6}x^{-12/5}y^{18}}{(x+y)^{-3}}$

$\frac{(x+y)^3x^{18/5}}{8y^{18}}$

$\frac{(x+y)^3\sqrt[5]{x^{18}}}{8y^{18}}$

$\frac{(x+y)^3\sqrt[5]{x^{18}}}{8y^{18}}$

(f) $\frac{x^2y^{-3} \cdot \sqrt{9\sqrt{x^{-3}}\sqrt{y^5}}}{\sqrt{x^3y^5}}$

$\frac{x^2y^{-3} (9(x^{-3}(y^{5/2}))^{1/2})^{1/2}}{(x^3y^5)^{1/2}}$

$\frac{x^2y^{-3} \cdot (9(x^{-3/2}y^{5/4}))^{1/2}}{x^{3/2}y^{5/2}}$

$\frac{x^2y^{-3} \cdot 9^{1/2} \cdot x^{-3/4}y^{5/8}}{x^{3/2}y^{5/2}}$

$\frac{3x^{5/4}y^{-19/8}}{x^{3/2}y^{5/2}}$

$\frac{3x^{-1/4}y^{-39/8}}{x^{3/2}y^{5/2}}$

$\frac{3}{x^{14}y^{39/8}} \text{ or } \frac{3}{4\sqrt{x} \cdot 8\sqrt[8]{y^{39}}}$

11. Provide a counterexample for the claim that $\sqrt{a^2+b^2} = a+b$. Clearly define your values and show your work.

Let $a=3$
 $b=4$
 $\sqrt{3^2+4^2} = 5$
 $3+4 = 7$
 $5 \neq 7$

$5 \neq 7$
 $\Rightarrow \Leftarrow$