Math 8 Unit 1 worksheet: Zero and negative exponents

Name _____ Date _____ Period _____

1. Find the value of each. Give fractions in lowest terms.

(a) $\left(-\frac{3}{4}\right)^0$

(b) 3^{-4}

(c) $\left(-\frac{1}{3}\right)^{-3}$

(d) $-\left(\frac{1}{2}\right)^{-4}$

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

(f) $(3^0+3)^{-1}$

(g) $\frac{1}{10^{-2}}$

(h) $(0.2)^{-3}$

2. Rewrite with positive exponents only. Every variable is nonzero.

(a) m^{-7}

(b) $\frac{2}{5}k^{-3}$

(c) $(xy)^{-4}$

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

(e) $\frac{7}{2y^{-3}}$

(f) $x^0y^{-5}z^2$

(g) $\left(\frac{p}{5}\right)^{-2}$

(h) $\frac{6c^{-4}d}{d^{-2}}$

3. Simplify, writing the answer with positive exponents. Every variable is nonzero.

(a) $a^5 \cdot a^{-5}$

(b) $x^{-2} \cdot x^{-6}$

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

(d) $(m^{-3})^2$

(e) $\frac{t^{-7}}{t^{-3}}$

(f) $(2p^{-2})^{-3}$

(g) $(k^{-2})^0 \cdot k^{-3}$

(h) $\frac{(a^2b^{-1})^{-2}}{a^{-3}b}$

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4. Find the integer n that makes each equation true. It may be positive, negative or zero.

(a) $2^n = \dfrac{1}{32}$ (b) $10^n = 0.001$ (c) $\left(\dfrac{1}{3}\right)^n = 81$

(d) $5^n \cdot 5^3 = \dfrac{1}{125}$ (e) $(-7)^n = 1$

5. Without a calculator, list these numbers from least to greatest. Show the value of each.

$$2^{-3}, \quad 3^{-2}, \quad (-2)^{-3}, \quad \left(\frac{1}{2}\right)^{-2}, \quad 5^0$$

6. At noon a lab culture holds 972 bacteria, and the number triples every hour. So t hours after noon the culture holds $972 \cdot 3^t$ bacteria, where a negative t stands for hours before noon.

(a) How many bacteria does the formula give at $t = -1$?

(b) For which t does the formula give 4 bacteria? How many hours before noon is that?

7. Each line has a mistake. Say what went wrong and give the correct value or expression. Every variable is nonzero.

(a) $3^{-2} = -9$

(b) $5x^{-2} = \dfrac{1}{5x^2}$

(c) $\dfrac{x^8}{x^8} = x^0 = 0$

(d) $\dfrac{1}{3^{-1} + 6^{-1}} = 3 + 6 = 9$

8. A classmate says: "A negative exponent makes a number smaller, so a^{-2} is always less than a^2."

(a) Test the claim with $a = 3$, with $a = \dfrac{1}{3}$ and with $a = 1$.

(b) For which positive numbers a is the claim true? Explain.

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