Name _____ Date_____

Negative Exponents and the Laws of Exponents

Write each answer as a simplified expression that is equivalent to the given one.

1. $76543^{-4} =$

2. Let f be a nonzero number. $f^{-4} =$

3. $671 \times 28796^{-1} =$

4. Let a, b be numbers $(b \neq 0)$. $ab^{-1} =$

5. Let g be a nonzero number. $\frac{1}{g^{-1}} =$

1. Compute: $3^3 \times 3^2 \times 3^1 \times 3^0 \times 3^{-1} \times 3^{-2} =$
   Compute: $5^2 \times 5^{10} \times 5^8 \times 5^0 \times 5^{-10} \times 5^{-8} =$
   Compute for a nonzero number, a: $a^m \times a^n \times a^l \times a^{-n} \times a^{-m} \times a^{-l} \times a^0 =$

2. Without using (10), show directly that $17.6^{-1\ 8} = 17.6^{-8}$.

3. Without using (10), show (prove) that for any whole number n and any positive number y, $y^{-1\ n} = y^{-n}$.

4. Show directly without using (13) that $\frac{2.8^{-5}}{2.8^7} = 2.8^{-12}$.

Write each answer as a simplified expression that is equivalent to the given one.

1. $76543^{-4} = \frac{1}{76543^4}$

2. Let f be a nonzero number. $f^{-4} = \frac{1}{f^4}$

3. $671 \times 28796^{-1} = 671 \times \frac{1}{28796} = \frac{671}{28796}$

4. Let a, b be numbers $(b \neq 0)$. $ab^{-1} = a \cdot \frac{1}{b} = \frac{a}{b}$

5. Let g be a nonzero number. $\frac{1}{g^{-1}} = g$

1. Compute: $3^3 \times 3^2 \times 3^1 \times 3^0 \times 3^{-1} \times 3^{-2} = 3^3 = 27$
   Compute: $5^2 \times 5^{10} \times 5^8 \times 5^0 \times 5^{-10} \times 5^{-8} = 5^2 = 25$
   Compute for a nonzero number, a: $a^m \times a^n \times a^l \times a^{-n} \times a^{-m} \times a^{-l} \times a^0 = a^0 = 1$

2. Without using (10), show directly that $17.6^{-1\ 8} = 17.6^{-8}$.

$$17.6^{-1\ 8} = \left(\frac{1}{17.6}\right)^8 \qquad \textit{By definition}$$

$$= \frac{1^8}{17.6^8} \qquad \textit{By } \left(\frac{x}{y}\right)^n = \frac{x^n}{y^n} \textit{ (5)}$$

$$= \frac{1}{17.6^8}$$

$$= 17.6^{-8} \qquad \textit{By definition}$$

3. Without using (10), show (prove) that for any whole number n and any positive number y, $y^{-1\ n} = y^{-n}$.

$$y^{-1\ n} = \left(\frac{1}{y}\right)^n \qquad \textit{By definition}$$

$$= \frac{1^n}{y^n} \qquad \textit{By } \left(\frac{x}{y}\right)^n = \frac{x^n}{y^n} \textit{ (5)}$$

$$= \frac{1}{y^n}$$

$$= y^{-n} \qquad \textit{By definition}$$

4. **Show directly without using (13) that $\frac{2.8^{-5}}{2.8^{7}} = 2.8^{-12}$.**

$\frac{2.8^{-5}}{2.8^{7}} = 2.8^{-5} \times \frac{1}{2.8^{7}}$	*By the product formula for complex fractions*
$= \frac{1}{2.8^{5}} \times \frac{1}{2.8^{7}}$	*By definition*
$= \frac{1}{2.8^{5} \times 2.8^{7}}$	*By the product formula for complex fractions*
$= \frac{1}{2.8^{5+7}}$	*By $x^a \cdot x^b = x^{a+b}$ (10)*
$= \frac{1}{2.8^{12}}$	
$= 2.8^{-12}$	*By definition*