

Simplifying Algebraic Expressions Using Properties of Exponents

Quick Review		
Exponent Law	Numerical Example	Algebraic Example
$x^0 = 1$	$1837^0 = 1$	$a^0 = 1$
$x^{-n} = \frac{1}{x^n}$	$17^{-4} = \frac{1}{17^4} = \frac{1}{83521}$	$z^{-8} = \frac{1}{z^8}$
$x^m x^n = x^{m+n}$	$6^2 \cdot 6^3 = 6^{2+3} = 6^5 = 7776$	$x^8 x^6 = x^{8+6} = x^{14}$
$\frac{x^m}{x^n} = x^{m-n}$	$\frac{12^8}{12^6} = 12^{8-6} = 12^2 = 144$	$\frac{a^{12}}{a^9} = a^{12-9} = a^3$
$(x^m)^n = x^{m \cdot n}$	$(3^4)^2 = 3^{4 \cdot 2} = 3^8 = 6561$	$(r^{12})^5 = r^{12 \cdot 5} = r^{60}$
$(xy)^n = x^n y^n$	$(4 \cdot 2)^3 = 4^3 \cdot 2^3 = 64 \cdot 8 = 512$	$(bq)^{28} = b^{28} q^{28}$
$\left(\frac{x}{y}\right)^n = \frac{x^n}{y^n}$	$\left(\frac{3}{4}\right)^5 = \frac{3^5}{4^5} = \frac{243}{1024}$	$\left(\frac{c}{d}\right)^8 = \frac{c^8}{d^8}$
<p>Note: The simplest form of an algebraic expression should have no negative exponents remaining and should have only one appearance of each variable per term. Numerical coefficients in the form of fractions should also be reduced as much as possible.</p>		

Problems

Simplify each algebraic expression using the properties of exponents.

1. $(x^8)^3$
2. $\left(\frac{a^3}{b^6}\right)^5$
3. $\left(\frac{z^4}{z^3}\right)^2$
4. $(4x^8z^4)^9$

$$5. \left(\frac{4b^7}{5t^3}\right)^6$$

$$6. \left(\frac{3x^4z^5}{9r^9p^{11}}\right)^4$$

$$7. \left(\frac{4a^8b^3c^7}{6a^3b^7c^{12}}\right)^2$$

$$8. \frac{(x^5y^4)^2}{(x^2y)^5}$$

$$9. \left(\frac{a^{-8}}{2a^5}\right)^3$$

$$10. \left(\frac{4x^3y^9}{2y^3}\right)^4 * \left(\frac{3x^8}{x^6y^4}\right)^2$$