

## 6-1b Properties of Exponents

Property	Examples
1. $a^0 = 1$ (if $a \neq 0$ )	$x^0 = 1$ $500^0 = 1$
2. $a^m a^n = a^{m+n}$	$a^3 a^4 = (a \cdot a \cdot a)(a \cdot a \cdot a \cdot a) = a^7$ $a^3 a^4 = a^{3+4} = a^7$
3. $(a^m)^n = a^{mn}$	$(a^2)^3 = (a \cdot a)(a \cdot a)(a \cdot a) = a^6$ $(3^4)^2 = 3^{4 \cdot 2} = 3^8$
4. $\frac{a^m}{a^n} = a^{m-n}$	$\frac{a^4}{a^7} = \frac{\cancel{a \cdot a \cdot a \cdot a} \cdot 1}{\cancel{a \cdot a \cdot a \cdot a \cdot a \cdot a \cdot a}} = \frac{1}{a^3} = a^{-3}$ $\frac{7^5}{7^3} = 7^{5-3} = 7^2$
5. $\frac{a^{-n}}{1} = \frac{1}{a^n}$	$a^{-5} = \frac{1}{a^5}$ $4^{-3} = \frac{1}{4^3}$
6. $\frac{1}{a^{-n}} = \frac{a^n}{1}$	$\frac{1}{a^{-2}} = a^2$ $\frac{1}{3^{-2}} = 3^2$
7. $\frac{a^{-m}}{b^{-n}} = \frac{b^n}{a^m}$	$\frac{a^{-6}}{b^{-17}} = \frac{b^{17}}{a^6}$ $\frac{4^{-2}}{5^{-3}} = \frac{5^3}{4^2}$
8. $(ab)^n = a^n b^n$	$(ab)^2 = a^2 b^2$ $(3x)^2 = 3^2 x^2 = 9x^2$

\*Most of the time, you will need to combine more than one property to simplify algebraic expressions.

EXAMPLES:

1.  $2x^{-1}y^3 * 4y^4$

$8x^{-1}y^3 \cdot y^4$

$8x^{-1}y^7$

$$\frac{8y^7}{x^{-1}}$$

3.  $\frac{m^{-4}}{1} * 4m$

$\frac{1}{m^4} \cdot \frac{4m}{1} = \frac{4m}{m^4}$

$\frac{4m}{m \cdot m \cdot m \cdot m}$

$$\frac{4}{m^3}$$

5.  $(2y^3)^4$

$2^4 (y^3)(y^3)(y^3)(y^3)$

$2^4 y^{12}$

2.  $3y^3 * 3x^2y^2$

$9y^3x^2$

$$9x^2y^3$$

4.  $(4m^3n^{-3})^0$

$4^0 m^0 n^0$

$$1$$

6.  $\frac{3v^3}{vu^3}$

$\frac{3 \cancel{v} \cancel{v} \cancel{v}}{\cancel{v} \cdot u \cdot u \cdot u}$

$$\frac{3v^2}{u^3}$$