

8.1 - Zero and Negative Exponents

Vocabulary:

Evaluate/Simplify

$$6^2 = 1 \cdot 6 \cdot 6$$

$$-5^0 = 1$$

$$-9^0 = 1$$

$$1,259^0 = 1$$

$$x^0 = 1$$

$$y^0 = 1$$

$$(x)^0 = 1$$

$$\frac{5^{-2}}{1} = \frac{1}{5^2} = \frac{1}{25}$$

$$\frac{2x}{3x^{-2}} = \frac{2x^2}{3}$$


1 **EXAMPLE** Simplify.

a. $3^{-2} = \frac{1}{3^2}$

b. $(-22.4)^0 = 1$

$$4^{-2}$$

$$\frac{1}{4} \cdot \frac{1}{4} = \frac{1}{16}$$

$$\frac{1}{2^{-2}}$$


$$x^0$$

$$\frac{2^2}{1} = \frac{4}{1} = \boxed{4}$$

$$\boxed{1}$$

OBJECTIVE

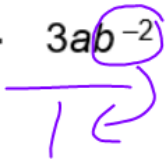
1

2

EXAMPLE

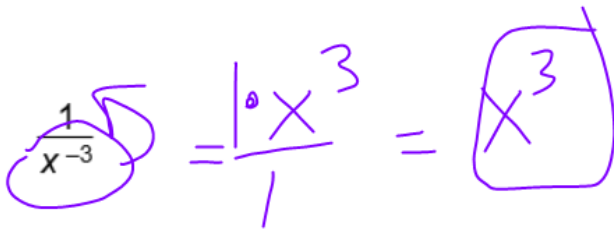
Simplify

a. $3ab^{-2}$



$$\frac{3a}{b^2}$$

b. $\frac{1}{x^{-3}}$


$$= \frac{1 \cdot x^3}{1} = x^3$$

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


$$\frac{b}{(3a)^2} = \frac{b}{3^2 a^2} = \frac{b}{9a^2}$$

3 EXAMPLEEvaluate $4x^2y^{-3}$ for $x = 3$ and $y = -2$.

$$4 \cdot (3)^2 \cdot (-2)^{-3} = \frac{4 \cdot 3^2}{(-2)^3} = \frac{36}{-8} \div 4 = -\frac{9}{2}$$

$$-4\frac{1}{2}$$

Evaluate.

$$\frac{10x^{-2}y}{2} \quad x=2 \quad y=8$$
$$\rightarrow \frac{10 \cdot (2)^{-2} \cdot 8}{2} = \frac{10 \cdot 8}{2 \cdot (2)^2} = \frac{80}{8} = \boxed{10}$$

4 EXAMPLE In the lab, the population of a certain bacteria doubles every month. The expression $3000 \cdot 2^m$ models a population of 3000 bacteria after m months of growth. Evaluate the expression for $m = 0$ and $m = -2$. Describe what the value of the expression represents in each situation.

$$3000 \cdot 2^0$$

$$3000 \cdot 1$$

3,000 bacteria
at 0 months

$$\frac{3000 \cdot 2^{-2}}$$

$$\frac{3000}{2^2} = \frac{3000}{4} = 750 \text{ bacteria}$$

two months ago

Homework: pg. 433 #18-32even, 41, 79

$$(18) \frac{5x^{-4}}{1} = \frac{5}{x^4}$$

$$(24) \frac{7ab^{-2}}{3w} = \frac{7a}{3wb^2}$$

$$(20) \frac{1}{c^{-1}} = c^1$$

$$(26) \frac{x^{-5}y^7}{1} = \frac{y^7}{x^5}$$

$$(22) \frac{a^{-4}c^0}{1} = \frac{c^0}{a^4} = \frac{1}{a^4}$$

$$(28) \frac{7s}{5t^{-3}} = \frac{7st^3}{5}$$

$$(30) \frac{x^2}{2^3 z^7} = \frac{x^2}{8z^7}$$

$$(32) \frac{7s^0 t^{-5}}{2^{-1} m^2} = \frac{7 \cdot 2}{m^2 t^5} = \frac{14}{m^2 t^5}$$