

## Using the Exponent Laws to Evaluate Expressions

Simplify using the exponent laws, then evaluate each expression for the given values. Leave your answer as an integer or a fraction (no decimal answers).

a.  $(x^{-3})(x)(x^4)$ , for  $x = 5$

$$\begin{aligned} &= x^{-3+1+4} \\ &= x^2 \\ &= (5)^2 \\ &= 25 \end{aligned}$$

b.  $(k^{-4})(k^{-2})(k^3)$ , for  $k = 4$

$$\begin{aligned} &= k^{-4-2+3} \\ &= k^{-3} \\ &= \frac{1}{k^3} \\ &= \frac{1}{(4)^3} = \frac{1}{64} \end{aligned}$$

c.  $(u^{-1}v)(u^4v^{-1})$ , for  $u = 2, v = -3$

$$\begin{aligned} &= u^{-1+4} v^{1-1} \\ &= u^3 v^0 \\ &= u^3 \\ &= (2)^3 = 8 \end{aligned}$$

d.  $(m^3n^3)(m^{-5}n^{-2})$ , for  $m = -1, n = 3$

$$\begin{aligned} &= m^{3-5} n^{3-2} \\ &= m^{-2} n^1 \\ &= \frac{n}{m^2} \\ &= \frac{(3)}{(-1)^2} = \frac{3}{1} = 3 \end{aligned}$$

e.  $(y^{-5} \div y^{-7})$ , for  $y = 4$

$$\begin{aligned} &= y^{-5--7} \\ &= y^{-5+7} \\ &= y^2 \\ &= (4)^2 \\ &= 16 \end{aligned}$$

f.  $(d^{-4} \div d^{-1})$ , for  $d = 6$

$$\begin{aligned} &= d^{-4--1} \\ &= d^{-4+1} \\ &= d^{-3} \\ &= \frac{1}{d^3} \\ &= \frac{1}{(6)^3} = \frac{1}{216} \end{aligned}$$

$$g. \frac{k^{-2}m^2}{km^{-1}}, \text{ for } k = -2, m = 3$$

$$\begin{aligned}
 &= k^{-2-1} m^{2-(-1)} \\
 &= k^{-3} m^3 \\
 &= \frac{m^3}{k^3} \\
 &= \frac{3^3}{(-2)^3} = \frac{27}{-8}
 \end{aligned}$$

$$i. (u^{-7})^{-1}, \text{ for } u = -1$$

$$\begin{aligned}
 &= u^{(-7)(-1)} \\
 &= u^7 \\
 &= (-1)^7 \\
 &= -1
 \end{aligned}$$

$$k. (st^4)^{-2}, \text{ for } s = 7, t = 3$$

$$\begin{aligned}
 &= s^{-2} t^{(4)(-2)} \\
 &= s^{-2} t^{-8} \\
 &= \frac{1}{s^2 t^8} \\
 &= \frac{1}{(7)^2 (3)^8} = \frac{1}{49 \times 6561} \\
 &= \frac{1}{321,489}
 \end{aligned}$$

$$h. (a^{-2}b) \div (a^{-5}b^{-3}), \text{ for } a = 5, b = 2$$

$$\begin{aligned}
 &= a^{-2-(-5)} b^{1-(-3)} \\
 &= a^3 b^4 \\
 &= (5)^3 (2)^4 \\
 &= 125 \times 16 \\
 &= 2000
 \end{aligned}$$

$$j. (3w^4)^{-2}, \text{ for } w = -2$$

$$\begin{aligned}
 &= 3^{-2} w^{(4)(-2)} \\
 &= \frac{1}{9} w^{-8} \\
 &= \frac{1}{9w^8} \\
 &= \frac{1}{9(-2)^8} = \frac{1}{9 \times 256} = \frac{1}{2304}
 \end{aligned}$$

$$l. (a^{-2}b^3)^{-2}, \text{ for } a = 3, b = -2$$

$$\begin{aligned}
 &= a^{(-2)(-2)} b^{3(-2)} \\
 &= a^4 b^{-6} \\
 &= \frac{a^4}{b^6} \\
 &= \frac{(3)^4}{(-2)^6} \\
 &= \frac{81}{64}
 \end{aligned}$$