

Powers and Exponents

base → $2^5 = 2 \times 2 \times 2 \times 2 \times 2 = 4 \times 4 \times 2$
exponent ↖

"2 to the fifth"
"2 to the power of 5"

$= 16 \times 2$
 $= 32$

1. Write the product as an exponent.

a) $12 \cdot 12 \cdot 12 \cdot 12 = 12^4$

b) $5 = 5^1$

c) $\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \left(\frac{1}{2}\right)^3$

d) $x \cdot x \cdot x \cdot x \cdot x = x^6$

e) $(2x)(2x)(2x) = (2x)^3$

f) $y \cdot y \cdot y \cdot y \cdot z \cdot z$

$y^4 z^2$

2. Evaluate the power.

$$\text{a) } 4^4 = 4 \cdot 4 \cdot 4 \cdot 4$$

$$\begin{aligned} &= 16 \cdot 16 \\ &= \boxed{256} \end{aligned}$$
$$\begin{array}{r} 3 \\ 16 \\ \times 16 \\ \hline 96 \\ 160 \\ \hline 256 \end{array}$$

$$\text{b) } \left(\frac{2}{3}\right)^3 = \left(\frac{2}{3}\right)\left(\frac{2}{3}\right)\left(\frac{2}{3}\right)$$

$$= \frac{2 \cdot 2 \cdot 2}{3 \cdot 3 \cdot 3}$$

$$= \boxed{\frac{8}{27}}$$

$$\text{c) } 1^{10} = 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1$$

$$= 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1$$

$$= 1 \cdot 1 \cdot 1$$

$$= 1 \cdot 1$$

$$= \boxed{1}$$

$$\text{d) } 2^2 \cdot 3^4$$

$$= 2 \cdot 2 \cdot 3 \cdot 3 \cdot 3 \cdot 3$$

$$= 4 \cdot 9 \cdot 9$$

$$= 36 \cdot 9$$

$$\begin{array}{r} 5 \\ 36 \\ \times 9 \\ \hline 324 \end{array}$$

$$= \boxed{324}$$