

2.2 Exponent Properties

$$\underline{a^m} \cdot \underline{a^n} = a^{m+n}$$

$$(a^m)^n = a^{mn}$$

$$\frac{a^m}{a^n} = a^{m-n}$$

$$a^{-m} = \frac{1}{a^m}$$

$$a^0 = 1$$

1. $2^2 2^4 2^2$

$$2^{2+4+2}$$
$$\boxed{2^8}$$

$$2^8 = 256$$

$$2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$$

~~2~~ 2^8

3. $4^1 \cdot 4^4$
$$\boxed{4^5}$$

$$\begin{array}{l} 6. \quad 2^4 \\ 2^4 = \boxed{16} \\ \underline{2 \cdot 2 \cdot 2 \cdot 2} \end{array}$$

$$7. \frac{4^2}{4^3}$$

BW

$$2 - 3 = -1$$

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

$$\begin{array}{r} X^{-2} y^3 \\ \hline -2 \quad W^{-4} \\ y^3 \quad W^4 \\ \hline X^{-2} (-2) \end{array}$$

11. $2^1 (2^3)^2$

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

$$\boxed{2^7}$$

13. $\frac{2^1}{(2^3 \cdot 2^3)^4}$

$$\frac{2^1}{2^{12} \cdot 2^{12}}$$

$$\frac{2^1}{2^{24}}$$

BW
 $= \frac{1 \cdot 2^1}{2^{24}}$
 $= 2^{-23}$

$$2^{-23} = \boxed{\frac{1}{2^{23}}}$$

$$16. (2n^4)^3 (n^3)^4$$

$$2^3 n^{12} n^{12}$$

$$\boxed{8n^{24}}$$

$$\begin{aligned}
 19. \quad & \frac{2b^1}{b^1 \cdot 2b^2 \cdot (2b^4)^4} \\
 & \quad \quad \quad b^1 \cdot 2b^2 \cdot 2^4 b^{16} \\
 & = \frac{2^1 b^1}{2^5 b^{19}} \quad \text{BW} \\
 & = 2^{-4} b^{-18} \quad \begin{array}{l} 1-5 = -4 \\ 1-19 = -18 \end{array} \\
 & = \boxed{\frac{1}{2^4 b^{18}}}
 \end{aligned}$$