

## Exponents - Power Rule

$$(x^m)^n = x^{m \cdot n}$$

base

Directions: Find the value of each expression.

$$1. (10^2)^3 = 10^{2 \cdot 3} = 10^6 = \boxed{1,000,000}$$

$$2. (-2^3)^3 = (-2)^{3 \cdot 3} = (-2)^9$$

$$\begin{aligned} & -2 \cdot -2 \cdot -2 \cdot -2 \cdot -2 \cdot -2 \cdot -2 \cdot -2 \cdot -2 \\ & \quad \underbrace{\quad} \quad \underbrace{\quad} \quad \underbrace{\quad} \quad \underbrace{\quad} \quad -2 \\ & \quad 4 \cdot 4 \cdot 4 \cdot 4 \cdot -2 \\ & \quad \underbrace{\quad} \quad \underbrace{\quad} \quad -2 = 256 \cdot -2 = \boxed{-512} \end{aligned}$$

$$3. (-3^2)^2 = (-3)^{2 \cdot 2} = (-3)^4 =$$

$$\begin{aligned} & -3 \cdot -3 \cdot -3 \cdot -3 \\ & \quad \underbrace{\quad} \quad \underbrace{\quad} \\ & \quad 9 \cdot 9 = \boxed{81} \end{aligned}$$

Directions: Simplify each expression.

$$4. \left(-\frac{2}{5}r^2s^3\right)^2 = \left(\frac{-2^1}{5^1} R^2 S^3\right)^2 = \left(\frac{-2^2}{5^2} R^4 S^6\right)$$

$-2 \cdot -2 = 4$   
 $5 \cdot 5 = 25$

$$= \boxed{\frac{4}{25} R^4 S^6}$$

$$5. (-x^3y^5z)^7 = (-1^1 x^3 y^5 z^1)^7 = (-1^7 x^{21} y^{35} z^7)$$

$-1 \cdot -1 \cdot -1 \cdot -1 \cdot -1 \cdot -1 \cdot -1$   
 $\swarrow \quad \searrow \quad \swarrow \quad \searrow \quad \swarrow \quad \searrow$   
 $1 \cdot 1 \cdot 1 \cdot 1$   
 $\swarrow \quad \searrow$   
 $1 \cdot -1 = -1$

$$= \boxed{-1x^{21}y^{35}z^7}$$

OR

$$= \boxed{-x^{21}y^{35}z^7}$$

$$\begin{aligned}
 6. (2x^5)^2(-3x^3y^4)^3(-8y^8) &= (2^2x^{10})(-3^3x^9y^{12})(-8y^8) \\
 &= (4x^{10})(-27x^9y^{12})(-8y^8) \\
 &= 864x^{10+9}y^{12+8} \\
 &= 864x^{19}y^{20}
 \end{aligned}$$

$-3 \cdot -3 \cdot -3$   
 $9 \cdot 3$   
 $-27$

$4 \times -27 = -108$   
 $-108 \times -8 = 864$

$$7. \left(\frac{1}{9x^2y}\right)^2 = \left(\frac{1^2}{9^2x^4y^2}\right) = \boxed{\frac{1}{81x^4y^2}}$$

$$8. \left(-\frac{2}{5x^3y^5}\right)^3 = \left(\frac{-2^3}{5^3x^9y^{15}}\right) = \boxed{\frac{-8}{125x^9y^{15}}}$$

$$\begin{aligned}
 &-2 \cdot -2 \cdot -2 \\
 &\quad \quad \quad \vee \\
 &\quad \quad \quad 4 \cdot -2 = -8
 \end{aligned}$$

$$\begin{aligned}
 &5 \cdot 5 \cdot 5 \\
 &\quad \quad \quad \vee \\
 &\quad \quad \quad 25 \cdot 5 = 125
 \end{aligned}$$