

Simplify Each Expression

(use only positive exponents in answer)

1. $3(3x^2)^3(9x)^{-4}$

2. $4(2x^4)^7(2x)^6$

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

4. $6(3y^4)(9y)^2$

5. $10(100x^8)^2(1000x^{-12})$

Answers

$$\begin{aligned} 1. & 3(3x^2)^3(9x)^{-4} \\ &= 3(3x^2)^3\left(\frac{1}{9x}\right)^4 \\ &= 3(27x^6)\left(\frac{1}{9^4x^4}\right) \\ &= \frac{81x^6}{9^4x^4} \\ &= \frac{x^2}{81} \end{aligned}$$

$$\begin{aligned} 2. & 4(2x^4)^7(2x)^{-6} \\ &= 4(2^7x^{28})\left(\frac{1}{2x}\right)^6 \\ &= \frac{4(2^7x^{28})}{2^6x^6} \\ &= 4 \cdot 2 \cdot x^{22} \\ &= 8x^{22} \end{aligned}$$

$$\begin{aligned} 3. & \left(\frac{1}{4}\right)(3x)^2(3x^2)^2 \\ &= \left(\frac{1}{4}\right)(9x^2)(9x^4) \\ &= \frac{81x^6}{4} \end{aligned}$$

$$\begin{aligned} 4. & 6(3y^4)(9y)^{-2} \\ &= 6(3y^4)\left(\frac{1}{9y}\right)^2 \\ &= 6(3y^4)\left(\frac{1}{81y^2}\right) \\ &= \frac{18y^4}{81y^2} \\ &= \frac{2y^2}{9} \end{aligned}$$

$$\begin{aligned} 5. & 10(100x^8)^2(1000x^{-12}) \\ &= 10(10000x^{16})(1000x^{-12}) \\ &= \frac{100000x^{16}(1000)}{x^{12}} \\ &= 100000000x^4 \\ &= 1000000000x^4 \end{aligned}$$