

Finding the Product and Quotients of Exponents Guided Lesson Explanation

$$1) (5t \cdot 4t^2 \cdot t)^4$$

Step 1) Break the problem down into 3 parts and solve each part.

$$(5t)^4 \cdot (4t^2)^4 \cdot (t)^4$$

$$(5t)^4 = (5 \cdot 5 \cdot 5 \cdot 5) t^4 = 625t^4$$

$$(4t^2)^4 = (4 \cdot 4 \cdot 4 \cdot 4)(t^2)^4 = 256t^8$$

$$(t)^4 = t^4$$

Step 2) Regroup the parts and re-evaluate the problem.

$$625t^4 \cdot 256t^8 \cdot t^4$$

a) Find the product of the numeric values: $625 \cdot 256 = 160,000$

b) Find the product of the variable: $t^4 \cdot t^8 \cdot t^4 = t^{16}$ (sum of the exponents)

Final value: $160,000t^{16}$

$$2) \left(\frac{8z^4}{2z^3} \right)^2$$

Step 1) Complete the square of the numerator and the denominator separately.

$$\text{Numerator: } (8z^4)^2 = (8 \cdot 8)(z^4)^2 = 64z^8 \quad \text{Denominator: } (2z^3)^2 = (2 \cdot 2)(z^3)^2 = 4z^6$$

$$\text{Step 2) Restate problem: } \frac{64z^8}{4z^6}$$

$$\text{Divide numeric values: } 64 \div 4 = 16$$

$$\text{Divide variables: } z^8 \div z^6 = z^2 \text{ (Quotient rule; subtract exponents with same base)}$$

$$\text{Final value: } 16z^2$$

