

3.3 Exponent Laws (Part 2)

MPM1D

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Simplify the following expressions, and then evaluate where possible:

$$\begin{aligned} 1. \quad & (x^7)(x^3)(x^6) \\ & = x^{16} \end{aligned}$$

$$\begin{aligned} 5. \quad & [(-1)^3]^9 \\ & = (-1)^9 \\ & = -1 \end{aligned}$$

$$\begin{aligned} 2. \quad & 5^9 \div 5^6 \\ & = 5^3 \\ & = 125 \end{aligned}$$

$$\begin{aligned} 6. \quad & 4^6 \div 4^9 \\ & = 4^{-3} \\ & = \frac{1}{4^3} \\ & = \frac{1}{64} \end{aligned}$$

$$\begin{aligned} 3. \quad & (x^3)^5 \\ & = x^{15} \end{aligned}$$

$$\begin{aligned} 7. \quad & 2n^4 \cdot 5n^4 \\ & = 10n^8 \end{aligned}$$

$$\begin{aligned} 4. \quad & (y^3)^2 (y^5) \\ & = y^6 y^5 \\ & = y^{11} \end{aligned}$$

$$\begin{aligned} 8. \quad & \frac{x^4 x^7}{x^{11}} \\ & = \frac{x^{11}}{x^{11}} \\ & = x^0 \\ & = 1 \end{aligned}$$

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$$\begin{aligned} 9. \quad & 9xy^2 \cdot 3x^5y^2 \\ & = 27x^6y^4 \end{aligned}$$

$$\begin{aligned} 13. \quad & \frac{10p^4}{6p^2} \\ & = \frac{5p^2}{3} \end{aligned}$$

$$\begin{aligned} 10. \quad & (2b^2)^4 \\ & = 16b^8 \end{aligned}$$

$$\begin{aligned} 14. \quad & \frac{4y^4}{14yx^8} \\ & = \frac{2y^3}{7x^8} \end{aligned}$$

$$\begin{aligned} 11. \quad & \frac{-3r^3}{3r} \\ & = -r^2 \end{aligned}$$

$$\begin{aligned} 15. \quad & \frac{16yx^4}{6x^8y^2} \\ & = \frac{8}{3x^4y} \end{aligned}$$

$$\begin{aligned} 12. \quad & 7v^3 \cdot 10u^3v^5 \cdot 2uv^3 \\ & = 140u^4v^{11} \end{aligned}$$

$$\begin{aligned} 16. \quad & \frac{(8x^3)(4xy^3)}{2x^4 \cdot 14y^3} \\ & = \frac{32x^4y^3}{28x^4y^3} \\ & = \frac{8}{7} \end{aligned}$$

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17. Consider the expression $\frac{(-3m^2n)(4m^3n^2)}{(2m^4n^2)(3mn)}$

a) Substitute $m = 4$ and $n = -3$ into the expression and evaluate it:

$$\begin{aligned} &= \frac{[-3(4)^2(-3)][4(4)^3(-3)^2]}{[2(4)^4(-3)^2][3(4)(-3)]} \\ &= \frac{114(2304)}{4608(-36)} \\ &= -2 \end{aligned}$$

b) Simplify the original expression using the exponent laws:

$$\begin{aligned} &= \frac{-12m^5n^3}{6m^5n^3} \\ &= -2 \end{aligned}$$

~~c) Substitute $m = 4$ and $n = -3$ into the simplified expression and evaluate it:~~

d) What are the advantages and disadvantages of the two methods?

Simplifying can save a lot of work!

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18. Your job: Invent an expression containing exponents that, when simplified, is equal to:

$$2p^2q$$

- Show all the steps required to prove that your expression simplifies correctly.
- The simplification should include all three exponent laws if possible. (product, quotient and power of a power).
- You are free to introduce any variables or operations you wish, as long as your original expression simplifies to the above expression

answers may vary.