3.3 Exponent Laws (Part 2)

MPM1D

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Simplify the following expressions, and then evaluate where possible:

1. $(x^7)(x^3)(x^6)$

$= x^{16}$

2. $5^9 \div 5^6$

$= 5^3$

$= 125$

3. $(x^3)^5$

$= x^{15}$

4. $(y^3)^2(y^5)$

$= y^6 y^5$

$= y^{11}$

5. $[(-1)^3]^3$

$= (-1)^9$

$= -1$

6. $4^6 \div 4^9$

$= 4^{-3}$

$= \frac{1}{4^3}$

$= \frac{1}{64}$

7. $2n^4 \cdot 5n^4$

$= 10n^8$

8. $\frac{x^4x^7}{x^{11}}$

$= \frac{x^{11}}{x^{11}}$

$= x^0$

$= 1$

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9. $9xy^2 \cdot 3x^5y^2$

$= 27x^6y^4$

10. $(2b^2)^4$

$= 16b^8$

11. $\frac{-3r^3}{3r}$

$= -r^2$

12. $7v^3 \cdot 10u^3v^5 \cdot 2uv^3$

$= 140u^4v^{11}$

13. $\frac{10p^4}{6p^2}$

$= \frac{5p^2}{3}$

14. $\frac{4y^4}{14yx^8}$

$= \frac{2y^3}{7x^8}$

15. $\frac{16yx^4}{6x^8y^2}$

$= \frac{8}{3x^4y}$

16. $\frac{(8x^3)(4xy^3)}{2x^4 \cdot 14y^3}$

$= \frac{32x^4y^3}{28x^4y^3}$

$= \frac{8}{7}$

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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:

$$= \frac{[-3(4)^2(-3)][4(4)^3(-3)^2]}{[2(4)^4(-3)^2][3(4)(-3)]}$$

$$= \frac{144(2304)}{4608(-36)}$$

$$= -2$$

b) Simplify the original expression using the exponent laws:

$$= \frac{-12m^5n^3}{6m^5n^3}$$

$$= -2$$

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.