

Math 9 – Unit 2: Algebra One

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Lesson #5: Dividing Monomials

Learning Goal: We are learning to divide by monomials.

We've added, subtracted, multiplied, and even raised monomials to powers. All that is left is dividing by monomials. First, let's develop a rule with numbers.

Simplify $\frac{4^5}{4^3} = \frac{\cancel{4} \times \cancel{4} \times \cancel{4} \times 4 \times 4}{\cancel{4} \times \cancel{4} \times \cancel{4}} = 4^2$

This leads to our 4th exponent law. When dividing, subtract the exponents. Time to put it into practice!

a) $\frac{x^8}{x^5}$
 $= x^3$

b) $\frac{y^{72}}{y^{46}}$
 $= y^{26}$

c) $\frac{m^5 n^3}{m^2 n}$
 $= m^3 n^2$

d) $\frac{18p^7 q^9}{3p^2 q^2}$
 $= 6p^5 q^7$

e) $\frac{6x^2 y^5}{10x^4 y^2}$
 $= \frac{3}{5} x^{-2} y^3$
 $= 0.6 x^{-2} y^3$

The final step is to divide a monomial into a polynomial, such as $\frac{4x^5 - 2x^3 + 6x^2}{2x^2}$. However, first let's look back

at adding fractions so we can see an integral step that we will need to use:

$\frac{1}{2} + \frac{3}{4} + \frac{5}{8}$

CD 8

$= \frac{4}{8} + \frac{6}{8} + \frac{5}{8} = \frac{4+6+5}{8} = \frac{15}{8}$

Keep in mind when doing the following questions that the denominator gets applied to all the terms in the numerator.

a) $\frac{4x^5 - 2x^3 + 6x^2}{2x^2}$

$= \frac{4x^5}{2x^2} - \frac{2x^3}{2x^2} + \frac{6x^2}{2x^2}$
 $= 2x^3 - 1x + 3$

b) $\frac{16x^3 y^5 + 8x^2 y^4}{4x^2 y}$

$= \frac{16x^3 y^5}{4x^2 y} + \frac{8x^2 y^4}{4x^2 y}$
 $= 4xy^4 + 2y^3$

$$\begin{aligned} \text{c) } & \frac{40a^3b^6 - 50a^2b^3 + 10ab}{10ab} \\ = & \frac{40a^3b^6}{10ab} - \frac{50a^2b^3}{10ab} + \frac{10ab}{10ab} \\ = & 4a^2b^5 - 5ab^2 + 1 \end{aligned}$$

$$\begin{aligned} \text{d) } & \frac{9x^7 + 27x^5 - 15x^4}{-3x^3} \\ = & \frac{9x^7}{-3x^3} + \frac{27x^5}{-3x^3} - \frac{15x^4}{-3x^3} \\ = & -3x^4 - 9x^2 + 5x \end{aligned}$$

$$\text{e) } \frac{192r^{78}s^{34} - 144r^{65}s^{53} - 256r^{98}s^{23} + 80r^{88}s^{45}}{16r^{33}s^{21}}$$

$$= 12r^{45}s^{13} - 9r^{32}s^{32} - 16r^{65}s^2 + 5r^{55}s^{24}$$

Success Criteria:

- I can divide like variables by subtracting their exponents
- I can understand the difference between dividing coefficients and dividing variables
- I can divide the monomial into each term of a polynomial separately
- I can recognize that when you divide two identical monomials, the result is one.