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Math 9 – Unit 2: Algebra One

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Lesson #5: Dividing Monomials

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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 $\frac{4^5}{4^3} = \frac{4\times4\times4\times4\times4}{4\times4\times4} = 4^2$ $\quad 5-3=2$

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

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

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

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

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

e) $\frac{15x^3}{6x}$ $\quad \div 3$ $= \frac{5}{2}x^2$

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:

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

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

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

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

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

$= 2x^3-x+3$

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

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

$= 4xy^4+2y^3$

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c) $\dfrac{40a^3b^6 - 50a^2b^3 + 10ab}{10ab}$ trinomial

$= 4a^2b^5 - 5ab^2 + 1$

trinomial

d) $\dfrac{9x^7 + 27x^5 - 15x^4}{-3x^3}$

$= -3x^4 - 9x^2 + 5x$

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

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

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.