

Dividing Monomials

Monomial ÷ Monomial

A monomial divided by a monomial is very similar to reducing a fraction. When I reduce these problems, I like to use a process that helps us avoid ever having to use the negative exponent rule. Let's illustrate this in an example. Simplify

$$\frac{25x^3y^5}{35x^7y^2} = \frac{\cancel{5}2\cancel{5}x^3y^5}{\cancel{7}3\cancel{5}x^7y^2}$$

First notice that 5 divides into the 25 and 35, so cross them out and write the answer as seen here. Now, the 3 x's in the top of the fraction cancel with three on the bottom leaving 4 on the bottom.

$$\frac{5\cancel{x^3}y^5}{7x^{\cancel{7}4}y^2}$$

Now the 2 y's in the bottom will cancel with 2 in the top leaving 3 in the top.

$$\frac{5y^{\cancel{5}3}}{7x^4\cancel{y^2}} = \frac{5y^3}{7x^4} \leftarrow \text{answer}$$

Notice that I left the variables where there were more of them instead of using the negative exponent rule. This can help if your directions say to not use negative exponents in the answer.

Let's look at another example:

$$\frac{36x^7y^3}{81x^5y^8} = \frac{\cancel{4}9\cancel{6}x^7y^3}{\cancel{9}8\cancel{1}x^5y^8}$$

First notice that 9 divides into the 36 and 81, so cross them out and write the answer as seen here. Now, the 5 x's in the bottom of the fraction cancel with 5 in the top leaving 2 in the top.

$$\frac{4x^{\cancel{7}2}y^{\cancel{3}}}{9x^{\cancel{8}5}y^8}$$

Now the 3 y's in the top will cancel with 3 in the bottom leaving 5 in the bottom.

$$\frac{4x^2\cancel{y^3}}{9y^{\cancel{8}5}} = \frac{4x^2}{9y^5} \leftarrow \text{answer}$$

Polynomial ÷ Monomial

Dividing a polynomial by a monomial is almost exactly like a monomial divided by a monomial. The only difference is that you will first separate the problem into fractions. Create one fraction for each term in the polynomial. The denominator of each fraction will be the monomial you are dividing by. Finally, just reduce each of the fractions. Let's look at an example:

$$\begin{aligned} & \frac{25x^5 - 35x^4 + 60x^3}{5x^3} \\ &= \frac{25x^5}{5x^3} - \frac{35x^4}{5x^3} + \frac{60x^3}{5x^3} \\ &= 5x^2 - 7x + 12 \end{aligned}$$

In case you are wondering: How can I break one fraction into multiple fractions?

Look at this:

$$\frac{1}{5} + \frac{2}{5} = \frac{1+2}{5}$$

If this makes sense, look at the equation backward:

$$\frac{1+2}{5} = \frac{1}{5} + \frac{2}{5}$$

This is why we can break one fraction into multiple fractions.