

LONG DIVISION OF POLYNOMIALS (5.5)

Same Idea as Long Division of Numbers: Except that there is more than one term to work with.

Step 1: Divide 1^{st} term of divisor into 1^{st} term of dividend; multiply through *entire* divisor.

Step 2: Now, just as in regular division, you subtract. But remember, there is more than one term to be subtracted, and the terms may be positive or negative at the beginning, so the easiest way to "keep things straight" is to show the subtraction of each term by a separate, changed sign in a small circle, so that it can be distinguished from the original sign. This makes it easier for you and I both to keep track of your work.

Step 3: At each step in regular division, we would "bring down" the next digit of the number in the dividend. In this case, we will "bring down" the next *TERM* or *TERMS* of the polynomial dividend so that the divisor will be able to "divide into it."

Warning: Be sure that you keep *like terms* lined up as you get ready to subtract. That is, sometimes, you must watch out for the powers of x to be sure that they are the same.

Remember: At each step, the next term of the quotient is added, or subtracted. The quotient will be another polynomial.

Last Step: When the divisor can not "divide into what is left" - that is the Remainder. Following the idea of $12 \div 7 = 1\frac{5}{7} = 1 + \frac{5}{7}$, the Remainder is added to the quotient as a fraction of "Remainder over Divisor". Remainders *MUST* be expressed this way for Long Division. You will be given an option in Synthetic Division.