Synthetic Division

<u>When Does it work?</u> In order to divide polynomials using synthetic division, you must be dividing by a **linear expression** and the **leading coefficient** (first number) **must be a 1.** For example, you can use synthetic division to divide by x + 3 or x - 6, but you cannot use synthetic division to divide by $x^2 + 2$ or 6x + 7.

How Does it work?

• <u>Step 1:</u> To set up the problem, first, Make a long "L" and put <u>all</u> of the <u>coefficients</u> of your dividend at the top. make sure the numerator is written in descending order and if any terms are missing you must use a zero to fill in the missing term.



- <u>Step 2:</u> Change the sign of your divisor, drop the x.
- <u>Step 3:</u> Once the problem is set up correctly, **bring the leading coefficient** (first number) **straight down**.
- <u>Step 4:</u> Multiply the number in the division box with the number you brought down and put the result in the next column.
- <u>Step 5:</u> Add the two numbers together and write the result in the bottom of the row. **Repeat** until done.
- <u>Step 6:</u> To write the final answer, <u>reduce the exponent by 1</u> and then use the numbers under the "L" as your coefficients. The last number is the remainder and the remainder must be written as a fraction.

