Synthetic Division Worksheet ....

Below are a few examples of how it is done.

EX. 1 $(x^4 - 4x^3 - 7x^2 + 34x - 24) \div (x + 3)$

You set it up like this...

$x + 3 = 0$

$x = -3$

Whatever number ends up in this position is the remainder. With this case, x + 3 divided into the polynomial evenly.

$$\begin{array}{c|rrrrr} -3 & 1 & -4 & -7 & 34 & -24 \\ & & -3 & 21 & -42 & 24 \\ \hline & 1 & -7 & 14 & -8 & 0 \end{array}$$

(mult. by -3 across each)

Once you finish you put the variable x back onto the number starting one degree lower that it was before. In this case you start with x^3 because it was x^4 before the synthetic division.

So, the answer would be $1x^3 - 7x^2 + 14x - 8$

Anytime you are missing exponents you MUST add in the missing terms. So, if the highest exponent is x^5, then you should see an x^4, x^3, x^2, x, and a constant term.

EX. 2 $(2x^5 - 14x^3 + 24x) \div (x - 3)$

So, let's rewrite it with those in there.

$(2x^5 + 0x^4 - 14x^3 + 0x^2 + 24x + 0) \div (x - 3)$

Now we can do the work.

$$\begin{array}{c|rrrrrr} 3 & 2 & 0 & -14 & 0 & 24 & 0 \\ & & 6 & 18 & 12 & 36 & 180 \\ \hline & 2 & 6 & 4 & 12 & 60 & 180 \end{array}$$

When you have a remainder, you **add** the **remainder** onto the answer and put it over what they were **dividing by.**

So, the answer would be $2x^4 + 6x^3 + 4x^2 + 12x + 60 + \dfrac{180}{(x-3)}$