more long division notes! ☺

ex $3x-4 \overline{)\,3x^3+23x^2+6x-28}$

first step: $3x \cdot \_\_ = 3x^3$? Write that above $3x^3$.

$$3x-4 \overline{)\,3x^3+23x^2+6x-28}\qquad x^2$$

next step: take $x^2(3x-4)$ and subtract from $3x^3+23x^2$

$$\begin{array}{r} x^2 \\ 3x-4 \overline{)\,3x^3+23x^2+6x-28} \\ \underline{-(3x^3-4x^2)} \\ 27x^2 \end{array}$$

← note the negatives!

step 3: drop down the next term, $6x$

$$\begin{array}{r} x^2 \\ 3x-4 \overline{)\,3x^3+23x^2+6x-28} \\ \underline{-(3x^3-4x^2)} \\ 27x^2+6x \end{array}$$

↓

now: rinse + repeat!

$(3x \cdot \_\_ = 27x^2?)$

all together:

$$
\begin{array}{r}
x^2+9x+14 \\
3x-4 \overline{)\,3x^3+23x^2+6x-28} \\
-(3x^3-4x^2) \\
\hline
27x^2+6x \\
-(27x^2-36x) \\
\hline
42x-28 \\
-(42x-56) \\
\hline
84
\end{array}
$$

Since $3x$ cannot go into 84, 84 is our remainder!