Polynomial Long Division

*Throw it Back!

ex) $216 \div 5$

$$5\overline{)216.0} \quad 43.2 = 43\frac{1}{5}$$

$-20\downarrow$

16

-15

10

10

0

ex) $368 \div 6$

$$6\overline{)368} \quad 61\ R2 = 61\frac{2}{6} = 61\frac{1}{3}$$

$-36\downarrow$

08

6

2

STEPS: ① Divide ② Multiply ③ Subtract ④ Bring Down ⑤ Repeat!

Before you begin long division with Polynomials:

→ make sure you're in standard form.
(powers need to descend highest power → lowest)

→ make sure missing terms are written with a 0 coefficient.

① $(x^2+x-2) \div (x-1) = x+2$

$$
\begin{array}{r|l}
x-1 & x^2+1x-2 \\
 & +(-x^2+1x)\downarrow \\
\hline
 & 2x-2 \\
 & +(-2x+2) \\
\hline
 & 0
\end{array}
\qquad x+2
$$

* Distribute my negative
* Changing signs!

② $\dfrac{x^3+4x^2+3x-2}{x+2} = x^2+2x-1$

$$
\begin{array}{r|l}
x+2 & x^2+2x-1 \\
 & x^3+4x^2+3x-2 \\
 & +(-x^3-2x^2)\downarrow \\
\hline
 & 2x^2+3x \\
 & +(-2x^2-4x)\downarrow \\
\hline
 & -1x-2 \\
 & +(+1x+2) \\
\hline
 & 0
\end{array}
$$

goal: first term cancels! →

* change signs!

(3) $(x^2-25) \div (x-2)$

$$
\begin{array}{r}
x \quad +2 \qquad R\,-21 \\
x-2 \,\overline{)\, x^2 + 0x - 25} \\
-(-x^2 + 2x) \downarrow \quad \\
\hline
2x - 25 \\
-(-2x + 4) \\
\hline
-21
\end{array}
$$

Answer: $x+2-\frac{21}{x-2}$

(4) $(x^3-13x-x^2+4) \div (x-4) = x^2+3x-1$

(5) $(x^2+3x+1) \div (x-2) = x+5+\frac{11}{x-2}$