

Dividing Polynomials Using Long Division

Long Division

Quotient

Divisor

$$\begin{array}{r}
 142 \\
 3 \overline{) 428} \\
 \underline{- 3} \\
 12 \\
 \underline{- 12} \\
 08 \\
 \underline{- 6} \\
 2
 \end{array}$$

Dividend

Remainder

$$\frac{428}{3} = 142 + \frac{2}{3}$$

$$3 \times 142 + 2 = 428$$

Divisor $\times$ Quotient + Remainder = Dividend

Given $p(x)$ and $q(x)$ are polynomial functions, with degree of $q(x) <$ degree of $p(x)$ then,

Dividend

Quotient

Remainder

Divisor

$$\frac{p(x)}{q(x)} = f(x) + \frac{r(x)}{q(x)}$$

Divisor

Given $p(x)$ and $q(x)$ are polynomial functions, with degree of $q(x) < \text{degree of } p(x)$ then,

The diagram illustrates the polynomial division equation $q(x) \cdot f(x) + r(x) = p(x)$. Above the equation, four colored boxes are arranged horizontally: a blue box labeled 'Divisor', a green box labeled 'Quotient', a purple box labeled 'Remainder', and an orange box labeled 'Dividend'. Arrows point from each box to its corresponding term in the equation: from 'Divisor' to $q(x)$, from 'Quotient' to $f(x)$, from 'Remainder' to $r(x)$, and from 'Dividend' to $p(x)$. Below the equation, the same relationship is written in words: 'Divisor $\times$ Quotient + Remainder = Dividend', with each word color-coded to match the boxes above.

$$q(x) \cdot f(x) + r(x) = p(x)$$

Divisor $\times$ Quotient + Remainder = Dividend

Long division with polynomials

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

Long division with polynomials

$$(x^4 + 6x^3 - 7x - 14) \div (x - 2)$$

Long division with polynomials

$$(6x^2 - 7x - 5) \div (3x - 5)$$