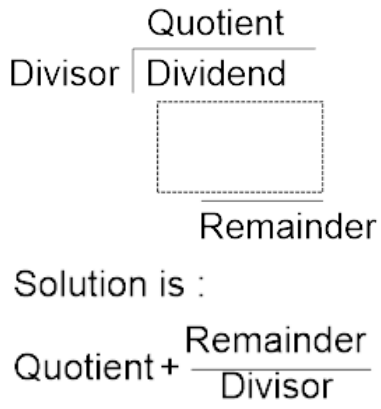


Example 4 Complete the division problem

$$\begin{array}{r}
 \boxed{} \\
 4x+3 \overline{) 12x^3 - 11x^2 + 9x + 18} \\
 \underline{12x^3 + 9x^2} \\
 -20x^2 + 9x \\
 \underline{-20x^2 - 15x} \\
 24x + 18 \\
 \underline{24x + 18} \\
 0
 \end{array}$$

$$\begin{array}{r}
 \overline{) x^3 - 2x^2} \\
 \underline{x^3 - 2x^2} \\
 0
 \end{array}$$

Polynomial Long Division



Example 3 Dividing with quadratic divisors

- Write your quadratic divisor in standard form and put in zeros for missing place values in both the divisor and dividend.
- Divide as you do with integers. Remember: distribute the (-) when subtracting!
- If the remainder is zero, the polynomial can be written as a product of factors.

A] $\frac{3x^3 + x^2 + x - 1}{x^2 - 4}$

B] $\frac{x^3 + x^2 - 5x + 3}{(x-1)(x-1)}$

Example 2 Dividing with linear divisors

- Write in long division form. Put in zeros for missing place values.
- Divide as you do with integers. Remember: distribute the (-) when subtracting!
- If the remainder is zero, the polynomial can be written as a product of factors.

A] $\frac{3x^3 + 2x^2 - 12x - 8}{3x + 2}$

B] $\frac{x^3 + 8}{x + 2}$

Example 1 The Factor Theorem

The Factor Theorem:

If a term divides evenly into a polynomial, then it is a factor.
 If the remainder is zero, the divisor is a factor and the product of the divisor and the quotient equals the dividend.

$$\begin{array}{r}
 2x+3 \\
 x+2 \overline{) 2x^2 + 7x + 6} \\
 \underline{-(2x^2 + 4x)} \\
 3x + 6 \\
 \underline{-(3x + 6)} \\
 0
 \end{array}$$

- A] Write the polynomial in standard form.
 B] Write the polynomial in factored form.
 C] Solve the polynomial to find all zeros.