

5.4 Long Division

Quotient

① Is 4 a factor of 64?

16 RO

$$\begin{array}{r} 4 \overline{) 64} \\ \underline{-4} \\ 24 \\ \underline{-24} \\ 0 \end{array}$$

Dividend

Divisor

Remainder

Yes, the remainder is 0.

$$\textcircled{2} (x^2 - 4x - 21) \div (x + 3) = x - 7$$

$$\begin{array}{r} x+3 \overline{) x^2 - 4x - 21} \\ \underline{-(x^2 + 3x)} \\ -7x - 21 \\ \underline{-(-7x - 21)} \\ 0 \end{array}$$

$$\frac{x^2}{x} = x$$

$$x(x+3) = x^2 + 3x$$

$$\underline{-7x} = -7$$

$$x \cdot -7(x+3) = -7x - 21$$

$$\textcircled{3} \quad \underline{6x^3 + 7x - 2}$$

$$2x - 5$$

$$3x^2 + 7\frac{1}{2}x$$

$$2x - 5 \overline{) 6x^3 + 0x^2 + 7x - 2}$$

$$\underline{-(6x^3 - 15x^2)} \downarrow$$

$$15x^2 + 7x$$

$$\underline{-(15x^2 - 37.5x)}$$

5.4 Long Division

① Is 4 a factor of 64?

$$\begin{array}{r} 16 \\ 4 \overline{) 64} \\ \underline{-4} \\ 24 \\ \underline{-24} \\ 0 \end{array}$$

16 → Quotient
Yes, b/c $R=0$
64 → Dividend
4 → Divisor
0 → Remainder

② Is $x-3$ a factor of

YES

$$x^3 - 7x^2 + 11x + 3$$

$$\begin{array}{r} x^2 - 4x - 1 \\ \underline{x-3} \overline{) x^3 - 7x^2 + 11x + 3} \\ - (x^3 - 3x^2) \\ \hline -4x^2 + 11x \\ - (-4x^2 + 12x) \\ \hline -1x + 3 \\ - (-1x + 3) \\ \hline 0 \end{array}$$

$$\begin{aligned} \frac{x^3}{x} &= x^2 \\ x^2(x-3) &= x^3 - 3x^2 \\ -7+3 & \\ \frac{-4x^2}{x} &= -4x \\ -4x(x-3) &= -4x^2 + 12x \end{aligned}$$

$$\textcircled{3} \quad \frac{x^2 - 4}{x + 3}$$

$$x + 3 \overline{) x^2 + 0x - 4}$$

$$\textcircled{4} (6x^3 - 4x + 2) \div (2x - 5)$$

$$\begin{array}{r}
 3x^2 + 7.5x + 16.75 \\
 \hline
 2x - 5 \overline{) 6x^3 + 0x^2 - 4x + 2} \\
 \underline{-(6x^3 - 15x^2)} \\
 15x^2 - 4x \\
 \underline{-(15x^2 - 37.5x)} \\
 33.5x + 2
 \end{array}$$

$$\begin{array}{r}
 33.5x + 2 \\
 \underline{-(33.5x + 83.75)} \\
 -81.75 \\
 \downarrow \\
 \text{Remainder}
 \end{array}$$

⑤

$$\begin{array}{r} 2x^2 + 5x + 3 \\ \hline 4x-1 \overline{) 8x^3 + 18x^2 + 7x - 3} \\ \underline{-(8x^3 - 2x^2)} \downarrow \\ 20x^2 + 7x \\ \underline{-(20x^2 - 5x)} \downarrow \\ 12x - 3 \\ \underline{-(12x - 3)} \\ 0 \end{array}$$

$$\begin{array}{r}
 \textcircled{3} \quad \quad \quad x^2 + 6x + 9 \\
 \hline
 \underline{2x+5} \sqrt{2x^3 + 17x^2 + 48x + 45} \\
 \quad - (2x^3 + 5x^2) \quad \downarrow \\
 \hline
 \quad \quad \quad 12x^2 + 48x \\
 \quad \quad \quad \underline{-(12x^2 + 30x)} \\
 \quad \quad \quad \quad \quad \quad 18x + 45 \\
 \quad \quad \quad \quad \quad \quad \underline{-(18x + 45)} \\
 \quad \quad \quad \quad \quad \quad \quad \quad \quad 0
 \end{array}$$

$$\textcircled{4} (8x^3 + 18x^2 + 7x - 3) \div (4x - 1)$$

$$\begin{array}{r} 2x^2 + 5x + 3 \\ 4x - 1 \overline{) 8x^3 + 18x^2 + 7x - 3} \\ \underline{-(8x^3 - 2x^2)} \downarrow \\ 20x^2 + 7x \end{array}$$