2.9 Factor Theorem.

**18.** If $(x + 1)$ and $(x + 3)$ are both factors of $2x^3 + ax^2 + bx - 3$, find the values of $a$ and $b$.
Find the third factor and hence solve the equation $2x^3 + ax^2 + bx - 3 = 0$.

① Sub in Roots to get 2 equations

$$f(-1) = 2(-1)^3 + a(-1)^2 + b(-1) - 3 = 0$$
$$\Rightarrow -2 + a - b - 3 = 0$$
$$\Rightarrow a - b = 5$$

$$f(-3) = 2(-3)^3 + a(-3)^2 + b(-3) - 3 = 0$$
$$\Rightarrow -54 + 9a - 3b - 3 = 0$$
$$\Rightarrow 9a - 3b = 57$$
$$\Rightarrow 3a - b = 19$$

② Solve sim. equations

$$\begin{array}{r} 3a - b = 19 \\ -a + b = -5 \\ \hline 2a \quad\quad = 14 \\ a = 7 \end{array}$$

$$\begin{array}{l} a - b = 5 \\ 7 - b = 5 \\ b = 2 \end{array}$$

Continued

**18.** If $(x + 1)$ and $(x + 3)$ are both factors of $2x^3 + ax^2 + bx - 3$, find the values of $a$ and $b$.
Find the third factor and hence solve the equation $2x^3 + ax^2 + bx - 3 = ($

Sub in a and b Values

$$2x^3 + 7x^2 + 2x - 3 = 0$$

Quadratic factor

$$(x + 1)(x + 3) = x^2 + 3x + 1x + 3$$
$$= x^2 + 4x + 3$$

Divide

$$\begin{array}{r} 2x - 1 \\ x^2 + 4x + 3 \overline{)\ 2x^3 + 7x^2 + 2x - 3} \\ \underline{+2x^3 + 8x^2 + 6x} \\ -x^2 - 4x - 3 \\ \underline{-x^2 - 4x - 3} \end{array}$$

3rd FACTOR: $(2x - 1)$