

## Finding the Remainder

After a division of a polynomial, if there is anything left then it is called the **remainder**. The answer is called the **quotient**. If there is no remainder then what you are dividing by is said to be a factor.

*Example 1:* Divide  $2x^3 - 5x^2 - 16x + 10$  by  $(x - 4)$  and state the remainder and quotient

$$\begin{array}{r} 2x^2 + 3x - 4 \\ (x - 4) \overline{) 2x^3 - 5x^2 - 16x + 10} \\ \underline{- 2x^3 + 8x^2} \phantom{+ 10} \\ 3x^2 - 16x \phantom{+ 10} \\ \underline{- 3x^2 + 12x} \phantom{+ 10} \\ - 4x + 10 \phantom{+ 10} \\ \underline{- -4x + 16} \\ - 6 \end{array}$$

$\therefore$  The remainder is  $- 6$  and the quotient is  $2x^2 + 3x - 4$

*Example 2:* Divide  $2x^3 + 9x^2 + 25$  by  $(x + 5)$  and state the remainder and quotient

$$\begin{array}{r} 2x^2 - x + 5 \\ (x + 5) \overline{) 2x^3 + 9x^2 + 0x + 25} \\ \underline{- 2x^3 + 10x^2} \phantom{+ 25} \\ - x^2 + 0x \phantom{+ 25} \\ \underline{- -x^2 - 5x} \phantom{+ 25} \\ 5x + 25 \phantom{+ 25} \\ \underline{- 5x + 25} \\ 0 \end{array}$$

Remember to use  $0x$   
as there is no  $x$  term.

$\therefore$  The remainder is  $0$  and the quotient is  $2x^2 - x + 5$