



**Factor Theorem:** The binomial  $x-a$  is a factor of the polynomial  $f(x)$  if and only if  $f(a) = 0$

Ex3) Show that  $x+3$  is a factor of  $f(x) = x^3 + 6x^2 - x - 30$ .

$$\begin{array}{r} -3 \overline{) 1 \quad 6 \quad -1 \quad -30} \\ \underline{3 \quad 18 \quad -9 \quad 30} \\ 0 \end{array}$$

Since  $f(-3) = 0$ ,  $x+3$  is a factor of  $f(x)$ .

Ex4) Find all factors of  $v(x) = x^3 + 3x^2 - 36x + 32$  if  $x - 4$  is a factor.


$$\begin{array}{r} 4 \overline{) 1 \quad 3 \quad -36 \quad 32} \\ \underline{4 \quad 12 \quad -48} \\ 1 \quad 7 \quad -8 \quad 0 \end{array}$$

$x^2 + 7x - 8$   
 $(x+8)(x-1)$

All factors

$x-4$   
 $x+8$   
 $x-1$

Ex5)  $V(x) = x^3 + 7x^2 + 2x - 40$ . Find the missing measures.

Given 

$$\begin{array}{r} 2 \overline{) 1 \quad 7 \quad 2 \quad -40} \\ \underline{2 \quad 14 \quad 40} \\ 0 \end{array}$$

$x^2 + 9x + 20$   
 $(x+4)(x+5)$

Answer

28)  $2x^3 + 17x^2 + 23x - 42$ ;  $2x+7$

$$\begin{array}{r} 2x+7 \overline{) 2x^3 + 17x^2 + 23x - 42} \\ \underline{2x^3 + 7x^2} \\ 10x^2 + 23x \\ \underline{10x^2 + 35x} \\ -12x - 42 \\ \underline{-12x - 42} \\ 0 \end{array}$$

$(x-1)(x+6)$  Other factors