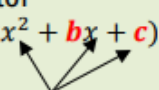
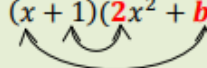


DIFFERENT METHODS TO FACTORISE A CUBIC POLYNOMIAL (3 <sup>RD</sup> DEGREE)	
METHOD AND DESCRIPTION OF STEPS	EXAMPLES
<b>SUM AND DIFFERENCE OF CUBES</b>	<p>A) <math>f(x) = x^3 + 27</math>  <math>= (x + 3)(x^2 - 3x + 9)</math>            Cannot factorise further</p> <p>B) <math>f(x) = 8x^3 - 1</math>  <math>= (2x - 1)(4x^2 + 2x + 1)</math>            Cannot factorise further</p>
<b>FACTORISE BY GROUPING</b> <ul style="list-style-type: none"> <li>Group terms in two pairs</li> <li>Take out common factor from each pair</li> <li>Two sets of brackets now become common factor</li> <li>Factorise bracket further if possible</li> </ul>	$f(x) = x^3 + 3x^2 - 4x - 12$ $= x^2(x + 3) - 4(x + 3)$ $= (x + 3)(x^2 - 4)$ $= (x + 3)(x + 2)(x - 2)$
<b>FACTORISE BY INSPECTION</b> <ul style="list-style-type: none"> <li>Find one linear factor using factor theorem</li> <li>Find other factor (quadratic expression) by inspection</li> </ul>	$f(x) = 2x^3 - 2x^2 - 10x - 6$ $f(-1) = 2(-1)^3 - 2(-1)^2 - 10(-1) - 6 = 0$ $\therefore (x + 1)$ is a factor $f(x) = (x + 1)(ax^2 + bx + c)$  Now find these coefficients Start with <b>a</b> and <b>c</b> : $1 \times a = 2 \therefore a = 2$ $1 \times c = -6 \therefore c = -6$ You now need to find <b>b</b> : Multiply the two brackets; the two $x^2$ -terms need to give you $-2x^2$ : $f(x) = (x + 1)(2x^2 + bx - 6)$  $bx^2 + 2x^2 = -2x^2 \therefore b = -4$ $\therefore f(x) = (x + 1)(2x^2 - 4x - 6)$ $= (x + 1)(2x + 2)(x - 3)$
<b>SYNTHETIC OR LONG DIVISION</b> <ul style="list-style-type: none"> <li>Find one linear factor using factor theorem</li> <li>Find other factor (quadratic expression) by long division or synthetic division (SEE NEXT PAGE)</li> </ul>	$f(x) = 2x^3 - 2x^2 - 10x - 6$ $f(-1) = 2(-1)^3 - 2(-1)^2 - 10(-1) - 6 = 0$ $\therefore (x + 1)$ is a factor $f(x) = (x + 1)(ax^2 + bx + c)$ Find <b>a</b> , <b>b</b> , <b>c</b> using synthetic division