Remainder Theorem: When a polynomial $f(x)$ is divided by $x-a$, the remainder is $f(a)$

$$f(x) = 2x^3 + 3x^2 - 17x - 30$$

a.) $x-1$

$a=1$

$2(1)^3 + 3(1)^2 - 17(1) - 30$

$= -42$

b.) $x-3$

$a=3$

$2(3)^3 + 3(3)^2 - 17(3) - 30$

Remainder $= 0$

Factor Theorem: If $x=a$ is substituted into a polynomial for x and the remainder is 0, then $x-a$ is a factor of the polynomial

$f(x) = 2x^3 + 3x^2 - 17x - 30$

$2(3)^3 + 3(3)^2 - 17(3) - 30 = 0$

Factor = $(x-3)$

Divide $\dfrac{2x^3 + 3x^2 - 17x - 30}{x-3}$

3	2	3	-17	-30
	↓	6	27	30
	2	9	10	0

$(x-3)(2x^2 + 9x + 10) \rightarrow$ Factor

$(x-3)(2x+5)(x+2)$