The factor theorem:

If $x-a$ is a factor of $P(x)$, then
$P(a)=0$ (the remainder is zero!)

$(x-3) \rightsquigarrow$ root: $+3$

Ex: $(Kx^3+3x+1) \div (x+2)$ the remainder is 3.
Find K.

3.2 #8 + ...

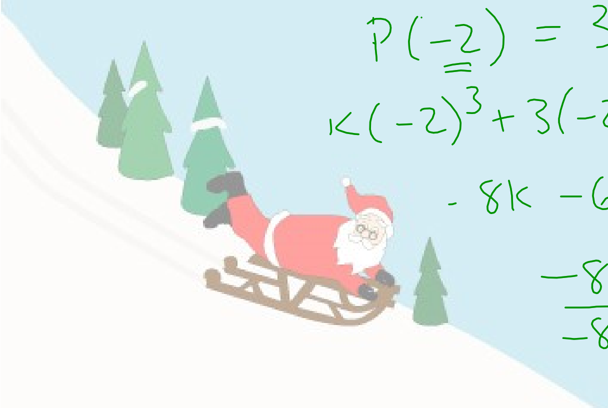
$P(-2)=3$

$K(-2)^3+3(-2)+1 = 3$

$-8K-6+1=3$

$\frac{-8K}{-8} = \frac{8}{-8}$

$K=-1$



$P(3) = 0$ Factor $(x-3)$

$P(-7) = 0$ $(x+7)$

$P(11) = 3$ $(x-11) \rightarrow$ R of 3

Is $x+2$ a factor of

$\downarrow$

-2

$\pm 1, \pm 2$

No

$3x^4 + 5x^3 + x - 2$?

$3(-2)^4 + 5(-2)^3 + (-2) - 2 =$

$48 + -40 - 2 - 2 = 4$

$P(x) = x^4 + 4x^3 - 7x^2 - 34x^1 - 24$

Possible roots:
$\pm 1, \pm 2, \pm 3, \pm 4, \pm 6, \pm 8, \pm 12, \pm 24$

$P(-1) = 1 + -4 - 7 + 34 - 24$
$1 - 11 + 34 - 24 = 0$

$(x+1)$

-1	1	4	-7	-34	-24
	↓	-1	-3	$+10$	$+24$
	1	3	-10	-24	0

$1x^3 + 3x^2 - 10x - 24$

$P(-2) = (-2)^3 + 3(-2)^2 - 10(-2) - 24$
$= -8 + 12 + 20 - 24 = 0$

$(x+2)$

-2	1	3	-10	-24
	↓	-2	-2	$+24$
	1	1	-12	0

$1x^2 + 1x - 12$

$(x+4)(x-3)$

$x^4 + 4x^3 - 7x^2 - 34x - 24 = (x+1)(x+2)(x+4)(x-3)$