

## An Easier Way!

In order to figure out if something is a factor...

• remainder =  $\emptyset$  OR plug in  $x$ -values  $\{y=0\}$

Ex. 1: Is  $x-2$  a factor of  $x^3 + 5x^2 - 32x + 36$ ?

$$x-2=0 \quad y = 2^3 + 5(2)^2 - 32(2) + 36$$

$$x=2 \quad y = 8 + 20 - 64 + 36$$

$$y = \emptyset \quad \text{yes } x-2 \text{ is a factor}$$

Ex. 2: Is  $x+5$  a factor of  $3x^4 - x^2 + 10x - 3$ ?

$$x=-5 \quad y = 3(-5)^4 - (-5)^2 + 10(-5) - 3$$

$$y = 1875 - 25 - 50 - 3$$

$$y = 1797 \quad \text{no } x+5 \text{ isn't a factor}$$

Fully Factoring!  $"x^2"$

\*\*use long division to make the polynomial into something you can factor!

\*\*do not forget the original factor you used for the division!

For the following, figure out if the given root/binomial a factor of the polynomial. If so factor completely.

(top)

3:  $x-4$  &  $x^3 - 5x^2 - 2x + 24$  ↓ factor

$x = -7$   
Ex. 4:  $\emptyset$  &  $x^3 - 4x + 9$

$$\begin{array}{r} x^3 - 5x^2 - 2x + 24 \\ - (x^3 - 4x^2) \\ \hline -x^2 + 4x \\ - (-x^2 + 4x) \\ \hline -6x + 24 \\ - (-6x + 24) \\ \hline 0 \end{array}$$

$$(x-3)(x+2)(x-4)$$

Ex. 5: Factor  $g(x) = x^3 - 11x^2 + 10x + 72$  completely if  $-2$  is a root.

#1: check if  $x = -2$  is a root

$$(-2)^3 - 11(-2)^2 + 10(-2) + 72 = 0$$

#3: factor!

$$(x-9)(x-4)(x+2)$$

top answer

given

questions

① divide

② factor?

→ yes or no  
→ remainder is  $\emptyset$

③ fully factor

→ LD until  $x^2$

→ factor

( ) ( ) ( ) ...

#1: check 1<sup>st</sup> factor

#2: long division

#3: factor answer

#1: check if  $x = -7$  is a factor

$$(-7)^3 - 4(-7) + 9 = -340$$

NO

#2:  $x+2 \overline{) x^3 - 11x^2 + 10x + 72}$

$$\begin{array}{r} x^3 + 2x^2 \\ \hline -13x^2 + 10x + 72 \end{array}$$

$$\begin{array}{r} -13x^2 - 26x \\ \hline 36x + 72 \end{array}$$

$$\begin{array}{r} 36x + 72 \\ - (36x + 72) \\ \hline 0 \end{array}$$