

# 7.5 Factor & Remainder Theorem

## Essential Question

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## Remainder Theorem

If  $P(x)$  is divided by  $x-c$ , then the remainder is equal to  $P(c)$ .

ex.  $P(x) = 2x^3 - 7x^2 + 5$        $x=3$   
 $P(3) = 2(3)^3 - 7(3)^2 + 5 = -4$

$$\begin{array}{r|rrrr} 3 & 2 & -7 & 0 & 5 \\ & \downarrow & 6 & -3 & -9 \\ \hline & 2 & -1 & -3 & -4 \end{array}$$

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## Factor Theorem

iff

$c$  is a zero of  $P$  if and only if  $x - c$  is a factor of  $P(x)$ .

$$\begin{array}{ccc} \text{zero} & & \text{factor} \\ -2 & \longleftrightarrow & x+2 \\ 3 & \longleftrightarrow & x-3 \end{array}$$

$0x^2$

ex.  $P(x) = x^3 - 7x + 6$

Show that 1 is a zero and factor completely.

$$\begin{array}{r|rrrr} 1 & 1 & 0 & -7 & 6 \\ & \downarrow & & & \\ \hline & 1 & 1 & -6 & 0 \end{array}$$

$x^2 + x - 6$

$$(x-1)(x^2 + x - 6)$$

$$(x-1)(x-2)(x+3)$$