Name:_____

Unit 3 Mod 6.5 Part 3 "Factor Theorem"

**Determine whether the given binomial is a factor of the polynomial $p(x)$ . If so, find the remaining factors of $p(x)$.**

**12.** $p(x) = x^3 + 2x^2 - x - 2;\ (x + 2)$

$$\begin{array}{r|cccc} -2 & 1 & 2 & -1 & -2 \\ & & -2 & 0 & 2 \\ \hline & 1 & 0 & -1 & 0 \end{array}$$

$x + 2$ is a factor.

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

So, $p(x) = x^3 + 2x^2 - x - 2$

$= (x + 1)(x - 1)(x + 2).$

**13.** $p(x) = 2x^4 + 6x^3 - 5x - 10;\ (x + 2)$

$$\begin{array}{r|ccccc} -2 & 2 & 6 & 0 & -5 & -10 \\ & & -4 & -4 & 8 & -6 \\ \hline & 2 & 2 & -4 & 3 & -16 \end{array}$$

$x + 2$ is not a factor.

**14.** $p(x) = x^3 - 22x^2 + 157x - 360;\ (x - 8)$

$$\begin{array}{r|cccc} 8 & 1 & -22 & 157 & -360 \\ & & 8 & -112 & 360 \\ \hline & 1 & -14 & 45 & 0 \end{array}$$

$x - 8$ is a factor.

$x^2 - 14x + 45 = (x - 5)(x - 9)$

So, $p(x) = x^3 - 22x^2 + 157x - 360 = (x - 5)(x - 9)(x - 8).$

**15.** $p(x) = 4x^3 - 12x^2 + 2x - 5;\ (x - 3)$

$$\begin{array}{r|cccc} 3 & 4 & -12 & 2 & -5 \\ & & 12 & 0 & 6 \\ \hline & 4 & 0 & 2 & 1 \end{array}$$

$x - 3$ is not a factor.