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Date _____
Algebra II

Identities

1. Solve for a: $x^2 + 6x + 8 = (x+2)(x+a)$

$$x^2 + \underline{6}x + \underline{8} = x^2 + \underline{(a+2)}x + \underline{2a}$$

	x	$+2$
x	x^2	$+2x$
$+a$	$+ax$	$+2a$

$$x^2 + (a+2)x + 2a$$

$$\frac{8=2a}{2} \quad \frac{6=a+2}{-2}$$

$4=9$
 $4=9$

2. Solve for h: $(x-6)^2 - h = x^2 - 12x + 40$

$$x^2 - 12x + \underline{36} - h = x^2 - 12x + \underline{40}$$

$$\begin{array}{r} 36 - h = 40 \\ -36 \quad -36 \\ \hline -h = 4 \\ \hline -1 \quad -1 \\ \hline h = -4 \end{array}$$

3. Solve for m and p: $(x-m)(px+3) = 2x^2 - 9x - 18$

	x	$-m$
px	px^2	$-mpx$
$+3$	$+3x$	$-3m$

$$px^2 + (3-mp)x - 3m$$

$$px^2 + (3-mp)x - 3m = 2x^2 - 9x - 18$$

$$\begin{array}{r} p = 2 \\ \frac{-3m = -18}{-3} \\ \hline m = 6 \end{array}$$

4. Solve for a and b: $(x^2+a)(x+b) = x^3 + x^2 + 3x + 3$

	x^2	$+a$
x	x^3	$+ax$
$+b$	$+bx^2$	$+ab$

$$x^3 + \underline{b}x^2 + \underline{ax} + \underline{ab} = x^3 + \underline{1}x^2 + \underline{3}x + \underline{3}$$

$b=1$
 $a=3$

5. Solve for h and k: $3x^3 - 8x^2 + 13 = (3x^2 + hx - 4)(x - 2) + k$

$$3x^3 - 8x^2 + 13 = 3x^3 + (h-6)x^2 + (-2h-4)x + 8 + k$$

$$\begin{array}{r} -8 = h - 6 \\ +6 \quad +6 \\ \hline -2 = h \end{array}$$

$$\begin{array}{r} 13 = 8 + k \\ -8 \quad -8 \\ \hline 5 = k \end{array}$$

$3x^2 + hx - 4$

$3x^3$	$+hx^2$	$-4x$
$-6x^2$	$+2hx$	$+8$

$3x^3 + (h-6)x^2 + (-2h-4)x + 8$

6. Algebraically determine the values of h and k to correctly complete the identity stated below.

$2x^3 - 10x^2 + 11x - 7 = (x-4)(2x^2 + hx + 3) + k$

$$2x^3 - 10x^2 + 11x - 7 = 2x^3 + (h-8)x^2 + (-4h+3)x - 12 + k$$

$$\begin{array}{r} -10 = h - 8 \\ +8 \quad +8 \\ \hline -2 = h \end{array}$$

$$\begin{array}{r} -7 = -12 + k \\ +12 \quad +12 \\ \hline 5 = k \end{array}$$

$2x^2 + hx + 3$

$2x^3$	$+hx^2$	$+3x$
$-8x^2$	$+4hx$	-12

$2x^3 + (h-8)x^2 + (-4h+3)x - 12$

7. Algebraically determine the values of h and k to correctly complete the identity stated below.

$x^3 - 8x^2 + 5x + 53 = (x-5)^2(x+h) + k$

$$\begin{aligned} &= (x-5)(x-5)(x+h) + k \\ &= (x^2 - 10x + 25)(x+h) + k \end{aligned}$$

$$x^3 - 8x^2 + 5x + 53 = x^3 + (h-10)x^2 + (25-10h)x + 25h + k$$

$$\begin{array}{r} -8 = h - 10 \\ +10 \quad +10 \\ \hline 2 = h \end{array}$$

$$\begin{array}{r} 53 = 25h + k \\ 53 = 25(2) + k \\ \hline 3 = k \end{array}$$

$x^2 - 10x + 25$

x^3	$-10x^2$	$+25x$
$+hx^2$	$+10hx$	$+25h$

$x^3 + (h-10)x^2 + (25-10h)x + 25h$

8. Solve for a and b: $(x+a)(x^2 - 3x + b) = x^3 - x^2 - 5x + 2$

$$x^3 + (a-3)x^2 + (-3a+b)x + ab = x^3 - x^2 - 5x + 2$$

$$\begin{array}{r} a - 3 = -1 \\ +3 \quad +3 \\ \hline a = 2 \end{array}$$

$$\begin{array}{r} -3a + b = -5 \\ -3(2) + b = -5 \\ -6 + b = -5 \\ +6 \quad +6 \\ \hline b = 1 \end{array}$$

$x^2 - 3x + b$

x^3	$-3x^2$	$+bx$
$+ax^2$	$-3ax$	$+ab$

$x^3 + (a-3)x^2 + (-3a+b)x + ab$