

Name: Key Hour: _____ Date: _____

Polynomial Long Division Notes

Let's review the kinds of polynomial long division problems that we solved at the end of the hour on Friday...

1) $(x^2 + 7x + 6) \div (x + 6)$

$$\begin{array}{r} x+1 \\ x+6 \overline{) x^2+7x+6} \\ \underline{-(x^2+6x)} \\ 1x+6 \\ \underline{-(1x+6)} \\ 0 \end{array}$$

$$\boxed{x+1}$$

2) $(x^2 - 9x + 20) \div (x - 4)$

$$\begin{array}{r} x-5 \\ x-4 \overline{) x^2-9x+20} \\ \underline{-(x^2-4x)} \\ -5x+20 \\ \underline{-(-5x+20)} \\ 0 \end{array}$$

$$\boxed{x-5}$$

All of the problems that we've seen so far do not have any remainders!

Let's look at some problems that have remainders!

Example 1: $(x^2 + 8x - 20) \div (x + 3)$

$$\begin{array}{r} x+5 \\ x+3 \overline{) x^2+8x-20} \\ \underline{-(x^2+3x)} \\ 5x-20 \\ \underline{-(5x+15)} \\ -35 \end{array}$$

$$\boxed{x+5 - \frac{35}{x+3}}$$

Example 2: $(x^2 - 14x + 24) \div (x - 4)$

$$\begin{array}{r} x-10 \\ x-4 \overline{) x^2-14x+24} \\ \underline{-(x^2-4x)} \\ -10x+24 \\ \underline{-(-10x+40)} \\ -16 \end{array}$$

$$\boxed{x-10 - \frac{16}{x-4}}$$

Example 3: $(x^3 - 4x^2 + 2x - 3) \div (x + 2)$

$$\begin{array}{r} x^2 - 6x + 14 \\ x+2 \overline{) x^3 - 4x^2 + 2x - 3} \\ \underline{-(x^3 + 2x^2)} \\ -6x^2 + 2x \\ \underline{-(-6x^2 - 12x)} \\ 14x - 3 \\ \underline{-(14x + 28)} \\ -31 \end{array}$$

$$x^2 - 6x + 14 - \frac{31}{x+2}$$

Example 4: $(x^3 - 2x^2 + 0x - 75) \div (x - 8)$

$$\begin{array}{r} x^2 + 6x + 48 \\ x-8 \overline{) x^3 - 2x^2 + 0x - 75} \\ \underline{-(x^3 - 8x^2)} \\ 6x^2 + 0x \\ \underline{-(6x^2 - 48x)} \\ 48x - 75 \\ \underline{-(48x - 384)} \\ 309 \end{array}$$

$$x^2 + 6x + 48 + \frac{309}{x-8}$$