

**Aim: Practice with Synthetic Division and the Remainder Theorem****I. Do Now:**

Given the equation  $x^3 - 11x - 4x^2 + 30 = 0$ .

- Is the equation in standard form?
- Is  $x = 1$  a root?
- Is  $x = 2$  a root?
- Find all roots.
- If  $f(x) = x^3 - 11x - 4x^2 + 30$ , find  $f(1)$ .
- Divide:  $\frac{x^3 - 11x - 4x^2 + 30}{x - 1}$

**II. Development:**

*The Remainder Theorem:* If a polynomial  $f(x)$  is divided by  $(x - k)$ , the remainder is \_\_\_\_\_.

**II. Applications:**

1. If one root of  $x^3 - 24x - 3x^2 + 80 = 0$  is  $x = -5$ , find all roots.

2. Find the remainder when  $x^5 - 3x^3 - 7x^2 + 11$  is divided by  $x + 3$ .

3. Given the polynomial  $2x^4 + 7x^3 - 4x^2 - 27x - 18$ ,  
 (a) Show that  $(x - 2)$  and  $(x + 3)$  are factors.  
 (b) Factor the polynomial completely.

**III. More Practice (if time):**

4. When  $x^3 + kx + 1$  is divided by  $x - 2$ , the remainder is  $-3$ . Find the value of  $k$ .

5. When  $x^3 + kx^2 - 2x - 7$  is divided by  $x + 1$ , the remainder is 5. What is the remainder when it is divided by  $x - 1$ ?

\*6. Use the Remainder Theorem to find the remainder when  $2x^2 - 3x + 5$  is divided by  $2x - 1$ .

HW7

Factor completely:  $8x^6 - 27$

p. 124-125: 13, 28, 29, 31, 39, 43, 47, 48