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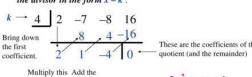
## Unit 3 – Polynomials Study Guide

Objective: Division

Synthetic division can be used when the divisor is in the form (x - k).

**Example:** Use synthetic division for the following  $(2x^3 - 7x^2 - 8x + 16) \div (x - 4)$ 

First, write down the coefficients in descending order, and k of the divisor in the form x - k:



by k column.

Repeat the process.

 $2x^2 + x - 4$ 

When \_\_\_\_\_ is a \_\_\_\_\_ divide your \_\_\_\_\_ one more time

Find the quotient and remainder of:

1.  $(x^3 + 4x^2 - 3x + 2) \div (x + 3)$ 

2.  $(2x^4 - 4x^3 - x^2 - 3x + 8) \div (x - 1)$ 

3.  $(5x^3 + 3x^2 - 3x - 6) \div (2x + 1)$ 

If there is a \_\_\_\_\_ term you need to put in a

Find the quotient and remainder of:

4. 
$$(x^3 + 6x + 1) \div (x - 3)$$

5. 
$$(2x^4 + 8 - 4x) \div (x + 2)$$

## Remainder Theorem:

If a polynomial p(x) is divided by the binomial x - a, the remainder

obtained is p(a).

So, looking at our example, if  $p(x) = x^3 - 4x^2 - 7x + 10$  was divided by x - 2, the remainder can be determined by finding p(2).

$$p(x) = x^3 - 4x^2 - 7x + 10$$

$$p(2) = (2)^3 - 4(2)^2 - 7(2) + 10$$

Or you can \_\_\_\_\_ in \_\_\_\_

5. Determine the remainder when  $3x^6-3$  is divided by x-2

Find k first then do division with other root

Suppose  $f(x) = x^3 - x^2 + 4x + k$ . The remainder of the division of f(x) by (x - 1) is 12. What is the remainder of the division of f(x) by (x + 3)

Just follow the pattern to find each

$$x^3 + x^2 + 7x + 30 + \frac{119}{x-4}$$

If the answer is in form  $B(x) + \frac{r(x)}{p(x)}$ 

The volume of a box is given by the polynomial $V(x) = -x^3 + 28x^2 - 71x - 100$ . The length is represented by the expression $(x - 4)$ . 12/13. Find the expressions that represent the height and width of the box.
14. Find the max volume of the box.
15/16. What are the realistic domain and range for this problem?

Finding all roots of a function.

To find all roots:  1. Graph the equation to determine the integer roots.  2. Use synthetic division to find the quadratic equation.  3. Solve the quadratic equation by either factoring or using the quadratic formula	17. Find all of the roots for f(x) = x <sup>3</sup> – 2x <sup>2</sup> -2x + 12. 18. x <sup>4</sup> – 2x <sup>2</sup> + 3x - 2
When is the second function greater than the first $y = .2(x-3)^2 + 3x + 8$ $y = 2^{.5x-6}$ What is a polynomial with roots 2 and 8 <i>i</i> ?	What is a polynomial with the roots $\frac{4}{3}$ , 2, $\frac{-1}{6}$ ?