**Using Pascal’s Triangle and Binomial Theorem to expand Binomials**



1. $(x – 3)^{5}$ 2. $(2x + 4)$4

3. $(x+4y)^{3}$

**Polynomial long division** is a method for dividing a polynomial by another polynomial of a lower degree. It is very similar to dividing numbers.

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**Numerical Long Division**

|  |
| --- |
|  **Fill in the boxes.**Which number is the…Dividend?Divisor?Quotient?Remainder?2310524 |

**How to Divide by Polynomials**

**Prepare:**

1. Write the problem in “long division form”. That means you change  or  into  form.
2. Put **0s** as placeholders for any missing term in the divisor and dividend.

**Process:**

1. **D**ivide the **first term** of the dividend by the **first term** of the divisor. Line up the result **above the like term** in the dividend.
2. **M**ultiply the result of the division by the **entire** divisor. Write it below the dividend’s first term.
3. **S**ubtract the **entire** product from the terms above it.
4. **B**ring down the next term from the dividend.
5. Repeat this process until you are left with a remainder (or 0). Write the remainder as a **fraction with the divisor as the denominator**.

**Guided Practice:**

1. $(2x^{3} – 9x ^{2}+ x + 3) ÷ (2x + 1)$

**Simplify the polynomial by performing the indicated operation.**

1. $(-x^{2} + 2x^{3}+ 25) ÷ (x – 3) $ 2. $(2x – 5)$4

3. $(15x^{2} + 8x -12) ÷ (3x + 1)$ 4. $(x + 7)^{2} – (4x – 10)$

5.  6. 

**Synthetic division** is a process that can be used as an alternative to long division. Synthetic division

can be used when the divisor is a \_\_\_\_\_\_\_\_\_\_\_\_\_ binomial with a leading \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of one.



Divide using long and synthetic division. Determine whether the given binomial is a factor of p(x).

1. $(2x + 1) : p(x) = 10x^{3} + 7x ^{2}- 3x – 5$ 2. $(x + 3) : p(x) = x^{3} - 4x + 11$

**Factor Theorem**

Let $p\left(x\right)=-3x^{4}+ x^{3}+8x^{2}+5x+18. $Evaluate $p\left(2\right).$ What does your answer tell you about the factors of $p\left(x\right)$.