Basic Operations with Polynomials

This sheet is designed as a review aid. If you have not previously studied this concept or after reviewing the contents you still don't pass you should enroll in the appropriate math class.

A polynomial is a series of terms that are to be added to or subtracted from each other in an equation. An example of a trinomial (a polynomial with three terms) would be $6x^2-5x-6$.

For the ATC apprenticeship math test you will work with factors to create polynomials.

Example:

Creating a polynomial from a problem where each factor is given:

Which of the following expressions represents the **product** of **3 less than twice *x*** and **2 more than the quantity 3 times *x***?

1. The word "product" indicates that you will be multiplying.
   a. 3 less than twice *x* is written $2x-3$ (this is the first factor in this problem)
   b. 2 more than 3 times *x* is written $3x+2$ (this is the second factor in the problem)

2. Factors are multiplied together to form a polynomial.

   The equation is written:

3. Convert the problem to a polynomial by multiplying each term in the first parentheses with each term in the second parentheses:

$$(2x-3)(3x+2)$$

$$6x^2+4x-9x-6$$

Multiply the **F**irst two numbers	Multiply the **O**uter two numbers	Multiply the **I**nner two numbers	Multiply the **L**ast two numbers

This is called the **FOIL** Method because it designates the order in which to multiply the numbers (First, Outer, Inner, Last).

4. Combine like terms (this is the answer): $6x^2-5x-6$

The following Samples are similar to problems you may see on the test:

1. Jake had a goal of practicing his saxophone *x* minutes a day. The first day he practiced 5 minutes less than his goal. The second day he practiced 2 times his goal plus 15 minutes. On day three he practiced 10 minutes more than his goal. On day four he practiced 10 minutes less than 3 times his goal. On day five, he practiced 5 minutes over his goal. In terms of his goal, how many minutes did Jake practice in the five days?

   Write the time practiced each day with a plus mark between each:

   $$(x-5)+(2x+15)+(x+10)+(3x-1)+(x+5)$$

   Day 1 Day 2 Day 3 Day 4 Day 5

   Drop the parentheses and combine like terms by adding them together:

   $8x+15$ Answer (this is a binomial)

2. $$\frac{\frac{6x}{2}}{2x+y}$$

   a. Invert the denominator and multiply: $\left(\frac{6x}{1}\right)\left(\frac{2x+y}{2}\right)$

   b. Factor out the 2in the denominator: $3x(2x+y)$

   (Multiply both sets by 2)

   c. Multiply: $3x(2x+y)=6x^2+3xy$ Answer (this is a binomial)

3. $$\frac{2}{3}(4x-5)(6)$$

   a. Multiply the terms in the parentheses: $\frac{2}{3}(24x-30)$

   b. Multiply the term in the parentheses by 2 then divide by 3:

   $$\frac{2}{3}(24x-30)=\left(\frac{2}{3}\right)\left(\frac{24x-30}{1}\right)=\frac{48x-60}{3}=16x-20$$ Answer