Study Guide

Subtraction of Polynominals
02/29/2012

Polynomials: Subtraction
A monomial is the product of a number and an unknown variable or unknown variables. 6xy is a monomial. The sum or difference of two or more monomials is called a polynomial.

Here is an example of a polynomial: $y^2 + 4y + 3$.
Adding and subtracting polynomials includes simplifying and combining "like" terms. Like terms are monomials that have the same variable or variables for which the variable or variables have the same exponent.

Examples :
$\begin{Bmatrix} 2x \\ 4x \end{Bmatrix}$ like terms $\quad \begin{Bmatrix} 2x \\ -4x^2 \end{Bmatrix}$ not like terms

To subtract polynomials, first write the polynomials as one long polynomial. Then distribute the subtraction sign through the second polynomial. Finally, combine like terms. Practice by subtracting the following polynomials.

Example 1: Subtract $(p^2 - 2p - 6)$ from $(p^2 + 3p + 3)$.

(1)
$p^2 + 3p + 3 - (p^2 - 2p - 6)$

(2)
(p^2) becomes $(-p^2)$
$(-2p)$ becomes $(+2p)$
(-6) becomes $(+6)$

(3)
$p^2 + 3p + 3 - p^2 + 2p + 6$

(4)
$p^2 - p^2 = 0$
$3p + 2p = 5p$
$3 + 6 = 9$

Step 1: Set up the two polynomials as one long polynomial. Since the problem is to subtract one polynomial from another, the second polynomial in the problem must be written first.
Step 2: Distribute the subtraction sign through the second polynomial. This involves changing the sign of each term in the second polynomial.
Step 3: Rewrite the polynomial after changing the signs in the second polynomial.
Step 4: Combine like terms.

Answer: 5p + 9

Example 2: Subtract four times a number decreased by ten from eight times the same number less six.

Step 1: "Four times a number decreased by ten" can be written (4x - 10).
Step 2: "Eight times the same number less six" can be written (8x - 6).
Step 3: Now the problem reads: Subtract (4x - 10) from (8x - 6).

(4)
$(8x - 6) - (4x - 10)$

(5)
$4x$ becomes $-4x$
-10 becomes $+10$

(6)
$8x - 6 - 4x + 10$

(7)
$8x - 4x = 4x$
$-6 + 10 = 4$

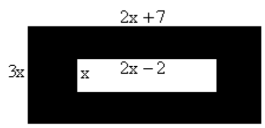
Step 4: Set up the polynomials as one long polynomial.
Step 5: Distribute the subtraction sign through the second polynomial. This involves changing the sign of

each term in the second polynomial.
Step 6: Rewrite the entire polynomial after changing the signs in the second polynomial.
Step 7: Combine like terms.

(4x - 10) subtracted from (8x - 6) equals 4x + 4.

Answer: 4x + 4

Example 3: Find area of the shaded region.



(1)
$3x(2x + 7)$
$3x(2x) + 3x(7)$
$6x^2 + 21x$

(2)
$x(2x - 2)$
$x(2x) - x(2)$
$2x^2 - 2x$

(3)
$(6x^2 + 21x) - (2x^2 - 2x)$

(4)
$6x^2 + 21x - 2x^2 + 2x$

(5)
$6x^2 - 2x^2 = 4x^2$
$21x + 2x = 23x$

Step 1: Determine the area of the large rectangle by multiplying the length (2x + 7) by the width (3x). This involves multiplying each term in (2x + 7) by 3x.
Step 2: Determine the area of the small rectangle by multiplying the length (2x - 2) by the width (x). This involves multiplying each term in (2x - 2) by x.
Step 3: Now subtract the area of the small rectangle from the area of the large rectangle. Remember to put the second polynomial in parentheses since this is subtraction.
Step 4: Distribute the subtraction sign through the second polynomial. This involves changing the sign of each term in the second polynomial.
Step 5: Combine like terms.

Answer: $4x^2 + 23x$.