

Objectives: Add polynomials by combining like terms.

Subtract polynomials by distributing the “-” sign throughout the parentheses (change all the signs within the parentheses) then combine like terms.

To add two polynomials, group like terms, in descending order of exponents if possible. Then simplify by combining like terms.

**Example 1** Add  $(2a^2 - 2a + 1) + (3a^2 - 4a + 6)$ .

**Example 2** Add  $(2a^4 - 4a + 9) + (-a^4 + a^6 + 4a - 2a^5)$ .

distributing the “-” sign throughout the parentheses (change all the signs within the parentheses)

**Example 3** Simplify  $-(-2x^2 + 7x - 4)$ ,  $-(-x^2 + 5x - 4)$ ,  $-(2x^2 - 6x - 8)$

**Example 4** Subtract  $(y^3 + 3y^2 - 9y) - (-3y^2 - 8y + 4)$ .

Recall that by the definition of subtraction, subtract  $a$  from  $b$  means  $b - a$ . You will apply this in Example 5.

**Example 5** Subtract  $y^3 - 5y^2$  from  $7y^4 - 8y^3 + 3y^2 - 4$ .

simplify by combining like terms in descending order of exponents

**Add.**

1.  $(3a^2 - 7a + 4) + (2a^2 - 3a + 5)$

2.  $(7b^2 - 3b + 2) + (-8b^2 + 2b + 6)$

3.  $(y^2 - y + 1) + (3y^2 - y - 5)$

4.  $(-4b^2 - 7b + 1) + (-3b^2 - 2b - 6)$

5.  $(a^4 - 7a + 9) + (a^5 - a^4 + 2a^3)$

6.  $(x^3 - 2x - 4) + (x^4 - x^3 + 3x^2)$

7.  $(x^4 - 9x + 5) + (2x^5 - x^4 + 3x^3)$

8.  $(a^3 - 5a + 2) + (a^4 - 2a^3 + 5a - 4)$

**Simplify.**

9.  $-(5b^2 - 2b)$

10.  $-(a^2 - a - 9)$

11.  $-(-y^2 + 5y - 4)$

12.  $-(-x^2 - x - 3)$

13.  $-(6x^2 - 7x)$

14.  $-(-2m^2 - 5m + 6)$

15.  $-(-a^2 - 5a - 2)$

16.  $-(-7m^2 - 5m + 1)$

17.  $-(-x^3 - x^2 + 2x - 4)$

**Subtract.**

18.  $(x^3 + 4x^2 - 6x) - (-2x^2 + 4x - 9)$

19.  $(a^3 + 5a^2 - 4a) - (-6a^2 + 3a - 2)$

20.  $(5m^3 - m^2 - m - 3) - (-m^2 - 2m + 8)$

21.  $(c^3 - 4c^2 - 7c + 1) - (-3c^3 - 5c^2 - 4c + 1)$

22. Subtract  $(x^3 - 5x^2)$  from  $(8x^4 + x^3 + 5x - 2)$ .

23. Subtract  $(a^2 - 3a)$  from  $(6a^3 - 8a^2 - 7a)$

24. Subtract  $(-a^3 - 3a)$  from  $(a^4 + 2a^2 - 7a + 1)$ .

25. Subtract  $(-m^2 - 5m)$  from  $(-m^3 - m^2 - 6m)$

one-step

two steps

three steps