Polynomials (Part 1): Adding and Subtracting

Section 1: Polynomials intro (KA link)

1. Pick the expression that matches this description: A polynomial of the 7th degree with a leading coefficient of 5 and a constant term of 6.

   a. $7x^6 - 2x^2 + 5$ **b.** $6x^5 + x^4 + 7$ **c.** $5x^7 + 3x^4 - 6$ **d.** $5x^7 - 8x^3 + 6$

2. Which of the following polynomials are in standard form?

   ✓ **a.** $3y^1 + 6$

   ✗ **b.** $3 - 4p + 6p^5$

   ✓ **c.** $-5q^3 + 2q^2 - 5q + 7$

3. What are the degrees of the following polynomials?

   a. $3y^1 + 6$ Degree = 1

   b. $3 - 4p + 6p^5$ Degree = 5

   c. $-5q^{11} + 2q^{12} - 5q + 7$ Degree = 12

   d. 5 Degree = 0

Section 2: Add polynomials (intro) (KA link)

1. Add (your answer should be a polynomial in standard form).

   a. $(-2h^4 + 3h^3 - h^2 - 6) + (2h^3 + 4h^2 - 6) = -2h^4 + 5h^3 + 3h^2 - 12$

   b. $(3f^5 - 5f^3 - 11f) + (9f^3 - 4f - 2) = 3f^5 + 4f^3 - 15f - 2$

Section 3: Subtract polynomials (intro) (KA link)

1. Subtract (your answer should be a polynomial in standard form).

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

$$\begin{array}{r} -2h^4+3h^3-h^2-6 \\ -\quad\quad 2h^3+4h^2-6 \\ \hline -2h^4+h^3-5h^2 \end{array}$$

b. $(3f^5-5f^3-11f)-(9f^3-4f-2) = 3f^5-14f^3-7f+2$

$$\begin{array}{r} 3f^5-5f^3-11f+0 \\ -\quad\quad 9f^3-4f-2 \\ \hline 3f^5-14f^3-7f+2 \end{array}$$

Section 4: Add and subtract polynomials (KA link)

1. Subtract $-8b^2+4b-5$ from $3b^2-4b-9$ (your answer should be a polynomial in standard form).

$3b^2-4b-9-(-8b^2+4b-5) = 11b^2-8b-4$

$$\begin{array}{r} 3b^2-4b-9 \\ -\quad -8b^2+4b-5 \\ \hline 11b^2-8b-4 \end{array}$$

2. $T=-3g^2+g-4$ and $N=-5g^2+4g+7$.

a. What is $N+N$? $N+N=2N=2(-5g^2+4g+7)=-10g^2+8g+14$

b. What is $N-T$? $N-T=-5g^2+4g+7-(-3g^2+g-4)=-2g^2+3g+11$

c. What is $T-N$? $T-N=-3g^2+g-4-(-5g^2+4g+7)=2g^2-3g-11$

$T-N=-(N-T)$

d. [Challenge] What is $T-N-N+T$?

$T-N-N+T=2T-2N=2(T-N)=2(2g^2-3g-11)=4g^2-6g-22$

Section 5: Add and subtract polynomials: two variables (intro) (KA link)

1. Evaluate (your answer should be a polynomial in standard form).

a. $(-4p^4+9p^2q-3pq^2)+(4p^4-pq-5q^2)=9p^2q-3pq^2-pq-5q^2$

b. $(3f^5-5df^3-11f^2)-(3f^5-4df-2f^2)=-5df^3+4df-9f^2$

$0-(-4df)=4df$

Section 6: Add and subtract polynomials: two variables (KA link)

1. $M = -3f^4 + 7f^2g^2 - 4g^4$ and $N = 2f^4 - 13f^2g^2 + 3g^4$.

a. What is $M + M$? $M + M = 2M = 2(-3f^4 + 7f^2g^2 - 4g^4) = -6f^4 + 14f^2g^2 - 8g^4$

b. What is $M + N$? $M + N = -3f^4 + 7f^2g^2 - 4g^4 + (2f^4 - 13f^2g^2 + 3g^4) = -f^4 - 6f^2g^2 - g^4$

c. What is $M - N$? $M - N = -3f^4 + 7f^2g^2 - 4g^4 - (2f^4 - 13f^2g^2 + 3g^4) = -5f^4 + 20f^2g^2 - 7g^4$

d. What is $N - M$? $N - M = -(M - N) = -(-5f^4 + 20f^2g^2 - 7g^4) = 5f^4 - 20f^2g^2 + 7g^4$