Get Ready

Classify Polynomials

You can classify a **polynomial** by its number of terms or its degree.

The **degree of a polynomial** is the greatest degree of any of its terms.
The degree of a term is the sum of the exponents on its variables.

$2abc$ is a **monomial**, because it has one term.
The sum of the exponents is $1 + 1 + 1$, or 3. $2abc$ is a third-degree polynomial.

$7x^2 + x$ is a **binomial**, because it has two terms.
The greatest power is 2 from the term $7x^2$. $7x^2 + x$ is a second-degree polynomial.

$7k^2m + 15k^3m^2 - 6km^2$ is a **trinomial**, because it has three terms.
The greatest exponent sum is $3 + 2$, or 5, from the term $15k^3m^2$.
$7k^2m + 15k^3m^2 - 6km^2$ is a fifth-degree polynomial.

1. Classify each polynomial by its number of terms.

a) $-3y$
b) $5 + 6a^3$
c) $6x^2 + x - 1$
d) $8a^4b^4 - 6a^3b^2 + 2ab^2$
e) $5d^3e - 7e$
f) $19m + 8n - 3p$

2. State the degree of each polynomial.

a) $9 + 5y^5 - 4y^2 + y$
b) $8a^3b^2 + 9a^2b - 6a^4b^2$
c) $10x^7y^2 - 3x^3y^3 + 5x^4y^4$
d) $6abc - 5a^2bc^2 - 7abc^2$

Add and Subtract Polynomials

To add polynomials, remove the brackets and then collect **like terms**.

$$\begin{aligned} &(2x^2 + 3x - 5) + (7x^2 - 6x - 2) \\ &= 2x^2 + 3x - 5 + 7x^2 - 6x - 2 \\ &= 2x^2 + 7x^2 + 3x - 6x - 5 - 2 \\ &= 9x^2 - 3x - 7 \end{aligned}$$

To subtract polynomials, add the opposite polynomial.

$$\begin{aligned} &(4a^2 + 5ab - 9b^2) - (7a^2 - 6ab + 2b^2) \\ &= (4a^2 + 5ab - 9b^2) + (-7a^2 + 6ab - 2b^2) \\ &= 4a^2 + 5ab - 9b^2 - 7a^2 + 6ab - 2b^2 \\ &= 4a^2 - 7a^2 + 5ab + 6ab - 9b^2 - 2b^2 \\ &= -3a^2 + 11ab - 11b^2 \end{aligned}$$

3. Simplify.

a) $(5x + 7) + (2x - 11)$
b) $(3b - 8) - (6b - 7)$
c) $(5x^2 + 6x + 8) + (2x^2 + 5x - 9)$
d) $(9y^3 - 7y^2 + 6) - (3y^3 - 5y^2 + 8)$
e) $(7a^2 + 3a - 4) + (8a^2 - 2a - 15)$
f) $(2c^2 - 3c + 1) - (-c^2 - 3c - 5)$

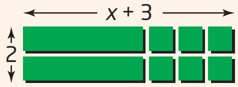
4. Simplify.

a) $(7x^2 + 3xy - 2y^2) + (8x^2 - xy - y^2)$
b) $(4g^2 + gh - 7h^2) - (g^2 - 2gh + 3h^2)$
c) $(5ab^2 + 7a - b) + (3ab^2 - 5a + 6b)$
d) $(3cd^2 + 2c + 9d) - (2cd^2 + 2c - d)$
e) $(2x + 8) - (6x - 7) + (5x - 1)$
f) $(5a^2 - b) + (6b - 2a^2) - (b^2 + 7a^2)$

The Product of a Monomial and a Polynomial

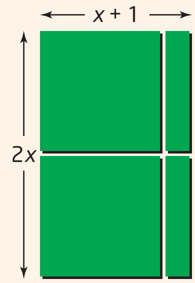
The **distributive property** allows you to expand algebraic expressions. When distributing, multiply the monomial by each term in the polynomial.

$$\begin{aligned} &2(x + 3) \\ &= 2(x) + 2(3) \\ &= 2x + 6 \end{aligned}$$



The area is $2x + 6$.

$$\begin{aligned} &2x(x + 1) \\ &= 2x(x) + 2x(1) \\ &= 2x^2 + 2x \end{aligned}$$



The area is $2x^2 + 2x$.

$$\begin{aligned} &-a(3a + 5) \\ &= -a(3a) + (-a)(5) \\ &= -3a^2 + (-5a) \\ &= -3a^2 - 5a \end{aligned}$$

5. Use algebra tiles to model each product.

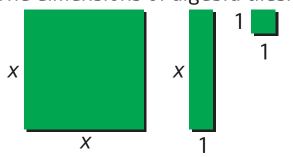
a) $3(x + 2)$

b) $4(x + 2)$

c) $x(x + 3)$

d) $4x(x + 4)$

The dimensions of algebra tiles:

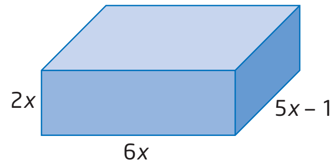


6. Expand using the distributive property.

a) $7m(3m + 8)$ **b)** $-4(c + 9)$

c) $5a^2(6a^2 - 8a)$ **d)** $2(d^2 - 2d + 1)$

7. A rectangular prism has the dimensions shown.



a) Find a simplified expression for the volume.

b) Find a simplified expression for the surface area.

Factors

The **factors** of 12 are 1, 2, 3, 4, 6, and 12. To find the **greatest common factor** (GCF) of 12 and 18, express each number as the product of its prime factors.

$12 = 2 \times 2 \times 3$

$18 = 2 \times 3 \times 3$

Since both 12 and 18 have factors of 2 and 3, their GCF is 2×3, or 6.

8. Write the factors of each number.

a) 10 **b)** 24 **c)** 16 **d)** 32

9. Write each number as the product of its prime factors.

a) 8 **b)** 14 **c)** 28 **d)** 30

10. Find the GCF of each pair of numbers.

a) 6 and 9 **b)** 25 and 15

c) 24 and 16 **d)** 20 and 28

e) 36 and 15 **f)** 32 and 40