

Lesson 8-4

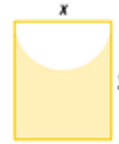
Example 1 Identify Polynomials

State whether each expression is a polynomial. If it is a polynomial, identify it as a *monomial*, *binomial*, or *trinomial*.

	Expression	Polynomial?	Monomial, Binomial, or Trinomial?
a.	$\frac{3x}{4}$	Yes, $\frac{3x}{4} = \frac{3}{4}x$.	monomial
b.	$\frac{1}{2}a^2 + 2b - 1$	Yes, $\frac{1}{2}a^2 + 2b - 1 = \frac{1}{2}a^2 + 2b + (-1)$ the expression is the sum of three monomials.	trinomial
c.	$\frac{2j^2}{k} + 2$	No, $\frac{2j^2}{k}$ is not a monomial.	none of these
d.	$r^2s^3 - 2r^3st$	Yes, $r^2s^3 - 2r^3st = r^2s^3 + (-2r^3st)$ the expression is the sum of two monomials.	binomial

Example 2 Write a Polynomial

GEOMETRY Write a polynomial to represent the area of the shaded region.



Words The area of the shaded region is the area of the rectangle minus the area of the half circle.

Variables
 area of the shaded region = A
 width of the rectangle = x
 length of the rectangle = y
 rectangle area = xy

$$\text{half circle area} = \frac{1}{2}\pi\left(\frac{1}{2}x\right)^2$$

Equation area of shaded region = rectangle area – half circle area

$$A = xy - \frac{1}{2}\pi\left(\frac{1}{2}x\right)^2$$

$$A = xy - \frac{1}{2}\pi\frac{1}{4}x^2$$

$$A = xy - \frac{1}{8}\pi x^2$$

The polynomial representing the area of the shaded region is $A = xy - \frac{1}{8}\pi x^2$.

Example 3 Degree of a Polynomial

Find the degree of each polynomial.

	Polynomial	Terms	Degree of Each Term	Degree of Polynomial
a.	$2xy - x^2 yz^2$	$2xy, x^2 yz^2$	2, 5	5
b.	$x + 3x^2 - 2$	$x, 3x^2, 2$	1, 2, 0	2
c.	$5r^2 s - 6r + 2rs - 1$	$5r^2 s, 6r, 2rs, 1$	3, 1, 2, 0	3

Example 4 Arrange Polynomials in Ascending Order

Arrange the terms of each polynomial so that the powers of x are in ascending order.

a. $-2x^2 + 1 + 3x^3$

$$\begin{aligned} -2x^2 + 1 + 3x^3 &= -2x^2 + 1x^0 + 3x^3 & x^0 = 1 \\ &= 1 - 2x^2 + 3x^3 & \text{Compare powers of } x: 0 < 2 < 3 \end{aligned}$$

b. $4 - 2x^5 a^2 + x^2 a^3 - xa$

$$\begin{aligned} 4 - 2x^5 a^2 + x^2 a^3 - xa &= 4x^0 - 2x^5 a^2 + x^2 a^3 - x^1 a & x^0 = 1, x = x^1 \\ &= 4 - xa + x^2 a^3 - 2x^5 a^2 & \text{Compare powers of } x: 0 < 1 < 2 < 5 \end{aligned}$$

Example 5 Arrange Polynomials in Descending Order

Arrange the terms of each polynomial so that the powers of x are in descending order.

a. $21 - x^3 + 4x^2 - 7x$

$$\begin{aligned} 21 - x^3 + 4x^2 - 7x &= 21x^0 - x^3 + 4x^2 - 7x^1 & x^0 = 1, x = x^1 \\ &= -x^3 + 4x^2 - 7x + 21 & 3 > 2 > 1 > 0 \end{aligned}$$

b. $4x^2 y - 8x^4 y^2 + xy - 12$

$$\begin{aligned} 4x^2 y - 8x^4 y^2 + xy - 12 &= 4x^2 y - 8x^4 y^2 + x^1 y - 12x^0 & x^0 = 1, x = x^1 \\ &= -8x^4 y^2 + 4x^2 y + xy - 12 & 4 > 2 > 1 > 0 \end{aligned}$$