

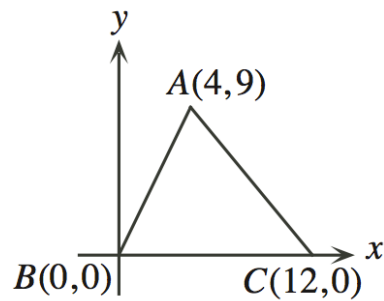
## 3.4 Communicate With Algebra

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### Brain Teaser:

In the diagram, what is the area of the triangle?

$$\begin{aligned} A_{\text{triangle}} &= \frac{(\text{base})(\text{height})}{2} \\ &= \frac{(12)(9)}{2} \\ &= 54 \text{ units}^2 \end{aligned}$$





## Part 1: DO IT NOW



A hockey team gets 2 points for a win, 1 point for a tie, and 0 points for a loss.

a) Write an equation for determining the amount of points a team has:

$$\text{Points} = 2(\text{wins}) + 1(\text{ties}) + 0(\text{losses})$$

b) If the Penguins win 54 games, tie 8, and lose 20; how many points will they get?

$$\text{Points} = 2(54) + 1(8) + 0(20)$$

$$\text{Points} = 108 + 8 + 0$$

$$\text{Points} = 116$$

## Part 2: Terms

**Term:** an expression formed by the **product** of numbers and or variables.

**Example of a term:**

$$4x^2$$

The number in front of the variable is called the coefficient.

Identify the coefficient and the variable for the expression  $4x^2$ :

Coefficient: 4

Variable:  $x^2$

## Practice with terms

Identify the coefficient and the variable of each term:

- a) Jim earns \$7 per hour at his part-time job. If he works for  $x$  hours, his earnings, in dollars, are  $7x$ .
- b) The depth, in meters, of a falling stone in a well after  $t$  seconds is  $-4.9t^2$
- c) The area of a triangle with base  $b$  and height  $h$  is  $\frac{1}{2}bh$
- d) The area of a square with side length  $k$  is  $k^2$

Expression	Coefficient	Variable	Comments
$7x$	$7$	$x$	
$-4.9t^2$	$-4.9$	$t^2$	The negative sign is included with the coefficient
$\frac{1}{2}bh$	$\frac{1}{2}$	$bh$	The variable can consist of more than one letter or symbol
$k^2$	$1$	$k^2$	When the coefficient is not shown, it is 1.

## Part 3: Polynomials

**Polynomial:** an algebraic expression consisting of one or more terms connected by addition or subtraction operators

Example of a polynomial:

$$3x^2 + 2x$$

A polynomial can be classified by the number of terms it has:

A MONOMIAL is a polynomial with only **one term** .

A BINOMIAL is a polynomial with **two terms** .

A TRINOMIAL is a polynomial with **three terms** .

A 4-TERM POLYNOMIAL is a polynomial with **four terms** .

**Classify each polynomial by the number of terms it has:**

Polynomial	Number of Terms	Type of Polynomial
$3x^2 + 2x$	2	BINOMIAL
$-2m$	1	MONOMIAL
$4x^2 - 3xy + y^2$	3	TRINOMIAL
$a - 2b + c - 3$	4	4-TERM POLYNOMIAL

*Hint: You can find the number of terms by looking for the addition and subtraction operators that separate the terms*

### **Part 4: Degree of a Term**

**Degree of a term:** the sum of the exponents on the variables in a term

**Example of determining the degree of a term:**

**Term:**  $5x^2y^3$

**Sum of Exponents on Variables:**  $2 + 3 = 5$

**Degree of Term:** 5

Find the degree of each term by adding the exponents of the variables:

Term	Sum of Exponents	Degree of Term
$x^2$	2	2
$3y^4$	4	4
$0.7uv$	$1+1 = 2$	2
$-2a^2b$	$2+1 = 3$	3
$-5$	0	0

**Note:**

- a variable that appears to have no exponent actually has an exponent of 1
- a constant has a degree of 0

### Part 5: Degree of a Polynomial

The **degree of a polynomial** is equal to the degree of the highest-degree term in the polynomial

**Example:**

**Polynomial:**  $3x^2y^4 + 11x^2y^2 + y^5$

**Highest-Degree Term:**  $3x^2y^4$

**Degree of highest-degree term:**  $2+4=6$

**Degree of polynomial:** 6

Find the degree of each polynomial:

Polynomial	Term with Highest Degree	Degree of Term with Highest Degree	Degree of Polynomial
$x + 3$	$x$	1	1
$5x^2 - 2x$	$5x^2$	2	2
$3y^3 + 0.2y - 1$	$3y^3$	3	3
$7x^2y^4 + x^6y$	$x^6y$	$6+1 = 7$	7

### Part 6: Apply Our Knowledge!

Mr. Jensen works part time as a golf instructor. He earns \$125 for the season, plus \$20 for each children's lesson and \$30 for each adult lesson that he gives.

a) Write an expression that describes Mr. Jensen's total earnings for the season. Identify the variables and what they stand for.

$$\text{Earnings} = 20(\text{child lessons}) + 30(\text{adult lessons}) + 125$$

b) If Mr. Jensen gave **8 children's** lessons and **6 adult lessons**, what were his total earnings?

$$\text{Earnings} = 20(8) + 30(6) + 125$$

$$\text{Earnings} = 160 + 180 + 125$$

$$\text{Earnings} = \$465$$

## Review of Terms

TERM : an expression formed by the product of numbers and/or variables

POLYNOMIAL : an algebraic expression consisting of one or more terms connected by addition or subtraction signs.

DEGREE OF TERM : the sum of the exponents on the variables in a term

DEGREE OF POLYNOMIAL : equal to the degree of the highest-degree term in a polynomial