



# 1 Student-Built Glossary

This is an alphabetical list of key vocabulary terms you will learn in Chapter 1. As you study this chapter, complete each term's definition or description. Remember to add the page number where you found the term. Add these pages to your Algebra Study Notebook to review vocabulary at the end of the chapter.

Vocabulary Term	Found on Page	Definition/Description/Example
absolute value		
algebraic expressions		
compound inequality		
empty set		
equation		
formula		
integers		
intersection		
irrational numbers		
natural numbers		

(continued on the next page)

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Vocabulary Term	Found on Page	Definition/Description/Example
open sentence		
order of operations		
rational numbers		
real numbers		
set-builder notation		
solution		
union		
variable		
whole numbers		

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# 1 Anticipation Guide

## Equations and Inequalities

### Step 1 Before you begin Chapter 1

- Read each statement.
- Decide whether you Agree (A) or Disagree (D) with the statement.
- Write A or D in the first column OR if you are not sure whether you agree or disagree, write NS (Not Sure).

STEP 1 A, D, or NS	Statement	STEP 2 A or D
	1. Algebraic expressions contain at least one variable.	
	2. The order of operations must be followed so that every expression will have only one value.	
	3. All real numbers are in the set of rational numbers.	
	4. The commutative property is true for addition and multiplication only.	
	5. The phrase twice the sum of a number squared and 6 could be written as $2n^2 + 6$ .	
	6. The reflexive property of equality states that if $a = b$ then $b = a$ .	
	7. The absolute value of a number is its distance from 0 on the number line.	
	8. If the absolute value of any expression is equal to a negative number, then the solution is the empty set.	
	9. When adding or subtracting a negative number to both sides of an inequality, the inequality symbol must be reversed.	
	10. Writing a solution in the form $\{x \mid x \leq 5\}$ is called set-builder notation.	
	11. If a compound inequality contains the word “or”, the solution will be the intersection of the solution sets of the two inequalities.	
	12. If $ 3x - 1  > 10$ , then $3x - 1 < 10$ and $3x - 1 > -10$ .	

### Step 2 After you complete Chapter 1

- Reread each statement and complete the last column by entering an A or a D.
- Did any of your opinions about the statements change from the first column?
- For those statements that you mark with a D, use a piece of paper to write an example of why you disagree.

# 1 Ejercicios preparatorios

## Ecuaciones y desigualdades

### PASO 1 Antes de comenzar el Capítulo 1

- Lee cada enunciado.
- Decide si estás de acuerdo (A) o en desacuerdo (D) con el enunciado.
- Escribe A o D en la primera columna O si no estás seguro(a) de la respuesta, escribe NS (No estoy seguro(a)).

PASO 1 A, D o NS	Enunciado	PASO 2 A o D
	1. Las expresiones algebraicas contienen por lo menos una variable.	
	2. Se debe seguir el orden de las operaciones para asegurar que cada expresión tenga sólo un valor.	
	3. Todos los números reales están en el conjunto de los números racionales.	
	4. La propiedad conmutativa es verdadera sólo para la adición y la multiplicación.	
	5. La frase dos veces la suma de un número al cuadrado y 6 podría escribirse como $2n^2 + 6$ .	
	6. La propiedad reflexiva de la igualdad establece que si $a = b$ , entonces $b = a$ .	
	7. El valor absoluto de un número es su distancia a partir de 0 sobre la recta numérica.	
	8. Si el valor absoluto de cualquier expresión es igual a un número negativo, entonces la solución es un conjunto vacío.	
	9. Cuando se suma o se resta un número negativo de ambos lados de una desigualdad, se debe invertir el símbolo de desigualdad.	
	10. Escribir una solución en la forma $\{x \mid x \leq 5\}$ se denomina notación de conjuntista.	
	11. Si una desigualdad compuesta contiene la palabra “o”, la solución será la intersección de los conjuntos solución de las dos desigualdades.	
	12. Si $ 3x - 1  > 10$ , entonces $3x - 1 < 10$ y $3x - 1 > -10$ .	

### PASO 2 Después de completar el Capítulo 1

- Vuelve a leer cada enunciado y completa la última columna con una A o una D.
- ¿Cambió cualquiera de tus opiniones sobre los enunciados de la primera columna?
- En una hoja de papel aparte, escribe un ejemplo de por qué estás en desacuerdo con los enunciados que marcaste con una D.

**1-1 Study Guide and Intervention****Expressions and Formulas****Order of Operations**

<b>Order of Operations</b>	<b>Step 1</b>	Evaluate expressions inside grouping symbols.
	<b>Step 2</b>	Evaluate all powers.
	<b>Step 3</b>	Multiply and/or divide from left to right.
	<b>Step 4</b>	Add and/or subtract from left to right.

**Example 1 Evaluate  $[18 - (6 + 4)] \div 2$ .**

$$\begin{aligned} [18 - (6 + 4)] \div 2 &= [18 - 10] \div 2 \\ &= 8 \div 2 \\ &= 4 \end{aligned}$$

**Example 2 Evaluate  $3x^2 + x(y - 5)$** **if  $x = 3$  and  $y = 0.5$ .**

Replace each variable with the given value.

$$\begin{aligned} 3x^2 + x(y - 5) &= 3 \cdot (3)^2 + 3(0.5 - 5) \\ &= 3 \cdot (9) + 3(-4.5) \\ &= 27 - 13.5 \\ &= 13.5 \end{aligned}$$

**Exercises****Evaluate each expression.**

1.  $14 + (6 \div 2)$

2.  $11 - (3 + 2)^2$

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

4.  $9(3^2 + 6)$

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

6.  $5^2 + \frac{1}{4} + 18 \div 2$

7.  $\frac{16 + 2^3 \div 4}{1 - 2^2}$

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

9.  $20 \div 2^2 + 6$

10.  $12 + 6 \div 3 - 2(4)$

11.  $14 \div (8 - 20 \div 2)$

12.  $6(7) + 4 \div 4 - 5$

13.  $8(4^2 \div 8 - 32)$

14.  $\frac{6 + 4 \div 2}{4 \div 6 - 1}$

15.  $\frac{6 + 9 \div 3 + 15}{8 - 2}$

**Evaluate each expression if  $a = 8$ ,  $b = -3$ ,  $c = 4$ , and  $d = -\frac{1}{2}$ .**

16.  $\frac{ab}{d}$

17.  $5(6c - 8b + 10d)$

18.  $\frac{c^2 - 1}{b - d}$

19.  $ac - bd$

20.  $(b - c)^2 + 4a$

21.  $\frac{a}{d} + 6b - 5c$

22.  $3\left(\frac{c}{d}\right) - b$

23.  $cd + \frac{b}{d}$

24.  $d(a + c)$

25.  $a + b \div c$

26.  $b - c + 4 \div d$

27.  $\frac{a}{b + c} - d$

**1-1 Study Guide and Intervention** *(continued)***Expressions and Formulas**

**Formulas** A **formula** is a mathematical sentence that expresses the relationship between certain quantities. If you know the value of every variable in the formula except one, you can use substitution and the order of operations to find the value of the remaining variable.

**Example** The formula for the number of reams of paper needed to print  $n$  copies of a booklet that is  $p$  pages long is  $r = \frac{np}{500}$ , where  $r$  is the number of reams needed. How many reams of paper must you buy to print 172 copies of a 25-page booklet?

$$\begin{aligned} r &= \frac{np}{500} && \text{Formula for paper needed} \\ &= \frac{(172)(25)}{500} && n = 172 \text{ and } p = 25 \\ &= \frac{4300}{500} && \text{Evaluate } (172)(25). \\ &= 8.6 && \text{Divide.} \end{aligned}$$

You cannot buy 8.6 reams of paper. You will need to buy 9 reams to print 172 copies.

**Exercises**

- For a science experiment, Sarah counts the number of breaths needed for her to blow up a beach ball. She will then find the volume of the beach ball in cubic centimeters and divide by the number of breaths to find the average volume of air per breath.
  - Her beach ball has a radius of 9 inches. First she converts the radius to centimeters using the formula  $C = 2.54I$ , where  $C$  is a length in centimeters and  $I$  is the same length in inches. How many centimeters are there in 9 inches?
  - The volume of a sphere is given by the formula  $V = \frac{4}{3}\pi r^3$ , where  $V$  is the volume of the sphere and  $r$  is its radius. What is the volume of the beach ball in cubic centimeters? (Use 3.14 for  $\pi$ .)
  - Sarah takes 40 breaths to blow up the beach ball. What is the average volume of air per breath?
- A person's basal metabolic rate (or BMR) is the number of calories needed to support his or her bodily functions for one day. The BMR of an 80-year-old man is given by the formula  $\text{BMR} = 12w - (0.02)(6)12w$ , where  $w$  is the man's weight in pounds. What is the BMR of an 80-year-old man who weighs 170 pounds?

**1-1 Skills Practice****Expressions and Formulas**Evaluate each expression if  $a = -4$ ,  $b = 6$ , and  $c = -9$ .

1.  $3ab - 2bc$

2.  $a^3 + c^2 - 3b$

3.  $2ac - 12b$

4.  $b(a - c) - 2b$

5.  $\frac{ac}{b} + \frac{2b}{a}$

6.  $\frac{3b - 4c}{2b - (c - b)}$

7.  $\frac{3ab}{c} + \frac{2c}{b}$

8.  $\frac{b^2}{ac} - c$

Evaluate each expression if  $r = -1$ ,  $n = 3$ ,  $t = 12$ ,  $v = 0$ , and  $w = -\frac{1}{2}$ .

9.  $6r + 2n$

10.  $2nt - 4rn$

11.  $w(n - r)$

12.  $n + 2r - 16v$

13.  $(4n)^2$

14.  $n^2r - wt$

15.  $2(3r + w)$

16.  $\frac{3v + t}{5n - t}$

17.  $-w[t + (t - r)]$

18.  $\frac{rv^3}{n^2}$

19.  $9r^2 + (n^2 - 1)t$

20.  $7n - 2v + \frac{2w}{r}$

**21. TEMPERATURE** The formula  $K = C + 273$  gives the temperature in kelvins (K) for a given temperature in degrees Celsius. What is the temperature in kelvins when the temperature is 55 degrees Celsius?

**22. TEMPERATURE** The formula  $C = \frac{5}{9}(F - 32)$  gives the temperature in degrees Celsius for a given temperature in degrees Fahrenheit. What is the temperature in degrees Celsius when the temperature is 68 degrees Fahrenheit?



**1-1 Practice****Expressions and Formulas****Evaluate each expression.**

1.  $3(4 - 7) - 11$

2.  $4(12 - 4^2)$

3.  $1 + 2 - 3(4) \div 2$

4.  $12 - [20 - 2(6^2 \div 3 \times 2^2)]$

5.  $20 \div (5 - 3) + 5^2(3)$

6.  $(-2)^3 - (3)(8) + (5)(10)$

7.  $18 - \{5 - [34 - (17 - 11)]\}$

8.  $[4(5 - 3) - 2(4 - 8)] \div 16$

9.  $\frac{1}{2}[6 - 4^2]$

10.  $\frac{1}{4}[-5 + 5(-3)]$

11.  $\frac{-8(13 - 37)}{6}$

12.  $\frac{(-8)^2}{5 - 9} - (-1)^2 + 4(-9)$

**Evaluate each expression if  $a = \frac{3}{4}$ ,  $b = -8$ ,  $c = -2$ ,  $d = 3$ , and  $g = \frac{1}{3}$ .**

13.  $ab^2 - d$

14.  $(c + d)b$

15.  $\frac{ab}{c} + d^2$

16.  $\frac{d(b - c)}{ac}$

17.  $(b - dg)g^2$

18.  $ac^3 - b^2dg$

19.  $-b[a + (c - d)^2]$

20.  $\frac{ac^4}{d} - \frac{c}{g^2}$

21.  $9bc - \frac{1}{g}$

22.  $2ab^2 - (d^3 - c)$

**23. TEMPERATURE** The formula  $F = \frac{9}{5}C + 32$  gives the temperature in degrees Fahrenheit for a given temperature in degrees Celsius. What is the temperature in degrees Fahrenheit when the temperature is  $-40$  degrees Celsius?

**24. PHYSICS** The formula  $h = 120t - 16t^2$  gives the height  $h$  in feet of an object  $t$  seconds after it is shot upward from Earth's surface with an initial velocity of 120 feet per second. What will the height of the object be after 6 seconds?

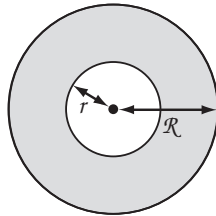
**25. AGRICULTURE** Faith owns an organic apple orchard. From her experience the last few seasons, she has developed the formula  $P = 20x - 0.01x^2 - 240$  to predict her profit  $P$  in dollars this season if her trees produce  $x$  bushels of apples. What is Faith's predicted profit this season if her orchard produces 300 bushels of apples?

# 1-1 Word Problem Practice

## Expressions and Formulas

**1. ARRANGEMENTS** The chairs in an auditorium are arranged into two rectangles. Both rectangles are 10 rows deep. One rectangle has 6 chairs per row and the other has 12 chairs per row. Write an expression for the total number of chairs in the auditorium.

**2. GEOMETRY** The formula for the area of a ring-shaped object is given by  $A = \pi(R^2 - r^2)$ , where  $R$  is the radius of the outer circle and  $r$  is the radius of the inner circle. If  $R = 10$  inches and  $r = 5$  inches, what is the area rounded to the nearest square inch?



**3. GUESS AND CHECK** Amanda received a worksheet from her teacher. Unfortunately, one of the operations in an equation was covered by a blot. What operation is hidden by the blot?

$$10 + 3(4 \blacksquare 6) = 4$$

**4. GAS MILEAGE** Rick has  $d$  dollars. The formula for the number of gallons of gasoline that Rick can buy with  $d$  dollars is given by  $g = \frac{d}{3}$ . The formula for the number of miles that Rick can drive on  $g$  gallons of gasoline is given by  $m = 21g$ . How many miles can Rick drive on \$8 worth of gasoline?

**5. COOKING** A steak has thickness  $w$  inches. Let  $T$  be the time it takes to broil the steak. It takes 12 minutes to broil a one-inch-thick steak. For every additional inch of thickness, the steak should be broiled for 5 more minutes.

a. Write a formula for  $T$  in terms of  $w$ .

b. Use your formula to compute the number of minutes it would take to broil a 2-inch-thick steak.

# 1-1 Enrichment

## Traveling on a Budget

You are traveling to your aunt’s house 200 miles away for a surprise birthday party. The party starts at 3 P.M. but you cannot leave from your house before 11 A.M. You must fill your gas tank before the trip. Gasoline is \$3.50 per gallon and you have \$18. Will you make it to the party?

1. First determine at which speed you must travel to arrive by 3:00.
  - a. A simple formula relates the travel time, depending on your average speed in miles per hour (mph),  $T = \frac{D}{S}$ , where  $T$  is time in hours,  $D$  is the distance (200 miles), and  $S$  is the speed. Determine travel time to your aunt’s house at various speeds.

Speed (mph)	Time (hours)
35	
40	
45	
50	
55	
60	
65	
70	
75	

- b. For which speed(s), will you miss the surprise birthday party?
  
2. Now determine if you can afford enough gasoline to make the trip.
  - a. How many gallons of gas can you buy?
  
  - b. Cost depends on the cost of gasoline, the number of total miles of the trip, and your car’s fuel efficiency (mi/gal). The miles per gallon can be found using the formula  $M = -\frac{1}{30}S^2 + \frac{5}{2}S$ , where  $S$  is your speed. Determine your fuel rate for the speeds needed to get to your aunt’s. Will you make it?

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