

COMPASS  
Pre-Algebra Review & Sample Tests

PROPERTIES OF REAL NUMBERS

Closure

$a + b$  is a real number; when you add two real numbers, the result is also a real number

*Example:* 3 and 7 are both real numbers,  $3+7=10$  and the sum, 10, is also a real number.

$a - b$  is a real number; when you subtract two real numbers the result is also a real number.

*Example:* 2 and 5 are both real numbers,  $2 - 5 = -3$ , and the difference, -3, is also a real number.

$(a)(b)$  is a real number; when you multiply two real numbers, the result is also a real number.

*Example:* 9 and -2 are both real numbers;  $(9)(-2) = -18$ , and the product, -18 is also a real number.

$a / b$  is a real number when  $b \neq 0$ ; when you divide two real numbers, the result is also a real number unless the denominator (divisor) is zero.

*Example:* -10 and 5 are both real numbers,  $-10 / 5 = -2$ , and the quotient, -2, is also a real number.

Commutative

$a + b = b + a$ ; you can add numbers in either order and get the same answer.

*Example:*  $2 + 6 = 8$  and  $6 + 2 = 8$  so  $2 + 6 = 6 + 2$

$(a)(b) = (b)(a)$ ; you can multiply numbers in either order and get the same answer.

*Example:*  $(7)(10) = 70$  and  $(10)(7) = 70$  so  $(7)(10) = (10)(7)$

$a - b \neq b - a$ ; you cannot subtract in any order and get the same answer.

*Example:*  $4 - 6 = -2$ , but  $6 - 4 = 2$ . There is no commutative property for subtraction.

$a / b \neq b/a$ ; you cannot divide in any order and get the same answer.

*Example :*  $4/2 = 2$ , but  $2/4 = .5$  so there is no commutative property for division.

Associative

$(a + b) + c = a + (b + c)$ ; you can group any numbers in any arrangement when adding and get the same answer.

*Example:*  $(1 + 2) + 3 = 3 + 3 = 6$  and  $1 + (2 + 3) = 1 + 5 = 6$  so  $(1 + 2) + 3 = 1 + (2 + 3)$ .

$(ab)c = a(bc)$ ; you can group any numbers in any arrangement when multiplying and get the same answer.

*Example:*  $(2 \times 6)3 = (12)3 = 36$  and  $2(6 \times 3) = 2(18) = 36$  so  $(2 \times 6)3 = 2(6 \times 3)$

The associative property does not work for subtraction or division.

## Identities

$a + 0 = a$ ; zero is the identity for addition because adding zero does not change the original number.

*Example:*  $7 + 0 = 7$  and  $0 + 7 = 7$ .

$a(1) = a$ ; one is the identity for multiplication because multiplying by one does not change the original number.

*Example:*  $21(1) = 21$  and  $(1)21 = 21$ .

Identities for subtraction and division become a problem. It is true that  $29 - 0 = 29$ , but  $0 - 29 = -29$ , not 29. This is also the case for division because  $4/1 = 4$ , but  $1/4 = .25$ , so the identities do not hold when the numbers are reversed.

## Inverses

$a + (-a) = 0$ ; a number plus its additive inverse (the numbers with the opposite sign) will always equal zero.

*Example:*  $6 + (-6) = 0$  and  $(-6) + 6 = 0$ . The exception is zero because  $0 + 0 = 0$  already.

$a(1/a) = 1$ ; a number time its multiplicative inverse or reciprocal ( the number written as a fraction and flipped) will always equal one.

*Example:*  $5(1 / 5) = 1$ . The exception is zero because zero cannot be multiplied by any number and result in a product of one/

## Distributive Property

- $a(b + c) = ab + ac$  or  $a(b - c) = ab - ac$ ; each term in the parentheses must be multiplied by the term in front of the parentheses

*Example:*  $4(5 + 7) = 4(5) + 4(7) = 20 + 28 = 48$ . This is a simple *Example* and the distributive property is not required to find the answer. When the problem involves a variable however, the distributive property is a necessity.

*Example:*  $4(5a + 7) = 4(5a) + 4(7) = 20a + 28$ .

## Properties of Equality

*Reflexive* :  $a = a$ ; both sides of the equation are identical

*Example:*  $6+k = 6+k$

*Symmetric:* If  $a = b$  then  $b = a$ . This property allows you to exchange the two sides of an equation.

*Example:*  $4a - 7 = 9 - 7a + 15$  becomes  $9 - 7a + 15 = 4a - 7$ .

*Transitive:* If  $a = b$  and  $b = c$  then  $a = c$ . This property allows you to connect statements which are each equal to the same common statement.

*Example:*  $5a - 6 = 9k$  and  $9k = a + 2$ ; you can eliminate the common term  $9k$  and connect the following into one equation:  $5a - 6 = a + 2$ .

*Addition Property of Equality:* If  $a = b$  then  $a + c = b + c$ . This property allows you to add any number or algebraic term to any equation as long as you add it to both sides to keep the equation true.

*Example:*  $5 = 5$ ; if you add 3 to one side and not the other the equation becomes  $8 = 5$  which is false, but if you add 3 to both sides you get a true equation  $8 = 8$ . Also,  $6a + 2 = 14$  becomes  $6a + 2 + (-2) = 14 + (-2)$  if you add -2 to both sides. The result is the equation  $6a = 12$

**Multiplication Property of Equality:** If  $a = b$  then  $ac = bc$  when  $c \neq 0$ . This property allows you to multiply both sides of an equation by any nonzero value.

**Example:** If  $4a = -24$ , then  $(4a)(0.25) = (-24)(0.25)$  and  $a = -6$ . Notice that both sides of the  $=$  were multiplied by 0.25.

### **DEFINITIONS**

**Natural or Counting numbers:**  $\{1, 2, 3, 4, 5, \dots\}$

**Whole numbers:**  $\{0, 1, 2, 3, \dots\}$

**Integers:**  $\{\dots -4, -3, -2, -1, 0, 1, 2, 3, 4, \dots\}$

**Rational numbers:**  $\{p/q \mid p \text{ and } q \text{ are integers, } q \neq 0\}$ ; the sets of *Natural* numbers, *Whole* numbers, and *Integers*, as well as numbers which can be written as proper or improper fractions, are all subsets of the set of *Rational* numbers.

**Examples:**

**Irrational numbers:**  $\{x \mid x \text{ is a real number but is not a } Rational \text{ number}\}$ ; the sets of *Rational* numbers and *Irrational* numbers have no elements in common and are therefore disjoint sets.

**Real numbers:**  $\{r \mid r \text{ is the coordinate of a point on a number line}\}$ ; the union of the set of *Rational* numbers with the set of *Irrational* numbers equals the set of *Real* numbers.

**Imaginary numbers:**  $\{ai \mid a \text{ is a real number and } i \text{ is the number whose square is } -1\}$ ;  $i^2 = -1$ ; the sets of *Real* numbers and *Imaginary* numbers have no elements in common and are therefore disjoint sets.

**Complex numbers:**  $\{a + bi \mid a \text{ and } b \text{ are real numbers and } i \text{ is the number whose square is } -1\}$ ; the set of *Real* numbers and the set of *Imaginary* numbers are both subsets of the set of *Complex* numbers.

**Examples:**  $4 + 7i$  and  $3 - 2i$  are complex numbers.

### **OPERATIONS OF REAL NUMBERS**

#### **Vocabulary**

**Total or Sum** is the answer to an addition problem. The numbers added are called addends

**Example:** In  $5 + 9 = 14$ , 5 and 9 are addenda and 14 is the total or sum.

**Difference** is the answer to a subtraction problem. The number subtracted is called the *subtrahend*. The number from which the *subtrahend* is subtracted is called the *minuend*.

**Example:** In  $25 - 8 = 17$ , 25 is the *minuend*, 8 is the *subtrahend*, and 17 is the difference.

**Product** is the answer to a multiplication problem. The numbers multiplied are each called a *factor*.

**Example:** In  $15 \times 6 = 90$ , 15 and 6 are factors and 90 is the *product*.

**Quotient** is the answer to a division problem. The number being divided is called the *dividend*. The number that you are dividing by is called the *divisor*. If there is a number remaining after the division process has been completed, that number is called the *remainder*.

**Example:** In  $45 \div 5 = 9$ , which may also be written as  $45/5$ , 45 is the dividend, 5 is the divisor and 9 is the quotient.

An **Exponent** indicates the number of times the *base* is multiplied by itself; that is, used as a factor.

**Example:** In  $5^2$ , 5 is the *base* and 2 is the *exponent*, or power, and  $5^2 = (5)(5) = 25$ , notice that the base, 5, was multiplied by itself 2 times.

A **Prime** number is a natural numbers greater than 1 having exactly two factors, itself and one.

**Examples:** 7 is *prime* because the only two natural numbers that multiply to equal 7 are 7 and 1; 13 is *prime* because the only two natural numbers that multiply to equal 13 are 13 and 1.

**Composite** numbers are natural numbers that have more than two factors.

**Examples:** 15 is a *composite* number because 1, 3, 5, and 15 all multiply in some combination to equal 15; 9 is *composite* because 1, 3, and 9 all multiply in some combination to equal 9.

The **Greatest Common Factor (GCF)** or **Greatest Common Divisor (GCD)** of a set of numbers is the largest natural number that is a factor of each of the numbers in the set; that is, the largest natural number that will divide into all of the numbers in the set without leaving a remainder.

**Example:** The greatest common factor (GCF) of 12, 30 and 42 is 6 because 6 divides evenly into 12, 30, and 42 without leaving remainders.

The **Least Common Multiple (LCM)** of a set of numbers is the smallest natural number that can be divided (without remainders) by each of the numbers in the set.

**Example:** The least common multiple of 2, 3, and 4 is 12 because although 2, 3, and 4 divide evenly into many numbers including 48, 36, 24, and 12, the smallest is 12.

The **Denominator** of a fraction is the number in the bottom; that is, the divisor of the indicated division of the fraction.

**Example:** In  $5/8$ , 8 is the *denominator* and also the divisor in the indicated division.

The **Numerator** of a fraction is the number in the top; that is, the dividend of indicated division of the fraction.

**Example:** In  $3/4$ , 3 is the *numerator* and also the dividend in the indicated division.

## **Order of Operations**

**Definition:** The order in which the operations of a calculation must be completed.

*Perform operations in the following order:*

**Parentheses:** Any operations contained in parentheses ( ), brackets [ ], and braces { } are done first, if there are any.

**Exponents:** Exponents and roots are simplified second, if there are any.

**Multiplication and Division:** These operations are done next in the order in which they are found, going *left to right*; that is, if division comes first going left to right, then it is done first.

**Addition and Subtraction:** These operations are done next in the order in which they are found going *left to right*; that is, if subtraction comes first, going left to right, then it is done first.

**Example: Simplify:**  $3(12 - 9) + 5^2 - (18 + 2) \div \sqrt{25}$   
 $= 3 \times 3 + 5^2 - 20 \div \sqrt{25}$   
 $= 3 \times 3 + 25 - 20 \div 5$   
 $= 9 + 25 - 4$   
 $= 30$

Complete operations in parentheses first  
 Next, complete exponents & roots  
 Next, complete multiplications & divisions as they occur from left to right  
 Finally, complete **additions** & subtractions as they occur from left to right

### DECIMAL NUMBERS

The *place value* of each digit in a base ten number is determined by its position with respect to the decimal point. Each position represents multiplication by a power of ten.

**Example:**  $324 = 300 + 20 + 4 = (3 \times 100) + (2 \times 10) + (4 \times 1) = (3 \times 10^2) + (2 \times 10^1) + (4 \times 10^0)$

**Example:**  $5.82 = 5 + 0.8 + 0.02 = (5 \times 1) + (8 \times 0.1) + (2 \times 0.01) = (5 \times 10^0) + (8 \times 10^{-1}) + (4 \times 10^{-2})$

**Example:** Identify the place value of each digit in 123.456. 1 is the *hundreds* place, 2 is the *tens* place, 3 is the *ones* or *units* place, 4 is the *tenths* place, 5 is in the *hundredths* place, 6 is in the *thousandths* place.

#### Writing Decimal Numbers as Fractions

Write the digits that are to the right of the decimal point as the *numerator* (top) of the fraction

Write the *place value* of the last digit as the *denominator* (bottom) of the fraction.

Any digits to the left of the decimal point are whole numbers

**Example:** In 4.67, the last digit to the right of the decimal point is 7 and it is in the *hundredths* (100ths) place; therefore,  $4.67 = 4 \frac{67}{100}$

Notice the number of zeros in the denominator is equal to the number of digits to the right of the decimal point in the original number.

#### Addition of Decimal Numbers

Write the decimal numbers in a vertical form with the decimal points lined up one under the other, so digits of equal place value are under each other.

**Example:** Add:  $234.67 + 45.458$

$$\begin{array}{r} 234.67 \quad \text{Addend} \\ + 45.458 \quad \text{Addend} \\ \hline 280.128 \quad \text{Sum} \end{array}$$

#### Subtraction of Decimal Numbers

Write the decimal numbers in a vertical form with the decimal points lined up one under the other.

Write additional zeros to the right of the last digit in the *minuend* (number on top) if needed, both the *minuend* and the *subtrahend* should have an equal number of digits to the right of the decimal point.

**Example:** Subtract:  $346.34 - 97.452$

$$\begin{array}{r} 346.340 \quad \text{Minuend} \\ - 97.452 \quad \text{Subtrahend} \\ \hline 248.888 \quad \text{Difference} \end{array}$$

## Multiplication of Decimal Numbers

Multiply the factors as if they were whole numbers.

Find the total number of digits to the right of the decimal point in all factors.

Count that many places from the right end of the product, then insert a decimal point. It is not necessary to line the decimal points up in multiplication.

**Example:** Multiply:  $12.89 \times 3.2$

$$\begin{array}{r} 12.89 \quad (2 \text{ digits to the right of decimal point}) \\ \times \quad 3.2 \quad (1 \text{ digit to the right of decimal point}) \\ \hline 2578 \\ 38670 \\ \hline 41.248 \quad (\text{Count 3 places from the right end, insert decimal point}) \end{array}$$

## **RATIO, PROPORTION, & PERCENT**

### Ratio

*Definition:* Comparison between two quantities written as a *quotient*.

**Examples:** 3 to 5, 3:5,  $\frac{3}{5}$

### Proportion

*Definition:* Statement of equality between two ratios.

**Examples:**  $3/6 = 6/12$ ,  $3 : 6 :: 6 : 12$ , 3 is to 6 as 6 is to 12

### Percents

*Definition:* Percent means *out of 100* or *per 100*

*Changing Percents into Fractions:* Percents can be written as fractions by placing the number over 100 and simplifying or reducing.

**Example:**  $20\% = 20/100 = 2/10$  ;  $4.5\% = 4.5/100 = 45/1000 = 9/200$

*Changing Fractions into Percents:* Write the fractions with a denominators of 100. The numerator is then the percent number.

**Example:**  $3/5 = 3/5 \times 20/20 = 60/100 = 60\%$

*Changing Percents into Decimal:* Move the decimal point two places to the left, remove % sign

**Example:**  $25\% = 0.25$

Changing a Decimal into a Percent: Move the decimal point two places to the right, add % sign

**Example:**  $4.89 = 489\%$

## **FRACTIONS**

### Reducing

Divide the *numerator* (top) and the *denominator* (bottom) by the same number, thereby making an equivalent fraction in lower terms.

**Example:**  $\frac{18}{24} = \frac{18 \div 6}{24 \div 6} = \frac{3}{4}$

## Addition & Subtraction

Same denominators:  $\frac{a}{d} + \frac{b}{d} = \frac{a+b}{d}$ ,  $\frac{a}{d} - \frac{b}{d} = \frac{a-b}{d}$  where  $d \neq 0$

**Example:**  $\frac{2}{5} + \frac{1}{5} = \frac{3}{5}$

**Example:**  $\frac{4}{7} - \frac{1}{7} = \frac{3}{7}$

Different denominators:

- 1) Find the *least common denominator* by determining the smallest number which can be divided evenly (no remainders) by all of the denominators .
- 2) Multiply the numerator and denominator of each fraction to make equivalent fractions with the common denominator.
- 3) Add the numerators and over the common denominator.

**Example:**  $\frac{1}{4} + \frac{1}{6} = \frac{1 \cdot 3}{4 \cdot 3} + \frac{1 \cdot 2}{6 \cdot 2} = \frac{3}{12} + \frac{2}{12} = \frac{3+2}{12} = \frac{5}{12}$

**Example:**  $\frac{2}{3} - \frac{1}{2} = \frac{2 \cdot 2}{3 \cdot 2} - \frac{1 \cdot 3}{2 \cdot 3} = \frac{4}{6} - \frac{3}{6} = \frac{4-3}{6} = \frac{1}{6}$

## Multiplication

Multiply the numerators then multiply the denominators. To finish, reduce the fraction to lowest terms, if necessary. Common denominators are not needed.

$$\frac{a}{b} \times \frac{c}{d} = \frac{ac}{bd}$$

**Example:**  $\frac{3}{5} \cdot \frac{5}{6} = \frac{3 \cdot 5}{5 \cdot 6} = \frac{15}{30} = \frac{15 \div 15}{30 \div 15} = \frac{1}{2}$

## Division

Flip the fraction to the right of the division sign and change the division sign to a multiplication sign.

Multiply the numerators then multiply the denominators. To finish, reduce the fraction to lowest terms, if necessary. Common denominators are not needed.

$$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c} = \frac{ad}{bc}$$

**Example:**  $\frac{4}{7} \div \frac{6}{14} = \frac{4}{7} \times \frac{14}{6} = \frac{4 \cdot 14}{7 \cdot 6} = \frac{56}{42} = \frac{56 \div 14}{42 \div 14} = \frac{4}{3}$

## ALGEBRA

### *Vocabulary*

Variables are letters used to represent numbers.

Constants are specific numbers that are not multiplied by any variables.

Coefficients are numbers that are multiplied by one or more variables.

Terms are constants or variable expressions.

Like or similar terms are terms that have the same variables to the same degree or exponent value. Coefficients do not matter, they may be equal or not.

Polynomials are terms that are connected by either addition or subtraction.

Equations are statements of equality between at least two terms.

## **Sample Test 1**

Select the best answer from the given choices.

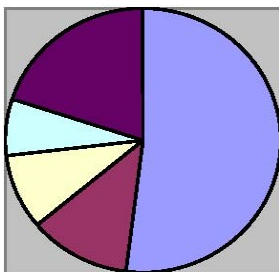
1.  $\frac{9}{10} = ?$   
A. .09    B. 90    C. 0.9    D. 9.0
2.  $\frac{60}{100} = ?$   
A. 0.6    B. 0.06    C. 6.0    D. 0.006
3.  $48 \div 1.25 = ?$   
A. 3.84    B. 38.4    C. 28.4    D. 2.84
4.  $6.7 \times 2.69 = ?$   
A. 180.23    B. 1.802    C. 18.023    D. 18.23
5.  $96,000,000 = ?$   
A.  $96.0 \times 10^9$     B.  $0.96 \times 10^9$     C.  $960 \times 10^7$     D.  $9.6 \times 10^7$
6.  $0.000045 = ?$   
A.  $4.5 \times 10^{-4}$     B.  $4.5 \times 10^{-5}$     C.  $4.5 \times 10^{-6}$     D.  $4.5 \times 10^5$
7.  $\frac{2}{12} = ?$   
A.  $\frac{2}{6}$     B.  $\frac{1}{6}$     C.  $\frac{3}{4}$     D.  $\frac{1}{12}$
8.  $\frac{15}{2} = ?$   
A.  $6\frac{1}{2}$     B.  $7\frac{1}{4}$     C.  $7\frac{1}{2}$     D.  $6\frac{1}{4}$
9.  $\frac{4}{7} + \frac{2}{7} = ?$   
A.  $\frac{6}{7}$     B.  $\frac{2}{7}$     C.  $\frac{1}{2}$     D.  $\frac{5}{7}$
10.  $\frac{3}{14} + \frac{1}{7} = ?$   
A.  $\frac{4}{14}$     B.  $\frac{2}{7}$     C.  $\frac{6}{14}$     D.  $\frac{5}{14}$
11.  $4\frac{3}{4} \times 6 = ?$   
A.  $28\frac{5}{8}$     B.  $28\frac{1}{2}$     C.  $28\frac{3}{4}$     D.  $29\frac{1}{2}$

12.  $\frac{1}{5} \div \frac{3}{4} = ?$   
 A.  $\frac{2}{7}$  B.  $\frac{4}{20}$  C.  $\frac{4}{9}$  D.  $\frac{4}{15}$
13.  $\frac{3}{7} \times \frac{6}{7} = ?$   
 A.  $\frac{18}{49}$  B.  $\frac{21}{42}$  C.  $\frac{9}{7}$  D.  $\frac{9}{49}$
14. What is 28% of 58?  
 A. 16.24 B. 162.3 C. 15.23 D. 16.14
15. 54 is what % of 108?  
 A. 0.20% B. 50% C. 0.5% D. 200%
16. 74 is 18.5% of what number?  
 A. 0.0025 B. 400 C. 40 D. 0.25
17.  $59\% = ?$   
 A. 5.9 B. 59.0 C. 0.59 D. 0.059
18.  $188\% = ?$   
 A. 0.188 B. 1.88 C. 18.80 D. 0.0188
19. Which of the following have the same value?  
 $3\frac{3}{8}$  33% 37.5% 3.33  $\frac{3}{8}$   
 A.  $3\frac{3}{8}$  and 3.33 B. 33% and 3.33 C. 37.5% and  $3\frac{3}{8}$  D. 37.5% and  $\frac{3}{8}$
20.  $18 + (-5) = ?$   
 A. 13 B. 23 C. -13 D. -23
21.  $-22 + (-10) = ?$   
 A. 32 B. -32 C. 12 D. -12
22.  $-6(4) = ?$   
 A. 24 B. 10 C. 18 D. -24
23.  $9(3x)$   
 A.  $12x$  B.  $27x$  C. 27 D.  $3x$
24.  $\frac{12x}{6} = ?$

- A.  $72x$    B.  $4x$    C.  $2x$    D.  $18x$
25. Solve:  $x + 9 = 30$ .  
A. 18   B. 21   C. 25   D. 3
26. Solve:  $\frac{1}{8}m - 27 = 16$ .  
A. 344   B. 300   C. 188   D. 6
27. Sergeant Jones bought 140 off-duty badges for his squad, but 35% of the badges were defective and had to be returned. How many badges did the sergeant return?  
A. 49   B. 105   C. 27   D. 100
28. Frank invested \$43,608 in a mutual fund that paid \$432.96 in dividends at the end of the year.  
What was the rate of return on the investment, rounded to the nearest percent?  
A. 10%   B. 3%   C. 6%   D. 1%
29. Officer Jacobi drove 180 miles during 40% of the month of May. How many miles did he drive during the entire month of May?  
A. 710 miles   B. 420 miles   C. 720 miles   D. 450 miles

For problems 30-2, use the chart presented below.

**Annual Expenses for the North Hill Police Department**

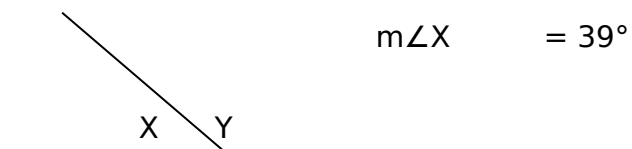


<p><b>Salaries</b> <b>52%</b></p> <p><b>Training</b> <b>12%</b></p>
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30. What part of the North Hill Police Department's annual expenses does equipment and training represent?  
A. about  $\frac{1}{2}$    B. about 20%   C. about  $\frac{1}{3}$    D. 40%
31. Which section of the chart accounts for vehicle repair?  
A. Uniforms   B. Training   C. Salaries   D. Miscellaneous

32. Which two sections equal 16% of expenses?
- |                             |                             |
|-----------------------------|-----------------------------|
| A. Miscellaneous & Uniforms | B. Training & Equipment     |
| C. Training & Uniforms      | D. Miscellaneous & Training |

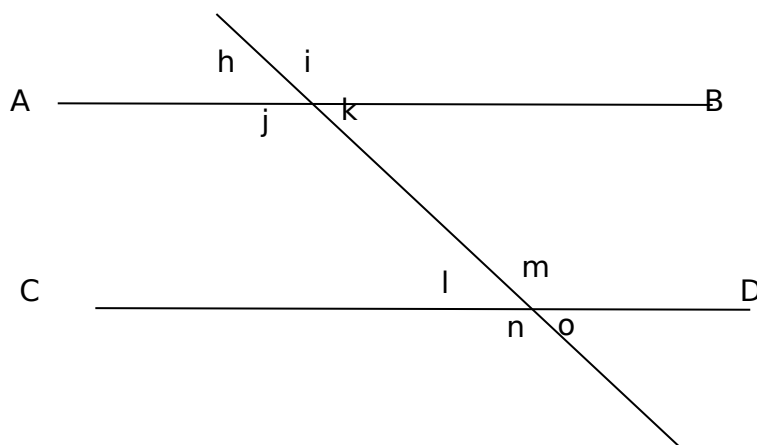
For problems 33-4, use the diagram presented below.



33. What is the  $m\angle Y$  ?  
 A.  $141^\circ$    B.  $51^\circ$    C.  $321^\circ$    D.  $219^\circ$
34.  $m\angle X + m\angle Y = ?$   
 A.  $360^\circ$    B.  $90^\circ$    C.  $180^\circ$    D.  $75^\circ$

Use the diagram presented below to complete all parts of problem 35.

35. Assume  $\overline{AB}$  is parallel to  $\overline{CD}$ .



- a) Name all other angles equal to  $\angle h$   
 A.  $k, l, o$    B.  $k, o, n$    C.  $i, l, o$    D. None
- b) Name all the angles equal to  $\angle n$   
 A.  $k, o, m$    B.  $m, j, k$    C.  $m, i, j$    D. None
- c) If  $\angle n = 117^\circ$ , what is  $m\angle h$  ?  
 A.  $63^\circ$    B.  $180^\circ$    C.  $90^\circ$    D.  $117^\circ$
36.  $5x + 12x = ?$   
 A.  $7x$    B.  $17x$    C.  $-17x$    D.  $-7$

37.  $-14a - (-3a) = ?$   
 A.  $11a$  B.  $17a$  C.  $-11a$  D.  $-17a$
38.  $9bc + (-3bc) = ?$   
 A.  $6bc$  B.  $12bc$  C.  $-12bc$  D.  $-6bc$
39.  $6(6x) = ?$   
 A.  $36x$  B.  $12x$  C.  $x$  D.  $42x$
40.  $\frac{12x}{4} = ?$   
 A.  $28x$  B.  $4x$  C.  $3x$  D.  $3$
41.  $15x(6y) = ?$   
 A.  $90xy$  B.  $21xy$  C.  $90$  D.  $21$
42.  $\frac{24x}{8x} = ?$   
 A.  $192x$  B.  $3x$  C.  $3$  D.  $4x$
43.  $4(3a - 9) = ?$   
 A.  $12 - 9a$  B.  $12a - 36$  C.  $-24a$  D.  $52a$
44.  $2(4x + 7y - p) = ?$   
 A.  $8x + 14y - 2p$  B.  $22xy - 2p$  C.  $8x + 14yp$  D.  $4x + 7y - 2p$
45.  $x(x^3) = ?$   
 A.  $2x^3$  B.  $x^2$  C.  $x^4$  D.  $x^3$
46.  $3x(3x) = ?$   
 A.  $6x^2$  B.  $9x^2$  C.  $9x$  D.  $6x$
47.  $\frac{14x^4}{7x} = ?$   
 A.  $2x^3$  B.  $21x^4$  C.  $21x^3$  D.  $2x^2$
48.  $\frac{49s^5}{s} = ?$   
 A.  $49s^4$  B.  $49s$  C.  $49s^2$  D.  $7s^2$

**Answers to Sample Test 1**

1C  
 2A

3B  
4C  
5D  
6B  
7B  
8C  
9A  
10D  
11B  
12D  
13A  
14A  
15B  
16B  
17C  
18B  
19D  
20A  
21B  
22D  
23B  
24C  
25B  
26A  
27A  
28D  
29D  
30C  
31D  
32A  
33A  
34C  
35a) A b) C c) A  
36B  
37C  
38A  
39A  
40C  
41A  
42C  
43B  
44A  
45C  
46B  
47A  
48C

**Sample Test 2**

1. 15% of 300 = ?

2. 60% of \$760 = ?

A. 45 B. 75 C. 50 D. 900  
D. 233

A. 400 B. 356 C. 456

3. Which of these numbers is a factor of 36?

A. 5 B. 7 C. 8 D. 6  
400

4.  $(6 \div 2) \times (10 \div 5) = ?$

A. 6 B. 2 C. 54 D.

5. 1 yard equals 3 feet, How many feet is 29 yards?  
reciprocal of 3?

A. 78 feet B. 56 feet C. 87 feet D. 100 feet  
C. 1/7 D. 3/33

6. What is the

A. 1/9 B. 1/3

7. A office measures 22 ft by 10 ft by 14 ft. What is the office's volume?

A. 3000 ft<sup>3</sup> B. 4567 ft<sup>3</sup> C. 2080 ft<sup>3</sup> D. 3080 ft<sup>3</sup>

8. A turkey was cooked at 350 °F in the oven for 5 hours. The internal temperature rose from 25 °F

to 150 °F. What was the average rise in temperature per hour?

A. 21.9 °F/hr B. 25°F/hr C. 55.05°F/hr D. 19°F/hr

9. You buy radio for \$120.00, and the sales tax where you are purchasing the book is 7.5 %. You have \$200. How much change will you receive back?

A. \$71.00 B. \$87.50 C. \$10.23 D. \$67.00

10. You buy a boat making a down payment of \$10,000 and 9 monthly payments of \$450. How

much have you paid so far for the car?

A. \$1405 B. \$14000 C. \$14050 D. \$13050

11. A teacher buys 575 pencils and 60 folders for her students. Pencils are purchased in sets of 5 for

\$3.55 per pack. Folders are sold in sets of 3 for 7.99. How much will the teacher spend buying

these products cost?

A. \$586.50 B. \$600.09 C. \$568.05 D. \$334.88

12. Which of the following percentages is equal to 0.78?

A. 78% B. 0.87% C. 7.95% D. .78%

13. A banker lost Saturday's deposit. He was supposed to deposit \$1200, but only made a deposit of

\$1024. How much money did the banker lose?

A. \$167.00 B. \$176.00 C. \$129.00 D. \$24.00

14. A Doctor prescribes a patient 30 mg of a certain medication. The medication is stored 6 mg per 8-mL dose. How many milliliters will need to be given?  
A. 50 mL    B. 11 mL    C. 25 mL    D. 40 mL
15. In the number 678.32 which digit represents the *hundredths* place?  
A. 6    B. 7    C. 3    D. 2
16. Which of these percentages equals 6.67?  
A. 667%    B. 66.7%    C. 6670%    D. 0.667%
17. If Paul drinks 8, (8oz) bottles of Powerade per day. If John drinks 12.8 oz of Powerade after a hard workout he has consumed what fraction of his average?  
A.  $\frac{1}{2}$     B.  $\frac{1}{6}$     C.  $\frac{1}{5}$     D.  $\frac{1}{3}$
18. If  $x = 2$ , then  $x^3(x^3 - x) = ?$   
A. 20    B. 45    C. 48    D. 480
19. 15% of 280 = ?  
A. 42    B. 24    C. 40    D. 245
20. You need  $\frac{3}{4}$  cups of milk for a cake. You accidentally put  $\frac{1}{4}$  cup into the mixing bowl with the dry ingredients. How much more milk in cups do you need to add?  
A.  $\frac{1}{4}$  cups    B.  $\frac{1}{2}$  cups    C.  $\frac{1}{3}$  cups    D.  $\frac{2}{3}$  cups
21.  $\frac{2}{3} - \frac{2}{6} = ?$   
A.  $\frac{3}{5}$     B.  $\frac{1}{3}$     C.  $\frac{5}{6}$     D.  $\frac{1}{2}$
22.  $\frac{1}{8} + \frac{1}{4} = ?$   
A.  $\frac{1}{8}$     B.  $\frac{1}{16}$     C.  $\frac{3}{8}$
- D.  $\frac{1}{4}$
23. You are buying a car for \$10,000. You are required to pay a 20% down payment. How much do you need for the down payment?  
A. \$500    B. \$5000    C. \$200    D. \$2000
24. You are traveling in Italy, and you see a sign stating that Rome is 6 kilometers away. If 1 kilometer is equal to 0.625 miles, how many miles away is London from where you are?  
A. .375miles    B. 3 miles    C. 1.75 miles    D. 3.75 miles
25. You need an 880 ft<sup>3</sup> box for your fine china. At the shipping store you see four choices of boxes, but the volume is not listed. The length, width, and height are listed on the box. Which of

the following boxes would fit your needs?

A. 11 ft x 10 ft x 8 ft    B. 12 ft x 14 ft x 12 ft    C. 10 ft x 20 ft x 7 ft    D. 13 ft x 12 ft x 11 ft

26. You invested \$6,000 and received a yearly interest payment of \$600. What is the interest rate on your investment?

A. 20%    B. 10%    C. 5%    D. 15%

27. At the car dealership there are 58 cars, 28 cars are white and the rest are blue. Approximately, what percentage of the cars are blue?

A. 34%    B. 25%    C. 51%    D. 77%

28. If  $x = (84 \div 2)$ , and  $y = 35 \cdot 2$ , then ?

A.  $x < y$     B.  $x = y$     C.  $x > y$     D. Not enough information

29. Suppose  $8x = (4a + 4a)$ . If  $a = 3$ , then  $x = ?$

A. 3    B. 5    C. 6    D. 2

30. In a bag there are 6 red marbles, 4 blue marbles, and 10 green marbles. What percentage of the marbles are blue?

A. 25%    B. 15%    C. 40%    D. 20%

31. A soda is 90 calories. How many calories are in 6 sodas?

A. 500 calories    B. 540 calories    C. 322 calories    D. 440 calories

32.  $10x = (6y + 4y)$ . If  $y = 5$ , then  $x = ?$

A. 2    B. 6    C. 5    D. 10

33.  $4x = (2y + 6y)$ . If  $y = 2$ , then  $x = ?$

A. 4    B. 5    C. 2    D. 7

34. What is the area of a triangle if the base is 8 cm and the height is 10 cm?

A. 28 cm<sup>2</sup>    B. 40 cm<sup>2</sup>    C. 32 cm<sup>2</sup>    D. 50 cm<sup>2</sup>

35.  $8\frac{1}{2} - 2\frac{3}{8} = ?$

A.  $\frac{23}{8}$     B.  $\frac{39}{8}$     C. 39    D. 8

36. The Miami Dolphins won 14 games, but lost 2. What was the ratio of wins to losses?  
A. 6:1 B. 2:1 C. 8:2 D. 7:1
37. 50 is 25% of what number?  
A. 250 B. 400 C. 200 D. 350
38.  $7 \times 1 \times 5 \times 2 \times 0 \times 10 = ?$   
A. 700 B. 350 C. 0 D. 1
39.  $8.5 \div 2.5 = ?$   
A. 3.4 B. 2.3 C. 4.3 D. 4.4
40. If  $x = 3$ , then  $3x + 5x = ?$   
A. 24 B. 14 C. 34 D. 135
41.  $\frac{1}{2} = ?$   
A. 0.005 B. 0.5 C. 0.05 D. 5.0
42.  $\frac{3}{4} = ?$   
A. 7.5 B. 0.05 C. 0.25 D. 0.75
43.  $\frac{2}{5} = ?$   
A. 0.004 B. 0.04 C. 0.4 D. 4.0
44.  $25,000 = ?$   
A.  $25.0 \times 10^5$  B.  $2.5 \times 10^4$  C.  $2.5 \times 10^{-4}$  D.  $25.0 \times 10^{-3}$
45.  $0.00567 = ?$   
A.  $5.67 \times 10^1$  B.  $5.67 \times 10^{-3}$  C.  $5.67 \times 10^3$  D.  $56.7 \times 10^4$
46.  $-25 + 6 = ?$   
A. 19 B. 31 C. -19 D. 30
47.  $-19 + (-10) = ?$   
A. 29 B. -9 C. 19 D. -29
48.  $39\% = ?$   
A. 0.39 B. 3.9 C. 0.039 D. 39
49.  $12(4x) = ?$   
A.  $4x$  B.  $480x$  C.  $8x$  D.  $48x$

**Answers to Sample Test 2**

1) A 2) C 3) D 4) A 5) C 6) B 7) D 8) B 9) A 10) C 11) C 12) A 13) B 14) D 15) D  
16) A 17) C. 18) C 19) A

20) B 21) B 22) C 23) D 24) D 25) A 26) B 27) C 28) C 29) A 30) D 31) B 32)  
C 33) A 34) B 35) B

36) D 37) C 38) C 39) A 40) A 41) B 42) D 43) C 44) B 45) B 46) C 47) D 48)  
A 49) D