

OBJECTIVES

When you have completed this section, you should be able to:

1. Combine sets through intersection and union.
2. Identify subsets.

I. SETS

Sets, a concept as old as man, has a definite place in the study of mathematics. From earliest times men have thought in terms of sets or collections of objects. We can think of such things as "sets of dishes," "members of a particular organization," or "the set of planets," as being natural in our environment. In mathematics, a set, symbolized { }, is a well-defined collection of objects. We need to define the properties of sets as they apply to mathematics so that we may use these properties to justify mathematical operations.

Natural numbers are counting numbers from +1 to infinity.

Whole numbers are all the natural numbers plus zero; whole numbers range from 0 to infinity.

Integers are all positive and negative numbers and zero; integers range from negative infinity to positive infinity.

REMEMBER?

PROPERTIES

In this section you will be concerned with the definitions, concepts, and operations of sets.

PROPERTIES OF SETS

- A. Sets are made up of *members* or *elements*. The symbol used is \in .
- B. A *finite* set is a set in which the number of elements is bounded by an interval. An *infinite* set is a set that is limitless.
- C. Sets may be designated in one of two ways: the *list* method or the *rule* method. In the *list* method elements of the set are *listed*.

A. Model: If A is the set of whole numbers, then $7 \in A$ and is read, "Seven is a member of Set A ."

B. Model 1: The set of states in the United States is finite and numbers 50.

Model 2: The set of whole numbers is infinite.

C. Model 1: If Set A is the set of even whole numbers less than 10, then the *list* method would be $A = \{0, 2, 4, 6, 8\}$.

Model 2: The *rule* method uses set-builder notation. $A = \{x \mid x \text{ is a whole number } < 10\}$. This notation is read, " A is the set of numbers such that x is a whole number less than 10." Note that 10 is *not* an element of the set.



Using the list method, write the following sets.

1.1 The odd integers between 2 and 15. _____

1.2 The even whole numbers less than 8. _____

1.3 The perfect square integers between 1 and 80 inclusive. _____

1.4 The last names of all your teachers. _____

1.5 Every two-digit number whose units' digit is three times its tens' digits. _____



Using the rule method, write the following sets.

1.6 $\{2, 4, 6, 8, 10, 12\}$ _____

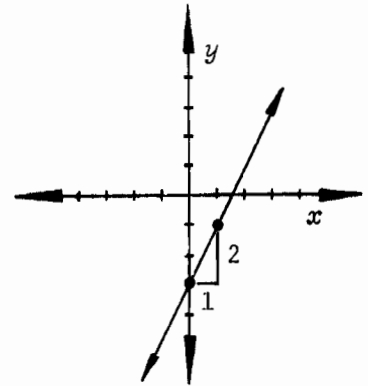
1.7 $\{1, 8, 27, 64\}$ _____

1.8 $\{a, l, g, e, b, r\}$ _____

1.9 $\{2, 4, 6\}$ _____

1.10 $\{0\}$ _____

Model 2: Locate the y -intercept, -3 . Since $m = \frac{\Delta y}{\Delta x} = \frac{2}{1}$, from -3 move up two units and right one unit to find the second point.

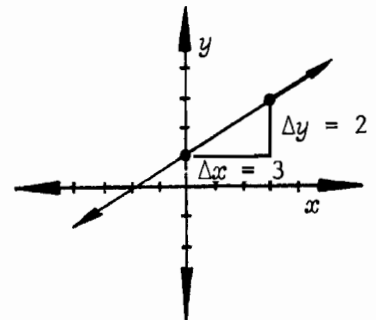


Remember, two points determine a line. We used the y -intercept as one point and found the second by using the slope, counting from the first point.

Model 3: Graph $y = \frac{2x}{3} + 1$

Solution: From the equation, $b = 1$ and $m = \frac{2}{3}$.

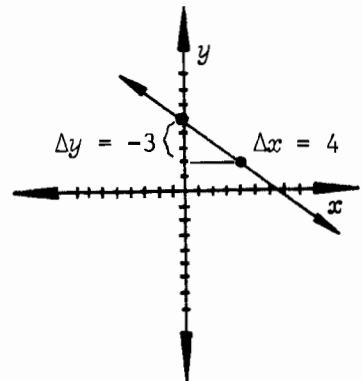
Locate the y -intercept, 1 ; then find the second point, using the slope, by counting up 2 and right 3 from the y -intercept, 1 .



Model 4: Graph $y = \frac{-3x}{4} + 5$.

Solution: From the equation, $b = 5$, $m = \frac{-3}{4}$.

Locate the y -intercept, 5 ; then find the second point, using slope. Count down 3 , right 4 .



Solve each equation for y and identify the slope and y -intercept.

1.140 $x + y = 6$

- a. $y =$ _____
- b. $m =$ _____
- c. $b =$ _____

1.142 $-x = y + 7$

- a. $y =$ _____
- b. $m =$ _____
- c. $b =$ _____

1.141 $x - y = 7$

- a. $y =$ _____
- b. $m =$ _____
- c. $b =$ _____

1.143 $2x + y = 4$

- a. $y =$ _____
- b. $m =$ _____
- c. $b =$ _____

SELF TEST 1

Graph and find the distance between the points with the given coordinates. Use the distance formula when helpful or necessary (each graph, 2 points; each distance, 2 points).

1.01 (2, 8) and (4, 7)

1.02 (5, 1) and (6, 3)

1.03 (8, 1) and (9, 1)

MATHEMATICS 1110: LIFE PAC TEST

Write the letter of the correct choice (each answer, 2 points).

1. Which one of the following equations illustrates the commutative property?

- a. $8 + 3 = 4 + 7$
 b. If $3 + 5 = a$, then $a = 3 + 5$.
 c. $2 + b = b + 2$
 d. $3(2 + 5) = 6 + 15$

2. Which one of the following numbers is a. a rational number?
 b. an irrational number? c. an imaginary number?

- a. $\sqrt[3]{11}$ b. $x + y = 8$ c. $\sqrt{-5}$ d. $\frac{1}{4}$

a. _____

b. _____

c. _____

3. The graph of the parabola $y = \frac{-x^2}{20}$ opens

- a. upward d. to the right
 b. downward e. none of these
 c. to the left

4. List all the subsets of the set $\{2, 7, 8, 12\}$.

Answer each item as directed (each answer, 4 points).

5. Evaluate $12x^2y^{-1}$ for $x = 3$ and $y = 4$. _____

6. Graph $3x - 4y = 7$ and find its slope. _____

