3-5 Working With Sets

Vocabulary

Review

1. Cross out the numbers below that are NOT *whole numbers.*

12 ~~2/3~~ 108 ~~0.3~~ 2

2. Describe the relationship between the set of *whole numbers* and the set of *real numbers.*

Whole #'s are positive with no decimal and real #'s are whole #'s, its opposites, decimals, etc.

Vocabulary Builder

The set {0, 1, 2} contains the elements 0, 1, and 2.

set (noun) **set**

Definition: A set is a collection of distinct objects or elements. The *complement* of a set is the set of all objects or elements *not* in the set.

Using Symbols: The set of the first three whole numbers can be written in roster form as $\{0, 1, 2\}$. It can be written in set-builder form as $H = \{x | \text{whole numbers}, x < 3\}$.

Examples: The universal set of all meals in a day is {breakfast, lunch, snack, dinner}. Let A be the set {breakfast, lunch}. The *complement* of set A, written A', is the set of all meals *not* in A. So, $A' = \{\text{snack, dinner}\}$.

Use Your Vocabulary

Complete each *set* with another element.

3. $A = \{\text{eyes, ears, nose, } \underline{?}\}$ mouth

4. $B = \{\text{mother, father, brother, } \underline{?}\}$ sister

5. $C = \{\text{A, E, } \underline{?}\text{, O, U}\}$ I

6. Suppose that the universal set of coins is {penny, nickel, dime, quarter}. Let D be the set {penny, quarter}. What is the *complement* of set D?

$D' = \{$ nickel, dime $\}$

Problem 1 Using Roster Form and Set-Builder Notation

Got It? N is the set of even natural numbers that are less than or equal to 12. How do you write N in roster form? In set-builder notation?

Roster

7. Circle the even natural numbers that are less than or equal to 12.

1 (2) 3 (4) 5 (6) 7 (8) 9 (10) 11 (12)

8. Write the numbers you circled in roster form below.

$N = \{2, 4, 6, 8, 10, 12\}$ Smallest → greatest

Set-builder

9. Complete the set-builder notation below. Use the description of the circled numbers from Exercise 7 to help you.

$N = \{x \mid$ even natural #'s, $x \leq 12\}$

possible solutions

Problem 2 Inequalities and Set-Builder Notation

Got It? In set-builder notation, how do you write the solutions of $9 - 4n > 21$?

10. Solve the inequality.

$9 - 4n > 21$

$9 - 9 - 4n > 21 - 9$

$-4n > 12$

$\frac{-4n}{-4} > \frac{12}{-4}$

$n < -3$

11. In set-builder notation, the solutions are

$N = \{n \mid$ all real #'s, $n < -3\}$.

The *empty set,* written $\{\ \}$, is the set that contains no elements. It is a *subset* of every set.

Problem 3 Finding Subsets

Got It? What are the subsets of the set $P = \{a, b\}$? Of the set $S = \{a, b, c\}$?

12. List all of the subsets of set P. The first one is done for you.

The empty set: $\{\}$

Two sets with one letter each: $\{\ \}, \{\ \}$

The original set: $\{\ ,\ \}$

13. List all of the subsets of set S.

The empty set:

Three sets with one letter each:

Three sets with two letters each:

The original set:

HW:
DO
2, 6, 10
together

14. How many subsets does P have?

15. How many subsets does S have?

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