

Set = a well-defined collection of objects

$$G = \{\Delta, \triangle, \square\}$$

$$\text{U.S. Military Services} = M = \{ \_, \_, \_, \_, \_ \}$$

States whose name begins with the letter L

3 ways to describe a set:

(1) complete list of elements  $A = \{a, b, c, d, e, f, g, \dots, x, y, z\}$

$$a \_ A \quad 1 \_ A$$

(2) a phrase

the set of Math 0997 students born in February

the set of Math 0997 students with more than one pet

(3) set-builder notation

$$\{x \mid x = 2n, n \in \mathbb{N}\} = \{ \_ \}$$

$$\{x \mid x = 2n + 1, n \in \mathbb{N}\} = \{ \_ \}$$

$$\{x \mid x = 2^n, n \in \mathbb{W}\} = \{ \_ \}$$

Cardinality of a set  $n(G) = \_ \quad n(M) = \_ \quad n(A) = \_$

Set operations: Given a universal set, U Use Venn diagrams to “visualize”.

(1) Set Complement = the set of elements in the universal set not in the original set

$$U = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$$

$$A = \{0, 2, 3, 5, 6, 8\} \quad A' \text{ or } \bar{A} = \_$$

$$B = \{0, 1, 4, 9\} \quad B' \text{ or } \bar{B} = \_$$

(2) Intersection

$A \cap B$  = the set of elements in A and in B      Find  $A \cap B$ .

P = the students in a PHED class

M = the students in math class

Find  $P \cap M$ .

(3) Union

$A \cup B$  = the set of elements in A or in B (or in both)      the “inclusive or”

$A = \{0, 2, 3, 5, 6, 8\}$

$A \cup B =$  \_\_\_\_\_

$B = \{0, 1, 4, 9\}$

P = the students in a PHED class

M = the students in math class

Find  $P \cup M$ .

(4) Set Difference

$B - A = B \cap \bar{A}$  = the set of elements in B that are not in A

$A - B = A \cap \bar{B}$  = the set of elements in A that are not in B

Find  $B - A$  and  $A - B$ .

Subsets

$B \subseteq A$       every element of B is an element of A       $n(B) \leq n(A)$

$B \subset A$       every element of B is an element of A and  $B \neq A$        $n(B) < n(A)$

Find all of the subsets of  $\{a, b, c\}$ . How many are proper?

Exercises:

1. If set  $B = \{1, i, n, e, a, r\}$ , find the cardinality of  $B$ .  $n(B) = \underline{\hspace{2cm}}$

Fill in the blank with the symbol ( $\in$  or  $\notin$ ) that makes the statement true:

2.  $4 \underline{\hspace{1cm}} \{0, 1, 2, 3, 4\}$

3.  $17 \underline{\hspace{1cm}} \{x \mid x = 3n + 1, n \in \mathbb{N}\}$

4. How many proper subsets does the set  $\{0, 1, 2, 3\}$  have? Multiple choice.

(a) 4

(b) 6

(c) 15

(d) 16

(e) None of these

If  $A = \{1, 3, 5, 7, 9\}$ ,  $B = \{0, 1, 4, 9\}$ , and the universal set  $U = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$ , find

5.  $A \cup B$

6.  $A \cap B$

7.  $\bar{A}$

8.  $A - B$

9.  $\overline{(A \cup B)}$

10.  $A \cup \bar{B}$

Note: For #5–10, you may choose to use the following Venn diagram.

