

1. SET: Any collection of objects with a specification that allows us to tell whether a given object is or is not in the collection.

Examples:

$$A = \{ 1, 2, 3, 4, 5 \}$$

B is the set of the days of the week.

2. MEMBER or ELEMENT: An object in the set

$a \in A$ means "a is an element of set A"

$a \notin A$ means "a is not an element of set A"

Examples:

3. EMPTY or NULL SET: A set without any elements. \emptyset represents "the empty set"

Example: T is the set of all people over 10 feet tall. T is empty. $T = \emptyset$

4. RULE METHOD: $S = \{x \mid P(x)\}$ means "S is the set of all x such that P(x) is true"

Examples:

5. LISTING (ROSTER) METHOD: A set given by listing all its elements or listing some elements and using dots to indicate an established pattern continues indefinitely.

Examples:

6. SUBSETS & EQUAL SETS

If each element in A is also an element of set B, A is a subset of B. If A and B have exactly the same elements, then the two sets are equal.

$A \subset B$ means "A is a subset of B"

$A \not\subset B$ means "A is not a subset of B"

$A = B$ means "A and B have exactly the same elements"

$A \neq B$ means "A and B do not have exactly the same elements"

Note: A set is a subset of itself and the empty set is a subset of every set.

7. Examples:

$$A = \{1, 2, 3\}$$

$$B = \{1, 2, 3, 4, 5\}$$

$$C = \{4, 5, 6\}$$

8. SET OPERATIONS:

A. UNION of sets A and B, denoted $A \cup B$, is the set of all elements in either A or B or both.

Example:

$$A = \{1, 2, 3, 4, 5, 6, 7\}$$

$$B = \{2, 4, 6, 8, 10, 12\}$$

B. INTERSECTION of sets A and B, denoted by $A \cap B$, is the set of all elements in the set A that are also in the set B.

Example:

Note: If $A \cap B = \emptyset$, the sets A and B are disjoint.

9. UNIVERSAL SET: The set of all elements under consideration is called the UNIVERSAL SET U. Once U is defined, all other sets under discussion must be subsets of U.

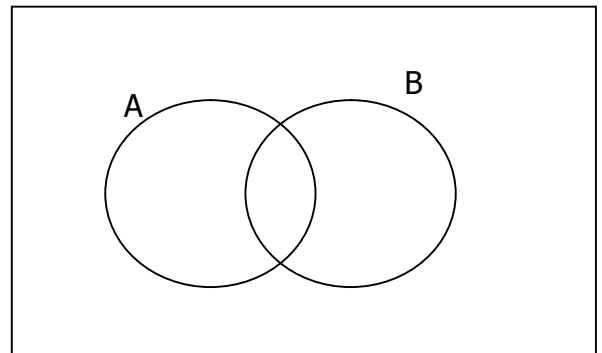
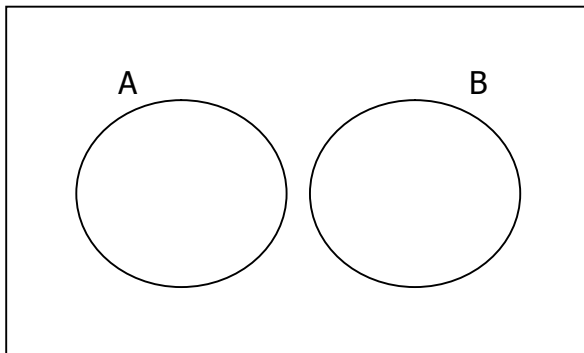
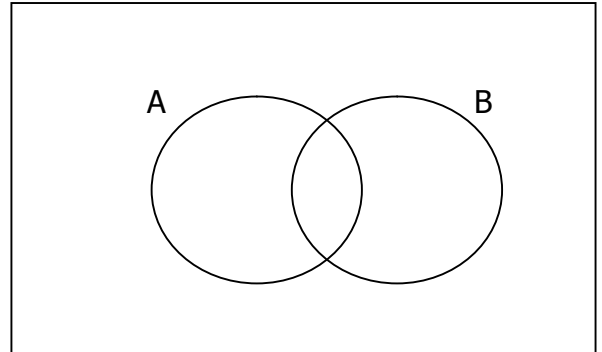
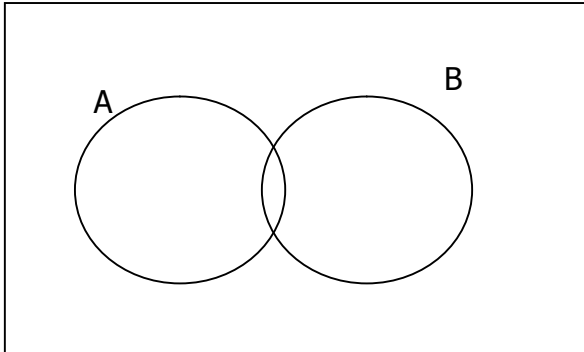
10. COMPLEMENT The complement of a set A, denoted A' , is the set of all elements in U that are not in A.

Examples: Recall sets A and B from page 2.

$$U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\}$$

11. VENN DIAGRAMS are useful in visualizing sets.

Draw Venn Diagrams for $A \cup B$, $A \cap B$, disjoint sets A and B, and A'



12. USING VENN DIAGRAMS TO COUNT

- A. A pediatrician took a survey of 100 children to determine the walking and talking abilities of a one-year-old. He found that 55 could walk unaided, 25 could talk (say at least 50 words), and 15 could both walk and talk. How many could
- A. neither walk nor talk
 - B. walk but not talk
 - C. talk but not walk
 - D. walk or talk?

- B. Country-western songs seem to emphasize three basic themes: love, prison, and trucks. A survey of the local country-western radio station produced the following data: 12 songs were about a truck driver who was in love while in prison, 13 were about a prisoner in love, 28 were about a person in love, 18 were about a truck driver in love, 3 were about a truck driver in prison who was not in love, 2 were about a prisoner who was not in love and did not drive a truck, 8 were about a person who was not in prison, not in love, and did not drive a truck and lastly, 16 were about truck drivers who were not in prison. A. How many songs were surveyed? Find the number of songs about:
B. truck drivers; C. prisoners; D. truck drivers in prison; E. people not in prison;
F. people not in love.