

Lesson 12-1

Example 1

Define each set in roster notation and in set-builder notation. Then determine whether the set is finite or infinite.

- W , the set of whole numbers
- B , the set of even numbers greater than 9 and less than 21

Solution

- Roster notation: $W = \{0, 1, 2, 3, 4, \dots\}$
Set-builder notation: $W = \{x \mid x \text{ is a whole number}\}$
The ellipsis indicates that all the elements cannot be listed, so W is infinite.
- Roster notation: $B = \{10, 12, 14, 16, 18, 20\}$
Set-builder notation: $B = \{x \mid x \text{ is an even number greater than 9 and less than 21}\}$
All the elements in the set are listed, so B is finite.

Example 2

Use set notation to write the following.

- 9 is an element of $\{1, 3, 5, 7, 9\}$.
- The letter c is not an element of the letters in “algebra.”

Solution

- $9 \in \{1, 3, 5, 7, 9\}$
- $c \notin \{a, l, g, e, b, r\}$

Example 3

Determine whether the following sets are equal or equivalent.

$$S = \{A, E, I, O, U, Y\}, T = \{E, I, O, U, A, Y\}, Q = \{6, 10, 14, 18, 22, 26\}$$

Solution

Sets S , T , and Q each contain six elements, so they are equivalent sets. Since S and T have exactly the same elements, $S = T$.

Example 4

ART List all of the subsets of the set {paint, clay}.

Solution

Each single element of a set is a subset of that set. Also, the set itself is a subset, and the null set is a subset. So there are four subsets: {paint}, {clay}, {paint, clay}, \emptyset .