

2.1 Notes: Basic Concepts of Sets

Read pages 44-49 then fill in the notes below:

A collection of objects is called a Set.

The objects in a set are called elements or members of the set.

A well defined set is Contents can be clearly determined.

An empty set or null set contains no elements. The empty set is represented by $\{\}$ or \emptyset but not $\{\emptyset\}$.

What are the 3 methods commonly used to represent a set? Description, Roster $\{, \}$, set-builder notation

The set of natural numbers is represent by N
 $N = \{1, 2, 3, \dots\}$

What does \in mean? is an element of
 \notin not an element

Which method is being used to describe each set?

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

b) $B = \{x | x \in N \text{ and } 1 \leq x \leq 5\}$ Set-builder

c) B is the set of natural numbers from 1 through 5. description

$\{x \mid \text{conditions to be members}\}$

\uparrow
elements
in general

the set of all
elements x , such
that x is ...

Write a description of the following sets:

$$\{a\} \neq \{a, b\}$$

$$a \in \{a, b\}$$

a) $K = \{2, 4, 6, 8\}$

K is the set of even integers from 2 to 8, inclusive.

2. Express each set using the roster method.

b) $L = \{\text{Oregon, Ohio, Oklahoma}\}$

L is the set of all US states beginning with O.

a) C is the set of natural odd numbers greater than 2, but less than 11.

$$C = \{3, 5, 7, 9\}$$

b) $F = \{x | x \in \mathbb{N} \text{ and } 4 < x \leq 15\}$

$$F = \{5, 6, 7, 8, 9, \dots, 15\}$$

3. Express each set in set builder notation.

a) $E = \{2, 3, 4, 5, 6\}$

b) $G = \{7, 9, 11, \dots, 49\}$

c) $R = \{11, 12, 13, 14, \dots\}$

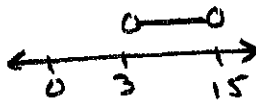
$$E = \{x | x \in \mathbb{N} \text{ and } 2 \leq x \leq 6\}$$

$$R = \{x | x \in \mathbb{N} \text{ and } x \geq 11\}$$

$$G = \{x | x \in \mathbb{N} \text{ and } x \text{ is odd and } 6 < x < 50\}$$

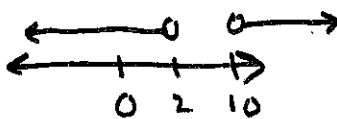
4. Determine which sets represent the empty set.

a) the set of individuals in this class who are 80 years old or older



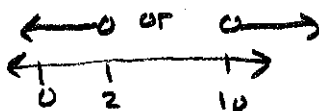
b) $\{x | x \in \mathbb{N} \text{ and } 3 < x < 15\}$

and

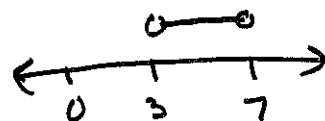


c) $\{x | x < 2 \text{ and } x > 10\}$

d) $\{x | x < 2 \text{ or } x > 10\}$



e) $\{x | x > 3 \text{ and } x < 7\}$



5. Is the statement true or false?

a) $2 \in \{x | x \in \mathbb{N} \text{ and } 2 < x \leq 5\}$

False $\{3, 4, 5\}$

b) $5 \notin \{x | x \in \mathbb{N} \text{ and } x > 4\}$

False $\{5, 6, 7, 8, \dots\}$