

EXERCISE 13A

PAGE: 148

1. Find, whether or not, each of the following collections represent a set:

- (i) The collection of good students in your school.
- (ii) The collection of the numbers between 30 and 45.
- (iii) The collection of fat-people in your colony.
- (iv) The collection of interesting books in your school library.
- (v) The collection of books in the library and are of your interest.

Solution:

- (i) The collection of good students in your school is not a set as it is not well defined.
- (ii) The collection of the numbers between 30 and 45 is a set.
- (iii) The collection of fat-people in your colony is not a set as it is not well defined.
- (iv) The collection of interesting books in your school library is not a set as it is not well defined.
- (v) The collection of books in the library and are of your interest is a set.

2. State whether true or false:

- (i) Set {4, 5, 8} is same as the set {5, 4, 8} and the set {8, 4, 5}
- (ii) Sets {a, b, m, n} and {a, a, m, b, n} are same.
- (iii) Set of letters in the word 'suchismita' is {s, u, c, h, i, m, t, a}
- (iv) Set of letters in the word 'MAHMOOD' is {M, A, H, O, D}.

Solution:

- (i) It is true.
- (ii) It is true.
- (iii) It is true as $\{s, u, c, h, i, s, m, i, t, a\} = \{s, u, c, h, i, m, t, a\}$
- (iv) It is true as it has the same elements.

3. Let set A = {6, 8, 10, 12} and set B = {3, 9, 15, 18}.**Insert the symbol '∈' or '∉' to make each of the following true :**

- (i) 6 A
- (ii) 10 B
- (iii) 18 B
- (iv) (6 + 3) B
- (v) (15 - 9) B
- (vi) 12 A
- (vii) (6 + 8) A
- (viii) 6 and 8 A

Solution:

- (i) $6 \in A$
- (ii) $10 \notin B$

- (iii) $18 \in B$
- (iv) $(6 + 3)$ or $9 \in B$
- (v) $(15 - 9)$ or $6 \notin B$
- (vi) $12 \in A$
- (vii) $(6 + 8)$ or $14 \notin A$
- (viii) 6 and $8 \in A$

4. Express each of the following sets in roster form :

- (i) Set of odd whole numbers between 15 and 27.
- (ii) $A =$ Set of letters in the word “CHITAMBARAM”
- (iii) $B =$ {All even numbers from 15 to 26}
- (iv) $P = \{x : x \text{ is a vowel used in the word 'ARITHMETIC'}\}$
- (v) $S =$ {Squares of first eight whole numbers}
- (vi) Set of all integers between 7 and 94; which are divisible by 6.
- (vii) $C =$ {All composite numbers between 2 and 20}
- (viii) $D =$ Set of Prime numbers from 2 to 23.
- (ix) $E =$ Set of natural numbers below 30 which are divisible by 2 or 5.
- (x) $F =$ Set of factors of 24.
- (xi) $G =$ Set of names of three closed figures in Geometry.
- (xii) $H = \{x : x \in W \text{ and } x < 10\}$
- (xiii) $J = \{x : x \in N \text{ and } 2x - 3 \leq 17\}$
- (xiv) $K = \{x : x \text{ is an integer and } -3 < x < 5\}$

Solution:

- (i) {17, 19, 21, 23, 25}
- (ii) $A = \{C, H, I, T, A, M, B, R\}$
- (iii) $B = \{16, 18, 20, 22, 24, 26\}$
- (iv) $P = \{a, e, i\}$
- (v) $S = \{0, 1, 4, 9, 16, 25, 36, 49\}$
- (vi) {12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72, 78, 84, 90}
- (vii) $C = \{4, 6, 8, 9, 10, 12, 14, 15, 16, 18\}$
- (viii) $D = \{2, 3, 5, 7, 11, 13, 17, 19, 23\}$
- (ix) $E = \{2, 4, 5, 6, 8, 10, 12, 14, 15, 16, 18, 20, 22, 24, 25, 26, 28\}$
- (x) $F = \{1, 2, 3, 4, 6, 8, 12, 24\}$

(xi) $G = \{\text{Triangle, Circle, Square}\}$

(xii) $H = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$

(xiii) $2x - 3 \leq 17$

By further calculation

$$2x \leq 17 + 3$$

$$2x \leq 20$$

So we get

$$x \leq 20/2$$

$$x \leq 10$$

Here $J = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

(xiv) $-3 < x < 5$

We know that x lies between -3 and 5

So we get

$$K = \{-2, -1, 0, 1, 2, 3, 4\}$$

5. Express each of the following sets in set-builder notation (form):

(i) $\{3, 6, 9, 12, 15\}$

(ii) $\{2, 3, 5, 7, 11, 13, \dots\}$

(iii) $\{1, 4, 9, 16, 25, 36\}$

(iv) $\{0, 2, 4, 6, 8, 10, 12, \dots\}$

(v) $\{\text{Monday, Tuesday, Wednesday}\}$

(vi) $\{23, 25, 27, 29, \dots\}$

(vii) $\{1/3, 1/4, 1/5, 1/6, 1/7, 1/8\}$

(viii) $\{42, 49, 56, 63, 70, 77\}$

Solution:

(i) $\{3, 6, 9, 12, 15\}$

It can be written as

$$= \{x: x \text{ is a natural number divisible by } 3; x < 18\}$$

(ii) $\{2, 3, 5, 7, 11, 13, \dots\}$

It can be written as

$$= \{x: x \text{ is a prime number}\}$$

(iii) $\{1, 4, 9, 16, 25, 36\}$

It can be written as

$$= \{x: x \text{ is a perfect square natural number; } x \leq 36\}$$

(iv) $\{0, 2, 4, 6, 8, 10, 12, \dots\}$

It can be written as

$$= \{x: x \text{ is a whole number divisible by } 2\}$$

(v) $\{\text{Monday, Tuesday, Wednesday}\}$

It can be written as

$$= \{x: x \text{ is one of the first three days of the week}\}$$

(vi) $\{23, 25, 27, 29, \dots\}$

It can be written as

$= \{x: x \text{ is an odd natural number; } x \geq 23\}$

(vii) $\{1/3, 1/4, 1/5, 1/6, 1/7, 1/8\}$

It can be written as

$= \{x: x = 1/n \text{ when } n \text{ is a natural number; } 3 \leq n \leq 8\}$

(viii) $\{42, 49, 56, 63, 70, 77\}$

It can be written as

$= \{x: x \text{ is a natural number divisible by } 7; 42 \leq x \leq 77\}$

6. Given: A = {x : x is a multiple of 2 and is less than 25}

B = {x : x is a square of a natural number and is less than 25}

C = {x : x is a multiple of 3 and is less than 25}

D = {x : x is a prime number less than 25}

Write the sets A, B, C and D in roster form.

Solution:

$A = \{x : x \text{ is a multiple of 2 and is less than 25}\} = \{2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24\}$

$B = \{x : x \text{ is a square of a natural number and is less than 25}\} = \{1, 4, 9, 16\}$

$C = \{x : x \text{ is a multiple of 3 and is less than 25}\} = \{3, 6, 9, 12, 15, 18, 21, 24\}$

$D = \{x : x \text{ is a prime number less than 25}\} = \{2, 3, 5, 7, 11, 13, 17, 19, 23\}$