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PERIOD 1& 2

SUBTOPIC: BASIC CONCEPT,ELEMENTS OF A SET, REPRESENTATION OF A SET

SUBJECT : MATHEMATICS
CHAPTER NUMBER: 13
CHAPTER NAME : SET CONCEPTS

Learning outcomes

Students will be able to

- define a set.
- elements of a set
- represent a set in description method, roster method , set builder/ rule method.

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PREVIOUS CONNECT

- Cite collection of well defined objects.

BASIC CONCEPT

A set is a well-defined collection of distinct objects, things or symbols.

Set and Elements of a Set

The collection of tall students of a class Is not well-defined, so it **does not form a set.**

The collection of students of a class with heights between 135 cm and 160 cm is well-defined, so it forms a set.

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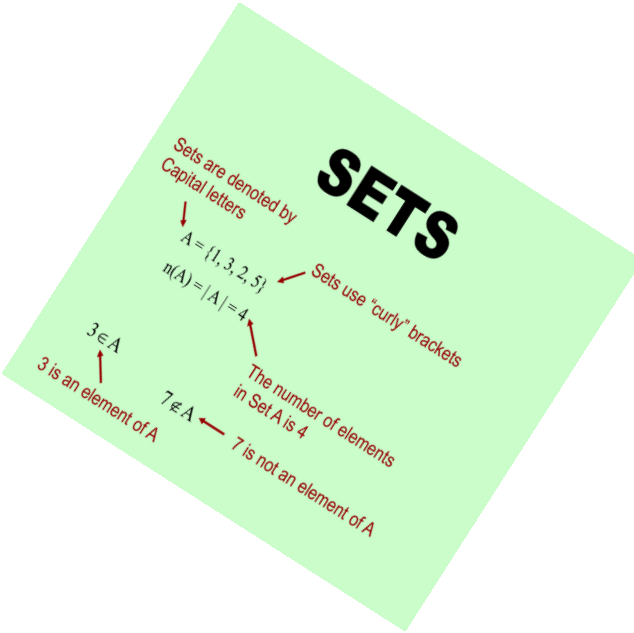
ELEMENTS OF A SET

The objects used to form a set are called elements or members of the set.
Set A = {5,10, 12 , 15}



USE OF THE SYMBOL 'ε' or SYMBOL $\notin$

The elements in a set can be written in any order.

The elements in a set should not be repeated .

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REPRESENTATION OF A SET

DESCRIPTION METHOD (FORM):A well defined description about the set is given.

ROSTER /TABULAR METHOD : The elements of the set are written inside a pair of curly brackets and are separated by commas.

Descriptive Form	Set - Builder Form	Roster Form
The set of all vowels in English alphabet	$\{x : x \text{ is a vowel in the English alphabet}\}$	$\{a, e, i, o, u\}$
The set of all odd positive integers less than or equal to 15	$\{x : x \text{ is an odd number and } 0 < x \leq 15\}$	$\{1, 3, 5, 7, 9, 11, 13, 15\}$
The set of all positive cube numbers less than 100	$\{x : x \text{ is a cube number and } 0 < x < 100\}$	$\{1, 8, 27, 64\}$

TABULAR /ROSTER METHOD (FORM)

The actual elements of the sets are not written , but a rule or statement or a formula is written in the briefest possible way.

EVALUATION QUESTIONS

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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, 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 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.

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 = {Triangle, Circle, Square}

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

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

$2x \leq 17 + 3$
$2x \leq 20$
$x \leq 20/2$
$x \leq 10$
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
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 …. }

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

(iv) {0, 2, 4, 6, 8, 10, 12, …. }

(v) {Monday, Tuesday, Wednesday}

(vi) {23, 25, 27, 29, … }

(vii) {1/3, ¼, 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 is a natural number divisible by 3; x < 18}

(ii) {2, 3, 5, 7, 11, 13 ….}

It can be written as

= {x: x is a prime number}

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

It can be written as

= {x: x is a perfect square natural number; x ≤ 36}

(iv) {0, 2, 4, 6, 8, 10, 12, ….}

It can be written as

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

(v) {Monday, Tuesday, Wednesday}

It can be written as

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

vi) {23, 25, 27, 29, …}
It can be written as
= {x: x is an odd natural number; x ≥ 23}

(vii) {1/3, ¼, 1/5, 1/6, 1/7, 1/8}
It can be written as
= {x: x = 1/n when n is a natural number; 3 ≤ n ≤ 8}

(viii) {42, 49, 56, 63, 70, 77}
It can be written as
= {x: x is a natural number divisible by 7; 42 ≤ x ≤ 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 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 is a square of a natural number and is less than 25} = {1, 4, 9, 16}

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

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

HOMEWORK

EX 13A

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