Class: XI
Subject: MATHS

SETS

- SET and their representation
- Types of sets

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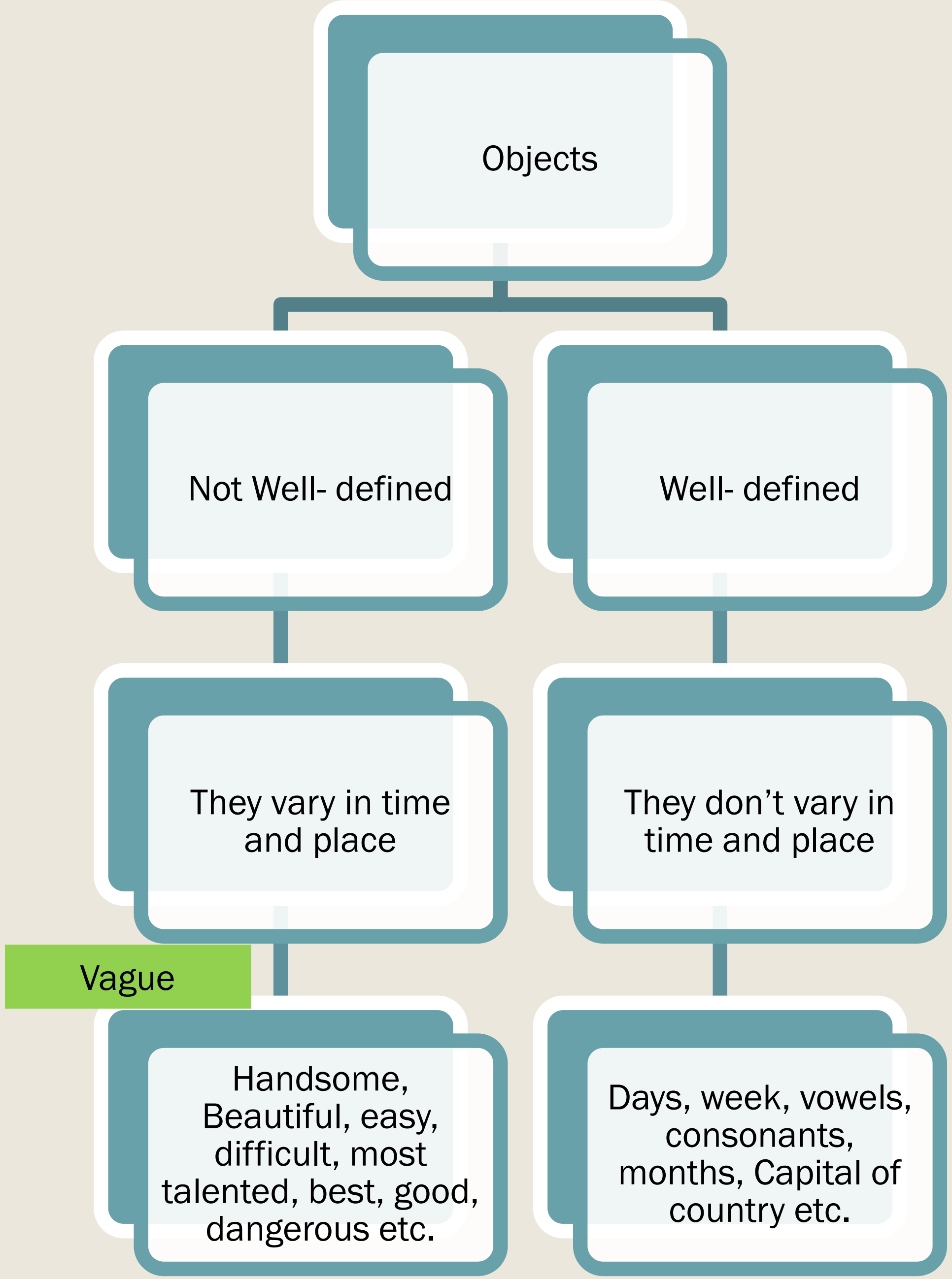
SETS

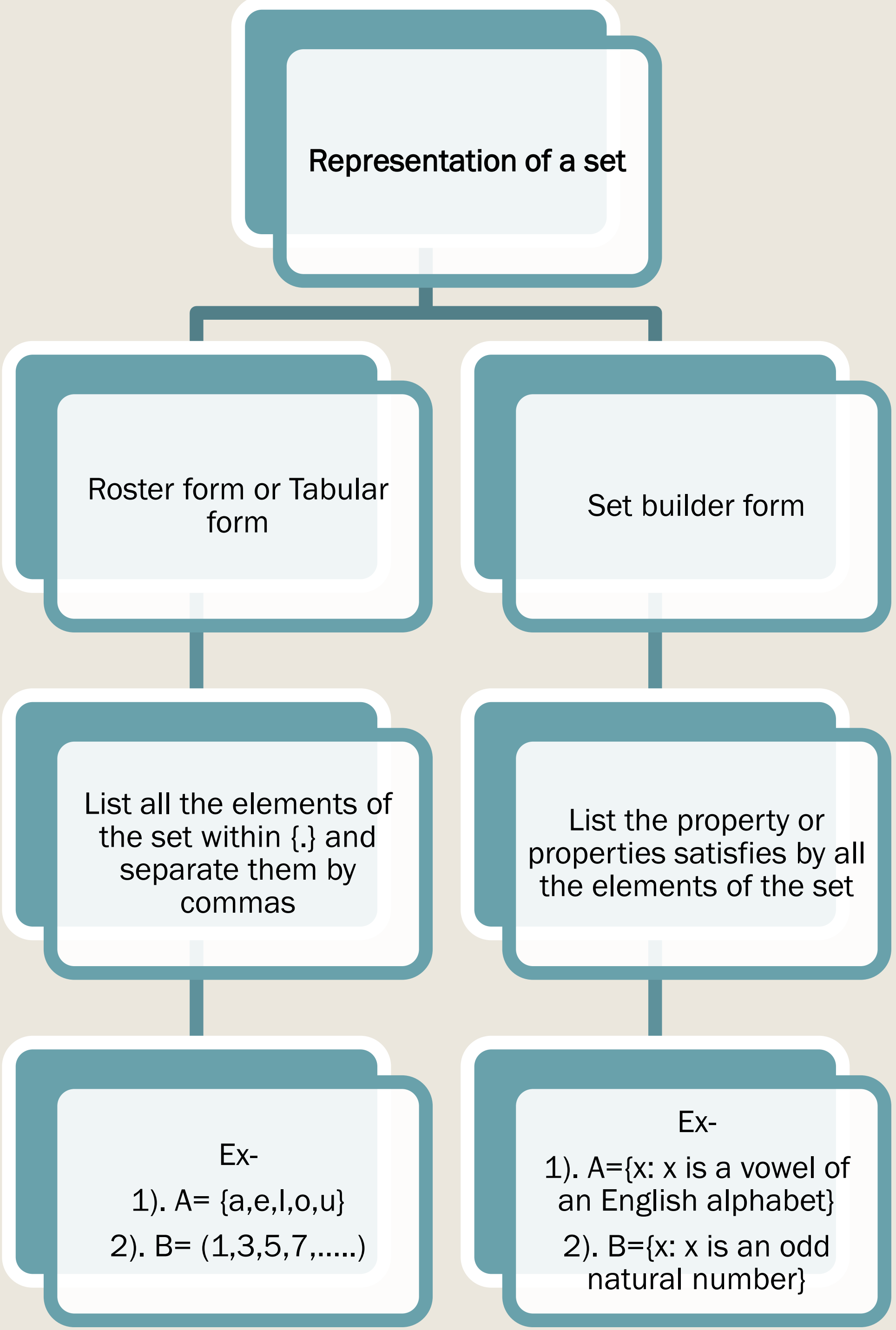

SET
Collection
Well Defined Objects


Objects
Not Well- defined
Well- defined
They vary in time and place
They don't vary in time and place
Vague
Handsome, Beautiful, easy, difficult, most talented, best, good, dangerous etc.
Days, week, vowels, consonants, months, Capital of country etc.

- Set is a collection of well- defined objects
- Examples of a set
  1. *The collection of vowels in an English alphabet*
  2. *The collection of natural numbers*
  3. *The collection of all students in your class XI Science*
- Examples which is not a set
  1. *The collection of 10 best batsmen in world*
  2. *The collection of 5 most talented writers of India*
  3. *The collection of five most dangerous animals of India*

Elements or Members ("E")

- Each well- defined objects in a set are called elements or members
- Generally sets is denoted by capital letter A,B,C,X,Y,Z etc.
- Elements are denoted by small letters a,b,c etc.
- If A is a set which is collection of all vowels in an English alphabets, we write
  - *A= {a,e,i,o,u}*
  - *Now, a is an element of set A* ⟶ $a \in A$
  - *b is not an element of set A* ⟶ $b \notin A$
  - *E is an element of set A* ⟶ $e \in A$
- Element- ∈ || not element- ∉
  - *I is an element of set A* ⟶ $i \in A$
  - *O is an element of set A* ⟶ $o \in A$
  - *U is an element of set A* ⟶ $u \in A$


Representation of a set
Roster form or Tabular form
Set builder form
List all the elements of the set within {.} and separate them by commas
List the property or properties satisfies by all the elements of the set
Ex-
1). A= {a,e,I,o,u}
2). B= (1,3,5,7,.....)
Ex-
1). A={x: x is a vowel of an English alphabet}
2). B={x: x is an odd natural number}

Types of a set

Singleton Set	Pair Set	Finite Set	Infinite Set	Empty Set or Null Set or Void Set
A set having exactly one element	A set having exactly two elements	A set having definite number of elements	A set which is not finite	A set having no any element
A= {a}	B= {1,3}	C= {1,2,3,……,10}	A= {1,3,5,……}	A= {x: x ∈ N, x>2 but x<1}
				It is denoted by {•} or ϕ

Equal Sets

- Two non- empty Sets A and B are said to be equal if they have exactly the same elements. We write A= B
- Ex- If A= {a,e,i,o,u} & B= {x: x is a Vowels of an English alphabet}
  - Here, B= {a,e,i,o,u}
  - Hence, A=B

Equivalent Sets

- Two Finite Sets A and B are said to be equivalent, if n(A)= n(B)

SUBSETS ("C")

- SUBSET
  - *If A and B be any two non- empty Sets and every element of Set A is also an element of Set B, then A is a subset of Set B. We write A* $\subset$ B
  - Ex- If A= {1,3} & B= {1,3,5}, then A $\subset$ B
  - Note:
    - "Empty Set is a subset of every set". If A be any non- empty Set, then $\phi \subset A$
    - Every Set is a subset of itself. i.e, $A \subset A$, where A be any set
- Proper Subset
  - *If A* $\subset$ B and A≠B, then A is a proper subset of Set B
  - Ex- Let A= {1,3,5} & B={1,3,5,7}. Here, A⊂B & A≠B. Hence, A is a proper subset of Set B

UNIVERSAL SET

- All Sets under consideration is a subset of Universal Set. Generally, example: It is denoted by **U**
- Let A= {1,3}, B= {2,4,6}, C={1,3,5} & **U**= {1,2,3,4,5,6,7}
  - *Here,* $A \subset \boldsymbol{U}$, $B \subset \boldsymbol{U}$, $C \subset \boldsymbol{U}$
  - *Here,* ***U*** *be Universal Set of Sets A, B & C*

Interval

Closed Interval

Open Interval

Closed interval a and b is denoted by [a,b] and is defined as [a,b]= {x : x∈ R, a <=x<=b}

Open interval a and b is denoted by]a,b[or (a,b) and is defined as]a,b[= (a,b)= {x : x**∈R,** a<x<b}

- **Right Half Open interval (or, Closed and Open interval)** a and b is denoted by *[a,b[* or *[a,b)* and is defined as $[a,b[= [a,b) = \{x : x \in R,\ a <= x < b\}$

- **Left Half Open interval (or, Open and Close interval)** a and b is denoted by *]a,b]* or *(a,b]* and is defined as $]a,b] = (a,b] = \{x : x \in R,\ a < x <= b\}$

QUESTIONS

- Express each of the following sets as an interval
  - i. *{x : x ∈ R, -4 < x < 0} = (-4,0)*
  - ii. *{x : x ∈ R, 0 <= x < 3} =*
  - iii. *{x : x ∈ R, 2<= x <= 6} =*
  - iv. *{x : x ∈ R, -2 < x <= 10} =*
- Write each of the following intervals in the set-builder form :
  - i. [-2,3] = {x : x ∈ R, -2 <= x <= 3}
  - ii. (2,6) =
  - iii.]0,4] =

POWER SET

- The set of all subsets of a given set "A" is called the power set of A. It is denoted by "P(A)".

Example : (1) Let A = {1,2}, then

P(A) = {ϕ, {1}, {2}, {1,2}}

(2) Let X = {a,b,c}, then

P(X) = {ϕ, {a}, {b}, {c}, {a,b}, {a,c}, {b,c}. {a,b,c}}

Note : $n[P(A)] = 2^{n(A)}$, where n(A) is the number of elements of set A & n[P(A)] is the number of elements of set P(A)

- In example 1: n(A)= 2

$n(P(A))= 2^{n(A)}$

$n(P(A))= 2^2 = 4$

Also, n(P(A))= 4

Hence, $n(P(A))= 2^{n(A)}$