1. Answer the following short questions.
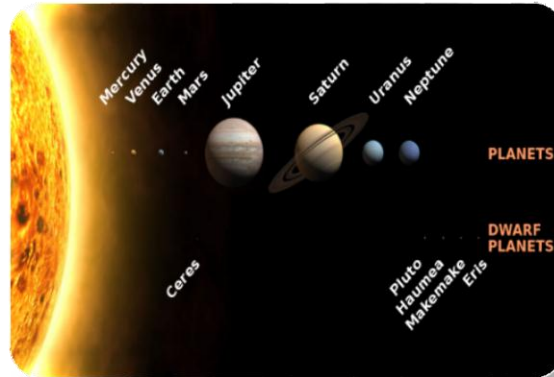
i. What is a set?

Answer: A set is a collection of well-defined and distinct objects. i.e.

$$A = \{books\ of\ class\ 6\}$$

Example: Set of planets in solar system

ii. How can we represent a set?

Answer: A set can be represented in 3 forms i.e. descriptive form, Set builder form, Tabular form.

Example:

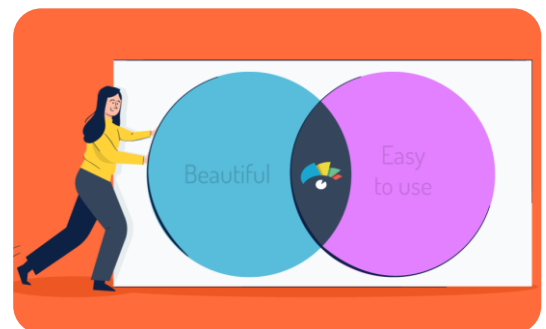Descriptive form: Set of first five natural numbers.

Tabular form: $\{1,2,3,4,5\}$

Set builder form: $\{x : x\ is\ a\ natural\ number < 5\}$

iii. What is a Venn diagram?

Answer: A set can be represented by a Venn diagram.

A Venn diagram is a pictorial representation of a set.

iv.   What are different types of sets?

Answer:

1. Empty set
2. Singleton set
3. Finite set
4. Infinite set
5. Disjoint sets
6. Overlapping sets
7. Equivalent sets
8. Equal sets
9. Subset
10. Superset
11. Power set
12. Universal set

v.   What is the cardinality of a set?

Answer: The number of elements of a set is called its cardinal number or cardinality.
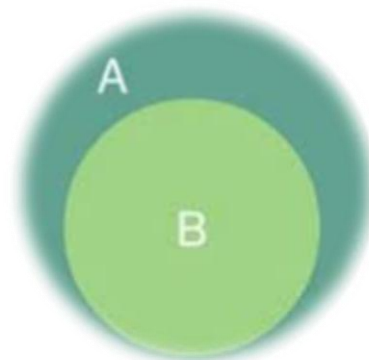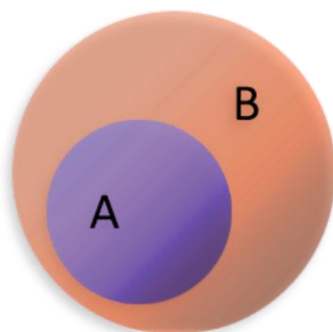
Example: The cardinality of a set $A = \{1, 2, 3, 4\}$ is 4.

vi.   Define subset?

Solution: If each element of a set A is also an element of another set B, then set A is called a subset of set B.

Representation: $A \subseteq B$

Example: $A = \{1,2,3\}$, $B = \{1,2,3,4,5\}$

vii.   Define power set with an example?

Answer: A power set is a set that contains all the subsets that can be possibly created from an original set.

Example: $A = \{1, 2, 3\}$

Subsets of the set A are: $\{\ \}, \{1\}, \{2\}, \{3\}, \{1, 2\}, \{1, 3\}, \{2, 3\}, \{1, 2, 3\}$

The power set is written as:

$$P(A) = \{\{\ \}, \{1\}, \{2\}, \{3\}, \{1, 2\}, \{1, 3\}, \{2, 3\}, \{1, 2, 3\}\}$$

viii.   How can we find the subsets of a set?

Solution: The subsets of a set can be find by the formula, 2^n, where n is the number of elements in that set.

Example: A={1,2,3}

$$= 2^n$$
$$= 2^3$$
$$= 8$$

Subsets=$\{\ \}, \{1\}, \{2\}, \{3\}, \{1,2\}, \{1,3\}, \{2,3\}, \{1,2,3\}$

ix.   Differentiate between proper and improper subset?

Proper subset: If every element of set A is also an element of set B, and set B has at least one extra element which is not in A, then set A is called the proper subset of set A.

Representation: $A \subset B$

Example: $A = \{1,2,3\}$, $B = \{1,2,3,4,5\}$

Improper subset: If every element of set A is also an element of set B, and set B has no extra element, then set A is called the improper subset of set B.

Representation: $A \subseteq B$

Example: $A = \{1,2,3\}$, $B = \{1,2,3\}$

x.   What is the correspondence of sets means?

Solution: Two sets $A = \{1, 2, 3\}$ and $B = \{a, b, c\}$ are said to be in one-one correspondence if each element in A can be paired with a single member of B, and vice versa.
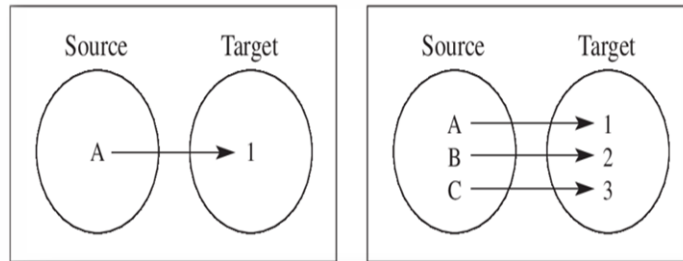
2. Crosswords
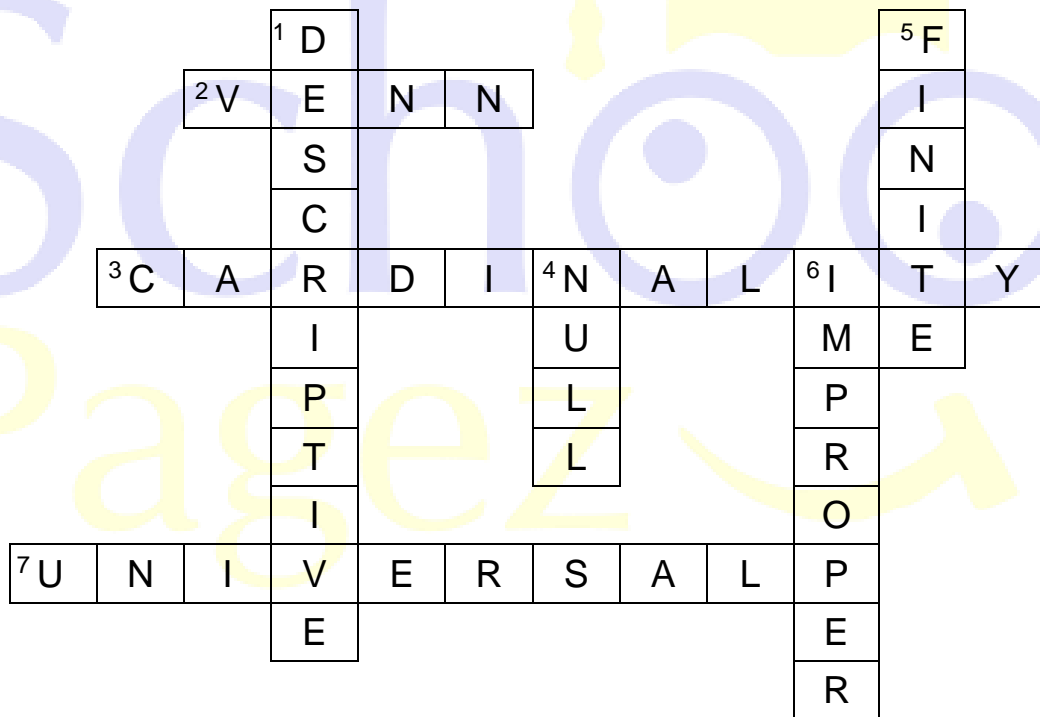
Across:

2. Graphical representation

3. Number of elements

7. Super set

Down:

1. Set notation

4. No element

6. A subset

5. Countable

Class : SIX   **Answer key : Introduction to Sets**   **Countdown**

3. Fill up the bubbles with correct option.

i.	Which of the following sets expresses set P of positive even integers less than 10?			
Ⓐ $A = \{1, 2, \ 3, 4, 5, 7\}$	Ⓑ $A = \{1, 8, 10\}$	Ⓒ *$A = \{2, 4, 6, 8, \}$*	Ⓓ $A = \{2, 4, 6, 8, 10\}$	

ii.	How many subsets does the Power set of an empty have?		
Ⓐ None	Three	Ⓒ Two	Ⓓ **One**

iii.	Which of the following sets A and B are equal?		
Ⓐ $A = \{12, 14, 16, 18$ $B = \{18, 16, 14, 12, 10\}$	Ⓑ $A\{11, 13, 15, 17, 19\}$ $B = \{19, 17, 15, 11\}$	Ⓒ $A = \{0, 12, 14, 16, 18\}$ $B = \{12, 14, 16, 18\}$	Ⓓ *$A = \{10, 15, 20\}$* *$B = \{20, 15, 10\}$*

iv.	Let Set Q={fruits which grow on trees}

Set A={brinjal, mango, banana}, Set B={mango, pear, orange}
Set C={tomato, capsicum, banana, mango}
Set D={grape, guava, watermelon}
Which of the following is correct?

Ⓐ A⊂Q	Ⓑ **B⊂Q**	Ⓒ C⊂Q	Ⓓ D⊂Q

v.	X={items which can be put in a Geometry box} Which of the following sets is not a subset of X?		
Ⓐ **A={measuring tape}**	Ⓑ B={compass, ruler}	Ⓒ C={compass, dividers}	Ⓓ D={2 set squares}

vi.	The set of whole numbers is		
Ⓐ finite	Ⓑ **infinite**	Ⓒ empty	Ⓓ none of these

vii.	A={5, 10, 15, 20, 25, …} and B={1, 2, 3, 4, 5, 6, 7,…} Which of the following is true?		
Ⓐ A=B	Ⓑ **A⊄B**	Ⓒ A⊂B	Ⓓ The set of integers

viii.	Which of the following statements is true?		
Ⓐ *Lilly P{flowers in the pond}*	Ⓑ Lilly ∈ {flowers that grow on trees}	Ⓒ Lilly ∈{flowers that grow on plants}	Ⓓ Lilly ∈ {flowers that grow on trees}

4. Words Search

Well-defined	Proper	Set builder	superset	diagram	set	disjoint	belongs	finite

E	W	Z	E	R	G	R	E	P	U	P	O
S	E	V	N	X	F	L	D	J	E	R	U
T	L	P	R	O	P	E	R	I	U	O	P
Y	L	S	U	P	E	R	S	E	T	D	Y
U	D	X	P	Q	F	R	L	S	Y	I	T
S	E	T	B	U	I	L	D	E	R	S	J
R	F	L	E	I	N	W	I	T	D	J	H
P	I	S	L	O	I	S	A	Y	S	O	A
I	N	T	O	P	T	B	G	U	J	I	S
P	E	G	N	L	E	D	R	Q	A	N	D
J	D	R	G	D	S	K	A	W	Y	T	C
W	Q	L	S	S	V	M	M	P	U	S	A

5. Jumbled Words

i.	ITOOTANN	NOTATION	ii.	NIPPALREGVO	OVERLAPPING
iii.	TECKARB	BRACKET	iv.	ECOBJETS	OBJECTS
v.	VITEGENA	NEGATIVE	vi.	TTINISCD	DISTINCT
vii.	TUBESS	SUBSET	viii.	EERMMB	MEMBER
ix.	TYMPE	EMPTY	x.	RUBLAAT	TABULAR

6. Columns

Match the descriptive form with the tabular form.

Descriptive form		Tabular form

Set of days in a week

Set of first five planets

Set of even numbers between 12 and 21

Set of one-digit natural number

Set of 2-digit numbers

{14,16,18,20}

{1,2,3,4,5,6,7,8,9}

$\{Mercury, Venus, Earth, Mars, Jupiter\}$

$\{Monday, Tuesday, Wednesday, ..\}$

{10,11,12,,,,99}

7. **Draw the Venn diagram of "Names of 5 boys starting with A and names of 5 girls starting with S".**

Names of boys

Ali   Ahmed
Anas   Akram
Amjad

Names of girls

Saba   Saima
Saiqa   Sania
Sara
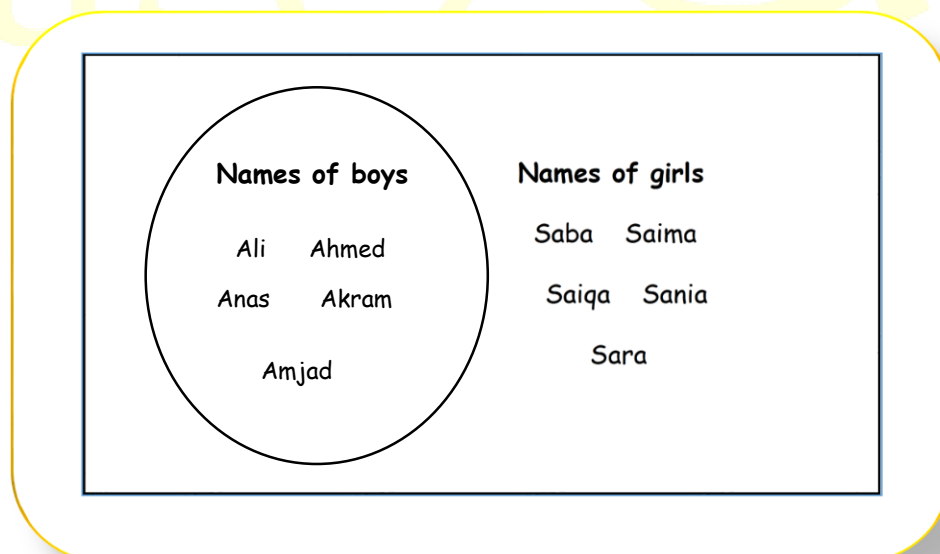
8. **Fill in the blanks using the given words.**

i.   A unit set is also called a _singleton_ .

ii.   A set of all integers is an _infinite_ set.

iii.   The symbol Ø represents an _empty_ set.

iv.   Two sets that contain the same number of elements are called

    equivalent sets.

v.   A _Power_ set contains all the possible subsets of a set.

vi.   A proper subset is denoted by the symbol __⊂__ .

vii.   The number of elements in a set is called its __cardinality__ .

viii. Set A= {1, 2, 3} is a _subset_ of set B= {1, 2, 3, 4}

ix.   Overlapping sets have at least one **common** element.

x.   The universal set for $A = \{1, 3, 5\}$ and $B = \{2, 4, 6\}$ is **{1, 2, 3, 4, 5, 6}**

9. **Identify the true and false statement from the following.**

i.   If $A = \{a, b, c, d, e\}$ and $B = \{b, d, e\}$ then $B \subseteq A$ **false**

ii.   There can be no one-one correspondence in set $A = \{A, B, C\}$ and set $B = \{1, 2, 3\}$ **false**

iii.   Set A= {Japan, China, South Korea} and set B= {Mars, Earth, Jupiter, Uranus} are equivalent sets **true**

iv.   The power set includes a null set **true**

v. $P = \{1, 2, 3, \dots, 10\}$ is written as $P = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ in a set builder form **false**

vi.   A set of all the children in the school is a finite set **true**

vii.   A set of all the beautiful cities of the world is a well-defined set **false**

viii. The symbol $\in$ denotes a subset **false**

ix.   Set B is the superset of set A if set B contains all the elements of set A **true**

x.   The cardinality of set $A = \{5, 10, 15, 20, 25\}$ is 30 **false**

10. **Drag and Drop**

Look at the symbols carefully and identify which symbols are used in sets and which are not.

∉	⊆	$x\vert$	÷	≤
Does not belong to	Is a subset of	Such that	Division	Less than equal to
∗	∼	>	∈	✕
Asterisk	Are equivalent	Greater than	Belongs to	Multiplication

Symbols used in sets	Symbols not used in sets
∉	÷
⊆	≤
$x\vert$	✕
∼	>
∈	∗

11.   Comprehension

Sets are one of the most fundamental concepts in mathematics. A set is a collection of objects, and the order of the objects in a set does not matter. Sets can be defined in a variety of ways, including using roster notation, set-builder notation, and Venn diagrams. Roster notation is a way of defining a set by listing all of its elements between curly braces.

For example, the set of all even numbers can be defined as $\{2, 4, 6, 8, \dots\}$. Set-builder notation is a way of defining a set by describing the properties that its elements must satisfy. For example, the set of all even numbers can be defined as $\{x \mid x \text{ is an integer and } x \text{ is divisible by } 2\}$. Venn diagrams are a graphical way of representing sets.

 A Venn diagram consists of a series of overlapping circles, each of which represents a set. The area of each circle represents the number of elements in the set. Sets are used in many different areas of mathematics, including set theory, logic, and combinatorics. They are also used in other fields, such as computer science and statistics.

Read the above paragraph carefully and answer the following questions.

   i.   What is a set?

Answer: A set is a collection of well-defined and distinct objects.

   ii.   How many methods are there to represent a set?

Answer: Sets can be defined in a variety of ways, including using roster notation, set-builder notation, and Venn diagrams.

   iii.   How can you use sets to solve mathematical problems?

Answer:

   iv.   What is Roaster notation of a set?

Answer: Roster notation is a way of defining a set by listing all of its elements between curly braces.

v.   What is the application of sets?

Answer: Sets are used in many different areas of mathematics, including set theory, logic, and combinatorics. They are also used in other fields, such as computer science and statistics.