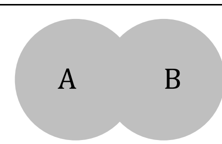
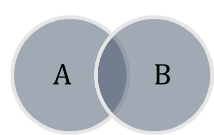
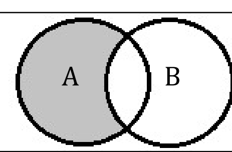
SET

Set means	Collection of well-defined distinct objects. It is usually denoted by capital letter
Element	Each object of set is called as element. It is usually denoted by small letter
Braces Form	When set shown as a list of elements within braces { } e.g. A = {1,3,5,7}
Descriptive Form	Set can be presented in statement form e.g. A = set of first four odd numbers
Set-Builder or Algebraic form	Here Set is written in the algebraic form in this format – {x: x satisfies some properties or rule}. The method of writing this form is called as Property or Rule method
Belongs to	It is denoted by '∈', **a ∈ A** means that element **a** is one of the element of Set A. ∉ used for do not belongs to.
Subset	Set A is a subset of Set B if all the elements of Set A also exist in Set B. It is denoted as **-** A⊂B
Proper Subset	A is a proper subset of B if A is a subset of B and A≠B
Improper Subset	Two equal sets are improper subsets of each other
Null Set	A set having no elements is called as Null or Empty Set. It is denoted by **ϕ**
No. of subsets	Formula: no. of subsets = 2^n, no. of proper subsets = 2^n-1
Intersection denoted by **[A∩B]**	Intersection set of A and B is a set that contains common elements between both of the sets
Union denoted by **[A∪B]**	Union set of A and B is a set that contains all the elements contained in both the sets without repeating the common elements
Universal Set	The set which contains all the elements under consideration in a particular problem is called the universal set generally denoted by **S**
Complement Set	A complement set of set P is a set that contains all the elements contained in the universe other than elements of P. It is denoted by **P' or P^c**
Set (A-B)	A-B is a set that contains elements of A other than those which are common in A and B. [A-B = A - A∩B]
De Morgan's Law	1. (P∪Q)' = P'∩Q' 2. (P∩Q)' = P'∪Q'
Venn Diagrams	Universal Set  Union Set A∪B  Intersection Set A∩B  Set A-B 
2 sets – Formula	n(A∪B) = n(A) + n(B) – n(A∩B)
3 sets – Formula	n(A∪B∪C) = n(A) + n(B) + n(C) – n(A∩B) –n(B∩C) –n(C∩A) + n(A∩B∩C)

Venn Diagram related some basics	A or B , atleast A or B, either A or B — $A \cup B$ A and B, Both A and B — $A \cap B$ Only A means — $A - B$ Only B means — $B - A$ Neither A nor B — $(A \cup B)'$
Cardinal Number	No. of distinct elements contained in a finite Set A is called Cardinal Number. For Set A = {4,6,8,3}, cardinal no. n(A) = 4
Equivalent Set	Two sets A and B are equivalent sets if n(A) = n(B)
Power Set	Collection of all possible subsets of a given set A is called Power set of Set A. It is denoted by P(A)
Ordered Pair	Pair of two elements both taken from different Sets. E.g. if $a \in A$ and $b \in B$ then ordered pair is (a,b) where first element will always from A and second always from B in every pair
Product of Sets	Also called as Cartesian Product. If A and B are two non-empty sets, then set of all the ordered pairs such that $a \in A$ and $b \in B$ is called as Product Set. It is denoted by A×B. **[A×B = {(a:b): a∈A and b∈B}]**
Why Product?	$n(A \times B) = n(A) \times n(B)$ i.e. cardinal no. of product set is equal to product of cardinal no. of each set

FUNCTION

Relation	Any subset of product set is called A×B is said to define relation from A to B. It's any collection of ordered pairs taken from a product set.
Function (set based definition)	A relation where no ordered pairs have same first elements is called Function. First element of the ordered should not be repeated in the relation set. (a,b) all a should be unique for different values of b
Function (non set based definition)	A rule which associate all elements of A to B is called function from A to B. It is denoted by $f: A \to B$ or $f(x)$ of B
Image, Pre-image	$f(x)$ is called the image of x and x is called the pre-image of $f(x)$ Pre-image is input and Image is output
Domain, Co-domain, Range	Let $f: A \to B$, then A is called domain of *f* and B is called the co-domain of *f*. Set of all the images (contained in B) of pre-images taken from A is called Range. Domain is a set of all pre-images and Range is a set of all images. Also Range is a subset of Co-domain.
Types of Functions	One-One Function — Let $f: A \to B$, if different elements in A have different images in B then f is one-one or injective function or one-one mapping Onto Function — Let $f: A \to B$, if every element in B has at least one pre-image in A, then *f* is an onto or surjective function Into Function — Let $f: A \to B$, if even a single element in B is not having pre-image in A, then it is said to be into function Bijection Function — If a function is both one-one and onto it is called as Bijection Function Identity Function — If domain and co-domain are same then function is identity function Let $f: A \to A$ and $f(x) = x$ Constant Function — If all pre-images in A will have a single constant value in B then the function is constant function
Equal Function	Two functions f and g are said to be equal function if both have same domain and same range
Inverse Function	Let $f: A \to B$, is a one-one and onto function. Every value of x (preimage)will give unique image $f(x)$ using *f*. If there is a function that takes value of images as input and gives pre-images as output, such function is called inverse

	function. It is denoted as $f^{-1}: B \rightarrow A$.
Composite Function	A function of function is called composite function. Example: if f *and* g are functions, then $f[g(x)]$ *and* $g[f(x)]$ are composite functions. Also called as fog *or* gof

RELATION

Relations	Any subset of product set is called A×B is said to define relation from A to B. It's any collection of ordered pairs taken from a product set.	
Domain and Range	If R is a relation from A to B, then set of all first elements of ordered pairs is domain and set of all second elements of ordered pairs is range.	
Types of Relation	Reflexive	If S is a universal set, S = {a,b,c ...} then R is a relation from S to S. If this R contains all the ordered pairs in the form (a,a) in S×S, then it is a reflexive relation
	Symmetric	If (a,b) ∊ R, then if (b,a) ∊ R then R is called Symmetric
	Transitive	If (a,b) ∊ R and also (b,c) ∊ R, then if (a,c) ∊ R such relation is Transitive. [if in a relation only (a,b) is present but (b,c) is not present we will consider it as transitive relation]
Equivalence Relation	If a relation is Reflexive, Transitive and Symmetric as well, then it is called as Equivalence Relation	