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❖ **Paper = Discrete Structure**

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❖ **Examination: Assignment**

Q No1: What is Venn diagram? Explain in detail the Application of Venn diagram?

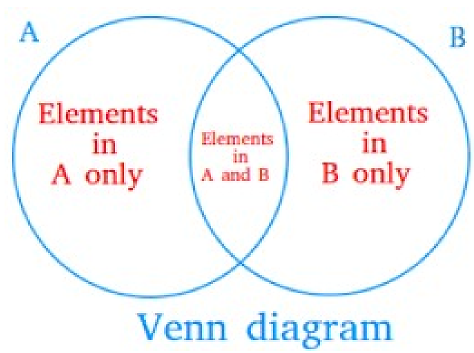
Answer: **Venn diagram:**

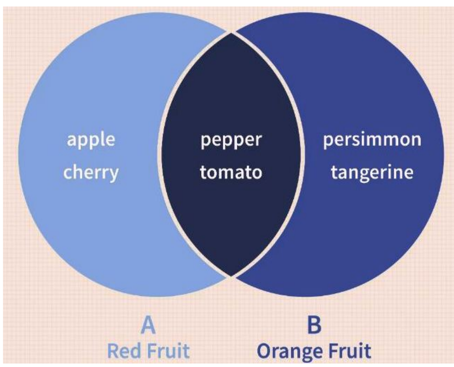
A Venn diagram is an illustration that uses circles to show the relationships among things or finite groups of things.

OR

- In a Venn diagram, sets are represented by shapes; usually circles or ovals. The elements of a set are labeled within the circle.

- Examples of Venn Diagrams:
- A Venn diagram could be drawn to illustrate fruits that come in red or orange colors. Below, we can see that there are orange fruits (circle B) such as persimmons and tangerines while apples and cherries (circle A) come in red colors. Peppers and tomatoes come in both red and orange colors, as represented by the overlapping area of the two circles.





Explanation:

A Venn diagram is an illustration that uses circles to show the relationships among things or finite groups of things. Circles that overlap have a commonality while circles that do not overlap do not share those traits. Venn diagrams help to visually represent the similarities and differences between two concepts.

Application of Venn diagram:

Possible Classroom Examples:

A survey of 300 workers yielded the following information: 231 belonged to a union, and 195 were Democrats. If 172 of the union members were Democrats, how many workers were in the following situations?

a. Belonged to a union or were Democrats.
b. Belonged to a union but were not Democrats.
c. Were Democrats but did not belong to a union.
d. Neither belonged to a union nor were Democrats.

A recent transportation survey of w urban commuters (that is n(U) = w) yielded the following information: x rode neither trains nor busses, y rode trains, and z rode only trains. How many people rode the following?

a. Trains and buses.
b. Only buses.
c. Buses.
d. Trains or buses.

Given the sets.

U = { 0, 1, 2, 3, 4, 5, 6, 7, 8, 9}

A = {0, 2, 4, 5, 9}

B = {1, 2, 7, 8, 9}

Use DeMorgan's laws to find:

a. $(A \cap B')'$
b. $(A \cup B')'$

A nonprofit organization's board of directors, composed of four women (Angela, Betty, Carmine, and Delores) and three men (Ed, Frank, and Grant), holds frequent meetings. A meeting can be held at Betty's house, at Delores's house, or at Frank's house.

- Delores cannot attend any meetings at Betty's house.
- Carmine cannot attend any meetings on Tuesday or on Friday.
- Angela cannot attend any meetings at Delores's house.
- Ed can attend only those meetings that Grant also attends.
- Frank can attend only those meetings that both Angela and Carmine attend.

If the meeting is held on Tuesday at Betty's, which of the following pairs can be among the board members who attend?

1. Angela and Frank
2. Ed and Betty
3. Carmine and Ed
4. Frank and Delores
5. Carmine and Angela

QNo2: What is Union? Draw Membership table for union using different examples?

Answer: **Union:**

The set made by combining the elements of two sets.

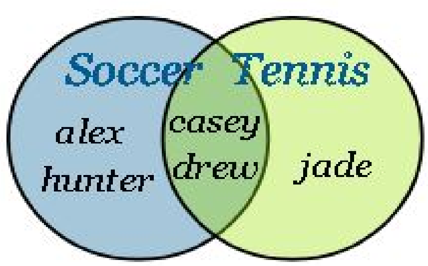
OR

So the union of sets A and B is the set of elements in A, or B, or both.

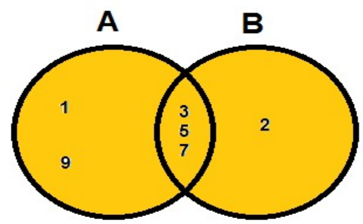
The symbol is a special "U" like this: ∪.

Example:
Soccer = {alex, hunter, casey, drew}
Tennis = {casey, drew, jade}
Soccer ∪ Tennis = {alex, hunter, casey, drew, jade}
In words: the union of the "Soccer" and "Tennis" sets is alex, hunter, casey, drew and jade

Diagrams:



Another Example of Union:



A={1,3,5,7,9} and B={2,3,5,7,}, what are AUB:
A∪B={1,2,3,5,7,9}
The Union is any region including either A or B.

Membership Tables:

We combine sets in much the same way that we combined propositions. Asking if an element xx is in the resulting set is like asking if a proposition is true. Note that xx could be in any of the original sets.

What does the set A∪(B∩C)A∪(B∩C) look like? We use 11 to denote the presence of some element xx and 00 to denote its absence.

A	B	C	$A \cap B$	$\overline{\mathbf{A \cap B}}$	$\overline{A}$	$\overline{B}$	$\overline{\mathbf{A}} \cup \overline{\mathbf{B}}$
1	1	1	1	**0**	0	0	**0**
1	1	0	1	**0**	0	0	**0**
1	0	1	0	**1**	0	1	**1**
1	0	0	0	**1**	0	1	**1**
0	1	1	0	**1**	1	0	**1**
0	1	0	0	**1**	1	0	**1**
0	0	1	0	**1**	1	1	**1**
0	0	0	0	**1**	1	1	**1**

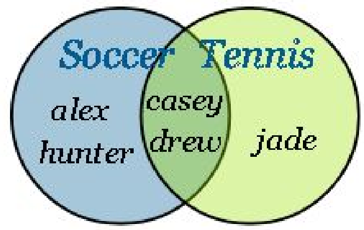
A	B	C	$B \cap C$	$A \cup (B \cap C)$
1	1	1	1	1
1	1	0	0	1
1	0	1	0	1
1	0	0	0	1
0	1	1	1	1
0	1	0	0	0
0	0	1	0	0
0	0	0	0	0

Q No3: What is Intersection? Draw Membership table for intersection using different examples:

Answer: **Intersection:**

The intersection of two sets has only the elements common to both sets.

- If an element is in just one set it is not part of the intersection.
- The symbol is an upside down U like this: ∩



Example: The intersection of the "Soccer" and "Tennis" sets is just Casey and drew (only Casey and drew are in both sets), which can be written:

Soccer ∩ Tennis = {Casey, drew}

Membership Table For Intersection:

The Membership table for intersection of sets A and B is given below

- The truth table for conjunction of two statements P and Q is given below
- In the membership table of Intersection, replace 1 by T and 0 by F then the table is same as of conjunction
- So membership table for Intersection is similar to the truth table for conjunction (∧).

A	B	A∩ B
1	1	1
1	0	0
0	1	0
0	0	0

P	Q	P∧Q
T	F	T
T	F	T
F	T	T
F	F	T

QNo4: What is Difference? Draw Membership table for Set difference using different examples?

Answer: **Difference:**

- Difference is the result that you get when you subtract one number from another.
- The result of subtracting one number from another. How much one number differs from another.
- Let A and B be subsets of a universal set U
- The difference of A and B is the set of all elements in U that belong to A but not to B
- It is denoted as A – B
- $A - B = \{x \in U \mid x \in A \text{ and } x\ B\}$
- Set difference is not commutative: $A - B \neq B - A$.
- $A - B \subseteq A \bullet A - B$, $A \cap B$ and $B - A$ are mutually disjoint sets.

Example of Difference:

- The difference between 5 and 2 is 3.
- The difference between 6.3 and 9.8 is 3.5
- Let U = {a, b, c, d, e, f, g}
  A = {a, c, e, g} B = {d, e, f, g}
  Then A – B = {a, c}

Membership Table for Set Difference:

The Membership table for the difference of sets A and B is given below.

- The truth table for negation of implication of two statements P and Q is given below.
- In the membership table of difference, replace 1 by T and 0 by F then the table is same as of negation of implication.
- So membership table for difference is similar to the truth table for negation of implication.

A	B	A-B
1	1	0
1	0	1
0	1	0
0	0	0