

## CHAPTER 14

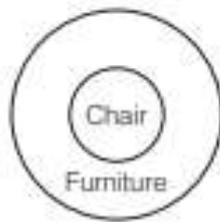
### **Venn Diagram**

Venn diagram is the diagrammatic representation of a particular group of objects. In it, different figures are drawn to represent relationship between two or more objects.

The figures used are generally circular but sometimes square, triangle and rectangles are also used.

In these Venn diagrams, the basic concept of set, subset, disjoint set etc. are used.

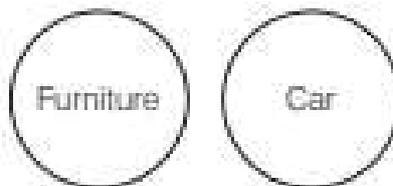
(1) An object is a subset of another object if former is a part of latter and this relation is shown by two concentric circles. e.g. Chair, furniture.



(2) An object is said to have an intersection with another object when two objects share something in common. e.g. Surgeon, Males



(3) Two objects are said to be disjoint when neither one is a subset of another nor they share anything in common. e.g. Furniture, Car.



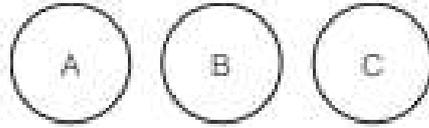
The questions related to Venn diagram are based on the following types

**1. Identification of Relation Based on Venn Diagram-** In this type, geometrical figures in the form of circles are given that represent different classes.

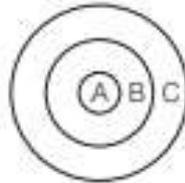
These different classes share some common relationship or sometimes they are completely disjoint too.

Here, a group of three items are shown by three circles and their relation can be as follows.

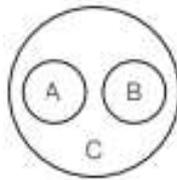
(a) Three items belong to three different groups



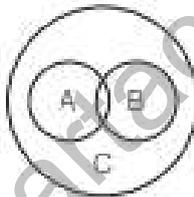
(b) One item belongs to the class of second and second belongs to the class of third.



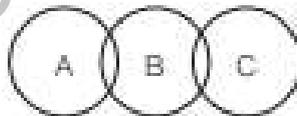
(c) Two separate items belong to the class of third.



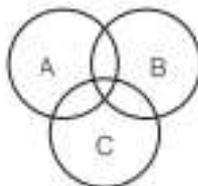
(d) Two items with some common relationship belong to the class of third.



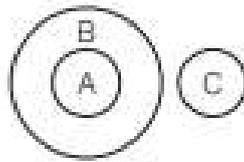
(e) Two items are partly related to the third and are themselves independent of each other.



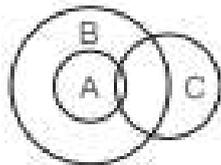
(f) Three items are partly related to each other.



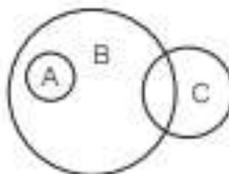
(g) One item belongs to the class of second while third item is different from the two.



(h) One item belongs to the class of second and the third item is partly related to these two.



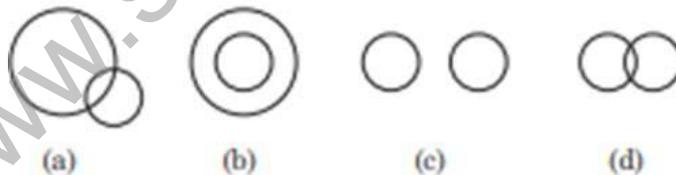
(i) One item belongs to the class of second and third is partly related to second.



(j) Two items are partly related to each other and the third item is entirely different from the two.



**Example 1:** Which of the following diagrams represents pens and pencils ?



**Sol.** (c) Pens and Pencils both are used for writing but both are entirely different.

**Directions (Ex. Nos. 2-6)** In the following questions, three classes are given. Which of the following figures will represents the best relationship amongst them?

**Example 2:** Metal, Iron, Chlorine

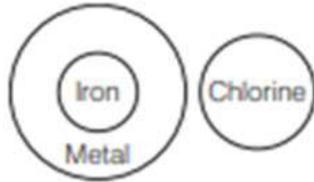
**Example 3:** Brick, House, Bridge

**Example 4:** Vegetables, Potato, Cabbage

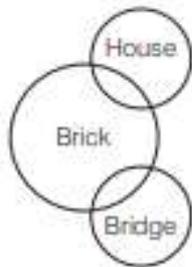
**Example 5:** Judge, Thief, Criminal

**Example 6:** Tea, Coffee, Beverages

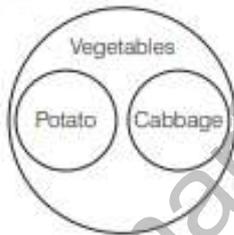
**Sol. 2. (b)** Iron is a metal but chlorine is a non-metal.



**3. (d)** Some houses and some bridges are made of bricks.



**4. (c)** Potato and cabbage are entirely different. But both are vegetables.



**5. (b)** All thieves are criminals. But judge is different.



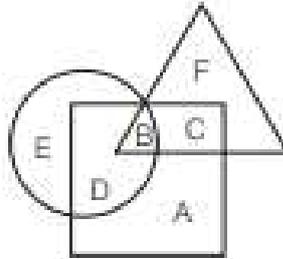
**6. (c)** Tea and coffee are entirely different. But both belong to the class of Beverages.



**2. Analysis Based Venn Diagram-** In this type, generally a venn diagram is given. Each geometrical figure in the diagram represents a certain class.

The candidate is required to analyze all the figures carefully and answer the questions.

**Directions (Ex. Nos. 7 and 8)** In the following diagram, three classes of population are represented by three figures. The triangle represents school teachers, the square represents the married persons and the circle represents the persons living in joint families.



**Example 7:** Married persons living in joint families but not working as school teachers are represented by

- (a) C                      (b) F                      (c) D                      (d) A

**Sol. (c)** Married persons living in joint families are represented by the region common to the square and the circle, i.e. D and B. But according to the given conditions, the persons should not be school teachers. So, B is to be excluded.

Hence, the required condition is denoted by region D.

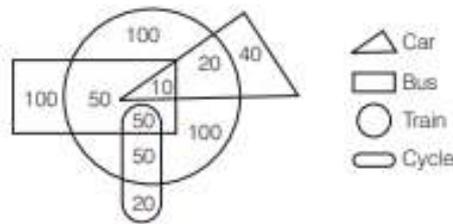
**Example 8:** School teachers who are neither married nor do live in joint families are represented by

- (a) F                      (b) C                      (c) B                      (d) A

**Sol. (a)** School teachers are represented by the triangle. But according to the given conditions, persons are neither married nor do they live in joint families.

So, the region should not be a part of either the square or the circle. Such a region is F.

**Directions (Ex. Nos. 9-11)** Study the following diagram and answer questions based on it.



**Example 9:** The ratio of total number of train travelers to the people who do not travel by train is

(a)  $\frac{27}{16}$

(b)  $\frac{28}{16}$

(c)  $\frac{37}{16}$

(d)  $\frac{38}{16}$

**Sol. (d)** Number of people who are train travelers

$$= 50 + 100 + 50 + 50 + 100 + 10 + 20 = 380$$

Number of people who do not travel by train

$$= 100 + 20 + 40 = 160$$

$$\begin{aligned} \therefore \text{Required ratio} &= \frac{380}{160} \\ &= \frac{38}{16} \end{aligned}$$

**Example 10:** How many people who travel by train also travel by car or bus but not cycle?

(a) 50

(b) 70

(c) 80

(d) 100

**Sol. (c)** Number of people who travel by train also travel by car or bus but not cycle

$$= 10 + 20 + 50 = 80$$

**Example 11:** Which two modes of transport used by people are mutually exclusive?

(a) Car—Bus

(b) Car—Cycle

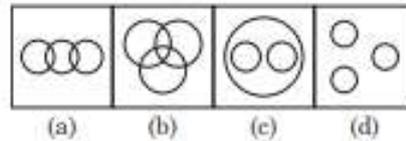
(c) Bus—Cycle

(d) Cannot be determined

**Sol. (b)** From the diagram it is clear that car  $\rightarrow$  ' $\triangle$ ' and cycle ' $\bigcirc$ ' are mutually exclusive.

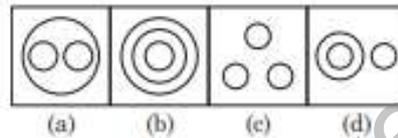
### **Practice Questions**

1. Which of the following diagrams best depicts the relation among Red, Pink and Colour?

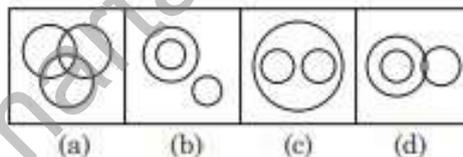


2. Identify the diagram that best represents the relationship among the classes given below.

Book, Pen, Pencil



**Directions (Q. Nos. 3-6)** In the following questions, three classes are given. Out of the four figures that follows, you have to find the figure that best represents the relationship amongst the three given classes.



3. Elephants, Wolves, Animals

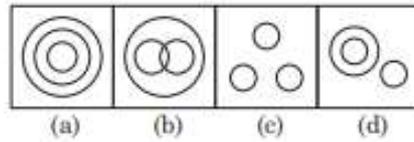
4. Tea, Coffee, Drinks

5. Boys, Students, Athletes

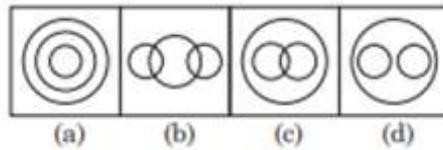
6. Police, Thief, Criminal

7. Which of the the following figures represents the relationship among Doctor, Man and Actor ?

8. Identify the diagram that best depicts the relation among Classroom, Black board and School?



**Directions (Q. Nos. 9-11)** In the following questions, three classes are given. Out of the four figures that follows, you have to find the figure that best depicts the relation amongst the three given classes.

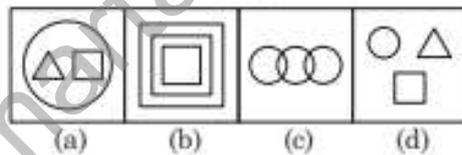


9. Topic, Book, Chapter

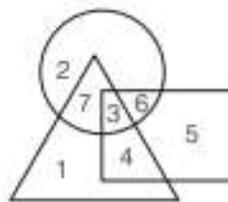
10. Clothes, Saree, Dhoti

11. Forests, Earth, Mountains

12. Which of the following diagrams best depicts the relation among Liquids, Milk and River water?



**Directions (Q. Nos. 13 and 14)** Study the following diagram carefully and answer the following questions.



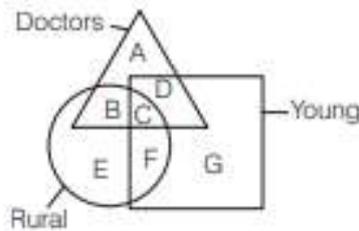
13. Find the number that lies inside all the figures.

- (a) 3      (b) 6      (c) 4      (d) 7

14. Find the number that lies only inside the triangle.

- (a) 1      (b) 4      (c) 7      (d) There is no such number

**Directions (Q. Nos. 15-17)** In the following figure, triangle represents Doctors, Square represents Young persons and circle represents Rural peoples. Study the diagram carefully and answer the given questions.



15. Find the portion that represents young Doctors that live in rural areas.

- (a) F      (b) G      (c) E      (d) C

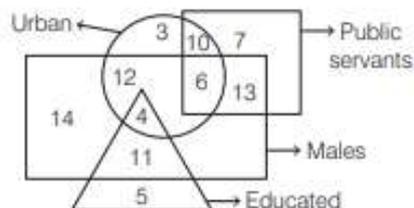
16. Find the portion that represents doctors living in rural area but are not young.

- (a) E      (b) A+B      (c) B      (d) D+C

17. Find the portion that represents people living in rural area who are neither Doctors nor young.

- (a) B      (b) E      (c) C      (d) F

**Directions (Q. Nos. 18-20)** In the following figure, rectangle represents males, triangle represents educated people, square represents public servants and circle represents people living in urban area. Study the diagram carefully and answer the given questions.



18. Out of the following options, how many educated males do not live in urban area?

- (a) 10      (b) 4      (c) 11      (d) 9

19. Out of the following options, how many people live in urban area who are neither public servants nor educated or males?

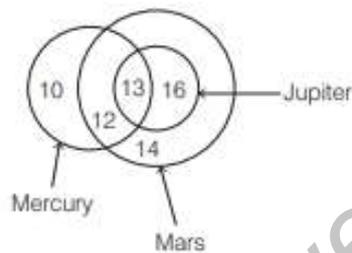
- (a) 3            (b) 5            (c) 6            (d) 10

20. Out of the following options, how many educated males are living in urban area?

- (a) 4            (b) 5            (c) 6            (d) 10

**Directions (Q. Nos. 21-23)** Study the following diagram and answer questions based on it.

The diagram represents the likes of kids of a class.



21. The ratio of kids who like only Mars to those who like all the three is

- (a)  $\frac{7}{5}$             (b)  $\frac{7}{8}$             (c)  $\frac{7}{6}$             (d)  $\frac{14}{13}$

22. What is the difference between the kids who like Mercury and Jupiter?

- (a) 6            (b) 8            (c) 10            (d) 12

23. How many people who like Mars like Jupiter also?

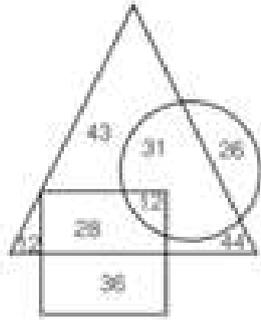
- (a) 45            (b) 29            (c) 26            (d) 13

**Directions (Q. Nos. 24-26)** Study the diagram given below and answer the questions based on it.

△ represents persons who like reading

○ represents persons who like cycling

□ represents persons who like trekking



24. How many persons like reading?

- (a) 170      (b) 154      (c) 176      (d) 117

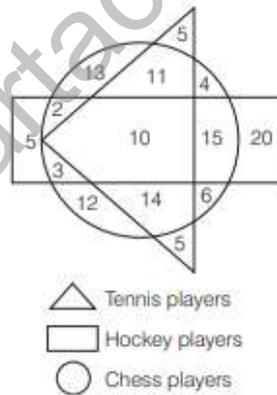
25. How many persons like trekking and reading but not cycling?

- (a) 12      (b) 31      (c) 44      (d) 28

26. How many persons like reading and cycling but not trekking?

- (a) 31      (b) 12      (c) 26      (d) 28

Directions (Q. Nos. 27-29) Study the following diagram and answer questions based on it.



27. The number of Non-Chess players is how much more, than the players who play both Chess and Tennis?

- (a) 5      (b) 10      (c) It is the same      (d) Cannot be determined

28. The number of Tennis players who are not Hockey players is

- (a) 10      (b) 50      (c) 55      (d) 35

29. The ratio of Hockey players to Chess players is

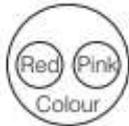
- (a)  $\frac{9}{18}$       (b)  $\frac{10}{18}$       (c)  $\frac{11}{18}$       (d)  $\frac{15}{18}$

### ANSWERS

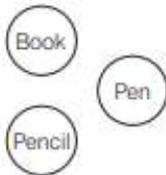
1.	(c)	2.	(c)	3.	(c)	4.	(c)	5.	(a)	6.	(b)	7.	(d)	8.	(a)	9.	(a)	10.	(d)
11.	(c)	12.	(a)	13.	(a)	14.	(d)	15.	(d)	16.	(c)	17.	(b)	18.	(c)	19.	(a)	20.	(a)
21.	(d)	22.	(a)	23.	(b)	24.	(d)	25.	(d)	26.	(a)	27.	(c)	28.	(d)	29.	(c)		

### Hints & Solutions:

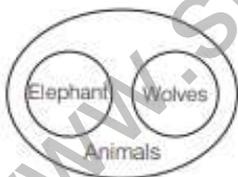
1. (c) Red and Pink both belong to the group of colour. But they both are entirely different.



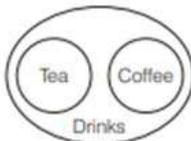
2. (c) Book, Pen and Pencil, all the three belong to stationery items but they are entirely different.



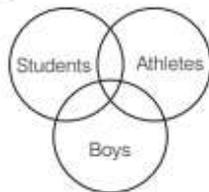
3. (c) Elephants and Wolves are entirely different. But, they both belong to the class of animals.



4. (c) Tea and Coffee are entirely different. But both belong to the class of drinks.



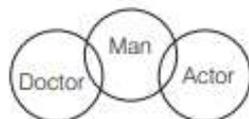
5. (a) Some boys can be students and some boys can be Athletes. Also, some athletes can be students.



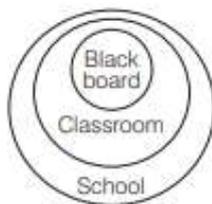
6. (b) All thieves are criminals, but all criminals are not thieves. Also, police is entirely different.



7. (d) Doctors and Actors are entirely different. But some doctors and actors are men.



8. (a) Blackboard is a part of classroom and classroom is a part of school.



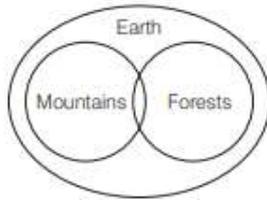
9. (a) A book has chapters and chapter has topics.



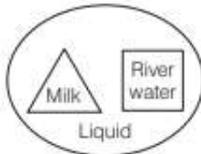
10. (d) Dhoti and Saree are entirely different but both belong to the group of clothes.



11. (c) Mountains and Forests are part of Earth. But, Some mountains are forested and some forests are mountainous.



12. (a) Milk and River water both belong to the group of liquids. But they both are entirely different.



13. (a) The number common to triangle, circle and rectangle is 3.

14. (a) The number that lies only inside the triangle is 1.

15. (d) The region 'C' is common to all the figures. Hence, 'C' represents young Doctors that live in rural areas.

16. (c) The region 'B' is common to triangle and circle only. Hence, 'B' represents Doctors living in rural area but are not young.

17. (b) The region 'E' is present in circle only and hence is the required answer.

18. (c) Only 11 educated males do not live in urban area.

19. (a) Only 3 persons live in urban area who are neither public servants nor educated or males.

20. (a) Only 4 educated males are living in urban area.

21. (d) Number of kids who like only Mars = 14 Number of kids who like all the three = 13

$$\therefore \text{Required ratio} = \frac{14}{13}$$

22. (a) Number of kids who like Mercury =  $10 + 12 + 13 = 35$

$$\text{Number of kids who like Jupiter} = 16 + 13 = 29$$

$$\therefore \text{Required difference} = 35 - 29 = 6$$

23. (b) Number of kids who like Mars like Jupiter also =  $13 + 16 = 29$

24. (a) Number of persons who like Reading =  $43 + 31 + 12 + 28 + 12 + 44 = 170$

25. (d) Number of persons who like Trekking and Reading but not Cycling = 28

26. (a) Number of persons who like Reading and Cycling but not Trekking = 31

27. (c) Number of players who play both Chess and Tennis =  $11 + 10 + 14 = 35$

Number of Non-Chess players = 35

Clearly, the number of Non-Chess players are same the number of players who play both Chess and Tennis.

28. (d) The number of Tennis players who are not Hockey players =  $5 + 11 + 14 + 5 = 35$

29. (c) Number of Hockey players =  $5 + 2 + 3 + 10 + 15 + 20 = 55$

Number of Chess players =  $2 + 13 + 11 + 4 + 15 + 6 + 14 + 12 + 3 + 10 = 90$

$$\therefore \text{Required ratio} = \frac{55}{90} = \frac{11}{18}$$

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