9.VENN DIAGRAMS

Venn Diagrams are diagrammatic representation of data, using geometrical figures like circles, triangles, rectangles, etc. Each geometrical figure represents an event as shown in the examples.

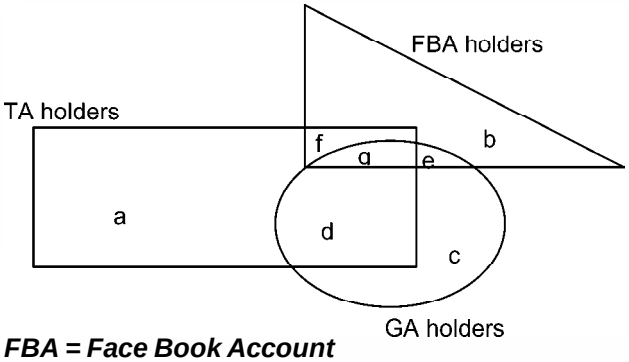
Majorly there are 3 types of questions:

1) Diagram based questions
2) Information based questions
3) Relation among the given objects/elements

Examples:

Type 1:

Directions for questions 1 to 5: These questions are based on the following figure.



FBA = Face Book Account
TA = Twitter Account
GA = Google+ Account

1. Which of the following represents only GA holders?
   (1) d (2) c (3) a (4) g (5) f

2. Which of the following represents those who are FBA as well as GA but not TA holders?
   (1) e (2) e, g & f (3) e & g
   (4) d, g & e (5) e& f

3. Which of the following represents those who are both TA and FBA but not GA holders?
   (1) g (2) e (3) b (4) f (5) a

4. Which of the following represents GA who are also TA but not FBA holders?
   (1) c (2) a (3) d (4) g (5) b

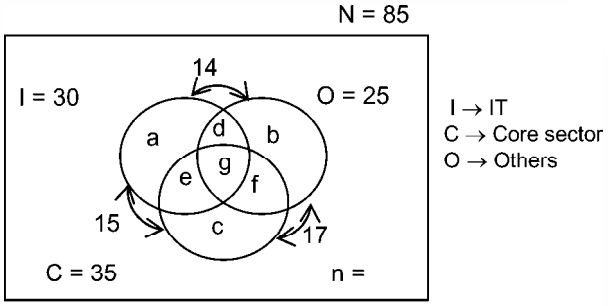
5. Which of the following represents TA who are GA as well as FBA holders?
   (1) a (2) f (3) e (4) d (5) g

Answers: 1. 2 2. 1 3. 4 4. 3 5. 5

Type – 2:

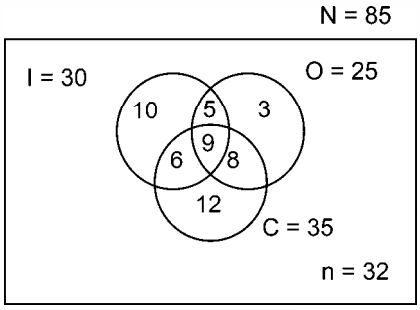
In a class of 85 students, 30 students got placed in IT, 35 students got placed in Core sector and 25 students got placed in Others. It is also known that 15 students got placed in both IT and Core sector, 17 students in both Core sector and Others and 14 students got placed in both IT and Others, 9 students got placed in IT, Core sector as well as Others.

Sol: Based on the information given, we get the following diagram.



Now, g = 9 is given.
$\Rightarrow$ d = 14 – 9 = 5; e = 15 – 9 = 6; f = 17 – 9 = 8
Also,
a = 30 – (d + g + e)
= 30 – (5 + 9 + 6) = 10
b = 25 – (d + g + f)
= 25 – (5 + 9 + 8) = 3
c = 35 – (e + g + f)
= 35 – (6 + 9 + 8) = 12
Now, I or O or C = a + b + c + d + e + f + g
= 10 + 13 + 12 + 6 + 8 + 5 + 9 = 53
$\Rightarrow$ n = N – (I or O or C) = 85 – 53 = 32

Hence, we can now get the following diagram from the above data.



Now, we can answer the questions of the following nature.

1. What is the total number of students who got placed in neither IT nor Others nor Core sector?
Sol: n = N – (I or O or C) = 85 – 53 = 32

2. How many students do not get placed in IT?
Sol: Do not got placed in IT = b + f + c + n = 3 + 8 + 12 + 27 = 50 (or) I = N – I = 85 – 30 = 55

3. How many got placed in IT but not in Others?
Sol: The regions of I excluding O = 10 + 6 = 16

4. How many placed in IT or Others but not Core sector?

Sol: 10 + 5 + 3 = 18 (excluding C)

5. What is the total number of students who got placed in both IT and Others but not in Core sector?
Sol: Number of students who got placed in both IT and Others but not Core sector = d = 5

6. How many got placed in exactly one of the three?
Sol: Only IT + only Others + only Core = 10 + 3 + 12= 25

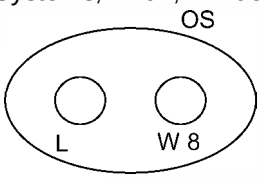
7. How many got placed in exactly two of the three?
Sol: 5 + 6 + 8 = 19

8. How many got placed in at least one of the three?
Sol: at least one = one + two + three
= (10+3+12) + (5+8+6) + (9) = 53

9. How many got placed in at most two of the three?
Sol: at most two = none + one + two
= (32) + (10+3+12) + (5+8+6) =76
OR total – all three = 85 – 9 = 76

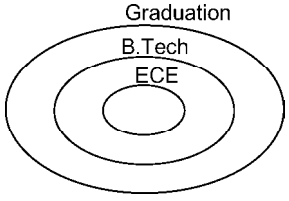
Type – 3:
Two or more groups are given and the Venn diagram, which most correctly establishes a relation between them, has to be chosen out of the various Venn diagrams given in the choices. Let us look at some of the examples given below.

Examples:
1. Operating Systems, Linux, Windows 8



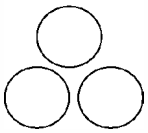
Here, in Operating Systems we have many varieties, of which Linux and Windows 8 are two different kinds of species, having nothing in common. So the above diagram is the most appropriate representation of the given groups.

2. Graduation, B.Tech, ECE



We know that ECE is a part of the B.Tech and B.Tech is a part of the Graduation. So the above diagram is the most appropriate representation of the given groups.

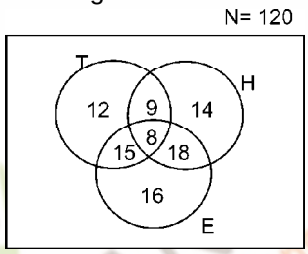
3. Bus, Train, Aero plane



We know that Bus, Train and aero plane are three different modes of transportation and nothing in common. So the above diagram is the most appropriate representation of the given groups.

Practice Exercise

Directions for questions 1 to 8: These questions are based on the given diagram.



T = Telugu, H = Hindi, E = English

1. How many speak only Hindi?
(1) 14 (2) 49 (3) 10 (4) 50

2. How many speak Telugu or Hindi?
(1) 17 (2) 76 (3) 58 (4) 48

3. How many Speak English?
(1) 16 (2) 57 (3) 41 (4) 8

4. How many speak Hindi or English but not Telugu?
(1) 32 (2) 48 (3) 54 (4) 44

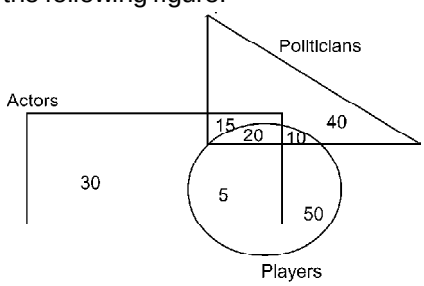
5. How many speak at least one language?
(1) 42 (2) 58 (3) 92 (4) 106

6. How many speak at most two languages?
(1) 32 (2) 96 (3) 54 (4) 112

7. How many speak exactly one language?
(1) 32 (2) 42 (3) 54 (4) 44

8. How many speak Telugu and Hindi as well as English?
(1) 8 (2) 92 (3) 106 (4) 44

Directions for questions 9 to 13: These questions are based on the following figure.



9. How many people are players?
(1) 50 (2) 85 (3) 35 (4) 40 (5) 30

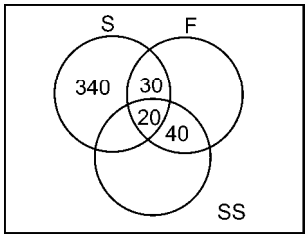
10. How many people are Politicians as well as Players but not Actors?
(1) 10 (2) 20 (3) 35 (4) 50 (5) 40

11. How many people are both Actors and Politicians but not Players?
(1) 5 (2) 10 (3) 15 (4) 20 (5) 25

12. How many people are Players who are also Actors but not Politicians?
(1) 5 (2) 10 (3) 20 (4) 15 (5) 25

13. How many people are Actors who are Players as well as Politicians?
(1) 170 (2) 5 (3) 15 (4) 10 (5) 20

Directions for questions 14 to 18: The population of a village is 1600. There are three public communities namely Sports (S), Fun (F), and Social Service (SS). Now using the data mentioned and the diagram given below answer the questions that follow.



- Total members in community S is 400.
- Total members in community F is 450.
- Total members in community SS is 610.

14. How many people is part of only community SS?
(1) 360 (2) 420 (3) 210 (4) 540

15. How many people is not part of any community?.
(1) 390 (2) 260 (3) 160 (4) 230

16. How many people is part of at least two communities?
(1) 70 (2) 30 (3) 20 (4) 100

17. How many people is part of at most one community?
(1) 1500 (2) 1120 (3) 1340 (4)1100

18. How many people is part of exactly two communities?
(1) 90 (2) 80 (3) 100 (4) 120

Directions for questions 19 to 23: These questions are based on the data given below.

In a class of 125 students, 78 play cricket, 50 play tennis and 10 play both cricket and tennis.

19. How many students play only tennis?
(1) 35 (2) 30 (3) 40 (4) 18

20. How many students play only cricket?
(1) 68 (2) 35 (3) 40 (4) 78

21. How many students play exactly one game?
(1) 68 (2) 108 (3) 78 (4) 50

22. How many students play at least one game?
(1) 80 (2) 70 (3) 118 (4) 108

23. How may students play neither cricket nor tennis?
(1) 12 (2) 9 (3) 18 (4) 7

Directions for questions 24 to 28: Read the following data and then answer the questions given below.

In a class, 63 students have only Laptops, 50% of thestudents have Desktop, 25% of the students have both laptop and Desktop and 5% of the students have neither of the two.

24. What is the total strength of the class?
(1) 160 (2) 180 (3) 120 (4) 140

25. How many of the students have only laptop or only Desktop?
(1) 98 (2) 96 (3) 133 (4) 35

26. How many of the students have neither laptop nor Desktop?
(1) 6 (2) 5 (3) 7 (4) 12

27. How many of the students have only Desktop?
(1) 70 (2) 35 (3) 30 (4) 63

28. How many of them have at least one of the two?
(1) 133 (2) 98 (3) 105 (4) 140

Directions for questions 29 to 32: These questions are based on the following information.

In a class of 150 students, 80 students passed in Physics and 90 students failed in Maths. 30 students failed in both the subjects.

29. How many students in the class failed in at least one subject?
(1) 120 (2) 130 (3) 140 (4) 180

30. How many students failed in physics only?
(1) 40 (2) 20 (3) 30 (4) 60

31. How many students passed in at least one subject?
(1) 120 (2) 150 (3) 140 (4) 130

32. How many students passed in exactly one subject?
(1) 110 (2) 120 (3) 100 (4) 140

Directions for questions 33 to 37: Study the following data and the table to answer the questions given below.

The following table gives the information of 200 people in a sports village in which each plays either kabaddi or hockey or both. Due to some problem while entering the data, some vital information is lost. The following table shows the remaining data.

	Kabaddi	Hockey	Both	Total
Men	90			
Women				
Total		130		200

The Information available is :
(i) The ratio of number of men to women is 5: 3.
(ii) $27\frac{1}{2}$ % of the total number of people play both the games.
(iii) None of the women plays both the games.

33. How many women play only hockey?
(1) 28 (2) 30 (3) 17 (4) 40

34. How many people play both hockey and kabaddi?
(1) 55 (2) 35 (3) 40 (4) 36

35. How many men play only Kabaddi?
(1) 40 (2) 55 (3) 32 (4) 35

36. How many people play at most one game?
(1) 130 (2) 145 (3) 150 (4) 170

37. How many people play kabaddi?
(1) 110 (2) 140 (3) 125 (4) 100

Directions for questions 38 to 41: Read the data given below and then answer the questions that follow.

A survey is conducted among 105 people. Among them 47 people have TVs, 59 people have ACs and 38 people have cars. 16 people have both a T.V and an A.C, 15 people have both a A.C and a car and 17 people have both a car and a T.V. Each of them has at least one of the three.

38. How many people have all the three?
(1) 10 (2) 8 (3) 9 (4) 7

39. How many people have exactly two?
(1) 20 (2) 15 (3) 12 (4) 21

40. How many people have only T.V?
(1) 37 (2) 15 (3) 23 (4) 20

41. How many people have either a T.V or a car but not a A.C?
(1) 50 (2) 46 (3) 45 (4) 58

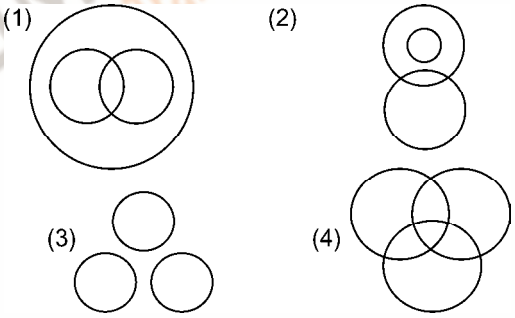
Directions for questions 42 and 43: questions are based on the data given below.

In a colony, it is known that three brands of mobile phones are used, namely Nokia, Samsung and Micromax. 70 families use only one brand, 47 families use exactly two brands and 8 use all the three brands. It is assumed that each family uses at least one of these three brands.

42. How many families are there in the colony?
(1) 75 (2) 100 (3) 105 (4) 125

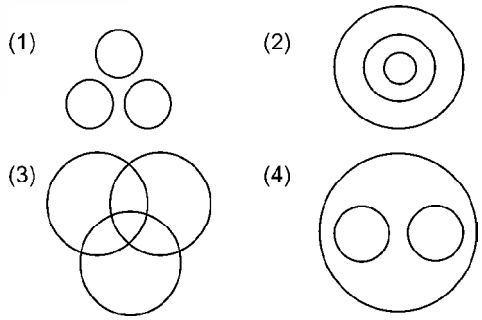
43. How many families use at least two brands?
(1) 117 (2) 55 (3) 47 (4) 125

Directions for questions 44-48: These questions are based on the following diagrams. In each question a group of words is given which is related to one of the four given diagrams. Observe the diagrams carefully and mark the number of that figure as your answer which you feel would best fit into the group of words given in each question.



44. Blue, Red, Green
45. Players, Students, Actors
46. Odd numbers, Prime numbers, Odd multiples of nine
47. Natural numbers, even natural numbers, Prime numbers
48. Europe, Asia, Africa

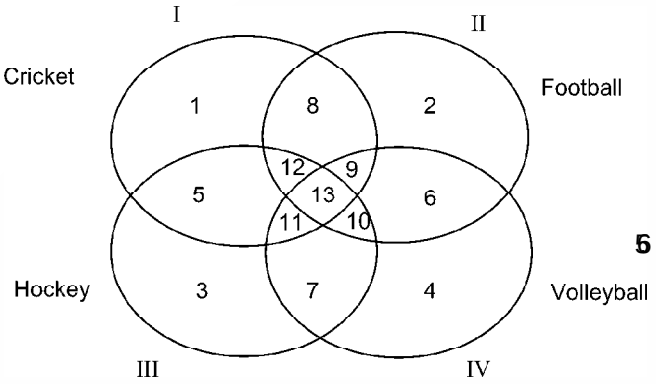
Directions for question 49-55 : Choose the Venn diagram which best illustrates the three given classes in each question:



(5) None of the above

49. Cricket, Tennis, Football
50. Whole numbers, integers, natural numbers
51. India, Hyderabad, Mumbai
52. Asia, India, Pune
53. Father, son, family
54. Maths, algebra, geometry
55. Dancers, actors, singers

Directions for questions 56 to 60 **:** These questions are based on the following diagram.



Which of the following represents the students who play all the four games?
(1) 10 (2) 11 (3) 13 (4) 9 (5) 7

57. Which of the following represents the students who play both cricket and football but not any other game?
(1) 1 and 2 (2) 1, 8 and 2 (3) 8
(4) 1, 8,9, 13 and 2 (5) 8, 2 and 13

58. Which of the following represents the students who play volleyball but not any other game?
(1) 10, 6, 7 and 4 (2) 13, 10, 6, 7 and 4
(3) 10, 6 and 4 (4) 7 and 6 (5) 4

59. Which of the following represents the students who play only football or only hockey?
(1) 3 and 2 (2) 13 (3) 3, 10 and 2
(4) 13 and 2 (5) None of these

60. Which of the following represents the students who play neither football nor volleyball?
(1) 1 and 3 (2) 1, 7 and 3 (3) 1, 5, 8, 3 and 4
(4) 1, 5 and 3 (5) 3, 5 and 7

Venn Diagrams																							
1	1	**6**	4	**11**	3	**16**	4	**21**	2	**26**	3	**31**	1	**36**	2	**41**	2	**46**	2	**51**	4	**56**	3
2	2	**7**	2	**12**	1	**17**	1	**22**	3	**27**	2	**32**	3	**37**	3	**42**	4	**47**	1	**52**	2	**57**	3
3	2	**8**	1	**13**	5	**18**	2	**23**	4	**28**	1	**33**	4	**38**	3	**43**	2	**48**	3	**53**	4	**58**	5
4	2	**9**	2	**14**	4	**19**	3	**24**	4	**29**	2	**34**	1	**39**	4	**44**	3	**49**	1	**54**	4	**59**	1
5	3	**10**	1	**15**	2	**20**	1	**25**	1	**30**	1	**35**	4	**40**	3	**45**	1	**50**	2	**55**	3	**60**	4