

# Fundamentals of Venn Diagram

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Logical Reasoning forms an integral part of most of the examinations. It is continuously undergoing a sophistication process and acquiring the resultant perfection.

On encountering the test of Logical Reasoning, candidates are bewildered to see the problems in the tests as they appear not only silly but also totally alien to this world.

Logic comes from the Greek root *logos* that means 'a word connoting expression of thought in language'. So logic is the science of thoughts expressed in language.

Logical Reasoning is the process of thinking that disciplines our mind to arrive at valid inferences and conclusions by following the rules of formal logic.

## Logical Reasoning Diagrams

In questions based upon the logical reasoning diagrams, students are expected to establish a relationship among two or more items represented by diagrams.

The logical reasoning diagram questions have various figures, i.e. triangles, rectangles, circles, squares etc. Each of these figures represents a set. It could be a set of animals, cutlery, individuals, groups, classes, or categories of individuals. Any two figures can have three types of relationships.

### Solved Examples

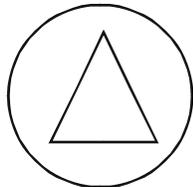
#### Relation 1:

One set being a subset or a part of the other.

##### Example:

A circle representing educated people and a triangle representing postgraduates.

This is represented as follows.



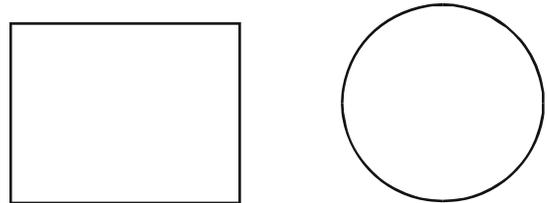
#### Relation 2:

Both sets being mutually exclusive or unrelated.

##### Example:

A square representing females and a circle representing males.

This is represented as follows.



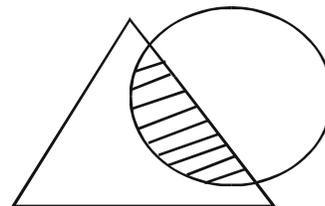
#### Relation 3:

If both sets have some common characteristics, then the figures will have a certain interlocking or overlapping area.

##### Example:

A triangle representing males and a circle representing tennis players.

This is represented as follows:



The shaded area here represents those males who are tennis players.



## Exercise

**Directions for questions 1 to 5:** Read the following information carefully and answer the questions that follow.



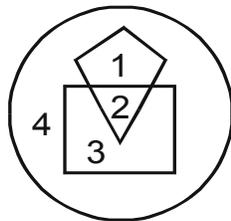
denotes shooters



denotes Hardcore criminals

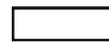


denotes Terrorists



- Shooters, who are Terrorists as well as Hardcore criminals, are represented by
  - 1
  - 2
  - 3
  - 4
- Terrorists, who are not Hardcore criminals, are represented by
  - 2
  - 3
  - 4
  - 1
- Hardcore criminals, who are not Terrorists, are represented by
  - 3
  - 4
  - 2
  - 1
- Number 4 represents
  - Terrorists who are not Hardcore criminals
  - Hardcore criminals who are not Terrorists
  - Shooters who are neither Terrorists nor Hardcore criminals
  - Shooters who are Terrorists
- Shooters, who are either Terrorists or Hardcore criminals but not both of them, are represented by
  - 2 and 3
  - 1 and 2
  - 3 and 4
  - 1 and 3

**Directions for questions 6 to 15:** From the given diagram choose the correct option that represents the relationships asked in the following questions.



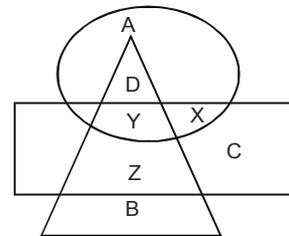
represents Medical Specialists



represents Surgical Specialists



represents College Professors



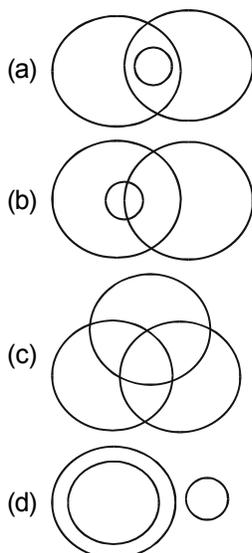
- College Professors who are also Surgical Specialists are represented by
  - A, Y
  - B, A
  - C, X
  - D, Y
- Surgical Specialists who are also Medical Specialists but not Professors are represented by
  - X
  - Y
  - Z
  - D
- College Professors who are both Medical as well as Surgical Specialists are represented by
  - D
  - Y
  - C
  - X
- College Professors who are also Medical Specialists are represented by
  - Y, Z
  - Z, X
  - X, Y
  - A, Y
- The section A represents
  - College Professors who may or may not be Surgical Specialists
  - College Professors who are Surgical Specialists
  - College Professors who are neither Surgical nor Medical Specialists
  - College Professors who are Medical Specialists
- College Professors who are Medical Specialists but not Surgical Specialists, and College Professors who are Surgical Specialists but not Medical Specialists are respectively represented by
  - X and Y
  - X and D
  - D and X
  - X and Z

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12. Those who are Surgical as well as Medical Specialists but not College Professors are represented by  
 (a) Z and B (b) B and X  
 (c) Z and D (d) Z only
13. Those who are either only College Professors or only Surgical Specialists or only Medical Specialists are represented by  
 (a) X, A and B (b) A, B and C  
 (c) X, Y and Z (d) Y, B and Z
14. The section B represents  
 (a) College Professors who are not Medical Specialists  
 (b) College Professors who are not Surgical Specialists  
 (c) College Professors who are neither Medical nor Surgical Specialists  
 (d) Surgical Specialists who are neither College Professors nor Medical Specialists
15. The section C represents  
 (a) College Professors who are Surgical Specialists  
 (b) Surgical Specialists who are Medical Specialists  
 (c) Medical Specialists who are neither Surgical Specialists nor College Professors  
 (d) Surgical Specialists who are Medical Specialists but not College Professors

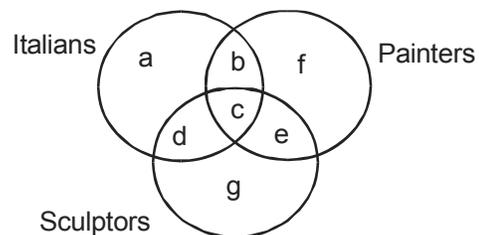
**Directions for questions 16 to 25:** From among the given four figures (a), (b), (c) and (d), choose the figure that represents the relationship among the three given classes in the questions.



16. Architects, Human beings, Cows  
 17. Men, Male PhD students, University students  
 18. India, Orissa, Sydney  
 19. Doctors, Men, Professors  
 20. Men, Tennis players, Bachelors  
 21. Books, Pages, Pen  
 22. Optical instruments, Lens, Cap  
 23. Stationery, Pen, Mango  
 24. Males, Husbands, Workers  
 25. Telephones, Mobile phones, Almira

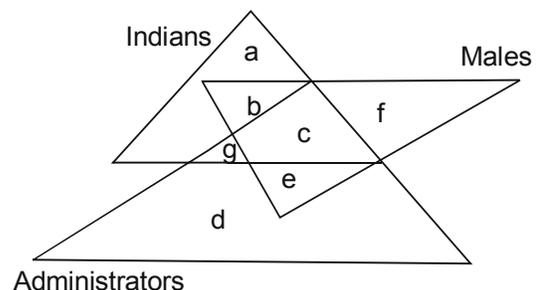
**Directions for questions 26 to 50:** The diagram given below has figures which interlock each other. Each figure represents a certain section of people (indicated below it). Different regions of the diagram are lettered from a to g. Read the statements given in the questions and write down the letter of the region which represents the statement.

**Directions for questions 26 to 30:** Answer the questions based on the following diagram.



26. Italians who are Painters but not Sculptors.  
 27. Painters who are neither Italians nor Sculptors.  
 28. Italians who are neither Painters nor Sculptors.  
 29. Italians who are Sculptors but not Painters.  
 30. Italians who are Painters as well as Sculptors.

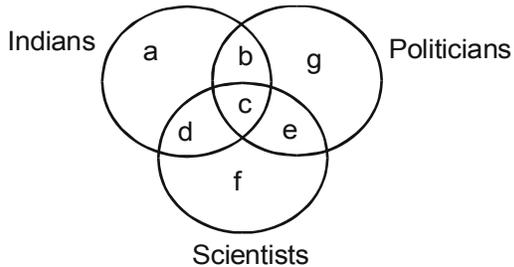
**Directions for questions 31 to 35:** Answer the questions based on the following diagram.



31. Indians who are neither Males nor Administrators.  
 32. Indian females who are Administrators.  
 33. Males who are Indians as well as Administrators.  
 34. Administrators who are non-Indians and females.  
 35. Indian Males who are not Administrators.

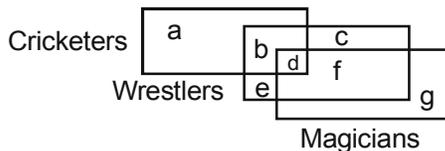
## 1.4

**Directions for questions 36 to 40:** Answer the questions based on the following diagram.



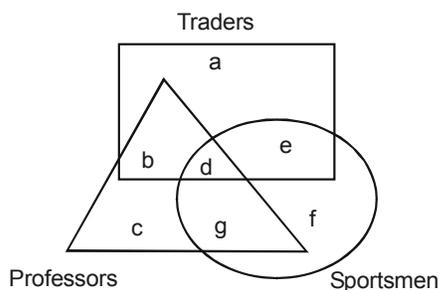
36. Indians who are neither Politicians nor Scientists.
37. Indians who are Politicians but not Scientists.
38. Scientists who are Indians but not Politicians.
39. Non-Indian Scientists who are not Politicians.
40. Indians who are Scientists as well as Politicians.

**Directions for questions 41 to 45:** Answer the questions based on the following diagram.



41. Cricketers who are Wrestlers but not Magicians.
42. Magicians who are Wrestlers but not Cricketers.
43. Wrestlers who are Cricketers but not Magicians.
44. Magicians who are neither Wrestlers nor Cricketers.
45. Cricketers who are Wrestlers as well as Magicians.

**Directions for questions 46 to 50:** Answer the questions based on the following diagram.

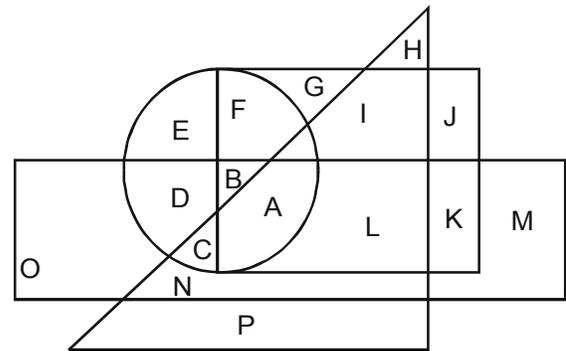


46. Professors who are neither Traders nor Sportsmen.
47. Professors who are Sportsmen but not Traders.
48. Professors who are Sportsmen as well as Traders.
49. Professors who are Traders but not Sportsmen.
50. Traders who are neither Professors nor Sportsmen.

**Directions for questions 51 to 65:** The diagrams given below have four figures which are interlocked. Different regions of the diagram are indicated by various letters. Study the diagram carefully and answer the questions that follow it.

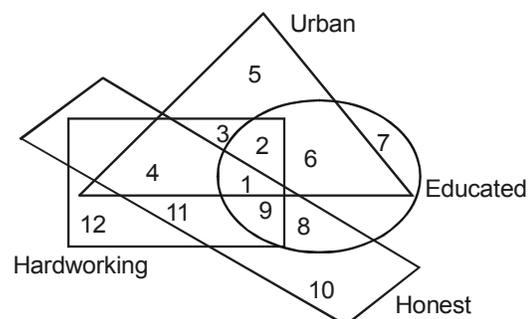
## Fundamentals of Venn Diagram

**Directions for questions 51 to 55:** Answer the questions based on the following diagrams.



51. In the diagram, which one of the following letters is inside the square and the triangle but outside the rectangle and the circle?
  - (a) G
  - (b) I
  - (c) L
  - (d) A
52. In the diagram, which one of the following letters is outside the square and the triangle but inside the rectangle and the circle?
  - (a) D
  - (b) B
  - (c) C
  - (d) A
53. In the diagram, which one of the following letters is in the square, circle and rectangle but not in the triangle?
  - (a) E
  - (b) D
  - (c) C
  - (d) B
54. In the diagram, which one of the following letters is inside all the figures?
  - (a) C
  - (b) B
  - (c) A
  - (d) Q
55. In the diagram, which one of the following letters is in the rectangle, square and triangle but not in the circle?
  - (a) B
  - (b) C
  - (c) A
  - (d) L

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

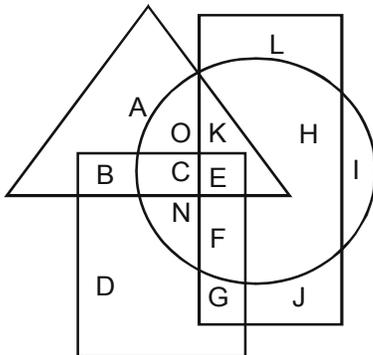


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56. Educated, Hardworking and Honest Urban people are indicated in the diagram by  
 (a) 1 (b) 2  
 (c) 3 (d) 4
57. Urban people who are Hardworking and Educated but not Honest are indicated by  
 (a) 1 (b) 2  
 (c) 3 (d) 4
58. Non-Urban, Educated people who are neither Hardworking nor Honest are indicated by  
 (a) 5 (b) 7  
 (c) 10 (d) 11
59. Urban, Educated people who are neither Honest nor Hardworking are indicated by  
 (a) 2 (b) 4  
 (c) 6 (d) 9
60. Honest, Educated and Hardworking non-Urban people are indicated by  
 (a) 3 (b) 4  
 (c) 6 (d) 9

**Directions for questions 61 to 65:** Answer the questions based on the following diagram.

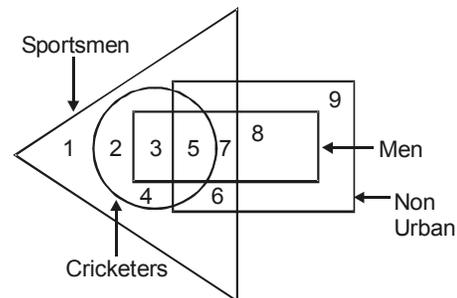


61. In the diagram, which one of the following letters is inside the rectangle and square but outside the triangle and circle?  
 (a) G (b) H  
 (c) F (d) J
62. In the diagram, which one of the following letters is in the triangle and circle but out of the rectangle and square?  
 (a) C (b) O  
 (c) E (d) K
63. In the diagram, which one of the following letters is in the circle, triangle and rectangle but out of the square?  
 (a) M (b) E  
 (c) H (d) K

64. In the diagram, which one of the following letters is common to all the figures?  
 (a) K (b) F  
 (c) E (d) C
65. In the diagram, which one of the following letters is in the circle, rectangle and square but out of the triangle?  
 (a) G (b) N  
 (c) C (d) F

**Directions for questions 66 to 69:** Answer the questions based on the following diagram.

The following diagram is made up of four interlocked figures. Each figure stands for a certain cross section of people as indicated therein.



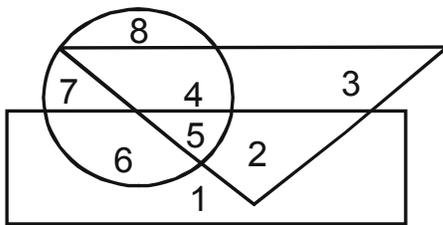
66. As per the diagram, which one of the following statements is true?  
 (a) All non-urban persons are sportsmen  
 (b) There are no men who are sportsmen and do not play cricket  
 (c) All urban men are not sportsmen  
 (d) All urban men play cricket
67. According to the diagram, which one of the following statements is true?  
 (a) There are some non-urban female who are sportsmen but not cricketers.  
 (b) There are some urban men who are not cricketers but who are sportsmen.  
 (c) There are no non-cricketer sportsmen among the non-urban men.  
 (d) There are some urban men who are not cricketers.
68. As per the diagram, which of the following statements is definitely false?  
 (a) There are some sportsmen who are neither men nor non-urban and do not play cricket.  
 (b) All urban men play cricket.  
 (c) All urban men are not sportsmen.  
 (d) There are some non-urban female who play cricket and are sportsmen.

## 1.6

69. According to the diagram, which of the following statements is not true?
- There are some non-urban, female who are neither sportsmen nor cricketers.
  - All non-urban men are sportsmen.
  - Every urban man is a cricketer.
  - There are some non-urban female who play cricket.

**Directions for questions 70 to 75:** Study the figure carefully and answer the questions that follow.

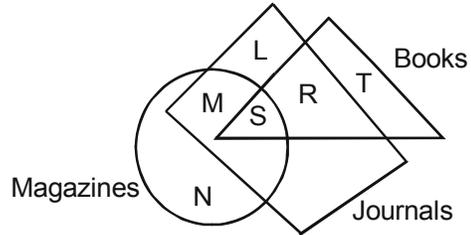
In the following figure, the triangle represents doctors, the circle represents players and the rectangle represents artists.



70. Which numbered-space in the figure represents doctors who are also players and artists?
- 2
  - 3
  - 4
  - 5
71. Which numbered-space in the figure represents artists who are players?
- 5 and 6
  - 6 and 7
  - 5 and 8
  - 4 and 6
72. Which numbered-space in the figure represents artists who are neither players nor doctors?
- 1
  - 2
  - 3
  - 4
73. Which numbered-space in the figure represents doctors who are neither players nor artists?
- 2
  - 4
  - 3
  - 5
74. Which numbered-space in the figure represents players who are neither artists nor doctors?
- 1, 2
  - 3, 4
  - 6, 7
  - 7, 8
75. Which numbered-space in the figure represents doctors who are players but not artists?
- 2
  - 3
  - 4
  - 5

**Directions for questions 76 to 80:** From the given diagram, find out the letters representing the relations asked in the questions that follow.

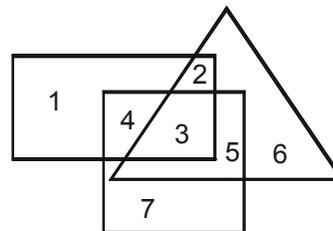
## Fundamentals of Venn Diagram



76. Which among the following represents the Magazines which are Books but not Journals?
- M
  - L
  - N
  - No such letter
77. Books that are neither Magazines nor Journals are represented by
- L
  - N
  - M
  - T
78. Journals that are neither Books nor Magazines are represented by
- N
  - T
  - L
  - M
79. Books which are Journals but not Magazines are represented by
- S
  - M
  - L
  - R
80. Magazines which are Books as well as Journals are represented by
- R
  - S
  - L
  - N

**Directions for questions 81 to 85:** Answer the questions based on the following information.

In the given diagram, the rectangle represents doctors, the square represents painters and the triangle represents musicians.



81. Doctors who are musicians but not painters are denoted by
- 2
  - 3
  - 4
  - 6
82. The number that represents musicians and painters but not doctors is denoted by
- 2
  - 4
  - 5
  - 6

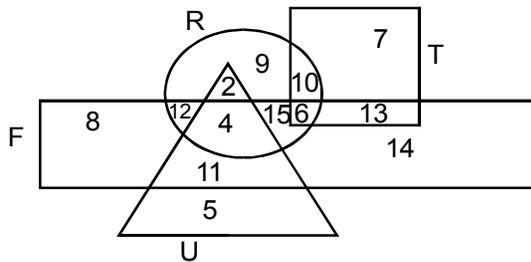
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83. Which number represents doctors who are musicians as well as painters?  
 (a) 2 (b) 3  
 (c) 4 (d) 5
84. Musicians who are neither doctors nor painters are represented by  
 (a) 1 (b) 2  
 (c) 3 (d) 6
85. Which number represents doctors who are painters but not musicians?  
 (a) 2 (b) 3  
 (c) 4 (d) 5

**Directions for questions 86 to 90:** Answer the questions based on the following information.

In the given diagram, the rectangle represents females, the triangle represents uneducated, the circle represents rural, and the square represents teachers.



86. Who among the following is an uneducated female who is not a rural resident?  
 (a) 4 (b) 5  
 (c) 9 (d) 11
87. Who among the following is a male, rural resident and also a teacher?  
 (a) 6 (b) 7  
 (c) 10 (d) 13
88. Who among the following is an uneducated female who hails from rural area?  
 (a) 4 (b) 2  
 (c) 11 (d) 5
89. Who among the following is a teacher and also a rural female?  
 (a) 2 (b) 11  
 (c) 12 (d) 6
90. Who among the following is a male teacher, not belonging to a rural area?  
 (a) 7 (b) 13  
 (c) 4 (d) 6



## Answer Key

1. (c)	2. (d)	3. (a)	4. (c)	5. (d)	6. (d)	7. (c)	8. (b)	9. (c)	10. (c)
11. (b)	12. (d)	13. (b)	14. (d)	15. (c)	16. (d)	17. (a)	18. (d)	19. (c)	20. (b)
21. (d)	22. (d)	23. (d)	24. (b)	25. (d)	26. (b)	27. (f)	28. (a)	29. (d)	30. (c)
31. (a)	32. (g)	33. (c)	34. (d)	35. (b)	36. (a)	37. (b)	38. (d)	39. (f)	40. (c)
41. (b)	42. (f)	43. (b)	44. (g)	45. (d)	46. (c)	47. (g)	48. (d)	49. (b)	50. (a)
51. (b)	52. (a)	53. (d)	54. (c)	55. (d)	56. (a)	57. (b)	58. (b)	59. (c)	60. (d)
61. (a)	62. (b)	63. (d)	64. (c)	65. (d)	66. (d)	67. (a)	68. (c)	69. (b)	70. (d)
71. (a)	72. (a)	73. (c)	74. (d)	75. (c)	76. (d)	77. (d)	78. (c)	79. (d)	80. (b)
81. (a)	82. (c)	83. (b)	84. (d)	85. (c)	86. (d)	87. (c)	88. (a)	89. (d)	90. (a)



## Explanations

1. c 2 is the area common to shooters, hardcore criminals and terrorists.
2. d 1 is the part of the area representing terrorists and not common with hardcore criminals.
3. a 3 is the part of the area representing hardcore criminals and not common with terrorists.
4. c 4 represents that portion of the area represented by shooters who are neither terrorists nor hardcore criminals.
5. d 1 represents shooters who are terrorists but not hardcore criminals. 3 represents shooters who are only hardcore criminals.
6. d D and Y represent the common area between circle (college professors) and triangle (surgical specialists).
7. c Z represents the common area between triangle (surgical specialists) and rectangle (medical specialists) only.
8. b This is the area common between all three – circle, triangle and rectangle is represented by Y.
9. c X and Y is the area common to college professors (circle) and medical specialists (rectangle).
10. c A represents college professors only.
11. b College Professors who are Medical Specialists but not Surgical Specialists and College Professors who are Surgical Specialists but not Medical Specialists are represented by regions X and D respectively.
12. d Z represents the area common to surgical and medical specialists but not common to the area representing college professors.
13. b Those who are either College Professors or Surgical Specialists or Medical Specialists are represented by A, B and C respectively.
14. d The section B represents Surgical Specialists who are neither College Professors nor Medical Specialists.
15. c The section C represents Medical Specialists who are neither Surgical Specialists nor College Professors.
16. d All architects are human beings. No cows are human beings or architects.
17. a All male Ph.D students are men. All male Ph.D students are university students. Some university students are men.
18. d Orissa is in India. Sydney is not in Orissa or India.
19. c Some men are doctors. Some men are professors. Some doctors are professors.
20. b All bachelors are men. Some tennis players are men. Some tennis players are bachelors.
21. d All pages are in books. Pen is not related to books or pages.
22. d All lens are in optical instruments. Cap is an unrelated item.
23. d All pen are a part of stationery. Mango is an unrelated item.

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24. b All husbands are males. Some workers are husbands. Some workers are male.
25. d All mobile phones are telephones. Almirah is not related.
26. b Italians who are Painters but not Sculptors are represented by **region b**.
27. f Painters who are neither Italians nor Sculptors are represented by **region f**.
28. a Italians who are neither Painters nor Sculptors are represented by **region a**.
29. d Italians who are Sculptors but not Painters are represented by **region d**.
30. c Italians who are painters as well as Sculptors are represented by **region c**.
31. a Indians who are neither Males nor Administrators are represented by **region a**.
32. g Indian females who are Administrators are represented by **region g**.
33. c Males who are Indians as well as Administrators are represented by **region c**.
34. d Administrators who are non-Indians and females are represented by **region d**.
35. b Indian Males who are not Administrators are represented by **region b**.
36. a Indians who are neither Politicians nor Scientists are represented by **region a**.
37. b Indians who are Politicians but not Scientists are represented by **region b**.
38. d Scientists who are Indians but not Politicians are represented by **region d**.
39. f Non – Indian Scientists who are not Politicians are represented by **region f**.
40. c Indians who are Scientists as well as Politicians are represented by **region c**.
41. b Cricketers who are Wrestlers but not Magicians are represented by **region b**.
42. f Magicians who are Wrestlers but not Cricketers are represented by **region f**.
43. b Wrestlers who are Cricketers but not Magicians are represented by **region b**.
44. g Magicians who are neither Wrestlers nor Cricketers are represented by **region g**.
45. d Cricketers who are Wrestlers as well as Magicians are represented by **region d**.
46. c Professors who are neither Traders nor Sportsmen are represented by **region c**.
47. g Professors who are Sportsmen but not Traders are represented by **region g**.
48. d Professors who are Sportsmen as well as Traders are represented by **region d**.
49. b Professors who are Traders but not Sportsmen are represented by **region b**.
50. a Traders who are neither Professors nor Sportsmen are represented by **region a**.
51. b The letter which is inside the square and the triangle but outside the rectangle and the circle is I.
52. a The letter which is outside the square and the triangle but inside the rectangle and the circle is D.
53. d The letter which is in the square, the circle and the rectangle but not in the triangle is B.
54. c The letter which is in all of the figures is A.
55. d The letter which is in the rectangle, the square and the triangle but not in the circle is L.
56. a Educated, Hardworking and Honest Urban people are indicated by 1.
57. b Urban people who are Hardworking and Educated but not Honest are indicated by 2.
58. b Non-Urban, Educated people who are neither Hardworking nor Honest are indicated by 7.
59. c Urban, Educated people who are neither Honest nor Hardworking are indicated in by 6.
60. d Honest, Educated and Hardworking non-Urban people are indicated by 9.
61. a The letter which is inside the rectangle and square but outside the triangle and circle is G.
62. b The letter which is in the triangle and circle but out of the rectangle and square is O.
63. d The letter which is in the circle, triangle and rectangle but out of the square is K.
64. c The letter which is common to all the figures is E.
65. d The letter which is in the circle, rectangle and square but out of the triangle is F.
66. d Area 3 represents urban men which is wholly contained in the area representing cricketers (circle).
67. a Area 6 represents non-urban, female who are sportsmen but not cricketers.
68. c Area 3 represents the urban men but they are sportsmen as well. Hence, option (c) is false.
69. b Area 8 represents non-urban men who are not sportsmen. Hence, statement (b) is false.
70. d Area 5 is common to the areas representing doctors, players and artists.
71. a Area 5 and 6 are common to the areas representing artists and players.
72. a Area 1 represents only artists.
73. c Area 3 represents only doctors.

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74. d Areas 7 and 8 represent only players.
75. c Area 4 represents the area common to doctors (triangle) and players (circle) only.
76. d There is no such area which is common to the circle and triangle but not common to the quadrilateral.
77. d Area T represents only Books.
78. c Area L represents only Journals.
79. d Area R represents Books which are Journals but not Magazines.
80. b Area S is common to all three — Books, Journals and Magazines.
81. a Area 2 is common to rectangle (doctors) and triangle (musicians) only.
82. c Area 5 is common to square (painters) and triangle (musicians) only.
83. b Area 3 is common to all three — painters, doctors and musicians.
84. d Area 6 represents only musicians.

## Fundamentals of Venn Diagram

85. c Area 4 is common to square (painters) and rectangle (doctors) only.
86. d Areas common between triangle and rectangle — 4 and 11. Out of these, 11 represents non-rural.
87. c 

Male — outside the rectangle	}	Areas 2, 9, 10
Rural — within the circle		
- Also a teacher — within the square. Hence, from above observations we conclude that area 10 is the common area.
88. a Area 4 represents an uneducated female who hails from rural area.
89. d Rural female — area common between circle and rectangle — areas 12, 4, 15 and 6. Only area 6 is part of square (teacher).
90. a Male teacher — area of the square outside the rectangle — areas 10 and 7. 7 represents a male teacher not belonging to a rural area.