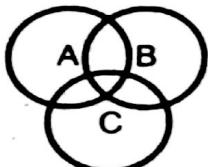


But all the pets are not dogs or cats. Also dogs and cats are not related to each other. So the given items would be represented as shown above with circle A representing Cats, circle B representing Pets and circle C representing Dogs.

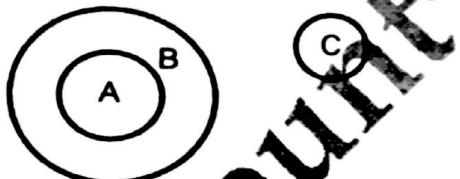
6. If the three items are partly related to one-another, they are represented as shown in the adjoining figure.



**Ex. Males (A), Government-Employees (B), Educated Persons (C).**

Clearly, some males may be government employees and some may be educated. Similarly, some government employees may be males as well as educated. Also, some educated persons may be males and government employees. So, the given items may be represented as shown above with three intersecting circles denoting the three classes.

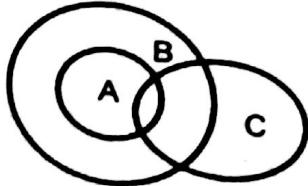
7. If one item belongs to the class of second while third item is entirely different from the other two, then they may be represented by the adjoining diagram.



**Ex. Teachers (A), Human Beings (B), Dogs (C).**

Clearly, all teachers are human beings. This would be represented by two concentric circles. But the class of dogs is entirely different from these two. Thus, these items would be represented as shown above with circle A representing Teachers, circle B representing Human Beings and circle C representing Dogs.

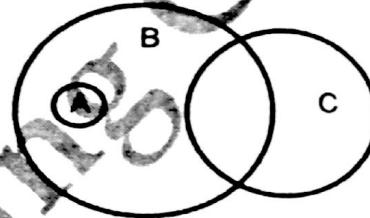
8. If one item belongs to the class of second and the third item is partly related to these two, they are represented as shown below.



**Ex. Males (B), Fathers (A), Doctors (C).**

Clearly, all fathers are males. This would be represented by two concentric circles. But, some males and some fathers can be doctors. So, the circle representing doctors would intersect each of the two concentric circles. Thus, the diagram becomes as shown with circle A representing Fathers, circle B representing Males and circle C representing Doctors.

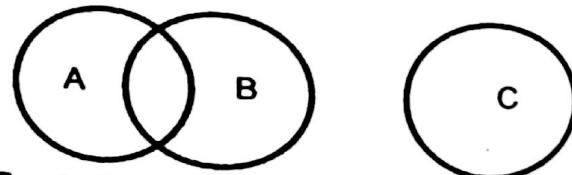
9. If one item belongs to the class of second and the third item is partly related to the second, they are represented as shown below.



**Ex. Females (B), Mothers (A), Children (C).**

Clearly, all mothers are females. This would be represented by two concentric circles. But, some Females are Children. But, Children cannot be Mothers. Thus, the diagram becomes as shown with circle A representing Mothers, circle B representing Females and circle C representing Children.

10. If two items are partly related to each other and the third item is entirely different from the two, they are represented as shown below.

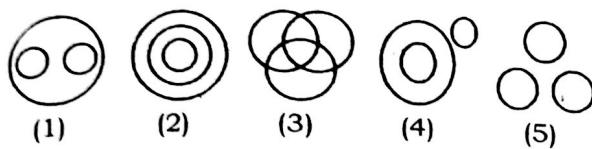


**Ex. Govt. Employees (A), Doctors (B), Children (C)**

Clearly, some Govt. employees can be doctor and vice versa. This would be represented by two intersecting circles. But the class of children would be entirely different from these two. Thus the venn diagram would be as shown with Circle A representing Govt. employees, Circle B representing doctors and circle C representing Children.

Let us take some questions in order to understand thoroughly.

**Directions (1 - 6) :** There are five diagrams (1), (2), (3), (4) and (5) given below. In the following questions, three objects/subjects are given. Choose the diagram that best illustrates the relationship between them.

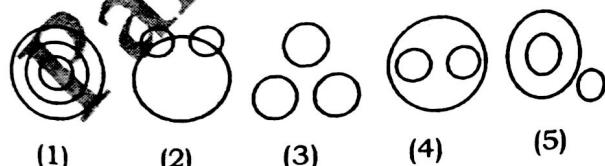


1. Furniture, Table, Books
2. Lakes, Rain, Water
3. Fathers, Brothers, Husbands
4. T-shirts, Trouzers, Skirts
5. Buses, Cars, Vehicles
6. Lemons, Citrus fruits, Chocolates

#### Answers and explanations

1. 4; 'Table' belongs to the group 'Furniture', while 'Books' do not. Hence (4).
2. 1; 'Lakes' and 'Rain' both belong to the group 'Water'. Hence (1).
3. 3; Some fathers are brothers. Some brothers are husbands. Also, some husbands are fathers. Hence, option diagram (3).
4. 5; All the three are separate items of clothing. Hence (5).
5. 1; 'Buses' and 'Cars' both belong to the group 'Vehicles'. Hence (1).
6. 4; 'Lemons' belongs to the group 'Citrus fruits', while 'Chocolates' is entirely different. Hence (4).

**Directions (7 - 10):** Each of these questions below contains three groups of things. You are to choose from the following five numbered diagrams, the diagram that depicts the correct relationship among the three groups of things in each question.



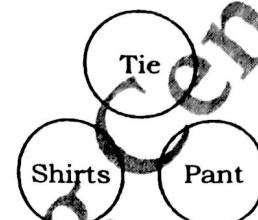
7. Tables, Chairs, Furniture
8. Tie, Shirt, Pant
9. Dogs, Pets, Cats
10. Brinjal, Meat, Vegetables

#### Answers and explanations

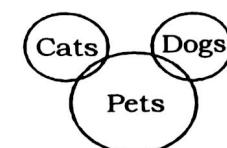
7. 4; Tables and Chairs are unrelated items. But, both are items of Furniture.



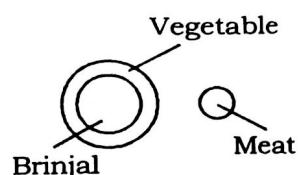
8. 3; Tie, shirt and Pant are separate items, entirely different from each other.



9. 2; Dogs and Cats are entirely different from each other. But, both are pet as well as animals.

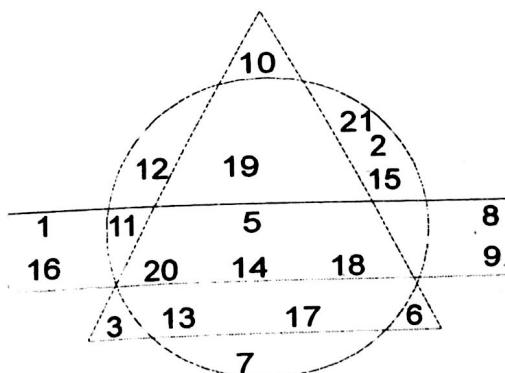


10. 5; Brinjal is a vegetable. But Meat is entirely different.



#### Exercise:

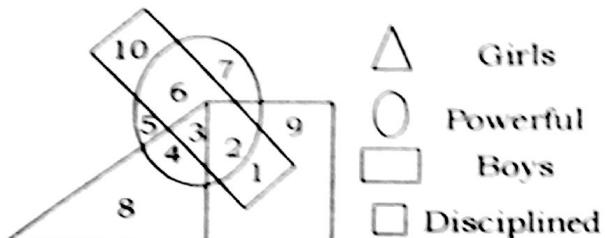
1. Study the figure formed by a circle, a rectangle and a triangle, which is shown in the following figure and answer the following questions.



From above which number (s) is/ are comprised by all the figures?

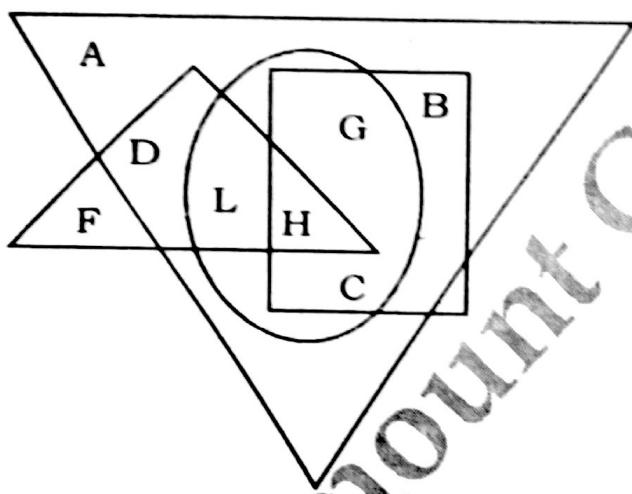
- (1) 19      (2) 13      (3) 15  
 (4) 20      (5) None of these

2. In the given figure which number represents both powerful and disciplined boys?



- (1) 1      (2) 2      (3) 6  
 (4) 10      (5) None of these

**Directions (3 - 7): These are based on the given figure . Study the following figure and answer the following questions:**



1. Bigger triangle indicates artists.
2. Smaller triangle indicates scientists.
3. Rectangle indicates dancers.
4. Circle indicates doctors.
3. According to the figure which letter represents those artists who are doctors as well as dancers?  
 (1) A      (2) G      (3) D  
 (4) F      (5) None of these

Which letters represent those artists who are neither scientists nor doctors?

- (1) A and B      (2) A and C      (3) B and G  
 (4) L and H      (5) None of these

Which letters represent those artists who are doctors as well as dancers?

- (1) A and D      (2) G and H      (3) C and A  
 (4) C and D      (5) None of these

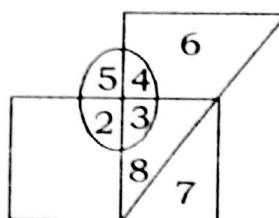
Which letter represents those artists who are neither doctors nor scientists and nor dancers?

- (1) D      (2) F      (3) A  
 (4) G      (5) None of these

Which letter represents those scientists who are not artists?

- (1) B      (2) D      (3) L  
 (4) P      (5) None of these

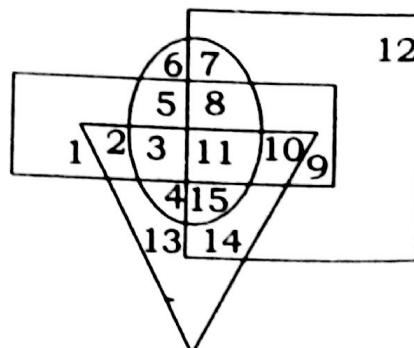
In the given figure, circle represents youths, triangle represents the persons who are in job and rectangle represents illiterate person.



Which of the following number depicts illiterate youths who have a job?

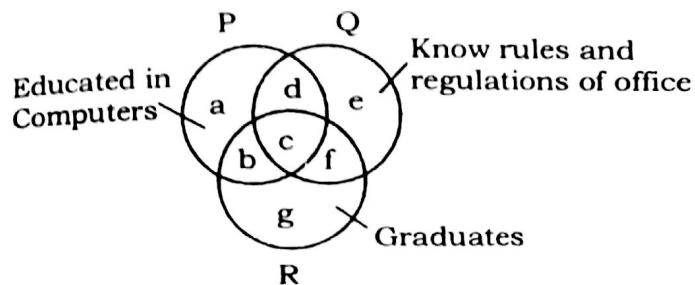
- (1) 5      (2) 4      (3) 3  
 (4) 10      (5) None of these

9. In the given Venn-Diagram, circle represents sportsperson, square represents unmarried, triangle represents women and rectangle represents literate. Each part has a number in it. Study the diagram and answer the following questions.



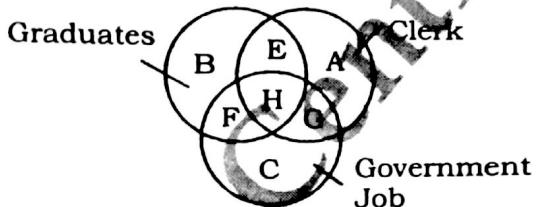
- Which classes are represented by number 11? 14. Which alphabet represents those candidates who are graduates, know rules and regulations of office but don't know computers?
- Married, literate sportswomen
  - Unmarried, illiterate sportswomen
  - Married, literate sportsmen
  - Unmarried, literate sportswomen
  - None of these
- c
  - e
  - f
  - g
  - None of these

**Directions (10 - 14): In the following diagram, there are 3 intersecting circles showing 3 different classes, one showing those candidates who have knowledge in computers, second showing those who know rules and regulations of office and third showing graduates. Each part of the diagram is represented by an alphabet.**

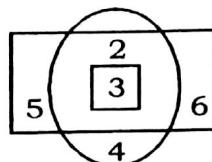


- Which alphabet represents those candidates who have knowledge in computers, know rules and regulations of office but are not graduates?
  - Which alphabet represents those candidates who have knowledge in computers but are neither graduates nor they know rules and regulations?
  - Which alphabet represents those candidates who know computers and are graduates but do not know about rules and regulations?
  - Which alphabet represents those candidates who have knowledge in computers, know rules and regulations of office and are also graduates?
- b
  - c
  - d
  - f
  - None of these
- a
  - b
  - c
  - d
  - None of these
- e
  - f
  - c
  - b
  - None of these
- b
  - c
  - f
  - g
  - None of these

- Which part represents those clerks who are graduates and have government job?
- E
  - H
  - G
  - F
  - None of these



**Directions (16 - 19): In the following figure circle represents literate, bigger rectangle represents healthy and smaller rectangle represents rich people:**



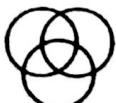
- Which number represents those literates who are neither rich nor healthy?
  - Illiterates who are not healthy is represented by:
  - Choose which is not correct:
  - Choose which is right:
- 4
  - 2
  - 5
  - 6
  - None of these
- 2
  - 4
  - 6
  - None of these
- To be rich, one must be literate
  - To be rich, one must be healthy
  - All rich are healthy and literate.
  - None of these
- Literates who are neither healthy nor rich are zero in number.
  - Some rich are those who are not literate.
  - All rich are not healthy and literate.
  - Only in case of health, people represented by 4 are different from people represented by 2.

20. Which of the following is best represented by the above diagram?



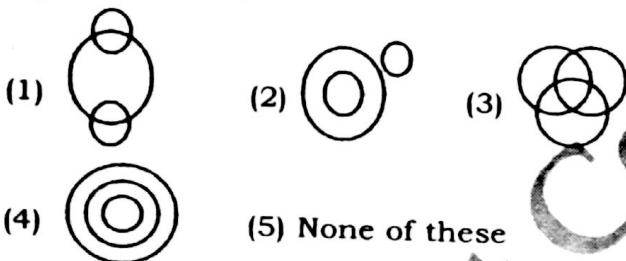
- (1) Human, Sea, Mountain
- (2) Domestic, Dog, Buffalo
- (3) Doctor, Nurse, Patient
- (4) Sun, Moon, Water
- (5) None of these

21. Which of the following is the best represented in diagram?

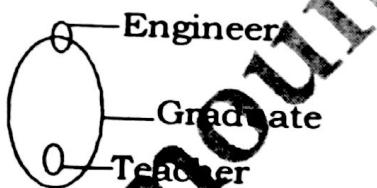


- (1) Chair, Table, Furniture
- (2) Doctor, Social person, honest person
- (3) Family, Parents, Children
- (4) Gold, Silver, Ornaments
- (5) None of these

22. District, State, Country are the best represented in:

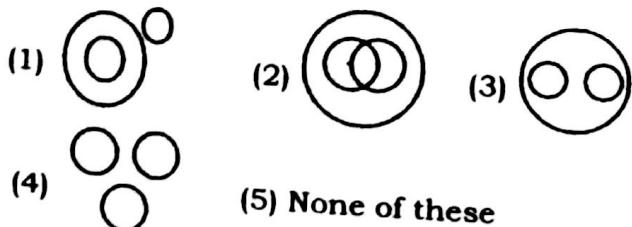


23. According to the diagram choose the wrong statement:



- (1) Some graduates are engineers
- (2) All graduates are either engineers or teachers
- (3) No teacher is an engineer
- (4) Some engineers are not graduates.
- (5) None of these

**Directions (24 - 28): Four diagrams are given for each question. Choose the best diagram that describes it.**



24. Cot, Furniture, Book

25. Fish, Reptile, Snake

26. Outdoor game, Cricket, Hockey

27. India, America, Nigeria

28. India, Meghalaya, Pondicherry.

**Directions (29 - 38): Choose the suitable diagram which represents the relation among the different classes given below.**



29. Children, Boy, Girl

30. Paper, Book, Stationery

31. Apple, Fruit, Vegetable

32. Wheat, Pulse, Grain

33. Sun, Mars, Planet

34. Elephant, Wolf, Animal

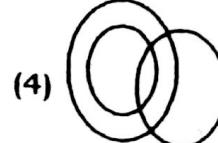
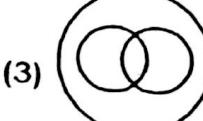
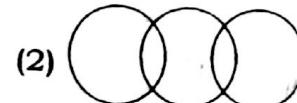
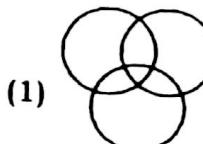
35. Pigeon, Dog, Bird

36. Teacher, Women, Student

37. Elephant, Tiger, Four-footed animal.

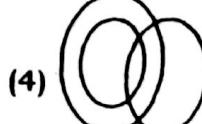
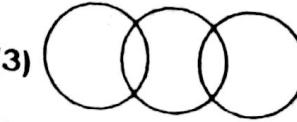
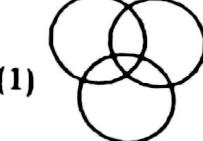
38. Revolver, Gun, Explosive

39. Which of the following diagram represents the correct relation among - Bad Elements, Pick pocket and Black-mailer.



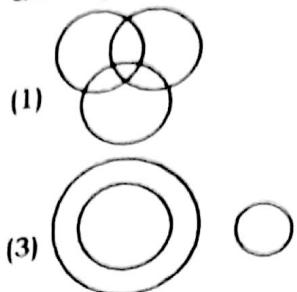
- (5) None of these

40. Which of the following diagram shows the correct relation among Tennis Player, Cricket Player and Student.

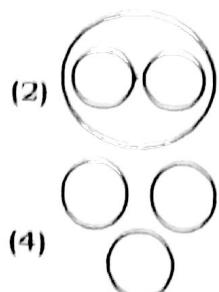


- (5) None of these

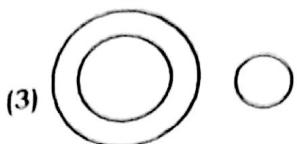
41. Which of the following diagram shows the relation between Triangle, Quadrilateral and Square.



(1) None of these



(2) None of these



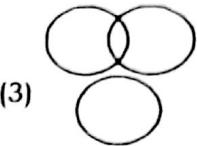
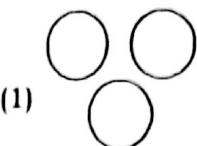
(3) None of these



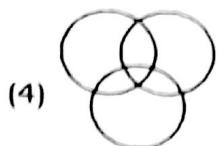
(4) None of these

(5) None of these

42. Which of the following diagram shows the relation among Elected member, M.P. and M.L.A.?



(1) None of these



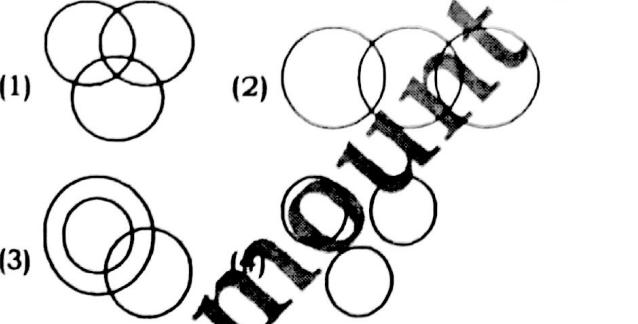
(2) None of these

(3) None of these

(4) None of these

(5) None of these

43. Which of the following diagram shows the relation among Woman, Mother and Doctor?



(1) None of these



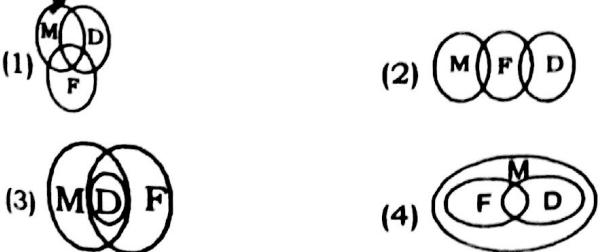
(2) None of these

(3) None of these

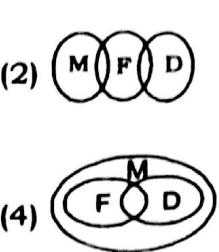
(4) None of these

(5) None of these

44. There are few members in a club in which some are female doctors. Then which of the following diagrams does not support this statement. (Here M = Member, F = Women and D = Doctor)



(1) None of these



(2) None of these



(3) None of these

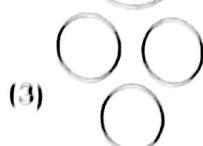


(4) None of these

(5) None of these

45.

- Which of the following diagram shows the relation among Husband, Wife and Family?



(1) None of these

(2) None of these

(3) None of these

(4) None of these

(5) None of these

46.

- Which of the following diagram shows the students who learn Law and Music, music and Dance and who learn law, Music and Dance.



(1) None of these

(2) None of these

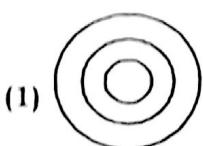
(3) None of these

(4) None of these

(5) None of these

47.

- Which of the following diagram shows the Musicians, Instrument/Players and Violinist.



(1) None of these

(2) None of these

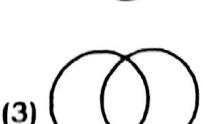
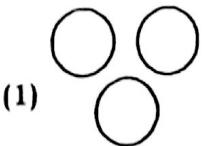
(3) None of these

(4) None of these

(5) None of these

48.

- Which of the following diagram shows Mammals, Cows and Crows?



(1) None of these

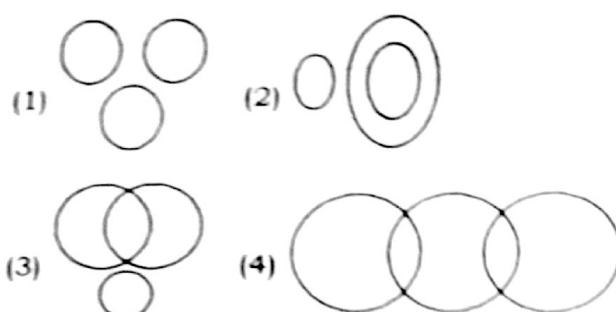
(2) None of these

(3) None of these

(4) None of these

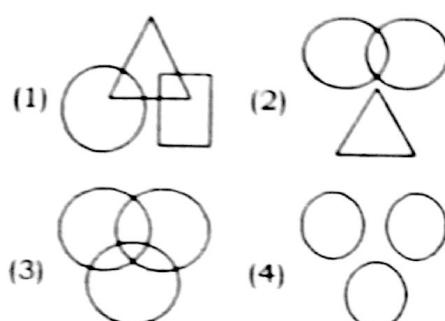
(5) None of these

49. Which of the following diagram represents Doctors, Professors & Engineers.



(5) None of these

50. Which of the following diagram represents the relation among Friend, Guide and Philosopher?



(5) None of these

#### Answers with Explanations:-

1. 4; There are only 4 numbers which are present in all the three figures: which are 5, 20, 14, 18.

Hence, the answer is (4).

2. 2; Powerful and disciplined boys means the number should be present in circle, rectangle and square.

Hence, the answer is (2).

3. 2; The letters which represents those artists who are doctor as well as dancers are C, H and G.

Hence, the answer is (2).

4. 1; The letters which represent those artists who are neither scientists nor doctors are B and A.

Hence, the answer is (1).

5. 2; The letters which represents those artists who are doctor as well as dancers are C, H and G.

Hence, the answer is (2).

6. 5; The number which represents those artists who are neither doctors, nor scientists and nor dancers are A.

Hence, the answer is (3).

7. 4; The scientists who are not artists is F. Hence, the answer is (1).

8. 3; The number of illiterate young who have a Job are three.

Hence, the answer is (3).

9. 4; Here the number 11 represents women who are Unmarried, Literate and Sports person

Hence, the answer is (4).

10. 3; Candidates who have knowledge in computers, know rules and regulation of office but are not Graduates are d.

Hence, the answer is (3).

11. 1; Those who have knowledge in computers but they are neither graduates nor they know rules and regulations are represented by a.

Hence, the answer is (1).

12. 4 13. 2 14. 3 15. 2

16. 1; Those who are neither rich nor healthy but are literates are represented by 4.

Hence, the answer is (1).

17. 4; There are no such illiterates..

Hence, the answer is (4).

18. 4; All the statements given in the question are correct.

Hence, the answer is (4).

19. 4; People represented by 4 are different than people represented by 2.

Hence, the answer is (4).

20. 2; The figure is most suitable for the Domestic, Dog and Buffalo.

Hence, the answer is (2).

21. 2; Some doctors are social person. Some social persons are honest person. Also, some honest persons are doctors.

Hence, the answer is (2).

22. 4 23. 2 24. 1 25. 1 26. 3 27. 4

28. 3 29. 4 30. 2 31. 2 32. 4 33. 2

34. 4 35. 2 36. 1 37. 4 38. 4 39. 3

40. 1 41. 3 42. 2 43. 3 44. 2 45. 4

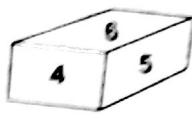
46. 1 47. 1 48. 2 49. 4 50. 3

Dice is a 3 dimensional object, which when seen from any direction shows its 3 surfaces to us. Its length, breadth and height all are equal. It has six surfaces. Each surface has 4 adjacent surfaces and no two opposite surfaces can be seen at a single time. On its 6 surfaces, numbers from 1 to 6 are written or there could be figures, indications or different colours shown on them. Dice are of two types -

(a) Standard dice

(b) Ordinary dice

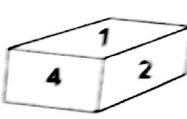
- (a) **Standard dice:** In a standard dice, sum of its any two opposite sides is 7, and no two adjacent sides can give sum of 7. Such dice is known as standard dice. Like-



$$6 + 5 = 11$$

$$5 + 4 = 9$$

$$6 + 4 = 10$$



$$1 + 2 = 3$$

$$4 + 2 = 6$$

$$1 + 4 = 5$$

- (b) **Ordinary dice:** In an ordinary dice, any two opposite surfaces can't give sum of 7, but it's adjacent sides may sum to 7, such dice is known as ordinary dice.

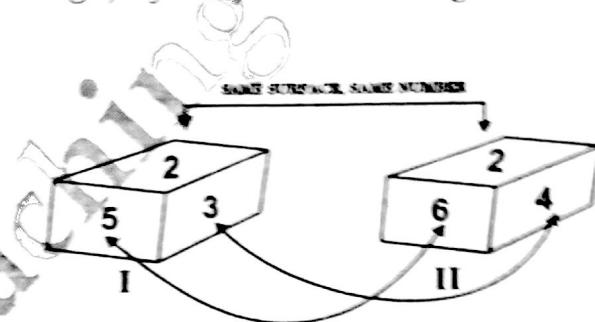


2.

the number 4, 5 or 6

which we can't see, can come opposite to 1, and as we don't know anything except this, we can't determine the exact number. So either of 4, 5 or 6 can come opposite to 1.

If any dice is represented in 2 ways and in both situations only one digit/symbol/colour is common and is represented on the same surface then the surface opposite to the common digit/symbol/colour is the digit/symbol/colour missing



**Means:**

5 is opposite to 6

3 is opposite to 4

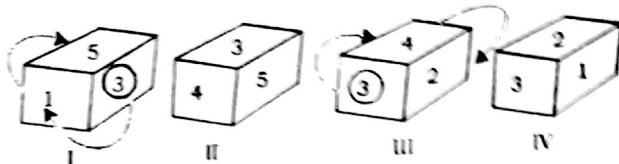
And

2 is opposite to 1 (As we can see 2, 3, 4, 5 and 6 in figure and the number missing is 1, hence number opposite to 2 is 1.)

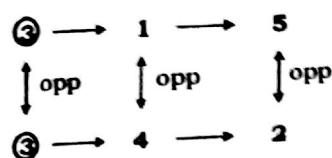
3.

**Universal Rule:** This rule can be applied to any dice (standard or ordinary). It is applicable when we have been given 2, 3 or 4 situations of a dice. To understand this rule, let us see an example.

We have been provided with 4 situations of a dice.



**By Fig I and Fig III;**



After studying this figure we have to predict which number is opposite to which number, or we have to decipher value of each face of the dice shown. Now, according to the rule, identify any two situations in which we have only one digit common. See fig. (1) and (3). In both of them we have only one digit in common i.e. 3. Now look at the fig. (1) and write the numbers as you see clockwise, starting from the common number. Here we have  $3 - 1 - 5$

Now look at the second selected figure which has only 3 in common and write its number, as we see clockwise starting from the common number. Here we have

$3 - 4 - 2$

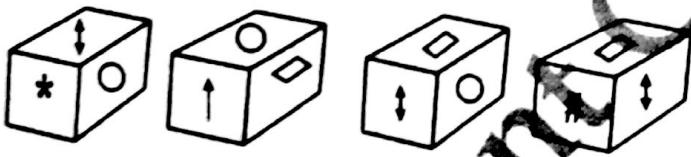
Now write both of them, one above the other as

$3 - 1 - 5$

$3 - 4 - 2$

This implies 1 is opposite to 4, 5 is opposite to 2. Now, only digit left is 6, and that would be opposite to our common number 3. By this method we can reveal all the numbers within few seconds.

**Ex. 2.**



Which symbol will be opposite to  $\downarrow$ ?

**Sol.** From universal rule we will take fig (i) and (iv) because only  $\downarrow$  symbols are common in them. After taking two figures write the symbol appearing clockwise from our common symbol  $\downarrow$ .

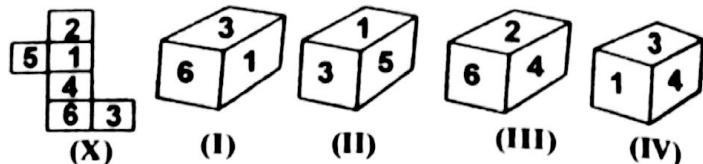
We will have:-

Fig. (i)  $\downarrow$  - O - \*

Fig. (iv)  $\downarrow$  - # - □

Hence, O is opposite to #, \* is opposite to □ and the only symbol left is  $\uparrow$  which will be opposite to our common symbol  $\downarrow$ .

**4.** Sometimes we are provided with an explanatory diagram and after folding it in a proper manner it forms a dice. Which of the following dice will be formed from the explanatory diagram given?



**Sol.** From the given figure, first we will find numbers on opposite faces.

Like:



To find out opposite faces, take alternate numbers vertically. i.e. Take 2, then leave its adjacent face (i.e. 1) and then take 4. So, 2 is opposite to 4, similarly 1 is opposite to 6 and remaining numbers 5 and 3 are opposite to each other.

In dice I, we can see 1 and 6 which cannot be possible as two opposite faces cannot be seen at the adjacent side. Hence this dice cannot be obtained by folding the explanatory diagram.

In dice II, we can see 5 and 3 which cannot be possible as two opposite faces cannot be seen at the adjacent side. Hence this dice cannot be obtained by folding the explanatory diagram.

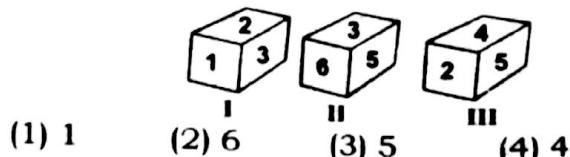
In dice III, we can see 2 and 4 which cannot be possible as two opposite faces cannot be seen at the adjacent side. Hence this dice cannot be obtained by folding the explanatory diagram.

In dice IV, 6, 5 and 2 cannot be seen which are the opposite faces of 1, 3 and 4 respectively. Hence our dice is dice IV.

### Exercise:

**Directions (1 - 4):** In the questions given below one dice has been shown in different positions, whose sides have 1 to 6 digits printed on them. Study the following positions and answer the following.

1. In the dice given below which number will be on the opposite side to 3?



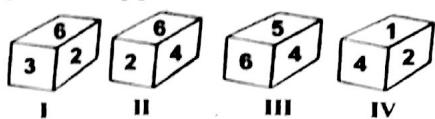
(1) 1

(2) 6

(3) 5

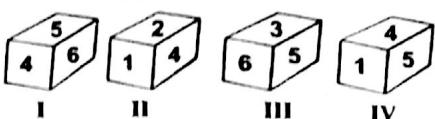
(4) 4

2. In the dice given below which number will be on the opposite side to 6? **answer the following questions.**



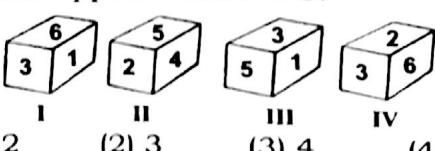
- (1) 1 (2) 2 (3) 3 (4) 4

3. In the dice given below which number will be on the opposite side to 3?



- (1) 1 (2) 2 (3) 4 (4) 6

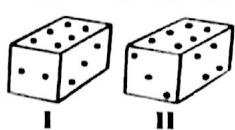
4. In the given dice which number will be on the opposite side to 3?



- (1) 2 (2) 3 (3) 4 (4) 6

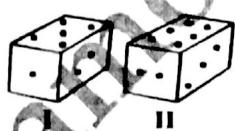
**Directions (5 - 7):** In the pictures given below two positions of a single dice is shown. Each side of the dice has dots (.) printed on it, which vary from one to six. Study the positions and answer the following questions accordingly.

5. If there are three dots at the bottom, then how many dots will be on top?



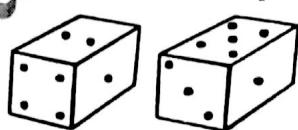
- (1) 1 or 5 (2) 2 (3) 4 (4) 5

6. If the number of dots is three on top then how many will be at bottom?



- (1) 1 (2) 4 (3) 5 (4) 6

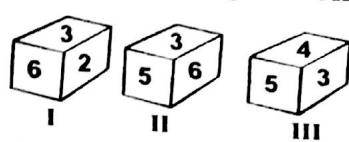
7. If 4 dots are at bottom then what will be the number of dots on top?



- (1) 3 (2) 2 (3) 5 (4) 6

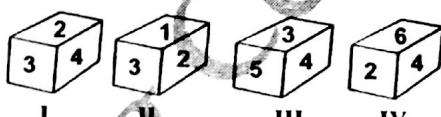
**Directions (8 - 21):** A dice has been shown in more than one positions. On their faces there can be digits/symbols/dots etc. Study carefully the different positions given and

8. What will be the digit opposite to 2?



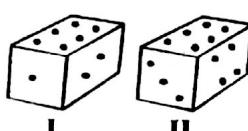
- (1) 1 (2) 4 (3) 5  
(4) Can't be determined.

9. Dice given below has been shown in four positions on which digit 1 to 6 has been shown. What will be opposite to digit 2 on this dice?



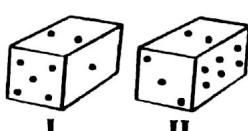
- (1) 3 (2) 4 (3) 5 (4) 6

10. A dice has been shown in two positions as given below. If the number of dots is 6 at bottom. Then what will be the number of dots on top of it?



- (1) 1 (2) 2 (3) 4 (4) 5

11. A dice has been given below in two positions. If number of dots on top is 1 then what will be the number of dots at bottom?



- (1) 1 (2) 2 (3) 3 (4) 6

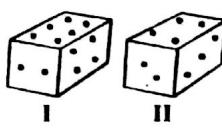
12. In question 11, which number will be on the opposite face to 6?

- (1) 1 (2) 5 (3) 4  
(4) Can't be determined.

13. In question 11, what will be at the bottom face in position I?

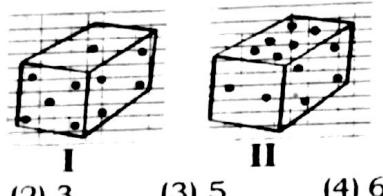
- (1) 1 (2) 4 (3) 5  
(4) None of these

14. If the number of dots is 3 at bottom then what will be the number of dots on top?



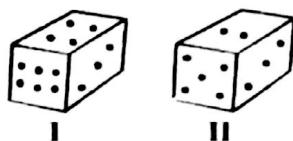
- (1) 2 (2) 1 (3) 4 (4) 6

15. A dice has been shown below in two positions. If the number of dots on top is 4 then what will be the number of dots at bottom?



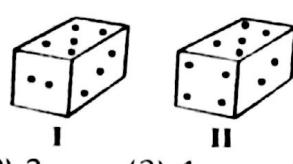
- (1) 2    (2) 3    (3) 5    (4) 6

16. A dice has been shown below in two positions. If the number of dots at bottom is 2 then what will be the number of dots on top?



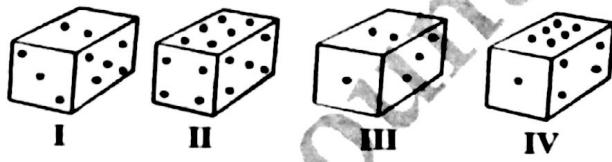
- (1) 1    (2) 4    (3) 5    (4) 6

17. A dice has been given below in two positions. If the number of dots at bottom is three then what will be the number of dots on top?



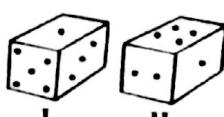
- (1) 2    (2) 3    (3) 4    (4) 6

18. What will be the number of dots opposite to the surface of 2 dots?



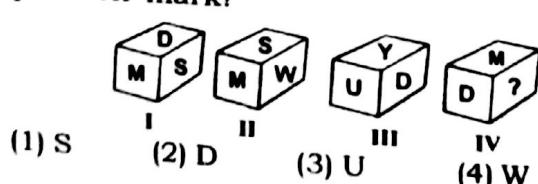
- (1) 1    (2) 4    (3) 5    (4) 6

19. If the bottom of the dice shows 2 dots, then what would be the number of dots on its top?



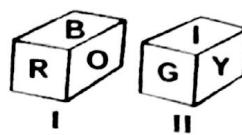
- (1) 2    (2) 3    (3) 5    (4) 6

20. Which alphabet will come in place of question mark?



- (1) S    (2) D    (3) U    (4) W

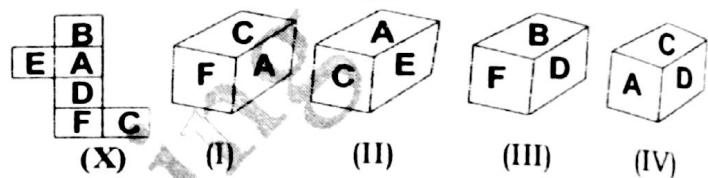
21. Colours of rainbow are shown on the faces of a dice. Which colour among the seven colours is left?



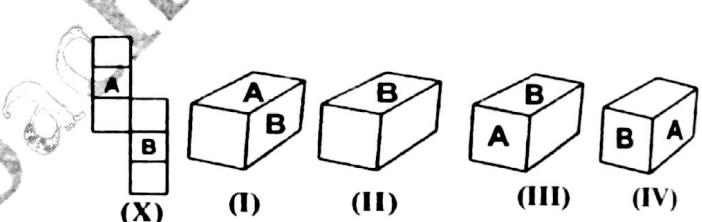
- (1) blue    (2) green  
(3) yellow    (4) violet

**Directions (22 - 29):** In each question an explanatory figure of dice is given. Study the figure and identify the correct dice formed by that figure.

22.

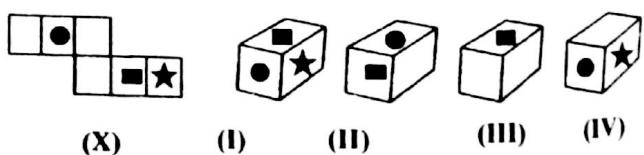


23.



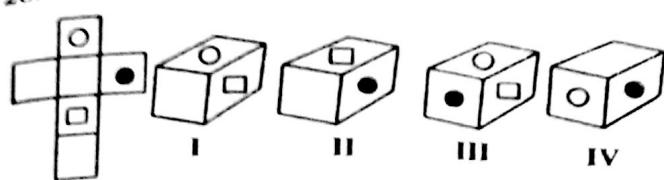
- (1) I, II and IV only  
(2) I, II and III only  
(3) II only  
(4) II and IV only

24.



- (1) I, and II only  
(2) II, III and IV only  
(3) IV only  
(4) III and IV only

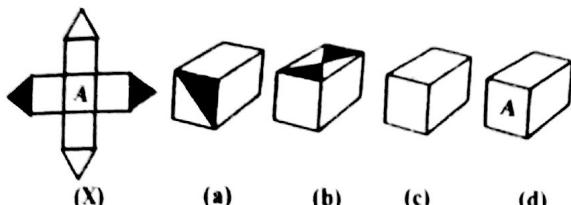
25.



- (X)  
 (1) I and III only  
 (2) II, III and IV only  
 (3) II and IV only

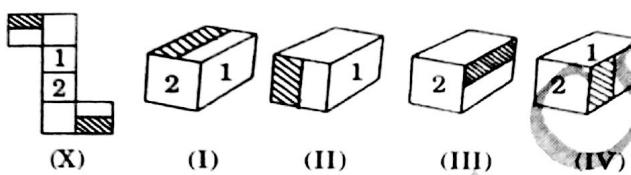
(4) III and IV only

26.



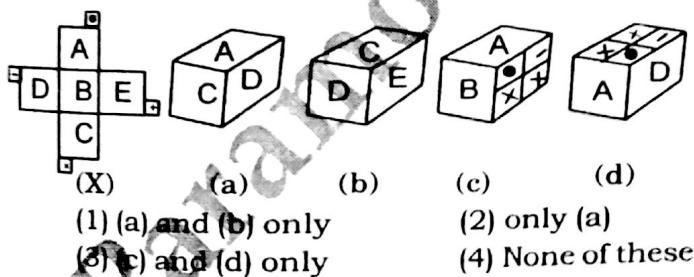
- (X)  
 (1) a and c only  
 (2) b and d only  
 (3) b and c only  
 (4) b, c and d only

27.



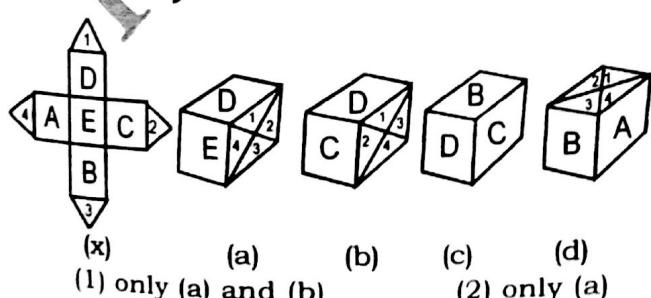
- (1) I, II, III and IV  
 (2) only I and II  
 (3) only II and III  
 (4) only I, II, and III

28.



- (1) (a) and (b) only  
 (3) (c) and (d) only  
 (4) None of these

29.



- (X)  
 (1) only (a) and (b)  
 (2) only (a)

(3) only (c) and (d)

(4) only (d)

30. How many minimum number of colours would be used to colour each surface of a dice so that no two adjacent surfaces have the same colour?

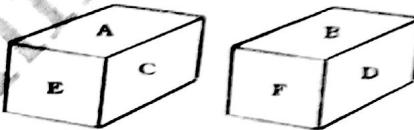
- (1) 3    (2) 8    (3) 4    (4) 5

31. Which alphabet can come in place of question mark?



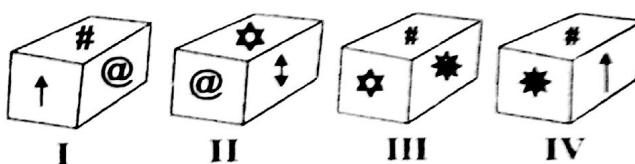
- I    (1) D    (2) F    (3) E    (4) can't be determined.

32. Below are given explanatory figures of a single dice shown in two positions, determine the correct explanatory figure.



- (1) (2) (3) (4)

Directions (33 - 35): Study all the positions of a dice and answer the following:



33. Which symbol will be opposite to #?

- (1)  $\uparrow\downarrow$     (2)  $\uparrow\uparrow$     (3)  $\star\star$     (4)  $\star\star$

34. Which symbol will be opposite to  $\uparrow\downarrow$ ?

- (1) @    (2)  $\uparrow\uparrow$     (3)  $\star\star$     (4) #

35. Which symbol will be in opposite to  $\star\star$ ?

- (1) @    (2)  $\uparrow\uparrow$     (3)  $\uparrow\downarrow$     (4)  $\star\star$

**Answer with Explanation:**

1. 4; According to the universal rule, if we identify two positions in which we have only one number in common then, we will write their sequence in clockwise manner. After studying we come to know that position I and III have only one digit in common which is 2. Writing the sequence in clockwise direction writing our common number first gives - 2 - 3 - 1. And in position III we get - 2 - 4 - 5. So according to the rule 4 is opposite to 3.
2. 1; Look at the positions I and IV of the given dice. We get only number 2 as common. Write down the numbers in clockwise direction starting from 2, we get
- 2 - 3 - 6  
2 - 4 - 1
- Obviously, 6 is opposite to 1, 3 is opposite to 4 whereas 2 is opposite to 5.
3. 3; Look at the positions III and IV of the given dice. We get only number 5 as common. Write down the numbers in clockwise direction starting from 5, we get
- 5 - 6 - 3  
5 - 1 - 4
- Obviously, 3 is opposite to 4, 6 is opposite to 1, whereas 5 is opposite to 2.
4. 3; Look at the positions II and III of the given dice. We get only number 5 as common. Write down the numbers in clockwise direction starting from 5, we get
- 5 - 4 - 2  
5 - 3 - 1
- obviously, 3 is opposite to 4, 2 is opposite to 1 whereas 5 is opposite to 6.
5. 1; Look at the two positions of the dice carefully. The adjacent surfaces of three dots surface are two, four and six dots surfaces. Therefore, these three surfaces can't be opposite to the surface having three dots.
- Thus, the surface opposite to three dots surface is either one dot surface or five dots surface.
6. 3; Here, 2 is common surface,
- 2 - 1 - 5  
2 - 6 - 3
- Obviously, 5 is opposite to 3. 1 is opposite to 6, whereas 2 is opposite to 4.
7. 1; Here, 1 is common surface.
- 1 - 4 - 2
- 1 - 3 - 5  
Obviously, 4 is opposite to 3, 2 is opposite to 5, whereas 1 is opposite to 6.
8. 3; From positions I and III, we get,  
3 - 2 - 6  
3 - 5 - 4
- Obviously, 2 is opposite to 5, 6 is opposite to 4, whereas 3 is opposite to 1.
9. 3; Look at the positions I and III of the given dice. Two numbers 3 & 4 are common. In this case the third number visible in position I will be opposite to the third number visible in position III.
- Thus, we can conclude that 2 is opposite to 5.
10. 4; Here, 6 is common surface.
- 6 - 2 - 1  
6 - 4 - 3
- Obviously, 2 is opposite to 4, 1 is opposite to 3, whereas 6 is opposite to 5.
11. 4; Here, 2 is common surface.
- 2 - 1 - 5  
2 - 6 - 3
- Obviously, 1 is opposite to 6, 5 is opposite to 3, whereas 2 is opposite to 4.
12. 1;  
13. 2  
14. 4;
- Look at the explanation of the 11<sup>th</sup> question.
15. 2; Here, 4 is common surface.
- 4 - 5 - 1  
4 - 2 - 6
- Obviously, 5 is opposite to 2, 1 is opposite to 6, whereas 4 is opposite to 3.
16. 2; Here, 3 is common surface.
- 3 - 6 - 4  
3 - 5 - 2
- Obviously, 6 is opposite to 5, 4 is opposite to 2, whereas 3 is opposite to 1.
17. 3; In the given positions two surfaces (2 dots and 5 dots) are common.
- Therefore, the third surface remaining in both the positions must be opposites to each other. Hence, 3 dots surface is opposite to 4 dots surface.
18. 4; Look at the positions I and II of the given dice.
- Here, we get

5 - 3 - 2

5 - 4 - 5

Obviously, 3 is opposite to 4, 2 is opposite to 6,

whereas 5 is opposite to 1.

19. 2; Here, dot 1 is common surface.

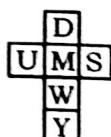
1 - 3 - 5

1 - 2 - 4

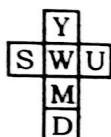
Obviously, 3 is opposite to 2, 5 is opposite to 4,

whereas 1 is opposite to 6.

20. 3; If we open the dice it will look as follow.



Now, if D is on facing surface, M is on top then the right surface will be occupied by U.



21. 4; Others are clearly visible.

22. 4; Here, from diagram X we get

$$B \leftrightarrow D$$

$$A \leftrightarrow F$$

$$E \leftrightarrow C$$

Reject the diagram I, since A and F can't be on the adjacent surfaces because A is on the surface opposite to F. Similarly, reject the diagram II, because C and E can't be on the adjacent surfaces. Also, reject the diagram III, because B and D can't be on the adjacent surfaces.

23. 3; Look at the diagram (X). On the basis of the given diagram we can conclude that A is opposite to B. Reject the diagrams I, III and IV because in these diagrams A and B are shown on adjacent surfaces.

24. 4;



Look at the diagram shown above. If we fold the diagram in order to give it a shape of dice, we get

1 is opposite to 3

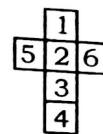
4 is opposite to 6

2 is opposite to 5

Now, with the help of the hint shown above, observe the diagram X carefully.

we get • is opposite to ■. Hence, reject the diagram I and II. In these two diagrams shaded ball and shaded rectangle are shown on adjacent surfaces.

25. 3;



Look at the diagram shown above. If we fold the diagram in order to give it a shape of dice, we get

1 is opposite to 3

2 is opposite to 4

5 is opposite to 6

Now, observe the given diagram X, we get that unshaded circle is just opposite to the surface which consists of rectangle.

Reject the diagram I and III, because in these two diagrams unshaded circle and rectangles are shown on adjacent surfaces.

26. 2 27. 4 28. 4 29. 4 30. 1

31. 2; From diagram I and II we get

$$A - B - C$$

$$A - D - F$$

Thus, we get that

B is opposite to D,

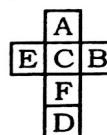
C is opposite to F,

A is opposite to E.

Look at the positions I and IV carefully, two surfaces are common.

Therefore the question mark in the position IV will be replaced by F.

32. 1;



According to the above diagram  
A is on the surface opposite to F.  
C is on the surface opposite to D.  
E is on the surface opposite to B.

33 - 35: From positions I and II, we get

@ - ↑ - #

@ - ⚡ - ↓

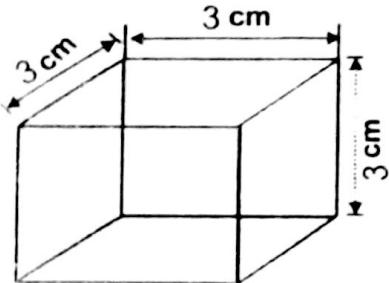
Now, we can conclude that '↑' is on the surface opposite to '⚡', '#' is on the surface opposite to '↑', whereas '@' is on the surface opposite to '⚡'

33. 1 34. 4 35. 1

- 1.** **Cube:** A cube is a three dimensional object whose length, breadth and height are all of equal measures. In addition to this a cube has the following properties-

- A cube will always have six surfaces
- A cube will always have twelve edges, and
- A cube will always have eight corners

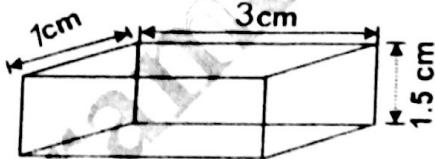
Here, **Length (s) = Breadth (s) = Height (s)**



- 2.** **Cuboid:** A cuboid is such a three dimensional object whose length, breadth and height will always be of unequal or different measures. In addition to this a cuboid has the following properties which are similar to those of a cube-

- A cuboid will always have six surfaces
- A cuboid will always have twelve edges and
- A cuboid will always have eight corners

Here, **Length (s) ≠ Breadth (s) ≠ Height (s)**

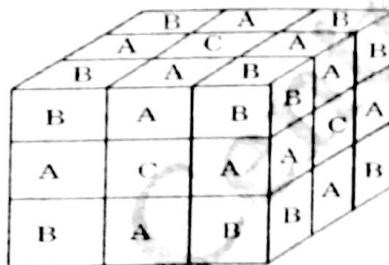


- 3.** After cutting a bigger cube/cuboid into smaller cubes/cuboids of equal dimensions, we obtain different cube/cuboids from the different portions of the original cube/cuboids. These are called by different names as follows -

- The Central cube
- The Middle cube
- The Corner cube
- The Inner cube

To identify these cubes the original cube

is coloured on all the faces with a single colour and then this coloured cube is divided into smaller ones as follows,



In the given figure

A = is the Middle cube

B = is the Corner cube

C = is the Central cube

- 4.** According to the colour, the cubes have been classified as -

**(a) Central Cube:** This cube is located exactly in the middle portion of the original/uncut cube. In addition, this cube has colour on its one face only. The above given figure shows this cube marked as C.

**(b) Middle Cube:** This cube is located on the middle portions of the different edges of the original cube. The above given figure shows this cube marked as A.

**(c) Corner Cube:** This cube is located on each of the corners of the original cube. It has three of its faces coloured. In the above given figure this cube has been marked as B.

**(d) Inner Cube:** This cube is located at the central point of the original cube and the "central" cubes surround it from all sides. Thus this cube is not visible. In addition to this none of this cube's face is coloured.

Some important techniques to determine and calculate different cubes after cutting and subdividing the original cube.

$$\text{Total No. of cubes} = (x)^3$$

$$\text{Inner cube} = (x - 2)^3$$

$$\text{Central Cube} = 6(x - 2)^2$$

$$\text{Middle Cube} = 12(x - 2)$$

$$\text{Corner Cube} = (x - 2)^3$$

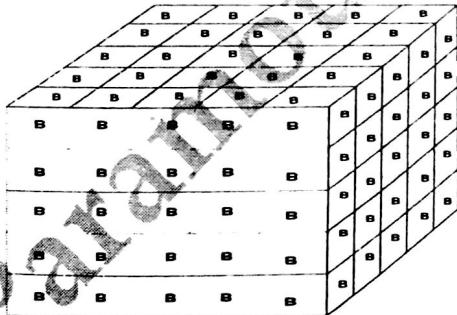
Some Important questions based on cubes/cuboids:

**Ex. (I):**

A cube of 5 cm length has been coloured black on each surface and then it has been subdivided into smaller cubes of length 1 cm.

Now, answer the following questions based on the information provided above-

1. How many cubes are there with only one face coloured black?  
 (1) 5      (2) 12      (3) 18  
 (4) 17      (5) None of these
2. How many cubes are there which have three of their faces coloured black?  
 (1) 6      (2) 8      (3) 4  
 (4) 3      (5) None of these
3. How many cubes are there which have only two of their faces coloured black?  
 (1) 20      (2) 24      (3) 38  
 (4) 36      (5) None of these
4. How many cubes are there which have none of their faces coloured with any colour?  
 (1) 18      (2) 17      (3) 26  
 (4) 39      (5) None of these
5. How many cubes will be obtained after cutting the original bigger cube of 5 cm?  
 (1) 24      (2) 625      (3) 125  
 (4) 64      (5) None of these

**Sol.**

1. 5;

∴ The central cubes are coloured only on one of their surfaces/faces.

So, according the formula,

$$\text{Central cubes} = 6 \times (x - 2)^2 \text{ (Here putting } x = 5\text{)} \\ = 6 \times (5 - 2)^2 = 6 \times 3^2 = 6 \times 9 = 54$$

- 2; This is because it is the corner cube which has its three surfaces coloured and in any cube or cuboid, there are always 8 corner cubes. So the answer should be 8 cubes.
3. 4; The middle cubes have their two surfaces coloured.  
Therefore, according to the formula,  
Middle cubes =  $12(x - 2)$  (Here, putting  $x = 5$ ) =  $12(5 - 2) = 12 \times 3 = 36$  cubes
- 4 5; The inner cubes do not have any coloured surface  
Inner cubes =  $(x - 2)^3$  (Here, putting  $x = 5$ ) =  $(5 - 2)^3 = 3^3 = 27$  cubes
5. 3; The total number of cubes =  $x^3$  (Here putting  $x = 5$ ) =  $5^3 = 125$

**Ex. (II):**

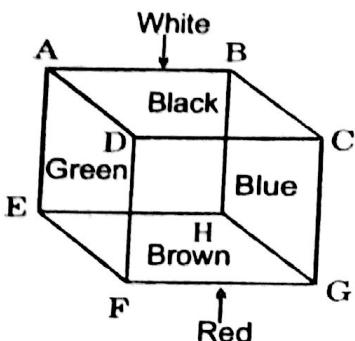
The six surfaces of a cube are coloured with Black, Brown, Green, Red, White and Blue colours in such a way that-

- (a) The Red colour is on the lower surface of the cube.
- (b) The Red colour is on the opposite surface of the Black surface.
- (c) The Green colour is between the Black and the Red colours.
- (d) The Brown colour is adjacent to the base.
- (e) The Blue colour is adjacent to the white colour.

**Sol.** Now, answer the following questions based on the above given facts-

1. What will be the colour opposite to the brown coloured surface?  
 (1) White      (2) Red      (3) Green  
 (4) Blue      (5) None of these
2. Which of the following colours faces the green coloured surface?  
 (1) Red      (2) Green (3) White  
 (4) Blue      (5) None of these
3. Which one of the following groups of colours meet at the corners of the cube?  
 (1) Black, White and Blue  
 (2) Brown, White and Green  
 (3) White, Green and Blue  
 (4) Red, Black and Green  
 (5) None of these

**Sol.**



Here,

Black surface = ABCD

Red surface = EFGH

Blue Surface = BCGH

Green Suface = ADEF

White surface = ABHE

Brown surface = DCGF

Hence,

1. 1; White colour surface is opposite to the brown colour surface.
2. 4; Blue colour will be facing the green colour.
3. 1; Blue, White and Black colours will meet at the corner of the given cube.

**Ex. (III):**

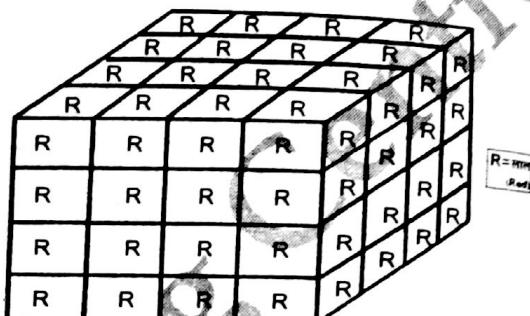
All the surfaces of a solid cube have been coloured red and then cut and subdivided into 64 equal sized cubes.

Now, answer the following questions after carefully reading the above information-

1. How many cubes are there which have their three surfaces coloured?  
 (1) 4                                  (2) 8                                  (3) 16  
 (4) 24                                (5) None of these
2. How many cubes are there which do not have any of their surfaces coloured?  
 (1) 0                                    (2) 8                                    (3) 16  
 (4) 24                                (5) none of these
3. How many cubes are there which have two of their surfaces coloured with red on the opposite surface?  
 (1) 0                                    (2) 8                                    (3) 12  
 (4) 6                                    (5) None of these
4. How many cubes are there with just one surface coloured?  
 (1) 4                                    (2) 8                                    (3) 16  
 (4) 24                                (5) none of these

5. How many cubes are there with adjacent surfaces coloured in red and rest of the surfaces with no colours?  
 (1) 16                                    (2) 24                                    (3) 48  
 (4) 32                                    (5) none of these

**Sol.** Let us suppose the given cube is coloured red from all sides.



1. 2; Only the corner cubes are coloured on three sides and if there are more than one layer, the corner cubes will be 8 in all circumstances.
2. 2; None of the surfaces of the inner cubes are coloured. If we can find out the number of inner cubes, we can easily determine the number of cubes with no coloured surface.  

$$\text{inner cube} = (x - 2)^3 = (4 - 2)^3 = 2^3 = 8$$

$$\therefore \text{No. of cubes} = 8$$
3. 1; Because the number of layers is more than one, so in this particular case, there will be no such cubes which have two coloured surfaces at the opposite sides.  

$$\therefore \text{No of cubes} = 0$$
4. 4; It is the central cube which has only one surface coloured. So after identifying the central cube, we can easily find the required no. of cubes.  

$$\text{Central cubes} = 6 \times (x - 2)^2 = 6(4 - 2)^2$$

$$= 6 \times (2)^2 = 6 \times 4 = 24$$
5. 2; We know that, the middle cube has two adjacent surfaces coloured surfaces and four surfaces without any colour. So, if we find the number of the middle cubes, then calculating the required cubes would be easier.  

$$\text{Middle Cube} = 12 \times (x - 2) = 12 \times (4 - 2)$$

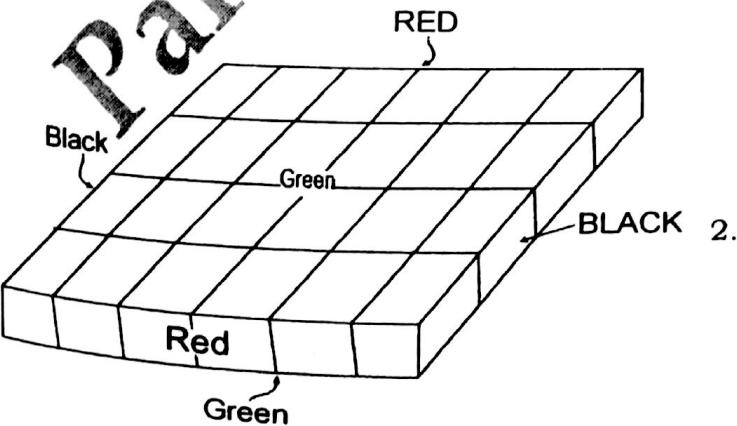
$$= 12 \times 2 = 24$$

**Ex. (IV):**

Answer the following questions based on the information given below-

- (a) A rectangular wooden block with dimensions length 6 cm, breadth 4 cm and height 1 cm, has been taken.
  - (b) The two sides with measurements 4 cm  $\times$  1 cm have been painted Black.
  - (c) The two sides with measurements 6 cm  $\times$  1 cm have been painted Red.
  - (d) The two sides with measurements 6 cm  $\times$  4 cm have been painted Green.
  - (e) This block has been subdivided into six equal parts (on 6 cm sides) and four equal parts (on 4 cm sides).
1. How many cubes are there which have Black, Green and Red colours on, at least, different sides?
    - (1) 8
    - (2) 10
    - (3) 12
    - (4) 16
    - (5) none of these
  2. What is/are the total number of cubes present here?
    - (1) 6
    - (2) 12
    - (3) 16
    - (4) 24
    - (5) none of these
  3. Supposing that the cube with Black and Green colour are removed, then how many cubes would be left?
    - (1) 4
    - (2) 8
    - (3) 12
    - (4) 16
    - (5) none of these
  4. How many cubes are there with their two surfaces painted Green and the remaining four surfaces have no colour at all?
    - (1) 4
    - (2) 8
    - (3) 10
    - (4) 12
    - (5) none of these
  5. How many cubes are there with four of their sides coloured but the remaining two sides have no colour at all?
    - (1) 4
    - (2) 8
    - (3) 10
    - (4) 16
    - (5) none of these

Sol.



In the figure given above the front and the back surface is painted Red, the left and the right surface is painted Black and the upper (Roof) and the lower (ground) surface is painted Green.

1. 5;

$\therefore$  We know that only the corner cube has colours on its three surfaces, but when there is only one layer of cubes, then the corner cube will have four coloured surfaces. Now according to the demand of the question we need a cube/cubes with Black, Red and Green Colours. For this we have to calculate the number of corner cubes and this comes out to be = 4. (Answer)

2. 2; The total number of Cubes = the given Volume of the cube  
 $= \text{length} \times \text{Breadth} \times \text{Height}$   
 $= 6 \times 4 \times 1 = 24$  (Answer)

3. 4; The above cube shows that there are four cube with the black colour painted on them. When we remove them from our calculation then we obtain the remaining number of cubes. Now this is (equal to) = The Total number of cubes - 8 = 24 - 8 = 16 (Answer)

4. 2; From the figure only centred cubes have two surface painted green. By calculating the no. of such cubes is  $4 \times 2 = 8$  cubes.

5. 1; The above cube contains four such smaller cubes which have green colour on two surfaces, Black colour on one surface and Red colour on another single surface. Whereas there is no colour painted on the remaining two surfaces.

**Examples:**

1. A cube of 3 cm. side has been coloured blue on all of its surfaces and then cut into smaller cubes of length 1 cm. each. Calculate how many of the smaller cubes will be obtained having two of their surfaces coloured?

- (1) 8
- (2) 4
- (3) 6
- (4) 12
- (5) None of these

2. A cube has been coloured with different colours on each of its surfaces. The bottom face of the cube has been coloured red and the upper surface has been coloured white. Now, the remaining four surfaces have been coloured, in clockwise

direction with green, yellow, blue and violet colours respectively. What will be the colour of top surface if the surface coloured with yellow colour is being considered as the base?

- (1) Blue      (2) Green      (3) Violet  
 (4) Red      (5) None of these

3. All the surfaces of a cube of side 4 cm, has been coloured and then cut into smaller cubes of length 1 cm each. Find out how many smaller cubes would be obtained which have been painted only on one of their surface(s)?

- (1) 24      (2) 16      (3) 8  
 (4) 32      (5) None of these

**Directions (4 - 6): A cubical toy having six surfaces has been given pictures of different fruits on each of its 6 surfaces, which are Orange, Watermelon, Mango, Banana, Grapes and Apple but not in the same order. Orange is on the topmost surface. To the adjacent surface of Banana lies the Watermelon and the Orange. The Apple is not at the bottom surface of the given cube and Watermelon lies on the opposite surface containing the picture of the Grapes.**

4. Which of these pictures is not on the adjacent surface of mango which is on the 6<sup>th</sup> surface?

- (1) Apple      (2) Orange      (3) Grape  
 (4) Banana      (5) None of these

5. What will be the picture exactly opposite to Apple?

- (1) Banana      (2) Grapes      (3) Orange  
 (4) Mangoes      (5) None of these

6. Which of these pairs of fruits are not on the correspondingly opposite surfaces of the cube?

- (a) Orange-Mango  
 (b) Apple-Banana  
 (c) Apple-Mango  
 (d) All of these  
 (e) None of these

**Directions (7 - 10): These are based on the information given below. Study the following information carefully to answer the questions given below.**

All the correspondingly opposite surfaces of a solid cube of side 16 cm. have been coloured with red, green and blue colours. Thereafter

this cube is cut and changed into smaller cubes of side 4 cm.

7. How many cubes are there with three of their surfaces coloured as blue, green and red?

- (1) 6      (2) 8      (3) 10  
 (4) 12      (5) None of these

How many cubes are there which do not have any of their surface coloured?

- (1) 0      (2) 8      (3) 16  
 (4) 24      (5) None of these

How many cubes are there which have only two of their surfaces coloured?

- (1) 4      (2) 8      (3) 12  
 (4) 24      (5) None of these

How many cubes are there having only one of their surfaces coloured?

- (1) 8      (2) 16      (3) 12  
 (4) 24      (5) None of these

**Directions (11 - 15): These are based on the information given below. Study the following information carefully to answer the questions given below:**

A solid cube is coloured red on two of its opposite surfaces, blue on two adjacent faces and yellow on the remaining faces. It is now cut into two parts so that both red surfaces get separated from each other. After this, one part is cut into four bigger cubes of equal measures and dimensions and the other in 32 smaller cubes of equal length.

11. How many cubes are there which have at least one of their surface coloured blue?

- (1) 4      (2) 14      (3) 16  
 (4) 20      (5) None of these

12. How many cubes are there which has at least two of their surfaces coloured?

- (1) 4      (2) 14      (3) 16  
 (4) 20      (5) None of these

13. How many cubes are there which do not have any of their surfaces coloured with any colour?

- (1) 0      (2) 2      (3) 4  
 (4) 8      (5) None of these

14. How many cubes are there which have only one coloured surface and that too with yellow colour?

- (1) 4      (2) 14      (3) 16  
 (4) 18      (5) None of these

15. How many cubes are there which do not have red colour on any of their surfaces?  
 (1) 10      (2) 16      (3) 14  
 (4) 18      (5) None of these

**Directions (16 - 20): These are based on the information given below. Study the following information carefully to answer the questions given below:**

- (i) Two wooden cubes P and Q have been placed near each other in front of you in such a way that the cube P is on your left and the cube Q is on your right sides.  
 (ii) Cube P's one pair of correspondingly opposite surfaces are coloured red and the other pair is coloured as blue, whereas out of the remaining two surfaces, one is coloured yellow and the other is coloured violet.  
 (iii) Cube Q's two opposite surfaces have been coloured blue and the rest of the surfaces have been coloured in such a manner that the brown coloured surface is exactly opposite to the green coloured surface and the black coloured surface lies exactly opposite to the white coloured surfaces.
16. If the cube Q's black surface is placed on the red surface of the cube P, then what will be the colour of the surface of Q that will face the sky?  
 (1) White      (2) Blue      (3) Brown  
 (4) Data Insufficient      (5) None of these

17. If cube Q is kept to your left in such a manner that its green surface faces you and the cube P is kept to your right in such a manner that its blue coloured surface is facing you then which of these coloured surfaces of the cubes P and Q would be facing each others?  
 (1) Yellow-Black      (2) Yellow-White  
 (3) Black-Violet      (4) Violet-White  
 (5) None of these

18. If the red surface of the cube P and the blue surface of the cube Q touches the table and the yellow surface of the cube P and the black surface of the cube Q is facing you, then which of the following coloured surfaces of the cube Q would be facing the blue coloured surface of the cube P?

19.

- (1) Brown      (2) Green      (3) White  
 (4) Either Brown or Green  
 (5) None of these

If the given cubes are kept on top of each other in such a way that the white surface of the cube Q faces the sky and the yellow surface of the cube P is on top of it, then which coloured surface would you be facing you?

- (1) Violet      (2) Blue  
 (3) Either blue or black  
 (4) Either Blue or Violet      (5) None of these
- If cube Q is kept behind cube P in such a manner that cube Q's brown face is in front of cube P's yellow face, then which of the following coloured surfaces of Q would be on your right side?  
 (1) Blue      (2) Black      (3) Green  
 (4) White      (5) None of these

**Directions (21 - 30): These are based on the information given below. Study the following information very carefully to answer the following questions:**

Three surfaces of a solid cube have been coloured yellow, blue and green. Now, the yellow colour is opposite to yellow, blue colour is exactly opposite to blue, and green is opposite to the green colour. Thereafter, this cube is cut into 36 equal parts such that 32 cubes are of the same size while four others are of bigger size. Also no face of any of the bigger cubes have blue colour.

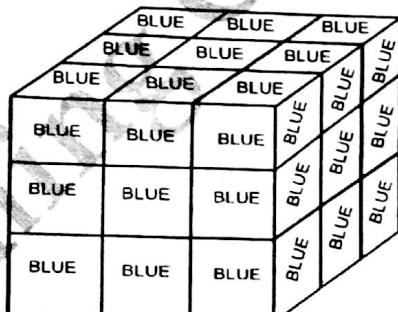
21. How many cubes are there which have blue colour on at least one of its surfaces?  
 (1) 0      (2) 8      (3) 16  
 (4) 32      (5) None of these
22. How many cubes are there which have only one of their surfaces coloured?  
 (1) 0      (2) 4      (3) 8  
 (4) 12      (5) None of these
23. How many cubes are there which have only two of their surfaces coloured?  
 (1) 24      (2) 20      (3) 16  
 (4) 8      (5) None of these
24. How many cubes are there which have at least two of their surfaces coloured?  
 (1) 36      (2) 34      (3) 28  
 (4) 24      (5) None of these

- 25.** How many cubes have only three of their surfaces coloured?  
 (1) 8      (2) 4      (3) 2  
 (4) 0      (5) None of these
- 26.** How many cubes are there which do not have yellow colour on any of their surfaces?  
 (1) 0      (2) 4      (3) 8  
 (4) 16      (5) None of these
- 27.** How many cubes are there that have at least one of their surfaces coloured as green?  
 (1) 0      (2) 8      (3) 16  
 (4) 20      (5) None of these
- 28.** How many cubes have at least one of their surfaces coloured with either yellow or green colour?  
 (1) 36      (2) 32      (3) 16  
 (4) 0      (5) None of these
- 29.** How many cubes are there that do not have any colour on any of their surfaces?  
 (1) 8      (2) 4      (3) 1  
 (4) 0      (5) None of these
- 30.** How many cubes are there that have two of their surfaces coloured with yellow and green colours respectively?  
 (1) 0      (2) 8      (3) 12  
 (4) 16      (5) None of these
- Directions (31 - 40):** A solid cuboid has been coloured Black on two of its opposite sides, Red on the two other opposite sides and Green on remaining two opposite sides. It is then cut into 72 cubes in such a manner that the 64 cubes are smaller and the remaining 8 cubes are bigger in size. The bigger cubes should not have any of their surfaces coloured Black.
- 31.** How many cubes are there which have at least one of their surfaces coloured Red?  
 (1) 40      (2) 16      (3) 32  
 (4) 64      (5) None of these
- 32.** How many cubes are there which have only one of their faces coloured?  
 (1) 10      (2) 8      (3) 16  
 (4) 24      (5) None of these
- 33.** How many cubes are there which have only two of their faces coloured?  
 (1) 48      (2) 40      (3) 32  
 (4) 16      (5) None of these
- 34.** How many cubes are there which have at least two or more than two of their surfaces coloured?  
 (1) 32      (2) 68      (3) 56  
 (4) 48      (5) None of these
- 35.** How many cubes are there which have three of their faces coloured?  
 (1) 8      (2) 4      (3) 12  
 (4) 2      (5) None of these
- 36.** How many cubes are there which do not have any colour on any of their surfaces?  
 (1) 4      (2) 8      (3) 12  
 (4) 6      (5) None of these
- 37.** How many cubes are there which have at least one of their surfaces coloured Green?  
 (1) 30      (2) 16      (3) 32  
 (4) 40      (5) None of these
- 38.** How many cubes are there which have at least one of their surfaces coloured, either Red or Green?  
 (1) 72      (2) 64      (3) 32  
 (4) 40      (5) None of these
- 39.** How many cubes are there which have at least one surface coloured Red and opposite surface coloured Green?  
 (1) 0      (2) 4      (3) 8  
 (4) 2      (5) None of these
- 40.** How many cubes are there which have two of their adjacent surfaces coloured Red and Green? (Considering only two sides).  
 (1) 8      (2) 16      (3) 24  
 (4) 32      (5) None of these
- Directions (41 - 47):** Read the informations given below and answer the questions based on it.
- (i) A dice have 6 sides and each side has a number (1 to 6) and a colour.
  - (ii) 3, 6 lies correspondingly opposite to 1, 5.
  - (iii) When you see number 2 and Red surface then you find that the Green colour and number 4 are exactly opposite to it and the White colour and number 1 lies on the top.
  - (iv) Yellow and Blue are in front of each other
  - (v) When you observe the Pink colour in front of you, you find number 2 on the top, number 3 on your right and Blue colour on your left number?

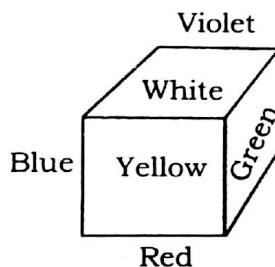
41. Which of these following four colours touch the blue coloured surface?  
 (1) Red, Green, Pink, Yellow  
 (2) Green, Pink, Yellow, White  
 (3) Red, White, Pink, Green  
 (4) Can't be determined (5) None of these
42. When digit 1 is in front of you then which of the colours definitely lies at the bottom?  
 (1) Green (2) Blue (3) Yellow  
 (4) Can't be determined (5) None of these
43. Which colour is represented by digit 5?  
 (1) Blue (2) Yellow (3) Pink  
 (4) Can't be determined (5) None of these
44. Which of the following colours is represented by digit 3?  
 (1) Blue (2) Yellow (3) Pink  
 (4) Can't be determined (5) None of these
45. When Green colour is in front of you then which number is definitely on the top?  
 (1) 1 (2) 5 (3) 6  
 (4) Can't be determined (5) None of these
46. When the number 4 is at the top then which colour would be in front of you?  
 (1) Either Blue or Yellow  
 (2) Either Pink or Red  
 (3) Either Pink or White  
 (4) Either White or Green  
 (5) Either White or Red
47. If digit 6 is in front of you then which colour would be definitely on the opposite surface to this surface?  
 (1) Green (2) Red (3) Blue  
 (4) Can't be determined (5) None of these
48. A rectangular block with dimensions  $6 \times 4 \times 2$  cms, has been cut and changed into smaller cubes of dimension 1 cm each. Calculate how many total number of smaller cubes would be obtained?  
 (1) 64 (2) 48 (3) 32  
 (4) 96 (5) None of these
49. A carpenter is given a solid cube on a condition that, he will convert it into smaller cubes and no part of this original cube should be left as waste. He is paid Rs 7.50 per cutting and finally he earns Rs 135 as the total wage. Calculate how many smaller cubes did he make?  
 (1) 243 (2) 343 (3) 216  
 (4) 225 (5) None of these
50. To obtain smaller cubes of length 1 cm from the solid cube of length 4 cms, how many times should it be cut?  
 (1) 3 (2) 9 (3) 6  
 (4) 2 (5) None of these

### Answers with Explanation:

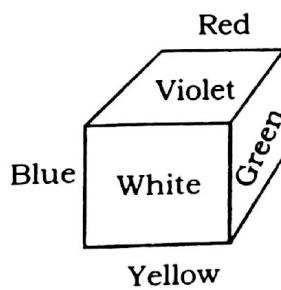
1. 4; According to question, following cube will have 12 cubes whose both surfaces are coloured as blue.



2. 3; According to question, when the said cube is coloured with Green, Yellow, Blue and Violet colours, the following cube is obtained.

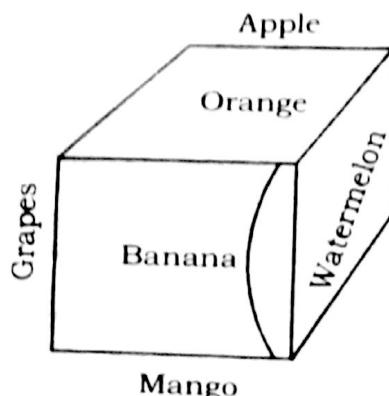


When the Yellow coloured surface is considered as base, we will get Violet colour on the exactly opposite surface/face to the yellow coloured surface, as shown in the figure .



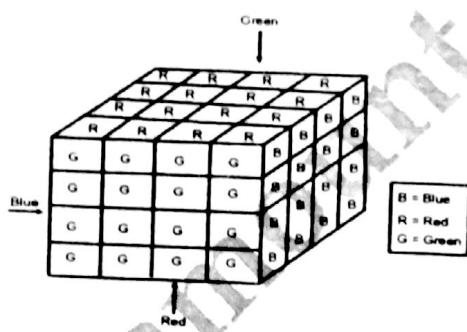
3. 1; According to question, from the one surface of the cube we get 4 cubes, Thus from the 6 surfaces of cube we will get 24 cubes which will have only single coloured surface

**Directions (4 - 6): Position of cube will as follows:**



4. 2; In the following figure the surface depicting Mango is opposite to the surface depicting Orange. Thus Orange is not on the adjacent surface of the surface depicting Mango.
5. 1; Apple is exactly opposite to the surface depicting Banana.
6. 3; These are adjacent depiction pictures.

**Directions (7 - 10): position for cube will be as follows:**



7. 2; Since the Corner cube have three coloured surfaces thus it will always be 8 in number. Therefore it is clear that the Corner cube will possess three colours Blue, Green and Red respectively. Therefore number of cubes = 8.

8. 2; Since Inner cube does not have any of its sides coloured. Thus we can easily calculate the number of Inner cube with this formula.

Numbers of inner cubes

$$= (x - 2)^3 = (4 - 2)^3 = (2)^3 = 8$$

Thus, number of inner cubes are 8

9. 2; Middle cube have only two faces coloured. Thus we can calculate the number of middle cubes with the following formula:

$$\text{Number of middle cubes} = 12(x - 2) = 12(4 - 2) = 24$$

Thus, number of cubes = 24

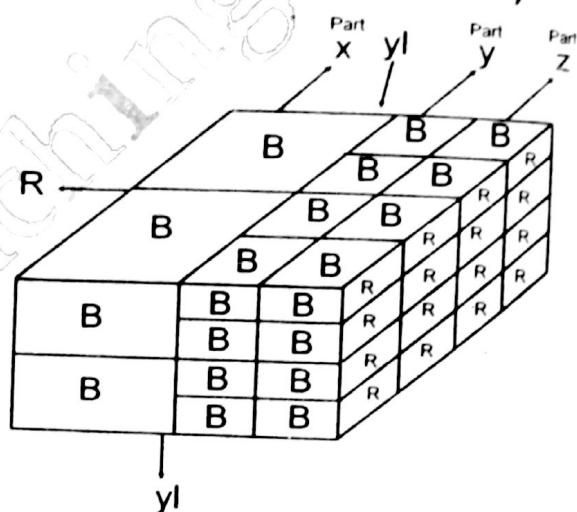
10. 4; Central cube will have only single face coloured. We can thus calculate the number of central cubes with the following formula:

$$\text{Number of central cubes} = 6(x - 2)^2 = 6(4 - 2)^2 = 24$$

Thus, Number of cubes = 24

**Directions (11 - 15): Position for cube will be as follows:**

(Note: At least one surface = one or more than one surface)



B = Top Surface = Blue

B = Front Surface = Blue

R = Rightside Surface = Red

R = Leftside Surface = Red

Yl = Backside Surface = Yellow

Yl = Bottom Surface = Yellow

11. 5; Blue coloured face cubes for at least one face are as follows:

From the front and top face minimum number of big cubes of Blue colour = 3

From the front and top face minimum number of small cubes of Blue colour = 14

Therefore total number of cubes are  $3 + 14 = 17$ .

12. 2; Since two and three faces are coloured for middle cube and corner cube respectively. Thus according to question, we have to find the total number of middle and corner cubes from the above mentioned cube.

Thus number of cubes with three face coloured are 8 and number of cubes with two faces coloured are 12.

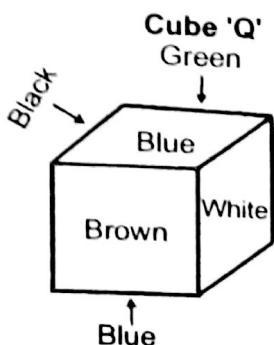
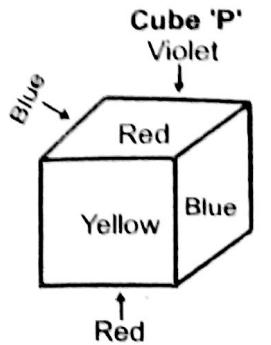
Therefore total number of cubes  
 $= 8 + 12 = 20$

13. 3; Since the Inner Cube does not have any coloured face, so there will be 2 cubes, which do not have any coloured face, from the part we have 4 such cubes.

14. 1; Since central cube has only one face coloured, so there are 2 such cubes in part Y and 2 such cubes in Y1 part. In total we have 4 such cubes.

15. 2; 16 We have such cubes from part Y only

**Directions (16 - 20): Position for cube will be as follows:**



16. 1; White face is exactly opposite to the Black coloured surface of the cube Q. Therefore if Black surface of cube 'Q' is kept above the Red face of cube 'P' then White face of cube 'Q' will be definitely on the top face.

17. 5; Cannot be determined because there are many possibilities.

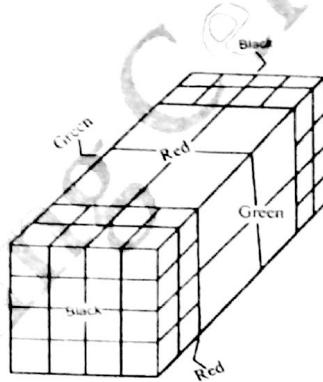
18. 4 19. 3

20. 5; Cannot be determined because there are many possibilities.

**Directions (21 - 30): Position for cube will be as follows:**

21. 4;  $6 + 16 = 32$   
 22. 3;  $4 \times 2 = 8$   
 23. 2;  $(8 \times 2) + 4 = 20$   
 24. 3;  $(12 \times 2) + 4 = 24 + 4 = 28$   
 25. 1;  $4 + 4 = 8$   
 26. 4;  $8 \times 2 = 16$   
 27. 4;  $(8 \times 2) + 4 = 20$   
 28. 1; 36  
 29. 4; 0  
 30. 3;  $(4 \times 2) + 4 = 12$

**Directions (31 - 40): Position for cube will be as follows:**



31. 1; It is clear from the above figure that on the top face 20 cubes and in the bottom face, 20 cubes are coloured Red.

$$\text{So, } 20 + 20 = 40$$

32. 4; As we know that only one surface is coloured on central cube. (Top surface = 4) + (bottom surface = 4) + (front surface = 4) + (back surface = 4) + (left side surface = 4) + (right side surface = 4), total = 24.

33. 5; Since two faces are coloured of Middle cube. Number of middle cubes is as follows On the separate ends –

$$4 + 4 + 4 + 4 + 4 + 4 + 4 = 32$$

34. 5; Since Middle cube's two faces and corner cube's three faces are coloured Middle Cube = 32 and Corner Cube = 8 Thus Required number of cubes =  $32 + 8 = 40$

35. 1; Since only corner cubes have three face coloured .

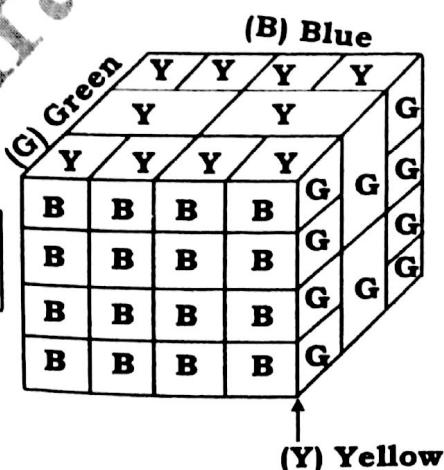
$$\text{Thus required number of cubes} = 8$$

36. 2; Since Inner cube does not have any coloured face, total number of cubes will be 8

37. 4; Cubes with at least one face coloured green is as follows:

(i) On the Right face total number of cubes = 20

(ii) On the left face total number of cubes = 20



Thus, required number of cubes  
 $= 20 + 20 = 40$

38. 5; From the above figure it is clear that total number of cubes with only one face coloured Red

$= 20 \times 2 = 40$  and  
 only one face coloured Green

$$= 20 \times 2 = 40$$

Thus, required number of cubes  
 $= 40 + 40 = 80$

39. 1; There is no cube which has one face coloured Red and exactly opposite face coloured Green.

40. 2; from the above figure it is clear that total number of cubes which have two adjacent faces coloured Red and Green are 16

**Directions (41 - 47): Position for cube will be as follows:**

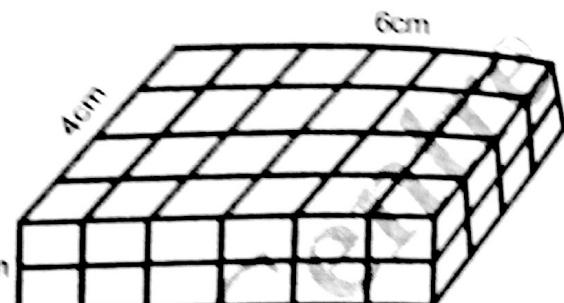
Surface	No.	Colour	Surface	No.	Colour
Top	1	White	Top	2	Red
Bottom	5	Pink	Bottom	4	Green
Front	2	Red	Front	5	Pink
Back	4	Green	Back	1	White
Left	3	Yellow	Left	6	Blue
Right	6	Blue	Right	3	Yellow
Position - I		Position - II			

41. 3

42. 5; When number 2 is situated in front then

Pink colour is at the bottom. Therefore Red colour will be at bottom when number 1 is in front  
 43. 3  
 47. 5;  
 48. 2;

44. 2 45. 2 46. 3  
 6 (Blue) is in opposite to the 3 (Yellow)



From the above figure it is clear that in each layer there are 24 cubes

49. 2; Total wages given = 135

Wage given on every cutting = 7.50

Therefore number of cutting =  $135/7.50$

$$= 18$$

Thus,  $18/3 = 6$

Therefore  $x = 6 + 1 = 7$

(Note : If any cubes is to be cut in  $x$  parts then the corner is cut in  $(x-1)$  part thus total number of cubes =  $x^3 = 7^3 = 343$ )

Thus required number of cubes = 343

50. 2; Total number of cutting =  $(4-1) \times 3 = 9$

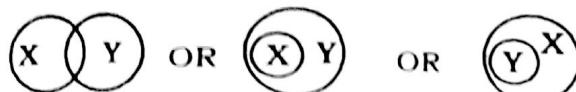
# SYLLOGISM

## The method of Venn diagrams

**Step I:** Draw standard representations for both the statements separately as given below:

**Note:** By standard representation we represent the way which is the most common and usually sufficient to denote the statement.

**For eg.-** "Some X are Y" can be represented as:



But, for all practical purposes the first of these representation suffices. And this is the standard representation for an I-type proposition.

## Types of Statements:-

1. All books are pens - **A type** (Means all +ve)
2. No books are pens - **E type** (Means all -ve)
3. Some books are pens - **I type** (Some +ve)
4. Some books are not pens - **O type** (Some -ve)

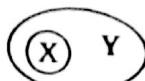
Given below is a table of standard representation.

Statement of type	Standard representation
<b>A</b> (All X are Y)	
<b>E</b> (No X are Y)	
<b>I</b> (Some X are Y)	
<b>O</b> (Some X are not Y)	

**Step II:** Now try to combine the representations (as drawn in step I) in as many ways as possible.

**Note:** When we say as many ways as possible, we mean that you should combine the representations in all possible ways. For example, if statement (1) is "All X are Y" and

statement (2) is "Some Y are Z" then the standard representations are:



and



They can be combined in more than one ways. The possible ways are:

Fig. (i)

or, Fig. (ii)

or, Fig. (iii)

Therefore, step II asks you to draw all possible combinations.

**Step III:** Finally, make interpretations of the combined figures (obtained from step II). Any given conclusion will be true if it is supported by all the combined figures and no combined figure contradicts it.

**For eg.** In the illustration to step II, we see that a conclusion that "Some X are Z" is supported by Fig. (ii) but not by fig. (i). Since it is not supported by all the figures it does not follow. Minimum encroachment technique will make your work easier.

Choose one from the above three diagrams (a, b and c) the one which has least encroachment. A careful survey of the figures reveal that figure (i) has minimum encroachment. In figure (i) the whole part of X is inside Y. Some part of Y is in Z but we do not have clear information about the relation between X and Z.

Figure (i) is sufficient to consider the conclusions.

## Statements:

All cats are bats.

All bats are tables.

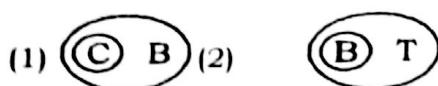
## Conclusions:

(I) Some tables are bats.

(II) Some tables are cats.

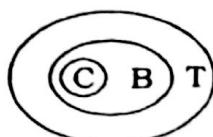
**Sol.**

**Step I:** Looking at table, we draw the standard representations for the two statements:



**Let B = bats, C = cats, T = tables.**

**Step II:** Now combine figure (1) and figure (2) in all possible ways. Figure (1) and figure (2) can be combined in only one way. That is:



**Step III:** We see that both conclusions: 'Some tables are bats' and 'Some tables are cats' are supported by the combined figure. Hence, both conclusions follow.

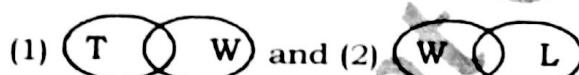
**Ex. 2: Statements:**

Some tables are watches.  
Some watches are lamps.

**Conclusions:**

- (I) Some tables are lamps.  
(II) Some tables are not lamps.

**Sol. Step I:**



**Let T = tables, W = watches, L = lamps**

**Step II:** Combining figure (1) and figure (2) in all possible ways,



Out of the four figures, figure (i) is the minimum encroachment figure.

According to figure (i), some part of table is watch. Some part of watch is lamp but we do not have any information about the relation between table and lamp.

Now see the conclusions given.

Since we do not have any information about the relation between the table and lamp. So we cannot decide whether the two conclusions are right or wrong.

We must pay attention that both the conclusions cannot be wrong simultaneously.

So one out of two conclusions must be definitely correct.

**Note:**

Prepare your solution based on minimum encroachment technique for the examples given below.

**Ex. 3: Statements:**

No tables are watches.

Some watches are lamps.

**Conclusions:**

- (I) Some lamps are not tables.  
(II) Some lamps are tables.

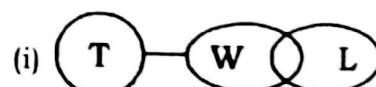
**Sol.**

**Step I:** We draw standard representation as drawn in the table or step I.



**Let T = tables, W = watches, L = lamps**

**Step II :** Now we combine the two figures in all possible ways. They are:



**Step III:** We see that the conclusion 'Some lamps are not tables' is always supported by all the possible combinations. Hence the conclusion (I) is true.

**Ex. 4: Statements:**

All rivers are mountains.

Some rivers are deserts.

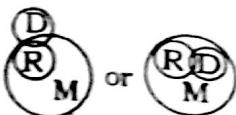
**Conclusions:**

- (I) Some mountains are deserts.  
(II) Some deserts are not mountains.

**River = R, Mountain = M, Desert = D**

**Sol.**

**Step I:**



**Step II:** Combine



**Step III:** When all rivers are mountains and some rivers are deserts, then some mountains will be deserts. Therefore, only conclusion (I) is correct.

**Ex. 5: Statements:**

All men are horses.

All horses are elephants.

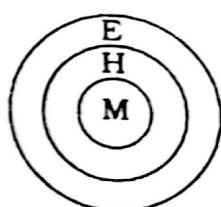
**Conclusions:**

(I) All men are elephant.

(II) All elephant are men.

**Elephants = E, Horses = H, Men = M**

**Sol.** Step I & II



Step III When all men are horses and all horses are elephants then naturally all men are elephants, but all elephants need not be men. Therefore only conclusion (I) is correct.

**Ex. 6: Statements:**

All talented persons are trustworthy.  
Some trustworthy are musicians.

**Conclusions:**

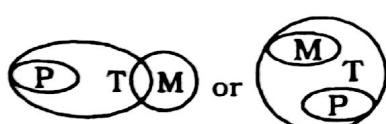
- (I) All talented persons are musicians.
- (II) Some musicians are not talented persons.

Talented person = P

Trustworthy = T

Musicians = M

**Sol.** Step I & II



Step III According to venn diagram, conclusion (I) and (II) both do not follow.

**Ex. 7: Statements:**

Some engineers are teachers.

Some engineers are efficient.

**Conclusions:**

(I) Some teachers are efficient.

(II) All efficient are engineers.

**Efficient = E, Engineers = G, Teacher = T**

**Sol.** Step I



Step II



Step III When some engineers are teachers, then some teachers are engineers. Also, when some engineers are efficient, then some efficient are engineers. Therefore, both the conclusions are do not follow.

**Ex. 8: Statements:**

Some foods are sweet.

Some foods are sour.

**Conclusions:**

(I) All foods are either sweet or sour.

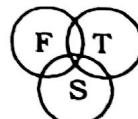
(II) Some sweet are sour.

**Sour = S, Food = F, Sweet = T**

**Sol.** Step I



Step II



Step III When some foods are sweet and some foods are sour, then all foods are not necessarily sweet or sour and what is sweet need not be sour. Therefore, neither of the conclusion is correct.

**Ex. 9: Statements:**

All cups are goats

All goats are tins

**Conclusions:**

(I) All goats are cups

(II) All tins are goats

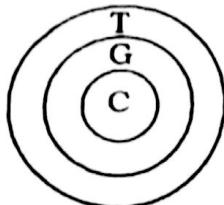
(III) No cups are tins

(IV) No tins are cups

- (1) Only conclusions III and IV follow
- (2) Only conclusion I and II follow
- (3) Only conclusions I, II and III follow
- (4) All conclusions are correct
- (5) None of these

**Cup = C, Goat = G, Tin = T**

**Sol.** Step I & II



Step III When all cups are goats, then some goats must be cups. when all goats are tins, then some tins can be goats. When all cups are goats and all goats are tins, then naturally all cups are tins and some tins must be cups. Therefore, all the conclusions are do not follow.

**Ans (5)**

**Ex 10: Statements:**

All birds are peacocks.

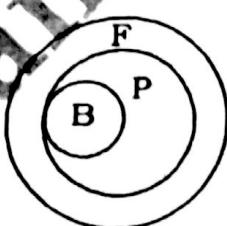
All peacocks are farmers.

**Conclusions:**

- (I) Some farmers are birds.
- (II) Some peacocks are birds.
- (1) Only conclusions I and II follows
- (2) Only conclusions II and III follow
- (3) Data is insufficient
- (4) All conclusions are correct
- (5) None of the above

**Birds = B, Peacock = P, Farmer = F**

**Sol.** Step I & II



Step III When all birds are peacocks, which are all farmers, then all birds are farmers. When all birds are peacocks, then some peacocks must be birds and when all birds are farmers, then some farmers must be birds. Therefore, all conclusions are correct.

**Ans. (4)**

**Ex.11: Statements:**

No chair is tree.

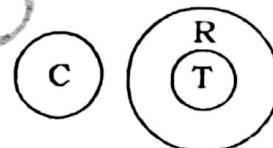
All trees are trains.

**Conclusions:**

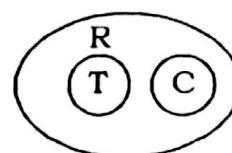
- (I) No chair is train.
- (II) No trains is chair.
- (III) Some trains are trees.
- (IV) No train is tree.
- (1) Only IV follows
- (2) Only III and IV follow
- (3) Only I and II follow
- (4) Only II and III follow
- (5) None of these

**Chair = C, Tree = T, Train = R**

**Sol.**



**Step II**



Step III When all tree are trains then some trains must be trees. Also from the given two statements we can conclude that some trains are not chair. Hence, no chair is train and vice versa cannot be established with certainty. Therefore, only conclusion III is correct.

**Ans. (5)**

**Ex.12: Statement:**

Some bags are pockets.

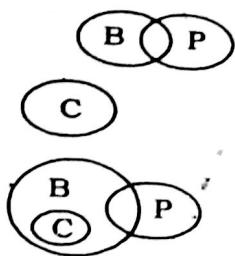
No pocket is a pouch.

**Conclusions:**

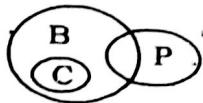
- (I) No bag is a pouch.
- (II) Some bags are not pouches.
- (III) Some pockets are bags.
- (IV) No pocket is a bag.
- (1) Only either I or IV follow
- (2) Only II and III follow
- (3) Only I and III follow
- (4) All follow
- (5) None of follows

**Bag = B, Pocket = P, Pouch = C**

Sol. Step I



Step II



Step III Some bags are pockets, so some pockets must be bags. Also, when 'Some bags are pockets' and 'no packets are pouches' then we can conclude that some bags (which are pockets) are not pouches. Therefore, only conclusions II and III are correct.

Ans. (2)

Ex. 13: Statements:

All soil are diamonds.

No gold is a diamond.

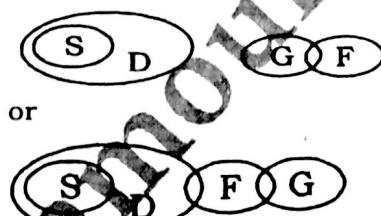
Some golds are foils.

Conclusions:

- (I) No soil is a diamond.
- (II) Some foils are not diamonds.
- (III) Some soils are golds.
- (IV) Some foils are soil.
- (1) Only I and II follow
- (2) Only II follows
- (3) Only I and III follow
- (4) Only I, III and IV follow
- (5) None of these

Soil = S, Diamond = D, Gold = G, Foil = F

Sol. Step I & II



Step III Only II follows

Ans. (2)

Ex. 14: Statements:

Some bells are flowers.

Some cards are bells.

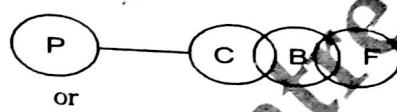
No cards are papers..

Conclusions:

- (I) Some bells are papers.
- (II) Some papers are not bells.
- (III) Some flowers are cards.
- (IV) Some bells are not papers.

- (1) Only III and IV follow
- (2) Only I and II follow
- (3) Only II follows
- (4) Only IV follows
- (5) Either I or IV and II follow

Card = C, Bell = B, Flower = F, Paper = P  
Sol. Step I & II



Step III Only IV follows

Ex. 15: Statements:

Some diaries are pockets.

All pockets are digitals.

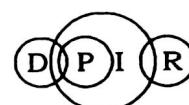
Some digitals are purses.

Conclusions:

- (I) Some pockets are digitals.
- (II) Some diaries are digitals.
- (III) Some diaries are purses.
- (iv) Some diaries are not purses.
- (1) Only I, II and III follow
- (2) Only I, II and IV follow
- (3) Only II and III follow
- (4) Only II and either III are IV follow
- (5) Only I, II and either III or IV follow

Diary = D, Pocket = P, Purse = R, Digital = I

Sol. Step I



Step II



Step III Here III and IV are complementary pairs and statement I and II follows.

Ans. (5)

Ex. 16: Statements:

Some pillows are beds.

Some leaders are pillows.

All ministers are beds.

Conclusions:

- (I) Some pillows are not beds.
- (II) No pillow is a minister.
- (III) Some leaders are not pillows.
- (IV) Some ministers are pillows.