CUBES & DICE

Dice

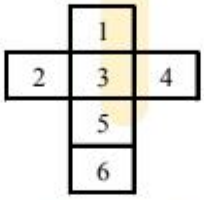
Dice is a three dimensional figure with all of its surfaces numbered.

Important points about Dice :

(i) A dice has six surfaces and all of them are numbered from 1 to 6.

(ii) If the surfaces of dice are unfolded and placed on a plane, the figure of dice so obtained will look like one of the following figures.

Here, in the figure 1 we find that

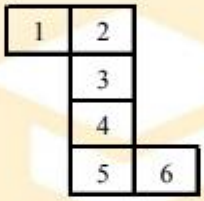


Number 1 is opposite to 5

Number 2 is opposite to 4

Number 3 is opposite to 6.

Here in the figure 2 we find that

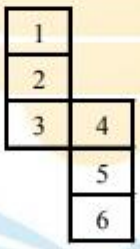


Number 1 is opposite to 6

Number 2 is opposite to 4

Number 3 is opposite to 5.

Here in the figure 3 we find that



Number 1 is opposite to 3

Number 2 is opposite to 5

Number 4 is opposite to 6.

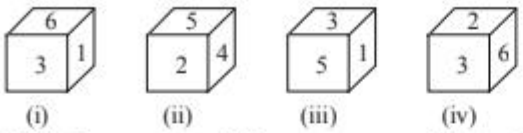
(iii) A number on one surface of dice has one numbers opposite to it and four different numbers on its adjacent surfaces.

Qusestion on dice have been classified under three different categoreis. In the following paragraphs different types of questions have been discussed with the help of examples under different categories.

❖ EXAMPLES ❖

Category I

Ex.1 A dice has been thrown four times and produces following results.



(i) (ii) (iii) (iv)

Which number will appear opposite to the number 3 ?

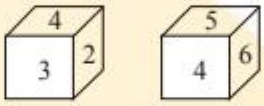
(A) 4 (B) 5 (C) 6 (D) 1

Sol. From the figures (i), (ii) and (iv) we find that numbers 6, 1, 5 and 2 appear on the adjacent surfaces to the number 3. Therefore, number 4 will be opposite to number 3. Hence option (a) is the answer.

Category II

Ex. 2 The figures given below show the two different positions of a dice. Which number will appear to number 2.

(A) 3 (B) 4 (C) 5 (D) 6



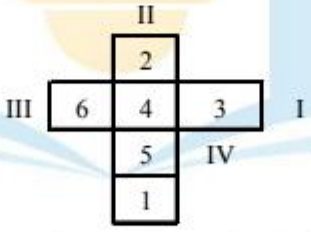
(i) (ii)

Sol. The above question, where only two positions of a dice are given, can easily be solved with the following method.

Step I : The dice, when unfolded, will appear as shown in the figure given on the right side.

Step II : Write the common number to both the dice in the middle block. Since common number is 4, hence number 4 will appear in the central block.

Step III : Consider the figure (i) and write the first number in the anti-clockwise direction of number 4, (common number) in block I and second number in block II. Therefore, numbers 3 and 2 being the first and second number to 4 in anticlockwise directions respectively, will appear in block I & II respectively.



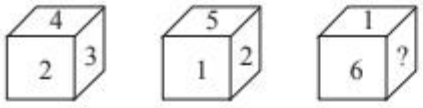
StepIV : Consider fig (ii) and write first and second number in the anticlockwise direction to number 4, (common number) in block (iii) & (iv) Hence number 6 and 5 will appear in the blocks III and IV respectively.

Step V : Write remaining number in the remaining block. Therefore, number 1 will come in the remaining block.

Now, from the unfolded figures we find that number opposite to 6 is 3, number opposite to 2 is 5 and number opposite to 4 is 1. Therefore, option (c) is our answer.

Category III

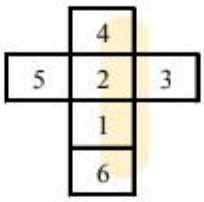
Ex.3 From the following figures of dice. Find which number will come in place of ?



(i) (ii) (iii)

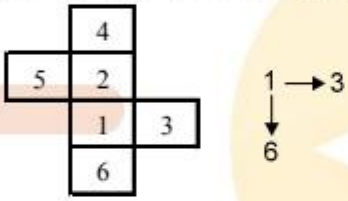
(A) 4 (B) 5 (C) 2 (D) 3

Sol. If the above dice is unfolded, it will look like as the fig given below. (Student should follow the methods as explained in the previous example to find the appropriate place of the numbers appearing on the different surfaces of the dice in the figure).



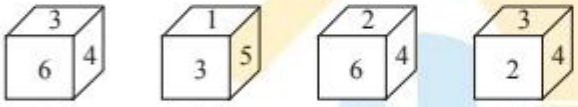
Now the number in place of '?' can be obtained by making a slight change in the figure as given here.

Now comparing fig (iii) as above, we get that number in place of ? is 3

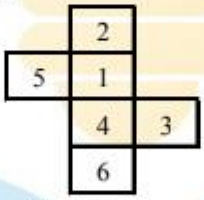


Category IV

Ex.4 Which of the following dices is identical to the unfolded figure as shows here ?



(a) (b) (c) (d)



Sol. From the unfolded figure of dice, we find that number opposi te to 2 is 4, for 5 it is 3 and for 1 it is 6. From this result we can definitely say that figure (b), (c) and (d) can not be the answer figure as number lying on the opposite pair of surface are present on the adjacent surfaces. Hence fig (a) is our answer.

Ex.5 A die is thrown four times and its four different positions are given below. Find the number on the face opposite the face showing 2.

(i) (ii) (iii) (iv)

(a) 3 (b) 4 (c) 5 (d) 6

Sol. Here, the number 2 appears in three dice, namely
(i), (ii) and (iv). In these dice, we ovserve that the numbers 2, 4, 1 and 6 appear adjacent to 3.

So, none of these numbers can be present opposite 2. The only number left is 5.

Hence, 5 is present on the face opposite 2.

Ex.6 Shown below are, four different positions of the same dice. Find the number on the face opposite the face showing 6.

(i) (ii) (iii) (iv)

(a) 1 (b) 2 (c) 4 (d) 5

Sol. In this case, the number 6 appears in only two dice from which we observe that the numbers 1, 3 and 5 appear adjacent to 6, so that 2 or 4 can appear opposite 6.

So, we beign finding a number which appears at least in three of the given dice. 3 is such a number, which appears in (i), (ii) and (iii). We observe in these dice that, the numbers 1, 4, 5 and 6 appear adjecent to 3. So, they cannot appear opposite 3. The only number that can appear opposite 3 is 2.

So, 2 cannot appear opposite 6.

Hence, 4 appears opposite 6, so that (c) is the answer.

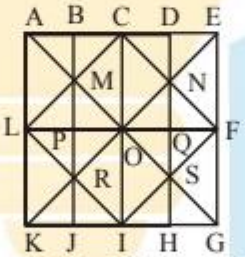
We are now in a position to solve the following exercise.

❖ EXAMPLES ❖

Ex.7. What is the number of straight lines in the following figure ?

(A) 11 (B) 14 (C) 16 (D) 17

Sol. The figure is labelled as shown.



Clearly, there are 3 horizontal lines namely AE, LF and KG.

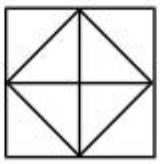
There are 5 vertical lines : AK, BJ, CI, DH and E G.

There are 6 slanting lines : LC, KE, IF, LI, AG and CF.

Thus, there are 3 + 5 + 6 = 14 straight lines in the figure.

Hence, the answer is (b).

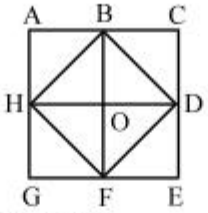
Ex.8 Count the number of triangles in the following figure.



(A) 8 (B) 10 (C) 12 (D)14

Sol. We first label the entire figure as shown. Count the number of simplest triangles. These

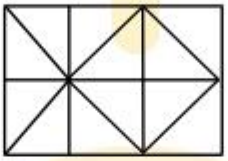
are ABH, BHO, BCD, BOD, DEF, DFO, FGH and FHO. Thus,there are 8 such triangles. Next count the number of triangles which are composed of two components each. Such triangles are HBD, BDF, DFH and FHB. Thus, there are 4 such triangles.



∴ The total number of triangles in the given figure = 8 + 4 = 12

Thus, (C) is the answer.

Ex.9 How many squares does the figure have ?



(A) 6 (B) 7 (C) 9 (D) 10

Sol. The figure may be labelled as shown :

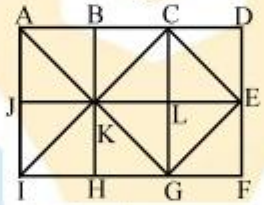
The squares composed of two components each, are ABKJ, BCLK, CDEL, LEFG, KLGH and JKHI. Thus, there are 6 such squares.

Only one square, KCEG is composed of four components.

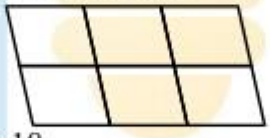
Two squares namely, ACGI and BDFH are composed of eight components each.

Thus, there are 2 such squares.

∴ There are 6 + 1 + 2 = 9 squares in the given figure. Hence, (C) is the answer.



Ex.10 How many parallelograms are there in the figure below ?



(A) 14 (B) 15 (C) 16 (D) 18

Sol. We can label the figure as shown.

The simplest || gms are ABFE, BCGF, CDHG, EFJI, FGKJ and GHKL. These are 6 in number.

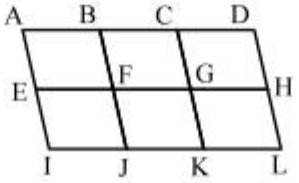
The || gms composed of two components each, are ACGE, BDHF, EGKI, FHLJ, ABJI, BCKJ and CDLK.

Thus, there are 7 such || gms.

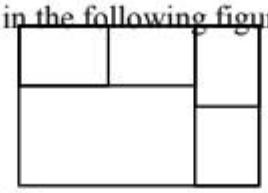
The || gms composed of four components each, are ACKI and BDLJ. i. e. 2 in number. There is only one || gm composed of six components, namely, ADLI.

Thus, there are 6 + 7 + 2 + 1 = 16 parallelograms in the figure.

Hence, (C) is the answer.

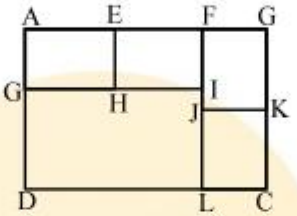


Ex.11 What is the number of rectangles in the following figure ?



(A) 6 (B) 7 (C) 8 (D) 9

Sol. The figure is labelled as shown :



Simplest rectangles are AEHG, EFIH, FBKJ, JKCL and GILD. i. e. there are 5 such rectangles.

The rectangles composed of two coponents each are AFIG and FBCL.

Thus, there are 2 such triangles.

Only one rectangle, namely AFLD is composed of 3 components and only one rectangle, namely ABCD is composed of 5 components.

Thus, there are 5 + 2 + 1 + 1 = 9 rectangles in the figure.

Hence, (d) is the answer.

Ex.12 Determine the number of pentagons in the following figure.

(A) 5 (B) 6

(C) 8 (D) 10

Sol. The figure may be labelled as shown in this case. Six Pentagons have been formed by the combination of three triangles and two rhom buses - ADFHJ, CFHJL, EHJLB, GJLBD, ILBDF and KBDFH.

Four other pentagons are formed by the combi nation of three triangles and one rhombus - LCFHM, LBEHM, BKFHM and BLIFM.

Thus, there are 10 pentagons in the figure.

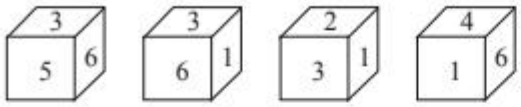
Hence, (D) is the answer.

EXERCISE

Directions (1-8) :

In each of the following questions four positions of the same dice have been shown. You have to see these figures and select the number opposite to the number as asked in each question.

Q.1

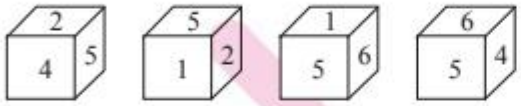


(i) (ii) (iii) (iv)

Which number is on the opposite surface of number 3 ?

(A) 4 (B) 6 (C) 5 (D) 1

Q.2



(i) (ii) (iii) (iv)

Which number is opposite to number 1 ?

(A) 4 (B) 6 (C) 2 (D) 3

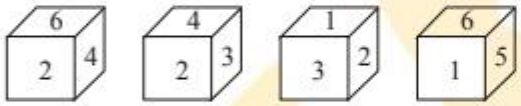
Q.3

(i) (ii) (iii) (iv)

Which number is opposite to number 5 ?

(A) 6 (B) 5 (C) 1 (D) 3

Q.4

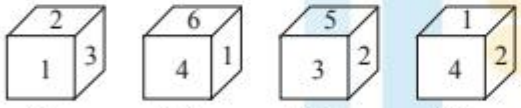


(i) (ii) (iii) (iv)

Which number is opposite to number 2 ?

(A) 4 (B) 6 (C) 5 (D) 3

Q.5

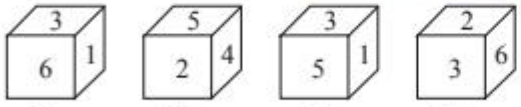


(i) (ii) (iii) (iv)

Which number is opposite to number 5 ?

(A) 4 (B) 6 (C) 1 (D) 3

Q.6

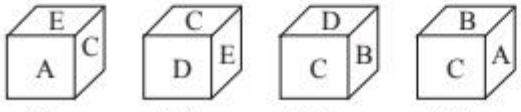


(i) (ii) (iii) (iv)

Which number is on the opposite surface of number 3 ?

(A) 2 (B) 3 (C) 4 (D) 6

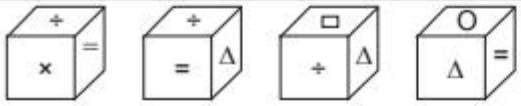
Q.7



(i) (ii) (iii) (iv)

Which letter will be opposite to letter D ?

(A) A (B) B (C) E (D) F

Q.8 

(i) (ii) (iii) (iv)

Which symbol will come opposite to symbol ÷

(A) 0 (B) = (C) × (D) Δ

Direction (9-23) :

In each of the following questions, select the correct option for the question asked.

Q.9 

(i) (ii)

(i) Which number will come opposite to number 2 ?

(A) 5 (B) 1 (C) 6 (D) 3

(ii) Which number will come opposite to number 6?

(A) 1 (B) 5 (C) 4 (D) 3

(iii) Which number will come opposite to number 4?

(A) 3 (B) 5 (C) 1 (D) 2

Q.10 

(i) (ii)

Which will be number at the bottom if 5 is at top ?

(A) 1 (B) 2 (C) 3 (D) 6

Q.11 All the surfaces of the dice contain different numbers in the form of dots. Consider both the figures of dice and tell how many dots are contained on the face opposite to the face that contains four dots ?

(i) (ii)

(A) 2 (B) 3 (C) 5 (D) 6

Q.12 What is the number of dots on the face opposite to the face that contains 2 dots ?

(i) (ii)

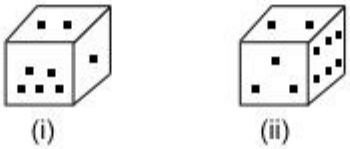
(A) 1 (B) 3 (C) 4 (D) 6

Q.13 On the basis of two figures of dice, you hav to tell what number will be on the opposite face of number 5 ?

(i) (ii)

(A) 1 (B) 3 (C) 4 (D) 5

Q.14 When number 1 is at the top, which number will be at the bottom ?



(i) (ii)

(A) 1 (B) 2 (C) 3 (D) 6

Q.15 Which alphabet will come on the opposite surface on which alphabet F appears ?

(i) (ii) (iii)

(A) B (B) A (C) C (D) E

Q.16 Which symbol will appear on the opposite surface to the symbol 'X' ?

(i) (ii)

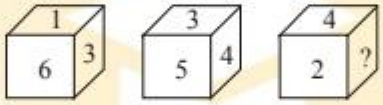
(A) ÷ (B) = (C) Δ (D) O

Q.17 Two position of a dice are shown below. When there are two dots at the botton, the number of dots at the top will be

(i) (ii)

(A) 2 (B) 3 (C) 5 (D) 6

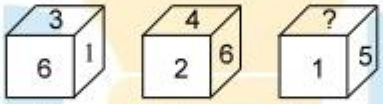
Q.18 Three position of the same dice are given below. Observe the figures carefully and tell which number will come in place of '?'



(i) (ii) (iii)

(A) 1 (B) 6 (C) 3 (D) 5

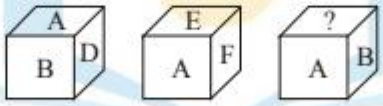
Q.19 On the basis of the following figures you have to tell which number will come in place of '?'



(i) (ii) (iii)

(A) 2 (B) 3 (C) 6 (D) 4

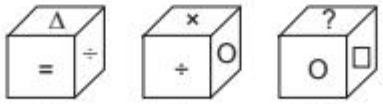
Q.20 Which letter will come on the blank surface?]



(i) (ii) (iii)

(A) C (B) A (C) D (D) E

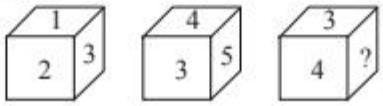
Q.21 Which symbol will appear in place of '?'



(i) (ii) (iii)

(A) × (B) = (C) ÷ (D) Δ

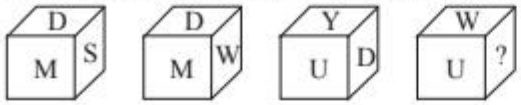
Q.22 Which number will come in place of '?'



(i) (ii) (iii)

(A) 1 (B) 6 (C) 5 (D) 2

Q.23 A cube on whose faces letters have been written, is shown below in different positions as can be seen from different directions. Find the missing letters ?



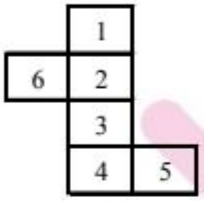
(i) (ii) (iii) (iv)

(A) S (B) D (C) Y (D) W

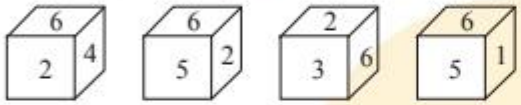
Directions (24-29) :

The figure (a) given below is the unfolded position of a cubical dice. In each of the following questions this unfolded figure is followed by four different figures of dice. You have to select the figure which is identical to the figure (A).

Q.24

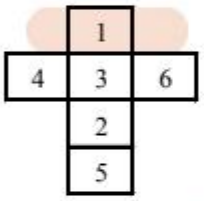


(a)



(A) (B) (C) (D)

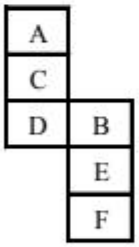
Q.25



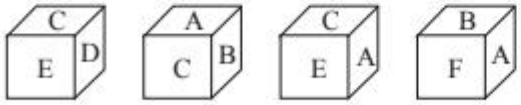
(a)

(A) (B) (C) (D)

Q.26

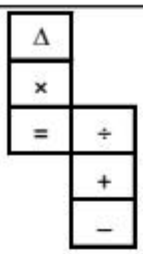


(a)

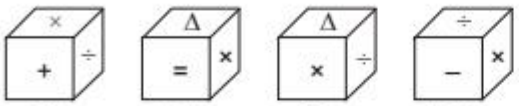


(A) (B) (C) (D)

Q.27

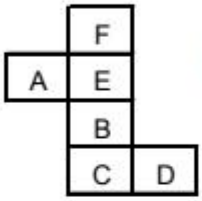


(a)

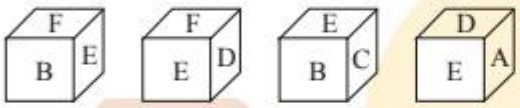


(A) (B) (C) (D)

Q.28



(a)

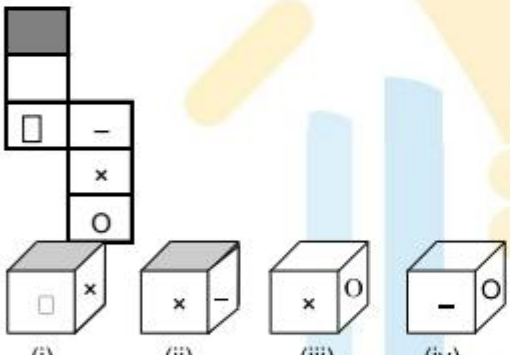


(i) (ii) (iii) (iv)

(A) (i) only (B) (ii) only

(C) (i) and (iii) only (D) All

Q.29



(i) (ii) (iii) (iv)

(A) (i) only (B) (ii) only

(C) (i) and (iii) only (D) (iv) only

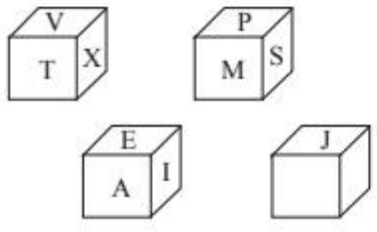
Direction :

In questions 30 to 35, four dices are shown. The first three display alphabets in some sequences. Find the sequencial rule and fill the blank spaces in the fourth dice from the given four alternatives.

Sequence of letters

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Q.30

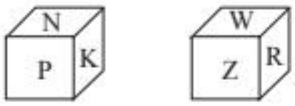


(A) L, N (B) C, F

(C) E, O (D) M, G

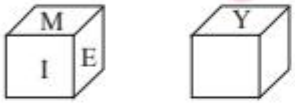
Q.31

(A) M, J (B) S, U
(C) S, V (D) L, G



Q.32

(A) Q, S (B) T, E
(C) T, F (D) N, Z

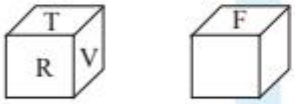


Q.33

(A) T, P (B) X, Z
(C) S, V (D) D, J

Q.34

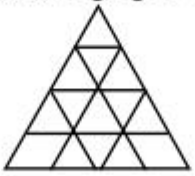
(A) Q, L (B) Q, V
(C) P, S (D) H, Q



Q.35

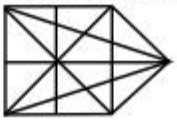
(A) C, I (B) N, Y
(C) F, M (D) L, Z

Q.36 How many straight lines are there in the following figure ?



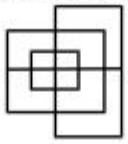
(A) 9 (B) 11 (C) 15 (D) 48

Q.37 What is the number of straight lines in the following figure ?



(A) 10 (B) 12 (C) 13 (D) 17

Q.38 What is the number of straight lines in the following figure ?

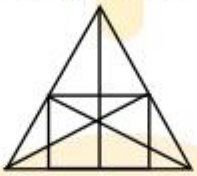


(A) 13 (B) 15 (C) 17 (D) 19

Q.39 State the minimum number of straight lines required to make the figure given below ?

(A) 16 (B) 17 (C) 18 (D) 19

Q.40 What is the number of straight lines and the number of triangles in the given figure ?



(A) 10 straight lines and 34 triangles (B) 9 straight lines and 34 triangles (C) 9 straight lines and 36 triangles

(D) 10 straight lines and 36 triangles

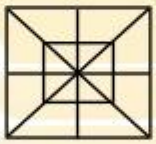
Q.41 How many triangles and squares are there in the following figure ?

(A) 28 triangles, 5 squares

(B) 24 triangles, 4 sqaures (C) 28 triangles, 4 squares

(D) 24 triangles, 5 squares]

Q.42 Count the number of triangles and squares in the following figure ?

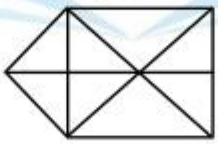


(A) 28 triangles, 10 squares

(B) 28 triangles, 8 squares (C) 32 triangles, 10 squares

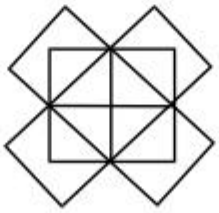
(D) 32 triangles, 8 squares

Q.43 Count the number of triangles in the following figure ?



(A) 15 (B) 16 (C) 17 (D) 18

Q.44 How many rectangles does the following figure have ?



(A) 10 (B) 12 (C) 13 (D) 14

Q.45 How many triangles are there in the figure below ?

(A) 5 (B) 6 (C) 8 (D) 10

Q.46 Count the number of triangles in the figure given below ?

(A) 18 (B) 20 (C) 24 (D) 27

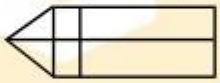
Q.47 Count the number of triangles in the following figure ?

(A) 27 (B) 25 (C) 23 (D) 21

Q.48 Count the number of squares in the figure given below ?

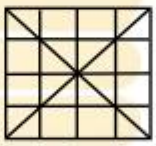
(A) 13 (B) 16 (C) 19 (D) 20

Q.49 How many rectangles are there in the given figure?



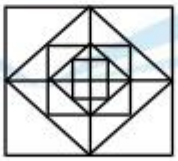
(A) 6 (B) 7 (C) 8 (D) 9

Q.50 How many triangles does the following figure have ?



(A) 36 (B) 40 (C) 44 (D) 48

Q.51 How many squares are there in the figure given below ?

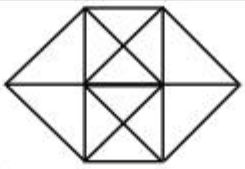


(A) 12 (B) 13 (C) 16 (D) 17

Q.52 Count the number of triangles in the following figure ?

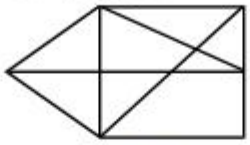
(A) 8 (B) 10 (C) 11 (D) 12

Q.53 How many triangles are there in the following figure ?



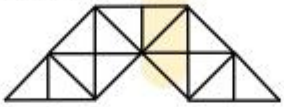
(A) 20 (B) 24 (C) 28 (D) 32

Q.54 How many triangles are there in the following figure ?



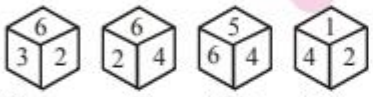
(A) 12 (B) 13 (C) 14 (D) 15

Q.55 Count the number of triangles in the following figure ?



(A) 23 (B) 27 (C) 29 (D) 31

Q.56



(i) (ii) (iii) (iv)

Which number is on the opposite 6 ?

(A) 1 (B) 2 (C) 3 (D) 4

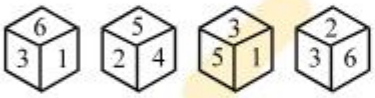
Q.57

(i) (ii) (iii) (iv)

What number is opposite 4 ?

(A) 1 (B) 2 (C) 5 (D) 6

Q.58

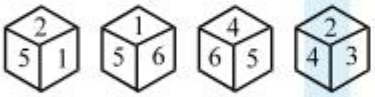


(i) (ii) (iii) (iv)

What number is opposite 3 ?

(A) 2 (B) 3 (C) 4 (D) 6

Q.59



(i) (ii) (iii) (iv)

Which number is on the face opposite 4 ?

(A) 1 (B) 2 (C) 3 (D) 5

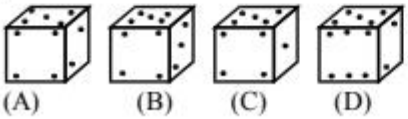
Q.60

(i) (ii) (iii) (iv)

Which number is opposite 3 ?

(A) 1 (B) 2 (C) 4 (D) 6

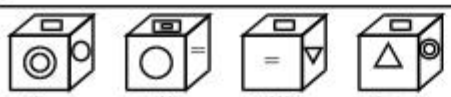
Q.61 If the total number of dots on opposite faces of a cubical block is always 7, find the figure which is correct ?



(A) (B) (C) (D)

Direction :

Question 62 to 64 are based on the following illustrations, Which are four views of a cube.



(i) (ii) (iii) (iv)

Q.62 The symbol at the bottom of (iv) is -

(A) ◯ (B) ◎ (C) △ (D) ▭

Q.63 The symbol opposite the face having the symbol = is -

(A) ◯ (B) △ (C) ◎ (D) ▭

Q.64 The symbol opposite the face having triangle is -

(A) ◯ (B) ◎ (C) = (D) ▭

Q.65 If the total number of dots on opposite faces of a cubical block is always 7, find the figure which is correct.

(A) (B) (C) (D)

Q.66

(i) (ii) (iii)

What should be the number opposite 3 ?

(A) 1 (B) 6 (C) 5 (D) 4

Q.67

(i) (ii) (iii)

How many dots lie opposite 2 dots ?

(A) 1 (B) 3 (C) 5 (D) 6

Q.68

(i) (ii) (iii)

Find the number of dots on the face opposite the face bearing 3 dots ?

(A) 5 (B) 6

(C) 4 (D) Cannot be determined

Q.69

(i) (ii) (iii)

What number occur at the bottom face in the three positions of the same die ?

(A) 6, 6, 2 (B) 5, 6, 1

(C) 5, 5, 5 (D) 6, 5, 2

Q.70

(i) (ii) (iii)

Find the alphabet opposite A.

(A) B (B) C (C) D (D) E

Q.71

(i) (ii) (iii)

A cube has six different symbols drawn over its six faces. The symbols are dot, circle, triangle, square, cross and arrow. Three different positions of the cube are shown in figures (i), (ii) & (iii).

(i) Which symbol is opposite the dot ?

(A) Circle (B) Triangle
(C) Arrow (D) Cross

(ii) Which symbol is opposite the Arrow ?
(A) Circle (B) Triangle
(C) Dot (D) Cross

(iii) Which symbol occurs at the bottom of fig. (ii).
(A) Arrow (B) Triangle
(C) Circle (D) Dot

Q.72

(X) (Y) (Z)

(i) Which number lies at the bottom face of the die X ?
(A) 1 (B) 2 (C) 3 (D) 4

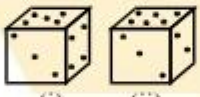
(ii) Which number lies at the bottom face of the die Y ?
(A) 6 (B) 5 (C) 2 (D) 1

(iii) Which number lies opposite 6 ?
(A) 1 (B) 2 (C) 4 (D) 5

(iv) Which numbers are hidden behind the numbers 6 and 5 in the die Z ?
(A) 1 & 4 (B) 1 & 3
(C) 4 & 3 (D) 1 & 2

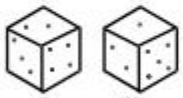
(v) Which of the hidden numbers adjacent to 5 in die X are common to the hidden numbers adjacent to 5 in die Z ?
(A) 1 & 4 (B) 2
(C) 6 (D) None

Q.73 Two positions of a dice are shown below. If 1is at the bottom, which number will be on the top ?


(i) (ii)

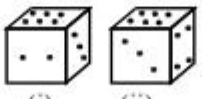
(A) 2 (B) 3 (C) 4 (D) 5

Q.74


(i) (ii)

What is the number of dots at the bottom face of the left hand side dice ?
(A) 3 (B) 4 (C) 5 (D) 6

Q.75 Two positions of a dice with 1 to 6 dots on its sides are shown below. If the dice is resting on the side with three dots, What will be the number of dots on the side at the top ?


(i) (ii)

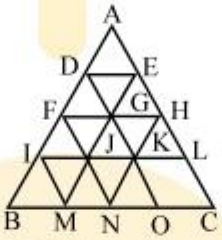
(A) 1or 5 (B) 2 (C) 3 (D) 6

ANSWER KEY

Ques.	1	2	3	4	5	6	7	8	9 (i)	9 (ii)	9 (iii)	10	11	12	13	14	15	16	17	18	19	20
Ans.	A	A	C	C	D	C	A	A	D	A	B	B	D	A	C	D	C	D	B	A	B	C
Ques.	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
Ans.	A	A	C	C	D	B	C	B	B	C	A	C	A	B	A	B	B	A	B	C	A	C
Ques.	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64
Ans.	C	D	D	C	C	B	D	D	D	D	D	D	C	A	A	C	A	C	C	D	A	A
Ques.	65	66	67	68	69	70	71(i)	71(ii)	71(iii)	72(i)	72(ii)	72(iii)	72(iv)	72(v)	73	74	75					
Ans.	A	B	C	B	C	D	D	B	C	C	C	A	B	D	B	D	A					

HINTS & SOLUTION

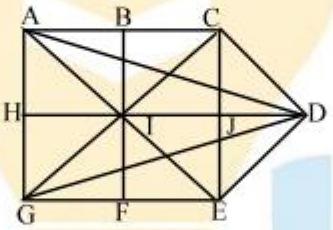
36.[B] The figure is labelled as shown-



Horizontal lines are DE, FH, IL and BC i. e. 4 in number. Slanting lines are IM, FN, DO, AC, AB, EM, and HN i. e. 7 in number.

∴ Total number of lines is 4 + 7 = 11.

37.[B] We can label the figure as shown-



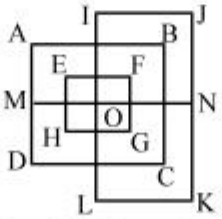
In this figure :

The horizontal lines are AC, HD and GE i. e. 3 in number :

the vertical lines are AG, BF and CE i. e. 3 in number : and the slanting lines are AE, CD, AD, CG, DE and GD i. e. 6 in number.

Thus, there are 3 + 3 + 6 = 12 lines in all.

38.[A] The figure may be labelled as follows :

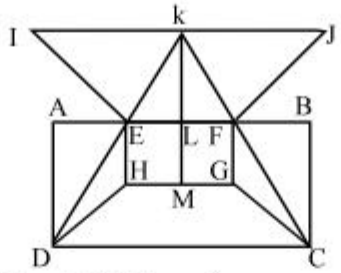


Vertical lines are AD, EH, IL, FG, BC and JK i. e. 6.

Horizontal lines are IJ, AB, EF, MN, HG, DC, LK i. e. 7.

∴ Total number of lines is 6 + 7 = 13

39.[B] The figure may be labelled as follows :



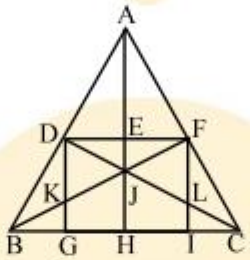
Horizontal lines are IJ, AB, HG and DC i. e. 4;

Vertical lines are AD, EH, KM, FG and BC i. e. 5;

Slanting lines are DE, CF, IE, EK , JF, KF, DH and CG i. e. 8.

Thus, there are $4 + 5 + 8 = 17$ straight lines in the figure.

40.[C] The figure is labelled as shown :



Horizontal lines are DF amd BC i. e. 2;

Vertical lines are DG, AH and FI i. e. 3;

Slanting lines are DC, EB, AB and AC i. e. 4

Thus, there are $2 + 3 + 4 = 9$ straight lines in the figure.

Now, we shall count the number of triangles in the figure.

The triangles composed of single components only, are AEF, AED, EFJ, EDJ, FJL DJK, FLC, DKB, LIC, and KGB. Thus, there are 10 such triangles.

The triangles composed of only two components are AJF, AJD, FJC, DJB, JHC, JHB, FIC, DGB, ADF and DFJ. Thus, there are 10 such triangles

The triangles composed of three components are DFK and FDL. Thus, there are 2 such triangles.

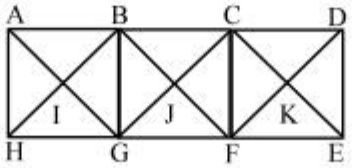
The triangles composed of four components are ABJ, ACJ, DFB, FDC, DGC, FIB and JBC i. e. 7 in number.

The triangles composed of six components are AHB, AHC, DAC, FAB, DBC and FBC i.e. 6 in number.

There is only one triangles composed of twelve components. This triangle is ABC.

Hence, there are $10 + 10 + 2 + 7 + 6 + 1 = 36$ triangles in the figure.

Q.41[A] The figure may be labelled as shown :



Triangles

Simplest triangles are ABI, BIG, GIH, HIA, BCJ, CFJ, FGJ, GBJ, CDK, DEK, EFK, and FCK i. e. 12 in number.

Triangles composed of two components are ABG, BGH, GHA, HAB, BCF, CFG, FGB, GBC, CDE, DEF, EFC and FCD. i.e. 12 in number.

Triangles composed of four components are AGC, BFD, HBF and GCE i. e. 4 in number.

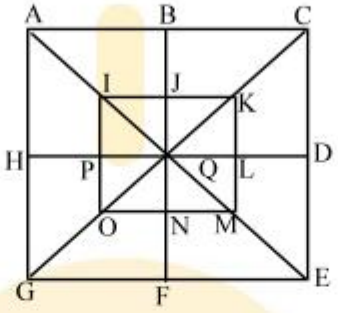
Thus, there are 12 + 12 + 4 = 28 triangles in the figure.

Squares

Squares composed of two components are BIGJ and CJFK i. e. 2 in number.

Squares composed of four components are ABGH, BCFG and CDEF i.e. 3 in number.

42.[C] We may label the figure as shown :



Triangles

The simplest triangles are IJQ, JKQ, KLQ, LMQ, MNQ, NOQ, OPQ and PIQ i.e. 8 in number.

The triangles composed of two components are ABQ, BCQ, CDQ, DEQ, EFQ, FGQ, GHQ, HAQ, IKQ, KMQ, MOQ and OIQ i. e. 12 in number.

The triangles composed of four components are ACQ, CEQ, EGQ, GAQ, IKM, KMO, MOI, and OIK i. e. 8 in number.

The triangles composed of eight components are ACE, CEG, EGA and GAC i. e. 4 in number

Thus, there are 8 + 12 + 8 + 4 = 32 triangles.

Squares

Squares composed of two components are IJQP, JKLQ, LMNQ, and OPQN, i. e. 4 in number.

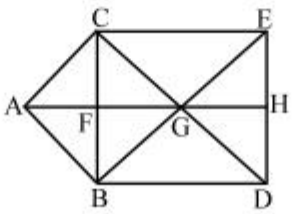
Squares composed of four components are ABQH, BCDQ, QDEF and HQFG i. e. 4 in number.

The only square composed of eight components is IKMO.

There is only one square composed of sixteen compo nents which is ACEG.

Hence, there are 4 + 4 + 1 + 1 =10 squares in the figure.

43.[C] The figure can be labelled as shown :



Count the number of simplest triangles. These are AFC, AFB, BGF, CGF, CGE, BGD, EHG,

and DHG.

Thus there are 8 such triangles.

Next, count the number of triangles which are com posed of two small triangles each.

These are ABC, ACG, CGB. ABG and GDE. Thus there are 5 such triangles.

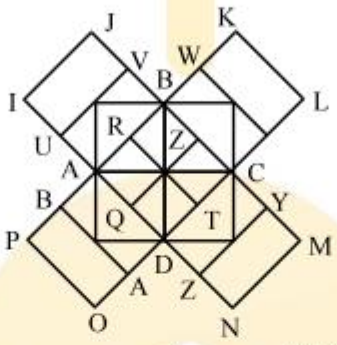
Also, count the number of triangles each of which contains three small triangles.

These are BCD, CEB, EDC and EDB.

Thus, there are 4 such triangles.

Consequently, there are 8 + 5 + 4 = 17 Triangles in the figure.

44.[D] The figure can be labelled as shown :



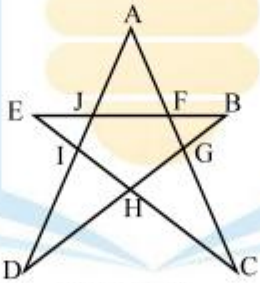
The rectangles composed of two components are JKBH, LMDB, NOFD and PQHF i.e. 4 in number.The rectangles composed of four components are ACDH, BCEF, DEGH and FGAB i. e. 4 in number.

The rectangles composed of six components are HLMF, BNOH, PQBD, and JKDF i. e. 4 in number.

The rectangles composed of eight components are JKNO and PQLM i.e. 2 in number.

Hence, the total number of rectangles in the figure = 4 + 4 + 4 + 2 = 14

45.[D] The figure is labelled as shown :

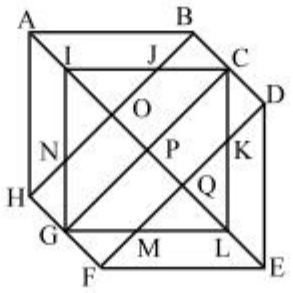


The simplest triangles are AJF, BFG, CGH, DHI and EJI i. e. 5.

The triangles having three parts are AIC, ADG, EHB, EFC and DJB i. e. 5.

∴ There are 10 triagles in the figure.

46.[C] The figure is labelled as shown :



The simplest triangles are BCJ,CDK, KLQ, LMQ, FGM, GHN, NOI and IJO i. e. 8 in number.

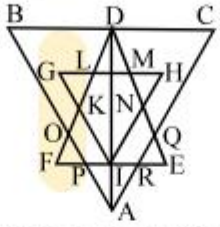
The triangles composed of two components each are AOB, DEQ, EFQ, AOH, GPI , CIP, CLP, GLP, KLM and NIJ i.e 10 in number.

The triangles composed of four components each are ABH, DEF, ICL, CLG, LGI and GIC i. e. 6 in number.

∴ Total number of triangles in the figure

= 8 + 10 + 6 = 24.

47.[C] The figure may be labelled as shown :



The simplest triangles are GKL, MHN, DLJ, DMJ, QRE, OPF, PIA and IRA i. e. 8 in number.The triangles having two components each. are BDO, CDQ, DLM, PRA, KEL,NEI, HJI, GJI, DKI, and DNI i. e. 10.

The triangles having four components each, are DIE, DFI, DOA, DQA and DHI i.e 252.

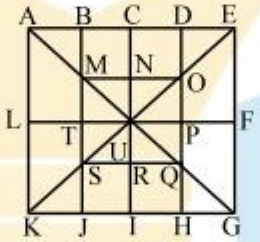
The triangle having six components each, are DCA, and DBA i. e. 2.

DEF is the only triangle having eight components.

ABC is the only triangle having twelve compo nents.

Thus, there are 8 + 10 + 5 + 2 + 1 + 1 = 27 triangles in the figure.

48.[B] We label the figure as shown :



The simplest squares are BCNM, CDON, HIRQ and SRIJ i. e. 4.

The squares composed of two components are MNUT, NOPU, UPQR and TURS i. e. 4.

The squares composed of five components are CEFU, GIUF, IKLU and ACUL i. e. 4.

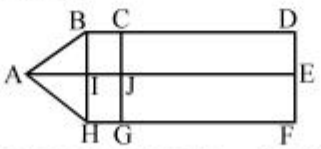
The squares composed of six components are BDPT and TPHJ i. e. 2.

There is only one square i. e. MOQS composed of eight components.

There is only one square i. e. AEGK composed of twenty components.

Hence, there are 4 + 4 + 4 +2 + 1 + 1 = 16 squares in the figure.

49.[D] The figure may be labelled as shown :



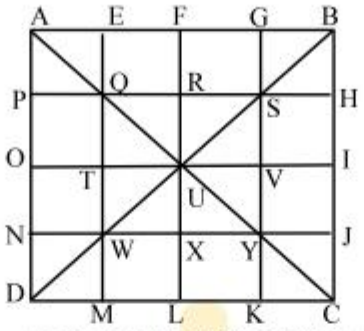
The simplest rectangles are BCJI, IJGH, CDEJ and JEFG i. e. 4.

The rectangles composed of two components are BDEI, IEFH, CDFG and BCGH i. e. 4.

The only rectangles composed of four components is BDFH.

Thus, there are 4 + 4 + 1 = 9 rectangles in the figure.

50.[D] The figure may be labelled as shown :



Now the simplest triangles are APQ, QTU, UXY, YKC, AEQ, QRU, UVY, YJC, BGS, SRU, UTW, WND, BHS, SVU, UXW and WMD i. e. 16.

The triangles having two components each, ate QUS, SUY, WUY, and QUY i. e. 4.

The triangles having three components each, are AFU, UIC, AOU, ULC, UOD, ULD, BFU and BIU i. e. 8.

The triangles having four components each, are

QSY, SQW, SYW and QWY i. e. 4.

The triangles having six components each, are ABU, ADU, CDU, and CBU i. e. 4.

The triangles having seven components each, are ANY, AGY, QMC, QHC, BJW, BEW, SKD and DPS i. e. 8.

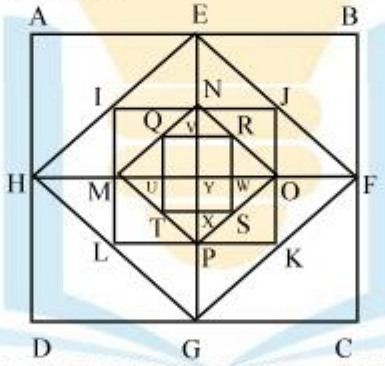
The triangles having twelve components each are ADC, BDC, ABC,and ABD i. e. 4.

Thus, there are in all

16 + 4 + 8 + 4 + 4 + 8 + 4 = 48

triangles in the figure.

51.[D] The figure may be labelled as shown :



The simplest squares are VRWY, YWSX, UYXT and QVYU i.e. 4.

The squares composed of four components are QRST, NJOY, OYPK, MYLP and INYM i.e. 5.

The squares composed of seven components are EBFY, YFCG, HYGD, and AEYH i.e. 4.

The square MNOP is composed of twelve compo nents.

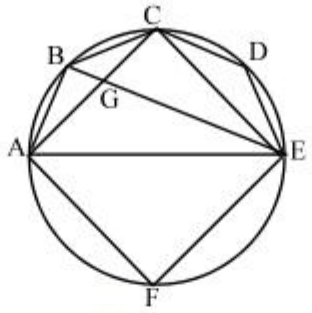
The square IJKL is composed of sixteen compo nents.

The square EFGH is composed of twenty four components.

The square ABCD is composed of twenty eight components.

Hence, there are 4 + 5 + 4 + 1 + 1 + 1 + 1 = 17 squares in the figue.

52.[D] We label the figure as shown :

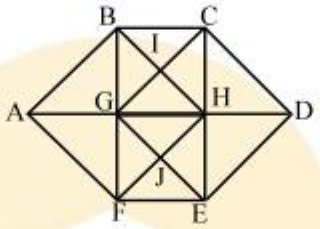


Simplest triangles are ABG, BCG, CDE, GCE, and AFE i.e. 6.

Triangles composed of two triangles each, are ABC, ABE, ACE, and BCE i. e. 4.

∴ There are 6 + 4 = 10 triangles in the figure.

53.[D] The figure is labelled as shown :



Simplest triangles are ABG, AGF, CHD, HDE, BGI, BCI, HCI, HGI, GHJ, HEJ, EFJ and GFJ i. e. 12.

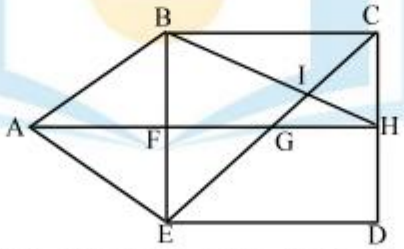
The triangles composed of two triangles are ABF, CDE, BCG, BCH, HCG, BHG, GHE, HEF, GFE and GHF i.e. 10.

The triangles composed of three triangles are ABH, AFH, CDG and GDE i. e. 4.

The triangles composed of four triangles are BHF and CGE i.e. 2.

∴ Total number of triangles = 12 + 10 + 4 + 2 = 28.

54.[D] The figure may be labelled as follows :



The simplest triangles are CHI, GHI, BCI, EFG, AFE and ABF i. e. 6.

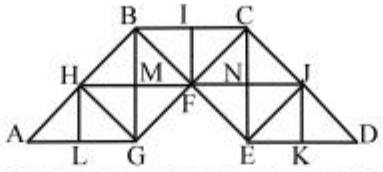
The triangles composed of two components are ABE, BHF, BEI, CGH, BCH and AEG i.e. 6.

The triangles composed of three components are ABH, BCE and CED i. e. 3.

Hence, the total number of triangles in the figure

$= 6 + 6 + 3 = 15.$

55.[C] The figure may be labelled as shown.



The simplest triangles are AHL, HLG, HMG, BHM, BFM, MGF, BIJ, FIC, CNF, NFE, CNJ, NJE, JKE and JDK i .e. 14.

The triangles composed of two simple triangles are AHG, GHB, HBF, BFG, FGH, BFC, CFE, EFJ, CEJ, CFJ and JED i. e.11.

The triangles composed of four simple triangles are AGB, GBC, ECB and CED i. e. 4.

$\therefore$ There are $14 + 11 + 4 = 29$ triangles in the figure.

56.(A) From Fig.(i), (ii) and (iii), it is clear that the numbers 3, 2, 4 and 5 lie adjacent to the number 6. so, 1 lies opposite 6.

57.(A) From fig. (i), (ii) and (iii), it is clear that the numbers 1, 5, 4 and 2 lie adjacent tos the number 3. So, 6 lies opposite 3. Form fig. (ii) and (iii), it follows that 3, 5 and 2 lie adjacent to 4. So, 1 and 6 can lie opposite 4. But 6 lies opposite 3. Therefore, 1 lies opposite 4.

58.(C) From, fig.(i), (iii) and (iv), it is clear that numbers 6, 1, 5 and 2 lie adjacent to 3. So, 4 lies opposite 3.

59.(A) From fig. (iii) and (iv), it is clear that the number 5, 6, 2 and 3 lie adjacent to 4. So 1 lies opposite 4.

60.(C) From fig. (i), (iii) and (iv), we find that the numbers adjacent to 4 are 5, 6, 1 and 2. So, 3 lies opposite 4 i.e. 4 lies opposite 3.

61.(C) Since the sum of the number of dots on opposite faces of the block is always 7, we cannot get 1 dot adjacent 6 dots, 2 dots adjacent 5 dots or 3 dots adjacent 4 dots. So, the figure (A), (B) and (D) cannot be correct.

62.(D) From fig. (i) (iii) and (iv), we observe that the symbols 'O' 'O' '=' & 'Δ'lie adjacent to '▭'. so '▭' lies opposite '▭'.

63.(A) From fig. (ii) and (iii), it is clear that the symbols '▭', 'O' '▭' and 'Δ' lie adjacent to '=' sign. So, O lies opposite '='

64.(A) From fig.(iii) and (iv), it follows the symbols '▭', '=' & 'O' lie adjacent to 'Δ'. So one of the symbols 'O'or '▭'can lie opposite 'Δ'. But '▭'lies oppsite '▭'. So, 'O' lies opposite 'Δ'.

65.(A) Since the sum of the number of dots on opposite faces of the block is always 7, we cannot get 1 dot adjacent 6 dots, 2 dots adjacent 5 dots or 3 dots adjacent 4 dots. So, the figures (B), (C) and (D) cannot be correct.

66.(B) From the three given figures, it is clear that the numbers 1, 2, 5 and 4 appear adjacent to 3, so none of these can appear opposite 3. Therefore, 6 appears opposite 3.

67.(C) From figures (ii) and (iii), it is clear that one, three four and six dots cannot appear opposite five dots. Therefore, two dots appear opposite five dots.

68.(B) From fig.(ii) and (iii) it is clear that six, four, one and three dots cannot appear opposite two dots. So, five dots appear opposite two dots. From fig. (i) and (iii) it is clear that four, two and one dots cannot appear opposite three dots. Also, since five dots appear opposite two dots so they cannot appear opposite three dots. Therefore, six dots appear opposite three dots.

69.(C) From three figuress it is clear that the numbers 2,3,1 and 6 cannot appear opposite 4. So,5 appears opposite 4. Since in each one of the three dice, 4 appears on the top. So, 5 appears at the bottom face of each dice.

70.(D) From fig. (ii) and (iii) it is clear that C, D, B and F cannot appear opposite E. So, A appears opposite E. i.e. E is the alphabet opposite A.

71. From fig. (i) and (iii), it is clear that dot, triangle, cross and arrow cannot appear opposite the circle. So, the square lies opposite the circle.

From fig. (ii) and (iii), it is clear that triangle, square, arrrow and circle cannot appear opposite the cross. So, the dot lies opposite the cross. Obviously, the triangle lies opposite the arrow.

(i) **(D)** As discussed earlier, the cross lies opposite the dot.

(ii) **(B)** As discussed earlier, the triangle lies opposite the arrow.

(iii) **(C)** Since the square lies at the top of fig. (ii) and the circle lies opposite the square, so the circle lies at the bottom of fig. (ii)

72. From fig. (Y) & (Z), it is clear that the numbers 4, 3, 2 and 5 cannot appear opposite 6. So, 1 lies opposite 6. From fig. (X) & (Y), it is clear that the numbers 5, 1, 6 and 3 cannot appear opposite 4.So, 2 lies opposite 4. Obviously, 3 lies opposite 5.

(i) **(C)** : Since 5 lies at the top or dice (X) and 3 lies opposite 5, So 3 lies at the bottom face of dice (X).

(ii) **(C)** : Since 4 lies at the top of dice (Y) and 2 lies opposite 4, so 2 lies at the bottom face of dice (Y).

(iii) **(A)** : As discussed earlier, 1 lies opposite 6.

(iv) **(B)** : The numbers which are hidden behind the numbers 6 and 5 in dice (Z) are the numbers lying opposite 5 and 6 i.e. 3 and 1.

(v) **(D)** : In fig. (X), the hidden numbers adjacent to 5 are those lying opposite 1 and 4. These are 6 and 2. In fig. (Z), the hidden numbers adjacent to 5 are those lying opposite 2 and 6. These are 4 and 1. Clearly, there is no number common to {6, 2 } and {4, 1}.

73.(B) : From the two figures it is clear that four, five, two and six dots cannot appear opposite three dots.So, one dot appears opposite three dots.Therefore, if one dot is at the bottom, then three dots will lie on the top.

74.(D) : From the two figures it is clear that three, four, one and five dots cannot appear opposite two dots. So, six dots appear opposite two dots. In thes left hand side dice, there are two dots on the top; so, there should be six dots at the bottom face.

75.(A) : From the two figures it is clear that two, six and four dots cannot appear opposite three dots. So, either one or five dots can appear opposite three dots. Therefore, if the dice is resting on the side with three dots, then either one or five dots will appear on the top.