

DICE

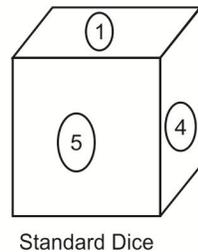
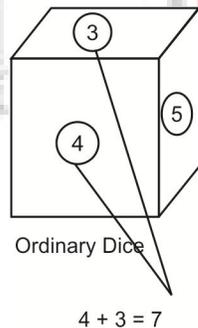
A dice is a small form of a cube. It is a three dimensional shape and it has 6 surfaces/slides/faces. Generally, the length, width and height of a dice is equal. But there are some dice whose length, width and height are unequal. The surface of each dice is attached to four other adjacent surfaces/sides and the surface which is not attached is just opposite of that surface. Generally, a dice is represented by 1 to 6 digit. Sometimes it is also represented by diagrams or alphabets.



Types of Dice:

There are two types of Dice.

- ✚ **Ordinary Dice:** In this type of dice, the sum of opposite sides is not 7 but the sum of two adjacent sides are seven.
- ✚ **Standard Dice:** In such type of dice, the sum of opposite sides is 7 or sum of adjacent side is not 7.



Here,

$$1 + 4 = 5$$

$$4 + 5 = 9$$

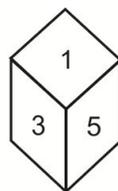
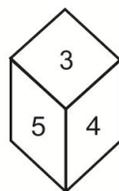
$$1 + 5 = 6$$

Opposite of 1 -----6 (since $1 + 6 = 7$)

Opposite of 5 -----2 (since $5 + 2 = 7$)

Opposite of 3 -----4 (since $3 + 4 = 7$)

Example 1: Given below are four dice. Which one is a standard dice?



Solution :(c)

In option (a) the sum of two adjacent sides 1 and 6 is 7

In option (b) the sum of two adjacent sides 3 and 4 is 7

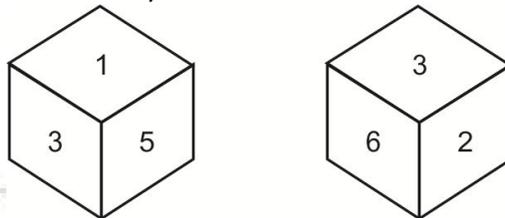
In option (d) the sum of two adjacent sides 2 and 5 is 7
 Therefore, they all are not a standard dice. It is because in a standard dice the sum of the adjacent surface is never 7. So only option (iii) does not have the sum of two adjacent side as 7 ($1 + 3 = 4$, $3 + 5 = 8$, $1 + 5 = 6$).
 Therefore, this dice be a standard dice.

DIFFERENT CASES OF DICE WHEN OPPOSITE NUMBER /ALPHA /SYMBOL HAS TO FIND

CASE 1:-One side/Surface Common

A dice can be shown in different positions and if two different position of a dice has a common surface then we can see 5 surfaces at the same time. It is so because one surface is seen twice. In such condition, to find out the opposite surface, the following formula should be used:

- 1) If two different position of a dice has a common surface then the surface opposite to it, will be that surface which cannot be seen. Therefore the opposite surface of the common side seen twice in two different positions of a dice will be that surface which is not seen.
- 2) Start writing in clockwise direction from the common surface of two different dice. The top surface will always have its opposite surface exactly below it.



Two position of a dice is shown in the above diagram. One of the surface is common in both i.e. digit 3. When we write in clockwise direction from the common surface of both the dice then it will be

From first dice (clockwise) 3 - 1 - 5
 From second dice (clockwise) 3 - 2 - 6

Therefore, the opposite of 1 is 2 and 5 is 6, and the opposite surface of 3 will be that surface which cannot be seen i.e 4

Opposite of 3 is 4

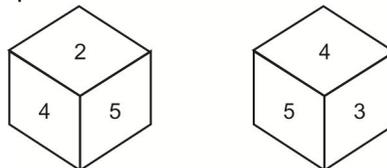
Opposite of 1 is 2

Opposite of 5 is 6

CASE 2: When two sides are common

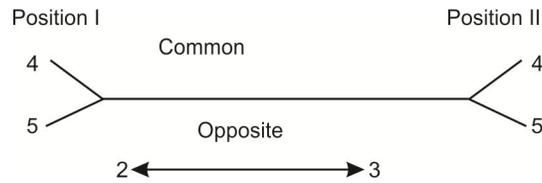
When a dice is shown in different positions and any two of the positions has two common sides or two different positions of the same dice are shown then top find out the opposite of two common sides, the following formula can be applied.

Example 9: Given below are the two positions of a dice in which two sides or surfaces are common.



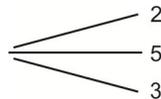
The two common sides are 4 and 5.

(1) The remaining side other than the two common sides (4 and 5) of the first dice position is 2 and the remaining sides other than the two sides (4 and 5) of the second dice position is 3. So, 2 and 3 is opposite to each other. Therefore,



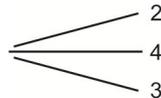
The opposite of side 2 will be 3 or the opposite of side 3 will be 2. There, other than the two common sides of dice in first and second position, the remaining side of the first and second position of the dice is opposite to each other.

(2) If the opposite of any two common side is asked – The two common sides are 4 and 5 in the above diagram, The side adjacent to 4



5 So, the opposite of 4 will be either 1 or 6

The side adjacent to 5



4 So, the opposite of 5 will be either 1 or 6

In other words, the opposite of two common sides i.e. 4 and 5 will be either 1 or 6.

(3) Similarly, if the opposite of the hidden sides i.e. 1 and 6 is asked, then the answer will be 4 or 5. Therefore the opposite of 1 will be either 4 or 5 and the opposite of 6 will be either 4 or 5

CASE3:- When None of the sides are common

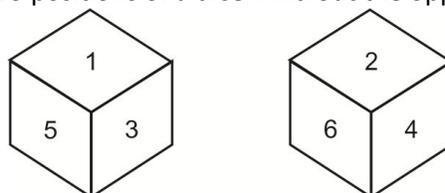
When two positions of a dice are shown and none of the sides surfaces are common, then to find out the opposite of all the 6 sides, the following formula can be applied.

When all the digit i.e. 1 to 6 represented on the dice, then the possible conditions can be:

1st → If it is a standard dice 2nd → If it is a standard dice

1st : If it is a standard dice

Example : Given below are the two positions of a dice. Find out the opposite of surface 3



- a.4 b.6 c.5 d.2

Solution (a)

In both the positions of the dice, name of the sides are common. Besides this the sum of none of the adjacent sides of 1st and 2nd position is 7

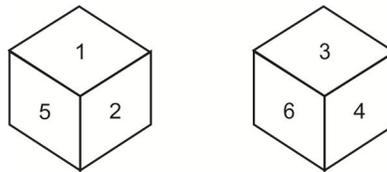
In 1st position $5 + 1 = 6$
 $5 + 3 = 8$
 $1 + 3 = 4$

In 2nd position $2 + 4 = 6$
 $2 + 6 = 8$
 $4 + 6 = 10$

As above its understood its standard dice because sum of none adjacent side is 7.so the opposite of 3 is 4.

2nd:- If it is a standard dice

Example: Given below are the two positions of a dice. Find out the opposite of surface 5.



- a. 4 b. 6 c. 5 d. 2

Solution (a)

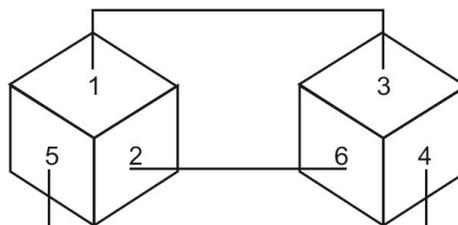
In both the positions of the dice, name of the sides are common. Besides this the sum of none of the adjacent sides of 1st and 2nd position is 7 such

In 1st position $2 + 1 = 3$
 $5 + 1 = 6$
 $2 + 5 = 7$

In 2nd position $3 + 4 = 7$
 $3 + 6 = 9$
 $4 + 6 = 10$

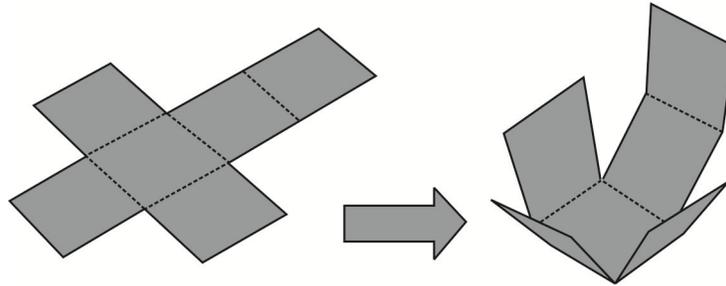
Thus it is not a standard dice. It is so because e in a standard dice, the sum of opposite sides should be 7 but not the sum of two adjacent sides. As we know, that it is not a standard dice and none of the two sides of the two dice positions are common, then the following formula can be applied to find out the digit in the opposite side. Opposite groups are

- Upper – Upper \Rightarrow (1 – 3)
- Left t - Right \Rightarrow (5 - 4)
- Right – Left \Rightarrow (2 – 6)



So the opposite of side 5 will be 4

Folding of dice

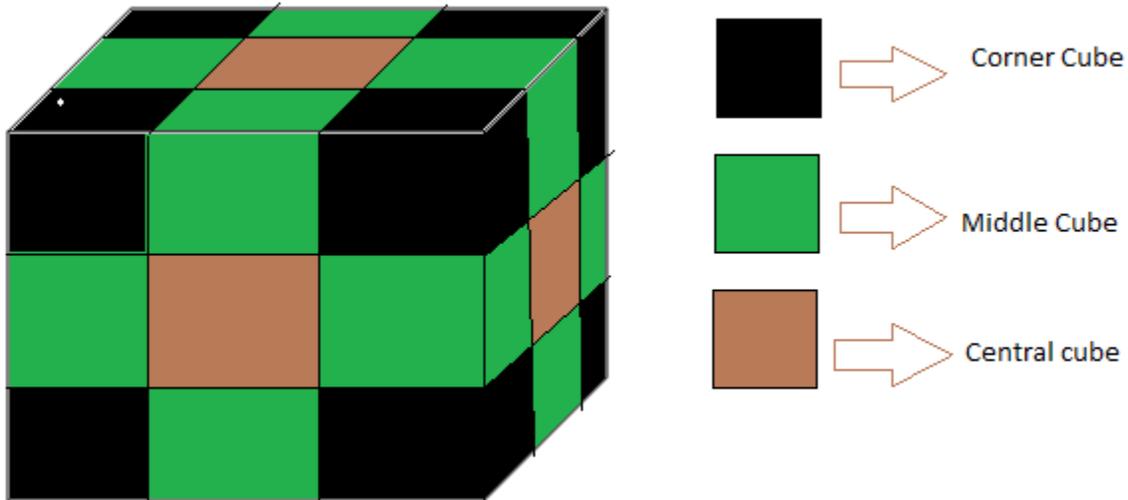


When a dice is unfolded the all the six can be seen. A dice which is unfolded can be show in different ways. As shown in figure

<p>1 lies opposite of 6</p> <p>2 lies opposite of 4</p> <p>3 lies opposite of 5</p>	<p>1 lies opposite of 5</p> <p>2 lies opposite of 4</p> <p>3 lies opposite of 6</p>
<p>1 lies opposite of 3</p> <p>2 lies opposite of 5</p> <p>3 lies opposite of 6</p>	<p>1 lies opposite of 4</p> <p>2 lies opposite of 6</p> <p>3 lies opposite of 5</p>
<p>1 lies opposite of 4</p> <p>2 lies opposite of 5</p> <p>3 lies opposite of 6</p>	

Cubes

If a cube is painted on all of its surfaces with the same colour and then divided into smaller cubes of equal size, then after separation, number of smaller cubes,



So obtained will be calculated as under:

- Number of smaller cubes with three surface painted / vertex cubes = 8
- Number of smaller cubes with two surface painted / middle cubes = $(n - 2) \times 12$
- Number of smaller cubes with one surface painted / center cubes = $(n - 2)^2 \times 6$
- Number of smaller cubes with no surface painted / inner center cubes = $(n - 2)^3$

Here n = Number of divisions on the surface of the bigger cube
= (Length of edge of big cube) / Length of edge of one smaller cube