CHAPTER 6

Cubes and Dice

CUBES

A cube is a three dimensional solid having 6 faces, 12 edges and 8 corners. All the edges of a cube are equal and hence all the faces are square in shape.

Basically, in competitive exams, a few questions may be asked based on cubes.

The questions on cubes may belong to any one of the following categories.

I. A cube is cut making certain specified cuts. The directions in which the cuts are made may or may not be given. We are to find the number of identical pieces resulting out of the given cuts.

II. The number of identical pieces, into which a cube is cut, is given and we need to find the cuts.

III. A cube could be painted on all or some of its faces with the same colour or different colours and then cut into a certain specified number of identical pieces. Questions of the form — "How many small cubes have 2 faces painted?" "How many smaller cubes have only one face painted?" etc., could then be framed.

PRACTICE EXERCISE 6 (A)

Directions for questions 1 to 4: Select the correct alternative from the given choices.

1. If five cuts are made on a cube, what is the minimum number of pieces obtained?

(1) 18 (2) 6
(3) 16 (4) 25

2. If six cuts are made on a cube, what is the maximum number of identical pieces obtained?

(1) 16 (2) 18
(3) 36 (4) 27

3. If two, three and four cuts are made parallel to different faces of a cube, then what is the number of identical pieces obtained?

(1) 60
(2) 30
(3) 48
(4) 24

4. What is the minimum number of cuts required to cut a cube into 216 identical pieces?

(1) 36 (2) 18
(3) 15 (4) 12

Directions for questions 5 to 7: These questions are based on the following information.

Each of 216 small identical cubes are painted blue on all faces and all these cubes are arranged to form a large cube. Now all the faces of the large cube are painted pink.

5. How many small cubes have only one colour on them?

(1) 96 (2) 125
(3) 64 (4) 48

6. How many small cubes have exactly two faces painted pink?

(1) 36 (2) 48
(3) 64 (4) 80

7. How many small cubes have exactly three faces painted blue?

(1) 8 (2) 4
(3) 2 (4) 6

Directions for questions 8 to 11: These questions are based on the following information.

216 small identical cubes are arranged to form a large cube. Now three faces of the large cube are painted yellow, of which no two faces are opposite each other. Of the remaining faces, two are painted green and the other black.

8. How many small cubes have all three colours on them?

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

9. How many small cubes have exactly two colours on them?

(1) 28 (2) 30
(3) 37 (4) 44

10. How many small cubes have exactly three faces painted in the same colour?

(1) 0 (2) 1
(3) 2 (4) 3

11. How many small cubes have black and green but not yellow colour on them?

(1) 8 (2) 9
(3) 10 (4) 12

Directions for questions 12 to 14: These questions are based on the following information.

A cube is painted in black and green, each on three faces such that any two faces with same colour are adjacent to each other. Now this cube is cut into 60 identical pieces using 2, 3 and 4 cuts parallel to different faces.

12. How many smaller pieces have exactly two faces painted in black?

(1) 5 (2) 9
(3) 18 (4) 27

13. How many smaller pieces have both the colours on them?

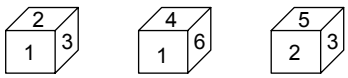
(1) 9 (2) 18
(3) 6 (4) 24

14. How many smaller pieces have no face painted?

(1) 6 (2) 9
(3) 11 (4) 1

Directions for questions 15 to 18: In each of the following questions, three different views of a cube are given. Based on these diagrams answer the following questions.

15.

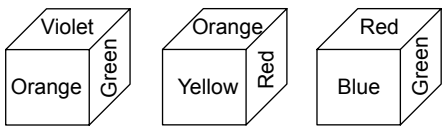


(i) (ii) (iii)

Which of the following statements is true?

(1) 3 is opposite 6 (2) 5 is opposite 4
(3) 4 is opposite 3 (4) 6 is opposite 2

16.

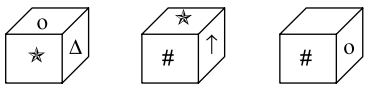


(i) (ii) (iii)

Which colour is at the bottom of the second figure?

(1) Blue (2) Green
(3) Orange (4) Red

17.

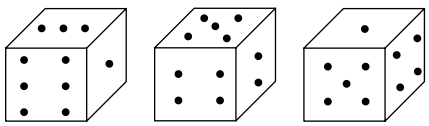


(i) (ii) (iii)

Which of the following are adjacent to Δ?

(1) *, # (2) ↑, #
(3) o, ↑ (4) o, #

18.



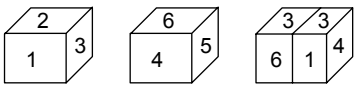
(i) (ii) (iii)

What is the sum of the dots on the two faces which are adjacent to both the faces with two dots and five dots, if the number of dots on the six faces is 1, 2, 3, 4, 5 and 6 respectively?

(1) 10 (2) 7
(3) 5 (4) 4

Directions for questions 19 and 20: In each of the following questions, figures (i) and (ii) are two dice which are similar to each other in all respects. Figure (iii) is the view of both the dice when joined together. Answer the questions that follow based on the above information.

19.

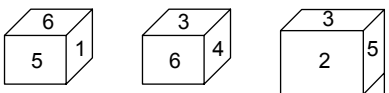


(i) (ii) (iii)

What is the sum of the values on the faces of the dice that touches each other?

(1) 7 (2) 4
(3) 6 (4) 5

20.



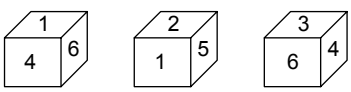
(i) (ii) (iii)

What is the sum of the values on the two faces at the back of fig. (iii)?

(1) 3 (2) 4
(3) 7 (4) 6

Directions for questions 21 and 22: Each of the following questions contain three views of the same cube. Find out from the given choices, the choice which represents the correct view of the same cube.

21.



(i) (ii) (iii)

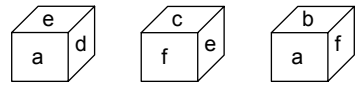
(1) 

(2) 

(3) 

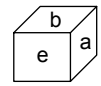
(4) 

22.

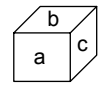


(i) (ii) (iii)

(1) 

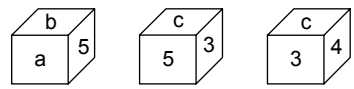
(2) 

(3) 

(4) 

Directions for questions 23 and 24: Each of the following questions contains three different views of a dice. Study the given figures and find out the incorrect statement from the given choices.

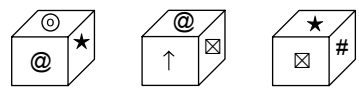
23.



(i) (ii) (iii)

(1) a is opposite c.
(2) 3 is opposite b.
(3) 4 is adjacent to a, b and 3.
(4) None of these

24.

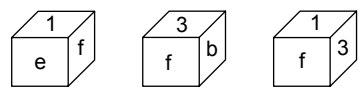


(i) (ii) (iii)

(1) # and @ are adjacent to both ★ and ↑.
(2) # and ↑ are adjacent to both ★ and @.
(3) ◎and ☒ are adjacent to ★ and ↑.
(4) @ and # are adjacent to ◎ and ☒.

Directions for question 25: The following question contains three views of a dice. Study it and find out the correct statement from the given choices.

25.



(i) (ii) (iii)

(1) 3-e and 1-f are opposite.
(2) 1-b and 5-3 are opposite pairs.
(3) 3-b and 5-f are opposite pairs.
(4) Data is insufficient.

Directions for questions 26 to 30: These questions are based on the following data.

There is a cube in which one pair of adjacent faces is painted red, the second pair of adjacent faces is painted blue and a third pair of adjacent faces is painted green. This cube is now cut into 216 smaller but identical cubes.

26. How many small cubes are there with no red paint at all?

(1) 144 (2) 150
(3) 125 (4) 130

27. How many small cubes are there with at least two different colours on their faces?

(1) 64 (2) 54
(3) 33 (4) 44

28. How many small cubes are there with one face painted red?

(1) 64 (2) 81
(3) 60 (4) 100

29. How many small cubes are with both red and green on their faces?

(1) 8 (2) 12
(3) 16 (4) 32

30. How many small cubes are there showing only green or only blue on their faces?

(1) 64 (2) 72
(3) 81 (4) 90

PRACTICE EXERCISE 6 (B)

Directions for questions 1 to 4: Select the correct alternative from the given choices.

1. What is the minimum number of cuts required to cut a cube into 24 identical pieces?

(1) 6 (2) 8
(3) 9 (4) 12

2. If 10 cuts are made on a cube, what is the maximum number of identical pieces obtained?

(1) 80 (2) 100
(3) 64 (4) 125

3. 27 identical cubes are arranged to form a large cube. How many such cubes are required to completely cover the large cube, so that the figure obtained also must be a cube?

(1) 125 (2) 98
(3) 64 (4) 80

4. A large cube is formed using 125 identical smaller cubes and is placed at the corner of a large room. How many such smaller cubes are required to cover the large cube completely, so that the figure obtained also must be a cube?

(1) 91 (2) 96
(3) 75 (4) 127

Directions for questions 5 to 7: These questions are based on the following information.

A cube, painted on all its faces, is cut into 125 identical smaller cubes.

5. How many smaller cubes have no face painted?

(1) 100 (2) 81
(3) 64 (4) 27

6. How many smaller cubes have only one face painted?

(1) 36 (2) 54
(3) 64 (4) 108

7. How many smaller cubes have exactly two faces painted?

(1) 36 (2) 54
(3) 48 (4) 60

Directions for questions 8 and 9: These questions are based on the following information.

Each of 125 small identical cubes are painted black on all faces and all these cubes are arranged to form a large cube. This large cube is placed at the corner of a large room and all the visible faces of this cube are painted white.

8. How many smaller cubes have at least two faces with white paint?

(1) 13 (2) 16
(3) 15 (4) 10

9. How many smaller cubes have no face painted white?

(1) 27 (2) 100
(3) 64 (4) 81

Directions for questions 10 and 11: These questions are based on the following information.

125 small identical cubes are arranged to form a large cube and it is painted in red, blue and green on two faces each,

such that any two faces with the same colour are adjacent to each other.

10. How many small cubes have only one colour on their faces?

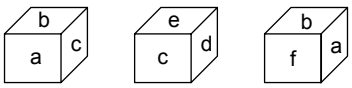
(1) 48 (2) 63
(3) 75 (4) 81

11. How many small cubes have exactly two colours on their faces?

(1) 24 (2) 27
(3) 33 (4) 39

Directions for questions 12 to 14: In each of the following questions, three different views of a cube are given. Based on these diagrams answer the following questions.

12.

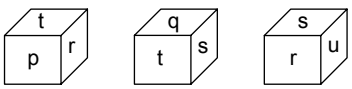


(i) (ii) (iii)

Which of the following indicates the correct pair of opposite faces?

(1) a – d (2) a – f
(3) f – e (4) b – d

13.

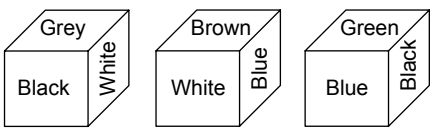


(i) (ii) (iii)

Which of the following are opposite r and t respectively?

(1) u and q (2) p and s
(3) s and p (4) q and u

14.



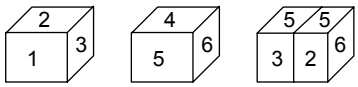
(i) (ii) (iii)

Which of the following is at the bottom of figure (i)?

(1) Blue (2) Green
(3) Black (4) Brown

Directions for questions 15 and 16: In each of the following questions, figures (i) and (ii) are two dice which are similar to each other in all respects. Figure (iii) is the view of both the dice when joined together. Answer the questions that follow based on the above information.

15.

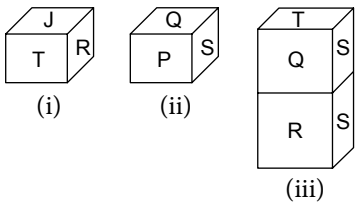


(i) (ii) (iii)

What is the sum values of the faces that are joined together, if the number on the face of the dice to the left in figure (iii) which is touching the other dice is 2?

(1) 5 (2) 2
(3) 7 (4) 12

16.



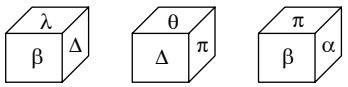
(i) (ii) (iii)

What are the letters on the top and bottom faces of the dice at the bottom in figure (iii)?

(1) Q and T (2) P and T
(3) P and Q (4) Q and J

Directions for questions 17 to 19: In each of these questions, three different views of a dice are given. Choose the answer which represents the correct view of the dice.

17.



(i) (ii) (iii)

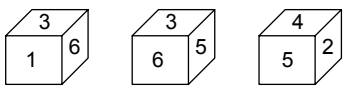
(1) 

(2) 

(3) 

(4) 

18.



(i) (ii) (iii)

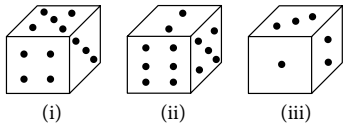
(1) 

(2) 

(3) 

(4) 

19.

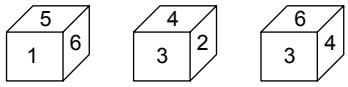


(i) (ii) (iii)

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

Directions for questions 20 to 22: Each of the following questions contains three different views of a dice. Study the given figures and find out the incorrect statement from the given choices.

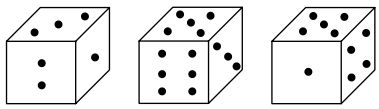
20.



(i) (ii) (iii)

(1) 6 is opposite 2. (2) 1 is opposite 5.
(3) 4 is opposite 1. (4) 3 is opposite 5.

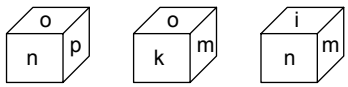
21.



(i) (ii) (iii)

(1) 5 dots are adjacent to 3, 2 and 4 dots.
(2) 2 and 5 dots are adjacent to both 3 and 4 dots.
(3) 3 and 4 dots are adjacent to both 1 and 6 dots.
(4) 1 and 6 dots are adjacent to both 2 and 5 dots.

22.

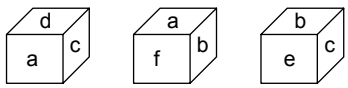


(i) (ii) (iii)

(1) l is opposite o. (2) k is opposite n.
(3) m is opposite n. (4) None of these

Directions for questions 23 to 25: Each of the following questions contains three views of a dice. Study them and find out the correct statement from the given choices.

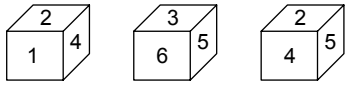
23.



(i) (ii) (iii)

(1) d is opposite e.
(2) a and b are adjacent to d.
(3) f is opposite d.
(4) None of these

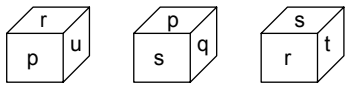
24.



(i) (ii) (iii)

(1) 1 is opposite 5. (2) 2 is opposite 3.
(3) 6 is opposite 4. (4) All the above

25.



(i) (ii) (iii)

(1) r and q are adjacent to t and s.
(2) u and r are adjacent to t and s.
(3) p is adjacent to q, r, t and u.
(4) None of these

Directions for questions 26 to 30: These questions are based on the following data.

Three different faces of a cube are painted in three different colours—red, green and blue. This cube is now cut into 216 smaller but identical cubes.

26. What is the least number of the smaller cubes that will have exactly three faces painted?

(1) 1 (2) 6
(3) 2 (4) None of these

27. How many of the smaller cubes have exactly two faces painted?

(1) 12 (2) 15
(3) 16 (4) Either (1) or (2)

28. What are the least and the largest numbers of small cubes that have exactly one face painted?

(1) 75 and 86 (2) 64 and 81
(3) 64 and 72 (4) 75 and 84

29. What is the least number of small cubes that have exactly one face painted red and no other face painted?

(1) 12 (2) 18
(3) 24 (4) 36

30. What is the maximum number of small cubes that have one face painted green and one face blue and no other face painted?

(1) 2 (2) 4
(3) 6 (4) 8

ANSWER KEYS

PRACTICE EXERCISE 6 (A)

1. 2	**2.** 4	**3.** 1	**4.** 3	**5.** 3	**6.** 2	**7.** 1	**8.** 2	**9.** 3	**10.** 2
11. 2	**12.** 2	**13.** 2	**14.** 1	**15.** 1	**16.** 1	**17.** 3	**18.** 1	**19.** 2	**20.** 3
21. 3	**22.** 1	**23.** 4	**24.** 2	**25.** 4	**26.** 2	**27.** 4	**28.** 3	**29.** 3	**30.** 2

PRACTICE EXERCISE 6 (B)

1. 1	**2.** 1	**3.** 2	**4.** 1	**5.** 4	**6.** 2	**7.** 1	**8.** 1	**9.** 3	**10.** 2
11. 3	**12.** 4	**13.** 4	**14.** 1	**15.** 1	**16.** 2	**17.** 4	**18.** 4	**19.** 4	**20.** 2
21. 1	**22.** 3	**23.** 4	**24.** 4	**25.** 4	**26.** 4	**27.** 4	**28.** 4	**29.** 3	**30.** 3