NTSE

SAMPLE PAPER – MAT

Time: 1:00 hours

Each Question Carries One Mark.

Direction: Read following information carefully and answer the questions given below it:
(i) A and B are good in Biology & Chemistry.
(ii) A & C are good in Biology & Physics.
(iii) C, D & E are good in Physics & History.
(iv) C & E are good in Physics & Mathematics.
(v) D & B are good in Chemistry & History.

1. Who is good in Physics, History & Mathematics but not in Biology?
(a) D (b) C (c) A (d) E

Ans. (d) E

Sol. By given information we can make the following table:

Person	Biology	Chemistry	Physics	History	Maths
A	✓	✓	✓	×	×
B	✓	✓	×	✓	×
C	✓	×	✓	✓	✓
D	×	✓	✓	✓	×
E	×	×	✓	✓	✓

Directions: (Que. 2 to 6) Read following information carefully and answer the questions given below it:
(i) P, Q, R, S and T are five friends.
(ii) Q is elder to T, but not as tall as R.
(iii) R is younger to P and is taller to S and T.
(iv) P is taller to S, but younger to T.
(v) S is elder to P but is shortest in the group.

2. Who among the following is the eldest?
(a) P (b) Q (c) S (d) Can't be determined

Ans. (d) Can't be determined

Sol. In terms of age,
We have: T < Q, R < P, P < T, P < S.
So, we have: R < P < T < Q, P < S.

In terms of height, we have: Q < R, S < R, T < R, S < P.

- Either Q or S is the eldest. It cannot be determined for sure.
- Q is shorter than R. So, Q is not the tallest. Thus, (i) is correct. Q and T are shorter than R. So, it cannot be concluded that Q is shorter to T. Thus, (ii) is incorrect. A single definite order of heights cannot be obtained from the give information. So, (iii) is incorrect.
- Since no definite order of height can be obtained, so it cannot be determined for sure how many persons lie between U and T.

P and R are youngest and so they cannot be selected. S is shorter than two persons P and Q is shorter than R only and is also relatively older. So, Q will be selected. T is younger than Q.

3. Which of the following pairs of students is elder to S?
(a) OP (b) QR (c) TP (d) None of these

Ans. (d) None of these

Sol. In terms of age, We have: T < Q, R < P, P < T, P < S.
So, we have: R < P < T < Q, P < S.

In terms of height, we have: Q < R, S < R, T < R, S < P.

- Either Q or S is the eldest. It cannot be determined for sure.
- Q is shorter than R. So, Q is not the tallest. Thus, (i) is correct. Q and T are shorter than R. So, it cannot be concluded that Q is shorter to T. Thus, (ii) is incorrect. A single definite order of heights cannot be obtained from the give information. So, (iii) is incorrect.
- Since no definite order of height can be obtained, so it cannot be determined for sure how many persons lie between U and T.

P and R are youngest and so they cannot be selected. S is shorter than two persons P and Q is shorter than R only and is also relatively older. So, Q will be selected. T is younger than Q.

4. Which of the following statements is correct about Q?
(i) Q is not the tallest.
(ii) Q is shorter to T.
(iii) When they are asked to stand in ascending order with respect to their heights, Q is in the middle.
(a) Only (i) is correct (b) Only (i) and (ii) are correct
(c) All are correct (d) None of these

Ans. (a) Only (i) is correct

Sol. In terms of age, We have: T < Q, R < P, P < T, P < S.
So, we have: R < P < T < Q, P < S.

In terms of height, we have: Q < R, S < R, T < R, S < P.

- Either Q or S is the eldest. It cannot be determined for sure.
- Q is shorter than R. So, Q is not the tallest. Thus, (i) is correct. Q and T are shorter than R. So, it cannot be concluded that Q is shorter to T. Thus, (ii) is incorrect. A single definite order of heights cannot be obtained from the give information. So, (iii) is incorrect.
- Since no definite order of height can be obtained, so it cannot be determined for sure how many persons lie between U and T.

P and R are youngest and so they cannot be selected. S is shorter than two persons P and Q is shorter than R only and is also relatively older. So, Q will be selected. T is younger than Q.

5. If U, another friend, is taller than R, how many of them will be between U and T according to their height?
(a) One (b) Two
(c) Three (d) Cannot be determined

Ans. (d) Cannot be determined

Sol. In terms of age, We have: T < Q, R < P, P < T, P < S.
So, we have: R < P < T < Q, P < S.

In terms of height, we have: Q < R, S < R, T < R, S < P.

- Either Q or S is the eldest. It cannot be determined for sure.
- Q is shorter than R. So, Q is not the tallest. Thus, (i) is correct. Q and T are shorter than R. So, it cannot be concluded that Q is shorter to T. Thus, (ii) is incorrect. A single definite order of heights cannot be obtained from the give information. So, (iii) is incorrect.
- Since no definite order of height can be obtained, so it cannot be determined for sure how many persons lie between U and T.

P and R are youngest and so they cannot be selected. S is shorter than two persons P and Q is shorter than R only and is also relatively older. So, Q will be selected. T is younger than Q.

6. If a selection is to be make among them who would be relatively older and also taller, who among them should be chosen?
(a) P (b) Q (c) R (d) S

Ans. (b) Q

Sol. In terms of age, We have: T < Q, R < P, P < T, P < S.
So, we have: R < P < T < Q, P < S.
In terms of height, we have: Q < R, S < R, T < R, S < P.

- Either Q or S is the eldest. It cannot be determined for sure.
- Q is shorter than R. So, Q is not the tallest. Thus, (i) is correct. Q and T are shorter than R. So, it cannot be concluded that Q is shorter to T. Thus, (ii) is incorrect. A single definite order of heights cannot be obtained from the give information. So, (iii) is incorrect.
- Since no definite order of height can be obtained, so it cannot be determined for sure how many persons lie between U and T.
- P and R are youngest and so they cannot be selected. S is shorter than two persons P and Q is shorter than R only and is also relatively older. So, Q will be selected. T is younger than Q.

Direction: Read the following information carefully and answer the question given below it.
(i) Seven books are placed one above the other in a particular way.
(ii) The History book is placed directly above the Civic book.
(iii) The Geography book is fourth from the bottom and the English book is fifth from the top.
(iv) There are two books in between the Civics and Economics books.

7. To find the number of books between the Civics and the Science books, which other extra piece of information is required, from the following?
(a) There are two books between the Geography and the Science books.
(b) There are two books between the Mathematics and the geography books.
(c) There is one book between the English and the Science books.
(d) The Civics book is placed before two books above the Economics book.

Ans. (c) There is one book between the English and the Science books.

Sol. According to the given question from (ii), we get

Since History and Civics cannot be at any other place than this, according to the given conditions. On the basis of this very arrangement, rest of the questions can be solved very easily.

(c) Clearly, C gives us the clue that the Science book is placed at the bottom. Thus, we know that there are three books between the Civics and Science books.

History
Civics

.....(1) Form (iii), we get

Geography
English

.....(2) From (iv), (1) and (2), we get

History
Civics
Geography
English
Economic

Direction: Read the following information carefully and answer the questions given below it:

Eight students A, B, C, D, E, F, G and H are planning to enjoy car racing. There are only two cars and following are the conditions:

(i) One car can accommodate maximum five and minimum four students.

(ii) A will sit in the same car in which D is sitting but H is not in the same car.

(iii) B and C can't sit in the same car in which D is sitting.

(iv) F will sit in the car of four people only along with A and E but certainly not with G.

8. If H and G are sitting in the same car, who are other two students sitting in the same car?

(a) B and C (b) C and D (c) B and D (d) E and B

Ans. (a) B and C

Sol. Following arrangement would be there for the two cars:

1st car: A, D, E, F and 2nd car: H, B, C, G

Direction: Read the given information carefully and answer the questions that follow: Ratan, Anil, Pinku and Gaurav are brothers of Rakhi, Sangeeta, Pooja and Saroj, not necessarily in that order. Each boy has one sister and the names of brothers and sisters do not begin with the same letter. Pinku and Gaurav are not Saroj's or Sangeeta's brothers. Saroj is not Ratan's sister.

9. Pooja's Brother is?

(a) Ratan (b) Anil (c) Pinku (d) Gaurav

Ans. (d) Gaurav

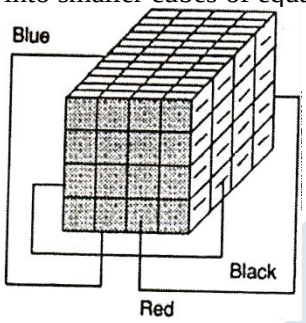
Sol. From the information we conclude that Ratan's sister is Sangeeta and Anil's sister is Saroj. Hence, pooja's brother is gaurav as brother and sister cannot have name beginning with same letter.

10. The ages of Mandar, Shivku, Pawan and Chandra are 32, 21, 35 and 29 years, not in order, Whenever asked they lie of their own age but tell the truth about others.
(i) Pawan say, 'My age is 32 and Mandar's age is not 35'
(ii) Shivku says, 'My age is not 29 and Pawan's age is not 21'
(iii) Mandar says, 'My age is 32.'
What is Chandra's age?
(a) 32 years (b) 35 years (c) 29 years (d) 21 years

Ans. (a) 32 years

Sol. from the first statement, it is clear that Pawan's age is not 32 years and Mandar's age in not 35 years. From the second statement, it is clear that Shivku's age is 29 years and Pawan's age is not 21 years. Thus, from these two statements we get Pawan's age as 35 years. Now from the third statement, Mandar's age is not 32 years. Thus, Mandar's age is 21 years. Hence, we get Chandra's age as 32 years.

Directions: (Que. 11–13):- A cube of side 4 cm is painted black on the pair of one opposite surfaces, blue, on the pair of another opposite surfaces and red on remaining pair of opposite surfaces. The cube is now divided into smaller cubes of equal of 1 cm each.



11. Number of smaller cubes with three surfaces painted
(a) 8 (b) 6 (c)10 (d)12

Ans. (a) 8

Sol. (These smaller cubes will have all three surfaces painted with different colour blue, black and red.)

12. Number of smaller cubes with two surfaces painted
(a) 20 (b) 22 (c) 24 (d) 26

Ans. (c) 24

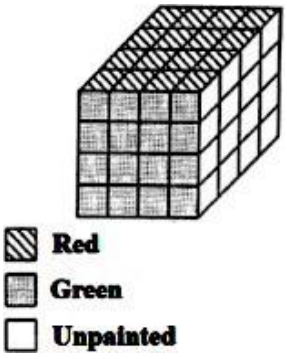
Sol. Total 24 And out of this-
(a) Number of cubes with two surfaces painted with black and blue colour = 8
(b) Number of cubes with two surfaces painted with blue and red colour = 8
(c) Number of cubes with two surfaces painted with black and red colour = 8.

13. Number of smaller cubes with one surface painted
(a) 20 (b) 22 (c) 24 (d) 26

Ans. (c) 24

Sol. Total = 24. And out of this –
(a) Number of cubes with one surface painted with black colour = 8
(b) Number of cubes with one surface painted with blue colour = 8
(c) Number of cubes with one surface painted with red colour = 8

Directions: (Que. 14–16):- A cube of side 4 cm is painted red on the pair of one opposite surfaces, green on the pair of another opposite surfaces and one pair of opposite surfaces is left unpainted. Now the cube is divided into 64 smaller cubes of side 1 cm each.

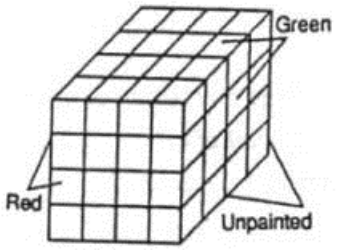


14. Number of smaller cubes with three surfaces painted
(a) 0 (b) 4 (c) 6 (d) 8
Ans. (a) 0
Sol. Total = 0 (Because each smaller cube at the corner is attached to a surface which is unpainted.)

15. Number of smaller cubes with two surfaces painted
(a) 10 (b) 14 (c) 16 (d) 18
Ans. (c) 16
Sol. Total= Number of cubes present at the corners + Numbers of cubes present at 4 edges
$=8(n-2)\times 4$
= 8 + 8 = 16

16. Number of smaller cubes with one surface painted.
(a) 32 (b) 38 (c) 40 (d) 44
Ans. (a) 32
Sol. Total = Number of cubes present at the 8 edges + number of cubes present at the four surfaces
$=(n-2)\times 8+(n-2)^2\times 4$
$=2\times 8+4\times 4=16+16=32$

Directions: (Que.17–19):- A cube of side 4 cm is painted red on the pair of one adjacent surfaces, green on the pair of other adjacent surfaces and two adjacent surfaces are left unpainted. Now the cube is divided into 64 smaller cubes of side 1 cm each.



17. Number of smaller cubes with two surfaces painted

(a) 10 (b) 14 (c) 16 (d) 18

Ans. (b) 14

Sol. Total = Number of smaller cubes at four corners + Number of smaller cubes at 5 edges.

$=4+(n-2)\times 5=4+2\times 5$

$= 4 + 10 = 14$

18. Number of smaller cubes with one surface painted

(a) 20 (b) 30 (c) 34 (d) 38

Ans. (b) 30

Sol. Total= Number of smaller cubes at four surfaces + Number of smaller cubes at 6 edges + Number of smaller cubes at two corners.

$=(n-2)^2\times 4+(n-2)\times 6+2$

$=4\times 4+2\times 6+2=16+12=28+2=30$

19. Number of smaller cubes with no surfaces painted

(a) 10 (b) 12 (c) 20 (d) 18

Ans. (d) 18

Sol. Total = Number of smaller cubes from inside the big cube + Number of cubes at two surfaces + Number of cubes at one edge.

$=(n-2)^3+(n-2)^2\times 2+(n-2)$

$=(2)^3+(2)^2\times 2+2$

$= 8 + 8 + 2 = 18$

20. A dice has been thrown four times and produces following result.

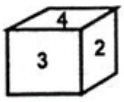
Which number will appear opposite to the number 3 ?

(a) 4 (b) 5 (c) 6 (d) 1

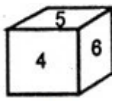
Ans. (a) 4

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.

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



(i)

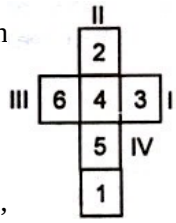


(ii)

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

Ans. (c) 5

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 is 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.

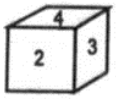
Step IV.

Consider figure (ii) and wire first and second number in the anticlock-wise direction to number 4, (common number) in block (III) & (IV). Hence numbers 6 and 5 will appear in the blocks III and IV respectively.

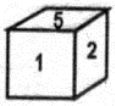
Step V.

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.

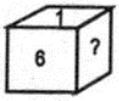
22. From the following figures of dice, find which number will come in place of '?'



(i)



(ii)



(iii)

(a) 4 (b) 5 (c) 2 (d) 3

Ans. (d) 3

Sol. If the above dice is unfolded, it will look like as the figure 1 given below.
Now the number in place of '?' can be obtained by making a slight change in the figure as given here. Now comparing figure (2) with figure (iii) as above, we get that number in place of ? is 3.

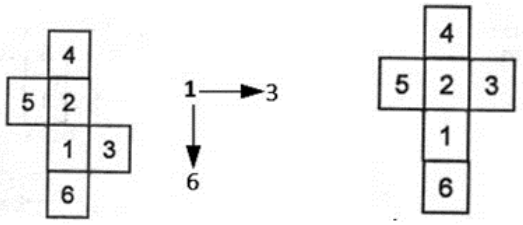
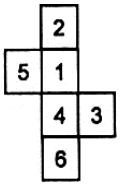
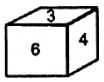
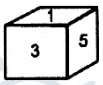


Figure 1 Figure 2

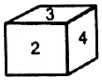
23. Which of the following dice is identical to the unfolded figure as shown here?

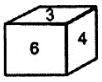


(a) 

(b) 

(c) 

(d) 

Ans. (a) 

Sol. From the unfolded figure of dice, we find that number opposite 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) cannot be the answer figure numbers lying on the opposite pair of surfaces are present on the adjacent surfaces. Hence fig. (a) is our answer.

24. In the following question select the one which is different from the other three responses .
(a) DEB (b) RTP (c) HIF (d) NOL

Ans. (b) RTP

Sol. 1. D(E)B ⟶ vowel in the middle
3. H(I)F ⟶ vowel in the middle
4. N(O)L ⟶ vowel in the middle
Option (2), No vowel in the middle.

25. Three of the following four pairs of alphas and numerals have same relationship between their elements as in the case of the pair PROBLEM : 2948375 and hence form a group. Which one does not belong to the group?
(a) BORE : 8497 (b) MOEP : 5972 (c) LBOR : 3849 (d) OMEP : 4572

Ans. (b) MOEP : 5972

Sol.

Letter	B	E	L	M	O	P	R
Code	8	7	3	5	4	2	9

$\left.\begin{matrix} B & O & R & E \\ 8 & 4 & 9 & 7 \end{matrix}\right\}$ *correct*

$\left.\begin{matrix} M & O & E & P \\ 5 & 9 & 7 & 2 \end{matrix}\right\}$ *incorrect*

$\left.\begin{matrix} L & B & O & R \\ 3 & 8 & 4 & 9 \end{matrix}\right\}$ *correct*

$\left.\begin{matrix} O & M & E & P \\ 4 & 5 & 7 & 2 \end{matrix}\right\}$ *correct*

26. Three of the following four are alike in a certain way and hence form a group. Which is the one that does not belong to that group?
(a) 42 (b) 72 (c) 110 (d) 152

Ans. (d) 152

Sol. $42 = 7^2 - 7$

$72 = 9^2 - 7$

$110 = 11^2 - 11$

$152 = 12^2 + 8$

Except 152, others show the trend $x^2 - x$.

DIRECTIONS (Qs. 27-28) : These questions are based on the following information.
Five men A, B, C, D and E read a newspaper. The one who reads first gives it to C. The one who reads last had taken from A. E was not the first or last to read. There were two readers between B and A.

27. B passed the newspaper to whom?
(a) A (b) C (c) D (d) E

Ans. (b) C

Sol. C is the second reader. A is the second last reader.
E is not the first or last to read. So, E is the third reader. There were two readers between B and A.
So, the order of reading the newspaper is : B, C, E, A, D.
(2) B passed the newspaper to C.

28. Who read the newspaper last ?
(a) A (b) B (c) C (d) D

Ans. (d) D

Sol. D read the newspaper last.

29. Three of the four are alike in a certain way & so form a group. Which does not belong to that group
(a) Robust : Weak (b) Chaos : Peace (c) Cruel : Kind (d) Abduct : Kidnap

Ans. (d) Abduct : Kidnap

Sol. The first 3 pairs indicate opposite of one another, whereas (d) is a pair of words having same meaning.

30. In the number 76534218 each digit is replaced next digit, i.e. '1' is replaced by '2' , '2' is replaced by '3' and so on and then the digits are arranged in ascending order from left to right, which digit will be fifth from the left end?
(a) 6 (b) 5 (c) 7 (d) 4

Ans. (a) 6

Sol. Given Number : 7 6 5 3 4 2 1 8
New Number : 8 7 6 4 5 3 2 9
Ascending Order : 2 3 4 5 6 7 8 9
Fifth digit in the above ascending order arrangement is '6'. Hence option (a) is the correct answer.

◀▶◀▶◀▶