

FIITJEE Solutions to NTSE STAGE-I (2014) (For Class X Students) (MAT)

Time: 50 Minutes

Max Marks: 50

INSTRUCTIONS TO CANDIDATES

Read the following instructions carefully before you open the Question Booklet.

1. Use blue/black ball point pen only.
2. Write your Roll No. very clearly (only one digit in on block) on this booklet and on the **ANSWER SHEET**.
3. This test consists of 50 questions of one mark each. All the questions are **COMPULSORY**.
4. Answer to each question by darkening the correct alternative among the four choices on the **ANSWER SHEET**.

Example:

Q.No.	Alternatives
Correct way: 1	<input type="radio"/> 1 <input type="radio"/> 2 <input checked="" type="radio"/> 3 <input type="radio"/> 4
Q.No.	Alternatives
Wrong way: 1	<input checked="" type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input checked="" type="radio"/> 4

5. Separate sheet has been provided for rough work in this test booklet.

Solutions

1. (4)

Let the required number be x .
According to the question,

$$\frac{1}{9}x = \frac{1}{10}x + 4$$

$$\frac{1}{9}x - \frac{1}{10}x = 4$$

$$\frac{10x - 9x}{90} = 4$$

$$x = 360$$

2. (1)

$x\%$ of x is 25

$$x \times \frac{x}{100} = 25$$

$$x^2 = 25 \times 100$$

$$x = 5 \times 10 = 50$$

3. (2)

$\frac{3}{5}$ of cistern is filled in 1 min.

1 of cistern is filled in $\frac{5}{3}$ min.

$\frac{2}{5}$ of a cistern is filled in $\frac{5}{3} \times \frac{2}{5}$ min. = $\frac{10}{15}$ min.

$$= \frac{10}{15} \times 60 \text{ sec.}$$

$$= 40 \text{ sec.}$$

4. (3)

Speed of a person = 1 m/s

Speed of a train = 65 m/s

\therefore Relative speed = = (65 - 1) m/s

$$= 64 \text{ m/s}$$

Now, Let length of the train = ℓ m

Time taken by train to overtake a person = 5 sec.

\therefore Distance = Speed \times Time

$$\ell = 64 \text{ m/sec.} \times 5 \text{ sec.}$$

$$= 320 \text{ m}$$

5. (2)

Mean weight of 21 students is 21 kg

So, total weight of 21 students is $21 \times 21 = 441$ kg

Then, remaining weight = $441 - 21 = 420$ kg

Now, the number of students = 20

$$\text{So, mean weight} = \frac{420}{20} = 21 \text{ kg.}$$

6. (4)

$$2^n - \frac{2^n}{2} = 4$$

$$\text{or, } 2^n \left(1 - \frac{1}{2}\right) = 4$$

$$\text{or, } \frac{2^n}{2} = 4$$

$$\text{or, } 2^n = 8$$

$$n = 3$$

$$\therefore 4^n = 4^3 = 4 \times 4 \times 4 = 64$$

7. (1)
For infinite solution there is a condition

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2} \quad \dots(i)$$

$$\text{Here, } a_1 = 3(k - 1)$$

$$b_1 = 4$$

$$c_1 = 24$$

$$a_2 = 15$$

$$b_2 = 20$$

$$c_2 = 8(k + 13)$$

by putting the values we will get

$$\boxed{k = 2}$$

8. (3)
Let the price of an article = Rs. 100
And consumption of the article = 100 units
Total expenditure = Rs. (100 × 100)
If price of an article is increased by 25%, then the new price of an article = Rs. 125.
Let consumption of the article = a units (after decreases)
Expenditure is same,
Therefore 125 × a = 100 × 100
a = 80
decrease in unit = (100 – 80) = 20
% decrease = $\frac{20}{100} \times 100 = 20\%$

9. (1)
- $$1 + \frac{4}{2 + \frac{3}{5 - \frac{1}{2}}} - \frac{1}{2}(10 + 2)$$
- $$\text{or, } 1 + \frac{4}{2 + \frac{3}{\frac{9}{2}}}$$
- $$\text{or, } 1 + \frac{4}{2 + \frac{2}{3}} - \frac{5}{2}$$
- $$\text{or, } 1 + \frac{4 \times 3}{8} - \frac{5}{2}$$

$$\text{or, } 1 - \frac{2}{2} = 0$$

10. (3)
 $(y + 2) = 0$
 $y = -2$
 by putting $y = -2$ in the given equation
 $(-2)^2 + m(-2) + 14 = 0$
 $4 - 2m + 14 = 0$
 $m = 9$

11. (3)
 The sum of first n natural numbers = $\frac{n(n+1)}{2}$
 The sum of first 81 natural numbers = $\frac{81 \times 82}{2} = 81 \times 41$
 Average of first 81 natural numbers = $\frac{\text{sum of all first 81 natural numbers}}{\text{number of observation}}$
 $= \frac{81 \times 41}{81} = 41$

Hence answer is 41. Option (3) is correct.

12. (2)
 Amount = Principle + Interest
 Let Principle = Rs. P .
 and Rate = $r\%$ p.a.
 SI after 3 years = $\frac{P \times r \times 3}{100}$
 Amount = $P + \frac{3rP}{100}$
 Given 815 = $P + \frac{3rP}{100}$... (i)
 SI after 4 years = $\frac{P \times r \times 4}{100}$
 Amount = $P + \frac{4rP}{100}$
 Given 854 = $P + \frac{4rP}{100}$... (ii)

Subtracting equation (i) from (ii)

$$854 - 815 = \frac{rP}{100}$$

$$39 = \frac{rP}{100}$$

Put the value of $\frac{rP}{100}$ in equation (i)

$$815 = P + 3 \times 39$$

$$815 - 117 = P$$

$$698 = P$$

Hence Principle is Rs. 698. Option (2) is correct.

13. (4)
 In every minute he climbs 15 meter but slips down 12 meter. Hence in one minute he climbs = $(15 - 12)$ meters i.e. 3 meters.
 After reaching 75 meters he climbs 15 meter i.e. 90 meter.
 i.e. it is an A.P.
 $3, 6, 9, 12, \dots, 75.$
 Hence in 25 minute he reaches to 75 meter and in next minute he reaches at the top. .
 Therefore total time = $(25 + 1)$ minute
 = 26 minute.

Directions (Solution for Q. 14 to 18):

Mode of Transport	Angle of Subtended at the Centre	Number of Students comes to School
ON FEET	80°	$\frac{80}{360} \times 1260 = 280$
CAR	90°	$\frac{90}{360} \times 1260 = 315$
BUS	120°	$\frac{120}{360} \times 1260 = 420$
SCOOTER	$70^\circ [360^\circ - (80^\circ + 90^\circ + 120^\circ)]$	$\frac{70}{360} \times 1260 = 245$
Total Students = 1260		

14. (1)
 From above Table.
15. (2)
 $245 : 315$
 $7 : 9$
16. (3)
 $280 + 420 = 700$
17. (4)
 $1260 - 420 = 840$
18. (3)
 Comes by their feet = 280
 Comes to the school by Car = 315
 More = $315 - 280 = 35$
 $\% = \frac{35}{280} \times 100 = 12.5\%$
19. (2)
 Let total number of coins = x
 According to the question value of the coins = Rs. $(x - 14)$
 Let number 50 paise coins = a
 Then number of 1 Re. coins = $(x - a)$
 Total value = Rs. $(x - 14)$
 $\frac{a}{2} + x - a = x - 14$
 $a = 28$
20. (1)

$$\begin{aligned} & \sqrt{5 \sqrt{5 \sqrt{5 \sqrt{5 \times 5^2}}}} \\ &= \sqrt{5 \sqrt{5 \sqrt{5^{1+\frac{3}{4}}}}} \\ &= \sqrt{5 \sqrt{5^{1+\frac{7}{8}}}} \\ &= \sqrt{5^{1+\frac{15}{16}}} \\ &= \left(5^{\frac{31}{16}} \right)^{\frac{1}{2}} = 5^{\frac{31}{32}} \end{aligned}$$

21. (2)

$$264 \times \frac{60}{100} = \frac{1584}{10} = 158.4$$

Let check options

$$(1) 10\% \text{ of } 44 = \frac{10}{100} \times 44 = 4.4$$

$$(2) 15\% \text{ of } 1056 = \frac{15}{100} \times 1056 = \frac{15840}{100} = 158.4$$

Hence option (2) is correct.

22. (4)

By observation answer is (4)

23. (3)

By observation answer is (3)

24. (2)

h is not mentioned. So, obviously answer is (2).

25. (2)

By observation answer is (2)

26. (2)

In the dice one face is adjacent to four faces. The adjacent faces to 2 are 3, 6, 5 and 4 (from first two figures). So, 2 is opposite to 1.

Similarly

$$6 \xrightarrow{\text{Opposite}} 5$$

$$2 \xrightarrow{\text{Opposite}} 1$$

$$4 \xrightarrow{\text{Opposite}} 3$$

So, answer is (2)

27. (1)

$$E : F :: L : I$$

$$(22 + 21 = 33) \quad (15 + 18 = 33)$$

Ranks from reverse Ranks from reverse

28. (3)

As $\frac{18}{3} = 6 \times 12 = 72$

So answer is (3)


29. (3)
Three faces always lies on corners and there are 8 corners.

30. (2)
 $125 - 27$ (No face painted)
 $= 98$

31. (3)
 $(n - 2)^3 = (5 - 2)^3 = 3^3 = 27$

32*. (2) / (3)



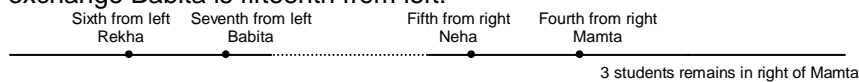
The elements move in the sequence ; the elements reaching the upper left and the lower right positions rotate 90° ACW; the elements reaching the upper right and lower left positions rotate 90° CW; the central elements rotates 90° ACW and gets laterally inverted.

***Note: (In figure 2, \rightarrow is not correct and in figure 3 the Δ is missing. So, no option is completely correct.)**

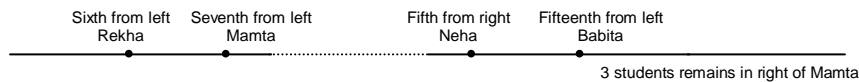
33. (3)
 $0 + 6 + 4 + 2 = 12 - 4 = 8$
 $6 + 2 + 10 + 8 = 26 - 4 = 22$
 $4 + 14 + 12 + 10 = 40 - 4 = 36$

34. (3)
 $3 + 12 = 15 + 12 = 27$
 $9 + 36 = 45 + 36 = 81$
 $6 + 25 = 31 + 25 = 56$

Directions (Solution for Q. 35 to 37): As Mamta is fourth from right and Babita is seventh from left and after exchange Babita is fifteenth from left:



When Babita and Mamta exchange their positions then



Therefore, total students 18.

35. (3)
Neha's position from left = $18 - 4 = 14$

36. (4)
Mamta's position from right = $18 - 6 = 12$

37. (1)
As Rekha is on sixth position so Neha's position is 6th.

38. (2)
 $6 + 5 + 4 + 3 + 2 + 1 = 21$
or, There were 7 people in the party, then number of handshakes

$$= {}^7C_2 = \frac{7!}{2!(7-2)!}$$

$$= \frac{7!}{2!5!} = 21$$

$$\left[{}^nC_r = \frac{n!}{r!(n-r)!} \right]$$

39. (4)
By observation
40. (1)
By observation
41. (4)
By observation
42. (3)
By observation
43. (1)
By observation
44. (2)
Only figure (2) contains four lines while others have three lines.
45. (3)
Figure (1), (2) and (4) are same only their position is changed.
46. (4)
When a cube is formed by folding the sheet shown in the given figure, then the face 2 lies opposite to 4, the face 1 lies opposite to 6 and the face 5 lies opposite to 3. Now the cubes in option (1), (2) and (3) consists of face which are not formed when the given sheet is folded. Therefore, only the cube in option (4) is formed.
47. (1)
When a cube is formed by folding the sheet shown in the given figure, then the face A lies opposite to C, the face B lies opposite to F and the face E lies opposite to D. Now the cubes in option (2), (3) and (4) consist of faces which are not formed when the given sheet is folded. Therefore, only the cube in option (1) is formed.

Directions (Solutions for Q. 48 to 50):

In ANT and SET, the common code digit 7 stands for T.
 In SUN and SET, the common code digit 5 stands for S.
 In ANT and SUN, the common code digit 3 stands for N.
 In SET, the remaining the code digit 2 stands for E.
 In ANT, the remaining code digit 0 stands for A.
 In SUN, the remaining code digit 4 stands for U.

48. (2)
49. (2)
50. (4)