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Answers & Solutions

for

NTSE (Stage-I) 2019-20

INSTRUCTIONS TO CANDIDATES

Read the following instructions carefully before you open the question booklet.

1. Use blue/black ballpoint pen only. There is no negative marking.
2. Part I : MAT : 1 - 100 questions
Part II : SAT : 1 - 100 questions
3. This test booklet contains 200 questions of one mark each. All the questions are compulsory.
4. Answer each question by darkening the one correct alternative among the four choices on the OMR SHEET with blue/black ballpoint pen.

Example :

Q. No.	Alternatives
Correct way : 1	① ② ● ④
Q. No.	Alternatives
Wrong way : 1	⊗ ⊕ ⊖ ④

Student must darkening the right oval only after ensuring correct answer on OMR Sheet.

5. Students are not allowed to scratch / alter / change out an answer once marked on OMR Sheet, by using white fluid / eraser / blade / tearing / wearing or in any other form.
6. Separate sheet has been provided for rough work in this test booklet.
7. Please handover the OMR Sheet to the invigilator before leaving the Examination Hall.
8. Darken completely the ovals of your answer on OMR Sheet in the time limit allotted for that particular paper.
9. Your OMR Sheet will be evaluated through electronic scanning process. Incomplete and incorrect entries may render your OMR Sheet invalid.
10. Use of electronic gadgets, calculator, mobile etc, is strictly prohibited.

PART-I : MENTAL ABILITY TEST (MAT)

1. In the series given below, how many 8 are there which is exactly divisible by its immediate preceding as well as succeeding number?

2 8 3 8 2 4 8 2 4 8 6 8 2 8 2 4 8 3 8 2 8 6

- (1) one (2) two
(3) three (4) four

Answer (2)

2. If you count 21 letters in the English alphabet from the end and 20 letters from the beginning, which letter will exactly appear in the middle of the sequence thus formed?

- (1) N (2) K
(3) M (4) L

Answer (3)

Sol.
$$\begin{array}{cccccccc} A, B, C, & \text{-----} & T \\ Z, Y, X, & \text{-----} & F \\ \hline F, G, H, & \text{---} & M & \text{---} & R, S, T \end{array}$$

3. In a row of boys facing the North, A is sixteenth from the left end and C is sixteenth from the right end. B, who is fourth to the right of A, is fifth to the left of C in the row. How many boys are there in the row?

- (1) 39 (2) 40
(3) 41 (4) 42

Answer (2)

Sol.
$$\begin{array}{ccccccc} & & & B & & & \\ & & & 3 & 4 & & \\ \hline & & & & & & \\ 15 & + & 15 & + & 3 & + & 4 & + & 3 & = & 40 \end{array}$$

4. Standing on the platform, Amit told Sunita that Aligarh was more than 10 km but less than 15 km from there. Sunita knew that it was more than 12 km but less than 14 km from there. If both of them were correct, which of the following could be the distance of Aligarh from the platform?

- (1) 11 km (2) 12 km
(3) 13 km (4) 14 km

Answer (3)

Sol. $10 < x < 15$ _____ Amit
 $12 < x < 14$ _____ Sunita
Intersection of both = 13 km

Directions (Q.5 to Q.7) : Five persons are sitting in a row. One of the persons at the extreme ends is intelligent and the other one is fair. A fat person is sitting to the right of a weak person. A tall person is to the left of the fair person and the weak person is sitting between the intelligent and the fat person.

5. Tall person is at which place counting from right?
(1) First (2) Second
(3) Third (4) Fourth

Answer (2)

Sol. Int Weak Fat Tall Fair

6. Person to the left of weak person possesses which of the following characteristics?
(1) Intelligent (2) Fat
(3) Fair (4) Tall

Answer (1)

Sol. Int Weak Fat Tall Fair

7. Which of the following persons is sitting at the centre?
(1) Intelligent (2) Fat
(3) Fair (4) Weak

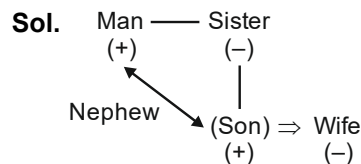
Answer (2)

Sol. Int Weak Fat Tall Fair

8. Pointing to a photograph, a woman said. "This man's sister is my mother-in-law." How is the woman's husband related to the man in the photograph?

- (1) grandson (2) nephew
(3) son (4) son-in-law

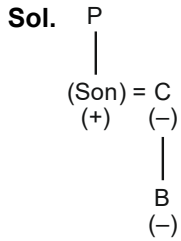
Answer (2)



9. A is the uncle of B, who is the daughter of C and C is the daughter-in-law of P. How is A related to P?

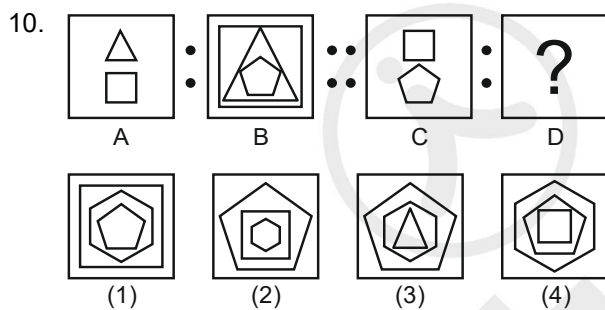
- (1) Brother (2) Son
(3) Son-in-law (4) Data inadequate

Answer (4)

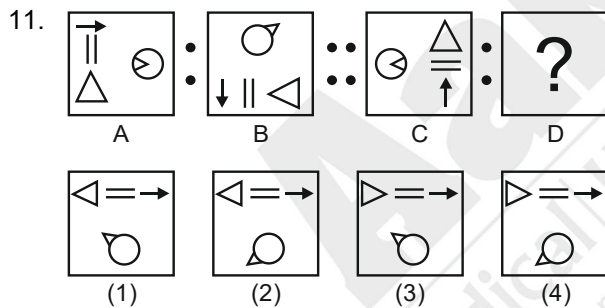


A can be maternal uncle or paternal uncle

Directions (Q.10 & Q.11) : There is a specific relations between first two figures A and B. Establish the same relationship between the set of figures C and D and select the correct figure amongst the four alternatives :

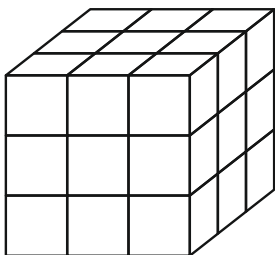


Answer (2)



Answer (2)

Directions (Q.12 to Q.14) : A wooden cube is painted blue on all the four adjoining sides and green on the top and the bottom sides. It is then cut at the equal distances at the right angles as shown in the figure. Study the diagram carefully and answer the questions given below :



12. How many cubes will have one face painted only in blue?

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

Answer (4)

Sol. Centre cubes are pointed by blue only.

13. How many cubes will have one face painted only in green?

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

Answer (2)

Sol. Bottom and up centre cubes are pointed by green only.

14. How many cubes will have no face painted?

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

Answer (1)

Sol. Only one cube is unpainted.

Directions (Q.15 to Q.17) : Study the following coded relationship carefully and answer the questions that are given below them. C + D means C is the father of D; C – D means C is the wife of D; C D means C is the brother of D; C ÷ D means C is the daughter of D.

15. If J – L + K, which of the following statement is true?

- (1) J is the mother of K
(2) K is the daughter of J
(3) J is the aunt of K
(4) J is the sister of K

Answer (1)

Sol. (+) Father of

(–) Wife of

(•) Brother of

(÷) Daughter of

J – L + K

J = L
(–) (+)

|
K

J is mother of K.

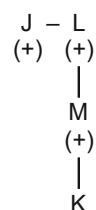
16. If J L + M + K, which of the following statement is true?

- (1) J is the mother of K
- (2) K is the daughter of J
- (3) J is the aunt of K
- (4) J is the sister of K

Answer (No option is correct)

Sol. (+) Father of

- (-) Wife of
- (●) Brother of
- (÷) Daughter of



No option is correct

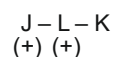
17. If J L K, which of the following statement is true?

- (1) J is the uncle of K
- (2) J is the father of K
- (3) J is the brother of K
- (4) J is the son of K

Answer (3)

Sol. (+) Father of

- (-) Wife of
- (●) Brother of
- (÷) Daughter of



J is brother of K.

Directions (Q.18 to Q.22) : Given below are two matrices containing two classes of letters. The rows and columns of matrix I are numbered from 0 to 4 and that of matrix II from 5 to 9. A letter from these matrices can be represented first by its row number and next by its column number.

	0	1	2	3	4
0	T	N	D	R	I
1	R	I	T	N	D
2	N	D	R	I	T
3	I	T	N	D	R
4	D	R	I	T	N

Matrix I

	5	6	7	8	9
5	M	W	O	F	E
6	F	E	M	W	O
7	W	O	F	E	M
8	E	M	W	O	F
9	O	F	E	M	W

Matrix II

18. Which set of numbers will represent the word TIME?

- (1) 23, 66, 01, 02
- (2) 42, 11, 55, 66
- (3) 44, 32, 61, 72
- (4) 51, 63, 70, 90

Answer (2)

Sol. T = 42, I = 11, M = 55, E = 66

19. Which set of numbers will represent the word ERODE?

- (1) 66, 10, 76, 02, 66
- (2) 22, 55, 41, 62, 21
- (3) 23, 01, 65, 10, 03
- (4) 65, 11, 01, 76, 44

Answer (1)

Sol. E = 66, R = 10, O = 76, D = 02, E = 66

20. Which set of numbers will represent the word NEW?

- (1) 20, 66, 56
- (2) 22, 68, 57
- (3) 75, 32, 88
- (4) 23, 55, 97

Answer (1)

Sol. N = 20, E = 66, W = 56

21. Which set of numbers will represent the word METER?

- (1) 62, 33, 44, 03, 57
- (2) 55, 97, 12, 59, 03
- (3) 76, 65, 87, 98, 00
- (4) 65, 11, 01, 76, 44

Answer (2)

Sol. M = 55, E = 97, T = 12, E = 59, R = 03

22. Which set of numbers will represent the word DIRT?

- (1) 86, 85, 21, 12
- (2) 55, 97, 12, 03
- (3) 20, 66, 56, 39
- (4) 21, 23, 34, 31

Answer (4)

Sol. D = 21, I = 23, R = 34, T = 31

Directions (Q.23 to Q.32) : In each of the following questions, four groups of words or letters or numbers are given. Three of them are alike in a certain way while one is different. Find the odd one out from the group.

- 23. (1) TSR
- (2) LKJ
- (3) PQO
- (4) HGF

Answer (3)

Sol. Consecutive alphabets in reverse order.

- 24. (1) FG
- (2) DF
- (3) PR
- (4) MQ

Answer (3)

Sol. F G D F P R M Q
6 7 4 6 16 18 13 17
└──┬──┘ └──┬──┘ └──┬──┘ └──┬──┘
1 2 2 4

Gap should be 3

25. (1) DfH (2) MoQ
(3) UwY (4) pnO

Answer (4)

Sol. D f H M o Q
4 6 8 13 15 17
└──┬──┘ └──┬──┘
+2 +2 +2 +2
U w Y P n O
21 23 25 16 14 15
└──┬──┘ └──┬──┘
+2 +2 -2 +1

26. (1) 129 (2) 130
(3) 131 (4) 132

Answer (2)

Sol. 131 is prime number.

27. (1) 60 (2) 1
(3) 28 (4) 9

Answer (1)

Sol. $x^3 + 1$

28. (1) 1996 (2) 2006
(3) 1988 (4) 1980

Answer (2)

Sol. 2006 is not leap year.

29. (1) 33116 (2) 34343
(3) 35512 (4) 36729

Answer (1)

Sol. ABCDE is no form – $(A + B)^3 = CDE$

30. (1) meter (2) furlong
(3) acre (4) mile

Answer (3)

Sol. Acre is used to indicate area remaining are used to measure length.

31. (1) club (2) hostel
(3) hotel (4) motel

Answer (1)

Sol. Except club, all places are to stay.

32. (1) Nose (2) Eyes
(3) Skin (4) Teeth

Answer (4)

Sol. Teeth is not sense organ

Directions (Q.33 to Q.37) : In each of the following figures, the number are arranged according to certain rule. Find the missing numbers in place of ? from the alternatives given.

33.

3 C	24 D	8 E
7 I	21 K	3 M
4 D	?	7 J

- (1) 11 E (2) 28 G
(3) 35 I (4) 48 F

Answer (2)

Sol. $3 \times 8 = 24$ C D E → No gap
 $3 \times 7 = 21$ I K M → 1 gap
 $4 \times 7 = 28$ D G J → No gap

34.

7	4	9	2
3	14	18	6
12	16	?	5
2	4	9	4

- (1) 45 (2) 30
(3) 52 (4) 18

Answer (2)

Sol. $\frac{7 \times 4 \times 3}{6} = 14$

$\frac{9 \times 2 \times 6}{6} = 18$

$\frac{12 \times 4 \times 2}{6} = 16$

$\therefore \frac{5 \times 4 \times 9}{6} = 30$

35.

10 11 13 5 13	17 5 9 17 16	19 6 7 10 14	9 15 6 6 ?
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- (1) 21
(2) 13
(3) 12
(4) 15

Answer (3)

Sol. $\frac{10+11+13+5}{3} = 13$

$\frac{17+5+9+17}{3} = 16$

$\therefore \frac{9+15+6+6}{3} = 16$

36.

36
49 26 64
25

9
81 21 25
16

25
64 ? 144
36

- (1) 19 (2) 23
(3) 25 (4) 31

Answer (4)

Sol. Addition of square roots of outer numbers is the number in the circle.

37.



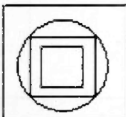
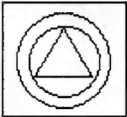
23	529	1024
21	441	144
19	361	?

- (1) 1441 (2) 3529
(3) 8281 (4) 9361

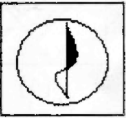
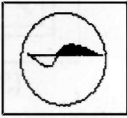
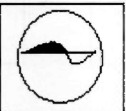

Answer (3)

Sol. $23 \leftrightarrow 32$ $32^2 = 1024$
 $21 \leftrightarrow 12$ $12^2 = 144$
 $19 \leftrightarrow 91$ $91^2 = 8281$

Directions (Q.38 & Q.39) : From the four figures given below, three are alike in a certain way and one is different. Find the odd figure.

38. (1)  (2) 
(3)  (4) 

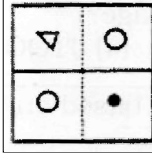
Answer (4)

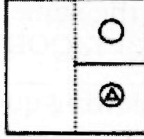
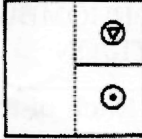
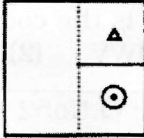
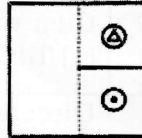
39. (1)  (2) 
(3)  (4) 

Answer (3)

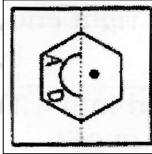
Sol. Rotate clockwise by 90° and take mirror image.

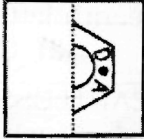
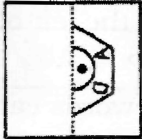
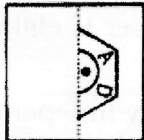

Directions (Q.40 & Q.41) : In each question a square transparent sheet with a pattern is given. Find out from amongst the four alternatives as to how the pattern would appear when the transparent sheet is folded at the dotted line?

40. 
X

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

Answer (2)

41. 
X

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

Answer (2)

Directions (Q.42 to Q.45) : The numbers are obtained by using one of the rules given below. Identify and write the correct rule number against the question number.

- (1) Square a number and add two.
- (2) Multiply a number by three and add three.
- (3) Divide a number by three and add the square of the quotient.
- (4) Square a number and subtract double the number.

42. 4, 10, 18, 28, 40

Answer (3)

43. 11, 38, 83, 146, 227

Answer (1)

Sol. $3^2 + 2, 6^2 + 2, 9^2 + 2$, and so on

44. 12, 21, 30, 39, 48

Answer (2)

Sol. $3 \times 3 + 3, 6 \times 3 + 3, 9 \times 3 + 3, 12 \times 3 + 3$

45. 3, 24, 63, 120, 195

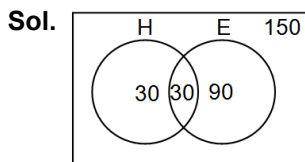
Answer (4)

Sol. $3^2 - 2 \times 3, 6^2 - 6 \times 2, 9^2 - 6 \times 2$,

46. There are 150 students in a group. 80% students speak English, and the rest of the students speak Hindi. 25% of English speaking students speak Hindi too. What is the total number of Hindi-speaking students?

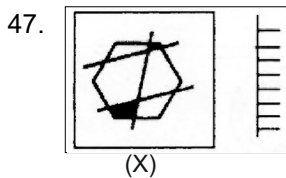
- (1) 45 (2) 60
(3) 75 (4) 100

Answer (2)



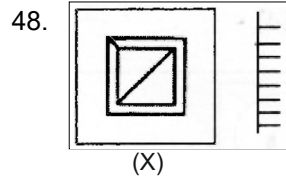
$n(H) = 30 + 30 = 60$

Directions (Q.47 & Q.48) : In each questions choose the correct mirror image of Fig (X) from amongst the four alternatives given along with it :



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

Answer (4)



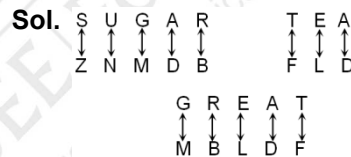
- (1)
- (2)
- (3)
- (4)

Answer (2)

49. In a certain code language 'SUGAR' is coded as 'ZNMDB'. And 'TEA' is coded as 'FLD'. How will you code 'GREAT' in the same code language?

- (1) BNDFL (2) MBLDF
(3) LDZMN (4) FLDZB

Answer (2)



50. If DRINK = 6, POLLUTION = 10, then GOVERNMENT is equal to?

- (1) 8 (2) 10
(3) 12 (4) 11

Answer (4)

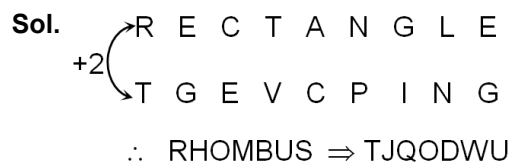
Sol. Drink - 6

Number of letters + 1

51. In a certain code language the word RECTANGLE is coded as TGEVCPING, then what is the code for RHOMBUS in the same code language?

- (1) TJOQDWV (2) UVWTJQN
(3) TJQODWU (4) JTQOEWN

Answer (3)



Directions (Q.52 to Q.55) : Each of the following questions are based on the alphabet series A to Z.

52. Which letter is exactly midway between H and S in the given alphabet?

- (1) L (2) M
(3) O (4) No such letter

Answer (4)

Sol. H ———— M N ———— S
| | | |
8 13 14 19

No midway alphabet.

53. Which letter is eighth to the left of sixteenth letter from the right end?

- (1) B (2) S
(3) C (4) H

Answer (3)

Sol. A, B, C, X, Y, Z

16th letter from right end = K

8th to the left of k is ⇒ C

54. How many independent words can "HEARTLESS" be divided into without changing the order of the letters and using each letter only once?

- (1) Two (2) Three
(3) Four (4) Five

Answer (3)

Sol. H E A R T L S

E A R
A R T
H E A R T
H E A R

55. Which of the following word cannot be made from the letters of the word UNCONSCIOUS?

- (1) SON (2) COIN
(3) SUN (4) NOSE

Answer (4)

Sol. E is not there in given word.

56. Which of the following is the correct dictionary sequence of the words: 1. Page, 2. Pagan, 3. Palisade, 4. Pageant, 5. Palate

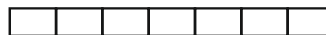
- (1) 1,4,2,3,5 (2) 2,4,1,3,5
(3) 2,1,4,5,3 (4) 1,4,2,5,3

Answer (3)

Sol. Pagan, Page, Pageant, Palate, Palisade

2 1 4 5 3

57. How many rectangles are there in the given figure?



- (1) 24 (2) 28
(3) 32 (4) 36

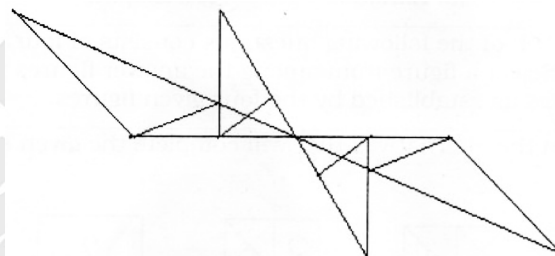
Answer (2)

Sol.

1	2	3	4	5	6	7
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Total no. of rectangles = $\frac{7 \times 8}{2} = 28$

58. How many triangles are there in the given figure?



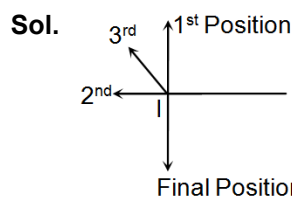
- (1) 18 (2) 11
(3) 26 (4) 24

Answer (3)

59. A girl facing North turns 90° in the anticlockwise direction and then turns 45° in the clockwise direction and then again turns 135° in the anticlockwise. Which direction is she facing now?

- (1) South (2) East
(3) North (4) West

Answer (1)



60. Reaching the place of meeting 15 minutes before 8.30 am, Anuj found himself half an hour earlier than the man who was 40 minutes late. What was the scheduled time of meeting?

- (1) 8.00 am (2) 8.05 am
(3) 8.15 am (4) 8.10 am

Answer (2)

Sol. Anuj came at 8 : 15 am

A man reaches at 8 : 45 am

Man is 40 minutes late

Meeting time is 8 : 05 am

Directions (Q.61 to Q.70) : In the following questions, there is some relationship between the first two terms. The same relation exists between the last two terms. Find out the proper term in place of a question mark from the alternatives given below.

61. 25 : 15 :: 7 : ?

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

Answer (1)

Sol. $\frac{25+5}{2} = 15$

$\therefore \frac{7+5}{2} = 6$

62. 96 : 24 :: 120 : ?

- (1) 36 (2) 30
(3) 24 (4) 40

Answer (2)

Sol. Number is divided by 4 to get 2nd number.

63. 6 : 38 :: 8 : ?

- (1) 76 (2) 62
(3) 66 (4) 72

Answer (3)

Sol. Square the 1st number + 2

64. 8 : 28 :: 27 : ?

- (1) 8 (2) 28
(3) 64 (4) 65

Answer (4)

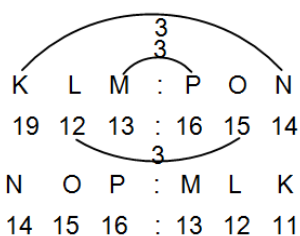
8 : 28	27 : 65
$2^3 : 3^3 + 1$	$3^3 : 4^3 + 1$

65. KLM : PON :: NOP : ?

- (1) LMK (2) NML
(3) MLK (4) KLN

Answer (3)

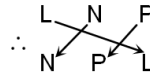
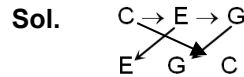
Sol.



66. CEG : EGC :: LNP : ?

- (1) LPN
(2) UWY
(3) MOP
(4) NPL

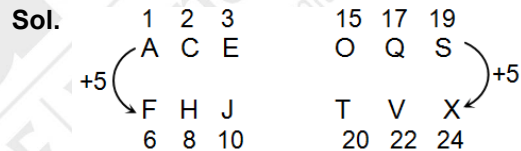
Answer (4)



67. ACE : FHJ :: OQS : ?

- (1) PRT
(2) RTU
(3) TVX
(4) UWY

Answer (3)



68. Pigeon : Peace :: White flag : ?

- (1) Enmity
(2) Victory
(3) Surrender
(4) War

Answer (3)

Sol. Indication of white flag is surrender or negotiation

69. Apparent : Evident :: Hidden : ?

- (1) Dark
(2) Concealed
(3) Internal
(4) Interior

Answer (2)

Sol. Synonyms

70. Detach : Affix :: Accumulate : ?

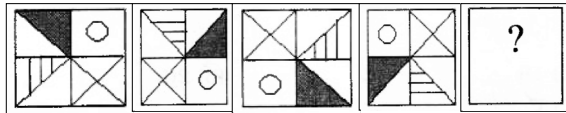
- (1) Vanish (2) Disappear
(3) Exhaust (4) Dissipate

Answer (4)

Sol. Antonyms

Directions (Q.71 & Q.72) : Each of the following questions consists of four figures that form a series. Select a figure from among the answer which will continue the same series as established by the four given figures.

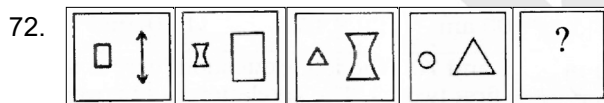
71. Find the correct figure from the alternatives that will complete the given series of figures.



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

Answer (2)

Sol. Rotate figure clockwise by 90°.



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

Answer (1)

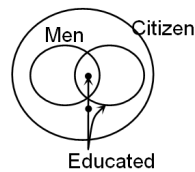
Directions (Q.73 to Q.75) : Each questions consists of three different classes. Identify the figure which best represent the relationship between the three classes in each question. The size of the circle do not indicate the relative size of the three classes.

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

73. Citizens, Educated, Men

Answer (2)

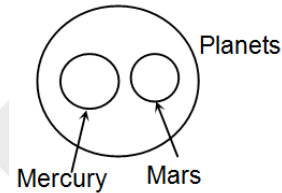
Sol.



74. Mercury, Mars, Planets

Answer (4)

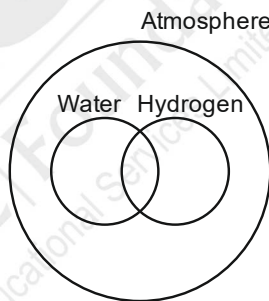
Sol.



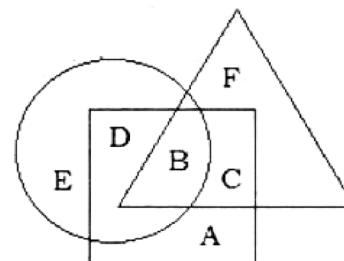
75. Water, Atmosphere, Hydrogen

Answer (2)

Sol.



Directions (Q.76 to Q.78) : In the following figure, the circle represents the persons living in joint families, the triangle represents school teachers and the square represents married persons. Study the figure carefully and answer the following questions.



76. Which of the following represents married persons living in joint families but not working as teachers?

- (1) C (2) F
(3) D (4) A

Answer (3)

Sol. D is there in circle and square but not in triangle.

77. School teachers who are married but do not live in joint families are represented by

- (1) C (2) F
(3) A (4) D

Answer (1)

Sol. C is there in triangle and square but not in circle.

78. Persons who live in joint families are unmarried and who do not work as teachers are represented by

- (1) C (2) B
(3) E (4) D

Answer (3)

Sol. E stays only in circle.

79. If your birthday 30th June, 2003 was on Monday, on what day of the week does your birth day was in the year 2005?

- (1) Sunday (2) Tuesday
(3) Wednesday (4) Thursday

Answer (4)

Sol. 30 June 2003 – Monday

30 June 2004 – Wednesday – Leap Year

30 June 2005 – Thursday

80. A clock is set to show the correct time at 11 a.m. The clock gains 12 minutes in 12 hours. What will be the time when the watch indicated 1 p.m. on the 6th day?

- (1) 10 a.m (2) 11 a.m
(3) 12 noon (4) None of these

Answer (2)

Sol. Clock gains 12 min in 12 hour

Total hours spent = 120 hours

120 minutes gain i.e. 2 hours gain

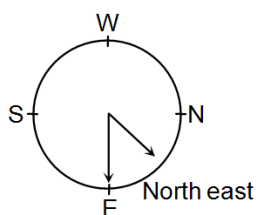
Hence actual time \Rightarrow 11 am

81. A watch reads 4.30. If the minute hand points East, to what direction will the hour hand point?

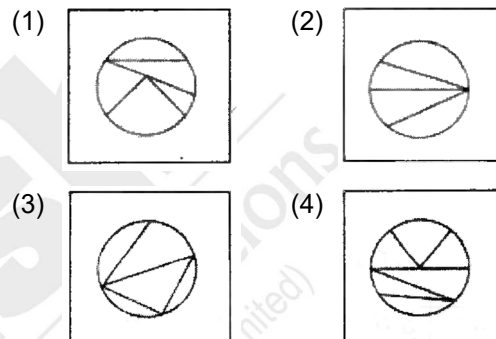
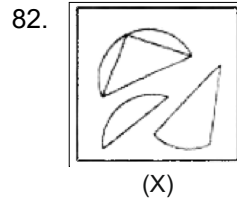
- (1) North (2) North-East
(3) North-West (4) South-East

Answer (2)

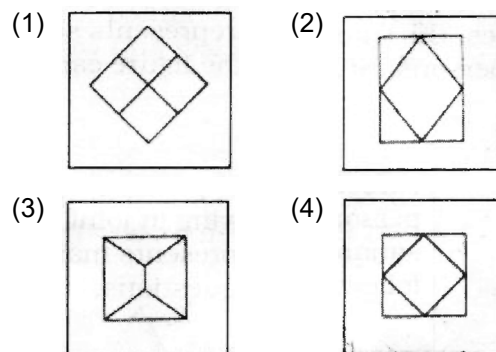
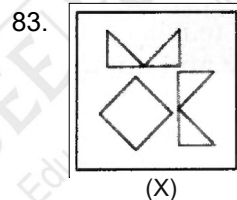
Sol.



Directions (Q.82 & Q.83) : In the questions given below, a question figure marked as X is given on the left hand side and four answer figures are given on the right hand side. Select the answer figure which can be formed from the cut-out pieces given in the figure X and write in the answer sheet.



Answer (3)



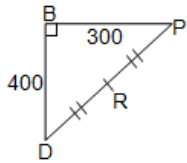
Answer (4)

84. P is 300 km Eastward of B and D is 400 km south of B. R is exactly in the middle of P and D. What is the distance between D and R?

- (1) 500 km
(2) 250 km
(3) 300 km
(4) 700 km

Answer (2)

Sol.



By Pythagoras
 $PD = 500 \text{ km}$
 $DR = \frac{1}{2} PD$
 $= 250 \text{ km}$

85. A boy was asked to multiply a certain number by 25. He multiplied it by 52 and got his answer more than the correct answer by 324. Find the number to be multiplied?

- (1) 12 (2) 15
 (3) 25 (4) 52

Answer (1)

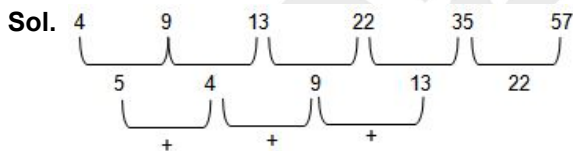
Sol. $x \times 25 + 324 = 52 \times x$
 $324 = 27 \times x$
 $x = 12$

Directions (Q.86 to Q.90) : In each of the following questions, the numbers are arranged according to some rule. Identify the rule and select the alternative that will complete the series and write :

86. 4, 9, 13, 22, 35, ?

- (1) 57 (2) 70
 (3) 63 (4) 75

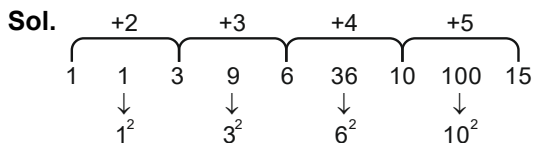
Answer (1)



87. 1, 1, 3, 9, 6, 36, 10, 100, ?, 225

- (1) 25 (2) 15
 (3) 20 (4) 16

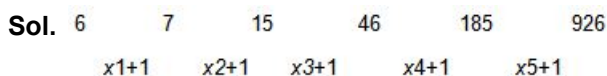
Answer (2)



88. 6, 7, 15, 46, 185, ?

- (1) 226 (2) 230
 (3) 271 (4) 926

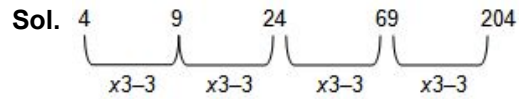
Answer (4)



89. 4, 9, 24, 69, ?

- (1) 165
 (2) 193
 (3) 204
 (4) 218

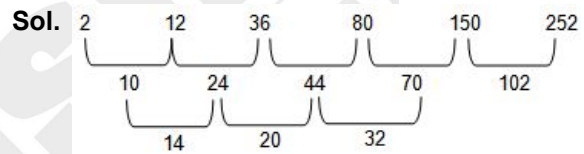
Answer (3)



90. 2, 12, 36, 80, 150, ?

- (1) 194 (2) 210
 (3) 252 (4) 258

Answer (3)

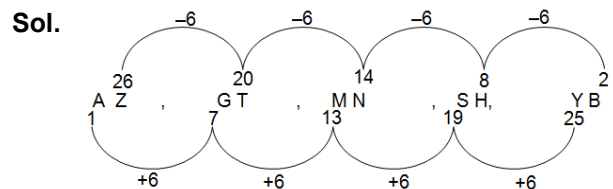


Directions (Q.91 to Q.94) : In each of the following questions, the alphabets are arranged according to some rule. Identify the rule and select and write the alternative that will complete the series.

91. AZ, GT, MN, ?, YB

- (1) KF (2) RX
 (3) SH (4) TS

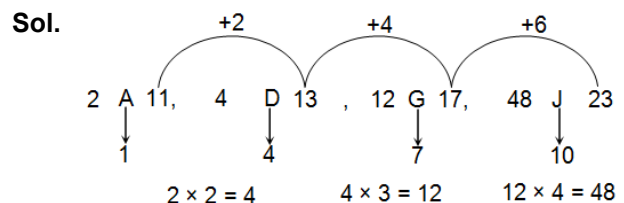
Answer (3)



92. 2 A 11, 4 D 13, 12 G 17, ?

- (1) 36 I 19
 (2) 36 J 21
 (3) 48 J 21
 (4) 48 J 23

Answer (4)



93. A – BBC – AAB – CCA – BBCC
 (1) ACBA (2) ABBA
 (3) CABA (4) BACB

Answer (1)

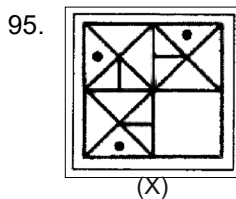
Sol. A A B B C C C A A B B C C A A B B C C
 ⇒ ACBA

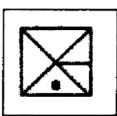
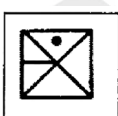
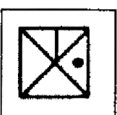
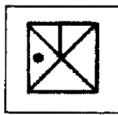
94. a – bccb – ca – cca – baab – c
 (1) abcaa (2) ababc
 (3) accab (4) bacaa

Answer (2)

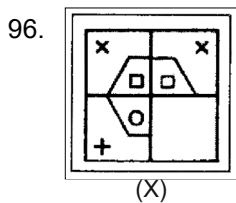
Sol. a a b c c | b b c a a | c c a b b | a a b c c

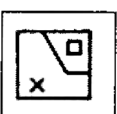
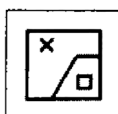
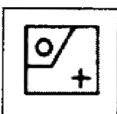

Directions (Q.95 & Q.96) : A part of the figure marked X is missing. The missing part is given among the four alternatives. Select and write the correct answer.



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

Answer (3)



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

Answer (3)

97. If – means +, + means –, x means ÷ and ÷ means x. Then the value of $7 - 8 \times 4 \div 6 + 4$ is _____
 (1) 3 (2) 12
 (3) 15 (4) 23

Answer (3)

Sol. $7 - 8 \times 4 \div 6 + 4$
 $7 + (8 \div 4) \times 6 - 4$
 $7 + 2 \times 6 - 4$
 $7 + 12 - 4 = 15$

Directions (Q.98 to Q.100) : Study the information given below and answer the questions that follows :

Six lectures A, B, C, D, E and F are to be organized in a span of seven days, Sunday to Saturday, only one lecture on each day accordance with the following :

- (i) A should not be organized on Thursday.
- (ii) C should be organized immediately after F.
- (iii) There should be a gap of two days.
- (iv) One day there will be no lecture (Friday is not that day), just before that day D will be organized.
- (v) B should be organized on Tuesday and should not be followed by D.

98. On which day there is no lecture?
 (1) Monday (2) Friday
 (3) Sunday (4) None of these

Answer (*)

Sol. Given data is insufficient.

99. How many lectures are organized between C and D?
 (1) Two (2) Three
 (3) Four (4) None

Answer (*)

Sol. Given data is insufficient.

100. On which day the lecture F will be organized?
 (1) Thursday
 (2) Friday
 (3) Sunday
 (4) Saturday

Answer (*)

Sol. Given data is insufficient.

PART-II : SCHOLASTIC APTITUDE TEST (SAT)

1. Two electromagnets are made by wrapping a few turns of wire on similar types of nails and passing through them. The number of turns of the wire wrapped over the two iron nails are in the ratio 4 : 3. The strength of

- (1) The first electromagnet will be greater
- (2) The second electromagnet will be greater
- (3) Both the electromagnets will be equal
- (4) Electromagnet does not depend on the number of turns

Answer (1)

Sol. $B = u_0 ni \Rightarrow B = \frac{u_0 Ni}{L}$

as u_0 and L are same, $\Rightarrow B \propto N$

2. Two cars P and Q of same mass start from the same location at the same time but on different straight roads. Car P travels on a road that has greater angle of inclination with horizontal compared to the road on which Q travels. At any instant both cars P and Q have the same height above the starting point. If E_P and E_Q are total energies of cars P and Q respectively, then

- (1) $E_P > E_Q$
- (2) $E_Q = E_P$
- (3) $E_Q > E_P$
- (4) Insufficient data

Answer (2)

Sol. Energy = mgh and h is same

3. Temperature of a body can be measured on different scales. The following table shows the temperature of the various materials measured in X and Y

Materials	X	Y
A	0	32
B	-40	-40
C	30	P
D	80	176

The value of P is

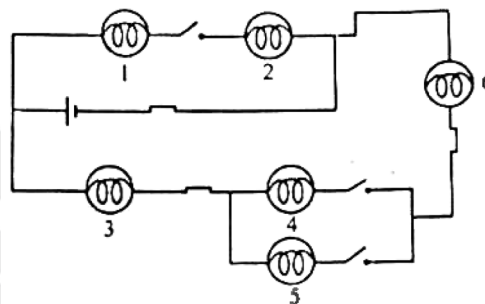
- (1) 76
- (2) 86
- (3) -138
- (4) 119

Answer (2)

Sol. $\frac{30 - (-40)}{80 - (-40)} = \frac{P - (-40)}{176 - (-40)}$

$\Rightarrow \frac{70}{120} \Rightarrow \frac{P + 40}{216} \Rightarrow P + 40 = 126 \Rightarrow P = 86$

4. In the electric circuit shown below



- (1) All the bulbs will glow
- (2) Only bulbs 2 and 6 will glow
- (3) Only bulbs 1, 3, 4 and 5 will glow
- (4) None of the bulb will glow

Answer (4)

Sol. None, no circuit is completed.

5. Two plane mirrors are placed perpendicular to each other with their reflecting faces inward. A candle is placed between the two mirrors then the number of images formed will be

- (1) 1
- (2) 2
- (3) 3
- (4) Infinite

Answer (3)

Sol. Number of images = $n - 1$, if n = even and

$n = \frac{360}{\theta} \Rightarrow n = \frac{360}{90} \Rightarrow n = 4$

Number of images = $4 - 1 = 3$

6. Which of the following is not a vector quantity?

- (1) Acceleration
- (2) Momentum
- (3) Weight
- (4) Pressure

Answer (4)

Sol. Pressure is not vector quantity.

7. A body is thrown vertically upward with a velocity V . It returns earth after reaching a height H . The ratio of displacement to the distance covered by a body is

- (1) $2H$ (2) $4H$
 (3) 0 (4) Infinite

Answer (3)

Sol. Distance = $2H$, displacement = 0

⇒ Ratio = 0

8. An electron moving with uniform velocity in x -direction enters a region of uniform magnetic field along y -direction. Which of the following physical quantity/quantities is/are non-zero and remains constant?

- I. Velocity of the electron.
 II. Magnitude of momentum of the electron.
 III. Force on the electron.
 IV. The kinetic energy of the electron.

- (1) Only I and II (2) Only III and IV
 (3) Only II and IV (4) All four

Answer (3)

Sol. Velocity and force will change in direction. Magnitude of momentum and Kinetic energy will remain same.

9. A convex lens of focal length of 25 cm is combined with a second lens such that combination has a power of 2.5 Diopter. Which of the following could be the second lens?

- (1) A concave lens of power 3 D
 (2) A concave lens of power 1.5 D
 (3) A convex lens of power 3 D
 (4) A convex lens of power 1.5 D

Answer (2)

Sol. $P = P_1 + P_2 \Rightarrow 2.5 = \frac{100}{25} + P_2$

⇒ $P_2 = -1.5$ Dioptr

⇒ Concave lens of power 1.5 D

10. A wire of resistance 20 is stretched by four times its length. The new resistance of the wire is

- (1) 500 (2) 320
 (3) 250 (4) 640

Answer (2)

Sol. On stretching the wire $R \propto l^2$

If wire stretched to n times, Resistance becomes n^2 time

⇒ Resistance becomes 16 times

⇒ New Resistance = $16 \times 20 = 320$

11. A stone is dropped into a lake from a tower 490 m height. Assuming the speed of the sound in air is 350 m/s. The sound of a flash will be heard by a man on the tower after

- (1) 20 s (2) 150 s
 (3) 11.4 s (4) 17.6 s

Answer (3)

Sol. Time = $\sqrt{\frac{2h}{g}} + \frac{h}{v}$; v = velocity of sound

$$\Rightarrow \sqrt{\frac{2 \times 490}{9.8}} + \frac{490}{350}$$

$$\Rightarrow t = 10 + 1.4 = 11.4 \text{ s}$$

12. When light travels from one transparent medium to another transparent medium which of the following quantity does not change?

- (1) Frequency (2) Velocity
 (3) Wavelength (4) Amplitude

Answer (1)

Sol. Frequency remains unchanged.

13. The gravitational potential energy difference per unit mass between the surface of a planet and a point 100 m above it is 1000 J/kg. How much work is required to be done in moving a 10 kg object 100 m on a slope at 30° to the horizontal on this planet?

- (1) 1250 J (2) 2500 J
 (3) 4350 J (4) 4900 J

Answer (No option is correct)

Sol. Answer must be 5000. No option is correct.

14. Prediction of properties of elements with more precision could be made, when elements are arranged on the basis of

- (1) Atomic masses (2) Atomic weights
 (3) Atomic numbers (4) Atomic sizes

Answer (3)

Sol. Reason : when the elements are arranged in the increasing order of atomic number, the gradation in their properties can be observed in a proper manner.

15. Oxides of non-metals are generally _____ in nature.

- (1) Basic (2) Acidic
(3) Amphoteric (4) Neutral

Answer (2)

16. During electrolytic refining the insoluble impurities settle down at the bottom is known as

- (1) Cathode mud (2) Ore
(3) Anode mud (4) Gangue

Answer (3)

17. Stainless steel is obtained by alloying iron with

- (1) Nickel and Aluminium
(2) Nickel and Chromium
(3) Aluminium and Nickel
(4) Chromium and Aluminium

Answer (2)

Sol. Stainless steel consists of Fe, Cr and Ni

18. An atom has electronic configuration 2, 8, 8 to which of the following element would it be chemically similar?

- (1) F(9) (2) Ne(10)
(3) Na(11) (4) Mg(12)

(Atomic numbers are given in parenthesis)

Answer (2)

Sol. 2, 8, 8 is the configuration of noble gas. So, Ne is a noble gas.

19. Total number of neutrons in five moles of water molecules is

- (1) 3.011×10^{24}
(2) $2.409n \times 10^{25}$
(3) 3.111×10^{25}
(4) 2.711×10^{25}

Answer (2)

Sol. 1 mole of H₂O contains 8 moles of neutron (Hydrogen has no neutrons)

5 moles of H₂O contains 40 moles of neutrons

$$\begin{aligned} &= 40 \times 6.022 \times 10^{24} \\ &= 4 \times 6.022 \times 10^{24} \\ &= 24.088 \times 10^{24} = 2.408 \times 10^{25} \\ &= 2.409 \times 10^{25} \end{aligned}$$

20. _____ is widely used as a fuel and is major component of biogas and compressed natural gas

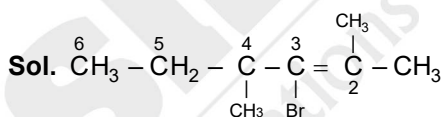
- (1) Hydrogen (2) Methane
(3) Oxygen (4) Ethane

Answer (2)

21. The name of the compound $\text{C}_2\text{H}_5 - \overset{\text{CH}_3}{\underset{\text{CH}_3}{\text{C}}} - \overset{\text{Br}}{\text{C}} = \overset{\text{CH}_3}{\text{C}} - \text{CH}_3$ is

- (1) 3-Bromo-2-Ethyl-4-methyl pentane
(2) 3-Bromo-2,4-dimethyl hexene
(3) 3-Bromo-2-Ethyl-4-methyl pentene
(4) 3-Bromo-2,4-dimethyl hexane

Answer (2)



3-Bromo-2,4-dimethyl hexene

22. When ethanol is heated at 443 K with excess of concentrated sulphuric acid produces?

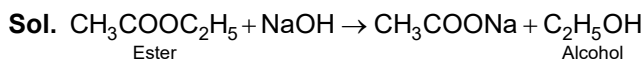
- (1) Ether (2) Ethene
(3) Sodium ethoxide (4) Ester

Answer (2)

23. Sweet smelling compound used in making perfumes and flavouring agent on treatment with Sodium hydroxide produces

- (1) Carboxylic acid
(2) Alcohol
(3) Benzene
(4) Ester

Answer (2)



24. The reaction commonly used in the hydrogenation of vegetable oils using a catalyst belongs to

- (1) Substitution reaction
(2) Addition reaction
(3) Oxidation reaction
(4) Combustion reaction

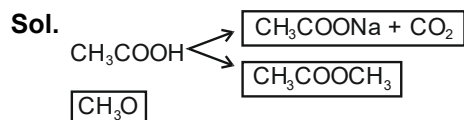
Answer (2)

Sol. Hydrogenation means addition of hydrogen

25. A compound 'X' reacts with a compound 'Y' to produce a colourless and odourless gas. The gas turns lime water milky. When 'X' reacts with Methanol in presence of Conc. Sulphuric acid, a sweet smelling substance is produced. The molecular formula of the compound 'X' is

- (1) C_2H_4O (2) $C_2H_4O_2$
 (3) C_2H_6O (4) $C_2H_6O_2$

Answer (2)



26. Propanol is a three carbons compound with the functional group

- (1) Carboxylic acid (2) Aldehyde
 (3) Ketone (4) Alcohol

Answer (4)

Sol. $\text{CH}_3\text{CH}_2\text{CH}_2 - \text{OH}$

Alcoholic functional group

27. The initial glomerular filtrate is 180 litres, but the urine excreted is 1 litre, this is due to

- (1) Reabsorption (2) Refiltration
 (3) Secretion (4) Retention

Answer (1)

Sol. Reabsorption occurs in PCT

28. This plant belongs to Cryptogamae because its reproduction is not exposed or visible.

- (1) Fern (2) Neem
 (3) Tulsi (4) Coconut

Answer (1)

Sol. Ferns belong to pteridophyta division (Cryptogamae)

29. Frogs are vertebrates because

- (1) Their notochord is rudimentary
 (2) They have no notochord in their embryonic stage
 (3) Their notochord is replaced by vertebral column in adults
 (4) The notochord is present in larval form

Answer (3)

Sol. Vertebrates have vertebral column instead of notochord.

30. When you add salt to slices of Onion, they lose their freshness after some time, due to

- (1) Osmosis (2) Oxidation
 (3) Saltation (4) Wilting

Answer (1)

Sol. Osmosis is the movement of water molecules from higher concentration to lower concentration. Adding salt to onion slices makes the medium hypertonic and thus exosmosis will occur.

31. The country richer in diverse forms of life is

- (1) England (2) Japan
 (3) Saudi Arabia (4) Mexico

Answer (4)

Sol. Mexico lies near the equator. It is rich in biodiversity.

32. Mimosa pudica leaves close when touched because

- (1) Their leaves sense danger
 (2) The cells at the leaf base lose water
 (3) Leaf cells have sensory receptors
 (4) The leaves need less sunlight

Answer (2)

Sol. Thigmonastic movement

33. The cell wall of Rhizopus is made up of

- (1) Cellulose (2) Suberin
 (3) Chitin (4) Glycans

Answer (3)

Sol. Cell wall of fungus is made up of chitin.

34. The brain sends messages to your hands to place a coverslip on the slide through the

- (1) Reflex arc (2) Peripheral nerves
 (3) Autonomic nerves (4) Sympathetic nerves

Answer (2)

Sol. PNS comprises of somatic nerves (Skeleton) and autonomic nerves (involuntary)

35. The Medulla is present in the

- (1) Forebrain
 (2) Mid-brain
 (3) Hind brain
 (4) Temporal brain

Answer (3)

Sol. Medulla oblongata is a part of hind brain

36. Which type of Microscope will you use to observe internal parts of the Mitochondria?
- (1) Electron microscope
 - (2) Electric microscope
 - (3) Binocular microscope
 - (4) Compound microscope

Answer (1)

Sol. Electron microscope is used to observe sub cellular structures.

37. When you chew bread it taste sweet due to the action of
- (1) Protease
 - (2) Nuclease
 - (3) Amylase
 - (4) Lypase

Answer (3)

Sol. Salivary amylase breaks starch into maltose

38. Name the process by which cellular waste product like CO₂ gets transported out of the cell.
- (1) Osmosis
 - (2) Diffusion
 - (3) Pressure
 - (4) Flow

Answer (2)

Sol. Exchange of CO₂ and O₂ occurs by diffusion.

39. DNA in a non-dividing resting cell, is present in the form of
- (1) Genes
 - (2) Proteins
 - (3) Chromatin
 - (4) Chromosomes

Answer (3)

Sol. Chromatin is the thread like form of DNA which is present during the interphase. It condenses into chromosome at the time of cell division.

40. Four cells undergo three consecutive (i.e. one after another) Mitotic division. The total number of daughter cells formed at the end of the division is
- (1) 16
 - (2) 8
 - (3) 32
 - (4) 64

Answer (3)

Sol. $4 \text{ cells} \xrightarrow{\text{I}^{\text{st}} \text{ division}} 8 \text{ cells} \xrightarrow{\text{II}^{\text{nd}} \text{ division}} 16 \text{ cells} \xrightarrow{\text{III}^{\text{rd}} \text{ division}} 32 \text{ cells}$

41. The Kingdom of Kublai khan in China was visited in 13th century by a foreign traveller from the Western state is _____.
- (1) Marco Polo
 - (2) Ibn Battuta
 - (3) Al-Biruni
 - (4) Francois Bernier

Answer (1)

42. On 19th October 1781, in the battle of Yorktown, George Washington accepted the surrender on the side of British forces from _____
- (1) Lord Cornwallis
 - (2) Lord Dalhousie
 - (3) Lord Wellesley
 - (4) Lord Canning

Answer (1)

43. Name a Goan, who was the first Secretary of Indian National Congress established in 1885.
- (1) Allan Octavian Hume
 - (2) Peter Alvares
 - (3) Kashinath Trimbak Telang
 - (4) Dr. Ram Hegde

Answer (3)

44. "Young Italy" was founded by _____.
- (1) Giuesppe Garibaldi
 - (2) Pope Pius IX
 - (3) Count Camillo Cavour
 - (4) Joseph Mazzini

Answer (4)

45. Hitler took over the German Workers Party and renamed it as _____.
- (1) National workers of Germany
 - (2) Socialist workers of Germany
 - (3) Nationalist Socialist Party
 - (4) Secular German Workers

Answer (3)

46. What is the dry forested area of Kumaon and Garhwal called?
- (1) Bhabar
 - (2) Bugyal
 - (3) Desert forest
 - (4) Arid Zone

Answer (1)

47. Slavery was finally abolished in French colonies in _____.
- (1) 1748
 - (2) 1749
 - (3) 1848
 - (4) 1794

Answer (3)

48. In 1848, which community founded the first Indian Cricket club in Bombay?
- (1) The Hindus
 - (2) The Muslims
 - (3) The Christians
 - (4) The Parsis

Answer (4)

49. The first printing Press was invented by John Guttenberg in _____.
- (1) France (2) Germany
(3) Italy (4) India

Answer (2)

50. Who published the journal 'Samwad Kaumudi'?
- (1) Raja Ram Mohan Roy
(2) Subhas Chandra Bose
(3) Bipin Chandra Pal
(4) Ishwar Chandra Vidyasagar

Answer (1)

51. Which European country became famous as the 'Workshop of the World'?
- (1) England (2) Spain
(3) Italy (4) France

Answer (1)

52. The Southern tip of Africa was called the 'Cape of Storm' by _____.
- (1) Bartholomew Dias (2) Christopher Columbus
(3) Prince Henry (4) Vasco Da Gama

Answer (1)

53. Why railway network is very scarcely spread in Jammu and Kashmir as compared to other parts of country?
- (1) Less population
(2) People are reluctant to use train transport
(3) The climatic conditions are very harsh which restricts the construction of railway tracks
(4) Economically not feasible due to less business.

Answer (3)

54. India does not shares its land boundaries with
- (1) Pakistan and Afghanistan in the northwest
(2) China (Tibet), Nepal and Bhutan in the north
(3) Myanmar and Bangladesh in the east
(4) Sri Lanka in the South

Answer (4)

55. The northern plain in India is formed of
- (1) Alluvial soil (2) Arid soil
(3) Black soil (4) Laterite soil

Answer (1)

56. The largest consumer of steel is
- (1) Russia (2) Japan
(3) USA (4) China

Answer (4)

57. Which of the following is not the tributaries which join the river Ganga.
- (1) Kosi (2) Ghaghara
(3) Kabini (4) Gandak

Answer (3)

58. An example of endangered species is
- (1) Indian rhino
(2) Asiatic elephant
(3) Asiatic Buffalo
(4) Hornbill

Answer (1)

59. One of the statement is not the true reason for activists demanding for sustainable Mining activity?
- (1) Increase in deforestation
(2) Increase in Pollution
(3) The price of minerals in international market has gone down
(4) Mineral resources are Finite and non-renewable

Answer (3)

60. Coffee plantation is done in this state :
- (1) West Bengal
(2) Karnataka
(3) Rajasthan
(4) Uttar Pradesh

Answer (2)

61. An example of Tropical Rain Forests in India is
- (1) The Eastern Ghats
(2) The Western Ghats
(3) The central plateau
(4) The desert region

Answer (2)

62. In this following state, cotton is grown because of Black soil
- (1) Punjab (2) Kerala
(3) Maharashtra (4) Assam

Answer (3)

63. The following one is NOT the true cause of social movements against multipurpose projects and dams :

- (1) Threat of leakages and water scarcity
- (2) Rehabilitation of large number of people
- (3) Deforestation of vast area
- (4) Large number of displacement

Answer (1)

64. India is _____ extension of the Asian Continent.

- (1) Northward
- (2) Eastward
- (3) Southward
- (4) Westward

Answer (3)

65. Name the organ of the UN that is Responsible for maintaining peace and security among countries.

- (1) The UN safety council
- (2) The UN security council
- (3) The UN surety council
- (4) The UN security camp

Answer (2)

66. How may amendments were considered while drafting the constitution?

- (1) More than one thousand
- (2) More than two hundred
- (3) More than two thousand
- (4) More than one hundred

Answer (3)

67. Who appoints Chief Election Commissioner in India?

- (1) The Governor
- (2) The President of India
- (3) The Chief Justice
- (4) The Prime Minister

Answer (2)

68. What is known as the Lower House?

- (1) Rajya Sabha
- (2) Public Sabha
- (3) Lok Sabha
- (4) Gyan Sabha

Answer (3)

69. The right to freedom is a cluster of how many freedoms?

- (1) Seven
- (2) Six
- (3) Five
- (4) Eight

Answer (2)

70. The system of Panchayati Raj involves _____.

- (1) The village, block and district levels
- (2) The village and state levels
- (3) The village, district and state level
- (4) The village, state and Union Levels

Answer (1)

71. Women in India are discriminated against in _____.

- (1) Political life
- (2) Social life
- (3) Economic life
- (4) All of these

Answer (4)

72. A democratic Government is _____.

- (1) An accountable Government
- (2) A responsive Government
- (3) A legitimate Government
- (4) All of the above

Answer (4)

73. Which is the most abundant factor of production?

- (1) Machinery
- (2) Business
- (3) Labour
- (4) Landlord

Answer (3)

74. Economic activities have two parts-market activities and _____.

- (1) Non market activities
- (2) Same activities
- (3) Post activities
- (4) Profit activities

Answer (1)

75. The term 'NSSO' stands for _____.

- (1) New sample survey organisation
- (2) National sample survey organisation
- (3) National simple survey organisation
- (4) National sample survey organisation

Answer (2, 4)

Sol. Both are same & Correct.

76. Public distribution system (PDS) is the most important step taken by the government of India towards _____.

- (1) Ensuring food security
- (2) Ensuring water security
- (3) Ensuring milk security
- (4) Ensuring fans security

Answer (1)

77. Average income is also called _____.

- (1) per capita income
- (2) per capita incentive
- (3) per capita information
- (4) percent capital income

Answer (1)

78. Production of a company mostly through the natural process is an activity in _____.

- (1) Last
- (2) Primary
- (3) Final
- (4) Second

Answer (2)

79. Reserve Bank of India issues currency notes on behalf of _____ Government.

- (1) Local Government
- (2) Central Government
- (3) State Government
- (4) District Government

Answer (2)

80. Rapid integration between countries is called _____.

- (1) Nationalization
- (2) Mutual share
- (3) Open share
- (4) Globalization

Answer (4)

81. If two positive integers are written as $a = x^3y^3$ and $b = xy^3$ such that x and y are prime numbers then HCF (a, b) is

- (1) xy
- (2) xy^2
- (3) x^3y^3
- (4) x^2y

Answer (No option is correct)

Sol. HCF (a, b) = xy^3

No option is correct.

82. If one of the zeroes of a cubic polynomial $x^3 + ax^2 + bx + c$ is -1 then the product of other two zeroes is

- (1) $b - a + 1$
- (2) $a + b + 1$
- (3) $a - b - 1$
- (4) $b - a - 1$

Answer (1)

Sol. $-1 + \beta + \gamma = -a$

$$(-1) \beta \gamma = -c$$

$$(-1) \beta + \beta \gamma - \gamma = b$$

$$-[\beta + \gamma] + \beta \gamma = b$$

$$a - 1 + \beta \gamma = b$$

$$\beta \gamma = b + 1 - a$$

83. If $\sin \theta + \cos \theta = \sqrt{3}$ then the sum of $\tan \theta$ and $\cot \theta$ is

- (1) 0
- (2) $\sqrt{3}$
- (3) 1
- (4) $\frac{1}{\sqrt{2}}$

Answer (3)

Sol. $(\sin \theta + \cos \theta)^2 = 3$

$$1 + 2 \sin \theta \cos \theta = 3$$

$$\sin \theta \cos \theta = 1$$

$$\tan \theta + \cot \theta$$

$$= \frac{\sin \theta}{\cos \theta} + \frac{\cos \theta}{\sin \theta}$$

$$= \frac{1}{\sin \theta \cos \theta}$$

$$= 1$$

84. A ladder rests against a vertical wall at an inclination to the horizontal. Its foot is pulled away from the wall through a distance ' d ' so that its upper end slides a distance ' h ' down the wall and the ladder makes an angle β to the horizontal. The ratio $\frac{d}{h}$ is

(1) $\frac{\cos \beta - \cos \alpha}{\sin \alpha - \sin \beta}$

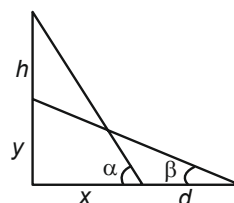
(2) $\frac{\cos \beta + \cos \alpha}{\sin \alpha + \sin \beta}$

(3) $\frac{\cos \beta - \cos \alpha}{\sin \alpha + \sin \beta}$

(4) $\frac{\cos \beta + \cos \alpha}{\sin \alpha - \sin \beta}$

Answer (1)

Sol.



$$\frac{\cos \beta - \cos \alpha}{\sin \alpha - \sin \beta}$$

Length of ladder is same = L

$$\frac{x + d}{L} = \frac{x}{L}$$

$$\frac{y + h}{L} = \frac{y}{L}$$

85. Vandana sold a table and a chair for ₹1050 with a profit of 10% on the table and 25% on the chair. If she had taken a profit of 25% on the table and 10% on the chair. She would have got ₹15 more profit. What is the total price of a table and a chair?

- (1) ₹800 (2) ₹1000
(3) ₹1200 (4) ₹900

Answer (4)

Sol. $\frac{110T}{100} + \frac{125C}{100} = 1050$

$$\frac{125T}{100} + \frac{110C}{100} = 1065$$

$$T = 500; C = 400$$

86. If every side of a triangle is doubled then area of a triangle increases by k times then the value of k is

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

Answer (4)

Sol. $S = \frac{a+b+c}{2}; A = \sqrt{s(s-a)(s-b)(s-c)}$

$$S' = \frac{2a+2b+2c}{2};$$

$$S' = a+b+c$$

$$S' = 2S$$

$$A' = \sqrt{S'(S'-2a)(S'-2b)(S'-2c)}$$

$$= \sqrt{2S(2S-2a)(2S-2b)(2S-2c)}$$

$$= 4\sqrt{S(S-a)(S-b)(S-c)}$$

$$A' = 4A$$

87. If $y = 3 + \sqrt{8}$ then the value of $y^3 + \frac{1}{y^3}$ is

- (1) 216 (2) 198
(3) 192 (4) 261

Answer (2)

Sol. $y = 3 + \sqrt{8}$

$$\frac{1}{y} = \frac{1}{3 + \sqrt{8}} \times \frac{3 - \sqrt{8}}{3 - \sqrt{8}}$$

$$\frac{1}{y} = \frac{3 - \sqrt{8}}{1}$$

$$y + \frac{1}{y} = 6$$

On cubing

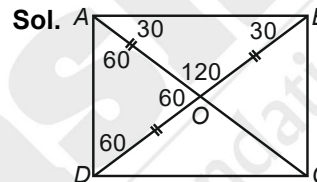
$$y^3 + \frac{1}{y^3} + 3\left(y + \frac{1}{y}\right) = 216$$

$$y^3 + \frac{1}{y^3} = 198$$

88. $ABCD$ is a quadrilateral whose diagonals intersect each other at O , such that $OA = OB = OD$. If $\angle OAB = 30^\circ$ then $\angle ODA$ is

- (1) 30° (2) 45°
(3) 60° (4) 90°

Answer (3)



89. Four pipes of each of 5 cm in diameter are to be replaced by a single pipe discharging the same quantity of water. If the speed of water remains same in both the cases then the diameter of the single pipe is

- (1) 10 cm (2) 20 cm
(3) 15 cm (4) 30 cm

Answer (1)

Sol. $4\pi(2.5)^2 \ell = \pi R^2 \ell$

$$R^2 = 25$$

$$R = 5$$

$$D = 10 \text{ cm}$$

90. In what ratio of line $x - y - 2 = 0$ divides the line segment joining $(3, -1)$ and $(8, 9)$?

- (1) 1 : 2 (2) 2 : 1
(3) 2 : 3 (4) 1 : 3

Answer (3)

Sol. $\frac{k}{(3, -1)} : \frac{1}{(8, 9)}$

$$\frac{8k+3}{k+1} - \left\{ \frac{9k-1}{k+1} \right\} = 2$$

$$k = \frac{2}{3}$$

91. If the sum of first of 'n' terms of A.P. is $2n + 3n^2$ then the r^{th} term is

- (1) $6r - 1$ (2) $2r + 1$
(3) $3r - 1$ (4) $9r - 1$

Answer (1)

Sol. $T_n = S_n - S_{n-1}$

92. $\frac{\text{LCM}(1, 2, 3, 4, \dots, 200)}{\text{LCM}(105, 106, 107, \dots, 200)}$ is

- (1) 1 (2) 101
(3) 101×103 (4) $101 \times 102 \times 103 \times 104$

Answer (3)

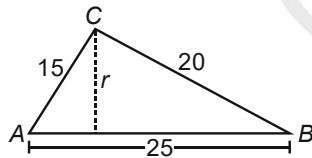
Sol. $\text{LCM}(1, 2, 3, \dots, 200) = \text{LCM}(101, 102, \dots, 200) \times 101 \times 103$

93. A right triangle whose sides are 15 cm and 20 cm is made to revolve about its hypotenuse. The volume of the double cone so formed is

- (1) $1200 \pi \text{ cm}^3$ (2) $1500 \pi \text{ cm}^3$
(3) $1800 \pi \text{ cm}^3$ (4) $1600 \pi \text{ cm}^3$

Answer (1)

Sol.



$$\frac{1}{2} \times 15 \times 20 = \frac{1}{2} \times r \times 25$$

$$r = 12$$

$$V = \frac{1}{3} \pi [12]^2 h_1 + \frac{1}{3} \pi [12]^2 h_2$$

$$= \frac{1}{3} \pi (12)^2 [25]$$

$$= 1200\pi$$

94. If $a = b^2 - b$ where b is an integer then $a^2 - 2a$ is divisible by

- (1) 24 (2) 36
(3) 48 (4) 60

Answer (1)

Sol. Let $b = 3$

$$a = 6$$

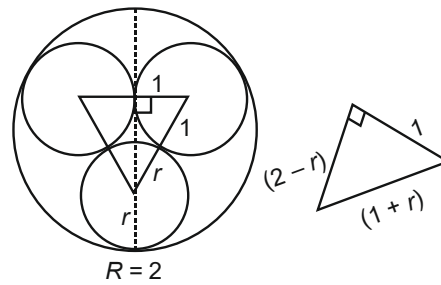
$$\therefore 36 - 2(6) = 24$$

95. Two circles having equal diameters 2 m touch each other and each of them touches internally a circle of diameter 4 m. Then the diameter of the circle which touches all the three circles is

- (1) m (2) $\frac{4m}{3}$
(3) $\frac{3m}{2}$ (4) $\frac{m}{2}$

Answer (2)

Sol.



$$(1+r)^2 = (2-r)^2 + r^2$$

$$r = \frac{2}{3}$$

$$D = \frac{4}{3}$$

96. Which of the following represents the decimal number 1257?

- (1) 132011
(2) 321022
(3) 120331
(4) 103221

Answer (4)

Sol.

4^5	4^4	4^3	4^2	4^1	4^0
1024	256	64	16	4	1
1	0	3	2	2	1
1024		192	32	8	1

$$1024 + 192 + 32 + 8 + 1 = 1257$$

97. Two dice are thrown simultaneously, the probability that the difference of the numbers appearing on them is a prime number

- (1) $\frac{7}{18}$ (2) $\frac{11}{26}$
(3) $\frac{4}{9}$ (4) $\frac{1}{3}$

Answer (1)

Sol. (1, 3) (4, 1)

(1, 4) (4, 6)

(1, 6) (5, 2)

(2, 5) (5, 3)

(3, 1) (6, 1)

(3, 5) (6, 3)

(3, 6) (6, 4)

$$= \frac{14}{36}$$

$$= \frac{7}{18}$$

98. The distance between the points $(a\cos\delta + b\sin\delta, 0)$ and $(0, a\sin\delta - b\cos\delta)$ is

- (1) $a^2 + b^2$
- (2) $\sqrt{a + b}$
- (3) $a^2 - b^2$
- (4) $\sqrt{a^2 + b^2}$

Answer (4)

Sol. $\sqrt{a^2 + b^2}$

$$\sqrt{(a\cos\delta + b\sin\delta)^2 + (a\sin\delta - b\cos\delta)^2}$$

99. A dice is thrown once. If the probability of getting a number less than 4 is x and the probability of getting a number greater than 4 is y then $x - y$ is

- (1) $\frac{5}{6}$
- (2) $\frac{1}{6}$
- (3) $\frac{2}{3}$
- (4) $\frac{1}{3}$

Answer (2)

Sol. $P(< 4) = 1, 2, 3 = \frac{3}{6} = \frac{1}{2}$

$$P(> 4) = 5, 6 = \frac{2}{6} = \frac{1}{3}$$

$$\therefore \frac{1}{2} - \frac{1}{3} = \frac{1}{6}$$

100. If $p(x) = ax^2 + bx + c$ and $q(x) = ax^2 - dx - c$ then $p(x)q(x) = 0$ has

- (1) At least three roots
- (2) No real roots
- (3) At least two real roots
- (4) Two real and two imaginary roots

Answer (3)

Sol. At least two real roots

$$D(px) = b^2 - 4ac$$

$$D(qx) = d^2 + 4ac$$

Either of D will be positive

