



Aakash

Medical | IIT-JEE | Foundations

(Divisions of Aakash Educational Services Limited)

Regd. Office : Aakash Tower, 8, Pusa Road, New Delhi-110005 | Ph.: 011-47623456

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
Wrong way :	1	⊗ ⊖ ⊙ ④

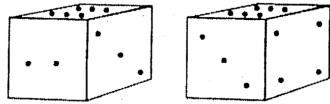
Student must darkening the right oval only after ensuring correct answer on OMR Sheet.

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)

Directions (Q.4 to Q.6) : Two positions of a block with 1 to 6 dots on its sides are shown below. Observe the dots on block.

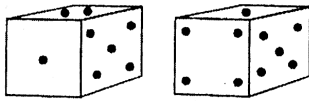
1. If the block is resting on the side with three dots. What will be the number of dots on the side the top?



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

Answer (1)

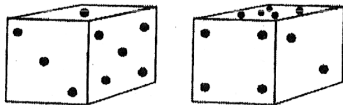
2. How many dots are contained on the face opposite to that containing four dots?



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

Answer (1)

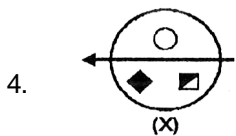
3. What is the number of dots on the face opposite 2 dots ?



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

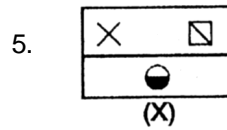
Answer (2)

Directions (Q.4 to Q.6) : Choose the correct water image of the figure (x) from amongst the alternatives given along with its.



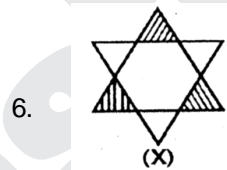
- (1)
- (2)
- (3)
- (4)

Answer (1)



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

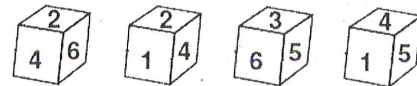
Answer (3)



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

Answer (4)

7. Which number is opposite to 3?



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

Answer (2)

Direction: (Q.8 to Q.12) A cube painted red on two adjacent faces and black on the faces opposite to the red faces and green on the remaining faces is cut into sixty four smaller cubes of equal size.

8. How many cubes are there which have no face painted ?

- (1) 1
(2) 4
(3) 8
(4) 16

Answer (3)

9. How many cubes have only one face painted ?

- (1) 8
- (2) 16
- (3) 24
- (4) 32

Answer (3)

10. How many cubes are there with three faces painted ?

- (1) 4
- (2) 8
- (3) 16
- (4) 24

Answer (2)

11. How many cubes are there with two faces painted?

- (1) 24
- (2) 8
- (3) 32
- (4) 12

Answer (1)

Sol. Total no. of cubes = 64

Number of Cubes on each edge painted two sides = 2

Total Cubes = $2 \times 12 = 24$

12. How many cubes have one face green and one of the adjacent faces black or red?

- (1) 8
- (2) 16
- (3) 24
- (4) 28

Answer (2)

13. Which group of letters is different from others?

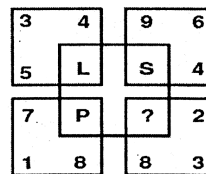
- (1) CBAED
- (2) TSRVU
- (3) KJIMN
- (4) WVUYX

Answer (3)

Sol. Consecutive letter starting from middle letter towards left, but in option (3) L is missing

- | | |
|---------------|---------------|
| (1) C B A E D | (2) T S R V U |
| ↓ ↓ ↓ ↓ ↓ | ↓ ↓ ↓ ↓ ↓ |
| 3 2 1 5 4 | 2019182221 |
| (3) K J I M N | (4) W V U Y X |
| ↓ ↓ ↓ ↓ ↓ | ↓ ↓ ↓ ↓ ↓ |
| 111091314 | 2322212524 |

14. Find the letter to be placed in place of (?) in the figure given.



- (1) M
- (2) N
- (3) Q
- (4) R

Answer (1)

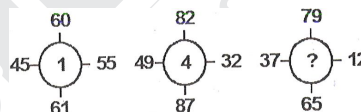
Sol. $3 + 4 + 5 = 12 \rightarrow L$

$9 + 6 + 4 = 19 \rightarrow S$

$7 + 8 + 1 = 16 \rightarrow P$

$2 + 3 + 8 = 13 \rightarrow M$

15. Identify the number in the position of (?).



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

Answer (2)

Sol. $60 + 61 = 121 = (11)^2$

$45 + 55 = 100 = (10)^2$

Thus, $11 - 10 = 1$

So, $82 + 87 = 169 = (13)^2$

$49 + 32 = 81 = (9)^2$

$13 - 9 = 4$

$79 + 65 = 144 = (12)^2$

$37 + 12 = 49 = (7)^2$

Thus, $12 - 7 = 5$

16. A sprinter goes off the starting block for 100 m run and at that instant the second hand of a stop watch had pointed towards North. He touches the finishing line exactly after 12 second. In which direction did the second hand point when he just crossed the finishing line?

- (1) 18° North of East
- (2) 18° East of North
- (3) 72° North of East
- (4) 82° East of North

Answer (1)

Sol. In stop watch

15 second would be make 90° so 12 second would make

$$\frac{90^\circ \times 12}{15} = 72^\circ \text{ in clockwise direction with the North}$$

This is same as $90^\circ - 72^\circ = 18^\circ$ in anticlockwise direction with the East.

Direction (Q.17 to Q.21) : Each letter of alphabet from A to Z has been given a value from 1 to 26 serially. Solve the questions on the basis of value of words.

17. BUSH = 50, CAMP = 33, then LIKE = ?

- (1) 40 (2) 41
(3) 32 (4) 37

Answer (4)

Sol. B U S H

$$\begin{array}{cccc} \downarrow & \downarrow & \downarrow & \downarrow \\ 2+21+19+8=50 \end{array}$$

C A M P

$$\begin{array}{cccc} \downarrow & \downarrow & \downarrow & \downarrow \\ 3+1+13+16=33 \end{array}$$

So, **L I K E**

$$\begin{array}{cccc} \downarrow & \downarrow & \downarrow & \downarrow \\ 12+9+11+5=37 \end{array}$$

18. Which word has the maximum value?

- (1) BURN (2) CURT
(3) DUCK (4) BUOY

Answer (4)

Sol. BURN = 2 + 21 + 18 + 14 = 55

$$\text{CURT} = 3 + 21 + 18 + 20 = 62$$

$$\text{DUCK} = 4 + 21 + 3 + 11 = 39$$

$$\text{BUOY} = 2 + 21 + 15 + 25 = 63 \text{ (Maximum)}$$

19. Which words have the equivalent value?

- (1) KING : CAST (2) BURY : SURE
(3) RICH : BOAT (4) BLUE : CANT

Answer (3)

Sol. RICH = 18 + 9 + 3 + 8 = 38

$$\text{BOAT} = 2 + 15 + 1 + 20 = 38$$

20. Which equation is correct?

- (1) $X + Y = 50$ (2) $Z - T = 6$
(3) $B \times V = 41$ (4) $R \div I = 5$

Answer (2)

Sol. $X + Y = 24 + 25 = 49$ (incorrect)

$$Z - T = 26 - 20 = 6 \text{ (correct)}$$

$$B \times V = 2 \times 22 = 44 \text{ (incorrect)}$$

$$R \div I = 18 \div 9 = 2 \text{ (incorrect)}$$

21. Which word is equivalent to 106 ?

- (1) MONKEY (2) DOG JACKY
(3) HAI HAPPY (4) SO LUCKY

Answer (4)

Sol. SO LUCKY

$$19 + 15 + 12 + 21 + 3 + 11 + 25 = 106$$

22. What will come at the place of '?'

T	E	Y
O	K	Z
R	G	?

- (1) W (2) X
(3) Y (4) Z

Answer (3)

Sol. T + E = Y

$$20 + 5 = 25$$

$$O + K = Z$$

$$15 + 11 = 26$$

$$R + G = Y$$

$$18 + 7 = 25$$

23. How many times in 24 hours the hands (hour & minutes) of a clock will be at right angles?

- (1) 24 (2) 30
(3) 72 (4) 48

Answer ()

Sol. 44 right angles will form.

None of the given options is correct.

24. If a train runs at a speed of 92.7 km/hr, then the distance covered in metres in 17 minutes will be:

- (1) 26265 (2) 26700
(3) 30002 (4) 29365

Answer (1)

Sol. 60 min $\rightarrow \frac{927}{10} \times 1000$

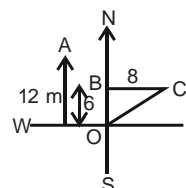
$$17 \text{ min} \rightarrow \frac{927}{60} \times 100 \times 17 = 26265$$

Direction (Q.25 & Q.26) : A lady runs 12 km towards North, then 6 km towards south and then 8 km East.

25. How far is she from her starting point?

- (1) 26 km (2) 18 km
(3) 14 km (4) 10 km

Answer (4)



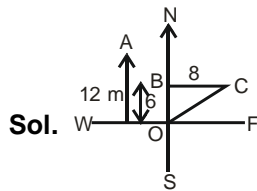
Sol.

OC = 10 km (By Pythagoras theorem)

26. Which direction is she from her starting point?

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

Answer (1)



By Diagram → North East

27. Here are some words translated from an artificial language –

- mie pie is blue light
mie tie is blue berry
aie tie is rasp berry

Which words could possibly mean "light fly"?

- (1) pie zie (2) pie mie
(3) aie zie (4) aie mie

Answer (1)

Sol. Pie zie (from line 1 and 2)

28. If in a certain code, STUDENT is written as RSTEDMS, then how would TEACHER be written in the same code?

- (1) SZZDGEQ (2) SZDDGEQ
(3) SDZGDQ (4) SDZCGDQ

Answer (3)

Sol.

S	T	U	D	E	N	T	T	E	A	C	H	E	R
-1	-1	-1	+1	-1	-1	-1	-1	-1	-1	+1	-1	-1	-1
R	S	T	E	D	M	S	S	D	Z	D	G	D	Q

29. If CHAIR is coded as FKDLU then RAID is coded as:

- (1) ULGD (2) ULKG
(3) ULDG (4) UDLG

Answer (4)

Sol. Each letter is coded to a letter which is three (+3) position ahead of it in alphabetical order.

30. In a certain code HNDT has been coded as 3694. How will you code THD in the same code?

- (1) 604 (2) 428
(3) 439 (4) 349

Answer (3)

Sol. H N D T

H = 3, N = 6, D = 9, T = 4

T H D = 439

4 3 9

Answer is 439

31. If the word PENCIL is coded as LICNEP then how would the word INKPOT be coded?

- (1) TOPINK (2) JOLQPU
(3) HMKOPS (4) TOPKNI

Answer (4)

Sol. PENCIL LICNEP
INKPOT ?

Step-I : Break word in two part each with three alphabets.

PEN + CIL

- (1) (2)

Step-II : Then write (2) part before (1) and with reflexive manner.

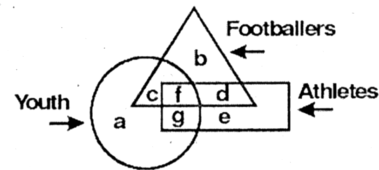
i.e PEN → NEP ⇔ LIC NEP

CIL → LIC

Sept-III : Same like step (1) and (2)

INK → POT ⇔ TOPKNI

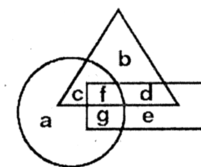
32. In the figure, the circle represents youth, the triangle represents footballers and the rectangle represents athletes – which letter represents athletes among youth who are not footballers?



- (1) c (2) g
(3) d (4) f

Answer (2)

Sol.



○ represent youth

△ represent football player

□ represent athletes

g occurs in rectangle and also in circle but not in triangles

So, g represent athlete among youth

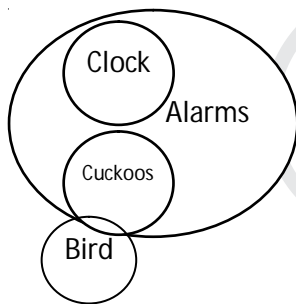
33. **Statement :** All clocks are Alarms. No Clocks are cuckoos. All cuckoos are Alarms. Some cuckoos are Birds.

Conclusion :

- (I) : Some Alarms are Birds
- (II) : No Clock is a Bird
- (III) : All Birds are Alarms
- (1) Only conclusion I follows
- (2) Only conclusion II follows
- (3) Only conclusion III follows
- (4) Both conclusions II and III follows

Answer (1)

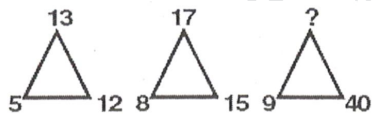
Sol. According to statement



According to this figure

- (I) Some alarm are Bird $\rightarrow \checkmark$
Because some cuckoos are Birds and all cuckoos are alarm
- (II) No Clock is Bird $\rightarrow \times$
Because statement don't give any information about the relation of clock and bird
- (III) All Birds are alarm $\rightarrow \times$
So any conclusion (I) follows.

34. Find the number in the Position of '?'



- (1) 42
- (2) 40
- (3) 41
- (4) 45

Answer (3)

Sol.
$$5 \triangle 12 \xrightarrow{\quad} 5^2 + 12^2 = 13^2$$

$$8 \triangle 15 \xrightarrow{\quad} 8^2 + 15^2 = 17^2$$

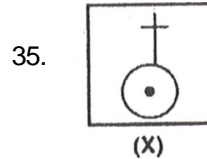
$$9 \triangle 40 \xrightarrow{\quad} ?$$

$9^2 + 40^2$

$\downarrow \quad \downarrow$

$81 + 1600 = \sqrt{1681} = 41$

Direction : (Q.35 to Q. 38): Find out which of the alternatives will exactly make up the key figure (X) ?



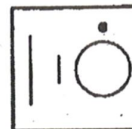
- (1)
- (2)
- (3)
- (4)

Answer (3)

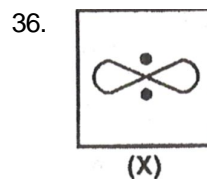


In this question only third option have contain all element of key figure

So, Answer

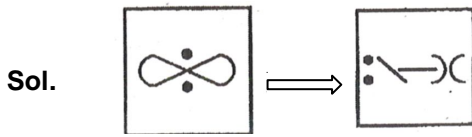


Answer figure contains a dot, a circle a large line and a small line and key figure also contains same

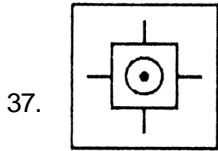


- (1)
- (2)
- (3)
- (4)

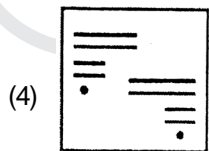
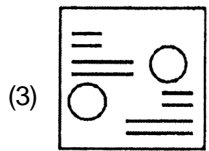
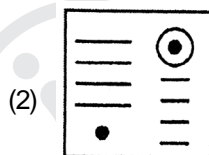
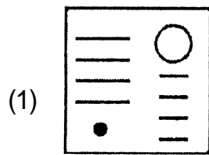
Answer (1)



Key figure contains Two arc, Two dots and two straight lines and only option (1) is contains all these elements. So, option (1) is correct answer.

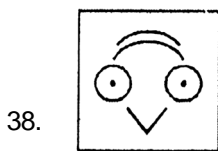
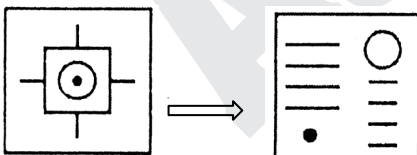


(X)

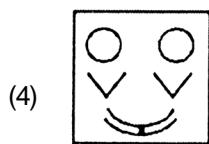
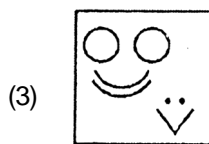
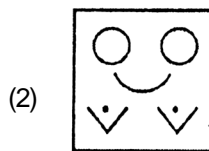
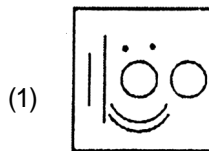


Answer (1)

Sol. Key figure contains focus long and four small straight lines, one circle, one dot and only option (1) have all these elements in it so figure (1) is correct answer

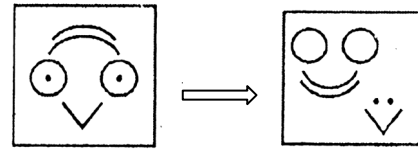


(X)

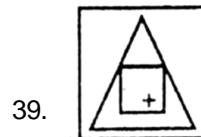


Answer (3)

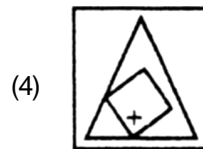
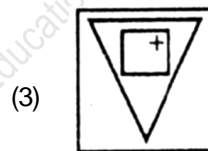
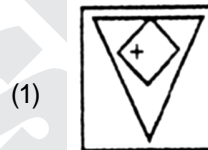
Sol. Key question contain Two circles, Two dots, Two arcs and V-Shape structure and only (3) contain all these elements So right answer is option (3)



Direction (Q.39 & Q.40) : Find out how will the key figure (X) look like after rotation?

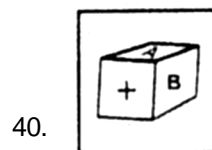


(X)

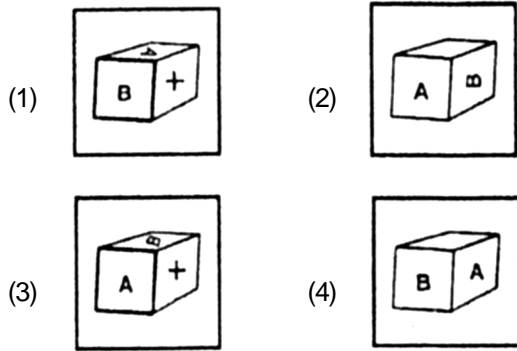


Answer (2)

Sol. For once figure x is rotated clockwise then we get option(2).

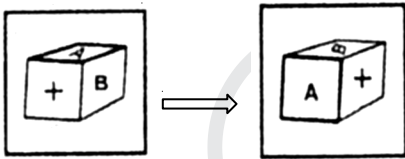


(X)



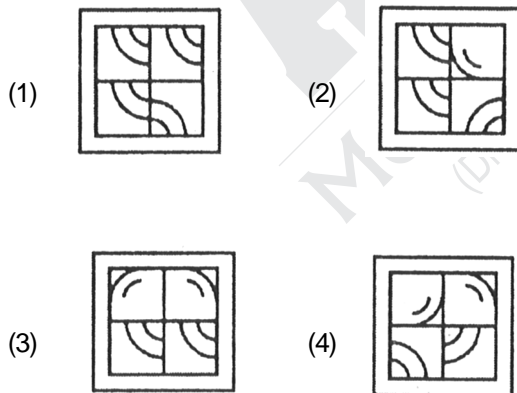
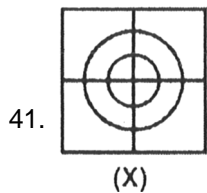
Answer (3)

Sol.

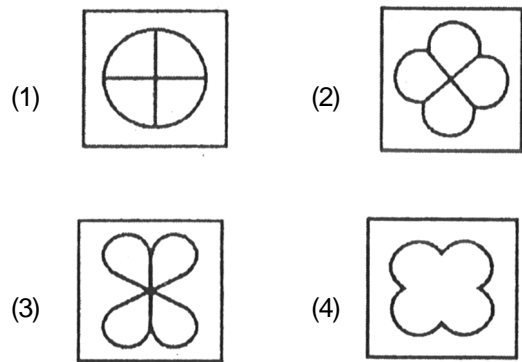
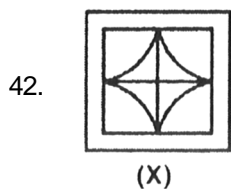


When dice is rotated for two times, we get the option(3).

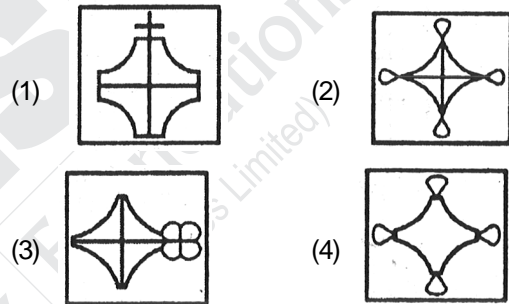
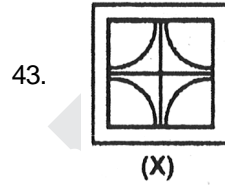
Direction (Q.41 to Q.43) : Which figure is the rearrangement of the parts of the given figure ?



Answer (1)

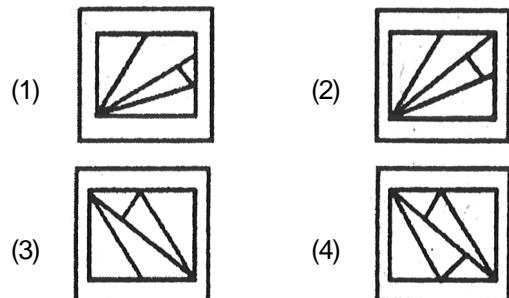
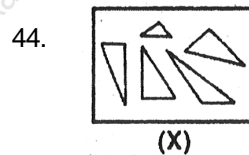


Answer (1)

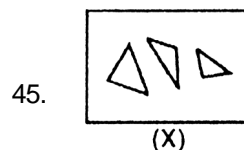


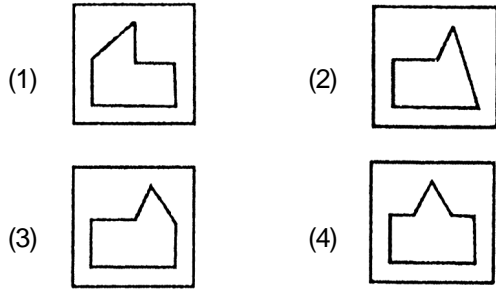
Answer (1)

Direction (Q.44 to Q.48) : Find out which of the figures (1, 2, 3 and 4) can be formed from the pieces given in the figure (X) .

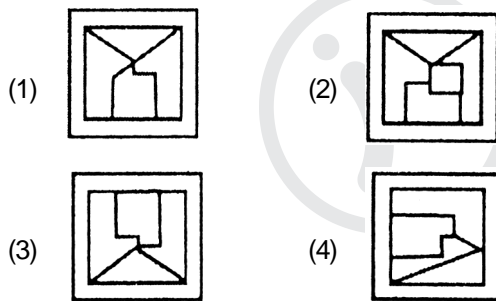
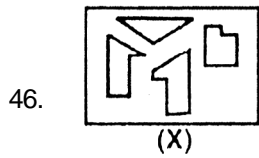


Answer (3)

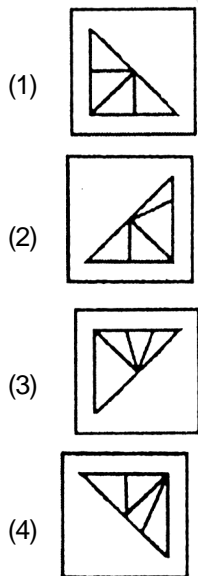
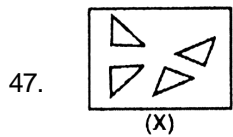




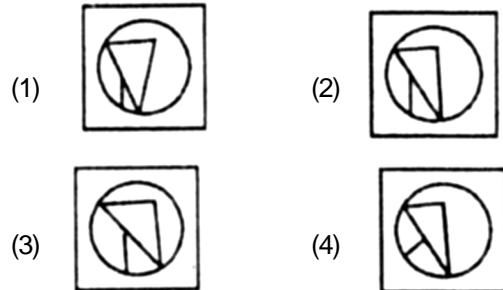
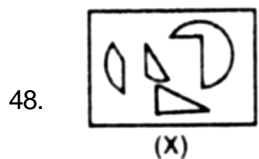
Answer (2)



Answer (3)

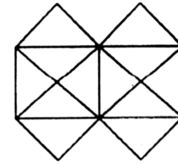


Answer (1)



Answer (2)

Direction : (Q.49 to 51) Study the following figure and answer the questions.



49. What is the minimum number of straight lines that is needed to construct the figure ?

- (1) 11
- (2) 13
- (3) 15
- (4) 21

Answer (2)

50. Count the number of triangles in the figure.

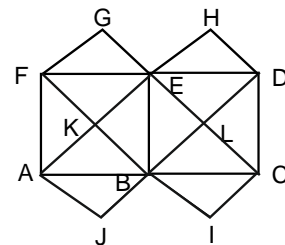
- (1) 22
- (2) 16
- (3) 20
- (4) 24

Answer (1)

51. How many squares does the figure contain?

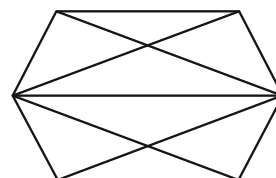
- (1) 5
- (2) 6
- (3) 7
- (4) 8

Answer (3)



Sol. AKBJ, KELB, HELD, FGEK, BICL, ABEF, BCDE

Direction: (Q.52 & Q.53) Analyse the following figure and answer the questions



52. Find the number of quadrilaterals.

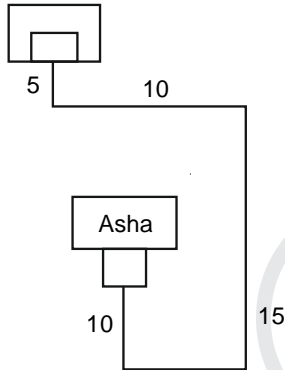
- (1) 6
- (2) 7
- (3) 9
- (4) 10

59. Asha's house faces south direction. She runs ahead 10 m, turns left and runs 5 m. Then she turns left again and runs 15 m and then again turns left and runs 10 m. Finally, she turns right and runs 5 m to reach her friend's house. What direction is Asha's friend's house facing ?

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

Answer (1)

Sol.



60. Mother was asked how many gifts she had in the bag. She replied that there were all dolls except six, all car's but six and all books but six. How many gifts had she in all?

- (1) 36 (2) 27
(3) 18 (4) 9

Answer (4)

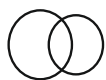
Sol. After taking all dolls only, there were 6 more gifts.
After taking all cars only, there were 6 more gifts
After taking all books only, there were 6 more gifts
This means after every time remaining set of same gifts there were 6 gifts remaining.
So, this implies she had 3 dolls, 3 cars & 3 books.
Hence, she had 9 gifts.

61. Which of the following diagram indicate the relation between women, mothers and parents?

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

Answer (1)

Sol.



The intersection part of the above figure represent the mothers.

62. In a dairy, there are 60 cows and buffalos, The number of Cows is twice that of buffalos. Buffalo X ranked seventeenth in terms of milk delivered. If there

are 9 Cows ahead of buffalo X, how many buffalos are after in rank in terms of milk delivered?

- (1) 10 (2) 11
(3) 12 (4) 13

Answer (3)

Sol. Cow + Buffalos = 60

Cow = 2 × Buffalos

So, Cow =40 and Buffalos =20

9 Cows ahead of X

7 Buffalos ahead of X

Total buffalos = 20 – (7 + 1)

= 20 – 8

= 12

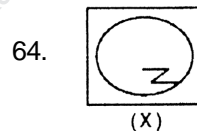
63. Amongst five friends, Lata, Alka, Rani, Asha and Sadhana. Lata is older than only three of her friends. Alka is younger to Asha and Lata. Rani is older than only Sadhana. Who amongst them is the eldest?

- (1) Asha (2) Lata
(3) Alka (4) Sadhana

Answer (1)

Sol. Asha>Lata>Alka>Rani>Sadhana

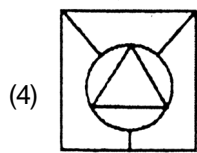
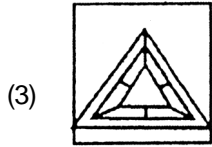
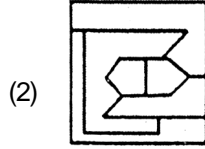
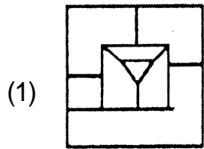
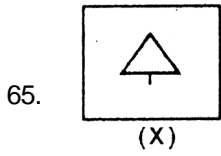
Direction: (Q.64 to Q.68) There is given a figure(X) followed by four figures 1, 2, 3 and 4 such that X is embedded in one of them. Trace out the correct alternatives.



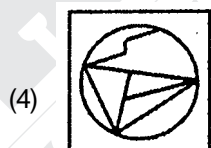
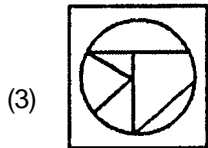
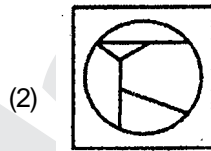
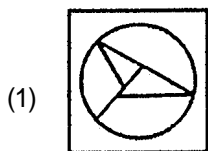
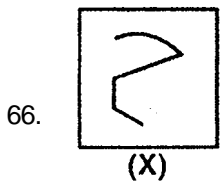
- (1) (2)
(3) (4)

Answer (4)

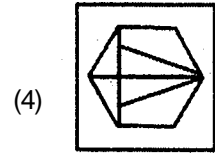
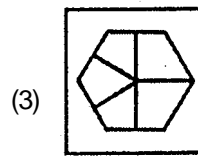
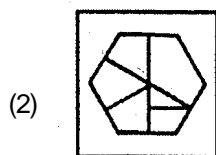
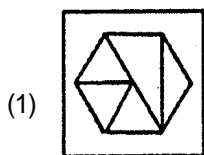
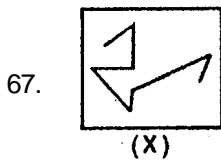




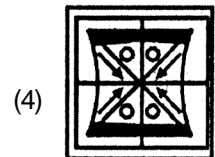
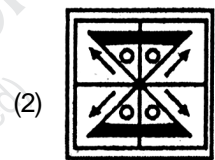
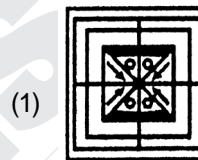
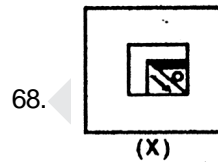
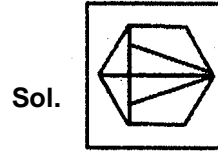
Answer (3)



Answer (2)



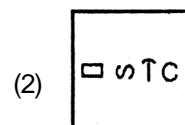
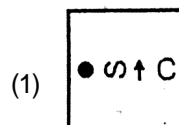
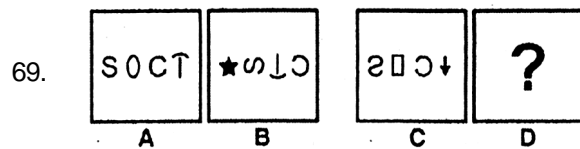
Answer (4)

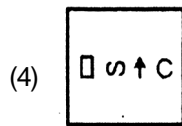
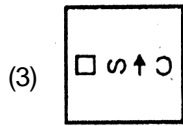


Answer (1)

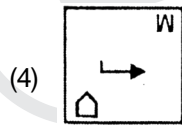
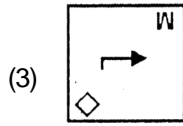
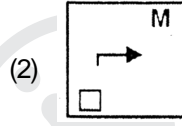
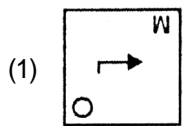
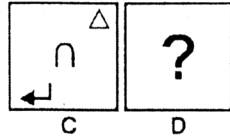
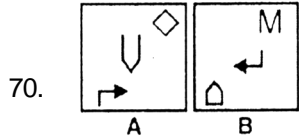
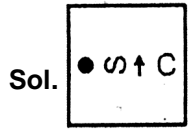


Direction (Q.69 to Q.73) : Figure A, B, C and D constitute the problem set while figures 1, 2, 3 and 4 constitute the answer set. There is a definite relationship between figures A and B. Establish a similar relationship between figures C and D by choosing a suitable figure (D) from the answer set.

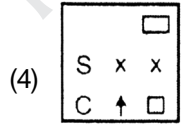
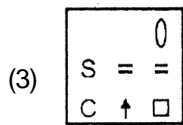
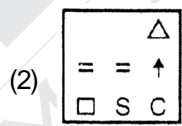
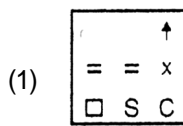
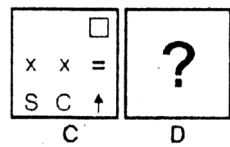
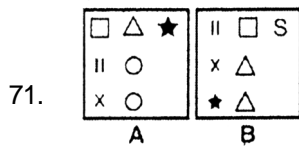
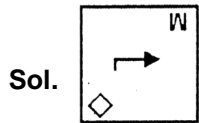




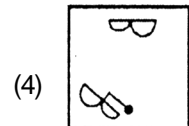
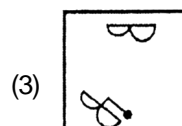
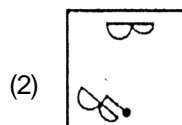
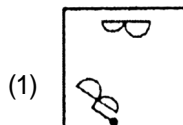
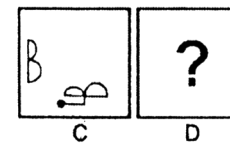
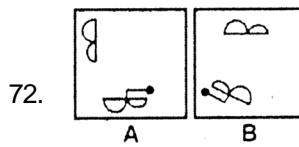
Answer (1)



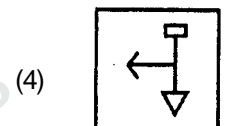
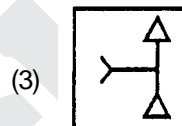
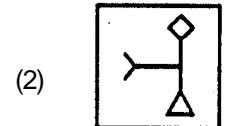
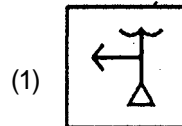
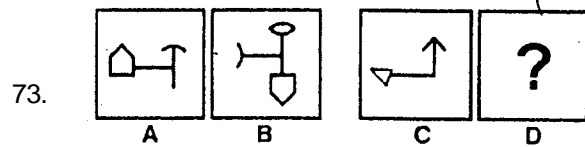
Answer (3)



Answer (2)

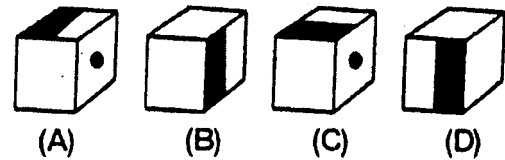
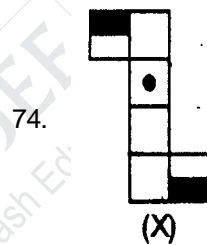


Answer (4)



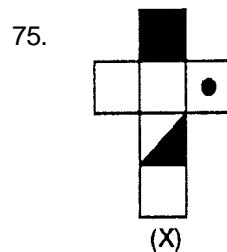
Answer (2)

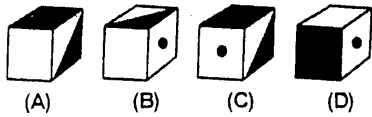
Direction : (Q. 74 to 78) The figure (X) given in each problem, is folded to form a box. Choose from amongst the alternatives, the boxes that are similar to the box formed.



- (1) A and B only
- (2) B and C only
- (3) B and D only
- (4) A, B, C and D

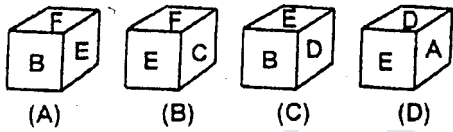
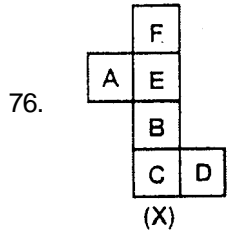
Answer (4)





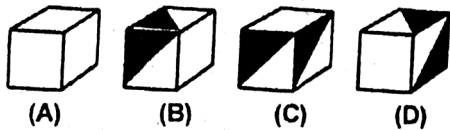
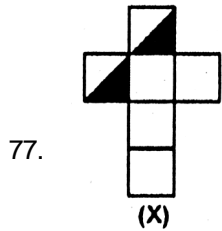
- (1) A and C only (2) B, C and D only
(3) B and D only (4) C and D only

Answer (3)



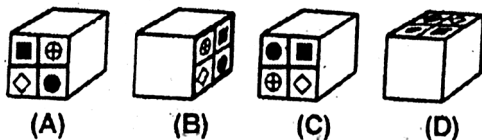
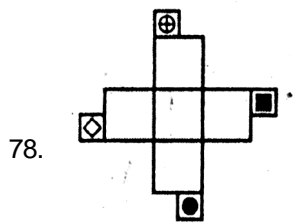
- (1) A only (2) C only
(3) A and C only (4) A and B only

Answer (2)



- (1) A and D only (2) C and D only
(3) A and B only (4) B and C only

Answer (1)



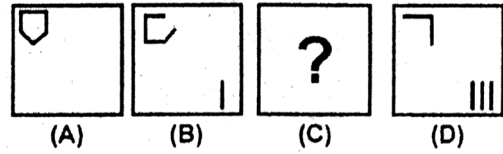
- (1) A and B only (2) B only

- (3) B and C only (4) A, B, and D only

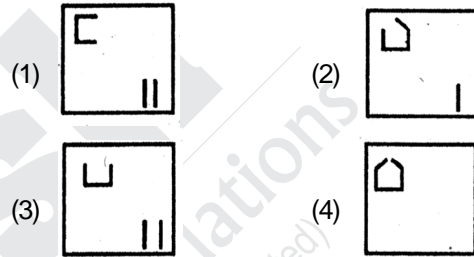
Answer (2)

Direction (Q. 79 to 85) There are given a set of four figures (A, B, C and D) forming a certain series. However, the figure at C is missing. Choose this figure from the given alternatives.

79. Problem Figures

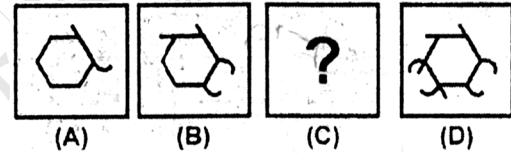


Answer Figures

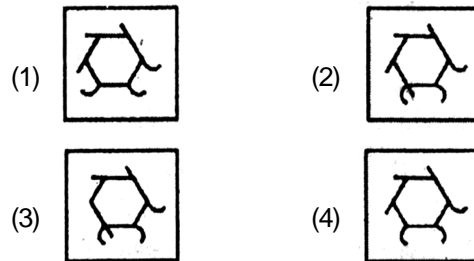


Answer (3)

80. Problem Figures

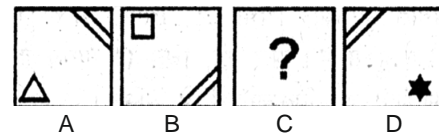


Answer Figures



Answer (4)

81. Problem Figures



Answer Figures

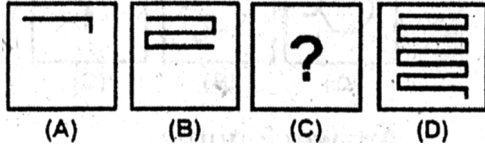




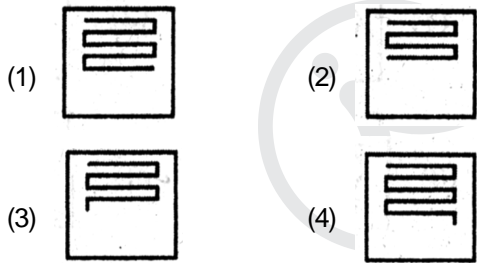
Answer (4)

Sol. Lines are moving in clock wise direction so in the third figure lines will be at bottom and Right hand side. In the same way figure inside Square is moving clockwise.

82. Problem Figures



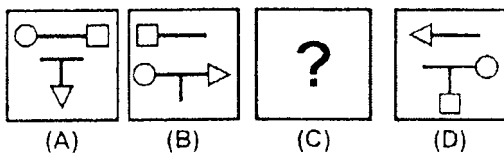
Answer Figures



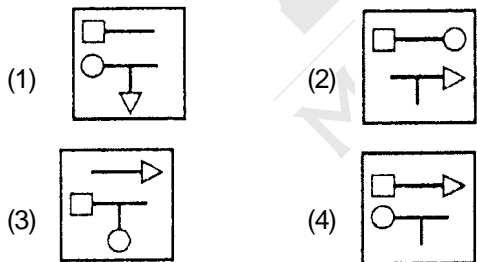
Answer (1)

Sol. Number of lines in figure 1 is 2. In figure 2 number of lines are 5. So in figure 3 numbers of lines must be 9.

83. Problem Figures



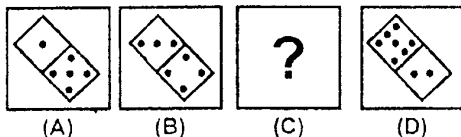
Answer Figures



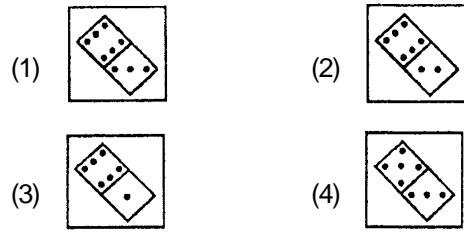
Answer (3)

Sol. From A to B upper figure is rotated 180 degree and circle has been removed so from figure C to D upper figure is rotated 180 degree and square has been removed.

84. Problem Figures



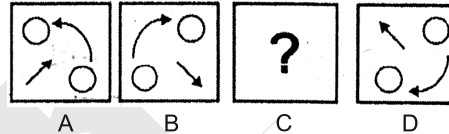
Answer Figures



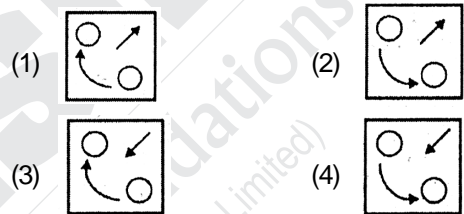
Answer (4)

Sol. In figure A upper square has 1 dot in figure B upper square has 3 dot. In figure D Upper Square has 7 dots. So in figure C Upper Square must have 5 dots.

85. Problem Figures



Answer Figures

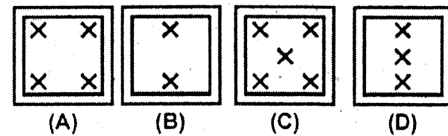


Answer (4)

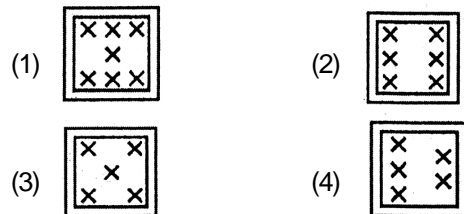
Sol. From figure 1 to 2 arrow has been rotated by 90 degree and shifted 1 position forward.

In the same way from figure 3 to figure 4 arrows has been positioned.

86. Problem Figures



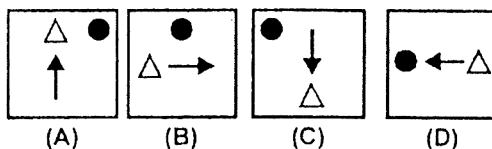
Answer Figures



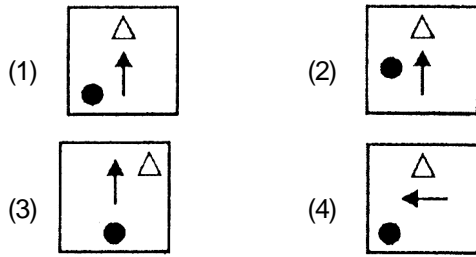
Answer (2)

Sol. It should have 6 X.

87. Problem Figures



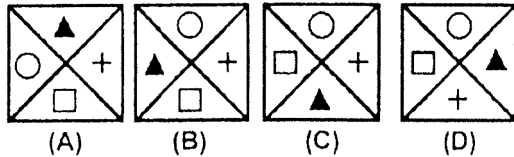
Answer Figures



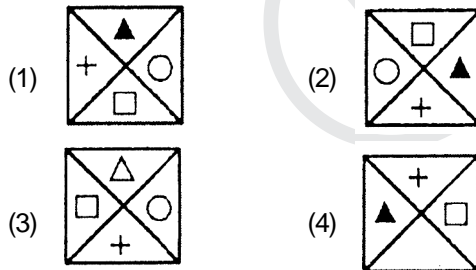
Answer (1)

Sol. Triangle is moving in anti-clockwise direction as well as circle.

88. Problem Figures



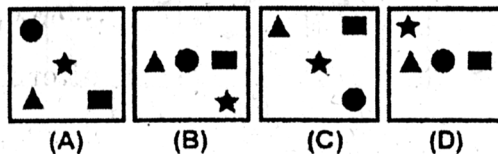
Answer Figures



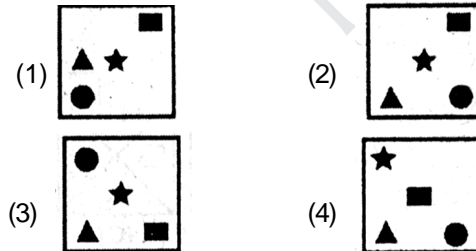
Answer (1)

Sol. From A to B 2 figure is same and other 2 are interchanged. In the same way from figure B to figure C again 2 figures are same and other 2 are interchanged.

89. Problem Figures



Answer Figures



Answer (3)

90. Find the missing number in the series 2, 10, 26, 50, _____, 122.

- (1) 81
- (2) 82
- (3) 80
- (4) 84

Answer (2)

Sol.
$$\begin{matrix} 2 & 10 & 26 & 50 & 82 & 122 \\ & \underbrace{\quad} & \underbrace{\quad} & \underbrace{\quad} & \underbrace{\quad} & \underbrace{\quad} \\ & 8 & 16 & 24 & 32 & 40 \end{matrix}$$

Direction (Q.91 to Q.94) : In the questions, a series is given with one term missing. Choose the correct alternative from the given ones that will complete the series.

91. 6, 24, 60, 120, ?

- (1) 180
- (2) 210
- (3) 240
- (4) 360

Answer (2)

Sol. $23 - 2 = 6$ $33 - 3 = 24$
 $43 - 4 = 60$ $53 - 5 = 120$
 $63 - 6 = 210$

92. 1, 9, 9, 81, 90, 810, 819, ?

- (1) 7371
- (2) 900
- (3) 8100
- (4) 1638

Answer (1)

Sol. $1 \times 9 = 9$ $9 + 0 = 9$
 $9 \times 9 = 81$ $81 + 9 = 90$
 $90 \times 9 = 810$ $810 + 9 = 819$
 $819 \times 9 = 7371$

93. 2, 3, 6, 18, 108, ?

- (1) 1944
- (2) 1658
- (3) 648
- (4) 1008

Answer (1)

Sol. $2 \times 3 = 6$ $3 \times 6 = 18$
 $6 \times 18 = 108$ $18 \times 108 = 1944$

94. 1, 2, 3, 4, 5, 7, 7, ?, ?

- (1) 11, 13
- (2) 10, 11
- (3) 8, 9
- (4) 9, 11

Answer (1)



Sol. 1, 2, 3, 4, 5, 7, 7, 11, 13

Combination of addition series and consecutive prime number series.

Direction (Q.95 to Q.98) : Find the wrong number in the following series.

95. 24576, 6144, 1536, 386, 96, 24

- (1) 96
- (2) 386
- (3) 1536
- (4) 6144

Answer (2)

Sol. $24576 \div 4 = 6144$
 $6144 \div 4 = 1536$
 $1536 \div 4 = 382$
 $382 \div 4 = 96$

$$96 \div 4 = 24$$

96. 3, 4, 10, 32, 136, 685

- (1) 685 (2) 10
(3) 136 (4) 32

Answer (4)

Sol. $3 \times 1 + 1 = 4$

$$4 \times 2 + 2 = 10$$

$$10 \times 3 + 3 = 33$$

$$33 \times 4 + 4 = 136$$

$$136 \times 5 + 5 = 685$$

97. 3, 8, 13, 24, 42, 70

- (1) 13 (2) 24
(3) 42 (4) 70

Answer (3)

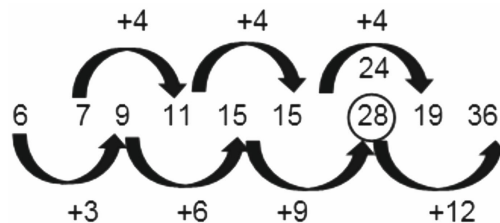
Sol.

3	8	13	24	(42)	70
$(3 + 8) + 2 = 13,$		$(8 + 13) + 3 = 24$			
$(13 + 24) + 4 = 41$		$(24 + 41) + 5 = 70$			

98. 6, 7, 9, 11, 15, 15, 28, 19, 36

- (1) 15 (2) 28
(3) 19 (4) 70

Answer (2)



Sol.

99. Shitin remembers that his mother's birthday is after 17th April but before twenty first April, where as his father remembers that his wife's birthday is after 19th April but before 24th April. Which of the following days in April is definitely his mother's birthday?

- (1) 19th April
(2) 20th April
(3) 21th April
(4) Both statements are not sufficient

Answer (2)

Sol. 17 18 19 20 21
 19 20 21 23 24

100. Day after tomorrow is my birthday. On the same day next week falls 'Holi'. Today is Monday. What will be the day after 'Holi'?

- (1) Thursday (2) Friday
(3) Wednesday (4) Saturday

Answer (1)

Sol. Monday _ Wednesday
 Wednesday _ Thursday

PART-II : SCHOLASTIC APTITUDE TEST (SAT)

1. Headquarter of UNESCO is at ?

- (1) Geneva (2) Rome
(3) Paris (4) London

Answer (3)

2. How many valence electrons are present in Cl^- ion?

- (1) 5
(2) 6
(3) 7
(4) 8

Answer (4)

Sol. $\text{Cl}, Z = 17, 2, 8, 7$

$$\text{Cl}^- = 7 + 1 = 8 \text{ valence electrons}$$

3. Blood cells are manufactured in our :

- (1) Bone marrow (2) Liver
(3) Spleen (4) Pancreas

Answer (1)

Sol. It is present in long bone and act as a haematopoietic organ.

4. If $a = (\sin\theta - \cos\theta)^4$, $b = \sin^6\theta + \cos^6\theta$ and

$c = (\sin\theta + \cos\theta)^2$, then the value of $\sqrt{3a + 4b + 6c}$ lies between:

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

Answer (2)

Sol. $3a + 4b + 6c$

$$\begin{aligned} &= 3(\sin\theta - \cos\theta)^4 + 4(\sin^6\theta + \cos^6\theta) + 6(\sin\theta + \cos\theta)^2 \\ &= 3[(\sin\theta - \cos\theta)^2]^2 + 4((\sin^2\theta)^3 + (\cos^2\theta)^3) + 6(\sin\theta + \cos\theta)^2 \\ &= 3[\sin^2\theta + \cos^2\theta - 2\sin\theta\cos\theta]^2 \\ &\quad + 4[(\sin^2\theta + \cos^2\theta)(\sin^4\theta + \cos^4\theta - \sin^2\theta\cos^2\theta)] \\ &\quad + 6(\sin^2\theta + \cos^2\theta + 2\sin\theta\cos\theta) \end{aligned}$$

⇒ We know,

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

Squaring

$$(\sin^2\theta + \cos^2\theta)^2 = 1$$

$$\Rightarrow \sin^4\theta + \cos^4\theta + 2\sin^2\theta\cos^2\theta = 1$$

$$\Rightarrow \sin^4\theta + \cos^4\theta = 1 - 2\sin^2\theta\cos^2\theta$$

$$= 3[1 + 4\sin^2\theta\cos^2\theta - 4\sin\theta\cos\theta] + 4(1 - 3\sin^2\theta\cos^2\theta)$$

$$+ 6[1 + 2\sin\theta\cos\theta]$$

$$= 3 + 4 + 6 = 13$$

$$3a + 4b + 6c = 13$$

$$\sqrt{3a + 4b + 6c} = \sqrt{13}$$

5. Which of the following statements are **correct** in relation to liberal Nationalism in 19th C. Europe ?

- I. Freedom for the individual and equality of all before the law.
- II. Government by consent of all.
- III. End of autocracy and the privileges of clergy.
- IV. Equal political rights for women and non-propertied men.

- (1) I, II, IV (2) I, II, III
(3) II, III, IV (4) I, III, IV

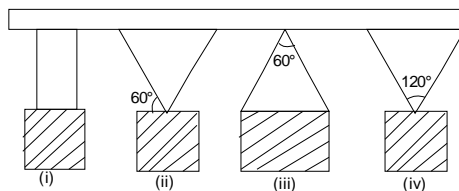
Answer (2)

6. Maintaining the proper amount of water and proper ionic balance in the body is named as :

- (1) Homeostasis
- (2) Osmoregulation
- (3) Excretion
- (4) Nutrition

Answer (2)

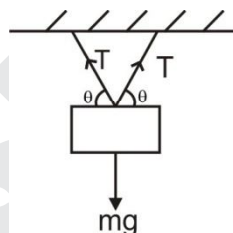
7. A 10 kg box is suspended from a beam in three ways as shown in figure. In which case, tension in string is maximum ?



- (1) i (2) ii
(3) iii (4) iii & iv both

Answer ()

Sol. None of the given option is correct



$$2T\sin\theta = mg$$

$$T = \frac{mg}{2\sin\theta}$$

For T to be maximum, $\sin\theta$ should be minimum i.e. angle (θ) should be minimum.

So the tension in string in the figure will be maximum

8. If $\frac{3}{\sqrt{28+10\sqrt{3}} - \sqrt{7-4\sqrt{3}}} = a + \sqrt{3b}$, Where a and b are integers, then the value of $\sqrt{5a+12b}$ is

- (1) 4 (2) 3
(3) $\sqrt{11}$ (4) $\sqrt{13}$

Answer ()

Sol. None of the given option is correct

9. Element M forms a chloride with the formula MCl_3 . Element M would most likely in the same group of periodic table as :

- (1) Si
- (2) Al
- (3) Mg
- (4) Na

Answer (2)

Sol. MCl_3

MCl_3 , Metal will be Al have 3 electrons in outer shell. Al have 3 electrons in outer shell.

10. Which of the following is **not** a part of human hind brain ?

- (1) Crura cerebri (2) Medulla oblongata
(3) Pons varoli (4) Cerebellum

Answer (1)

Sol. Medulla oblongata, pons, cerebellum are the part of hind brain and crura cerebri is the part of fore brain.

11. Which of the following statement does not match the Nazi views on women ?

- (1) Women are radically different from men.
(2) Women must become good mothers and rear pure blooded 'Aryan' children.
(3) Women should be entitled equal rights to men.
(4) Women must produce more children.

Answer (3)

12. What model of government did Montesquieu propose in his book 'A Spirit of Laws' ?

- (1) To refute the doctrine of the divine and absolute rights of the monarch.
(2) A government based on the social contract between people and their representatives.
(3) Division of powers within the government between the legislative, the executive and the judiciary.
(4) Concentration of all the powers in the hands of a monarch and his group of loyal people.

Answer (3)

13. Read the following statements.

Statement-I : Plaster of Paris is stored in moisture proof containers.

Statement-II : Plaster of Paris on reaction with water changes into a hard solid gypsum.

Select the correct answer from the options given below:

- (1) Statement-I is true.
Statement-II is false.
(2) Statement-I is false.
Statement-II is true.
(3) Both Statements are true and Statement-II provides explanation to Statement-I.
(4) Both Statements are true but Statement-II does not provides explanation to statement-I.

Answer (3)

14. Organs which look different and perform different functions but have similar basic structure and origin are called :

- (1) Analogous organs
(2) Homologous organs
(3) Similar organs
(4) Dissimilar organs

Answer (2)

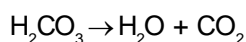
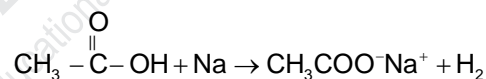
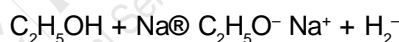
Sol. Organs which are similar in origin and internal morphology but differ in function and external morphology are known as homologous organs.

15. Two organic compounds 'X' and 'Y' react with sodium metal and both produce same gas 'A'. With sodium hydrogen carbonate only compound 'Y' reacts to produce gas 'B' identify X, Y, A and B.

- (1) $X = C_2H_4$ $Y = C_2H_5OH$ $A = CO_2$ $B = H_2$
(2) $X = C_2H_5OH$ $Y = CH_3COOH$ $A = H_2$ $B = CO_2$
(3) $X = CH_3OH$ $Y = C_2H_5OH$ $A = H_2$ $B = CO_2$
(4) $X = CH_3COOH$ $Y = HCOOH$ $A = CO_2$ $B = H_2$

Answer (2)

Sol. Explanation :



16. How many numbers lie between 100 and 400 which when divided by 9 leave a remainder 6, and when divided by 21, leave a remainder 12?

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

Answer (2)

Sol. common number will be

159 222 285 348

17. What did freedom mean for the plantation workers of Assam ?

- (1) Self Government
(2) Freedom from Zamindars
(3) Fare labour
(4) Right to move freely in and out of the plantations.

Answer (4)

18. If a , b and c are integers such that

$$(\sqrt[3]{4} + \sqrt[3]{2} - 2)(\sqrt[3]{4a} + \sqrt[3]{2b} + c) = 20$$

then which one of the following is true?

- (1) $a + b - c = 10$ (2) $a - b + c = 10$
(3) $a + b = 2c$ (4) $a + b + c = 16$

Answer (1)

Sol. If the question would be

$$(\sqrt[3]{4} + \sqrt[3]{2} - 2)(\sqrt[3]{4}a + \sqrt[3]{2}b + c) = 20, \text{ then}$$

$$\left[(2^{2/3}) + (2^{1/3}) - 2 \right] \times \left[(2)^{2/3}a + (2)^{1/3}b + c \right] = 20$$

$$\Rightarrow (2^{4/3})a + a(2^{3/3}) - (2^{5/3})a + (2^{3/3})$$

$$b + (2^{2/3})b - (2^{4/3})b + (2^{2/3})$$

$$c + (2^{1/3})c - 2c = 20$$

$$\Rightarrow [2^{1/3}(2a) + 2a - (2a)2^{2/3} + 2b + 2^{2/3}$$

$$(b) - 2^{1/3}(2b) + 2^{2/3}(c) + 2^{1/3}(c) - 2c] = 20$$

$$\Rightarrow [2^{2/3}[-2a + b + c] + 2^{1/3}[2a - 2b + c]$$

$$+ [2a + 2b - 2c] = 20$$

On comparison,

$$-2a + b + c = 0$$

$$2a - 2b + c = 0$$

$$2a + 2b - 2c = 20$$

$$\Rightarrow a + b - c = 10$$

Hence, no option is correct.

19. Which of the following were the famous three demands of Lenin that are also known as 'April Theses' ?

- I. The war be brought to close.
II. Land be transferred to the peasants.
III. Restrictions on public meetings be imposed
IV. Banks be nationalised.

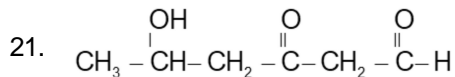
- (1) I, II, III (2) II, III, IV
(3) I, III, IV (4) I, II, IV

Answer (4)

20. Carrying the flag, holding it aloft during marches in Indian National movement, was a symbol of :

- (1) Leadership
(2) Defiance
(3) Non - Violence
(4) Satyagrah

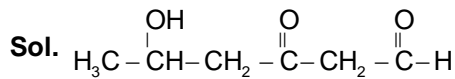
Answer (2)



Which functional groups are present in this organic compound?

- (1) Alcohol, ketone and ester
(2) Alcohol, ketone and carboxylic acid
(3) Alcohol, ketone and aldehyde
(4) Alcohol, aldehyde and carboxylic acid

Answer (3)



Alcohol, ketone, Aldehyde

22. How many subjects are given in central list ?

- (1) 97 (2) 66
(3) 50 (4) 47

Answer (1)

23. What is the mass of 2.5 moles of CO_2 ?

- (1) 100 g (2) 110 g
(3) 88 g (4) 98 g

Answer (2)

Sol. Weight = No. of moles \times molar mass

$$2.5 \times 44 \text{ g}$$

$$110 \text{ g}$$

24. Which of the following organ in human male is called thermoregulator ?

- (1) Vas deferens (2) Ejaculatory ducts
(3) Scrotum (4) Cowper's gland

Answer (3)

Sol. Scrotum provide an optimal temperature for the formation of sperm which is 2.5°C lower than the human internal body temperature.

25. The graphs of the equations $2x + 3y = A$ and $x + 2y = B$ intersect at the point P, which also lies on the graph of the equation:

- (1) $5x + 3y = A - B$ (2) $3x - 5y = A + B$
(3) $3x - 5y = A - B$ (4) $3x + 5y = A + B$

Answer (4)

Sol. $\Rightarrow x = \frac{A-3y}{2}$

$$\therefore \frac{A-3y}{2} + 2y = B \Rightarrow A - 3y + 4y = 2B$$

$$\Rightarrow y = 2B - A$$

$$\therefore x = \frac{A-3(2B-A)}{2} = \frac{A-6B+3A}{2}$$

$$= \frac{4A-6B}{2} = 2A-3B$$

$$\begin{aligned} 3x + 5y &= 3[2A - 3B] + 5[2B - A] \\ &= 6A - 9B + 10B - 5A \\ &= A + B \end{aligned}$$

26. Radha works in an office from 9 am to 5 pm. She gets her salary regularly every month and also she gets provident fund, medical and other allowances as per the rules laid down by the govt. Sunday is a paid holiday for her. She was given an appointment letter stating all the terms and conditions of work at the time of joining.

Her cousin Ram is a daily wage labourer in a cloth shop. He goes to shop at 8 am and works till 8 pm in the evening. He does not get any type of allowances apart from his wages. He is not paid for days he does not work i.e. He does not get paid holidays. Also, he did not get any appointment letter.

In which sectors, Both Radha and Ram work ?

- (1) Both are in organised sectors.
- (2) Both are in unorganised sectors.
- (3) Radha works in organised sector while Ram works in unorganised sector.
- (4) Radha works in unorganised sector while Ram works in organised sector.

Answer (3)

27. Who was the author of Arthashastra ?

- (1) Kautilya
- (2) Plato
- (3) Aristotle
- (4) Mechiavelli

Answer (1)

28. Which is the ruling party in Telangana ?

- (1) T.D.P
- (2) Indian National Congress
- (3) B.J.P
- (4) T.R.S.

Answer (4)

29. Which of the following UT does not have its own Assembly ?

- (1) Delhi
- (2) J & K
- (3) Ladakh
- (4) Pondicherry

Answer (3)

30. Teacher wrote following points on the blackboard about a particular crop i.e. Temp. 20° - 35°C, Rainfall - not less than 200 cm Terrain -undulating, soil - laterite, red, yellow. Which of the following crop the teacher is discussing about ?

- (1) Jute
- (2) Millet
- (3) Coffee
- (4) Rubber

Answer (4)

31. The daily wage of a person in rural area is Rs. 200 and the poverty line for a person is fixed at Rs. 800 per month for rural areas. Following table shows the detail of employment of four families living in a village. Identify the family living below poverty line:

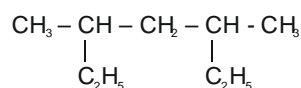
Family Total days of Employment got in a months by the family Member of family

Family	Total days of Employment got in a months by the family	Member of family
Ram	10	2
Radha	18	3
Raju	12	4
Pooja	25	5

- (1) Pooja
- (2) Ram
- (3) Radha
- (4) Raju

Answer (4)

32. The I.U.P.A.C. name of following compound is:



- (1) 2,4 - Diethyl pentane
- (2) 2, 4 - Diethyl butane
- (3) 3, 5 - Dimethyl hexane
- (4) 3, 5 - Dimethyl heptane

Answer (4)

33. Which one of the following is not an example of fixed capital ?

- (1) Tools
- (2) Raw Materials
- (3) Machines
- (4) Buildings

Answer (2)

34. If $\sqrt{\frac{1-\cos\theta}{1+\cos\theta}} \times \sqrt{\frac{\cos\theta \csc\theta - \cot\theta}{\cos\theta \csc\theta + \cot\theta}} = \frac{r-1}{r+1}$, then

(1) $\tan\theta = \sqrt{r^2 - 1}$

(2) $\cos\theta = r$

(3) $\sin\theta + \cos\theta = \frac{\sqrt{r^2 + 1}}{r}$

(4) $\cot\theta = \sqrt{1 - r^2}$

Answer (1)

Sol. $\sqrt{\frac{1-\cos\theta}{1+\cos\theta}} \times \sqrt{\frac{\cos\theta \csc\theta - \cot\theta}{\cos\theta \csc\theta + \cot\theta}} = \frac{r-1}{r+1}$

$$\Rightarrow \sqrt{\frac{1-\cos\theta}{1+\cos\theta}} \times \sqrt{\frac{\frac{1-\cos\theta}{\sin\theta}}{\frac{1+\cos\theta}{\sin\theta}}} = \frac{r-1}{r+1}$$

$$\Rightarrow \sqrt{\frac{1-\cos\theta}{1+\cos\theta}} \times \frac{1-\cos\theta}{1+\cos\theta} = \frac{r-1}{r+1}$$

$$\Rightarrow \frac{1-\cos\theta}{1+\cos\theta} = \frac{r-1}{r+1}$$

Use Componendo & Dividendo

$$\frac{1-\cos\theta-1-\cos\theta}{1-\cos\theta+1+\cos\theta} = \frac{r-1-r-1}{r-1+r+1}$$

$$\frac{-2\cos\theta}{2} = \frac{-2}{2r}$$

$$-\cos\theta = \frac{-1}{r}$$

$$\Rightarrow r = \sec\theta$$

$$\tan\theta = \sqrt{\sec^2\theta - 1}$$

$$\tan\theta = \sqrt{r^2 - 1}$$

35. Arrange the following households in ascending order of per capita income.

Name of Household	Total Income of Household	Size of the Household
Rajat	6000	5
Raman	5000	5
Suman	3200	4
Priya	8400	6

(1) Suman < Raman < Rajat < Priya

(2) Priya < Rajat < Raman < Suman

(3) Raman < Rajat < Suman < Priya

(4) Suman < Rajat < Raman < Priya

Answer (1)

36. India imports Chinese toy at Rs. 100, whereas the same toy is manufactured and available in India for Rs. 150. Now if Indian Govt. puts tax of Rs. 50 on import of that toy. This practice of Indian Govt. is known as :

(1) Export substitution (2) Trade barrier

(3) Import substitution (4) Dumping

Answer (2)

37. The arithmetic progressions : 1, 4, 7, and 2, 10, 18,, each contains 100 terms, How many terms are common to both the progression?

(1) 10 (2) 12

(3) 13 (4) 14

Answer (3)

Sol. 1, 4, 7, 10 100 terms.

2, 10, 18, 100 terms.

Common difference of First A.P. $d=3$

Common difference of Second A.P. $D=8$

$$T_n = a + (n - 1) d$$

$$\text{For first A.P. } t_{100} = 1 + (100 - 1) 3 = 298$$

$$\text{For Second A.P. } T_{100} = 2 + (100 - 1) 8 = 794$$

$$\text{For both A.P. c.d.} = \text{LCM}(3, 8) = 24$$

$$\text{So first term} = 10, \text{ let } T_n = 298$$

$$10 + (n - 1) 24 = 298$$

$$(n - 1) 24 = 288$$

$$(n - 1) = \frac{288}{24} = 12$$

$$n = 12 + 1 = 13$$

Direction (Q.38 to Q.41) : Read the statements and select the correct answer from the options given below.

(1) Statement-I is True.

Statement-II is false.

(2) Statement-I is false.

Statement-II is true.

(3) Both statements are true and Statement-II provides explanation to statement-I.

(4) Both statements are true but statement-II does not provide explanation of statement-I

38. **Statement-I :** Three wars over seven years with Austria, Denmark and France ended in Prussian Victory and completed the process of unification of Germany.

Statement-II : On 18th January, 1871 new German Empire was proclaimed headed by Kaiser William I of Prussia in the Palace of Versailles.

Answer (3)

46. Consider the following statements.

- A. The velocity of sound in air increases due to presence of moisture in it.
R. The presence of moisture in air lowers the density of air.

In above statements :

- (1) Both 'A' & 'R' are correct & 'R' is the correct explanation of 'A'
(2) Both 'A' & 'R' are correct & 'R' is not the correct explanation of 'A'
(3) 'A' is correct, 'R' is incorrect
(4) 'A' is incorrect, 'R' is correct

Answer (1)

Sol. (Humidity increases and density decreases.)

47. When a cell is placed in strong salt solution. It shrinks, because :

- (1) Salt solution enters in cell
(2) Cytoplasm of the cell begins to decompose
(3) Water came out of the cell to develop equilibrium
(4) Water enters inside the cell to develop equilibrium

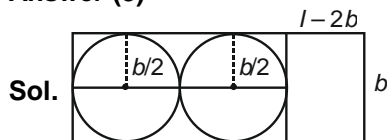
Answer (3)

48. A person has a rectangular sheet of metal. He has to make cylindrical vessel whose both circular ends are closed. When he minimize the wastage of the sheet, then what is the ratio of the wasted sheet to

the utilised sheet? ($\pi = \frac{22}{7}$)

- (1) $\frac{1}{22}$ (2) $\frac{3}{11}$
(3) $\frac{1}{11}$ (4) $\frac{5}{22}$

Answer (3)



$$\pi b = l - 2b$$

$$\Rightarrow l = (\pi + 2)b$$

$$\text{Utilized area} = (l - 2b)b + 2\pi \frac{b^2}{4} = \frac{3\pi b^2}{2}$$

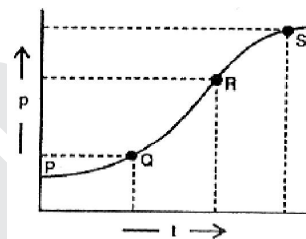
$$\text{Unutilized area} = lb - \frac{3\pi b^2}{2} = (\pi + 2)b^2 - \frac{3\pi b^2}{2}$$

$$= \left(-\frac{\pi}{2} + 2\right)b^2$$

$$\text{Required ratio} = \frac{2 - \frac{\pi}{2}}{\frac{3\pi}{2}} = \frac{2 - \frac{11}{7}}{\frac{3 \times 22}{2 \times 7}} = \frac{3}{7} \times \frac{7}{33}$$

$$= \frac{1}{11}$$

49. In a two body collision, the momentum is varying with time as shown in graph. The instantaneous force is maximum at :



- (1) P (2) Q
(3) R (4) S

Answer (3)

Sol. $F = \frac{\Delta p}{\Delta t}$ (max. slope)

50. Select the correct set of statements regarding change in properties, as we move left to right in the second period of periodic table :

- I. Atomic size decreases
II. Valency remains same
III. Electronegativity increases
IV. Metallic character decreases
- (1) I, II and III (2) II, III and IV
(3) I, II and IV (4) I, III and IV

Answer (4)

Sol. I, III & IV

51. Shivasamudram fall is found on which river?

- (1) Mahanadi (2) Chenab
(3) Cavery (4) Krishna

Answer (3)

52. Which metallic mineral is famous in the Balaghat district of Madhya Pradesh?

- (1) Gold (2) Iron
(3) Copper (4) Zinc

Answer (3)

53. Ram was working with his father in their farm. His father was small farmer. Income generated from the farm was not enough for the family. Ram got an opportunity to get loan from the bank under a govt. programme. He bought a rickshaw with that money and started working as a rickshaw puller in the city. Now he is able to earn good enough and their family income is increased than earlier. Such kind of activity done by Ram to improve his financial condition comes under:

- (1) Primary sector (2) Secondary sector
(3) Manufacturing sector (4) Service sector

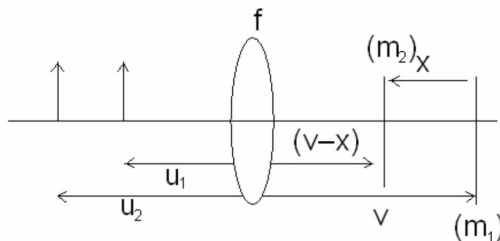
Answer (4)

54. A screen bearing a real image of magnification m_1 , formed by a convex lens, is moved by a distance x . The object is then moved until a new image of magnification m_2 is formed on screen. The focal length of lens is :

- (1) $\frac{x}{m_2 - m_1}$ (2) $\frac{m_2 - m_1}{x}$
(3) $\frac{x}{m_1 - m_2}$ (4) $\frac{m_1 - m_2}{x}$

Answer (3)

Sol.



$$-m_1 = \frac{v}{-u_1} \Rightarrow v = m_1 u_1$$

and $v - x = m_2 u_2$

$$\therefore x = m_1 u_1 - m_2 u_2 \quad \dots(i)$$

Also from lens formula (using sign convention),

$$-m_1 = \frac{f}{f - u_1}$$

$$\Rightarrow m_1 u_1 = f + m_1 f \quad \dots(ii)$$

And $m_2 u_2 = f + m_2 f \quad \dots(iii)$

(ii) - (iii)

$$m_1 u_1 - m_2 u_2 = (m_1 - m_2) f$$

$$\Rightarrow x = (m_1 - m_2) f \quad \text{(from (i))}$$

$$\Rightarrow f = \frac{x}{(m_1 - m_2)}$$

55. The number of integral solutions (x, y) of the system of equations $x^2 - xy + 8 = 0$ and $x^2 - 8x + y = 0$ is

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

Answer (1)

Sol. $x^2 - xy + 8 = 0$

$$\Rightarrow x(x - y) = -8$$

$$\Rightarrow x - y = \frac{-8}{x}$$

$$\Rightarrow y = x + \frac{8}{x}$$

$$x^2 - 8x + y = 0$$

$$x^2 - 8x + x + \frac{8}{x} = 0$$

$$\Rightarrow x^2 - 7x + \frac{8}{x} = 0$$

$$\Rightarrow x^3 - 7x^2 + 8 = 0$$

$$\Rightarrow (x + 1)(x^2 - 8x + 8) = 0$$

$$\Rightarrow x = -1$$

Put $x = -1$ in $y = x + \frac{8}{x}$

$$\Rightarrow y = -9$$

$(-1, -9)$

56. Match the following famous place with their respective states.

- | I | II |
|---------------------------------|------------------------|
| (A) Pampa Sagar Lake | (i) Tamil Nadu |
| (B) Dibang Multipurpose Project | (ii) Arunachal Pradesh |
| (C) Umnanda Island | (iii) Karnataka |
| (4) Anicut Canal | (iv) Guwahati |
| (1) A(ii), B(i), C(iii), D(iv) | |
| (2) A(iii), B(ii), C(iv), D(i) | |
| (3) A(iii), B(iv), C(i), D(ii) | |
| (4) A (iv), B(ii), C(i), D(iii) | |

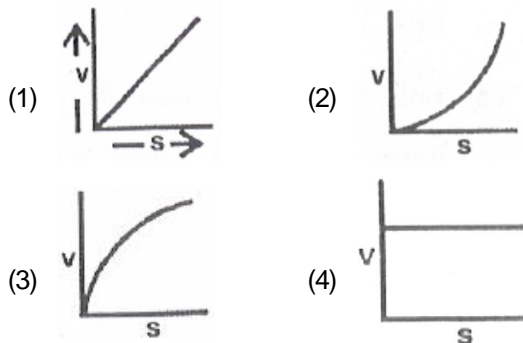
Answer (2)

57. Which of the following type of teeth are called as tearing teeth ?

- (1) Incisors (2) Canines
(3) Premolars (4) Molars

Answer (2)

58. A body is dropped from rest. Its velocity varies with displacement covered as :



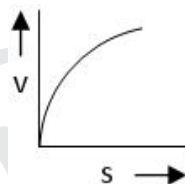
Answer (3)

Sol. Using equation of motion

$$v^2 - u^2 = 2gx$$

$$v^2 = kx$$

So graph will be parabola

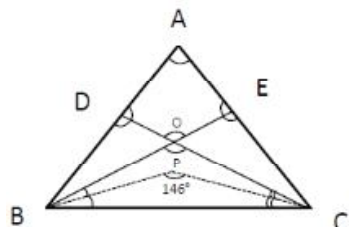


59. In $\triangle ABC$, BE and CD are the perpendiculars on sides AC and AB , respectively and intersect each other at O . The bisectors of $\angle OBC$ and $\angle OCB$ meet at P . If $\angle BPC = 146^\circ$, then what is the measure of $\angle A$?

- (1) 34° (2) 68°
(3) 73° (4) 36.5°

Answer (2)

Sol.



$$\angle BPC = 90 + \frac{1}{2} \angle BOC$$

$$146 - 90 = \frac{1}{2} \angle BOC$$

$$56 \times 2 = \angle BOC$$

$$\angle BOC = 112^\circ$$

$$\angle DOE = 112^\circ$$

$$\angle A + 180 + 112^\circ = 360^\circ$$

$$\angle A = 68^\circ$$

60. A normal bar magnet is 6 cm long. It's north pole will be away from its mid point at a distance of

- (1) 6 cm
(2) 3 cm
(3) Slightly more than 3 cm
(4) Slightly less than 3 cm

Answer (4)

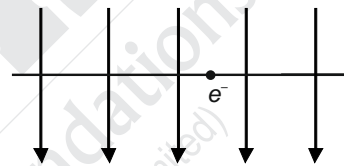
Sol. Poles are not exactly at the ends so it will be slightly less than 3 cm from midpoint

61. Choose the **correct** statement:

- (1) Lok Sabha and Rajya Sabha have equal power in financial bill.
(2) Lok Sabha and Rajya Sabha have equal power on ordinary bill.
(3) Lok Sabha and Rajya Sabha have equal power on constitutional amendment bill.
(4) Rajya Sabha is house of general people.

Answer (3)

62. A uniform magnetic field pointing top to bottom in a plane of paper. When an electron is allowed to move perpendicular to it, it gets deflected outwards. The electron must be moving along:



- (1) Left to Right (2) Right to Left
(3) It is stationary (4) It can't deflect outward

Answer (1)

Sol. According to Fleming's left hand rule since electron is deflected outward so velocity of electron will be along x axis i.e. from Left to Right

63. Which has maximum number of atoms?

- (1) 24 g of C(12) (2) 56 g of Fe(56)
(3) 27 g of Al(27) (4) 108 g of Ag(108)

Answer (1)

Sol. 24 g of carbon has maximum number of atoms. i.e. 12.046×10^{23} atoms

64. A Pulse crop is grown in the time interval between two cereal crops to compensate for the:

- (1) Loss of phosphate (2) Loss of sulphur
(3) Loss of potassium (4) Loss of nitrogen

Answer (4)

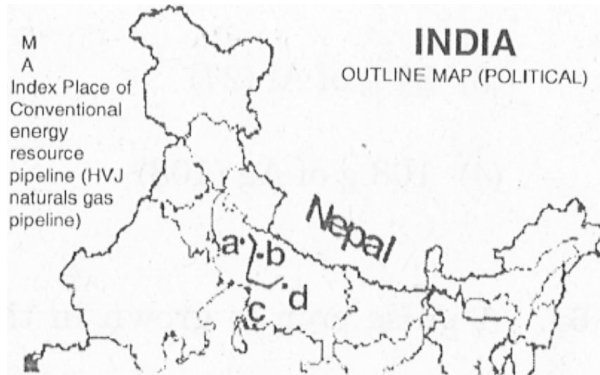
Sol. Pulse crops help to improve the deficiency of nitrogen in the soil.

65. Which Indian soil is formed due to weathering of basic igneous rock?

- (1) Lignite soil (2) Alluvial soil
(3) Desert soil (4) Black soil

Answer (4)

66. Observe the map given below. Identify the correct marked points of a pipeline of conventional energy resource with a sequence:



- (1) (a) Aonla (b) Shahjahanpur (c) Auraiya (d) Jagdishpur
 (2) (a) Jagdishpur (b) Aonla (c) Shahjahanpur (d) Auraiya
 (3) (a) Auraiya (b) Shahjahanpur (c) Aonla (d) Jagdishpur
 (4) (a) Shahjahanpur (b) Aonla (c) Auraiya (d) Jagdishpur

Answer (1)

67. When $x^3 - 1$ is divided by $x - 1$ the remainder is $r(x)$. The value of $r(-2) + r(2)$ is :
- (1) 0
 (2) 4
 (3) 6
 (4) 8

Answer (2)

Sol. $p(x) = x^{100} - 2x^{51} + 1$

$q(x) = x^2 - 1 = (x - 1)(x + 1)$

$p(1) = 1 - 2 + 1 = 0$

$p(-1) = 1 + 2 + 1 = 4$

$p(x) = (x^2 - 1)g(x) + r(x)$

$p(x) = (x - 1)(x + 1)g(x) + ax + b$

$p(1) = a + b$

$\therefore a + b = 0$

$p(-1) = 0 + a(-1) + b$

$\Rightarrow 4 = -a + b$

$\therefore a = -2, b = 2$

$\therefore r(x) = ax + b = -2x + 2$

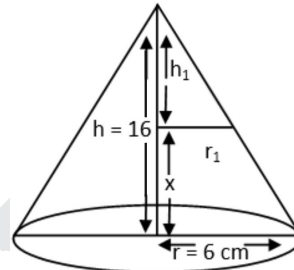
$r(-2) + r(2) = -2(-2) + 2 - 2(2) + 2 = 4$

68. A conical paper cup with height 16 cm and base radius 6 cm is filled to the top with water. If $\frac{19}{27}$ of the water is removed, then water level in the cup will drop by (in cm):

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

Answer (1)

Sol.



$\frac{h_1}{16} = \frac{r_1}{6} \Rightarrow r_1 = \frac{3h_1}{8}$

$\Rightarrow \frac{1}{3}\pi r_1^2 h_1 = \left(1 - \frac{19}{27}\right) \frac{1}{3}\pi r^2 h$

$\Rightarrow r_1^2 h_1 = \frac{8}{27} \times 6 \times 6 \times 16$

$\Rightarrow \frac{3}{8} \times \frac{3}{8} \times h_1^3 = \frac{8}{27} \times 6 \times 6 \times 16$

$\Rightarrow h_1^3 = \frac{8 \times 8 \times 8 \times 2 \times 2 \times 2 \times 8}{3 \times 3 \times 3}$

$\therefore h_1 = \frac{8 \times 2 \times 2}{3} = \frac{32}{3}$

$\therefore x = 16 - \frac{32}{3} = \frac{48 - 32}{3} = \frac{16}{3} = 5\frac{1}{3}$

69. Each exterior angle of a regular polygon is less than 40° and the sum of its interior angles is less than 1980° . If N is the number of sides of the polygon, then the number of possible values of N is :

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

Answer (3)

Sol. Sum of interior angles $< 1980^\circ$

$(N - 2)180^\circ < 1980^\circ$

$N - 2 < 11$

$N < 13$

Exterior angle $< 40^\circ$

$\frac{360^\circ}{N} < 40^\circ$

$9 < N$

$N > 9$

\therefore Possible values of N must be 10, 11, 12

70. Match the following states with respect to their highest literacy rate :

State	Literacy Rate %
A Kerala	(i) 91.85
B Lakshwadeep	(ii) 91.33
C Mizoram	(iii) 94.00
D Tripura	(iv) 87.75

- (1) A (ii), B (iii), C (i), D (iv)
 (2) A (iii), B (iv), C (i), D (ii)
 (3) A (iii), B (i), C (ii), D (iv)
 (4) A (iv), B (iii), C (ii), D (i)

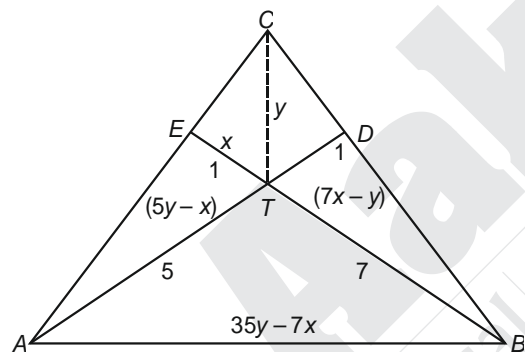
Answer (3)

71. D and E are the points on sides BC and AC, respectively of $\triangle ABC$. AD and BE intersect each other at T. If $AT/TD = 5$ and $BT/ET = 7$, then $CD : BD =$

- (1) 1 : 7 (2) 5 : 7
 (3) 5 : 17 (4) 3 : 17

Answer (4)

Sol.



Let $ar\triangle TCD = y$ $\therefore ar\triangle ATC = 5y$

Let $ar\triangle ETC = x$ $\therefore ar\triangle BTC = 7x$

$ar\triangle ATE = 5y - x$

$ar\triangle BTD = 7x - y$

$\therefore ar\triangle ATB = 7ar\triangle ATE = 35y - 7x$

$\frac{CD}{BD} = \frac{ar\triangle CDA}{ar\triangle ABD} = \frac{5y - x + x + y}{35y - 7x + 7x - y} = \frac{6y}{34y} = \frac{3}{17}$

72. The coordinates of vertices A and B of a triangle ABC are (0, 0) and (36, 15), respectively. If the coordinates of C are integers, then what is the minimum area (in sq. units) that $\triangle ABC$ can have ?

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

Answer (2)

Sol. A(0, 0), B(36, 15), C(x, y)

$$\text{Area} = \frac{1}{2} [0(15 - y) + 36(y - 0) + x(0 - 15)]$$

$$= \frac{1}{2} |36y - 15x|$$

for minimum area $y = 2, x = 5$

$(\text{Area})_{\min} = \frac{3}{2}$

73. The seasonal or periodic movement of pastoral farmer with their livestock over relatively short distances seeking fresh pastures between two areas of different climatic conditions is called as :

- (1) Lay farming (2) Crop rotation
 (3) Transhumance (4) Ground farming

Answer (3)

74. On which basis, the sectors can be classified into Public and Private sector ?

- (1) Ownership of enterprises
 (2) The nature of economic activity
 (3) Number of workers employed in the enterprise
 (4) Employment conditions

Answer (1)

75. The nature of a solution obtained by dissolving soluble metal oxide in water is :

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

Answer (3)

Sol. Basic

76. Which of the following does not have poison apparatus?

- (1) Scorpion (2) Centipede
 (3) Spider (4) Crab

Answer (4)

Sol. Crabs do not produce the toxin except only few species, almost crabs are edible.

77. A cork is immersed in a jar of water & released. How the cork will move if the jar is assumed to be kept in a satellite orbiting earth :

- (1) Sink
 (2) Rise
 (3) Remain where left
 (4) Depends upon the satellite velocity

Answer (3)

Sol. Remains where left because net force acting on it is zero $F_{\text{net}} = 0$

78. A person of weight W jumps to ground with his legs fixed & comes to rest with an upward acceleration of $3g$. (g = acceleration due to gravity). The force exerted by him during landing is :

- (1) W (2) $2W$
(3) $3W$ (4) $4W$

Answer (4)

Sol. $F_{\text{net}} = ma$

$$N - mg = m(3g)$$

$$N = 4mg$$

$$= 4W$$

79. Tracheal respiration is found in:

- (1) Birds (2) Reptiles
(3) Mammals (4) Insects

Answer (4)

Sol. Birds, Reptiles and Mammals respire through lungs.

80. Choose the wrong statements in the following :

- (1) India has unity in diversity.
(2) India has Parliamentary democracy.
(3) India is Republic.
(4) India is not member of commonwealth countries.

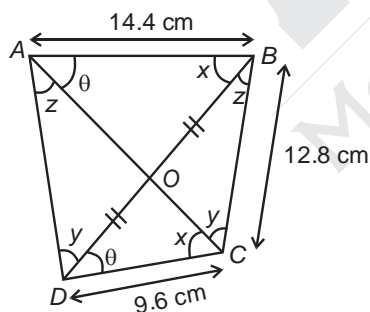
Answer (4)

81. ABCD is a cyclic quadrilateral in which $AB = 14.4$ cm, $BC = 12.8$ cm and $CD = 9.6$ cm. If AC bisects BD, then what is the length of AD ?

- (1) 16.4 cm (2) 13.6 cm
(3) 15.8 cm (4) 19.2 cm

Answer (4)

Sol.



$\triangle AOB \sim \triangle DOC$ and $\triangle BOC \sim \triangle AOD$

$$\frac{AO}{OD} = \frac{OB}{OC} = \frac{AB}{CD} \text{ and } \frac{OB}{OA} = \frac{OC}{OD} = \frac{BC}{AD}$$

$$\frac{AB}{CD} = \frac{OB}{OC}$$

$$\frac{AB}{CD} = \frac{OD}{OC}$$

$$[\because OB = OD]$$

$$\frac{AB}{CD} = \frac{AD}{BC}$$

$$AD = \frac{AB \times BC}{CD}$$

$$= \frac{12.8 \times 14.4}{9.6}$$

$$= 19.2 \text{ cm}$$

82. Mark the correct reason for the following statement – Karnataka has developed as an in state for the growth of silk industry :

- (1) Availability of good market, skilled labour and political reasons.
(2) Availability of good market, good climate and political reasons.
(3) Good climate, availability of soft water and mulberry plants
(4) Availability of soft water, good climate and nearness to port

Answer (3)

83. Which British banned sati in India ?

- (1) William Bentinck (2) Lord Cornwallis
(3) Lord Dalhousie (4) Lansdown

Answer (1)

84. Which statement out of following is true ? Isobars have :

- (1) Same protons (2) Same electrons
(3) Same neutrons (4) Same nucleons

Answer (4)

Sol. Same Nucleons

85. The %age of irrigated land in India is about ___ as per 2017 datas.

- (1) 45% (2) 65%
(3) 25% (4) 35%

Answer (4)

86. The equations $x^2 + rx + 64 = 0$ and $x^2 - 8x + r = 0$, where $r > 0$, have real roots. Then r satisfies the equation :

- (1) $r^2 - 15r + 8 = 0$ (2) $r^2 - 14r - 30 = 0$
(3) $r^2 - 13r - 48 = 0$ (4) $r^2 - 12r - 56 = 0$

Answer (3)

Sol. $x^2 + rx + 64 = 0$

$$r^2 - 4(64) \geq 0$$

$$r^2 \geq 256 \quad \dots(i)$$

$$x^2 - 8x + r = 0$$

$$64 - 4(r) \geq 0$$

$$64 - 4r \geq 0$$

$$64 \geq 4r$$

$$r \leq 16 \quad \dots(ii)$$

Only possible value is $r = 16$

$$r = 16 \text{ is a root of } r^2 - 13r - 48 = 0$$

Hence option (3) is correct.

87. Which of the following statements is incorrect about honey bees?

- (1) Queen bee is largest in size.
- (2) Worker bees outnumber the others.
- (3) Drone keep the hive clean.
- (4) Bees have no sense of direction.

Answer (4)

Sol. Pesticides are detrimental to the bees' sense of direction.

88. If $x^4 - 83x^2 + 1 = 0$, then a value of $x^3 - x^{-3}$ is :

- (1) 758
- (2) 756
- (3) 739
- (4) 737

Answer (2)

Sol. $x^4 - 83x^2 + 1 = 0$

$$x^4 + 1 = 83x^2$$

$$x^2 + \frac{1}{x^2} = 83$$

$$x^2 + \frac{1}{x^2} - 2 = 83 - 2$$

$$\left(x - \frac{1}{x}\right)^2 = 81$$

$$\left(x - \frac{1}{x}\right) = 9 \quad \dots(i)$$

$$x^3 - x^{-3} = \left(x - \frac{1}{x}\right)\left(x^2 + \frac{1}{x^2} + 1\right)$$

$$= 9 \times (83 + 1)$$

$$= 9 \times 84$$

$$= 756$$

89. A dice is constructed so that when it is thrown each even number is twice as likely to come up as each of the odd number. What is the probability of getting 6, when it is thrown once ?

- (1) $\frac{1}{6}$
- (2) $\frac{1}{9}$
- (3) $\frac{2}{9}$
- (4) $\frac{1}{3}$

Answer (3)

Sol. $P(\text{even}) = x$

$$P(\text{odd}) = \frac{x}{2}$$

$$x + x + x + \frac{x}{2} + \frac{x}{2} + \frac{x}{2} = 1$$

$$3x + \frac{3x}{2} = 1$$

$$x = \frac{2}{9}, P(6) = \frac{2}{9}$$

90. A metal sphere is dipped in water. If at 0°C & 4°C the buoyancies in water are β_1 & β_2 respectively, then

- (1) $\beta_1 > \beta_2$
- (2) $\beta_2 > \beta_1$
- (3) $\beta_1 = \beta_2$
- (4) It depends upon radius of sphere

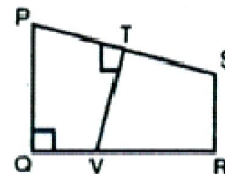
Answer (2)

Sol. $F_B = \rho_w V g$

With increase in temperature from zero to 4°C density of water increases. Also due to increase of temperature, volume of metal sphere increases. Hence buoyancy force will increase

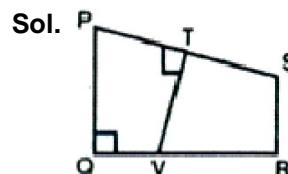
$$\beta_2 > \beta_1$$

91. In the figure, $PT = TS$, $PQ \perp QR$ and $PQ \parallel SR$. If $PQ = 9$ cm, $QR = 8$ cm, and $SR = 7$ cm, then what is the area (in cm^2) of quad (PTVQ) ?



- (1) 22
- (2) 24
- (3) 25
- (4) 26

Answer (4)



$$\text{Let } Q = (0, 0), P = (0, 9), S = (8, 7), R = (8, 0)$$

Here PQ and QR are considered as Y and X axis respectively.

$$\text{Now } PS = \sqrt{8^2 + (9-7)^2} = \sqrt{68} = 2\sqrt{17}$$

$$PT = TS = \sqrt{17}$$

Equation of PS

$$(y - 7) = \frac{2}{0 - 8} (x - 8)$$

$$x + 4y = 36$$

Here T lies on PS, So, T (4, 8)

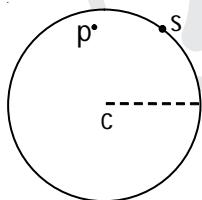
Now equation of TV $4x - y = 8$

So, V (2, 0)

$$\text{Now, Area of PTQV} = \frac{1}{2} \begin{vmatrix} 0 & 0 \\ 0 & 9 \\ 4 & 8 \\ 2 & 0 \\ 0 & 0 \end{vmatrix}$$

$$= \frac{1}{2} \times 52 = 26$$

92. The force between a hollow sphere 'S' and a point mass 'P' inside it, as shown in figure is :



- (1) Attractive & Constt.
- (2) Repulsive & Constt.
- (3) Attractive & depends upon the location of P w.r.t centre
- (4) Zero

Answer (4)

Sol. Inside hollow sphere gravitational field intensity remains zero, so Force will be zero

93. 'Ratoon Cropping' is gaining popularity among which of the following crop cultivators ?

- (1) Sugarcane
- (2) Millet
- (3) Rice
- (4) Wheat

Answer (1)

94. If Samir withdraws Rs. 25,000 from his bank account by submitting a self cheque in bank for making payments and he also gave a account Payee cheque of Rs. 52,000 issued by his employer in his favour. Now what happens to the Balance in his account.

- (1) Samir's bank balance will increase by Rs. 77,000

- (2) Samir's bank balance will decrease by Rs. 77,000
- (3) Samir's bank balance will increase by Rs. 27,000
- (4) Samir's bank balance will decrease by Rs. 27,000

Answer (3)

95. The vapour density of an organic compound is 30. This organic compound can be:

- (1) Ethanol
- (2) Ethanal
- (3) Ethanoic acid
- (4) Methyl ethanoate

Answer (3)

Sol. ethanoic acid

Molecular mass = vapor density \times 2

$$\text{i.e. } 30 \times 2 = 60$$

Ethanoic acid has molecular mass 60



$$2 \times 12 + 2 \times 16 + 4$$

$$= 24 + 32 + 4 = 60$$

96. Which kind of disease is arthritis?

- (1) Acute disease
- (2) Chronic disease
- (3) Infectious disease
- (4) Communicable disease

Answer (2)

Sol. Chronic disease

97. Muscles involved in the movement of the arm are:

- (1) Striated
- (2) Non striated
- (3) Cardiac
- (4) Smooth

Answer (1)

Sol. Striated muscles

98. Who among the following coined the phrase 'Jet Stream'?

- (1) H. Seilkoph
- (2) Wiley Post
- (3) Herodotus
- (4) Sir Gilbert Walker

Answer (1)

99. Anything we get from the physical environment to fulfill our needs is called:

- (1) Resource (2) Agriculture
(3) Domestication (4) Horticulture

Answer (1)

100. Which atom has the smallest size?

- (1) B (2) N
(3) Al (4) P

Answer (2)

Sol. Nitrogen atom has smallest size

