NATIONAL TALENT SEARCH EXAMINATION
(NTSE 2021) STAGE - 1

STATE : UTTARAKHAND **PAPER: MAT**
Date: 12/01/2021

Max. Marks : 100 **SOLUTIONS** Time : 120 mins.

Directions: (Question 1 to 10) In the following questions there is a relationship between the two words/ letters/ numbers and figures given to the left of the proportionality (: :) sign. The same relationship exists between the words/ letters/ numbers/ figures given to the right of the sign (: :) of which one is missing. Choose the missing one from the given alternative.

Question 01. 8 : 9 : : 64 : ?

a. 16
b. 36
c. 25
d. 20

Answer: (b) or (c)

Solution:

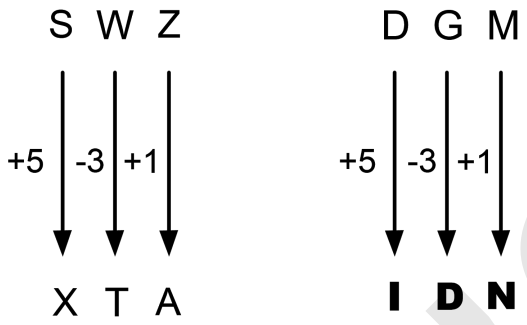
Option b, $2^3 : 3^2 :: 4^3 : 6^2$
Option c, $2^3 : 3^2 :: 4^3 : 5^2$

Question 02. SWZ : XTA : : DGM : ?

a. JEO
b. IDN
c. HCM
d. NDI

Answer: (b)

Solution:



Question 03. 6 : 18 : : 4 : ?

a. 2
b. 10
c. 8
d. None of these

Answer: (c)

Solution:

$6 : 6^2/2 = 6 : 18$
$4 : 4^2/2 = 4 : 8$

Question 04. Centimeter : Meter : : Paise : ?

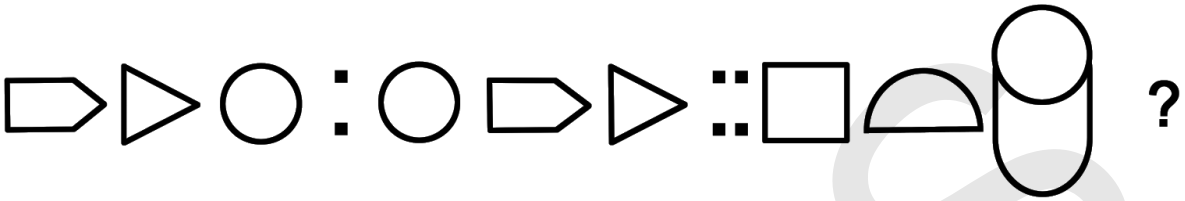
a. Rupee
b. Coin
c. Wealth
d. Currency

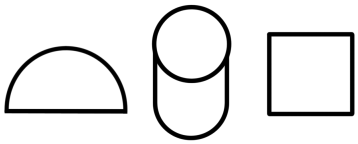
Answer: (a)

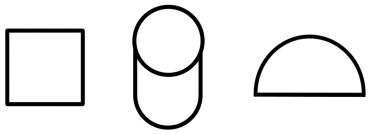
Solution:

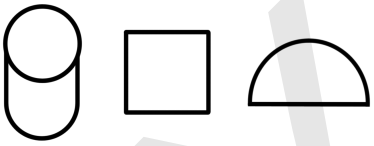
100 cm = 1 m (Units of length)
100 paise = 1 rupee (Unit of currency)

Question 05.



a. 

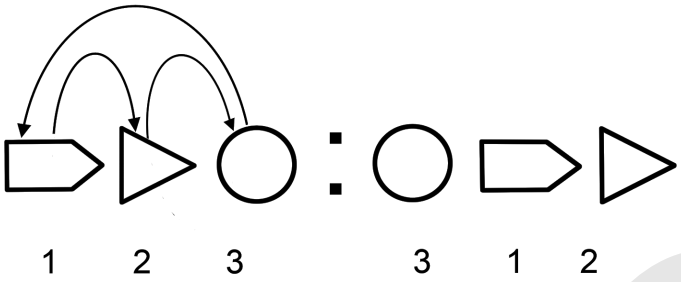
b. 

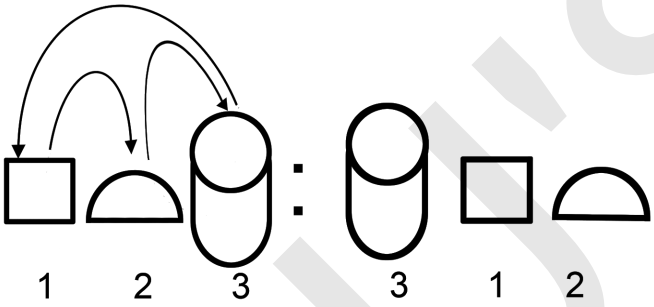
c. 

d. 

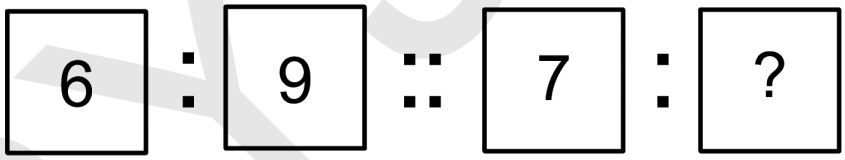
Answer: (c)

Solution:

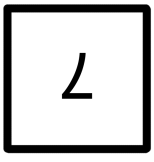




Question 06.



a. 

b. 

c. 

d. 

Answer: (b)

Solution:

The image of the number is rotated by 180°.

Question 07. Entrance : Exit : : Loyalty: ?

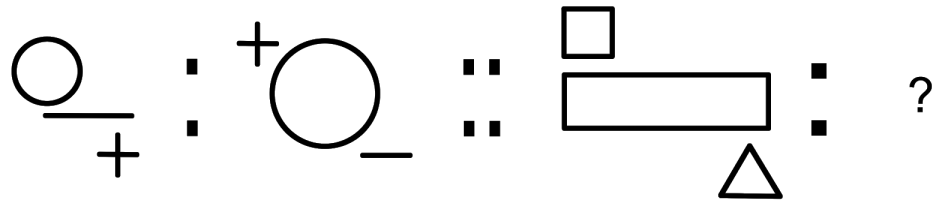
a. Treachery
b. Patriotism
c. Clarity
d. Fidelity

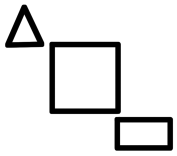
Answer: (a)

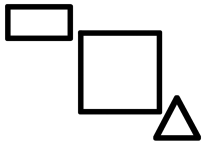
Solution:

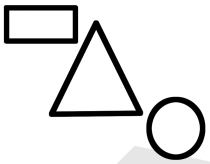
Exit is the antonym of entrance. Similarly, treachery is the antonym of loyalty.

Question 08.



a. 

b. 

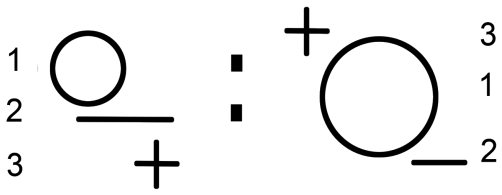
c. 

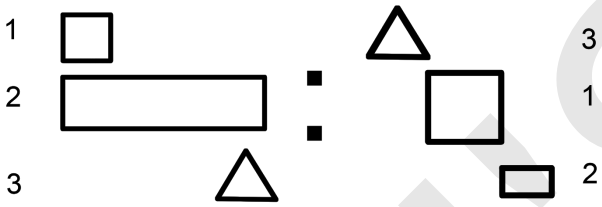
d. None of these

Answer: (a)

Solution:

If each component in the image is given a number, you can see how the order changes.



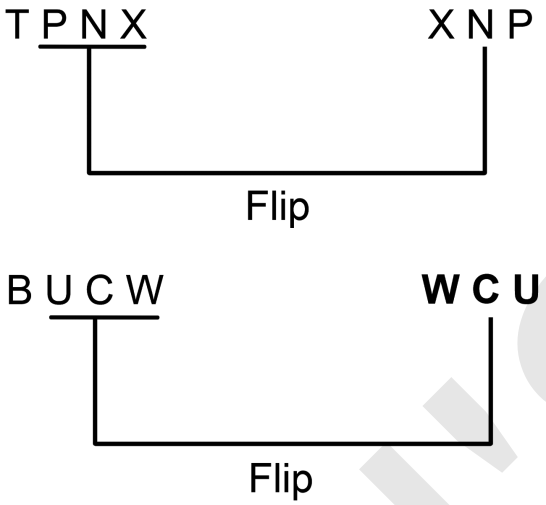


Question 09. TPNX : XNP : : BUCW : ?

a. WUC
b. CUW
c. WCU
d. COW

Answer: (c)

Solution:

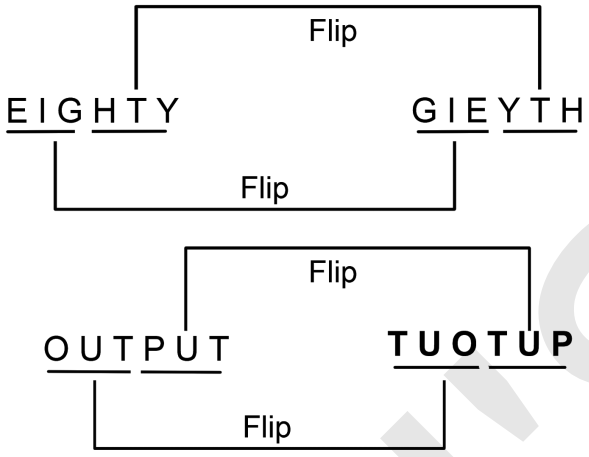


Question 10. EIGHTY : GIEYTH : : OUTPUT : ?

a. UTOPTU
b. VOTUPT
c. TUOUTP
d. TUOTUP

Answer: (d)

Solution:



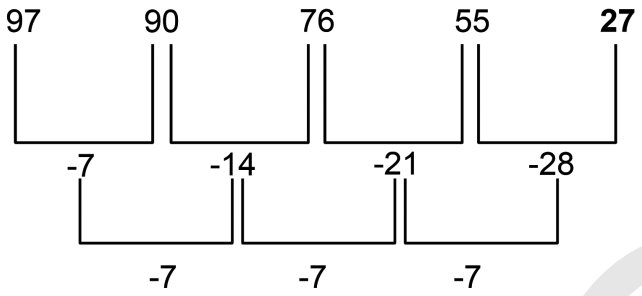
Directions: (Question 11 to 20) In the following questions numbers/ letters/ figures are arranged in a sequence on the basis of some logic. Find out the logic and select the correct answer from the given alternatives.

Question 11. 97, 90, 76, 55, ?

a. 28
b. 27
c. 26
d. 25

Answer: (b)

Solution:

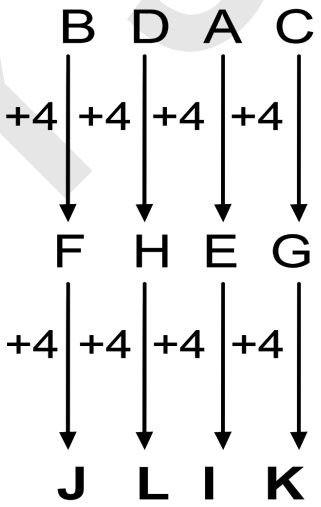


Question 12. BDAC FHEG ?

a. JLIK
b. IKJL
c. JKLI
d. KLIJ

Answer: (a)

Solution:



Question 13. 17, 19, 23, 29, ?, 37

a. 33
b. 36
c. 31
d. 35

Answer: (c)

Solution:

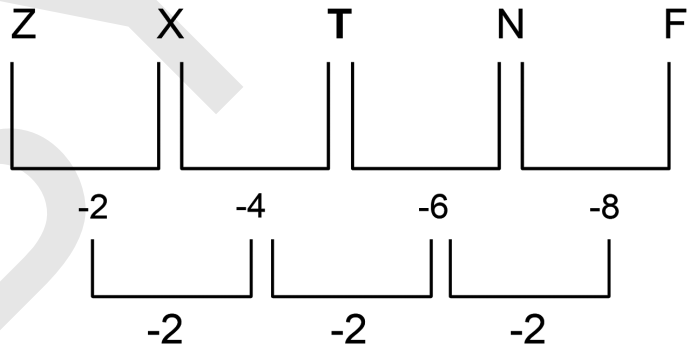
The given series represents the series of consecutive prime numbers starting from 17. Therefore, the missing prime number in the series is 31 after 29.

Question 14. Z, X, ?, N, F

a. T
b. R
c. Q
d. O

Answer: (a)

Solution:



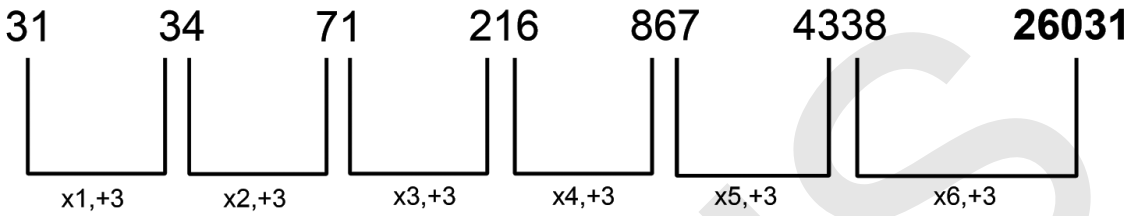
Question 15. 31, 34, 71, 216, 867, 4338, ?

a. 26028
b. 26031
c. 21690

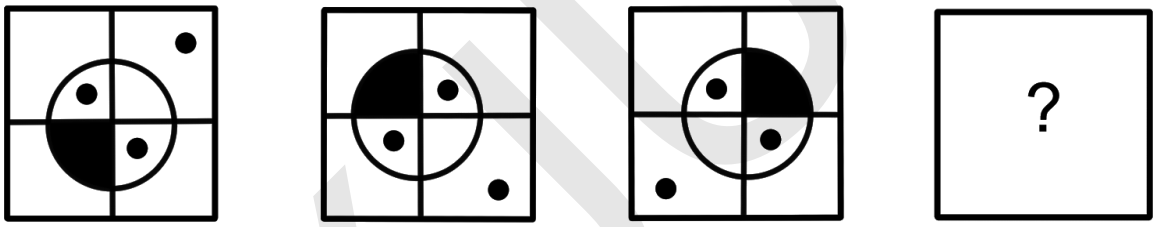
d. 23150

Answer: (b)

Solution:

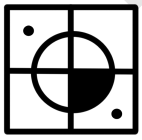


Question 16.



a. 

b. 

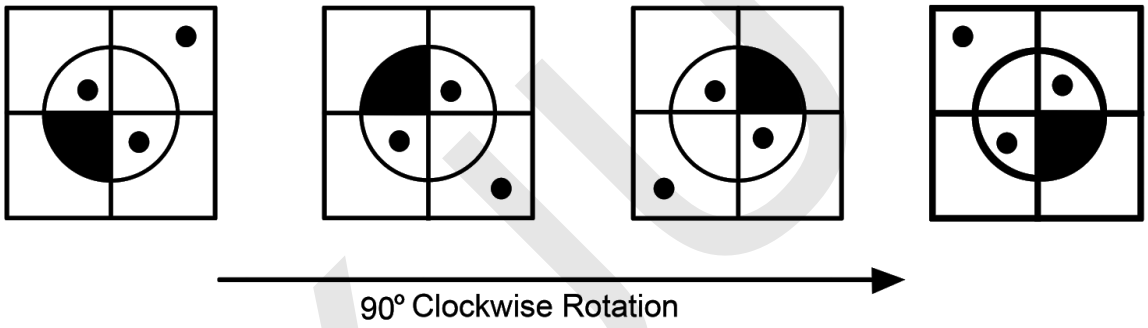
c. 

d. 

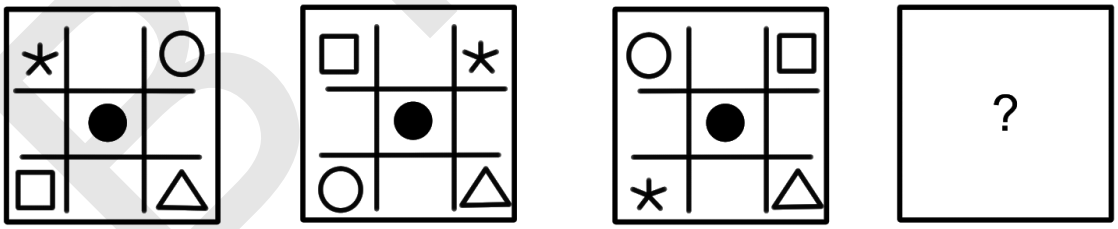
Answer: (d)

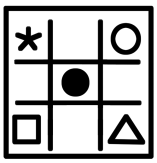
Solution:

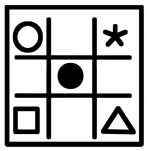
By observation it can be determined that the image rotates by 90° in the clockwise direction.

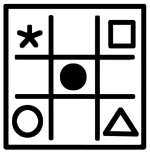


Question 17.



a. 

b. 

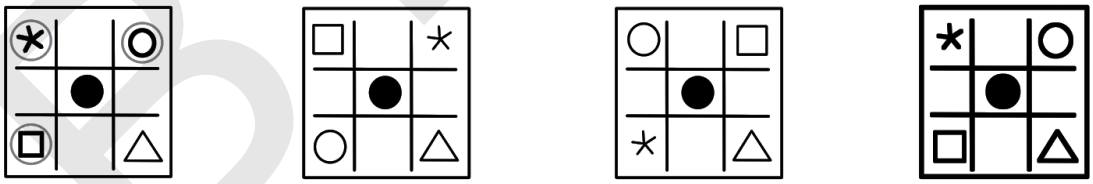
c. 

d. 

Answer: (a)

Solution:

The three symbols circled in the first image are moving in clockwise direction.



Question 18. aac__bba__cc__baa__cb__

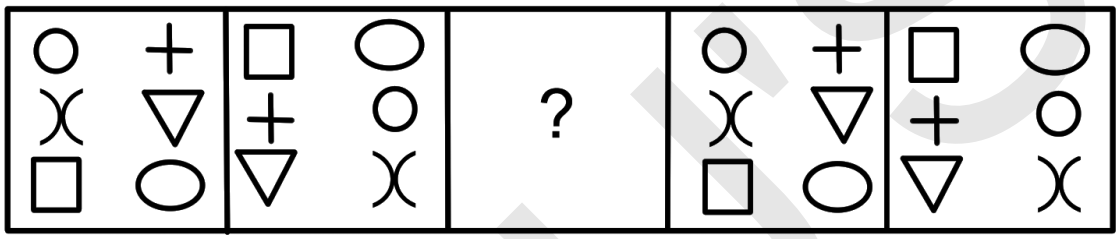
a. acbac
b. bacbc
c. abaac
d. cabcb

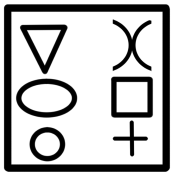
Answer: (d)

Solution:

Repeating group of letters: aaccbb
Series: aaccbb | aaccbb | aaccbb

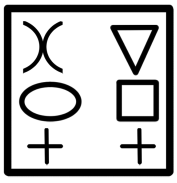
Question 19.



a. 

b. 

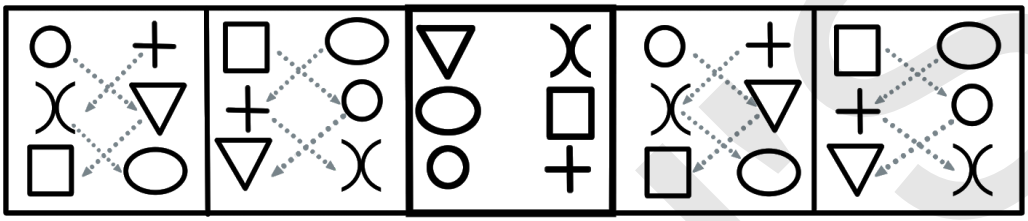
c. 

d. 

Answer: (a)

Solution:

The symbols move to the next row and interchange their position. The bottom rows shift to the top without interchanging their position

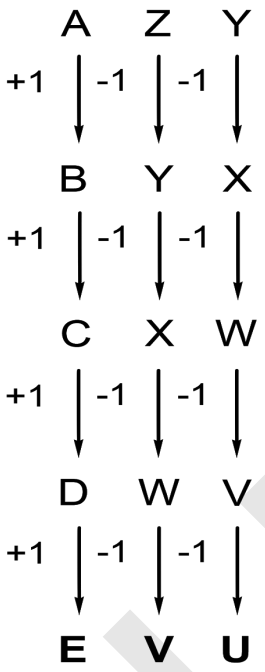


Question 20. AZY, BYX, CXW, DWV, ?

a. EVA
b. EVU
c. VEU
d. VUE

Answer: (b)

Solution:



Directions : (Question 21 to 30) In the following questions four items are given. Find the odd Item in these.

Question 21.

a. Mars
b. Sun
c. Jupiter
d. Satum

Answer: (b)

Solution:

The Sun is a star and the rest are planets.

Question 22.

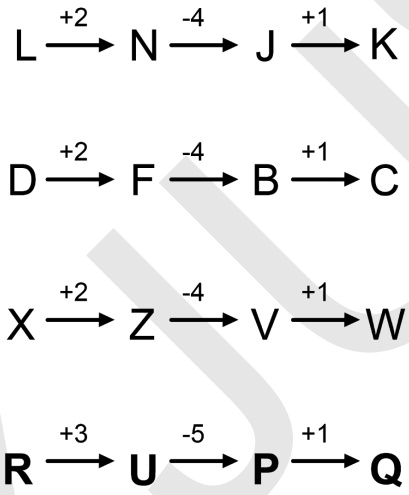
a. LNJK

b. DFBC
c. XZVW
d. RUPQ

Answer: (d)

Solution:

All the options follow the same sequence except option d.



Question 23.

a. 

b. 

c. 

d. 

Answer: (b)

Solution:

By observation it can be determined that all of them represent a happy face whereas option B represents a sad face.

Question 24.

a. L
b. Y
c. T
d. V

Answer: (a) or (b)

Solution:

For option (a); letters Y, T, and V have a vertical line of symmetry whereas letter L does not have such symmetry.

For option (b); letters L (12), T (20) and V (22) are in even position whereas letter Y is in odd position.

Question 25.

a. 1111
b. 11
c. 121
d. 1211

Answer: (c) and (d)

Solution:

Option c; All numbers specified in the options 121 are not symmetric.
Option d; All numbers specified in the options except 1211 are divisible by 11.

Question 26.

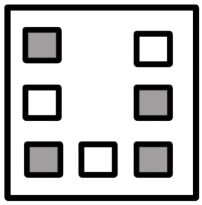
a. 6 : 14
b. 10 : 24
c. 4 : 10
d. 22 : 46

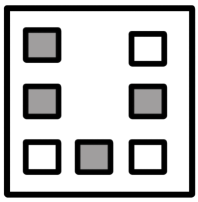
Answer: (b)

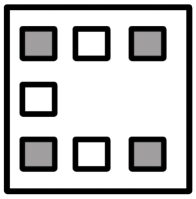
Solution:

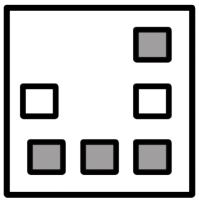
6 : 14 = 6 : (6 X 2) + 2
4 : 10 = 4 : (4 X 2) + 2
22 : 46 = 22 : (22 X 2) + 2
10 : 24 = 10 : (10 X 2) + 4

Question 27.

a. 

b. 

c. 

d. 

Answer: (d)

Solution:

All options except for option (d) have 7 squares in it.

Question 28.

a. 12 - 21
b. 34 - 43
c. 23 - 32
d. 55 - 65

Answer: (d)

Solution:

If we will observe the pairs of numbers, we will see that:
12 - 21 (12+9)
34 - 43 (34+9)
23 - 32 (23+9)
55 - 65 (55+10)
So, the odd one out is 55 - 65.

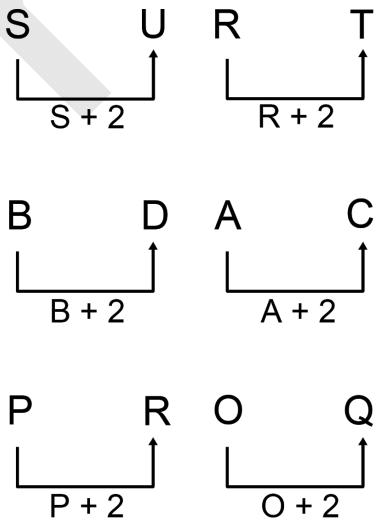
Question 29.

a. VWUX
b. SURT
c. BDAC
d. PROQ

Answer: (a)

Solution:

Except the option a, all other options follow the below pattern:



Question 30.

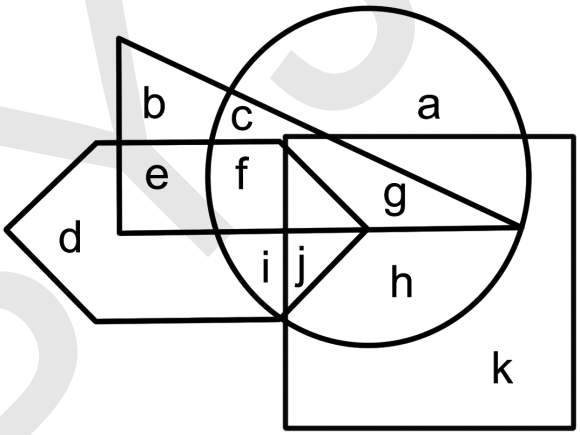
a. 5
b. 23
c. 9
d. 29

Answer: (c)

Solution:

By observation it can be determined that all the numbers except the number 9 is a prime number.

Directions: Answer question No. 31 to 34 on the basis of the following diagram. The circle represents players. The triangle represents outdoor games. The hexagon represents Indoor games and the square represents National level players.



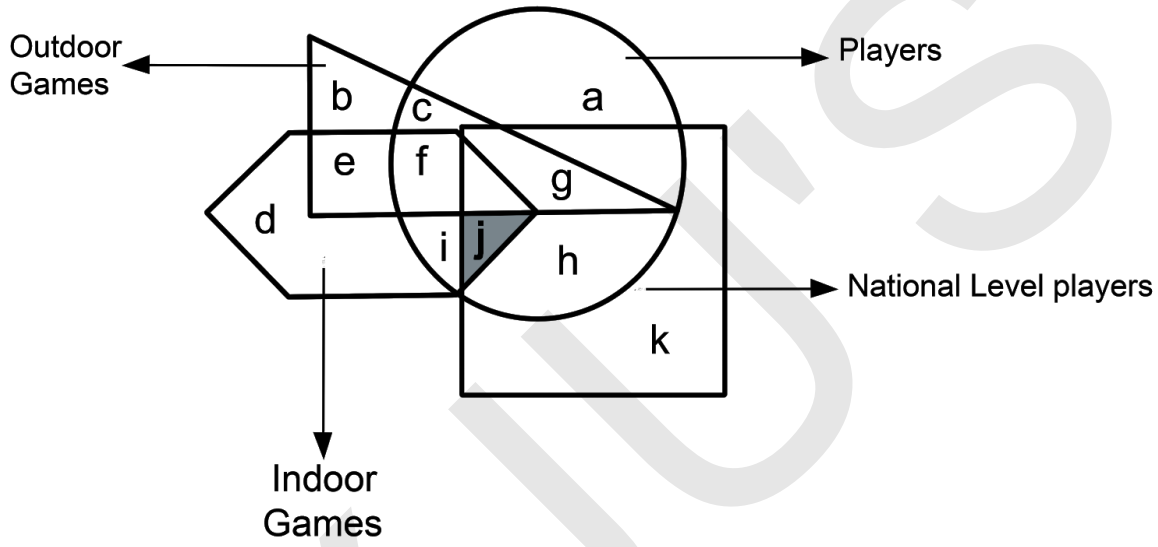
Question 31. Which letter in the section represents the players who play indoor games at the National level ?

a. f
b. i

c. j
d. g

Answer: (c)

Solution:

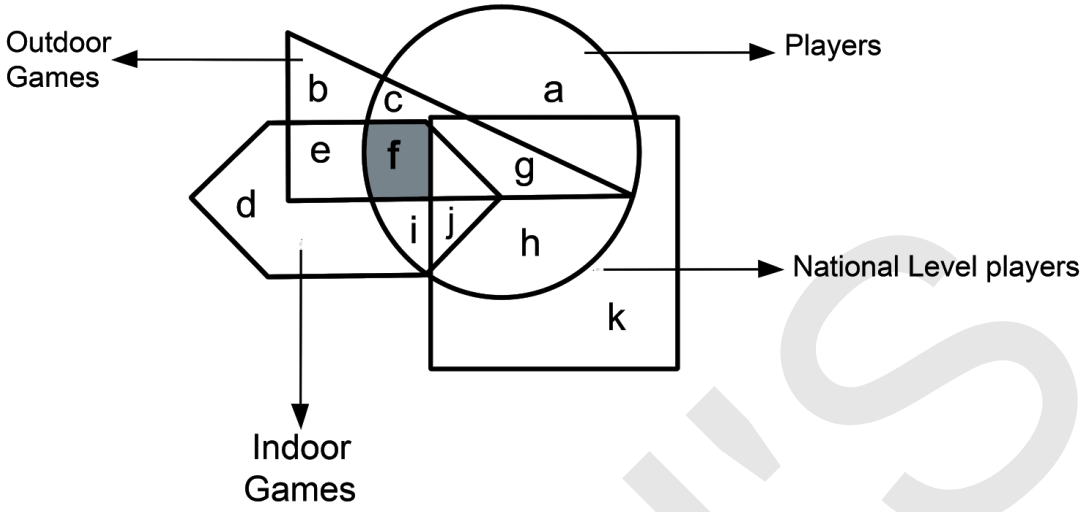


Question 32. The letter representing the section of outdoor as well as indoor game players who do not play at the national level?

a. c
b. f
c. i
d. k

Answer: (b)

Solution:

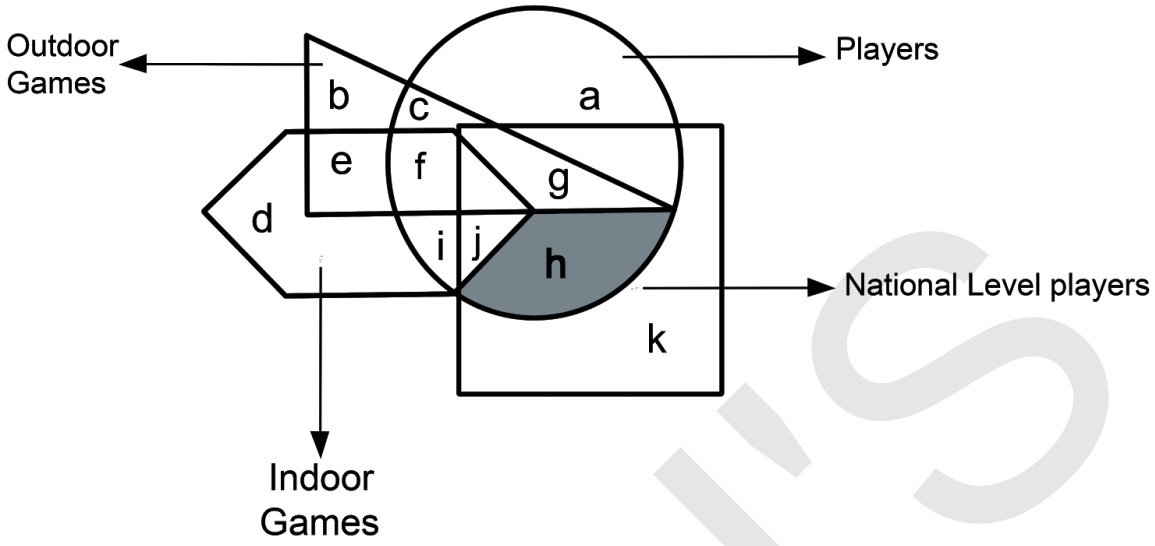


Question 33. The section representing national level players who do not play either outdoor or indoor games but still come under the category of players is -

a. k
b. g
c. c
d. h

Answer: (d)

Solution:

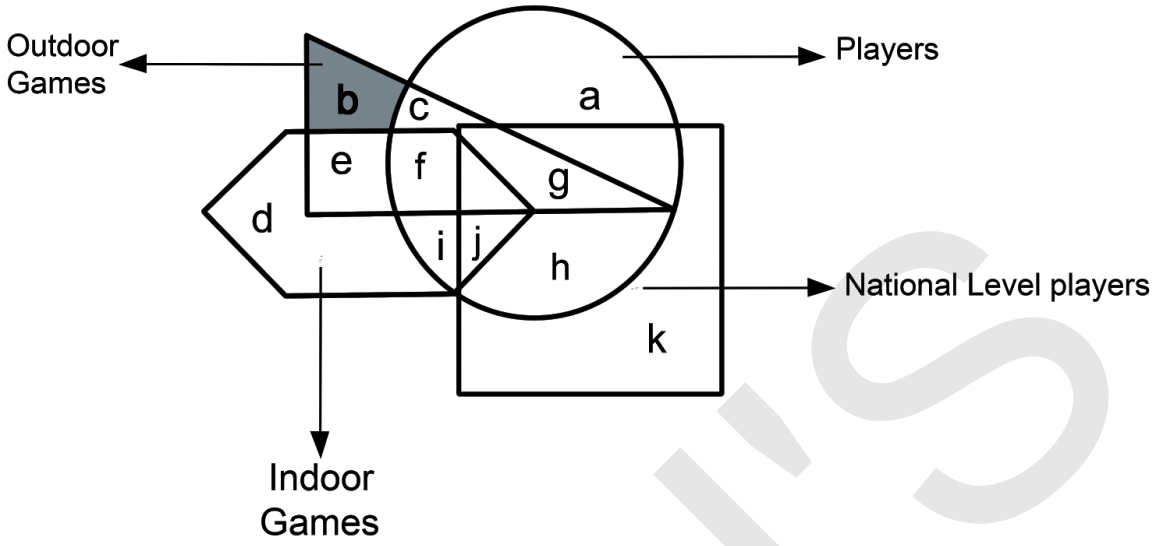


Question 34. Persons who play outdoor games but do not come under the category of players are represented in the section marked as-

a. b
b. c
c. a
d. d

Answer: (a)

Solution:



Directions (Question No. 35 to 39): Study the following paragraph and answer the questions.

Rohit, Kunal, Ashish and John are students of a school. Three of them stay far from the school and one near it. Two study in class IV, one in class V and one in class VI. They study Hindi, Mathematics, Social Science and Science. One of them is good at all the four subjects while the performance of the other is low in all the subjects. Rohit stays far from the school and is good at Mathematics only while Kunal's performance is low in Mathematics only and he stays close to the school. Neither of these two nor Ashish studies in Class VI. One who is good at all the subjects studies in class V.

Based on the information given above, the table can be made:

	Stay	Class	Good At	Weak In
Rohit	Far	IV	Mathematics	Hindi, Social Science, Science
Kunal	Close	IV	Hindi, Social Science, Science	Mathematics
John	Far	VI		All subjects
Ashish	Far	V	All subjects	

1. Kunal stays close to the school. Since only one person stays near the school this means that the rest stay far from school.
2. Rohit, Kunal and Ashish do not study in class VI. This implies that John studies in class VI.
3. Rohit is good at maths but weak in the rest so he cannot be in class V. Similarly, as Kunal is not good at maths so he cannot be in class V either. Hence, Ashish studies in class V. He is therefore good to all subjects.
4. Class IV has two students. So, Rohit and Kunal study in class IV.
5. Since, John has not been good in any subject, therefore, he is weak in every subject.

Question 35. Name the boy who is good subjects-

a. Rohit
b. Kunal
c. Ashish
d. John

Answer: (c)

Solution:

From the solution table, it is clear that Ashish is good in every subject.

Question 36. Name the boy whose performance has been low in all the subjects?

a. Rohit
b. Kunal
c. Ashish
d. John

Answer: (d)

Solution:

From the solution table, the boy who has been low in all the subjects is John.

Question 37. Who are the two boys good at Hindi?

a. Rohit and Kunal
b. Kunal and Ashish
c. Ashish and John
d. John and Rohit

Answer: (b)

Solution:

From the solution table, it is clear that Kunal and Ashish are good at hindi.

Question 38. Who are the two boys good at Mathematics?

a. Rohit and Ashish
b. Kunal and Ashish
c. John and Ashish
d. Rohit and John

Answer: (a)

Solution:

From the solution table, it is clear that Rohit and Ashish are good at maths.

Question 39. Other than Rohit and the boy good at all the subjects, who else stays far from the school?

a. Rohit
b. Kunal
c. Ashish
d. John

Answer: (d)

Solution:

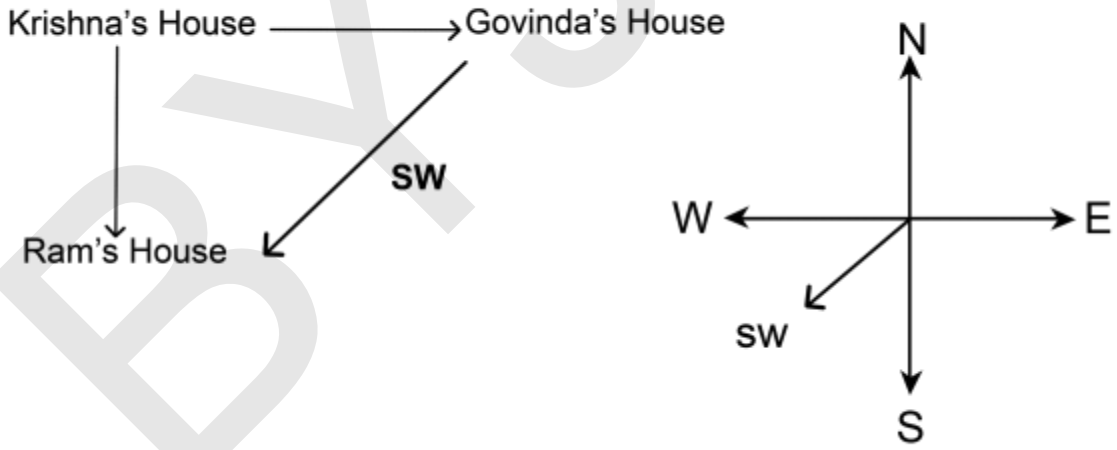
From the soluble table, it is clear that apart from Rohit and Ashish, even John stays far from the school.

Question 40. If Ram's house is located to the south of Krishna's house and govnda's house is to the East of Krishna's house, in which direction is Ram's house situated with respect to Govinda's house?

a. North - East
b. North - West
c. South - East
d. South - West

Answer: (d)

Solution:

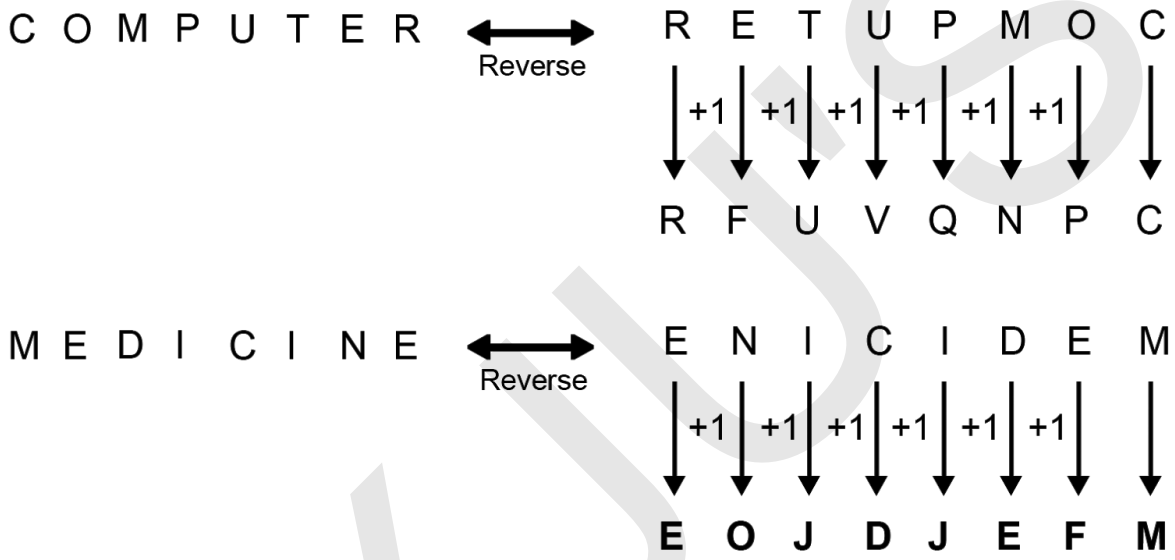


Question 41. In a certain code language COMPUTER is written as RFUVQNPC. How will MEDICINE be written in that code language?

a. MFEDJJOE
b. EOJDJEFM
c. MFFJDJOE
d. EMJDJEFM

Answer: (b)

Solution:



Question 42. If $Z = 52$ **and** $ACT = 48$ **then** $BAT = \ ?$

a. 39
b. 41
c. 44
d. 46

Answer: (d)

Solution:

Z = 26 x 2 = 52
ACT = (1 + 3 + 20) x 2 = 48

BAT = (2 + 1 + 20) x 2 = 46

Question 43. Which of the following words cannot be formed using the letters given in the word Father?

a. Heater
b. Cheat
c. Fear
d. Tear

Answer: (b)

Solution:

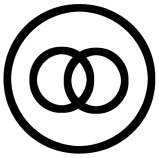
When we see the word CHEAT the letter C is not present in the word FATHER.

Question 44. Eagles, Birds, Dogs

a. 

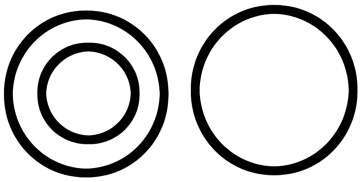
b. 

c. 

d. 

Answer: (c)

Solution:

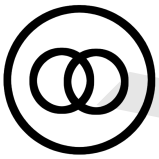


Eagles are Birds. Dogs do not come under the birds category.

Question 45. Pen, Ink, Writing material

a. 

b. 

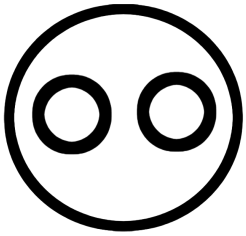
c. 

d. 

Answer: (a) or (d)

Solution:

<u>Option a</u>



Pen and Ink are different materials. But, both of them come under writing material.

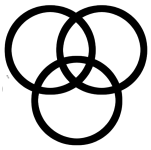
Option d

Ink is present in pen and pen is a writing material.

Question 46. Pulses, Arhar, Moong

a. 

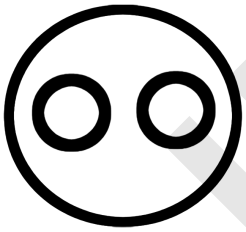
b. 

c. 

d. 

Answer: (a)

Solution:



Moong and Arhar are two different types of pulses.

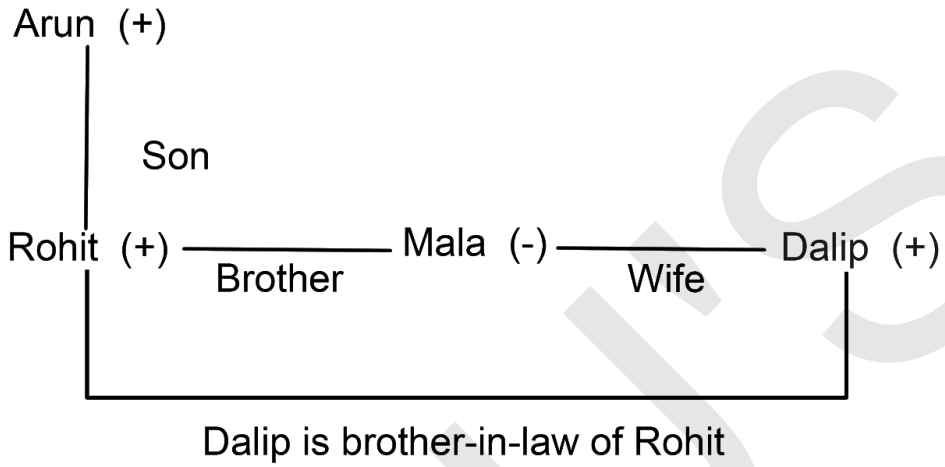
Question 47. Arun is the father of Rohit. Rohit is the brother of Mala. Mala is the wife of Dalip. How is Dalip related to Rohit?

a. Brother-in-law
b. Father-in-law
c. Son
d. Uncle

Answer: (a)

Solution:

(+) Male (-) Female



Dalip is brother-in-law of Rohit

Question 48. Arrange the following words in alphabetical order-

1. Equal 2. Entire 3. Erase 4. Envelope 5. Entreat

a. 25431
b. 25143
c. 25413
d. 25134

Answer: (c)

Solution:

The alphabetical order of the words are: Entire, Entreat, Envelope, Equal and Erase.

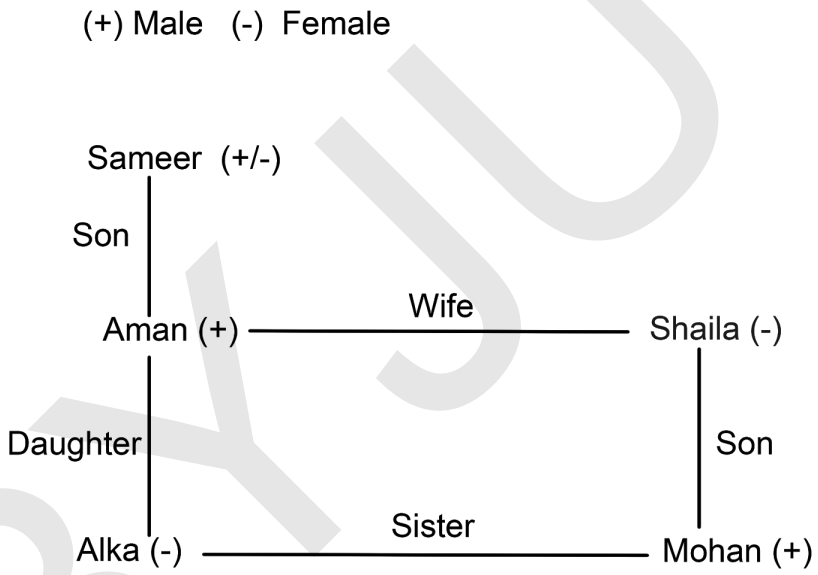
Question 49. Aman is the son of Sameer. Alka is the daughter of Aman. Shaila is the wife of Aman. Mohan is the son of Shaila. How is Alka related to Mohan?

a. Sister
b. Uncle
c. Son
d. Father

Answer: (a)

Solution:

Aman and Mohan are the male members of the family. (Nothing is given about Sameer)



Question 50. In certain code language pic vic nic means winter is cold, to nic re means summer is hot. vic tho pa means nights are cold then what will be the code of cold?

a. to
b. nic
c. pic
d. vic

Answer: (d)

Solution:

	Statement	Code Language
1.	Winter is cold	pic vic nic
2.	Summer is hot	to nic re
3.	Nights are cold	vic tho pai

From statement 1 and 2, the common word is cold. In the code language, the only common term is vic, therefore, the code for cold is vic.

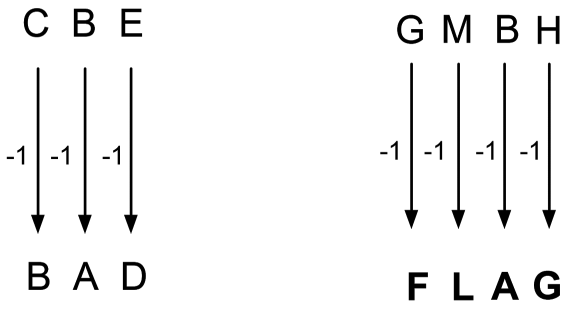
Question 51. If CBE means BAD then GMBH means-

a. GOOD
b. FOOD
c. FLAG
d. FLOG

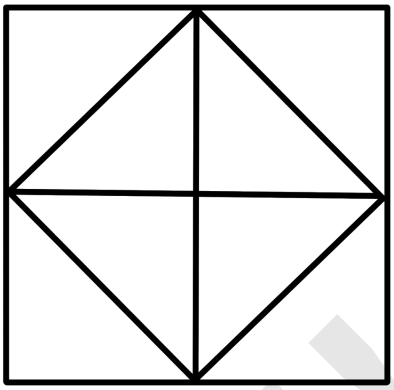
Answer: (c)

Solution:

We have to take the alphabet that lies before the alphabet of the first set of letters.



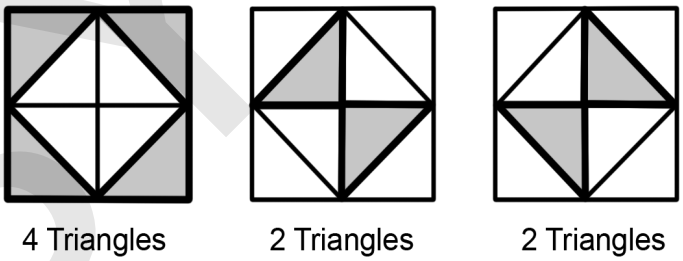
Question 52. How many triangles are there in the following figure?

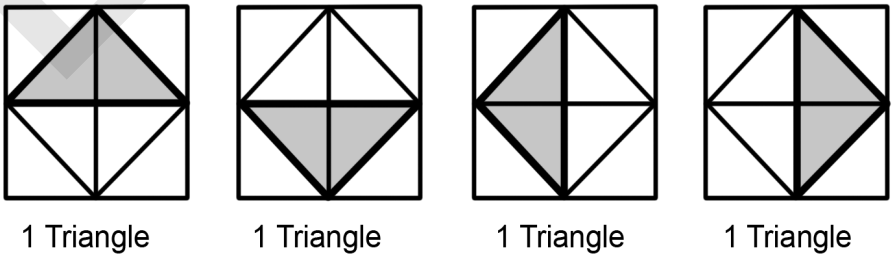


a. 4
b. 16
c. 10
d. 12

Answer: (d)

Solution:





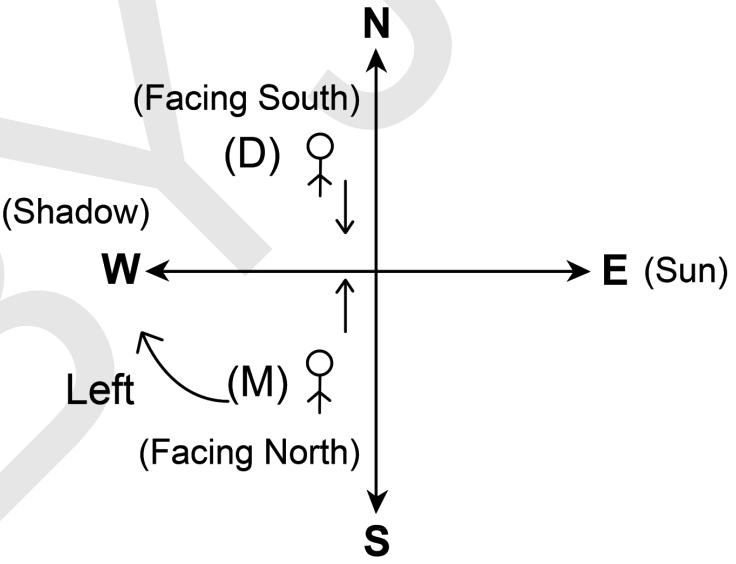
Question 53. In the morning at sunrise Munbahadur and Dhanbahadur are talking to each other face to face. If Munabahadur's shadow is exactly to his left side, then which direction is Dhanbahadur facing?

a. East
b. West
c. North
d. South

Answer: (d)

Solution:

Sun rises in the East, so any shadow will be formed at the West during sunrise. As Manbahadur's (M) shadow (formed at West) is exactly to his left, he must be facing North. Thus, Dhanbahadur (D) will be facing South as both are facing each other while talking.



Question 54. A family consists of a man, his wife and three sons. All three sons have their wives and three children. How many members are there in the family?

a. 17
b. 15
c. 12
d. 13

Answer: (a)

Solution:

Man + Wife = 2 members
Three sons = 3 members
Wives of three sons + three children each = 1 +1 + 1 + 3 + 3 + 3 = 12 members
Total members = 2 + 3 + 12 = 17

Question 55. If Republic day was celebrated on Sunday in the year 1997, then on which day Independence day would have been celebrated in that year?

a. Tuesday
b. Friday
c. Saturday
d. Wednesday

Answer: (b)

Solution:

There are 5 + 28 + 31 + 30 + 31 + 30 + 31 + 15 = 201 days between Republic day and Independence day which consist of 28 weeks and 5 odd days. Thus, if Republic day was celebrated on Sunday, Independence day would have been celebrated after five days of Sunday i.e., on Friday.

Question 56. Five books are kept on a table. Economics book is above Maths. Sanskrit is below Hindi. Maths is above Hindi but Science is below Sanskrit, then which book is in the middle?

a. Hindi
b. Sanskrit
c. Science
d. Maths

Answer: (a)

Solution:

The order of books from top to bottom as per the sequence given in the question is:

- English
- Maths
- Hindi
- Sanskrit
- Science

Hence, the hindi book lies in the middle.

Question 57. If $'N'$ means $'\times'$, $'M'$ means $'\div'$, $'P'$ means $'+'$ and $'Q'$ means $'-'$, then what will be the value of the given equation?
16 P 24 M 8 Q 6 M 2 M 3 = ?

a. 13
b. 17
c. 24
d. 10

Answer: (d)

Solution:

By replacing the letters with the symbols, we get:

16 + 24 ÷ 8 - 6 ÷ 2 ÷ 3

By applying BODMAS to the given expression, we get,
16 + (24 ÷ 8) - 6 ÷ (2 ÷ 3) or 16 + (24 ÷ 8) - (6 ÷ 2) ÷ 3

$16 + (24 \div 8) - 6 \div (2 \div 3) = 16 + 3 - 6 \div \frac{2}{3}$
$= 16 + 3 - (6 \times \frac{3}{2})$
$= 16 + 3 - 9 = 10$

OR

$16 + (24 \div 8) - (6 \div 2) \div 3 = 16 + 3 - 3 \div 3$
$= 16 + 3 - 1 = 18$

So the answer for the given expression can be 10 or 18. From the given options it is 10.

Question 58. A, B, C and D are four buildings. A is higher than only D. B is shorter than C but higher than A. Which is the highest building?

a. A
b. B
c. C
d. D

Answer: (c)

Solution:

Given:
1. A > D
2. A < B < C

On combining: D < A < B < C
Hence, the highest building is C.

Question 59. If A means $+$, B means $-$, C means $\times$ and D means $\div$, then what will be the value of the given equation?

18 C 14 A 6 B 16 D 4 = ?

a. 254
b. 238
c. 188
d. 258

Answer: (a)

Solution:

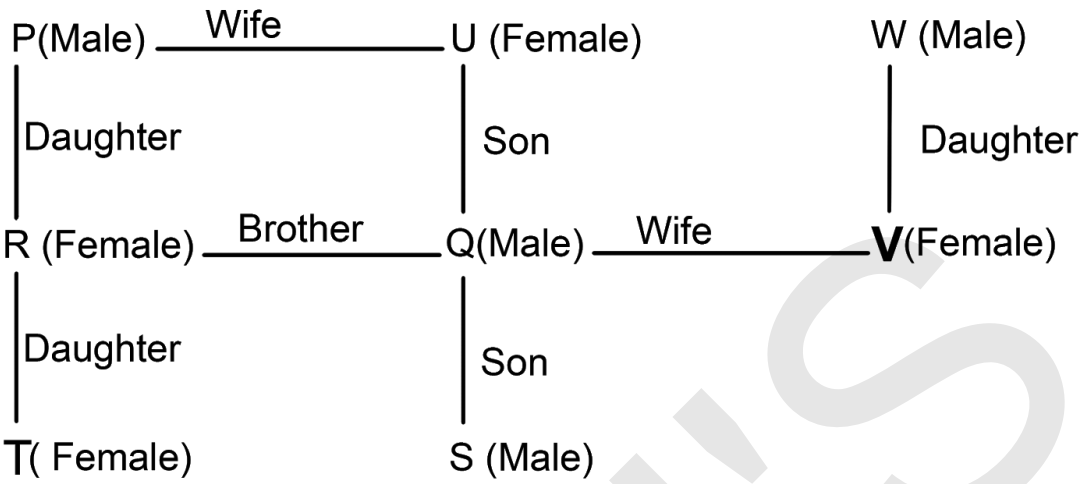
By replacing the letters with the symbols we get:
$18 \times 14 + 6 - 16 \div 4$
On applying BODMAS, we get:
$(18 \times 14) + 6 - (16 \div 4) = 252 + 6 - 4 = 254$

Question 60. P is the father of R, but R is not his son. T is the daughter of R. U is the wife of P. Q is the brother of R. S is the son of Q. V is the wife of Q. W is father of V. Who is the sister-in-law of R?

a. S
b. V
c. U
d. T

Answer: (b)

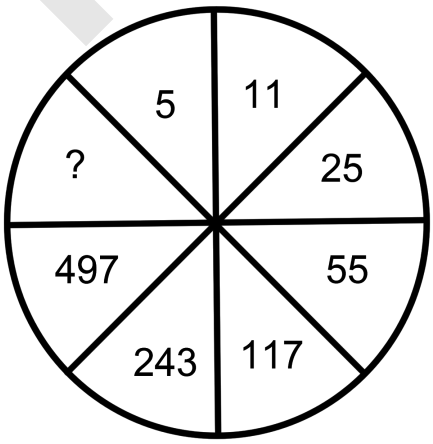
Solution:



Since, V is the wife of Q and Q is the brother of R. Hence, V is the sister-in-law of R.

Direction : (Q. No. 61 to 70) : Study the pattern of numbers / figures in the given matrix and find out the missing figures / numbers which will replace the question mark (?)

Question 61.



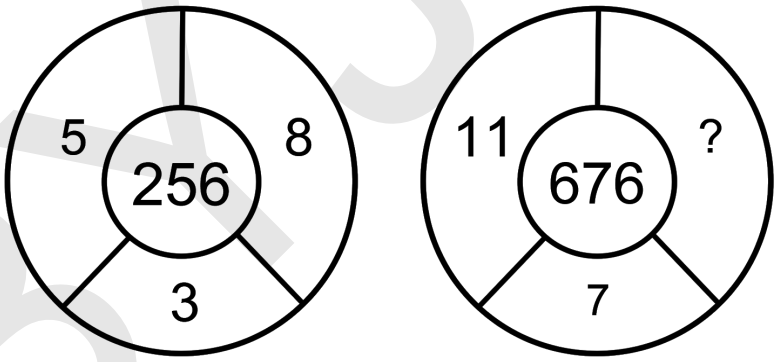
a. 1007
b. 1105
c. 1309
d. 1307

Answer: (a)

Solution:

The pattern in clockwise direction is as follows:
11 = 5 x 2 + 1
25 = 11 x 2 + 3
55 = 25 x 2 + 5
117 = 55 x 2 + 7
243 = 117 x 2 + 9
497 = 243 x 2 + 11
1007 = 497 x 2 + 13

Question 62.



a. 3
b. 5
c. 7
d. 8

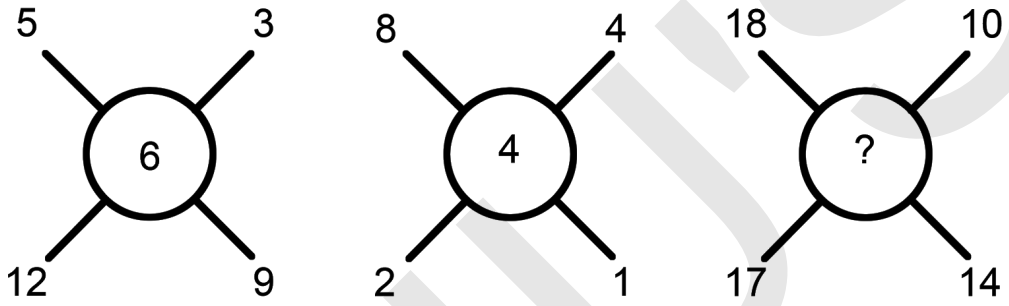
Answer: (d)

Solution:

The pattern followed in first figure is:
$5 + 3 + 8 = 16 \Rightarrow 16^2 = 256$

Similarly, $11 + 7 + ? = 26 \Rightarrow 26^2 = 676$
$11 + 7 + 8 = 26$

Question 63.



a. 18
b. 10
c. 36
d. 24

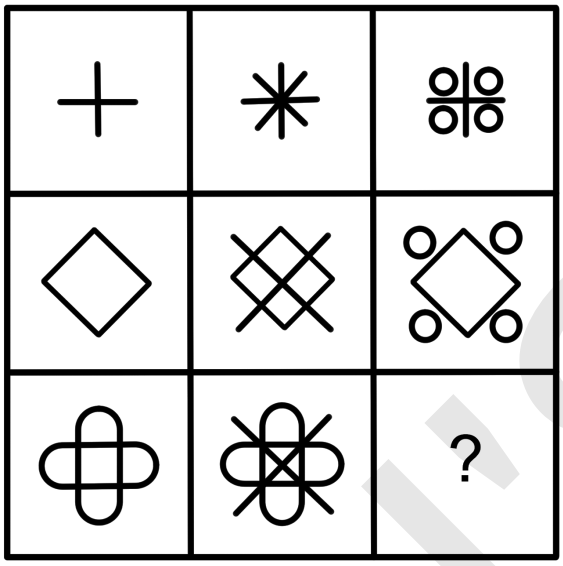
Answer: (d)

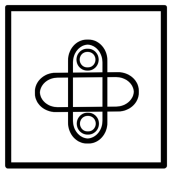
Solution:

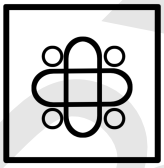
The pattern in first and second figure is as follows:
$(5 - 3) \times (12 - 9) = 2 \times 3 = 6$
$(8 - 4) \times (2 - 1) = 4 \times 1 = 4$

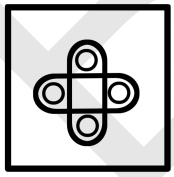
Similarly, for the third figure:
$(18 - 10) \times (17 - 14) = 8 \times 3 = 24$

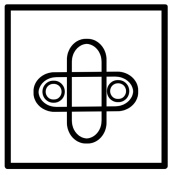
Question 64.



a. 

b. 

c. 

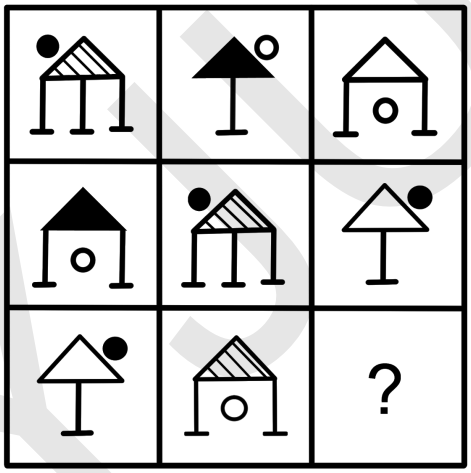
d. 

Answer: (b)

Solution:

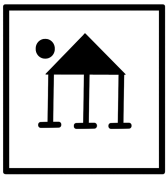
By observation it can be determined that in a particular row, the base of all the three figures is the same as figure one. Also, on going from second figure to third figure, the cross over the base figure gets replaced by four small exterior circles. So it is option (b).

Question 65.



a. 

b. 

c. 

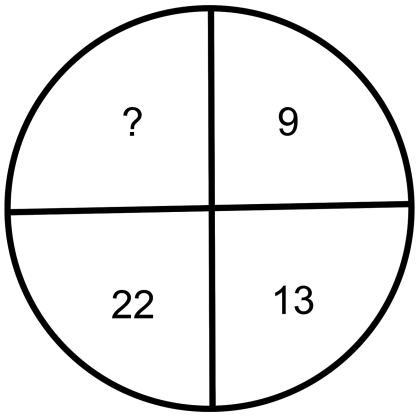
d. 

Answer: (c)

Solution:

By observation it can be determined that each row consists of three different types of triangles with different vertical lines count (1,2 and 3). Also, each row consists of three small circles: 2 black and 1 white. Now, in the third row, the only figure missing is a black triangle with three vertical lines and a black circle.

Question 66.



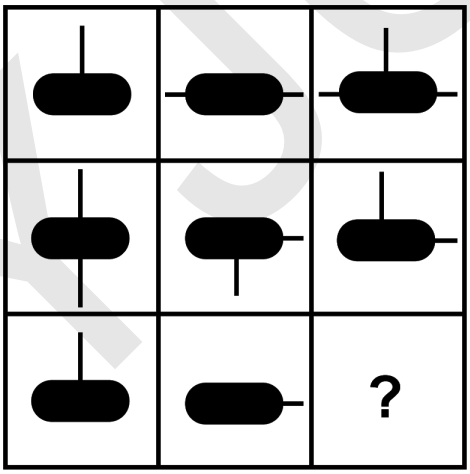
a. 40
b. 38
c. 45
d. 39

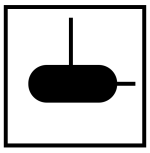
Answer: (b)

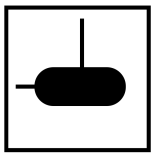
Solution:

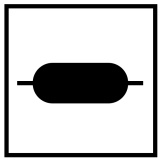
The pattern in clockwise direction is followed as:
$13 = 9 + 2^2$
$22 = 13 + 3^2$
Similarly, $22 + 4^2 = 38$

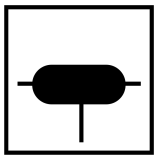
Question 67.



a. 

b. 

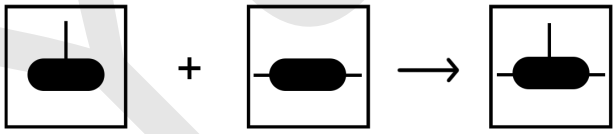
c. 

d. 

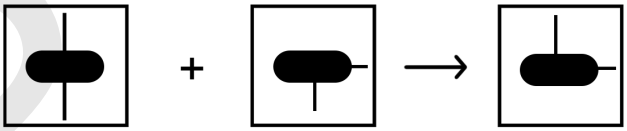
Answer: (a)

Solution:

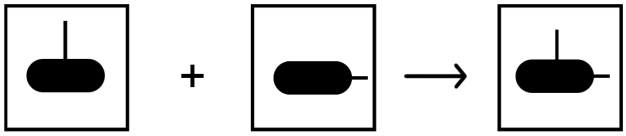
For each row, the figure shown in 3rd column is the addition of non-common part of the figures shown in 1st and 2nd columns.
For Ist row:



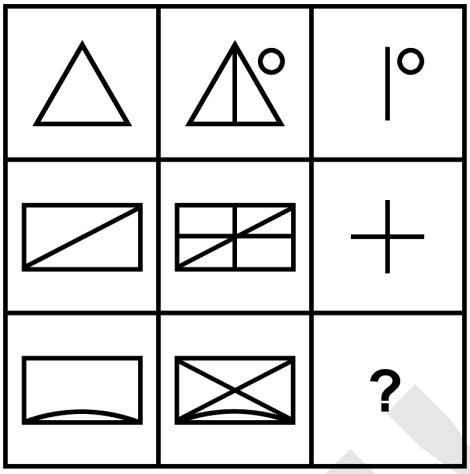
For 2nd row:

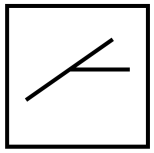


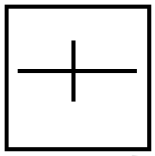
Hence, for the third row:

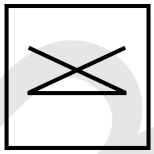


Question 68.



a. 

b. 

c. 

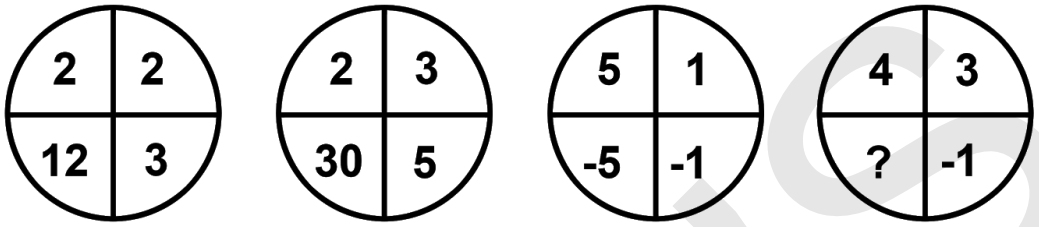
d. 

Answer: (d)

Solution:

The common portion of the figures in the first two columns are removed in figure in the third column.

Question 69.



a. -12
b. 12
c. 9
d. 7

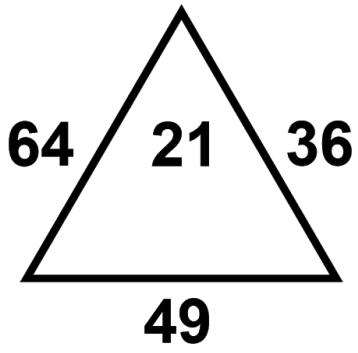
Answer: (a)

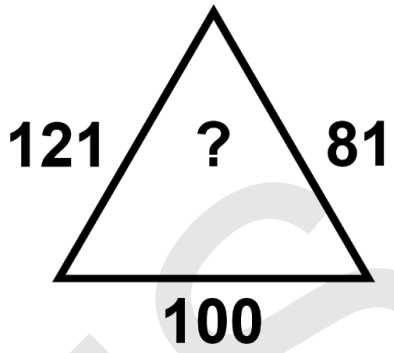
Solution:

The pattern followed in first, second, and third figure is:

$2 \times 2 \times 3 = 12$
$2 \times 3 \times 5 = 30$
$5 \times 1 \times (-1) = -5$
Similarly, for the third figure:
$4 \times 3 \times (-1) = -12$

Question 70.





a. 30
b. 20
c. 10
d. 40

Answer: (a)

Solution:

The pattern in the first figure is followed as:

$\sqrt{64} + \sqrt{49} + \sqrt{36} = 8 + 7 + 6 = 21$

Similarly, for the second figure:

$\sqrt{121} + \sqrt{100} + \sqrt{81} = 11 + 10 + 9 = 30$

Question 71. In the following series only one number is wrong. Find out the wrong number.
8000, 3200, 1280, 512, 204.8, 84.92, 32.768

a. 512
b. 84.92
c. 204.8
d. 1280

Answer: (b)

Solution:

The pattern in the series is followed as:

8000 × 0.4 = 3200
3200 × 0.4 = 1280
1280 × 0.4 = 512
512 × 0.4 = 204.8
204.8 × 0.4 = 81.92
81.92 × 0.4 = 32.768

Thus, the wrong number in the series is 84.92.

Question 72. Five boys A, B, C, D, E are sitting in a park in a circle. A is facing South-West direction, D is facing South-East B is sitting exactly opposite to E and A is sitting exactly opposite to D. C is sitting equidistant between D and B. Which direction is C facing?

a. West
b. South
c. North
d. None of these

Answer: BONUS

Solution:

Positioning of B and E in relation to A and D is not mentioned in the question. So, Position of C cannot be determined due to insufficient information.

Question 73. If 1 March 1997 was a saturday, then what was the day on 1 March 2000?

a. Monday

b. Tuesday
c. Wednesday
d. Friday

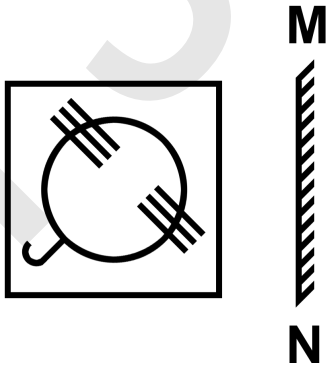
Answer: (c)

Solution:

Year 2000 was a leap year. So there are 365 + 365 + 366 = 1096 days between 1 March 1997 and 1 March 2000, which consist of 156 weeks and 4 odd days. Thus, 1 March 2000 lies after 4 days of saturday i.e., on wednesday.

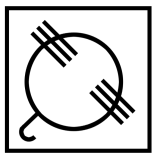
Direction : (Q.No. 74 to 75) : In the following questions, if a mirror is placed on the line MN, then which of the answer figures will be the correct image of the given question figure?

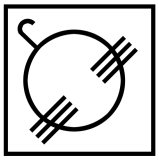
Question 74. Question figure



a. 

b. 

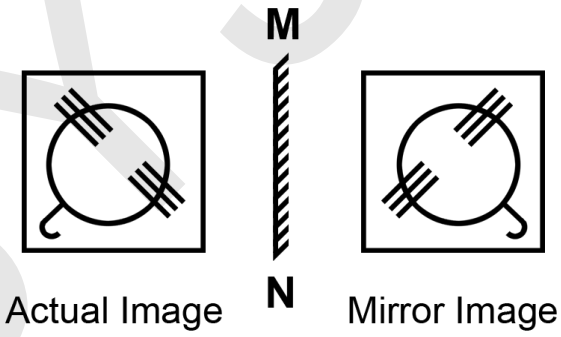
c. 

d. 

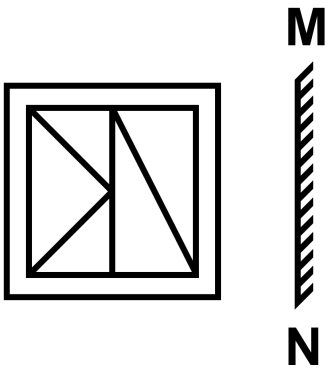
Answer: (a)

Solution:

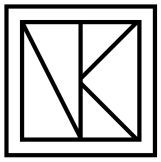
The figure provided in option (a) is the mirror image of the figure provided in the question.



Question 75. Problem figure



Answer figure

a. 

b. 

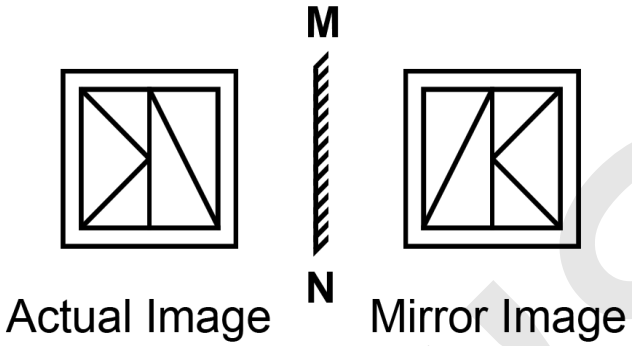
c. 

d. 

Answer: (d)

Solution:

The figure provided in option (d) is the mirror image of the figure provided in the question.



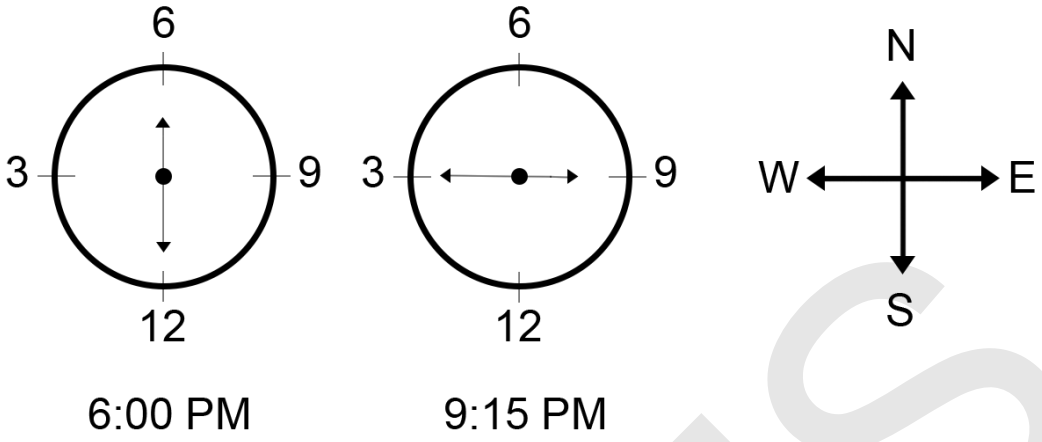
Question 76. Rahul put his timepiece on the table in such a way that at 6 PM the hour hand points to North, then in which direction will the minute hand point at 9.15 PM?

a. East
b. South
c. North
d. West

Answer: (d)

Solution:

As the hour hand at 6 PM is pointing in the North direction, we can say that the timepiece has been rotated by 180^0 clockwise/anticlockwise.
Therefore, at 09:15 PM, the minute hand will point in the West direction.



Question 77. If $+$ denotes $\div$, $-$ denotes $\times$, $\times$ denotes $-$, and $\div$ denotes $+$ then, $35+7-5\div5\times6=?$

a. 36
b. 24
c. 20
d. 14

Answer: (b)

Solution:

According to the sign change, the given equation $35+7-5\div5\times6$ becomes $35\div7\times5+5-6$
On applying BODMAS,

= 5 $\times$ 5 + 5 - 6
= 25 + 5 - 6
= 24

Question 78. Find the total number of e's followed by a vowel in the following letter series.

Ebeabeacacbcbceedeeceaceaceace

a. 4
b. 6
c. 7
d. 8

Answer: (c)

Solution:

On counting the marked e's, we get 7.

E b e a b e a c a c b c b c e e d e e c e a c e a c e

Question 79. If RUSH is coded as 66 then what will be the code for GIRL?

a. 74
b. 64
c. 47
d. 46

Answer: (d)

Solution:

The alphabet's positional values are added:
RUSH = 18 + 21 + 19 + 8 = 66
Similarly GIRL = 7 + 9 + 18 + 12 = 46

A	B	C	D	E	F	G	H	I	J	K	L	M
1	2	3	4	5	6	7	8	9	10	11	12	13

N	O	P	Q	R	S	T	U	V	W	X	Y	Z
14	15	16	17	18	19	20	21	22	23	24	25	26

Question 80. Five senior citizens are living in a multi storeyed building. Mr. Muan lives in a flat above Mr. Ashokan. Mr. Lokesh lives in a flat below Mr. Gaurav, Mr. Ashoka lives in a flat above Mr. Gaurav and Mr. Rakesh lives in a flat below Mr. Lokesh. Who lives in the top most flat?

a. Mr. Lokesh
b. Mr. Gaurav
c. Mr. Muan
d. Mr. Rakesh

Answer: (c)

Solution:

According to the data given in the question, the flats starting from the top are in the following order:
Mr. Muan
Mr. Ashokan
Mr. Gaurav
Mr. Lokesh
Mr. Rakesh

Question 81. Six persons A, B, C, D, E and F are sitting in two rows. Three persons are sitting in each row. E is not sitting at the end of any row. D is second to the left of F. C, the neighbour of E, is sitting diagonally opposite to D. B is the neighbour of F. Which of the following are sitting in one of the two rows?

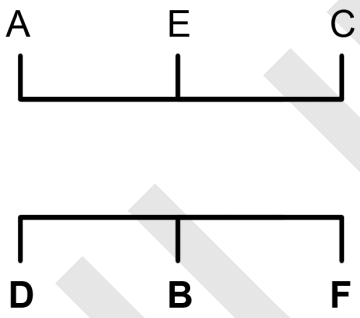
a. D, B and F

b. C, E and B
c. A, E and F
d. F, B and C

Answer: (a)

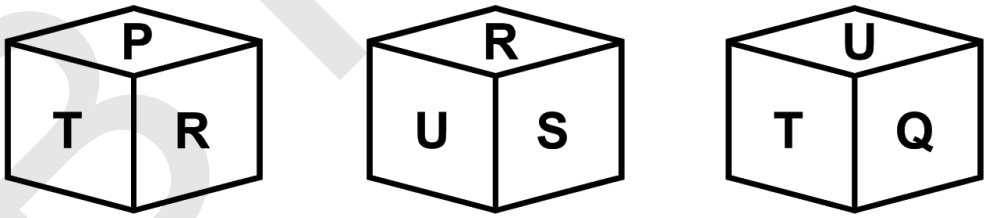
Solution:

From the information given in the question, the following arrangement can be made:



So the two rows are: AEC and DBF.

Question 82. A dice has been marked with some letters and placed in three different positions. Which letter is opposite to Q?

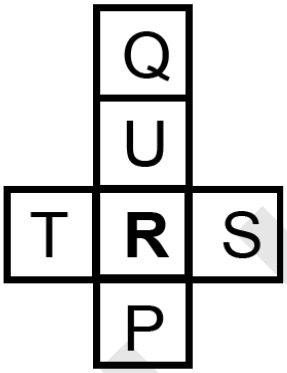


A. P
B. R
C. S
D. None of these

Answer: (b)

Solution:

From the first two orientations of the dice, we can conclude that the letters P, T, U and S are adjacent to the letter R. Therefore the letter Q must be opposite to the letter R. Conversely, R is opposite to Q.



Question 83. How many 7' s are there in the following series which are preceeded by 6 which is not preceeded by 8?

876786756798616776886975687

a. 2
b. 3
c. 4
d. 1

Answer: (b)

Solution:

8 7 6 7 8 6 7 5 6 7 9 8 6 1 6 7 7 6 8 8 6 9 7 6 8 7

Question 84. Study the letter series given below and answer the following question.

HDYSMWNBQPOCRTBLZVEGUF

Which letter has the same two neighbours as in the alphabetical order though they have changed their places?

a. M
b. N
c. O
d. P

Answer: (d)

Solution:

H D Y S M W N B Q P O C R T B L Z V E G U F

P has the same neighbours (O and Q) though their places are interchanged.

Question 85. The time on two clocks is corrected at 10 AM on Sunday. One clock loses 3 minutes in an hour while the other gains 2 minutes in an hour. By how many minutes do the two clocks differ at 4 PM on the same day?

a. 25 minutes
b. 20 minutes
c. 35 minutes
d. 30 minutes

Answer: (d)

Solution:

Time difference between 10 AM and 4 PM = 6 hours

Now, in one hour the time difference between two clocks = 3+2 = 5 minutes.
Therefore, the time difference from 10 AM to 4 PM = (6 X 5) minutes = 30 minutes

Question 86. In 1980, Indian Republic Day was on Saturday. 'X' was born on March 3, 1980. If 'Y' is four days elder than 'X', then on which day was 'Y' born?

a. Thursday
b. Friday
c. Saturday
d. None of these

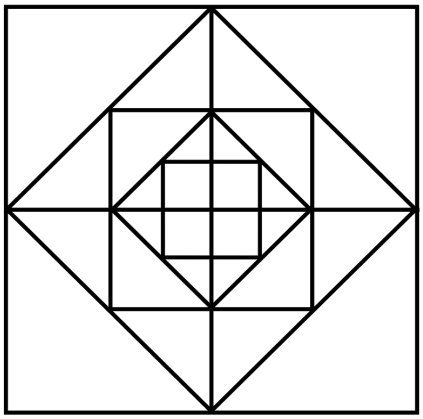
Answer: (a)

Solution:

Republic Day of India is on 26th January. In 1980 (leap year), the republic day was on Saturday.
Y is 4 days older than X, i.e., Y's birthday is 4 days before that of X, or 4 days before March 3, i.e. on February 28, 1980.
So, there is a gap of 5 days (27-31 Jan) + 28 days = 33 days (between 26 January and 28 February.)

Now, we know that a day repeats itself after every 7 days or a week.
Then, there will be 33/7 = 4 weeks + 5 odd days between them.
The 5th day from Saturday will be Thursday.

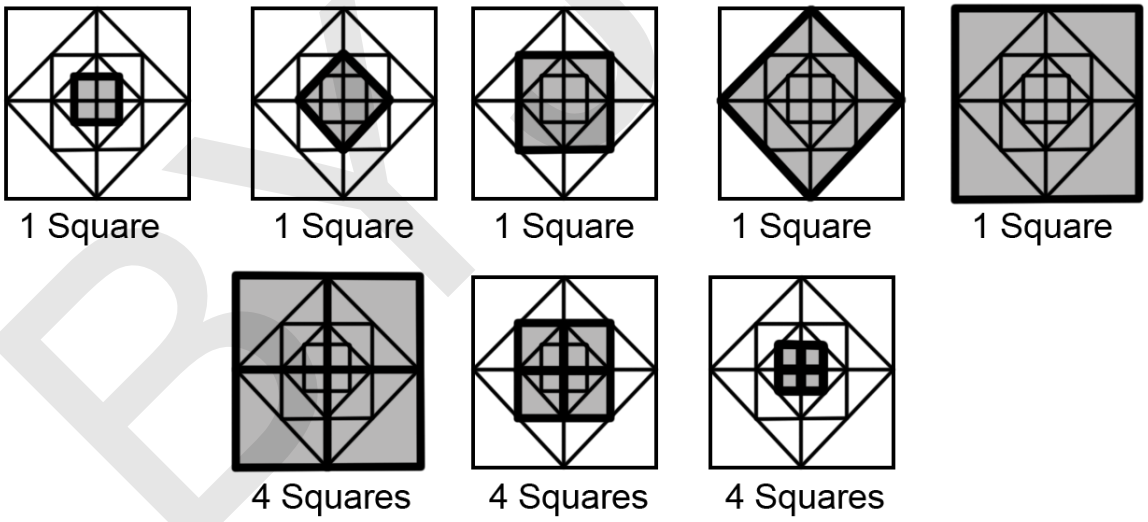
Question 87. How many squares are there in the given figure.



a. 12
b. 17
c. 16
d. None of these

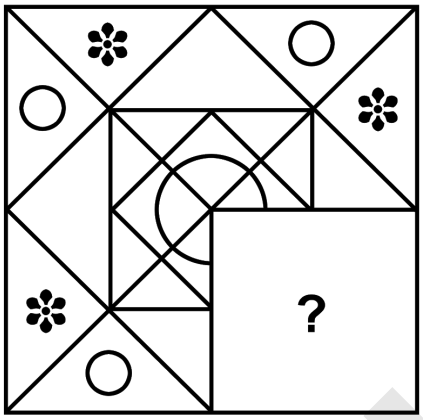
Answer: (b)

Solution:

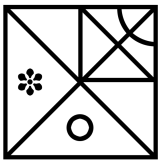


Direction (Q. No. 88 to 89) : Identify the missing part of the Problem figure and select it from the answer figures.

Question 88. Problem figure



Answer figure

a. 

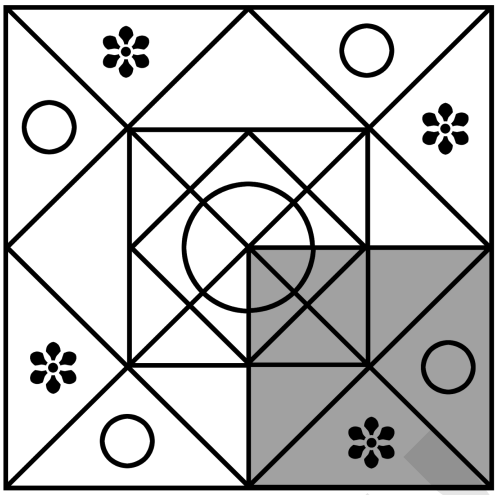
b. 

c. 

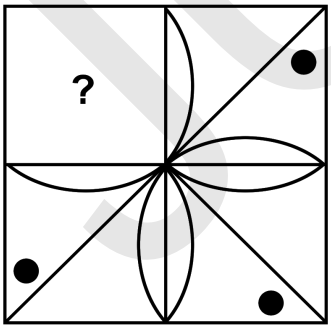
d. 

Answer: (b)

Solution:

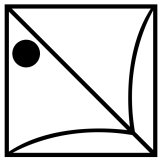


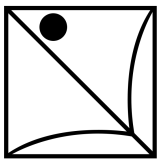
Question 89. Problem figure

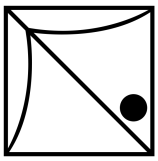


Answer figure

a. 

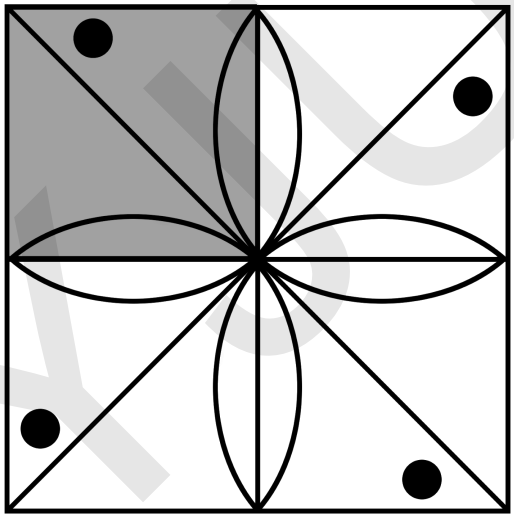
b. 

c. 

d. 

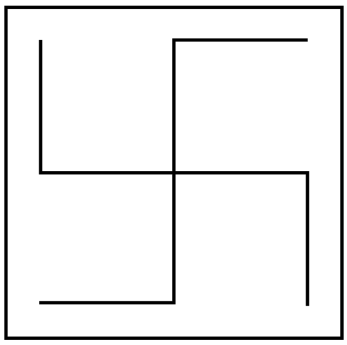
Answer: (c)

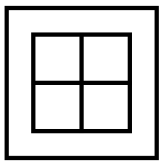
Solution:

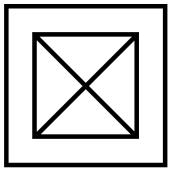


Directions (Q. No. 90 to 91) : Find the answer figure which has the problem figure hidden in it.

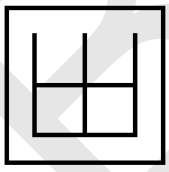
Question 90. Problem Figure.



a. 

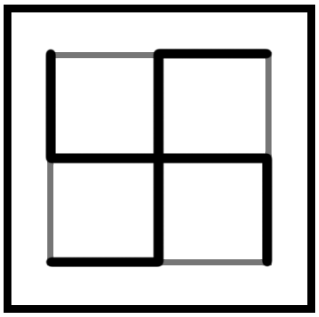
b. 

c. 

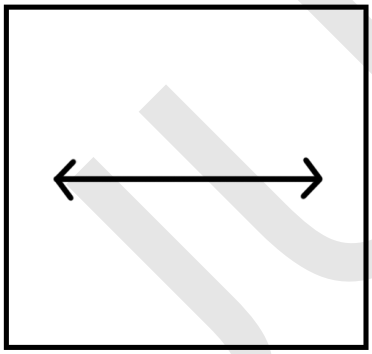
d. 

Answer: (a)

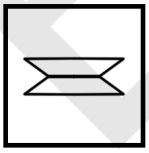
Solution:

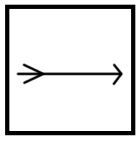


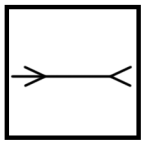
Question 91. Problem figure.



a. 

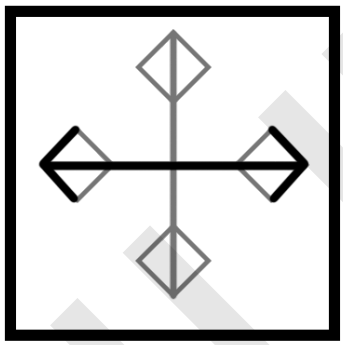
b. 

c. 

d. 

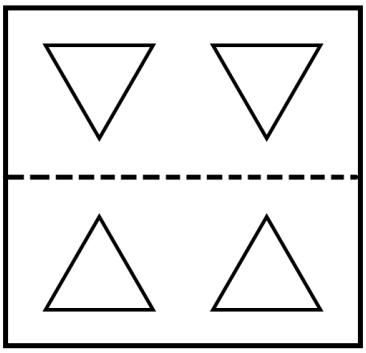
Answer: (a)

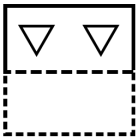
Solution:

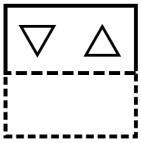


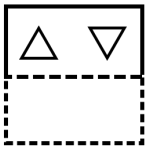
Direction (Q. No. 92 to 93) : In the following figure, a square transparent sheet of paper is given with some patterns. Find out the correct option from the given alternatives that shows the pattern would appear when the transparent sheet is folded at the dotted line.

Question 92. Problem Figure.



a. 

b. 

c. 

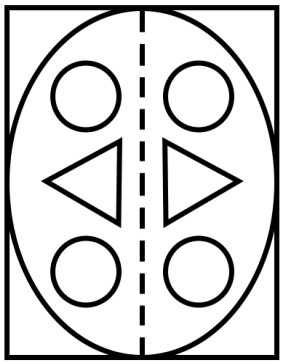
d. None of these

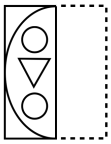
Answer: (a)

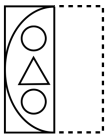
Solution:

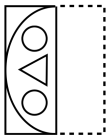
When we will fold the sheet along the dotted line, the two triangles which are at the bottom will coincide with the two triangles at the top. So, the pattern will look as given in option A.

Question 93. Problem Figure.



a. 

b. 

c. 

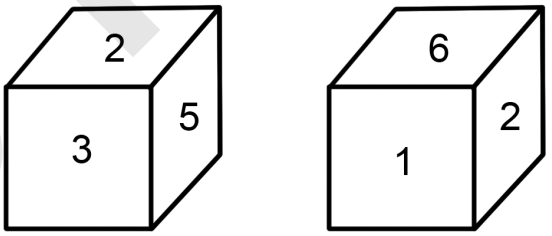
d. None of these

Answer: (c)

Solution:

When we will fold the sheet along the dotted line, the right side will coincide with the left side. So, the pattern will look as given in option C.

Question 94. In the following figures two positions of one dice is given. Which number will be opposite to number 3 ?

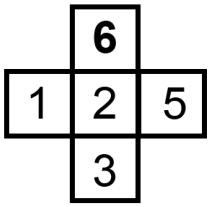


a. 6
b. 4
c. 1
d. None of these

Answer: (a)

Solution:

Considering the two orientations of the dice we can see that 6 is opposite to 3.

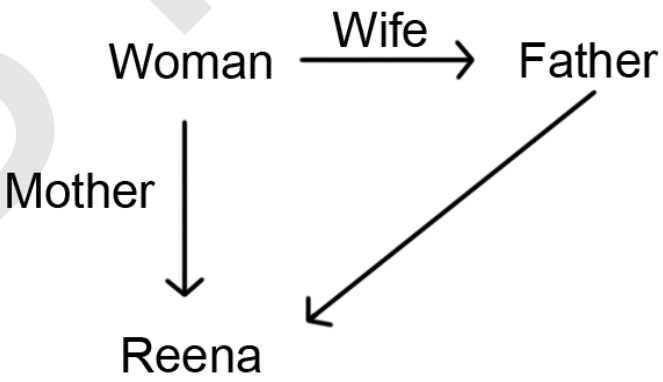


Question 95. Reena said "The woman walking on the road is my father's wife. "How is the woman related to Reena ?

a. Sister
b. Aunt
c. Mother
d. Daughter

Answer: (c)

Solution:



Question 96. The ratio of present age of Sameer and Milan is 8:5. After 6 years, the ratio of their ages will be 3:2. What will be the ratio between the sum of their present ages and the difference of their present ages?

a. 39 : 19
b. 33 : 9
c. 12 : 7
d. 13 : 3

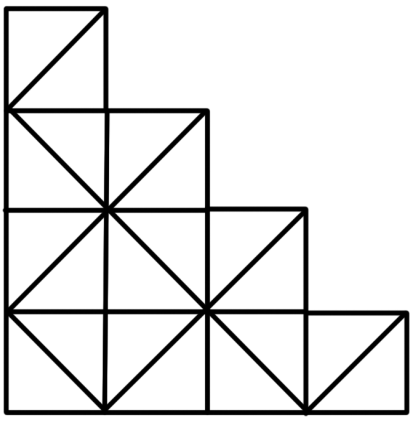
Answer: (d)

Solution:

Let the present age of Sameer and Milan be 8x and 5x respectively.
After 6 years, their ages will be 8x + 6 and 5x + 6 respectively.
Now, (8x+6)/(5x+6) = 3/2
16x+12 = 15x+18
x = 18-12 = 6

Now, sum of present ages of Sameer and Milan = 8x + 5x = 13x = 13×6 = 78
Difference between their present ages = 8x -5x = 3x = 3 × 6 =18
Ratio = 78/18 = 13/3
Therefore, the required ratio is 13:3

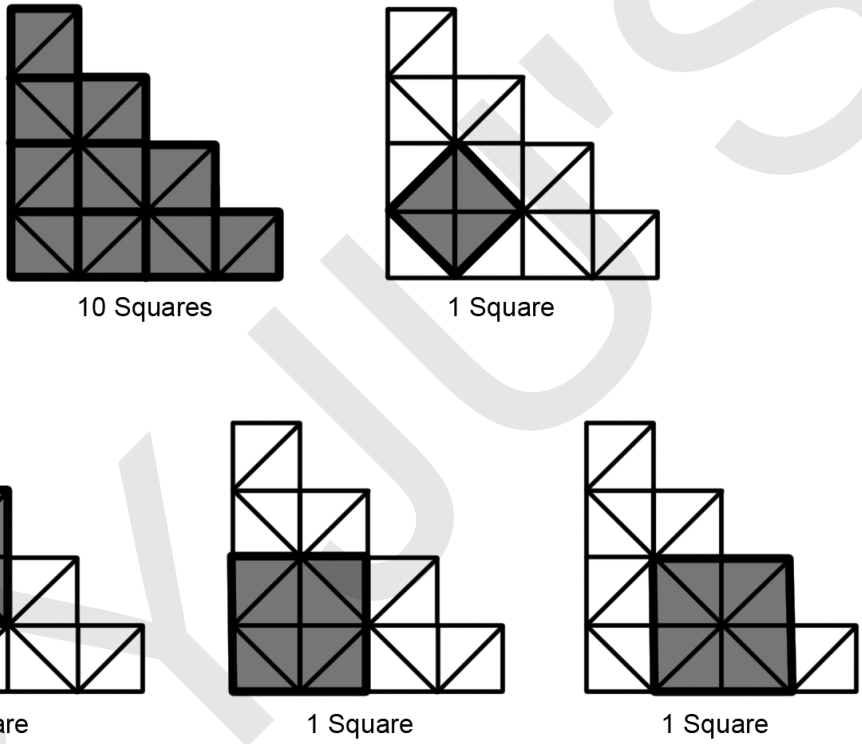
Question 97. How many squares are there in the given figure?



a. 12
b. 13
c. 14
d. None of these

Answer: (c)

Solution:



Question 98. If 10 years ago, Neha's mother was four times older than Neha. After 10 years, Neha's mother age will be twice of Neha's age. How old is Neha now ?

a. 10 Years
b. 15 Years
c. 17 Years
d. 20 Years

Answer: (d)

Solution:

Let the present age of Neha and her mother be x and y respectively.
10 years ago, Neha and her mother's age would have been (x-10) and (y-10) respectively.
Thus, (y-10) = 4 (x-10)
y = 4x - 30 Equation 1
After 10 years, Neha and her mother's age will be (x+10) and (y+10) respectively.
Thus, (y+10) = 2 (x+10)
y= 2x + 10 Equation 2

On solving the above two equations,
We get x = 20.

Question 99. Which two signs are to be interchanged to make the given equation true?

$5 \times 15 \div 7 - 20 + 4 = 77$

a. $-$ and $\div$
b. $\times$ and $\div$
c. $+$ and $\div$
d. $+$ and $\times$

Answer: (c)

Solution:

On interchanging $+$ and $\div$, we get,
$(5 \times 15) + 7 - (20 \div 4) = 5 \times 15 + 7 - 5 = 75 + 2 = 77$

Question 100. A river flows west to east and on the way turns left and goes in a semi circle around a hillock and turns left at right angles. In which direction is the river finally flowing?

a. West
b. East

c. North
d. None of these

Answer: (b)

Solution:

Based on the information given in the question, the following diagram can be made:

Now we can see that the final direction of the river is towards the east.

NATIONAL TALENT SEARCH EXAMINATION
(NTSE 2021) STAGE - 1

STATE : UTTARAKHAND **PAPER : SAT**
Date : 15/01/2021

Max. Marks : 100 **SOLUTIONS** Time : 120 mins.

SOCIAL SCIENCE

Question 01. In 18th century, which class of the French society had to pay taxes to the State?

a. The nobility
b. The clergy
c. The traders and the peasants
d. None of the above

Answer: (c)

Solution:

The French society was divided into 3 estates, the first, second, and third estates. The clergy and the nobility belonged to the first and second estates respectively. The traders and peasants belonged to the third estate and had to pay taxes to the state.

Question 02. Who sought to build a cooperative community called "New Harmony," in the United States of America?

a. Robert Owen
b. Louis Blanc
c. Karl Marx
d. Friedrich Engels

Answer: (a)

Solution:

Robert Owen was a Welsh industrialist and social reformer. In 1825, he built a cooperative community called ‘New Harmony’ in Indiana, United States of America. He was one of the most influential advocates of utopian socialism in the early nineteenth century.

Question 03. The book "Third Reich of Dreams written by-

a. Charlotte Beradt
b. Ernst Hammer
c. Der Sturemer
d. Elvira Bauer

Answer: (a)

Solution:

Charlotte Beradt was the author of ‘Third Reich of Dreams’. The book is a compilation of dreams and nightmares of Germans from 1933-1939.

Question 04. With which country the Bolsheviks made a treaty at Brest Litovsk?

a. Italy
b. France
c. Austria
d. Germany

Answer: (d)

Solution:

The Treaty of Brest-Litovsk was a peace treaty signed between the Bolsheviks and the Central Powers led by the German Empire. It was signed at the

German-controlled area of Brest-Litovsk. The treaty ended Russia's participation in World War I.

Question 05. Match the Column 'A' with Column 'B' and choose the correct option -

Column 'A'		**Column 'B'**	
(I)	**Treaty of Versailles**	**(a)**	**January 1933**
(II)	**Hitler become chancellor of Germany**	**(b)**	**September 1939**
(III)	**Birth of the Weimar Republic**	**(c)**	**June 1919**
(IV)	**Germany attacks Poland**	**(d)**	**November 1918**

	I	**II**	**III**	**IV**
a.	d	b	a	c
b.	c	d	a	b
c.	b	d	a	c
d.	c	a	d	b

Answer: (d)

Solution:

The German Empire ended with the abdication of Kaiser Wilhelm II on 9th November 1918. The Weimar Republic was the government of Germany from 1919 to 1933. The Treaty of Versailles was signed on 28th June 1919. Hitler was appointed as the Chancellor of Germany on 30th January 1933. Germany invaded Poland on 1st September 1939. It marked the beginning of World War II.

Question 06. Choose incorrect statement-

a. Indian Forest Act was enacted in 1865
b. Indian Forest Act was amended in 1878 and 1927.
c. The 1878 act divided forests into three categories.
d. The villagers could take wood from all three categories.

Answer: (d)

Solution:

The Indian Forest Act was passed in 1865. It was amended in 1878 and 1927. The amendment in 1878 divided Indian forests into 3 categories- reserved, protected and village forests. The villagers had no access to reserved forests and limited access to protected forests. Only village forests were open for villagers to use.

Question 07. Who were called Junkers?

a. Land-owners
b. Workers
c. Traders
d. Artisans

Answer: (a)

Solution:

Junkers were the land-owning nobility in Prussia and eastern Germany. They owned large areas of land and collected taxes from the peasants. They had substantial political influence under the German Empire and the Weimar Republic.

Question 08. 'Vietnam Cong San Dang' Party was established by-

a. Liang Qichao
b. Phan Boi Chau
c. Phan chu Trinh

d. Ho chi Minh

Answer: (d)

Solution:

Ho Chi Minh established the Vietnam Cong San Dang Party in 1930. Also known as the Communist Party of Vietnam, it is the ruling communist party of Vietnam.

Question 09. In which session of Indian National Congress Non -cooperation programme was adopted?

a. Nagpur, 1920
b. Amritsar, 1919
c. Ahmedabad 1921
d. Gaya, 1922

Answer: (a)

Solution:

The Non-Cooperation programme was adopted by the Indian National Congress at the Nagpur session in 1920. The movement was launched by Mahatma Gandhi with the aim to attain 'Purna Swaraj'.

Question 10. Match Column 'A' with Column 'B' and choose the correct option-

Column 'A'		**Column 'B'**	
(I)	**Jobber**	**(a)**	**Run-down house**
(II)	**Tenements**	**(b)**	**Pickwick Papers**
(III)	**Inquisition**	**(c)**	**To get new recruits into mills**
(IV)	**Serial**	**(d)**	**A former Roman Catholic court for identifying and punishing heretics**

	I	II	III	IV
a.	d	c	a	b
b.	c	d	b	a
c.	b	a	d	c
d.	c	a	d	b

Answer: (d)

Solution:

Industrialists hired jobbers to find recruits. The jobbers became figures of authority and began to demand bribes and started controlling the lives of workers. Tenements are run-down houses and overcrowded apartment houses.
The Inquisition was a powerful Roman Catholic court which identified and punished heretics throughout Europe and the Americas. The Pickwick Papers was Charles Dickens' first novel. It popularised serialised novels.

Question 11. In democracy

a. Freedom to oppose is necessary for the people.
b. People can not elect or change their representatives.
c. People do not have the right to freedom of expressing their ideas.
d. People's right to freedom of formation of association is not essential.

Answer: (a)

Solution:

Democracy empowers its citizens with rights to question and criticize the government when it makes unfavorable decisions affecting them. In a Democracy people have the right to oppose, show dissent and protest against the governments in a non-violent and peaceful manner.

Question 12. " I have fought against white domination and I have fought against black domination. I have cherished the ideal of a democratic and free society in which all persons live together in harmony and with equal opportunities. It is an ideal which I hope to live for and to achieve. But if needs be, it is an ideal for which \ am prepared to die." The above statement is of-

a. Nelson Mandela
b. Mahatma Gandhi
c. Subhash Chandra Bose
d. Lai Bahadur Shastri

Answer: (a)

Solution:

Nelson Mandela is known for his endeavour against racial discrimination and apartheid in South Africa. He was tried and imprisoned for the same at the Robben Island Prison between 1964 to 1982. Later, he went on to become the first black president of South Africa (1994-1999).

Question 13. Philosophy behind the Indian constitution is known through-

a. The Preamble
b. Fundamental Rights
c. Directive Principles of State Policy
d. Right to Constitutional Remedies

Answer: (a)

Solution:

The Preamble to the Constitution of India summarises the essence of the constitution and the principles and philosophies present in it. The Preamble declares India to be a Sovereign, Socialist, Secular and Democratic and Republic.

Question 14. Minimum condition /conditions of a democratic election is/are-

a. Everyone should be able to choose. This means that everyone should have right to vote and every vote should have equal value.
b. There should be something to choose from. Parties and candidates should be free to contest elections and should offer some real choice to the voters.
c. The choice should be offered at regular intervals. Elections must be held regularly after a few years.
d. All of the above.

Answer: (d)

Solution:

Democracy is a form of government in which people choose their representatives through free and fair elections held at regular intervals. Free and fair elections means that the voters are free to choose between political parties in elections held at regular intervals and there would be no misuse of power by the political party in power and cases of corruption like bribing voters at the time of election.

Question 15. In India the supreme power/powers Lok Sabha exercises over the Rajya Sabha is/ are:-

a. In a joint session, members of both the Houses sit together. Because of the larger number of members, the view of the Lok Sabha is likely to prevail in such a meeting.
b. Once the Lok Sabha passes the budget of the government or any other money related law, the Rajya Sabha cannot reject it.
c. Only a person who enjoys the support of the majority of the members in the Lok Sabha is appointed the Prime Minister.
d. All of the above.

Answer: (d)

Solution:

The Lok Sabha is known as the lower house of the parliament or the House of the people and the Rajya Sabha is known as the upper house of the parliament or the Council of states. The Lok Sabha enjoys certain powers than the Rajya Sabha

because members of the Lok Sabha are elected directly by the people. The Constitution of Indiaalso mandates that the Council of ministers are directly responsible to the Lok Sabha

Question 16. The Supreme Court of India can take up any dispute -

a. Between citizens of the country.
b. Between citizens and government.
c. Between the Union government and the state government.
d. All of the above.

Answer: (d)

Solution:

According to the Constitution of India, the original jurisdiction of the Supreme Court of India is to deal with disputes between the Central government and state governments. However, the Supreme Court of India can hear appeals in cases that deal with disputes between citizens of the country and between citizens and the government but cannot be approached directly on the same.

Question 17. Feature/features of federal form of government is/are-

a. There are two or more levels of government.
b. Different tiers of government govern the same citizens.
c. A single level of government cannot amend the fundamental provisions of the constitution at its own.
d. All of the above.

Answer: (d)

Solution:

Federalism is a type of government in which the power is divided between the central government and other lower levels of government. Or in other words, power is not concentrated within a single level of government like the central government.

Question 18. Education is a subject of -

a. Union List
b. State List
c. Concurrent List
d. None of the above

Answer: (c)

Solution:

The Constitution of India enlists three lists under the seventh schedule, namely, Union list, state list and the concurrent list in order to divide power between the centre and states. Education is a subject under concurrent list which means both parliament of India and the state assembly can make laws on this subject.

Question 19. Third level (Local self government) of the democratic government system was made more powerful and effective in-

a. 1992
b. 1993
c. 1994
d. 1996

Answer: (a)

Solution:

The 73rd Constitutional Amendment Act of 1992 introduced the Panchayati Raj system, a third tier to our federal structure. Local self governments at the village level became more powerful and effective as it got constitutional backing to them.

Question 20. Match Column ’A’ with Column 'B' and choose the correct option-

Column 'A'	**Column 'B'**

(I)	**Union of India**	**(a)**	**President**
(II)	**State**	**(b)**	**Sarpanch**
(III)	**Municipal**	**(c)**	**Governor corporation**
(IV)	**Gram Panchayat**	**(d)**	**Mayor**

	I	**II**	**III**	**IV**
a.	a	c	d	b
b.	a	b	d	c
c.	c	a	b	d
d.	c	a	d	b

Answer: (a)

Solution:

The President is the ceremonial head of our nation. Similarly the Governor is the head of the Indian states. Mayor is responsible for the administration of municipal corporations and the sarpanch heads the gram panchayats.

Question 21. Which one of the following rivers flows through a rift valley?

a. Mahanadi
b. Krishna
c. Tungabhadra
d. Tapi

Answer: (d)

Solution:

Tapi river flows through a rift valley. It originates near Multai reserve forest in Betul district of Madhya Pradesh. Flowing westward, Tapi enters Maharashtra and Gujarat before draining into the Arabian sea.

Question 22. A large proportion of children in a population is the result of-

a. High birth rate
b. High death rate
c. High life expectancy
d. None of the above

Answer: (a)

Solution:

Birth rate and death rate determine the population growth. A high birth rate results in a large population of children. Likewise, a high death rate may cause a decline in population.

Question 23. Which one of the following characterises the cold weather season in India?

a. Warm days and warm nights
b. Warm days and cold nights
c. Cold days and cold nights
d. Cold days and warm nights

Answer: (b)

Solution:

The cold season in India is characterised by warm days and cold nights. This season usually starts during November and ends by the end of February. The weather is normally marked by clear sky, low temperatures, low humidity and feeble winds.

Question 24. Which one of the following causes rainfall during winters in north-west region of India?

a. Cyclonic depression
b. Western disturbances
c. Retreating monsoon
d. South west monsoon

Answer: (b)

Solution:

Western disturbances is a type of extratropical cyclone originating over the Mediterranean region. It carries moisture towards the Indian subcontinent due to westerlies. This causes sudden rainfall during the winter in the northwestern parts of India.

Question 25. Which of the following conservation strategies does not directly involve communities ?

a. Joint forest management.
b. Beej Bachao Andolan.
c. Chipko Movement.
d. Demarcation of Wildlife sanctuaries

Answer: (d)

Solution:

A wildlife sanctuary is an area where animal habitats and their surroundings are protected from any sort of disturbance. The capturing, killing and poaching of animals is strictly prohibited in these regions.The government notifies such areas. Demarcation of such sanctuaries are done by the government, thus communities are not directly involved in this process.

Question 26. The tropic of cancer does not pass through-

a. Rajasthan
b. Odisha
c. Chhattisgarh
d. Tripura

Answer: (b)

Solution:

The tropic of Cancer passes through eight states in India. These states include Rajasthan, Gujarat, Madhya Pradesh, Chhattisgarh, Jharkhand, West Bengal, Tripura and Mizoram. The tropic of Cancer doesn't pass through the state of Odisha.

Question 27. What is' The Himalayan Yew'?

a. Medicinal plant
b. Himalayan animal
c. Himalayan bird
d. None of these

Answer: (a)

Solution:

The Himalayan Yew is a medicinal plant. This evergreen plant is found in the high altitude areas of Himalayan region.

Question 28. The finest type of Iron ore is -

a. Magnetite
b. Haematite
c. Limonite
d. Siderite

Answer: (a)

Solution:

Iron can be extracted from various types of ores. These include hematite, limonite, Magnetite, siderite etc. Magnetite is the finest type of Iron ore.

Question 29. Match Column 'A' with Column 'B' and choose the correct option

Column 'A'		**Column 'B'**	
(I)	**Old alluvial**	**(a)**	**Khadar**
(II)	**New alluvial**	**(b)**	**Sand soil**
(III)	**Black soil**	**(c)**	**Bagar**
(IV)	**Desert soil**	**(d)**	**Regur**

	I	**II**	**III**	**IV**
a.	b	c	d	a
b.	a	c	b	d
c.	c	a	d	b
d.	b	c	a	d

Answer: (c)

Solution:

(I)	Old alluvial	(c)	Bagar
(II)	New alluvial	(a)	Khadar
(III)	Black soil	(d)	Regur
(IV)	Desert soil	(b)	Sand soil

Question 30. In which field ' School Bhuvan Portal' is providing map based learning to the students to bring awareness about their role.

a. Country's natural resources environment and sustainable development.
b. About the educational institutions of the country.
c. To provide career guidance to the students.
d. None of the above.

Answer: (a)

Solution:

School Bhuvan portal provides map-based learning to the students. This initiative aims to bring awareness among the students about the country's natural resources, environment, and their role in sustainable development.

Question 31. Main purpose of buffer stock scheme is

a. To save food grains from pest attack
b. To stop price fluctuations
c. To meet the crisis of low production
d. Both (b) and (c)

Answer: (d)

Solution:

The price of food grains fluctuates with deviating harvest. To stop such price fluctuations, food grains are bought and stocked during a good harvest season under the buffer stock scheme. It helps to prevent prices falling below a target level. During a poor harvest season, stocks are released to avoid a food crisis and prices rising above a target level.

Question 32. Antyodaya Anna Yojana and Annapurna Scheme are linked with-

a. Public Distribution system

b. Mid-day Meal
c. Special Nutrition Programme.
d. None of these

Answer: (a)

Solution:

Antyodaya Anna Yojna and Annapurna Scheme are linked with the Public Distribution System. To make the Public Distribution System beneficial, Antyodaya Anna Yojna was launched to provide highly subsidized food to one crore poorest of the poor families. Similarly, under the Annapurna Scheme, food grains are distributed at free of cost to senior citizens regularly.

Question 33. The two components of Indian government food security system are-

a. Buffer Stock and Public Distribution system
b. Mid day meal and Antyodaya Anna Yojna
c. Integrated Child Development Services and Food for Work Programme.
d. None of the above

Answer: (a)

Solution:

Buffer stock and Public Distribution system are two main components of the food security system of the Indian government. Buffer stock is maintained for essential commodities like food grains, pulses etc. Under the Public Distribution System, commodities like wheat, rice, sugar are allocated to the States/UTs for distribution. The public distribution system is operated under the joint responsibility of the Central and the State Governments.

Question 34. MGNREGA is associated with -

a. Creation of employment in rural areas
b. Creation of employment in urban areas
c. Creation of employment for the minorities
d. All of the above

Answer: (a)

Solution:

MGNREGA(Mahatma Gandhi National Rural Employment Guarantee Act) is associated with the creation of employment only in rural areas. Passed in 2005, this act aims to provide guaranteed wage employment to rural unskilled labour on demand basis and increase their economic and social security.

Question 35. On which basis public and private sectors are categorised?

a. Conditions of employment
b. Nature of economic activities.
c. Ownership of enterprises
d. Number of workers

Answer: (c)

Solution:

The public and private sector are categorized on the basis of ownership of enterprises. The public sector enterprise is owned and operated by the state. Whereas, the private sector enterprise is owned and operated by an individual or group of individuals.

Question 36. Which is not a feature of organized sector?

a. Pension facility
b. Leave with pay facility
c. Entitled to medical benefits
d. Unsafe employment

Answer: (d)

Solution:

In the organized sector, the terms of employment are fixed and regular. Employees are provided with pension facilities, medical benefits, paid leaves and also a safe working environment. In India more number of people are employed under unorganized sector.

Question 37. The most common way for investment of Multinational companies (MNC) between countries all over the world is-

a. Buy existing local companies
b. Setup new factories
c. Form partnership with local companies
d. None of the above

Answer: (a)

Solution:

To expand their business, Multinational companies (MNC) look for various investment options worldwide. The most common way is acquiring or buying existing local companies. It helps them to gain access to the market and existing operational activities. While setting up new factories or forming partnerships may incur a higher operating cost or limited access to the market.

Question 38. Which of the following factors is responsible for poverty according to social scientists-

a. Less Income
b. Less Consumption
c. Social Exclusion
d. All of the above

Answer: (d)

Solution:

Poverty is the result of various socio-economic factors like the absence of employment opportunities, inadequate infrastructure, inequality, etc. Additionally, Social scientists identify social exclusion as a factor responsible for poverty. Less Income would lead to a lower standard of living. Less consumption of nutritious food, health and educational services would put them in a vicious cycle of poverty.

Question 39. The price that is announced before the sowing season is called -

a. Issue price
b. Fair price
c. Market price
d. Minimum support price

Answer: (d)

Solution:

Minimum support price is announced before the sowing season for certain crops. It aims to prevent losses suffered by the farmers, in case of a price fall. If the open market prices are less than the cost incurred, the government buys the farmers' harvest directly at the announced MSP.

Question 40. Which sector includes agriculture and animal husbandry?

a. Primary sector
b. Secondary sector
c. Tertiary sector
d. None of the above

Answer: (a)

Solution:

The primary sector of the economy includes activities related to the extraction and production of raw materials by utilising natural resources. Agriculture and animal husbandry, forestry, fishing, poultry farming are few activities that are included in this sector.

MATHEMATICS

Question 41. What kind of Decimal Expansion has the number $4\frac{1}{8}$?

a. Non terminating recurring
b. Terminating
c. Non terminating non recurring n
d. none of the above

Answer: (b)

Solution:

Converting the mixed fraction into decimal form shows that the number is terminating.

$4\frac{1}{8}$= 4 + $\frac{1}{8}$= 4 + 0.125 = 4.125

Question 42. If $sin\ x = \frac{3}{5}$, $cos\ y = \frac{12}{13}$, then the value of $tan\ x + tan\ y$will be-

a. $\frac{7}{6}$
b. $\frac{5}{6}$
c. $\frac{11}{6}$
d. $\frac{6}{7}$

Answer: (a)

Solution:

Given: $sin\ x\ = \frac{3}{5}$

$tan\ x\ = \frac{sin\ x}{cos\ x}\ = \frac{sin\ x}{\sqrt{1 - sin^2 x}}\ = \frac{\frac{3}{5}}{\sqrt{1 - \frac{9}{25}}} = \frac{3}{4}$

Given: $cos\ x\ = \frac{12}{13}$

$tan\ y\ = \frac{sin\ y}{cos\ y}\ = \frac{\sqrt{1 - cos^2 y}}{cos\ y}\ = \frac{\sqrt{1 - \frac{144}{!69}}}{\frac{12}{13}} = \frac{5}{12}$

$tan\ x\ +\ tan\ y\ =\ \frac{3}{4}\ +\ \frac{5}{12}\ =\ \frac{7}{6}$

Question 43. The mean of prime numbers between 20 and 30 is-

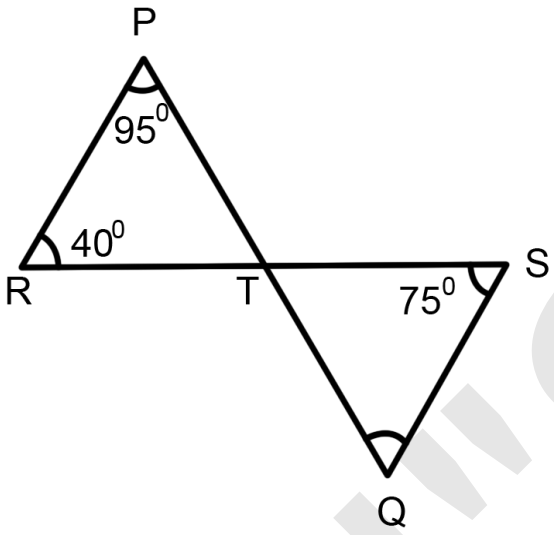
a. 21
b. 26
c. 25
d. 27

Answer: (b)

Solution:

The prime numbers between 20 and 30 are 23 and 29.
Mean of 23 and 29 = $\frac{23 + 29}{2}\ =\ \frac{52}{2}\ =\ 26$

Question 44. In the given figure, if line PQ and line RS intersect at a point T such that $\angle PRT\ =\ 40^0$, and $\angle RPT\ =\ 95^0$ and $\angle TSQ\ =\ 75^0$, then the value of $\angle SQT$ will be

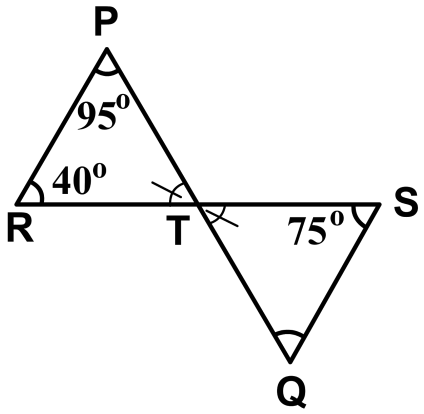


a. 45^0
b. 75^0
c. 60^0
d. 40^0

Answer: (c)

Solution:

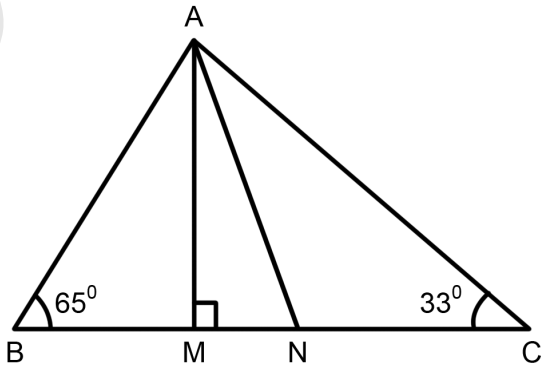
Since PQ and RS are two straight lines intersecting at T, therefore, $\angle$RTP = $\angle$QTS (Vertically opposite angle property).



In ΔPRT,
∠RPT + ∠RTP + ∠PRT = 180° (Angle sum property)
95° + 40° + ∠RTP = 180°
∠RTP = 180° - 135° = 45°
We know ∠RTP = ∠QTS = 45°

Now, in ΔSQT,
∠QTS +∠TSQ + ∠SQT = 180° (Angle sum property)
45° + 75° + ∠SQT = 180°
∠SQT = 180° - 120° = 60°

Question 45. In the given fig. $AM \perp BC$ and AN is the bisector of $\angle A$. If $\angle B = 65^0$ and $\angle C = 33^0$, then the value of $\angle MAN$ will be-



a. 33^0
b. 25^0
c. 16^0
d. 41^0

Answer: (c)

Solution:

In ΔABC,

$\angle ABC + \angle BAC + \angle BCA = 180^0$ (Using the angle sum property of a triangle)

$65^0 + 33^0 + \angle BAC = 180^0$

$\angle BAC = 180^0 - 98^0 = 82^0$

Now, AN is the angle bisector of the angle BAC.

$\angle BAN = \angle NAC = \frac{82^0}{2} = 41^0$

In ΔBAM,

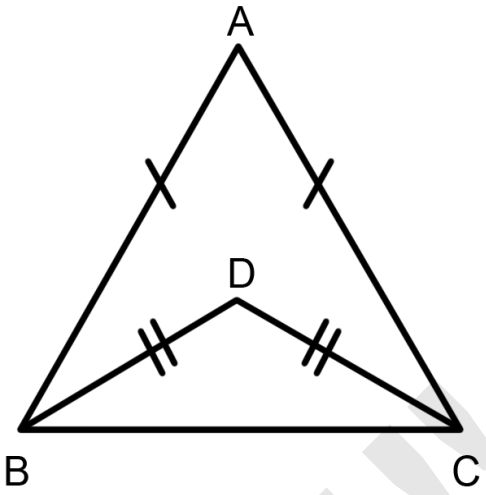
$\angle MBA + \angle BAM + \angle BMA = 180^0$ (Using the angle sum property of a triangle)

$65^0 + 90^0 + \angle BAM = 180^0$

$\angle BAM = 180^0 - 155^0 = 25^0$

Now, $\angle MAN = \angle BAN - \angle BAM = 41^0 - 25^0 = 16^0$

Question 46. In the given figure $AB = AC$ and $DB = DC$, Then $\angle ABD$: $\angle ACD$ will be

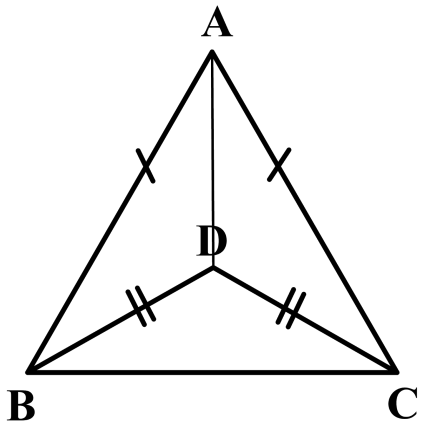


a. 1 : 2
b. 1 : 1
c. 2 : 1
d. 1 : 3

Answer: (b)

Solution:

An easy way to solve this question is to draw a line AD in the figure.



Now, AB = AC, BD = CD and AD is common for both ΔADB and ΔADC.
Hence, the angles will be equal for both the triangles.
∠ABD = ∠ACD
So, the ratio of ∠ABD : ∠ACD will be 1:1.

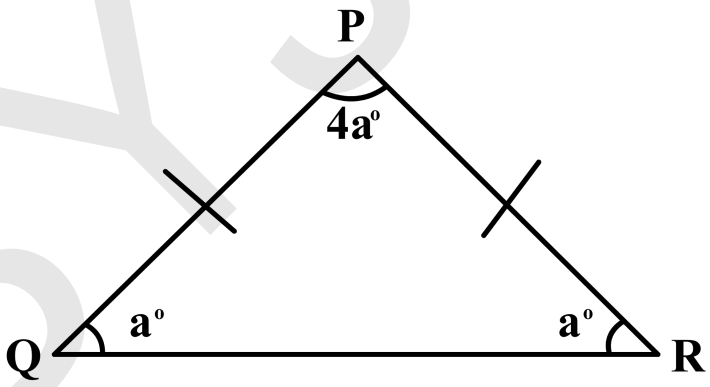
Question 47. In an isosceles triangle, if the vertex angle is twice the sum of the base angles, then the value of vertex angle will be -

a. 126^0
b. 124^0
c. 128^0
d. 120^0

Answer: (d)

Solution:

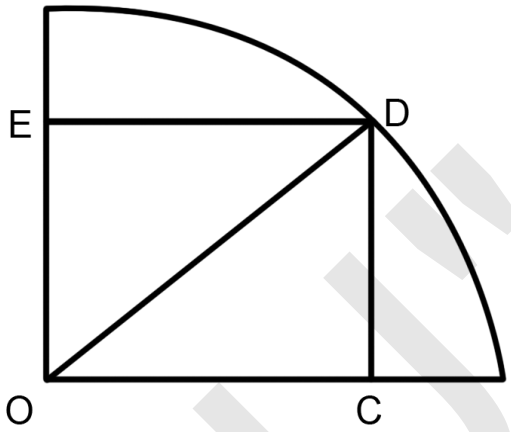
Let the value of base angle be a° .



Now based on the conditions in the questions and applying angle sum property we get:
∠PQR + ∠PRQ + ∠QPR = 180°
a° + a° + 4a° = 180°
6a° = 180°
a° = 30°

4a° = 120°

Question 48. In the given figure OCDE is a rectangle inscribed in a quadrant of a circle of 10 cm radius. If $OE = 2\sqrt{5}\ cm$, then the area of rectangle will be-

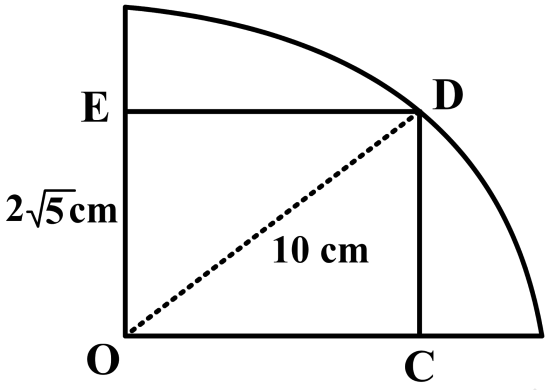


a. $38\ cm^2$
b. $40\ cm^2$
c. $42\ cm^2$
d. $44\ cm^2$

Answer: (b)

Solution:

Radius of the circle = Diagonal of the rectangle = 10 cm
OE = CD = $2\sqrt{5}\ cm$(Opposite sides in a rectangle are equal)



Now, in triangle OCD, using the pythagorean theorem,
$OD^2 = CD^2 + OC^2$
$(10^2) = (CD)^2 + (2\sqrt{5})^2$
$CD^2 = 100 - 20 = 80$
$CD = 4\sqrt{5}$ cm
Now, area of the rectangle OEDC = OC X CD $= 2\sqrt{5}$ X $4\sqrt{5}$ = 8 X 5 = 40 cm^2

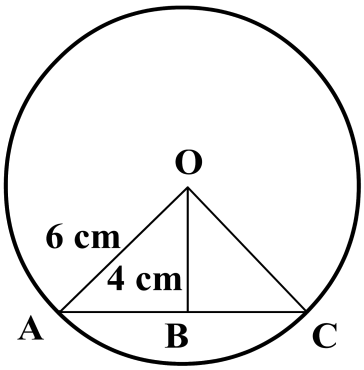
Question 49. The length of a chord which is at a distance of 4 cm from the centre of a circle of radius 6 cm will be-

a. $4\sqrt{5}\ cm$
b. $3\sqrt{5}\ cm$
c. $2\sqrt{5}\ cm$
d. $5\sqrt{5}\ cm$

Answer: (a)

Solution:

Let the image given below be a representation of the condition given in the question.



Let the cord be AC.
In ΔAOB, by applying pythagoras theorem.
$OA^2 = AB^2 + OB^2$
$6^2 = AB^2 + 4^2$
$AB^2 = 20$
$AB = 2\sqrt{5}$
Since, AB is half of AC, the length of chord will be 2AB.
$AC = 4\sqrt{5}$

Question 50. The radius and slant height of cone are in the ratio 4 : 7. If its curved surface area is $792\ cm^2$, then its radius will be-

a. 12 cm
b. 4 cm
c. 9 cm
d. 7 cm

Answer: (a)

Solution:

Ratio of the radius of the cone and its slant height is 4:7
Let the radius and the slant height of the cone be 4x and 7x respectively.
Curved surface area of a cone = $\pi rl = \frac{22}{7} \times 4x \times 7x = 792\ cm^2$
$88x^2 = 792$
$x^2 = 9$
$x = 3$

Therefore, the radius of the cone = 4x = 4 × 3 = 12 cm

Question 51. A cone and a hemisphere have equal bases and equal volumes. Then the ratio of their heights will be-

a. 1:2
b. 1 : 1
c. 2 : 1
d. 1 : 3

Answer: (c)

Solution:

The bases of cone and hemisphere are equal. Hence, their radii are equal.
Given: Volume of cone = Volume of hemisphere
$\frac{1}{3}\pi r^2 h = \frac{2}{3}\pi r^3$
$\Rightarrow h = 2r$
$\Rightarrow \frac{h}{r} = \frac{2}{1}$
Hence, the ratio of their heights is 2:1.

Question 52. The mean of marks Scored by 100 students was found to be 40. Later on it was discovered that a Score of 53 was misread as 83. Then the correct mean will be-

a. 39 .7
b. 39.9
c. 39.6
d. 39.8

Answer: (a)

Solution:

Mean of marks = 40
Total Students = 100

Hence, Total Marks = Mean × Total students = 40 × 100 = 4000
Corrected Total Marks = 4000 - 83 + 53 = 3970
Now, the correct mean = Corrected Total marks/ Total students = 3970/100 = 39.7

Question 53. If α, β and γ are the zeroes of a cubic polynomial $ax^3 + bx^2 + cx + d = 0$, then the value of $\alpha + \beta + \gamma$ will be-

a. $\frac{b}{a}$
b. $-\frac{b}{a}$
c. $\frac{c}{a}$
d. $-\frac{c}{a}$

Answer: (b)

Solution:

Sum of roots of cubic equation $ax^3 + bx^2 + cx + d = 0$ is given by $-\frac{b}{a}$.
Hence, $\alpha + \beta + \gamma = -\frac{b}{a}$

Question 54. For what value of p the points (11,4), (1, –1) and (p, 1) are collinear?

a. -5
b. -3
c. 3
d. 5

Answer: (d)

Solution:

Given: A(11, 4), B(1, -1), and C(p, 1) are collinear.
If these points are collinear, then the slopes of the lines made using any two pairs are equal.

Slope of AB = $\frac{-1-4}{1-11} = \frac{-5}{-10} = \frac{1}{2}$

Slope of AC = $\frac{1-4}{p-11} = \frac{-3}{p-11}$

Slope of AB = Slope of AC

$\frac{1}{2} = \frac{-3}{p-11}$

⇒ 1(p - 11) = -6

⇒ p - 11 = -6

⇒ p = -6 +11

⇒ p = 5

Question 55. The sum of probability of an event E and Probability of the event not E' is always equal to -

a. -1
b. 1
c. 0
d. $\frac{1}{2}$

Answer: (b)

Solution:

The sum of the probability of all events in an experiment is 1.
P(E) + P(E') = 1

Question 56. Two consecutive positive even integers, the sum of whose squares is 164, will be -

a. 6 and 8
b. 8 and 10
c. 10 and 12
d. 4 and 6

Answer: (b)

Solution:

Let two consecutive positive even integers be y and y+2.
Given: $y^2 + (y + 2)^2 = 164$
$\Rightarrow 2y^2 + 4 + 4y = 164$
$\Rightarrow y^2 + 2y - 80 = 0$
$\Rightarrow (y + 10)(y - 8) = 0$
$\Rightarrow y = -10$ or 8
y = 8 and y + 2 = 8 + 2 =10 ($\because$ positive even integers)
Hence, two consecutive positive even integers are 8 and 10.

Question 57. Let $\Delta ABC \sim \Delta DEF$ and their areas be respectively, $64\ cm^2$ and $121\ cm^2$, If $EF = 15.4\ cm$, then the value of BC is-

a. 11.2 cm
b. 11.6 cm
c. 11.4 cm
d. 11.8 cm

Answer: (a)

Solution:

Given: $\Delta ABC \sim \Delta DEF$

$\therefore \frac{ar(\Delta ABC)}{ar(\Delta DEF)} = \frac{BC^2}{EF^2}$

$\Rightarrow \frac{64\ cm^2}{121\ cm^2} = \frac{BC^2}{15.4^2}$

$\Rightarrow \frac{8^2}{11^2} = \frac{BC^2}{15.4^2}$

$\Rightarrow \frac{8}{11} = \frac{BC}{15.4}$

$\Rightarrow \frac{8}{11} \times 15.4 = BC$
$\Rightarrow$ BC = 11.2 cm

Question 58. How many terms of the A.P. 9, 17, 25…… must be taken to give a sum of 636 -

a. 13
b. 11
c. 14
d. 12

Answer: (d)

Solution:

For the given AP series:
First term, a = 9
Common difference, d =17-9 = 8
S_n = 636
$\therefore$ 636 = $\frac{n}{2}$[2×9 + (n-1)×8]
$\Rightarrow$ 636 = $\frac{n}{2}$[18 + 8n - 8]
$\Rightarrow$ 636 = n[9 + 4n - 4]
$\Rightarrow$ 636 = 5n + $4n^2$
$\Rightarrow$ $4n^2$ + 5n - 636 = 0
$\Rightarrow$ $4n^2$ + 53n - 48n - 636 = 0
$\Rightarrow$ n (4n + 53) - 12 (4n + 53)= 0
$\Rightarrow$ (n - 12) (4n + 53) = 0
$\Rightarrow$ n = 12 or -$\frac{53}{4}$
$\Rightarrow$ n = 12 ($\because$ terms can't be negative)

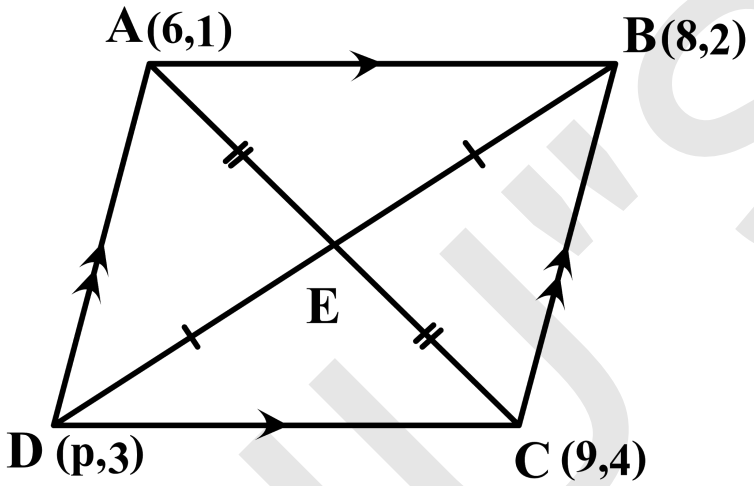
Question 59. If the points A (6, 1), B (8, 2), C (9, 4) and D (p, 3) are the vertices of a parallelogram, taken in order, then the value of p will be -

a. 6
b. 9
c. 8
d. 7

Answer: (d)

Solution:

Given: A(6,1), B(8,2), C(9,4), D(p,3) are vertices of parallelogram.



AC and BD bisects each other at point E. (Property of parallelogram)

∴ Midpoint of AC = Midpoint of BD

$(\frac{6+9}{2}, \frac{1+4}{2}) = (\frac{8+p}{2}, \frac{2+3}{2})$

$\Rightarrow (\frac{15}{2}, \frac{5}{2}) = (\frac{8+p}{2}, \frac{5}{2})$

So, $\frac{15}{2} = \frac{8+p}{2}$

$\Rightarrow 15 = 8+p$

$\Rightarrow p = 15-8 = 7$

Question 60. The length of the minute hand of a clock is 14 cm. The area swept by the minute hand in 5 minutes will be

a. $51\frac{1}{2}\ cm^2$

b. $51\frac{1}{3}\ cm^2$

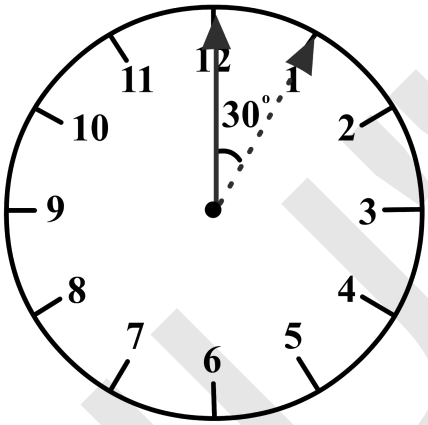
c. $51\frac{1}{4}\ cm^2$

d. None of these

Answer: (b)

Solution:

From the image given below it is clear that the minute hand covers 30° in 5 minutes.



Given: The length of the minute hand of the clock, r = 14 cm

Now, area of sector of circle of angle θ and radius r is given by : $\pi r^2 \times \frac{\theta}{360°}$

Area swept by minute hand in 5 minutes will be:

$\Rightarrow \frac{22}{7} \times (14)^2 \times \frac{30°}{360°}$

$\Rightarrow \frac{22}{7} \times 196 \times \frac{1}{12} = \frac{154}{3} = 51\frac{1}{3}$

Thus, the area swept by minute hand in 5 minutes will be $51\frac{1}{3}\ cm^2$.

BIOLOGY

Question 61.If a cell is placed in hypertonic solution it will-

a. Shrink
b. Show plasmolysis
c. Swell up

d. No change in shape and size

Answer: (a)

Solution:

A cell placed in hypertonic solution loses water by exosmosis and it shrinks.

Question 62. A plant hormone which inhibits plant growth is -

a. Auxin
b. Cytokinin
c. Gibberellin
d. Abscisic Acid

Answer: (d)

Solution:

Abscisic acid (ABA) is a plant growth inhibiting hormone. It causes wilting of leaves, helps in closure of stomata, abscission of fruits, seed dormancy, etc.

Question 63. The disease caused due to deficiency of iron in human diet is-

a. Anaemia
b. Goitre
c. Scurvy
d. None of the above

Answer: (a)

Solution:

Anaemia is the disease caused due to the deficiency of iron. Goitre and scurvy is caused due to the deficiency of iodine and vitamin C respectively.

Question 64. Oxygen rich blood from lungs comes to which chamber of the heart-

a. Right atrium
b. Left atrium
c. Both (a) and (b)
d. None of the above

Answer: (b)

Solution:

The pulmonary vein carries oxygenated blood from the lungs to the left atrium.

Question 65. The enzyme that is responsible for break down of starch into simple sugar in human mouth is-

a. Amylase
b. Pepsin
c. Lipase
d. Trypsin

Answer: (a)

Solution:

Salivary amylase is the enzyme that helps breakdown starch into simple sugar maltose in the mouth.

Question 66. The mode of nutrition in fungi is -

a. Only saprotrophic
b. Saprotrophic or parasitic
c. Only parasitic
d. None of the above

Answer: (b)

Solution:

Majority of the fungi basically have a saprotrophic mode of nutrition. Although many disease causing parasitic fungi are also found.

Question 67. Which organelle of cell contains its own DNA besides the nucleus?

a. Endoplasmic Reticulum
b. Golgi bodies
c. Mitochondria
d. Lysosome

Answer: (c)

Solution:

Mitochondria is a semi-autonomous cell organelle. It has its own genetic material in the form of a double-stranded circular DNA.

Question 68. Which one of the following is not a bacterial disease?

a. Cholera
b. COVID-19
c. Tuberculosis
d. Anthrax

Answer: (b)

Solution:

COVID-19 is a viral disease caused by coronavirus. Whereas cholera, tuberculosis and anthrax are bacterial diseases.

Question 69. Which of the following have open circulatory system?

a. Arthropoda

b. Porifera
c. Annelida
d. Coelenterata

Answer: (a)

Solution:

Arthropods have an open circulatory system. The blood flows without blood vessels directly into the haemocoel.

Question 70. Which of the following is not a component of phloem?

a. Stone cell
b. Sieve plate
c. Sieve tube
d. Phloem parenchyma

Answer: (a)

Solution:

Phloem consists of sieve plates, phloem fibres, sieve tubes, and phloem parenchyma. Stone cells are also called sclereids and constitute sclerenchymatous tissue.

Question 71. The function of centrosome is-

a. Formation of spindle fibers
b. Protein synthesis
c. Osmoregulation
d. Secretion

Answer: (a)

Solution:

Centrosome helps in the formation of spindle fibres during cell division.

Question 72. Which of the following juice is secreted by pancreas?

a. Trypsin
b. Pepsin
c. Bile juice
d. Both (a) and (b)

Answer: (a)

Solution:

Trypsin is an enzyme secreted by pancreas which helps in the digestion of proteins.

Question 73. A person suddenly spots a snake.His heart beat increases and blood pressure also goes up.Which hormone is being released in his body at that time?

a. Parathormone
b. Adrenalin
c. Corticoid
d. Thyroxine

Answer: (b)

Solution:

Adrenalin is a hormone synthesized by stimulation of the sympathetic nervous system in response to fight, flight and fright/fear.

CHEMISTRY

Question 74. When ice melts at same temperature 0^0C (273 Kelvin) , which one of the following has more energy?

a. Energy of water particles
b. Energy of ice particle
c. Both water and ice particles have same energy
d. None of these

Answer: (a)

Solution:

Energy possessed by the particles of water is maximum as ice melts into water by absorbing the latent heat of fusion.

Question 75. In order to balance a chemical equation, it is necessary to satisfy the law of

a. Conservation of motion
b. Conservation of momentum
c. Conservation of energy
d. Conservation of mass

Answer: (d)

Solution:

In order to balance a chemical reaction, law of conservation of mass needs to be satisfied. The process of balancing chemical equations makes the number and type of atoms equal on both sides of the chemical equation.

Question 76. Which of the following phenomenon occurs when a small amount of acid is added to water?

(I) ionisation (II) neutralization (III) dilution (IV) salt formation

a. I and II
b. I and III
c. II and III
d. II and IV

Answer: (b)

Solution:

Ionization of a compound refers to a process in which a neutral molecule splits into charged ions when exposed in a solution. According to Arrhenius theory, acids are the compounds that dissociate in an aqueous medium to generate hydrogen ions (H^+). Addition of acid to water leads to decrease in concentration of H^+ ions per unit volume leading to dilution of the acid.

Question 77. Which of the following statements is usually correct for carbon compounds?

(I) Are good conductor of electricity.
(II) Are poor conductor of electricity.
(III) Have strong forces of attraction between their molecules.
(IV) Do not have strong forces of attraction between their molecules.

a. I and III
b. II and III
c. I and IV
d. II and IV

Answer: (d)

Solution:

The compounds of carbon are poor conductors of electricity due to the absence of free electrons in the compounds and also they are bonded by covalent bonds which is a weak force of attraction compared to ionic bonds.

Question 78. Which one of the following is the weakest acid?

a. H_2SO_4
b. HNO_3

c. H_2SO_3
d. HCl

Answer: (c)

Solution:

H_2SO_3 is the weakest acid amongst all of them. A strong acid dissociates completely in aqueous medium to give H^+ ions. H_2SO_3 on the other hand partially dissociates in water.

Question 79. A milkman adds a very small amount of baking soda to fresh milk, why?

a. To increase the rate of fermentation
b. To decrease the rate of fermentation
c. To increase the quality of milk
d. To make paneer

Answer: (b)

Solution:

The milkman adds a very small amount of baking soda in fresh milk to increase the pH of the milk which in turn slows down the process of curdling by reducing the rate of fermentation.

Question 80. Read carefully the following statements regarding the ions Na^+, Mg^{2+}, F^- and O^{2-}
(I) All ions have same number of valence electrons.
(II) All ions belong to the elements of the same period of periodic table.
(III) All ions have same electronic configuration.
(IV) All ions have same number of electron shells.

a. I and II
b. I,II and III
c. I,III and IV

d. All are correct

Answer: (c)

Solution:

The number of valence electrons in Na^{+}, Mg^{2+}, F^{-} and O^{2-} is 8. They have attained the stable octet configuration of the nearest noble gas “Neon”. Thus, they have the same electronic configuration and electron shells.

Question 81. Two elements P and Q have 5 and 7 electrons in their outermost shell respectively. Atomic number of P and Q will be

a. 5 and 7
b. 9 and 11
c. 23 and 25
d. None of the above

Answer: (d)

Solution:

Atomic number = number of protons = number of electrons

Z (5) = 2, 3
Z (7) = 2, 5

Z(9) = 2, 7
Z (11) = 2, 8, 1

Z (23): 2, 8, 11, 2
Z (25): 2, 8, 13, 2

Thus, none of the options have 5 and 7 electrons in their outermost shell, respectively.

Question 82. In which reaction the addition and removal of oxygen take place simultaneously?

a. Oxidation reaction
b. Reduction reactions
c. Redox reactions
d. Precipitation reactions

Answer: (c)

Solution:

The addition of oxygen to a chemical entity is called oxidation and removal of oxygen from a chemical entity is called reduction. The reaction where both the processes happen simultaneously is known as a redox reaction.

Question 83. A piece of charcoal was heated over the flame of the burner. When it starts burning it is immediately dipped into a boiling tube containing water. Now this solution is transferred to another boiling tube and a piece of litmus paper is dipped into it. What will be the observation?

a. Blue litmus turns to red
b. Red litmus turns to blue
c. No change in the colour of litmus
d. None of the above

Answer: (a)

Solution:

The burning of charcoal over the flame of the burner produces carbon dioxide.

$$C + O_2 \rightarrow CO_2$$

When carbon dioxide is mixed with water, it produces carbonic acid. Carbonic acid turns blue litmus red.

$$CO_2 + H_2O \rightarrow H_2CO_3$$

Question 84. At a refinery petroleum is separated into several components by a process called fractional distillation using fractionating column. Which of the following statement is incorrect about the process?
(I) Temperature decreases from bottom to the top of the column
(II) At each level in the column only one compound is collected
(III) The fraction collecting at the top of column is less volatile
(IV) The fraction with the highest boiling point condenses first and gets collected near the base of the fractionating column.

a. I only
b. I and II
c. II only
d. II and IV

Answer: BONUS

Solution:

The statements II, III and IV are incorrect.

The most volatile compounds get collected at the top of the column. The fraction with the lowest boiling point condenses first at the top of the fractional distillation column due to its lower density and molecular weight. At each level of a fractionating column a mixture of hydrocarbons can also be produced which are then processed to obtain different products.

Question 85. Which of the following sets contains all the possible combustion products of methane?

a. $C,\ CO_2,\ CO$ and H_2O
b. $C,\ CO$ and H_2
c. $CO_2,\ CO,\ H_2$ and water
d. CO and water

Answer: (a)

Solution:

Complete combustion of methane produces carbon dioxide and water.

$$CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(g) + energy$$

Incomplete combustion of methane, on the other hand, produces carbon monoxide, water and some unburnt carbon.

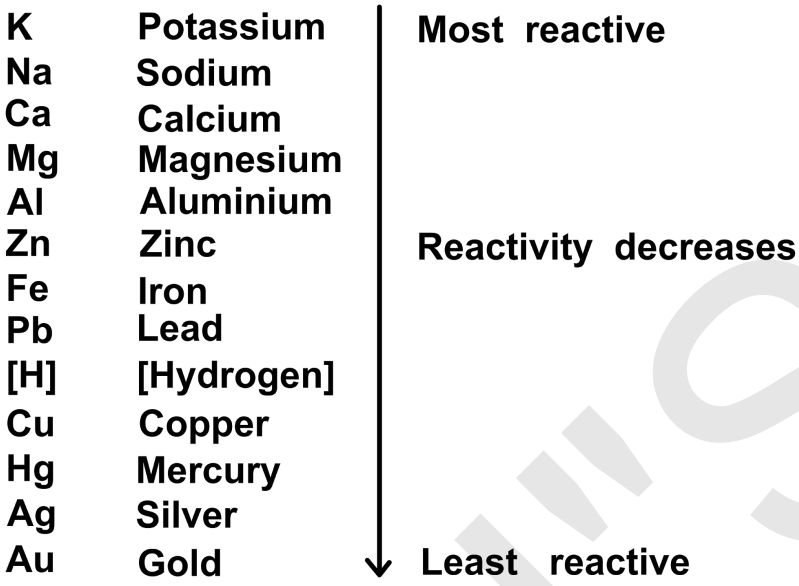
$$4CH_4(g) + 5O_2(g) \rightarrow 2CO(g) + 8H_2O(g) + 2C(s)$$

Question 86. Strips of metal X were dipped into the solution of silver nitrate and zinc nitrate separately. A greyish metallic deposit was found on both the strips. Metal X could be

a. Cu
b. Mg
c. Pb
d. Fe

Answer: (b)

Solution:



Since both silver and zinc got displaced from their nitrate solutions, it can be said that the metal which displaces them is more reactive than that of silver and zinc. Thus, the only possible metal capable of performing the reaction is magnesium.

$$2AgNO_3(aq) + Mg\ (s) \rightarrow Mg(NO_3)_2(aq) + 2Ag(s)$$

$$Zn(NO_3)_2(aq) + Mg\ (s) \rightarrow Mg(NO_3)_2(aq) + Zn(s)$$

Question 87. Some gases evolved during different tests are given in column A. Column B shows their characteristics. Match column A with column B and choose the correct option-

Column 'A'		**Column 'B'**	
(I)	**Chlorine**	**(a)**	**Colourless and odourless, burns with pop sound**
(II)	**Hydrogen**	**(b)**	**Suffocating odour, turns acidified potassium dichromate solution into green**
(III)	**Sulphur dioxide**	**(c)**	**Colourless, turns lead acetate paper black**

(IV)	**Hydrogen sulphide**	**(d)**	**Greenish yellow in colour, turns moist starch iodide paper blue**

	I	II	III	IV
a.	b	a	c	d
b.	a	c	b	d
c.	d	a	b	c
d.	d	b	a	c

Answer: (c)

Solution:

Chlorine is a gas having greenish-yellow colour and it turns moist starch iodide paper blue.
Hydrogen is a colourless and odourless gas which burns with a pop sound.
Sulphur dioxide has a suffocating smell and turns acidified potassium dichromate solution green.
Hydrogen sulphide is a colourless gas and it turns lead acetate paper black.

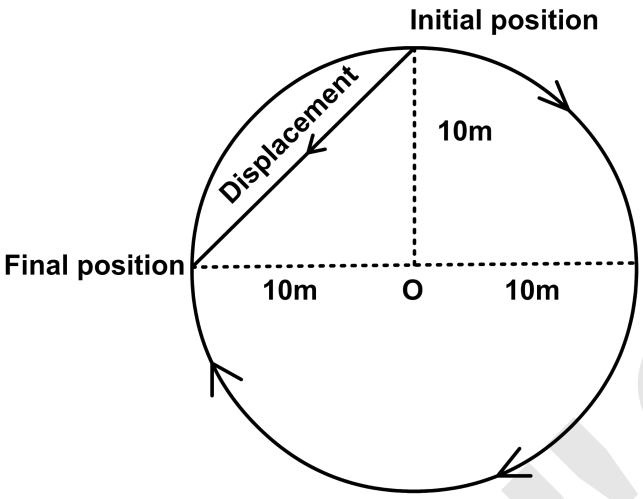
PHYSICS

Question 88. A boy moving along a circular path of radius 10 m completes $3/4$th of the circle in 10 sec. The magnitude of speed and velocity are

a. 4.71 m/s and 47.1 m/s
b. 4.71 m/s and 1.41 m/s
c. 1.41 m/s and 4.71 m/s
d. 1.41 m/s and 1.41 m/s

Answer: (b)

Solution:



Radius = 10 m

$Distance = (\frac{3}{4})2\pi r = (\frac{3}{4})2\pi \times 10 = 9.42\,m$

$Displacement = \sqrt{2}r = \sqrt{2} \times 10 = 14.14\,m$

$Speed = \frac{distance}{time} = \frac{9.42}{2} = 4.71\,m/s$

$Velocity = \frac{displacement}{time} = \frac{14.14}{10} = 1.414\,m/s$

Question 89. Two object have masses in the ratio 1:2. If the forces acting on them are in the ratio 2:1 then the ratio of their acceleration is -

a. 1:1
b. 1:2
c. 2:1
d. 4:1

Answer: (d)

Solution:

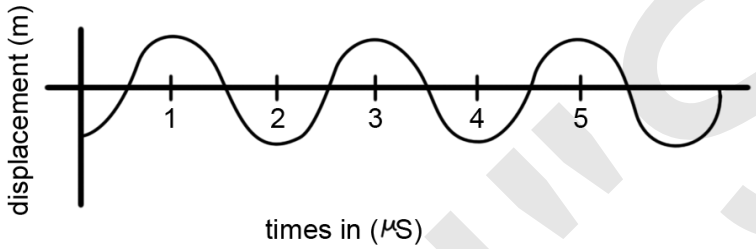
$F = ma;\ F_1 = m_1a_1;\ F_2 = m_2a_2$

$\frac{F_1}{F_2} = \frac{2}{1}\ and\ \frac{m_1}{m_2} = \frac{1}{2}$

$\frac{a_1}{a_2} = \frac{F_1 m_2}{F_2 m_1}$

$\frac{a_1}{a_2} = \frac{4}{1}$

Question 90. The given graph shows the displacement versus time relation for a disturbance travelling with velocity 1500 m/s. The wavelength of the disturbance will be -



a. $3 \times 10^{-3} m$
b. $15 \times 10^{-4} m$
c. $3 \times 10^{3} m$
d. $15 \times 10^{4} m$

Answer: (a)

Solution:

$Wavelength = speed\ x\ time$
$Speed = 1500\ m/s\ and\ time = 2\mu s = 2 \times 10^{-6} s$
$Wavelength = 1500 \times 2 \times 10^{-6} = 3 \times 10^{-3}$

Question 91. ρ_1 and ρ_2. Two wires of equal length and equal cross section area with resistivity and r2 are connected in a series. The equivalent resistivity of combination is -

a. $(\rho_1 + \rho_2)$
b. $\frac{1}{2}(\rho_1 + \rho_2)$

c. $\sqrt{\boldsymbol{\rho}_1\boldsymbol{\rho}_2}$

d. $2(\boldsymbol{\rho}_1 + \boldsymbol{\rho}_2)$

Answer: (b)

Solution:

$$R = \frac{\boldsymbol{\rho}L}{A} \text{ and in series } R_{eq} = R_1 + R_2$$

$$\frac{\boldsymbol{\rho}_{eq}(L+L)}{A} = \frac{\boldsymbol{\rho}_1 L}{A} + \frac{\boldsymbol{\rho}_2 L}{A};\ 2\boldsymbol{\rho}_{eq}\mathrm{L} = \boldsymbol{\rho}_1\mathrm{L} + \boldsymbol{\rho}_2\mathrm{L}$$

$$\boldsymbol{\rho}_{eq} = \frac{1}{2}(\boldsymbol{\rho}_1 + \boldsymbol{\rho}_2)$$

Question 92. A player caught a cricket ball of mass 150 g moving at a rate of 20 m/s. The catching process is completed in 0.1 second. The force exerted by the ball on the hand of the player is

a. 3 Newton
b. 30 Newton
c. 300 Newton
d. 150 Newton

Answer: (b)

Solution:

$$F = ma = mx(\text{change in velocity})/\text{change in time}$$
$$Mass = 150g = 150\times10^{-3}$$
$$F = \frac{0.15 \times (0-20)}{0.1} = -30\ N$$

Force exerted by the ball on the hand of the player is 30N.

Question 93. The energy produced by converting 1 micro gram of matter completely into energy will be-

a. 9×10^{14} Joule
b. 9×10^{10} Joule
c. 9×10^{7} Joule
d. 9×10^{4} Joule

Answer: (c)

Solution:

$$E = (change\ in\ mass)\ x\ c^2$$
$$E = 1\ x\ 10^{-3} x 10^{-6} x\ (3x10^{8})^2 = 9x10^{7}\ Joule$$

Question 94. The danger signals installed at the top of tall buildings are red in colour. These can be easily seen from a distance because among all other colours, the red light-

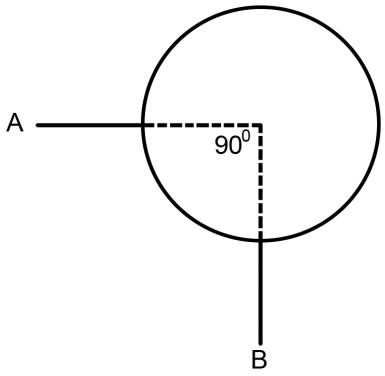
a. is scattered the most by smoke or fog.
b. is scattered the least by smoke or fog.
c. is absorbed the most by smoke or fog.
d. is absorbed the least by smoke or fog.

Answer: (b)

Solution:

Red light is least scattered by smoke, fog or particles since it has the highest wavelength.

Question 95. A wire of Resistance R is coiled in the form of a circle. Then the equivalent resistance between points A and B is-



a. $\frac{R}{16}\Omega$
b. $\frac{3R}{16}\Omega$
c. $\frac{3R}{4}\Omega$
d. $\frac{4}{3}\Omega$

Answer: (b)

Solution:

$Resistance\ in\ parallel\ is\ given\ by\ \frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + ...$

$Resistance\ of\ the\ bigger\ arc\ is\ \frac{3R}{4}\ and\ of\ the\ smaller\ arc\ is\ \frac{R}{4}$

$$\frac{1}{R_{eq}} = \frac{1}{(\frac{3R}{4})} + \frac{1}{(\frac{R}{4})} = \frac{4}{3R} + \frac{4}{R} = \frac{16}{3R}$$

$$R_{eq} = \frac{3R}{16}\Omega$$

Question 96. For a concave mirror of focal length 10 cm. to form twice magnified image, distance of object from its pole is/are

a. $-$ 5cm
b. $-$ 15cm

c. -10cm
d. Both (a) and (b)

Answer: (d)

Solution:

$Magnification = image\ distance/object\ distance = +2\ or\ -2$
$\frac{1}{v} + \frac{1}{u} = \frac{1}{f}$
$Taking\ m = 2$
$2 = -v/u$
$v = -2u$

Now,
$\frac{1}{v} + \frac{1}{u} = \frac{1}{f}$
$\frac{-1}{2u} + \frac{1}{u} = \frac{-1}{10}$
$\frac{1}{f} = \frac{1}{2u}$
$u = -5\ cm$
$Taking\ m = -2;\ v = 2u$

Now,
$\frac{1}{v} + \frac{1}{u} = \frac{1}{f}$

$\frac{1}{2u} + \frac{1}{v} = \frac{-1}{10}$
$\frac{3}{2u} = \frac{-1}{10}$
$u = -15\ cm$

Question 97. Value of G on surface of earth is $6.673 \times 10^{-11}\ m^2/kg^2$, then value of G on surface of Jupiter will be

a. $12 \times 6.673 \times 10^{-11} N - m^2/kg^2$
b. $\frac{6.673}{12} \times 10^{-11} N - m^2/kg^2$
c. $6.673 \times 10^{-11} N - m^2/kg^2$

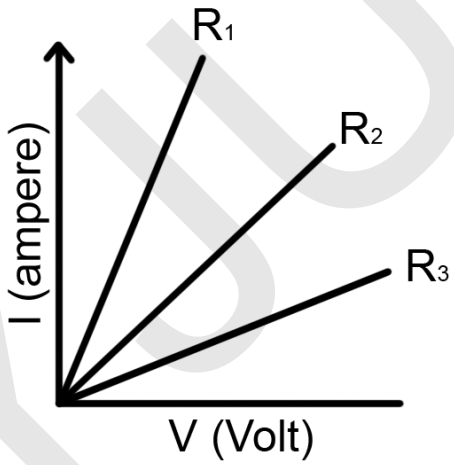
d. $\frac{6.673}{6} \times 10^{-11} N - m^2/kg^2$

Answer: (c)

Solution:

Value of the universal constant G remains the same everywhere.
$G = 6.673 \times 10^{-11} N - m^2/kg^2$

Question 98. A student carries out an experiment and plots the V-I graph of three samples of nichrome wire with resistance R_1, R_2 and R_3 respectively. Which of the following is true?



a. $R_1 = R_2 = R_3$
b. $R_1 > R_2 > R_3$
c. $R_3 > R_2 > R_1$
d. $R_2 > R_3 > R_1$

Answer: (c)

Solution:

V = IR; R = V/I
In a V-I graph, the resistance is directly proportional to the slope of the graph. But in a I-V graph, resistance and slope is inversely proportional.
Thus, $R_3 > R_2 > R_1$.

Question 99. A light and a heavy object have same momentum, then

a. The kinetic energy of heavy object will be more.
b. The kinetic energy of heavy object will be less.
c. The kinetic energy of both objects will be same.
d. None of the above.

Answer: (b)

Solution:

$K.E = \frac{p^2}{2m}$
Kinetic energy is inversely proportional to mass. Since momentum p is the same for both objects, the lighter object will have a higher kinetic energy compared to the heavier object.

Question 100. The unit of mass among the following is

a. AU
b. Light year
c. Chandrashekhar limit (CSL)
d. Å

Answer: (c)

Solution:

Chandrashekhar limit (CSL) is a unit of mass. It is 1.4 times the mass of the sun. The Astronomical Unit, light year and angstrom are all units of length.