1. Division of labour takes place in:
(a) Both unicellular and multicellular organisms
(b) Only multicellular organisms
(c) Neither unicellular nor multicellular organisms
(d) Only unicellular organisms **[b]**

Explanation –
In multicellular organisms, the body is made up of different types of cells that are differentiated to perform specific functions. For example, nerve cells transmit information, muscle cells contract, and cells of the digestive system absorb nutrients. Thus, division of labour brings efficiency and specialisation by assigning different functions to different specialised cells or tissues.
In unicellular organisms, a single cell has to perform all the essential processes of life on its own, so there is no division of labour as seen in multicellular organisms.

2. The sum of three consecutive multiples of 8 is 2424. Find the largest multiple.
(a) 848
(b) 824
(c) 816
(d) 810 **[c]**

व्याख्या –
- Let the consecutive multiples of 8 be 8x, (x+1), 8(x+2) respectively

Sum of the three multiples = 2424

$8x+8(x+1)+8(x+2)=2424$

$8x+8x+8+8x+16=2424$

$24x+24=2424$

$24(x+1)=2424$

$(x+1)=101$

$x=100$

Largest multiple of 8 $=8(x+2)\Rightarrow 8(100+2)=816$

3. What is the value of M in $(p/q)^{2M+2}=(q/p)^{9-M}$?
(a) $\frac{-7}{2}$
(b) 5
(c) –11
(d) 6 **[c]**

व्याख्या –

$\left(\frac{p}{q}\right)^{2m+2}=\left(\frac{q}{p}\right)^{9-m}$

$\left(\frac{p}{q}\right)^{2m+2}=\left(\frac{p}{q}\right)^{-9+m}$

$2m+2=-9+m$

$(m=11)$

Hence, the value of M is -11.

4. UPTQ is related to OJNK in a certain way based on the English alphabetical order. In the same way, RMQN is related to LGKH. Following the same logic, NIMJ is related to which of the following options?
(a) HCDG
(b) CHGD
(c) CHDG
(d) HCGD **[d]**

Explanation –
Just as,

U P T Q
–6↓ –6↓ –6↓ –6↓
O J N K

And

R M Q N
–6↓ –6↓ –6↓ –6↓
L G K H

In the same manner,

N I M J
-6↓ -6↓ -6↓ -6↓
H C G D

Therefore option (c) is correct.

5. The average marks of the students of a class in a particular examination are 80. If 5 students whose average marks in that examination are 40 are removed, then the average marks of the remaining students will be 90. Find the number of students who wrote the examination.
(a) 15
(b) 25
(c) 20
(d) 35 **[b]**

व्याख्या –
Let there are total x students in the exam.
The overall average of x students is 80 marks.
Then total marks of x students = 80x
In this examination 5 students are eliminated whose average is
40 marks or total marks of 5 students = 5 × 40 ⇒ 200 marks
So the total average of the remaining students is 90. So the total marks = (*x*-5)90
Number of students who wrote the exam =

$200+(x-5)90=80x$

$200+90x-450=80x$

$10x=450-200$

$10x=250$

$x=25$

Hence, the total number of students is 25.

6. KBWJ, MZZG are related in a certain way based on the English alphabetical order. Similarly OXCD is related to QVFA. Following the same logic, STIX is related to which of the following options?

(a) TSLV
(b) URLU
(c) VRKU
(d) VSLT **[b]**

Explanation –

Just as,

K B W J
+2↓ −2↓ +3↓ −3↓
M Z Z G

And

O X C D
+2↓ −2↓ +3↓ −3↓
Q V F A

Similarly,

S T I X
+2↓ -2↓ +3↓ -3↓
U R L U

Therefore option (b) is correct.

7. Which Indian Bharatanatyam dancer and film artist has been awarded the Padma Shri in 1968, and will be awarded the Padma Bhushan during the civilian investiture ceremony in 2024?

(a) Vaijayantimala
(b) Shobana
(c) Hema Malini
(d) Rukmini Devi Arundale **[a]**

व्याख्या –

Dr. Vaijayantimala has received many awards and honours.

She was awarded the honorary degree of Doctor of Letters by the Annamalai University, Chidambaram in 1995 for her contribution to the classical art of Bharatanatyam. The Government of India awarded her the "Padma Shri" in 1968.

8. In a certain code language, 'ARGOT' is written as '12497' 'YOUR GRAFT' is written as '29743'. In the same code language how will 'F' be written as?

(a) 2
(b) 7
(c) 3
(d) 4 **[c]**

Explanation –

Just as,

A	R	G	O	T	-	1	2	4	9	7
G	R	A	F	T	-	2	9	7	4	3

Similarly,

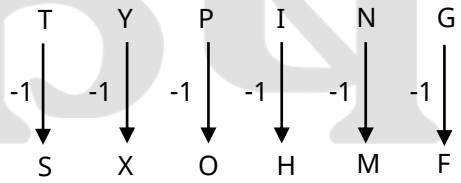
F = 3

Therefore option (c) is correct.

9. If each letter of the word TYPING is replaced by the letter immediately preceding it in the English alphabetical order, and the new group of letters thus formed is rearranged in the English alphabetical order, then which letter will be the first from the right in the new rearranged group of letters?

(a) M
(b) X
(c) O
(d) S **[b]**

Explanation –



Arranging them in English alphabetical order

F H M O S X

From left

It is clear from the diagram that the first letter from the right will be 'x'. Hence option (b) is correct.

10. Which of the following statements is incorrect?

(a) A force acts between the particles of matter.
(b) The force acting between the particles of matter holds them together.
(c) The strength of the force of attraction between the particles of matter remains constant, irrespective of the type of matter.
(d) The strength of the force of attraction between the particles of matter varies from one type of matter to another. **[c]**

Explanation –

The strength of the force of attraction between the particles of matter varies in different substances.

This force is highest in solids, due to which their particles are tightly bound and they have definite shape and volume.

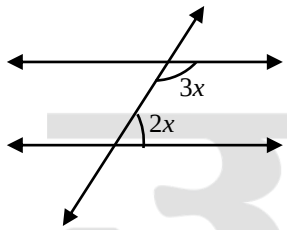
This force is less in liquids than in solids, due to which their particles can move and they have definite volume but not definite shape.

The force of attraction is very less in gases, due to which their particles can move freely and they have neither definite shape nor definite volume.

11. If the ratio of two interior angles on the same side of a transversal intersecting two parallel lines is 2 : 3, then which is the larger of the two angles?

(a) 136°
(b) 120°
(c) 108°
(d) 54° **[c]**

व्याख्या –



∵ Two interior angles are supplementary angles.

$3x + 2x = 180^\circ$

$5x = 180^\circ$

$x = 36^\circ$

Hence the largest angle $= 36 \times 3 \Rightarrow 108^\circ$

12. Based on the English alphabetical order, three of the following four letter-cluster pairs are alike in a certain way and thus form a group. Which of the following pair does not belong to that group?
(Note: Odd letter-cluster is not based on the number of consonants/vowels or their position in that letter-cluster.)

(a) WR-UP
(b) ID-GB
(c) MS-LH
(d) QL-OJ **[c]**

Explanation –

Option-A: 5 (W R) - 5 (U P)

Option-B: 5 (I D) - 5 (G B)

Option-C: 6 (M F) - 4 (L H)

Option-C: 5 (Q L) - 5 (Q J)

Option (c) is different from other options.
Hence option (c) is correct.

13. Find the LCM of 84, 105 and 140.

(a) 240
(b) 420
(c) 360
(d) 120 **[b]**

व्याख्या –

LCM of 84, 105 and 140 =

$84 = 2 \times 2 \times 3 \times 7$

$105 = 3 \times 5 \times 7$

$140 = 2 \times 2 \times 5 \times 7$

$\text{LCM} = 4 \times 3 \times 5 \times 7 \Rightarrow 420$

Hence, the LCM of 84, 105 and 140 is 420.

14. If + means -,- means ×,× means ÷,÷ means +, then what will come in place of question mark '?' in the following equation?
62 – 2 ÷ 7 + 14 × 7 = ?

(a) 143
(b) 129
(c) 131
(d) 133 **[b]**

Explanation –

62 – 2 ÷ 7 + 14 × 7 = ?

On changing the signs

$62 \times 2 + 7 - 14 \div 7 = ?$

$124 + 7 - 2 = ?$

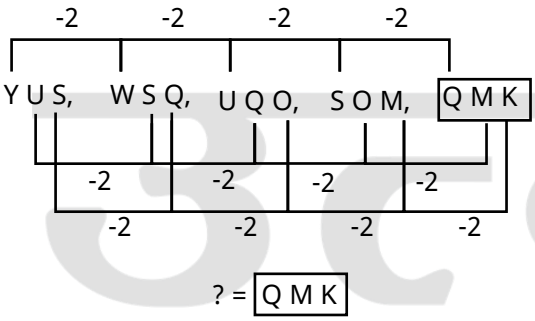
$129 = ?$

Therefore option (b) is correct.

15. Which of the following options should come in place of the question mark (?) in the given series based on the English alphabetical order?
YUS, WSQ, UQO, SOM, ?

(a) QKL
(b) RML
(c) QMK
(d) QOL **[c]**

Explanation –



Therefore option (c) is correct.

16. If each consonant of the word MASTER is replaced by the letter immediately preceding it in the English alphabetical order, and each vowel is replaced by the letter immediately following it in the English alphabetical order, then how many consonants will be present in the new group of letters thus formed?

(a) Five
(b) Three
(c) Six
(d) Four **[c]**

Explanation –

M	A	S	T	E	R
↓-1	↓+1	↓-1	↓-1	↓+1	↓-1
L	B	R	S	F	Q

According to the diagram, the number of consonants in the new letter group will be 6.
Hence option (c) is correct.

17. For which of the following Sustainable Development Goals a score below 50 highlights the need for targeted efforts?

(a) Goal 8 (Dignified work and economic growth)
(b) Goal 5 (Gender equality)
(c) Goal 15 (Life on land)
(d) Goal 13 (Climate action) **[b]**

व्याख्या –

Sustainable Development Goal (SDG) 5, focuses on gender equality, and needs targeted efforts as it has a score of less than 50. This means that progress in achieving this goal is slow and more efforts are needed.
Other options:-
- Goal 8 (Dignified work and economic growth):
This goal is about economic growth and decent work, and has a score of more than 50.
- Goal 15 (Life on land):
This goal is about conserving and managing terrestrial ecosystems.

- Goal 13 (Climate action):
This goal is about tackling climate change.•

18. In 2023, which institution implemented two-factor authentication for all e-way bill and e-invoice systems?

(a) RBI
(b) SEBI
(c) CBDT
(d) CBIC **[d]**

व्याख्या –

National Informatics Centre (NIC) has recently enabled 2-factor authentication for e-Waybill and e-Invoice systems to further enhance the security of the systems.
This 2-factor authentication is required in addition to the username and password to log in to the system.

19. A total of _____ Arjuna Awards were presented during the National Sports Awards 2023.

(a) 26
(b) 31
(c) 18
(d) 21 **[a]**

व्याख्या –

- A total of 26 Arjuna Awards were presented during the National Sports Awards 2023. The awards were presented by President Draupadi Murmu at a ceremony held on 9 January 2024 at Rashtrapati Bhavan. These awards honored sportspersons and para-sportspersons of various sports for their outstanding performance.
Arjuna Award:-
Arjuna Award is a prestigious award given by the Government of India for outstanding performance in the field of sports, which was started in 1961. This award is given to those players who have performed outstandingly at the national and international level, as well as have leadership ability and moral character. The award consists of a bronze statue (statue of Arjuna), citation and a cash prize of Rs 15 lakh

20. Choose the wrong pair.

(a) Small carnivores - Third nutritional level
(b) Primary consumers - Second nutritional level
(c) Autotrophs - First nutritional level
(d) Bacteria - Fourth nutritional level **[d]**

व्याख्या –

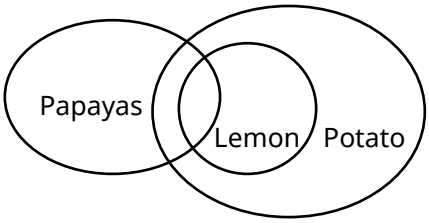
•

Nutritional level	Example
1st	Autotrophs → green plants, algae
2nd	Primary consumers → herbivores, deer, cow

3rd	Secondary consumers → small carnivores, frogs
4th	Tertiary consumers → large carnivores, lion, eagle
Decomposers	Bacteria, fungi → decompose dead organisms, they are counted separately

21. Read the statements and conclusions given below carefully. You have to assume that the given statements are true even if they seem to be at variance with commonly known facts and decide which of the conclusions logically follows from the given statement(s).
Statements:
All lemons are potatoes.
Some lemons are papayas.
Conclusions:
(I) Some potatoes are papayas.
(II) All papayas are potatoes.
(a) Neither conclusion (I) nor (II) follows from the statements.
(b) Only conclusion (I) follows from the statements.
(c) Only conclusion (II) follows from the statements.
(d) Both conclusions (I) and (II) follow from the statements. **[b]**

Explanation –



It is clear from the diagram that conclusion (i) follows.
Hence option (a) is correct.

22. The resistance of a 10 m long copper wire is R ohm. What will be the resistance of a 5 m long copper wire?
(a) 2R ohm
(b) R ohm
(c) 5R ohm
(d) 0.5R ohm **[d]**

Explanation –
Resistance of 10 m long copper wire = RΩ
For the same material (copper) and same thickness, the resistance of a 5 m long wire is asked.

Formula of resistance:

$$R = \rho \frac{l}{A}$$

Where R = resistance
ρ = coefficient of resistance of the material (constant for same material)
l = length
A = cross sectional area (same for same thickness)
This means, resistance is proportional to length,
i.e.: $\frac{R_1}{R_2} = \frac{l_1}{l_2}$
given:
$R_1 = R$
$l_1 = 10$ m
$l_2 = 5$ m

So: $R_2 = R \times \frac{l_2}{l_1}$

$$R_2 = R \times \frac{5}{10} = R \times 0.5 = 0.5R \text{ ohm}$$

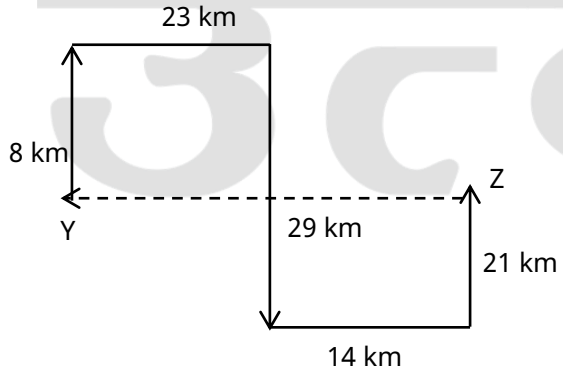
23. Which award has been given to Ram Chet Chaudhary in the field of Science and Engineering in 2024?
(a) Padma Shri
(b) Padma Bhushan
(c) Padma Vibhushan
(d) Bharat Ratna **[a]**

व्याख्या –
In 2024, Ram Chet Chaudhary, a distinguished Indian agricultural scientist, was awarded the Padma Shri award in the field of science and engineering.
Padma Shri Award:-
-It is the fourth highest civilian award of the Republic of India after Bharat Ratna, Padma Vibhushan and Padma Bhushan.
-Established on 2 January 1954, the award is given for "distinguished contribution in various fields of activity including art, education, industry, literature, science, acting, medicine, social service and public affairs".
-It is awarded by the Government of India every year on the Republic Day of India.•

24. Nalin starts from point Y and travels 8 km towards north. Then he turns right and travels 23 km, turns right and travels 29 km. Then he turns left and travels 14 km. He turns left and travels 21 km and stops at point 2. How far (shortest distance) and in which direction should he drive to reach point 4 again? (Unless specified, all turns are 90 degrees only)
(a) 37km towards west
(b) 26 km towards north

(c) 21km towards east
(d) 29km towards south **[a]**

Explanation –



It is clear from the diagram that to reach point y from point z one has to travel 37 km towards west. Hence option (a) is correct.

25. Simplify the following expression.

$(2z-5y)^2+(5z+2y)^2-25z^2$

(a) $19y^2-4z^2$
(b) $29y^2-4z^2$
(c) $29y^2+4z^2$
(d) $19y^2+4z^2$ **[c]**

व्याख्या –

$(2z-5y)^2+(5z+2y)^2-25z^2$

$=(2z)^2+(5y)^2-(2\times 2z\times 5y)+(5z)^2$

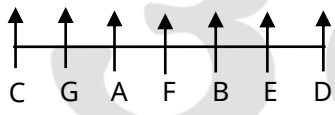
$+(2y)^2+(2\times 5z\times 2y)-25z^2$

$=4z^2+25y^2-20yz+25z^2+4y^2+20yz-25z^2$

$49y^2+4z^2$

26. Seven persons, A, B, C, D, E, F and G, are sitting in a row facing north. Only five persons are sitting between C and D. B is sitting third from the right end. G is sitting immediate right of C. E is sitting third to the right of A. How many persons are sitting between G and F?
(a) Three
(b) Two
(c) Four
(d) One

Explanation –



It is clear from the diagram that only one person (A) is sitting between G and F.
So option (d) is correct.

27. Which of the following electrolytes is used in the electrolytic refining of copper?
(a) Copper sulphate
(b) Sodium sulphate
(c) Cuprous chloride
(d) Copper oxide **[a]**

Explanation –

The process of electrolytic refining is used to purify impure metals.
In electrolytic refining of copper, a block of impure copper metal is used as the anode (positive electrode), and a thin layer of pure copper is used as the cathode (negative electrode).
An acidic solution of copper sulphate ($CuSO_4$) is used as the electrolyte. A small amount of sulphuric acid (H_2SO_4) is also added to this solution to increase the conductivity of the solution.
When electric current is passed, the impure copper at the anode is oxidised and dissolved in the solution as copper ions (Cu^{2+}):
$Cu(s) \rightarrow Cu^{+2}(aq) + 2e^-$
The copper ions present in the solution move towards the cathode and are reduced there and deposited at the cathode in the form of pure copper:
$Cu^{+2}(aq) + 2e^- \rightarrow Cu(s)$
The less active metals present in the impurities (such as gold, silver, platinum) get deposited below the anode as 'anode mud', while the more active metals (such as iron, zinc) remain in the solution but do not get deposited at the cathode along with copper.
Thus, we get high purity copper by the process of electrolytic refining.

28. Which of the following options represents the subatomic particles found in Thomson's atomic model?
(a) Only protons
(b) Only electrons
(c) Both electrons and protons
(d) Both protons and neutrons **[b]**

Explanation –

Thomson's atomic model, also known as the "plum pudding model" or "watermelon model", states that the atom is a positively charged sphere with electrons embedded in it, like seeds in a watermelon or raisins in a pudding.
Thomson was the first to discover the subatomic particle electron.

29. In the following number-pairs, the second number is obtained by performing certain mathematical operations on the first number. What numbers should come in place of X and Y

so that the pattern followed by the two numbers on the left of : is the same as that followed on the right of ::?
(Note: Operations should be performed on whole numbers without breaking the numbers into their constituent digits. Ex. 13- Operations on number 13 such as addition/subtraction/multiplying 13 etc. can be performed. Breaking 13 into 1 and 3 and then performing mathematical operations on 1 and 3 is not allowed.)
X : 128 : : 146 : Y
(a) X = 164 Y = 92
(b) X = 174 Y = 84
(c) X = 156 Y = 86
(d) X = 168 Y = 98 **[a]**

Explanation –
From option (b)

X	:	128	::	146	:	Y
164	:	128	::	146	:	92
↓		↓		↓		↓
1+6+4		1+2+8		1+4+6		9+2
11		11		11		11

Therefore option (b) is correct.

30. A person sells an item for ₹ 247.50 to make a profit of 12.5%. What was the price of the item?
(a) ₹225
(b) ₹210
(c) ₹224
(d) ₹220 **[d]**

व्याख्या –
Let the price of the item be Rs 100x.
Selling price of the article after selling it at 12.5 profit =

$$100x \times \frac{112.5}{100} = 112.5x$$

Then the cost price of the item $= \frac{247.50}{112.5x} \times 100x =$ Rs 220

31. What is the average of all prime numbers between 30 and 50?
(a) 40.4
(b) 40.2
(c) 38.9
(d) 39.8 **[d]**

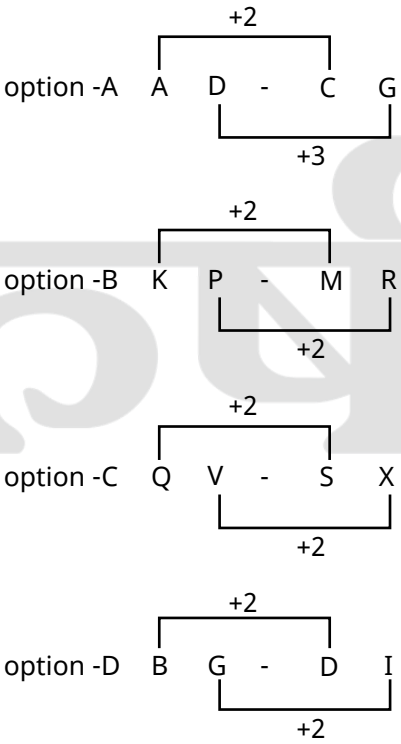
व्याख्या –
Total prime numbers from 30 to 50 = (31, 37, 41, 43, 47)
Average of prime numbers from 30 to 50

$$= \frac{31+37+41+43+47}{5}$$

$$\Rightarrow \frac{199}{5} \Rightarrow 39.8$$

32. Based on the English alphabetical order, three of the following four letter-cluster pairs are alike in a certain way and thus form a group. Which of the following pair does not belong to that group?
(Note: Odd letter-cluster is not based on the number of consonants/vowels or their position in that letter-cluster.)
(a) AD – CG
(b) KP – MR
(c) QV – SX
(d) BG – DI

Explanation –



Hence option (a) is different from other options.

33. Which of the following is not secreted by the gastric glands located in the stomach wall?
(a) Hydrochloric acid
(b) Mucus
(c) Pepsin
(d) Saliva **[d]**

Explanation –
Saliva is secreted by salivary glands located in the oral cavity and helps in emulsifying and wetting food and initiating the digestion of carbohydrates.
Hydrochloric acid (HCl) - Hydrochloric acid makes food acidic and helps in converting pepsinogen into active pepsin.

Mucus - It protects the inner lining of the stomach from the action of hydrochloric acid and pepsin.

Pepsin - It is an enzyme which breaks down proteins into small peptides.

34. A sum of money at a certain rate of compound interest doubles itself in 12 years, if the interest is compounded annually. In how many years will it become eight times itself?

(a) 24
(b) 48
(c) 12
(d) 36 **[d]**

व्याख्या –

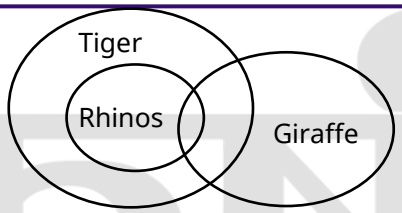
Given,
A sum of money doubles itself in 12 years.
Let the principal be Rs 100.
So amount = Rs 200
Interest = Rs 100
Time = 12 years (given)

As per the formula: - Amount = Principal $(1 + \text{rate})^{\text{time}}$
$200 = 100 (1 + \text{rate})^{12}$
$2 = (1 + \text{rate})^{12}$
In how much time will the amount become 8 times of itself?
$800 = 100 (1 + \text{rate})^{\text{time}}$
$23 = (1 + \text{rate})^{\text{time}}$
$[(1 + \text{rate})^{12}]^3 = (1 + \text{rate})^{\text{time}}$
Time = 36 years

35. Read the statements and conclusions given below carefully. You have to assume that the given statements are true even if they seem to be at variance with commonly known facts and decide which of the conclusions logically follows from the given statement(s).

Statements:
Some giraffes are rhinoceroses.
All rhinoceroses are tigers.
Conclusions:
(I) Some tigers are giraffes.
(II) All tigers are rhinoceroses.
(a) Both conclusion I and II follow from the statements
(b) Only conclusion I follows from the statements
(c) Only conclusion II follows from the statements
(d) Neither conclusion I nor II follows from the statements **[b]**

Explanation –



It is clear from the Venn diagram that only conclusion (I) follows.
Hence option (b) is correct.

36. Seven boxes A, B, C, D, E, F and G are placed one above the other but not necessarily in the same order. F is placed third from the top. Only two boxes are placed between B and G. D is placed just above G. Only three boxes are placed between E and A. D is placed one of the places below F. E is not placed at the topmost position.
Which box is placed fourth from the top,

(a) B
(b) C
(c) A
(d) E **[a]**

Explanation –

1 - A
2 - C
3 - F
4 - B
5 - E
6 - D
7 - G

It is clear from the diagram that box B is at the fourth place from the top.
So option (a) is correct.

37. Which of the following is not an example of a homogeneous mixture?

(a) Copper sulphate powder in water
(b) Sugar dissolved in water
(c) Oil in water
(d) Salt dissolved in water **[c]**

Explanation –

Homogeneous mixture → A mixture in which all the components are mixed uniformly and the entire mixture has the same structure and properties is called homogeneous mixture.
Example: Salt dissolved in water, sugar dissolved in water, copper sulphate solution etc.
Heterogeneous mixture → A mixture in which the components are not mixed uniformly, and its different layers or particles can be seen.
Example: Oil in water

Copper sulphate powder in water – homogeneous mixture – A uniform blue solution is formed on complete dissolution.

Sugar dissolved in water – homogeneous mixture – Sugar dissolves completely in water to form a uniform solution.

Oil in water – heterogeneous mixture – Oil and water remain in separate layers, do not dissolve.

Salt dissolved in water – homogeneous mixture – Salt dissolves completely in water.

38. Which of the following environmental factors play an important role in sex determination in some reptiles?

(a) Temperature
(b) Soil
(c) Pressure
(d) Water **[a]**

Explanation –

In some reptiles (e.g. turtles, crocodiles, lizards) sex determination depends on temperature, this is called TSD (Temperature-dependent sex determination).

The temperature of the nest during the development of eggs decides whether the embryo will become male or female.

Example:

High temperature in crocodiles → male;

High temperature in turtles → female.

39. If 25 persons can complete 5 units of work in 8 days by working 15 hours per day, then how many days will it take for 12 persons to complete 10 units of work by working 20 hours per day?

(a) 24 days
(b) 20 days
(c) 25 days
(d) 22 days **[c]**

व्याख्या –

Given

25 persons working 15 hours per day can complete a unit work in 8 days.

$m_1 = 25$

$h_1 = 15$

$w_1 = 5$

$d_1 = 8$

How much time will 12 people take to complete 10 units of work working 20 hours a day

According to formula

$$\frac{m_1 d_1 h_1}{w_1} = \frac{m_2 d_2 h_2}{w_2}$$

$$\frac{25 \times 15 \times 8}{5} = \frac{12 \times d_2 \times 20}{10}$$

$d_2 = 25$ days

40. Last year, there were 610 boys in a school. This year the number has decreased by 20%. If the number of girls in the school this year is 175% of the total number of boys, then how many girls are there in the school?

(a) 782
(b) 848
(c) 798
(d) 854 **[d]**

व्याख्या –

Given

There were 610 boys in the school last year.

After 20% reduction in the number of boys in the current year, the number of boys $610 \times \frac{80}{100} = 488$ boys

Number of girls currently in school

$= 488 \times \frac{175}{100} \Rightarrow 854$ girls

41. Choose the incorrect statement.

(a) The fusion of male gamete and female gamete is called fertilization.
(b) Male gamete is formed by pollen grains.
(c) Female gamete is present in the stigma.
(d) Fertilization gives us zygote. **[c]**

Explanation –

- Fertilization is the process in which male and female gametes (reproductive cells) fuse to form a zygote.
- In plants, male reproductive cells develop inside pollen grains. Pollen grains travel from the anther to the stigma and begin the process of fertilization.
- The female gamete (egg) is present in the ovule inside the ovary. The stigma is the part of the flower that receives pollen grains. The pollen tube travels through the style and stigma to reach the ovary and carries the male gametes to the female gametes.
- The process of fertilization results in the formation of a single cell called the zygote, which is the beginning of the development of the new organism.

42. When an object is placed at a distance of 20 cm in front of a concave mirror, a real image is formed at the centre of curvature of the

mirror. The magnification produced by the mirror is _____.

(a) -0.5
(b) -1
(c) -10
(d) -20 **[b]**

Explanation –

- Distance of object u=−20 cm (Object distance is negative for concave mirror)
- Image is formed at centre of curvature (centre of curvature, C), i.e. v=−20 cm (because real image is also considered negative)

Image is formed at centre of curvature, so distance of image (v) will be equal to radius of curvature (R).

For a concave mirror, when real image is formed at centre of curvature, object is also placed at centre of curvature.

The formula for magnification (m) produced by a mirror is:

$$m = -\frac{v}{u}$$

$$m = -\frac{-20}{-20} = -1$$

43. Which of the following is formed by the action of chlorine on dry slaked lime?

(a) Calcium oxide
(b) Bleaching powder
(c) Calcium chloride
(d) Hydrochloric acid **[b]**

Explanation –

When chlorine gas (Cl_2) is passed over dry slaked lime ($Ca(OH)_2$), bleaching powder ($Ca(OCl)_2$) is formed in the reaction.

It is used for bleaching and disinfection.

$$Ca(OH)_2 + Cl_2 \longrightarrow Ca(OCl)_2 + H_2O$$

44. Who was appointed as the Director General of Narcotics Control Bureau on 17 September 2024?

(a) Sanjay Arora
(b) Rakesh Asthana
(c) Anurag Garg
(d) Samant Goyal **[c]**

व्याख्या –

On September 17, 2024, Anurag Garg, a 1993 batch Indian Police Service (IPS) officer of Himachal Pradesh cadre, was appointed as the Director General (DG) of the Narcotics Control Bureau (NCB)

45. Which of the following devices does not use the motion of a current-carrying conductor in a magnetic field?

(a) Electric fan
(b) Electric motor
(c) Electric heater
(d) Electric generator **[c]**

Explanation –

The motion of a current-carrying conductor in a magnetic field is used in devices in which electrical energy is converted into mechanical energy or where electromagnetic force is used.

Electric fan:- It has a motor which runs on the motion of a current-carrying conductor in a magnetic field.

Electric motor:- This device also uses the magnetic field and the motion of the current-carrying conductor, it converts electrical energy into mechanical energy.

Electric heater:- It does not use any kind of magnetic field or motion of the conductor. It only generates heat through electric current (like heat is generated by flowing current in a wire).

Electric generator:- It also uses the motion of a conductor in a magnetic field, where the work of converting mechanical energy into electrical energy is done.

46. If 18 : 24 :: 24 : y, then what is the value of y?

(a) 18
(b) 36
(c) 24
(d) 32 **[d]**

व्याख्या –

Given,

18:24::24:y

As per question:-

$$y = \frac{24 \times 24}{18}$$

$$y = 32$$

47. Which Sikkimese craftsman, famous for his skill in making 'Sumak Thyaktuk' (Lepcha traditional hat), was awarded the Padma Shri in 2024 for his contribution to art and cultural heritage?

(a) Karma Wangchuk
(b) Sonam Tshering
(c) Tashi Namgyal
(d) Jordan Lepcha **[d]**

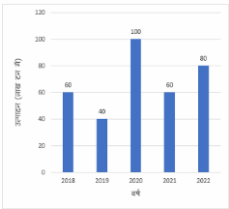
व्याख्या –

In 2024, Jordan Lepcha, a master craftsman from Sikkim was awarded the Padma Shri for his exceptional contribution to arts and cultural

heritage, particularly for his expertise in making 'Sumak Thyaktuk', the traditional hat of the Lepcha community.

48. Study the following graph and answer the given question.

The given bar graph shows the annual production of rice in a state during the period 2018 to 2022.



What is the total production of rice (in lakh tonnes) in the years 2020, 2021 and 2022 together?

(a) 270
(b) 240
(c) 260
(d) 250 **[b]**

व्याख्या –

Total production of rice in 2020 = 100 lakh tonnes
Total production of rice in 2021 = 60 lakh tonnes
Total production of rice in 2022 = 80 lakh tonnes
Hence total production = 100+60+80 ⇒ 240 lakh tonnes

49. When we are travelling in a bus, we start moving forward when the bus suddenly stops. This is due to _____.

(a) Newton's third law of motion
(b) Newton's second law of motion
(c) Inertia of our body
(d) Gravitational acceleration **[c]**

Explanation –

When we are travelling in a vehicle (such as a bus), our body moves with the speed of that vehicle. But when the bus stops suddenly, the inertia of our body forces us to maintain that speed.

Inertia is the property due to which an object tries to remain in its current state (i.e. if it is stationary it will remain stationary and if it is in motion it will remain in motion). When the bus stops, our body takes time to stop and due to this we try to move forward.

This is related to Newton's first law of motion (Inertia), which says that an object remains in its state unless an external force acts on it. It is also called the "Law of Inertia"

50. Fruits and seeds contain high concentrations of which of the following plant hormones?

(a) Auxin
(b) Gibberellin
(c) Abscissic acid
(d) Cytokinin **[d]**

Explanation –

Cytokinin Plant hormone induces cell division and cell growth, which is important for the development of fruits and seeds. This hormone also plays an important role in seed germination and breaking of dormancy.

Auxin - Auxin is a plant hormone found primarily in the tips of stems and roots and promotes cell elongation, differentiation and root formation. It is also involved in fruit development, but its high concentrations are not usually found in fruits and seeds.

Gibberellin - Gibberellin is a plant hormone that promotes stem growth, seed germination and flower development. It also helps increase fruit size, but its highest concentrations are usually found in developing stems and seeds, not in mature fruits.

Abscisic acid - Abscisic acid (ABA) is often referred to as the stress hormone. It plays a role in inducing leaf wilting, closing of stomata, and seed dormancy. Its concentration may be high in mature seeds to prevent germination until conditions are favorable, but its concentration is usually low compared to cytokinins in developing fruits and seeds.

51. The work done by a motor per unit time is called _____.

(a) Power
(b) Acceleration
(c) Energy
(d) Momentum **[a]**

Explanation –

Power is the rate at which work is done or energy is transformed.

When a motor operates, the amount of work it does per unit time is called power.

The unit of power is watt, where 1 watt = 1 joule/second.

Power is defined as the rate of doing work. It is expressed mathematically as follows -

$$P = \frac{W}{t}$$

Where: P is power.
W is the work done.
t is the time taken.

52. When light falls on an opaque object, we see its geometric shadow. This happens due to _____.

(a) Reflection of light
(b) Diffraction of light
(c) Dispersion of light by an object
(d) Light travelling in a straight line **[d]**

Explanation –

When light falls on an opaque object, the light does not reach behind that object, and we see the geometric shadow of that object. This is due to the light traveling in a straight line. Light travels in a straight line, so it creates a shadow behind that object.

This phenomenon is not caused by reflection, diffraction or dispersion of light, because in these phenomena the direction of light changes, which does not create a shadow.

53. Who among the following is the non-playing captain and coach of the Indian chess team at the Chess Olympiad 2024?

(a) Vikram Singh
(b) Srinath Narayanan
(c) Abhijeet Ganguly
(d) Pentala Harikrishna **[b]**

व्याख्या –

-At the 2024 Chess Olympiad held in Budapest, the Indian men's chess team achieved a historic gold medal under the leadership of Grandmaster (GM) Srinath Narayanan, who served as the non-playing captain and coach.

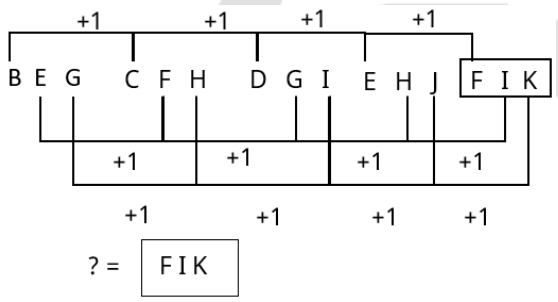
-His strategic guidance and mentorship were crucial in the team's excellent performance.

54. Which of the following options should come in place of the question mark (?) in the given series based on the English alphabetical order?

BEG, CFH, DGI, EHJ, ?

(a) FGL
(b) FIK
(c) FKL
(d) FGK **[b]**

Explanation –



Therefore option (b) is correct.

55. The sides of a rectangle are in the ratio 8 : 10, and its perimeter is 90 cm. Find the area of this rectangle.

(a) 450 cm²
(b) 520 cm²
(c) 550 cm²
(d) 500 cm² **[d]**

व्याख्या –

Given,

The ratio of the sides of a rectangle is 8:10.

Perimeter = 90 cm

Let the breadth and length of the sides of the rectangle be 8x, 10x respectively.

$2(8x+10x)=90$

$2(18x)=90$

$32x=90$

$x=\frac{5}{2}$

Length = $10x \Rightarrow 10\times\frac{5}{2} \Rightarrow$ 25 cm

Breadth $8x \Rightarrow 8\times\frac{5}{2} \Rightarrow$ 20 cm

Area of a Rectangle = 25 × 20 $\Rightarrow$ 500 cm²

56. What will happen to a massive object in free fall under the influence of the gravitational force of the earth?

(a) The mass of the object increases.
(b) The velocity of the massive object increases.
(c) The velocity of the massive object decreases.
(d) The mass of the object decreases. **[b]**

Explanation –

When an object falls freely under the influence of the Earth's gravitational force, its velocity increases. The gravitational force pulls the object downward, and this causes the object to continue to accelerate unless it is affected by another resisting force (such as air drag).

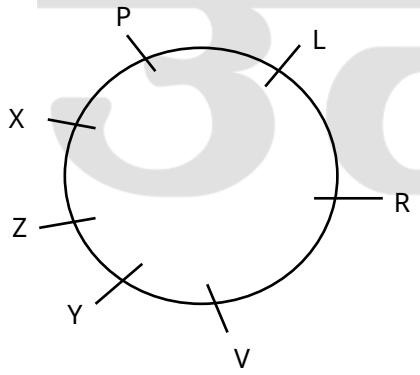
This phenomenon leads to an increase in the velocity of the object, but it has no effect on the mass. The mass always remains the same whether the object is falling or at rest.

57. L, P, R, V, X, Y and Z are seated around a circular table facing the centre. Only one person sits between V and L when counted from the right. Only one person sits between L and X. Only one person sits between V and Z. Only two persons sit between R and X. Only one person sits between P and Z. Who sits immediate right and immediate left of Y respectively?

(a) X and Z
(b) V and X

(c) V and Z
(d) Z and V **[c]**

Explanation –



It is clear from the diagram that v is to the right of y and z is to the left of it.
Therefore option (c) is correct.

58. If tax on a commodity is reduced by 20% and its consumption increases by 15%, what will be the effect on tax revenue?
(a) There will be an increase of 10%
(b) There will be no change
(c) There will be an increase of 8%
(d) There will be a decrease of 8% **[d]**

व्याख्या –

It is given,
The price of the item has been reduced by 20%.
Consumption increased by 15%
According to the formula:-

$$\Rightarrow -x + y - \frac{xy}{100}$$

$$\Rightarrow -20 + 15 - \frac{20 \times 15}{100}$$

$$\Rightarrow -20 + 15 - 3$$

$$\Rightarrow -8$$

Hence the price of the item will decrease by 8%.

59. Choose the correct balanced equation for the reaction $Al_2(SO_4)_3 + BaCl_2 \rightarrow AlCl_3 + BaSO_4$ -
(a) $Al_2(SO_4)_3 + 3BaCl_2 \rightarrow 2\ AlCl_3 + 3\ BaSO_4$
(b) $2Al_2(SO_4)_3 + 3BaCl_2 \rightarrow 2\ AlCl_3 + 3BaSO_4$
(c) $Al_2(SO_4)_3 + 3BaCl_2 \rightarrow 3\ AlCl_3 + 2\ BaSO_4$
(d) $Al_2(SO_4)_3 + 2BaCl_2 \rightarrow 2\ AlCl_3 + 3\ BaSO_4$ **[a]**

Explanation –

Now we balance each element:
Aluminum (Al): There are 2 aluminum atoms on the reactant side, while there is 1 on the product side. To balance it, we put a 2 in front of $AlCl_3$:
$Al_2(SO_4)_3 + BaCl_2 \rightarrow 2AlCl_3 + BaSO_4$
Sulfate groups (SO4): There are 3 sulfate groups on the reactant side, while the product side has 1. To balance this, we put a 3 in front of $BaSO_4$:
$Al_2(SO_4)_3 + BaCl_2 \rightarrow 2AlCl_3 + 3\ BaSO_4$
Barium (Ba): There are 3 barium atoms on the product side, so we need 3 barium atoms on the reactant side as well. To balance this, we put a 3 in front of $BaCl_2$:
$Al_2(SO_4)_3 + 3\ BaCl_2 \rightarrow 2AlCl_3 + 3\ BaSO_4$
Chlorine (Cl): Now let's check the number of chlorine atoms. There are 3×2=6 chlorine atoms on the reactant side, and 2×3=6 chlorine atoms on the product side. Chlorine is also balanced.
Thus, the balanced chemical equation is:
$Al_2(SO_4)_3 + 3\ BaCl_2 \rightarrow 2AlCl_3 + 3\ BaSO_4$

60. A statement is given below followed by two possible reasons numbered I and II. Read the statement carefully and decide which of the two reasons best explains the event/observation/information given in the statement?
Statement - Railway authorities have decided to run two holiday special trains on Tuesdays and Fridays from city A to city B from October 19, 2023 to January 5, 2024.
Reasons:
(I) Flights from city A to city C are booked to capacity, and airlines are planning to increase the number of flights operated between city A and city C from August 2023.
(II) Many migrants from city B who work in city A travel back to city B by trains from October to January for festivals. Existing trains cannot accommodate this increase in passenger demand.
(a) Only II is a possible cause.
(b) Both I and II are possible causes.
(c) Only I is a possible cause.
(d) Neither I nor II is a possible cause. **[a]**

Explanation –

Only II is the possible reason as migrants from city B who travel back to city B from city A during festivals increase the passenger demand. The existing trains cannot meet this additional demand, hence it was decided to run additional holiday special trains.
Hence option (a) is correct.

61. Which of the following is the general formula of alkenes?
(a) C_nH_{2n}
(b) $C_{2n}H_{2n}$
(c) C_nH_n
(d) C_nH_{2n-1} **[a]**

Explanation –

Alkenes are unsaturated hydrocarbons containing double bonds (C=C).

Its general formula is C_nH_{2n} where "n" indicates the number of carbon (C) atoms.
Its first member is ethylene or ethene C_2H_4.
CnH_{2n-1} is the general formula of alkynes.

62. A boatman rowing at a speed of 3 km/h in still water takes twice the time to cover 50 km upstream as compared to covering 50 km downstream. Find the speed of the boatman downstream.

(a) $\frac{9}{2}$ km/h
(b) $\frac{7}{2}$ km/h
(c) 4 km/h
(d) $\frac{10}{3}$ km/h **[c]**

व्याख्या –

Speed of the boatman = 3 km/hr
Let the speed of the current be x km/hr.
It takes twice the time to go 50 km/hr upstream as compared to going 50 km/hr downstream.

$$\frac{50}{x-3}=2t.....(i)$$
$$\frac{50}{x+3}=t.....(ii)$$
$$\Rightarrow \frac{50}{2(x-3)}=\frac{50}{x+3}$$
$$50x+150=100x-300$$
$$50x=150$$
$$x=3$$

Downstream speed of boatman = 3^+

63. In May 2024, DRDO awarded _____ defence technology projects to IIT Bhubaneswar.

(a) eleven
(b) nine
(c) five
(d) seven

व्याख्या –

- The Defence Research and Development Organisation (DRDO) and the Indian Institute of Technology (IIT) Bhubaneswar have launched a partnership aimed at advancing research in electronics warfare, AI-powered surveillance, power systems and radar systems.
- The DRDO has approved nine projects from the Electronics and Communication Systems (ECS) Cluster to IIT Bhubaneswar, with seven additional projects awaiting approval, receiving funding of ₹18 crore.

64. In the following number-pairs, the second number is obtained by performing some mathematical operations on the first number. What numbers should come in place of x and y so that the pattern followed by the two numbers on the left of : : is followed by the same pattern on the right of : : ?
X : 125 :: 13 :Y

(a) X = 11, Y = 169
(b) X = 11, Y = 173
(c) X = 12, Y = 173
(d) X = 12, Y = 169

Explanation –

$$11:125 \quad :: \quad 13:173$$
$$(11)^2+4=125 \quad (13)^2+4=173$$

Hence, x = 11, y = 173.

65. Two trains each 250 m long are running on the same parallel tracks in opposite directions at speeds of 90 km/h and 60 km/h respectively. In how many seconds will they cross each other completely?

(a) 18 seconds
(b) 12 seconds
(c) 10 seconds
(d) 15 seconds **[b]**

व्याख्या –

The length of each train was 250 m
The speed of both the trains is 90 km/hr, 60 km/hr respectively.

Speed of the first train in m/s $=90\times\frac{5}{18}\Rightarrow$ 25 meter/second

Speed of the second train in m/s $=60\times\frac{5}{18}=\frac{50}{3}$ meter/second

Total time taken to cover a distance of 500 m $=\frac{500}{25+\frac{50}{3}}\Rightarrow\frac{1500}{125}=$ 12 second

66. Which two numbers should be interchanged to make the given equation correct?
72 – 56 + (13 + 19) × 2 – 95 ÷ 17 = 76
(Note: Whole numbers should be interchanged and not the individual digits of the given numbers.)

(a) 13 and 17
(b) 17 and 56
(c) 19 and 5
(d) 19 and 17 **[d]**

Explanation –

72 – 56 + (13 + 19) × 2 – 95 ÷ 5 + 17 = 76

On interchanging the numbers from option (d)

$72-56+(13+17)\times 2-95\div 5+19=76$

$72-56+30\times 2-19+19=76$

$72-56+60=76$

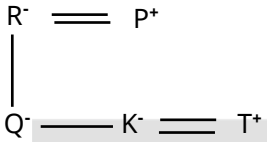
$76=76$

Therefore option (d) is correct.

67. In a certain code language,
A + B means 'A is the mother of B',
A - B means 'A is the brother of B',
A × B means 'A is the wife of B',
A ÷ B means 'A is the father of B',
and A # B means 'A is the daughter of B'.
If 'Q # R × P ÷ K × T', then how is R related to T?

(a) Son's wife
(b) Wife's mother
(c) Son's daughter
(d) Daughter's daughter **[b]**

Explanation –



It is clear from the diagram that R is the mother of T's wife.

So option (b) is correct.

68. In a certain code language, 'FEND' is written as '9735', and 'FEUD' is written as '3769'. How will 'U' be written in that code language?

(a) 6
(b) 9
(c) 7
(d) 3 **[a]**

व्याख्या –

Just as,

F	E	N	D	-	9	7	3	5

and

F	E	U	D	-	3	7	6	9

Similarly

U = 6

So option (a) is correct.

69. Find the number of bricks measuring 24 cm × 12 cm x 8 cm required to build a wall 24 m long, 8 m high and 60 m thick, if 10% of the wall is filled with mortar?

(a) 4500
(b) 45000
(c) 450
(d) 450000 **[b]**

व्याख्या –

Given,

Length of wall = 24 m, Height = 8 m, Thickness = 60 m

Length of brick = 24 cm, Height = 12 cm, Thickness = 8 cm

100% of the wall is filled with mortar.

Volume of wall = Length × Breadth Volume

Total number of bricks $=\frac{240\times 80\times 60}{24\times 12\times 8}=\frac{90}{100}\Rightarrow 45000$

70. If $4\sin^2\theta=1$, and θ is an acute angle, find the value of $\cos^2\theta+\tan^2\theta$.

(a) 1
(b) $\frac{13}{12}$
(c) $\frac{5}{13}$
(d) $\frac{1}{4}$ **[b]**

व्याख्या –

$4\sin^2\theta=1$

θ is an acute angle.

$\cos^2\theta+\tan^2\theta=$

$\sin^2\theta=\frac{1}{4}$

$\sin\theta=\frac{1}{2}$

$\sin 30^\circ=\frac{1}{2}$

$\theta=30^\circ$ Because it is an acute angle.

$\cos^2\theta=\cos^2 30^\circ=\left(\frac{\sqrt{3}}{2}\right)^2=\frac{3}{4}$

$\tan^2\theta=\tan^2 30^\circ=\left(\frac{1}{\sqrt{3}}\right)^2=\frac{1}{3}$

$\cos^2\theta+\tan^2\theta=\frac{3}{4}+\frac{1}{3}\Rightarrow\frac{13}{12}$

71. A discussion paper titled '____' was released by NITI Aayog on January 15, 2024.

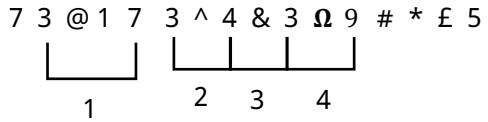
(a) Multidimensional Poverty in India since 2005-06
(b) Economic Growth and Poverty Reduction
(c) Government Initiatives for Poverty Eradication
(d) Poverty Alleviation in India
[a]

NITI Aayog released a discussion paper on 15 January 2024 titled 'Multidimensional Poverty in India since 2005-06'. This report analyzes the decline in multidimensional poverty in India from 2005-06 to 2022-23. According to the report, the multidimensional poverty rate in India declined from 29.17% to 11.28% during

this period, bringing about 24.82 crore people out of this category.

72. Look at the following series of numbers and symbols and answer the question given below. Numbers and symbols should be counted from left to right only.
(Left) 7 3 @ 1 7 3 ^ 4 & 3 Ω 9 # * £ 5 (Right)
How many such symbols are there in the above series, each of which is immediately preceded by a number and immediately followed by a number?
(a) Three
(b) Four
(c) Five
(d) More than five **[b]**

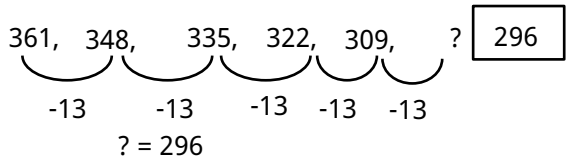
Explanation –



It is clear from the diagram that there are four pairs of symbols having a number immediately before and a number immediately after them.
So option (b) is correct.

73. Which of the following option should come in place of Question ((?) to complete the given series logically?
361, 348, 335 , 322, 309,?
(a) 294
(b) 290
(c) 300
(d) 296 **[d]**

Explanation –



Therefore option (d) is correct.

74. Which of the following numbers is divisible by 4?
(a) 7864534
(b) 9876754
(c) 9876342
(d) 8978624 **[d]**

व्याख्या –
Option (d) is divisible by 4.
Divisibility rule of four:- If the last digit of a number is 00 or divisible by 4, then that number will be exactly divisible by 4.
Hence, the number 8978624 is completely divisible by 4.

75. Two successive discounts of 40% and 60% on a deal are equivalent to a single discount of ____.
(a) 66%
(b) 80%
(c) 70%
(d) 76% **[d]**

व्याख्या –
Two successive discounts are 40% and 60% respectively.
Single discount:

$$\Rightarrow 40+60-\frac{40\times 60}{100}$$

$$\Rightarrow 100-24 \Rightarrow 76\%$$