RRB NTPC (UG) CBT-I Official Paper (Held On 18 Jun, 2026 Shift 2) (Previous Year Paper)

RRB NTPC • 2026 • 100 questions • 90 minutes • Answer key and solutions

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MATHEMATICS

Q1. A bus travels 90 km at 45 km/h, 120 km at 60 km/h, and 150 km at 75 km/h. What is the average speed of the bus for the entire journey?

(a) 66 km/h
(b) 55 km/h
(c) 60 km/h
(d) 70 km/h

Q2. The cost of 5 chairs and 3 tables is Rs. 12,500, while the cost of 3 chairs and 5 tables is Rs. 15,500. Find the cost of 2 chairs and 2 tables.

(a) Rs. 7,500
(b) Rs. 7,000
(c) Rs. 6,500
(d) Rs. 6,000

Q3. Simplify: (16/21)/(16/4) ÷ (4/5 × 10/12 + 4/7) + 4/8 ÷ 26/14 of 14/8

(a) 2/5
(b) 7/23
(c) 1/15
(d) 4/13

Q4. Three positive numbers are in proportion such that the ratio of the first number to the second number is the same as the ratio of the second number to the third number. If the first number is 16 and the second number is 24, find the value of the third number.

(a) 32
(b) 36
(c) 48
(d) 64

Q5. If the mean proportional between x and 36 is 12, find x.

(a) 5
(b) 7
(c) 6
(d) 4

Q6. The price of an article is increased by 20%. In the next step, it is decreased by x% of the new price. Finally, the price is increased by 10% of the original price. If the final price becomes exactly equal to the original price, the value of x is:

(a) 12.25
(b) 22.75
(c) 25
(d) 17.5

Q7. A car travels 560 km in 9.5 hours, partly at 40 km/h and partly at 160 km/h. Find the distance travelled at 160 km/h.

(a) 230 km
(b) 260 km
(c) 216 km
(d) 240 km

Q8. Find the sum of the surface areas of three spheres of radii 2 cm, 3 cm and 6 cm.
(Take π = 22/7)

(a) 616 cm^2
(b) 612 cm^2
(c) 608 cm^2
(d) 620 cm^2

Q9. Simplify: 55 1/8 + 55 3/8 + 55 5/8 + 55 7/8

(a) 222
(b) 220
(c) 224
(d) 226

Q10. Find the mode for the following distribution.

CL	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80
Frequency	4	4	13	5	6	5	2	1

(a) 54.60
(b) 48.57
(c) 51.34
(d) 52.65

Q11. In quadrilateral PQRS, angle P=2angle Q, angle Q=(angle R)/4, angle R=2angle S. Find the value of angle S.

(a) 85°
(b) 45°
(c) 60°
(d) 80°

Q12. A person standing on level ground looks up at the top of a vertical tower. The angle of elevation formed at the observer's eye is 60°. If the tower is 18 m high, determine the horizontal distance (in meters) between the person and the base of the tower.

(a) 5√3
(b) 6√3
(c) 7√3
(d) 4√3

Q13. The value of $(2+3/2)^2 - [4-(6/3)^2] \div 1/2$ is

(a) 49/2
(b) 7/4
(c) 49/4
(d) 7/2

Q14. Three numbers are in the ratio 9 : 7 : 5, and their LCM is 2205. Their HCF is:

(a) 24
(b) 34
(c) 7
(d) 29

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Q15. A man bought an article and sold it at a profit of 15%. If he had bought it at 25% less cost price and sold it for Rs. 294 less than the original selling price, he would have made a profit of 30%. Find the cost price of the article.

(a) Rs. 1,590
(b) Rs. 1,630
(c) Rs. 1,540
(d) Rs. 1,680

Q16. A four-digit number 3P2Q is divisible by both 2 and 3. Find the smallest value of P + Q.

(a) 7
(b) 2
(c) 1
(d) 4

Q17. A shopkeeper offers the following schemes on toys of the same marked price.

(A) Successive discounts of 24% and 33% on any number of toys bought.
(B) Successive discounts of 39%, 37% and 23% on any number of toys bought.
(C) 24% discount on the first 2 toys and 12% discount on each toy thereon.
(D) 2 toys free of cost on buying 5 toys.

A customer wants to buy 5 toys. Which of the above schemes is the least beneficial to her?

(a) C
(b) B
(c) D
(d) A

Q18. The sum of two positive numbers is 32 and their product is 220. The positive difference between them is:

(a) 12
(b) 17
(c) 11
(d) 16

Q19. The price of an article is first increased by 20% and then decreased by 20%. If the original price of the article is Rs. 500, what is the net percentage change in the price?

(a) 5% decrease
(b) No change
(c) 4% decrease
(d) 2% increase

Q20. Arun sold an article for Rs. 1,786.40 and incurred a loss of 12%. At what price should he sell the article to earn a profit of 14%?

(a) Rs. 2,485.70
(b) Rs. 2,268.70
(c) Rs. 2,112.20
(d) Rs. 2,314.20

Q21. An article is marked at Rs. 3,000. The shopkeeper offers successive discounts of 10% and 20%. What is the final selling price of the article?

(a) Rs. 2,250
(b) Rs. 2,100
(c) Rs. 2,200
(d) Rs. 2,160

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Q22. What sum (in Rs.) will earn a simple interest of Rs. 1,440 in 2 years at 16% per year rate of interest?

(a) 4,500
(b) 460.8
(c) 2,250
(d) 9,000

Q23. If the mean of the following data is 40, find the missing frequency.

x	10	20	30	40	50	60
frequency	2	3	1	4	f	4

(a) 5
(b) 1
(c) 4
(d) 7

Q24. Two banks, A and B, offered loans at 3.5% and 6.5% per annum, respectively. Ashish borrowed an amount of Rs. 3,40,000 from each bank. Find the positive difference between the amounts of simple interest (in Rs.) paid to the two banks by Ashish after 2 years.

(a) 21,400
(b) 20,400
(c) 21,900
(d) 19,900

Q25. Pipes A and B can fill a tank in 12 hours and 15 hours, respectively. A third pipe C can empty the full tank in 20 hours. If A and B are opened together for 2 hours and then C is also opened, what is the total time taken to fill the tank?

(a) 9.5 hours
(b) 8 hours
(c) 10 hours
(d) 9 hours

Q26. The combined present age of P and Q is 46 years. 2 years ago from now, P was twice as old as Q. What is the present age of P?

(a) 28 years
(b) 30 years
(c) 16 years
(d) 20 years

Q27. The sides of two square gardens are 16 m and 25 m, respectively. A third square garden is to be constructed such that the length of its side is the mean proportional between the sides of the given two gardens. What will be the length of the side of the new square garden?

(a) 21 m
(b) 20 m
(c) 19 m
(d) 18 m

Q28. Sixteen identical solid cubes, each of side 2 cm, are melted and recast into a cuboid whose length is twice its breadth and height equals its breadth. Find the volume of the cuboid.

(a) 128 cm^3
(b) 96 cm^3
(c) 100 cm^3
(d) 64 cm^3

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Q29. A specialized printing machine can print 2400 pages in 1 hour and 20 minutes. At this steady rate, how many pages can the machine print in 45 minutes?

(a) 1350
(b) 1250
(c) 1500
(d) 1450

Q30. Two taps can fill a cistern in 4 hours and 8 hours, respectively. A third tap can empty it in 8 hours. How long (in hours) will it take to fill one-fourth of the empty cistern if all the taps are opened together?

(a) 2
(b) 3
(c) 1
(d) 4

GENERAL AWARENESS

Q31. Which Article of the Indian Constitution directs the State to protect and improve the environment?

(a) Article 48A
(b) Article 39A
(c) Article 43A
(d) Article 37A

Q32. Which Indian state has the Konkan Coast along its western shoreline?

(a) Odisha
(b) Karnataka
(c) Maharashtra
(d) Kerala

Q33. The Committee on Government Assurances primarily deals with _____.

(a) Policy review of public enterprises
(b) Promises and undertakings made by Ministers in Parliament
(c) Monitoring of government expenditure in Parliament
(d) Examining Rules under Article 312

Q34. When a program in Windows appears as “Not Responding” and the user ends it using Task Manager, which action is effectively being requested from the operating system?

(a) Change the program’s file type
(b) Force the process to terminate and release its resources
(c) Convert the program into a service
(d) Move the program to another drive

Q35. The Kuki Rebellion (1917–19) took place in which region?

(a) Manipur
(b) Nagaland
(c) Assam
(d) Tripura

Q36. You can often hear a person speaking from behind a tall fence even if you cannot see them. Which property of sound waves explains this phenomenon?

(a) Polarization
(b) Refraction
(c) Reflection
(d) Diffraction

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Q37. On 3 November 2025, which state government started the Chief Minister Jibon Prerana Scheme?

(a) Odisha
(b) Sikkim
(c) Assam
(d) Manipur

Q38. Which of the following portrays the movement led by Baba Ramchandra?

(a) A protest against British education policy
(b) A religious reform movement
(c) A workers' strike in factories
(d) A rural uprising against exploitative landlords

Q39. Which award is presented to the women's singles champion at the Wimbledon Tennis Championships?

(a) Arthur Ashe Trophy
(b) Borg-McEnroe Trophy
(c) Venus Rosewater Dish
(d) Suzanne Lenglen Trophy

Q40. Which of the following statements is INCORRECT regarding organic farming?

(a) Organic farming is environment-friendly.
(b) Organic farming is beneficial for soil biota.
(c) Organic farming does not use synthetic chemicals.
(d) Organic farming relies heavily on high technology.

Q41. Which Acts are being amended to allow private sector participation in India's nuclear energy sector?

(a) Electricity Act, 2003 & CLND Act, 2010
(b) Atomic Energy Act, 1962 & Energy Conservation Act, 2001
(c) Electricity Act, 2003 & Atomic Energy Act, 1962
(d) Atomic Energy Act, 1962 & CLND Act, 2010

Q42. After defeating the Shakas and annexing their territories in western India, which Gupta ruler assumed the imperial title "Vikramaditya" to mark his supremacy?

(a) Skandagupta
(b) Chandragupta II
(c) Kumaragupta I
(d) Samudragupta

Q43. RAM and ROM belong to which broader category?

(a) Primary memory
(b) Input devices
(c) Processing units
(d) Output devices

Q44. Which of the following is an example of biomagnification in a food chain?

(a) Increased nitrate levels causing algal blooms
(b) Rapid sedimentation of silt at the river bottom
(c) Evaporation of pesticides from water bodies into the air
(d) Rising concentration of DDT from water to algae to fish to birds

Q45. Children of Indian citizens born abroad become Indian citizens by descent only if the birth is registered at an Indian consulate within what time period?

(a) One year
(b) Three years
(c) Six months
(d) Four years

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Q46. Which of the following is a non-point source of water pollution?

(a) Urban stormwater drain
(b) Sewage outlet
(c) Agricultural runoff
(d) Industrial discharge pipe

Q47. Which of the following countries participated in the 3^(rd) edition of the Joint Special Forces Exercise 'CYCLONE' at Mahajan Field Firing Ranges in Rajasthan from 10^(th) to 23^(rd) February 2025?

(a) India and China
(b) India and Egypt
(c) India and Namibia
(d) India and Iran

Q48. Which action does pressing the F5 key usually perform in Windows?

(a) Refreshes the current window or page
(b) Opens a new window
(c) Navigates to the next tab
(d) Opens help

Q49. Which substance would you use to test if lemon juice contains acid?

(a) Litmus paper
(b) Water
(c) Baking soda
(d) Sugar

Q50. Which language is known for its unique script called "Gurmukhi"?

(a) Bengali
(b) Punjabi
(c) Hindi
(d) Urdu

Q51. Article 371A of the Constitution of India states 'privilege of special status was also accorded to the North-Eastern State of Nagaland'. This represents which federalism?

(a) Centralised federalism
(b) Competitive federalism
(c) Bargaining federalism
(d) Asymmetric federalism

Q52. In India, the concept of judicial activism, as reflected through innovative interpretations of the Constitution and expansion of the scope of judicial review, was introduced during which of the following periods?

(a) Mid-1970s
(b) Mid-1990s
(c) Mid-1960s
(d) Mid-1980s

Q53. Who led the Portuguese expedition that first landed in Calicut, India, in 1498?

(a) Pedro Álvares Cabral
(b) Vasco da Gama
(c) Alfonso de Albuquerque
(d) Bartholomew Diaz

Q54. Which of the following strategies is crucial for fostering infrastructure development in developing countries?

(a) Restricting foreign investment
(b) Promotion of public-private partnerships
(c) Focusing only on urban areas

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(d) Sole reliance on government funding

Q55. The Cholas came to power after overthrowing the authority of which of the following dynasties in South India?

(a) Chera
(b) Satavahana
(c) Rashtrakuta
(d) Pallavas

Q56. Which of the following geographical factors most directly influences the location and growth of human settlements?

(a) Distance from the equator
(b) Availability of fresh water
(c) Color of local soil
(d) Shape of nearby hills

Q57. In Harappan Civilization, at Dholavira, _____ was/were used to build massive fortifications.

(a) stone
(b) granite
(c) wood
(d) bricks

Q58. Which of the following rivers is primarily responsible for the formation of badland topography in India?

(a) Ganga
(b) Chambal
(c) Brahmaputra
(d) Yamuna

Q59. Which of these is NOT an example of fundamental quantity?

(a) Velocity
(b) Electric Current
(c) Time
(d) Luminous Intensity

Q60. Which of the following is the largest multipurpose river valley project in India?

(a) Damodar Valley
(b) Bhakra Nangal
(c) Sardar Sarovar
(d) Hirakud

Q61. The President of India can make regulations for peace, progress, and good governance of which Union Territories without Legislative Assemblies?

(a) Puducherry and Delhi
(b) Andaman & Nicobar Islands, Lakshadweep, Dadra & Nagar Haveli and Daman & Diu
(c) Chandigarh and Puducherry
(d) Jammu & Kashmir and Ladakh

Q62. Which organisation’s leaders gathered in Tianjin for a summit in late August–early September, 2025?

(a) Shanghai Cooperation Organization (SCO)
(b) Commonwealth (CW)
(c) Group of Twenty (G20)
(d) Association of Southeast Asian Nations (ASEAN)

Q63. The Pallava temples at Mahabalipuram are made mainly from:

(a) Granite
(b) Marble
(c) Laterite

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(d) Sandstone alone

Q64. Under whose chairmanship was a 12-member drafting committee recently constituted to frame a law under the High Seas Treaty 'BBNJ'?

(a) Ramesh Pokhriyal
(b) Nitin Gadkari
(c) Ravi Shankar Prasad
(d) Sanjay Upadhyay

Q65. According to the Equirus Capital report on India's Green Building Market, India's green building sector is projected to grow at a CAGR of 10.5% and reach an estimated size of $85 billion by which year?

(a) 2032
(b) 2030
(c) 2033
(d) 2031

Q66. Which of the following swimmers won gold in the 200 m breaststroke at the 2025 World Aquatics Championships, setting a championship record and an American record?

(a) Torri Huske
(b) Evgeniia Chikunova
(c) Claire Curzan
(d) Kate Douglass

Q67. World Toilet Day was observed on which date in 2025?

(a) 19 November
(b) 9 November
(c) 19 October
(d) 9 October

Q68. When moving down a group in the Modern Periodic Table, what happens to the number of valence electrons?

(a) Remains the same
(b) Decreases by one
(c) Increases by two
(d) Increases by one

Q69. According to the research study by the State Bank of India (SBI) in 2024, what is the level of poverty in India?

(a) above 5% and below 10%
(b) above 15%
(c) below 5%
(d) less than 18% but more than 10%

Q70. A user wants to quickly pause work and resume in few minutes without waiting for the computer to reboot. The best option is:

(a) Complete shutdown
(b) Reinstall OS
(c) Format disk
(d) Sleep mode

GENERAL INTELLIGENCE AND REASONING

Q71. Six boxes E, F, G, H, I and B are kept one over the other but not necessarily in the same order. Only three boxes are kept above F. Only one box is kept between H and F. Only three boxes are kept between H and I. I is kept at some place above F. B is kept immediately below I. E is kept at one of the places below G.

How many boxes are kept between G and H?

(a) Two

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(b) Three
(c) Four
(d) One

Q72. Seven boxes, G, H, I, J, Q, R and S, are kept one over the other, but not necessarily in the same order.

Only two boxes are kept between I and R. Only J is kept above S. Only three boxes are kept below I. H is kept at some place below G but at some place above Q.

Which box is kept third above Q?

(a) G
(b) J
(c) S
(d) R

Q73. Refer to the following letter series and answer the question that follows.

(Left) H U N V Y M L N D M Q M B E M N Z W M J I N F Q N (Right)

How many letters are there in the English alphabetical series between the letter which is fifth from the right end and eighth from the left end of the series?

(a) Two
(b) Four
(c) Three
(d) Five

Q74. Read the given statements and conclusions carefully. Assuming that the information given in the statements is true, even if it appears to be at variance with commonly known facts, decide which of the given conclusions logically follow(s) from the statements.

Statements: Some bottles are jars. All jars are boxes.

Conclusions

(I) Some boxes are bottles.

(II) All boxes are jars.

(a) Only conclusion (II) follows
(b) Neither conclusion (I) nor (II) follows
(c) Only conclusion (I) follows
(d) Both conclusions (I) and (II) follow

Q75. WTQT is related to VSPS in a certain way based on the English alphabetical order. In the same way, ZWTW is related to YVSV. To which of the following is OLIL related, following the same logic?

(a) NLGO
(b) NJGK
(c) NKGK
(d) NKHK

Q76. In a certain code language, ‘GLOW’ is coded as ‘3187’ and ‘WOLF’ is coded as ‘1273’. What is the code for ‘G’ in the given code language?

(a) 8
(b) 3
(c) 1
(d) 7

Q77. In the following number-pairs, the second number is obtained by applying certain mathematical operations to the first number. Select the set in which the numbers are related in the same way as are the numbers of the following sets.

(NOTE: Operations should be performed on the whole numbers, without breaking down the numbers into their constituent digits. E.g. 13 – Operations on 13 such as adding / subtracting /multiplying etc. to 13 can be performed. Breaking down 13 into 1 and 3 and then performing mathematical operations on 1 and 3 is not allowed.)

78 - 88

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32 - 42

(a) 90 - 110
(b) 98 - 88
(c) 45 - 56
(d) 110 - 120

Q78. What should come in place of '?' in the given series?

280 225 175 130 90 55 ?

(a) 31
(b) 25
(c) 34
(d) 28

Q79. 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 is the one that does not belong to that group?

(Note: The odd one out is not based on the number of consonants/vowels or their position in the letter-cluster pairs.)

(a) KJ-PZ
(b) PO – UE
(c) FE-KU
(d) HG – NW

Q80. In a certain code language,

A + B means 'A is the sister of B',

A - B means 'A is the daughter of B',

A × B means 'A is the son of B', and

A ÷ B means 'A is the husband of B'.

Based on the above, how is V related to R if 'V - D + Q × T ÷ R'?

(a) Son's wife
(b) Sister's daughter
(c) Daughter's daughter
(d) Daughter

Q81. In a row of 38 people facing the north, Keerthi is 13^(th) from the right end. If Tanvi sits 7^(th) to the left of Keerthi, what is Tanvi's position from the left end of the row?

(a) 17^(th)
(b) 19^(th)
(c) 20^(th)
(d) 18^(th)

Q82. What should come in place of '?' in the given series?

135 146 168 201 245 ?

(a) 280
(b) 310
(c) 300
(d) 290

Q83. Which letter cluster will replace the question mark (?) to complete the given series?

CDX DFU EHR ? GLL

(a) FDR
(b) FGY
(c) FJO
(d) FTR

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Q84. Each of the digits in the number 7632198 is arranged in ascending order from left to right. The position(s) of how many digits will remain unchanged as compared to that in the original number?

(a) NONE
(b) ONE
(c) THREE
(d) TWO

Q85. DI 12 is related to JE 3 in a certain way. In the same way, EW 11 is related to KS 2. To which of the following is KN 19 related, following the same logic?

(a) LP 9
(b) QJ 10
(c) HY 14
(d) TR 11

Q86. If 1 is added to each odd digit and 1 is subtracted from each even digit in the number 7254136, how many digits will appear more than once in the new number thus formed?

(a) Three
(b) None
(c) One
(d) Two

Q87. If 3 is added to each odd digit and 2 is subtracted from each even digit in the number 8254316, then what will be the sum of the first digit from the left and the second digit from the right in the new number thus formed?

(a) 0
(b) 10
(c) 4
(d) 6

Q88. In a certain code language, ‘JACK’ is coded as ‘9621’ and ‘CALK’ is coded as ‘6231’. What is the code for ‘L’ in the given code language?

(a) 1
(b) 6
(c) 3
(d) 2

Q89. Which of the following letter-number clusters will replace the question mark (?) in the given series to make it logically complete?

RHE 53, WMC 61, BRA 69, GWY 77, ?

(a) KCU 83
(b) KBV 83
(c) LBW 85
(d) MAX 85

Q90. Seven people F, G, H, L, M, O and Q are sitting in a row facing north. Only Q sits to the left of H. Only four people sit between Q and G. Only F sits between L and M, and L is not an immediate neighbor of G. How many people sit between O and H?

(a) Three
(b) Four
(c) Two
(d) One

Q91. LL 22 is related to JH 6 in a certain way. In the same way, CR 20 is related to AN 4. To which of the following is GN 14 related, following the same logic?

(a) FI −4
(b) FJ −4

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(c) EJ −2
(d) EI −2

Q92. Refer to the following series and answer the question. (Counting to be done from left to right only.) (All numbers are single-digit numbers only.)

(Left) 1 1 9 4 8 6 9 2 4 2 8 9 7 1 3 2 7 5 8 2 1 5 3 (Right)

How many such odd digits are there, each of which is immediately preceded by an odd digit and also immediately followed by an odd digit?

(a) Three
(b) Four
(c) Five
(d) Two

Q93. Seven people X, Y, Z, A, B, C and D are sitting around a circular table facing towards the centre of the table. D sits third to the right of Y. B is sitting immediately between X and C. Z sits second to the right of X. What is the position of A with respect to Z?

(a) Second to the left
(b) Immediate right
(c) Immediate left
(d) Second to the right

Q94. Read the given statement(s) and conclusions carefully. Assuming that the information given in the statements is true, even if it appears to be at variance with commonly known facts, decide which of the given conclusions logically follow(s) from the statement(s).

Statements:

Some leaves are trees.

All chairs are trees.

Conclusions:

(I) Some leaves are chairs.

(II) All trees are chairs.

(a) Only conclusion (I) follows
(b) Only conclusion (II) follows
(c) Neither conclusion (I) nor (II) follows
(d) Both conclusions (I) and (II) follow

Q95. Refer to the given number series and answer the question that follows. Counting to be done from left to right only. All numbers are single-digit numbers only.

(Left) 3 8 7 5 3 2 1 9 6 4 8 7 5 2 1 4 6 3 2 9 8 7 5 4 1 5 2 6 9 8 7 5 6 3 2 1 5 4 7 8 5 1 2 5 9 6 3 9 8 7 5 1 4 5 2 (Right)

How many such even digits are there, each of which is immediately preceded by a perfect square and immediately followed by an odd digit? (NOTE: 1 is also a perfect square.)

(a) 4
(b) 2
(c) 8
(d) 6

Q96. Abhinav starts from Point A and drives 16 km towards the west. He then takes a right turn, drives 8 km, turns right and drives 19 km. He then takes a right turn and drives 14 km. He takes a final right turn, drives 3 km and stops at Point P. How far (shortest distance) and towards which direction should he drive in order to reach Point A again? (All turns are 90-degree turns only unless specified.)

(a) 6 km to the north
(b) 5 km to the north
(c) 5 km to the south
(d) 6 km to the south

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Q97. In a certain code language,

A : B means 'A is the father of B',

A @ B means 'A is the mother of B',

A ? B means 'A is the wife of B' and

A + B means 'A is the daughter of B'.

How is C related to R if 'C ? O : V @ E + R'?

(a) Wife's brother
(b) Wife's sister
(c) Wife's mother
(d) Wife's father

Q98. What should come in place of the question mark (?) in the given series based on the English alphabetical order?

PCO QGL RKI SOF ?

(a) SKM
(b) TSC
(c) SDF
(d) CAP

Q99. Based on the English alphabetical order, three of the following four are alike in a certain way and thus form a group. Which is the one that does not belong to that group?

(Note: The odd man out is not based on the number of consonants/vowels or their position in the letter cluster.)

(a) STQ
(b) GHE
(c) CDB
(d) LMJ

Q100. Based on the alphabetical order, three of the following four are alike in a certain way and thus form a group. Which is the one that does not belong to that group?

(Note: The odd one out is not based on the number of consonants/vowels or their position in the letter cluster.)

(a) MJN
(b) ROS
(c) LIM
(d) JKO

ANSWER KEY

1	c	2	b	3	d	4	b	5	d	6	c	7	d	8	a	9	a	10	d
11	d	12	b	13	c	14	c	15	d	16	c	17	a	18	a	19	c	20	d
21	d	22	a	23	a	24	b	25	d	26	b	27	b	28	a	29	a	30	c
31	a	32	c	33	b	34	b	35	a	36	d	37	c	38	d	39	c	40	d
41	d	42	b	43	a	44	d	45	a	46	c	47	b	48	a	49	a	50	b
51	d	52	a	53	b	54	b	55	d	56	b	57	a	58	b	59	a	60	b
61	b	62	a	63	a	64	d	65	a	66	d	67	a	68	a	69	c	70	d
71	c	72	a	73	b	74	c	75	d	76	a	77	d	78	b	79	d	80	c
81	b	82	c	83	c	84	b	85	b	86	b	87	b	88	c	89	c	90	b
91	c	92	b	93	b	94	c	95	c	96	a	97	c	98	b	99	c	100	d

SOLUTIONS

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Q1. Answer: (c) 60 km/h

Shortcut Trick

Identify Total Distance = 90 + 120 + 150 = 360 km.

Calculate Total Time = (90 ÷ 45) + (120 ÷ 60) + (150 ÷ 75) = 2 + 2 + 2 = 6 hours.

Average Speed = Total Distance ÷ Total Time = 360 ÷ 6 = 60 km/h.

Therefore The correct answer is 60 km/h.

Alternate Method

Given:

Distance1 (d1) = 90 km, Speed1 (s1) = 45 km/h

Distance2 (d2) = 120 km, Speed2 (s2) = 60 km/h

Distance3 (d3) = 150 km, Speed3 (s3) = 75 km/h

Formula Used:

Average Speed = Total Distance ÷ Total Time

Calculations:

=> Time taken for first part (t1) = 90 ÷ 45 = 2 hours

=> Time taken for second part (t2) = 120 ÷ 60 = 2 hours

=> Time taken for third part (t3) = 150 ÷ 75 = 2 hours

=> Total Distance = 90 + 120 + 150 = 360 km

=> Total Time = 2 + 2 + 2 = 6 hours

=> Average Speed = 360 ÷ 6 = 60 km/h

Therefore The correct answer is 60 km/h.

Additional Information

Average Speed for Equal Distances

If a journey is divided into two equal distances with speeds x and y, the Average Speed = 2xy ÷ (x + y).

Unit Conversion

To convert speed from km/h to m/s, multiply by 5/18. To convert from m/s to km/h, multiply by 18/5.

Relative Speed

When two objects move in the same direction, relative speed is s1 − s2. In opposite directions, it is s1 + s2.

Q2. Answer: (b) Rs. 7,000

Shortcut Trick

Sum both equations to find the cost of 8 chairs and 8 tables.

(5C + 3T) + (3C + 5T) = 12,500 + 15,500 => 8C + 8T = Rs. 28,000.

To find the cost of 2 chairs and 2 tables, divide the total sum by 4.

Cost = 28,000 ÷ 4 = 7,000.

Therefore The correct answer is Rs. 7,000.

Alternate Method

Given:

Cost of 5 chairs and 3 tables = Rs. 12,500

Cost of 3 chairs and 5 tables = Rs. 15,500

Formula Used:

Total Cost = (Cost per unit × Quantity)

Calculations:

Let the cost of one chair be C and one table be T.

=> 5C + 3T = 12,500 — (Equation 1)

=> 3C + 5T = 15,500 — (Equation 2)

Adding Equation 1 and Equation 2:

=> (5C + 3C) + (3T + 5T) = 12,500 + 15,500

=> 8C + 8T = 28,000

=> 8 × (C + T) = 28,000

=> C + T = 28,000 ÷ 8

=> C + T = 3,500

We need the cost of 2 chairs and 2 tables:

=> 2 × (C + T) = 2 × 3,500

=> 2C + 2T = 7,000

Therefore The correct answer is Rs. 7,000.

Additional Information

Linear Equations in Two Variables

Equations in the form ax + by = c can be solved using elimination, substitution, or cross-multiplication methods.

Symmetric Equation Property

When coefficients are swapped (ax + by and bx + ay), always add and subtract the equations to simplify the system quickly.

Unitary Concept

Finding the combined value of one unit of each item (C + T) often allows solving for any multiple (nC + nT) without finding individual prices.

Q3. Answer: (d) 4/13

Given:

(((16/21))) / (((16/4))) ÷ ((4/5 × 10/12) + 4/7) + 4/8 ÷ (26/14 of 14/8)

Formula used:

The VBODMAS rule: Brackets, Of, Division, Multiplication, Addition, Subtraction.

Calculations:

Simplify the first complex fraction term:

=> (16/21) / (16/4) = 16/21 × 4/16 = 4/21

Simplify the expression inside the brackets:

=> (4/5 × 10/12 + 4/7) = (2/3 + 4/7) = (14 + 12) / 21 = 26/21

Solve the Of operation (which takes priority over division):

=> 26/14 of 14/8 = (26/14) × (14/8) = 26/8 = 13/4

Now, substitute these simplified values back into the full expression:

=> (4/21 ÷ 26/21) + (4/8 ÷ 13/4)

=> (4/21 × 21/26) + (4/8 × 4/13)

=> 4/26 + 16/104

=> 2/13 + 2/13

=> 4/13

Therefore The correct answer is option (4).

Q4. Answer: (b) 36

Shortcut Trick

The numbers are in continued proportion, so the ratio 16 : 24 must equal the ratio 24 : third number.

Simplify the first ratio: 16 : 24 = 2 : 3.

This means the second ratio must also be 2 : 3.

If 2 units = 24, then 1 unit = 12.

Therefore, 3 units = 12 × 3 = 36.

Therefore The correct answer is 36.

Alternate Method

Given: First number = 16, Second number = 24.

Formula Used: For three numbers a, b, and c in continued proportion, a ÷ b = b ÷ c.

Calculations:

=> Let the third number be c.

=> 16 ÷ 24 = 24 ÷ c

=> (16 × c) = (24 × 24)

=> 16c = 576

=> c = 576 ÷ 16

=> c = 36

Therefore The correct answer is 36.

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Additional Information

Mean Proportional

If a, b, and c are in continued proportion, then b is called the mean proportional between a and c, where $b = \sqrt{(a \times c)}$.

Third Proportional

In the proportion a : b = b : c, the value c is known as the third proportional to a and b, calculated as $c = b^2 \div a$.

Fourth Proportional

For four numbers a, b, c, and d in proportion (a : b = c : d), d is the fourth proportional, where $d = (b \times c) \div a$.

Q5. Answer: (d) 4

Shortcut Trick

The Mean Proportional between a and b is $\sqrt{(a \times b)}$.

Given Mean Proportional = 12, numbers are x and 36.

Square of Mean = Product of numbers => $12^2 = x \times 36$.

$144 = 36 \times x$ => $x = 144 \div 36 = 4$.

Therefore The correct answer is 4.

Alternate Method

Given:

First term = x

Mean proportional (Middle term) = 12

Third term = 36

Formula Used:

In a Continued Proportion (a : b :: b : c), the relation is $b^2 = a \times c$.

Calculations:

=> x / 12 = 12 / 36

=> $x \times 36 = 12 \times 12$

=> $36x = 144$

=> $x = 144 / 36$

=> $x = 4$

Therefore The correct answer is 4.

Additional Information

Mean Proportional

For any two numbers a and c, the mean proportional b is calculated as $b = \sqrt{(ac)}$.

Third Proportional

In a continued proportion a : b = b : c, the term c is the third proportional, where $c = b^2 / a$.

Fourth Proportional

For four quantities a, b, c, d in proportion, a/b = c/d, the fourth proportional is $d = (b \times c) / a$.

Q6. Answer: (c) 25

Shortcut Trick

Let the Original Price be 100.

Step 1: 20% increase → 100 + 20 = 120.

Step 3: Final price becomes 100 after a 10% increase of the Original Price (+10).

This means the price before Step 3 was 100 − 10 = 90.

Step 2: Value of x is the percentage decrease from 120 to 90 => $(30 \div 120) \times 100 = 25$.

Therefore The correct answer is 25.

Alternate Method

Given:

Initial Price = 100

First Increase = 20%

Final Increase = 10% of Original Price

Final Price = Original Price = 100

Calculations:

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=> Let original price = 100

=> Price after 20% increase = 100 + 20 = 120

=> Price after x% decrease = 120 − (x/100 × 120) = 120 − 1.2x

=> Final price after 10% of original price increase = (120 − 1.2x) + 10

=> Given final price = 100

=> 130 − 1.2x = 100

=> 1.2x = 30

=> x = 30 ÷ 1.2 = 25

Therefore The correct answer is 25.

Additional Information

Successive Percentage Change

When a value is changed by a% and then by b%, the net effective change is given by the formula: [a + b + (ab ÷ 100)]%.

Base Value Concept

Percentage calculations always depend on the base value. In this problem, x% was calculated on the new price (120), while the 10% increase was calculated on the original price (100).

Percentage to Fraction Conversion

Common fractions help in fast calculation: 25% = 1/4, 20% = 1/5, 10% = 1/10.

Q7. Answer: (d) 240 km

Shortcut Trick

Assume the car travelled all 9.5 hr at the slower speed of 40 km/h.

Hypothetical distance = 40 × 9.5 = 380 km.

Shortfall in distance = 560 − 380 = 180 km.

Difference in speeds = 160 − 40 = 120 km/h.

Time spent at 160 km/h = 180 ÷ 120 = 1.5 hr.

Distance covered at 160 km/h = 1.5 × 160 = 240 km.

Therefore The correct answer is 240 km.

Alternate Method

Given: Total distance = 560 km, Total time = 9.5 hr, Speeds = 40 km/h and 160 km/h.

Formula Used: Time = Distance ÷ Speed

Let the distance travelled at 160 km/h be d km.

The distance travelled at 40 km/h will be (560 − d) km.

=> Total Time = Time1 + Time2

=> 9.5 = (560 − d) ÷ 40 + d ÷ 160

=> 9.5 = [4(560 − d) + d] ÷ 160

=> 9.5 × 160 = 2240 − 4d + d

=> 1520 = 2240 − 3d

=> 3d = 2240 − 1520

=> 3d = 720

=> d = 240 km

Therefore The correct answer is 240 km.

Additional Information

Distance, Speed, and Time Relationship

The fundamental relation is Distance = Speed × Time. If speed is constant, distance is directly proportional to time.

Average Speed

Average Speed = Total Distance ÷ Total Time. It is not the simple arithmetic mean of the individual speeds unless the time spent at each speed is equal.

Unit Conversion

To convert km/h to m/s, multiply by 5/18. To convert m/s to km/h, multiply by 18/5.

Alligation Rule for Speed

When alligation is applied to speeds, the resulting ratio is the ratio of the time taken at those respective speeds.

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Q8. Answer: (a) 616 cm²

Shortcut Trick

The total surface area of three spheres is given by the formula: $4\pi(r1^2 + r2^2 + r3^2)$.

Sum of squares of radii = $2^2 + 3^2 + 6^2 = 4 + 9 + 36 = 49$ cm².

Total Area = $4 \times (22/7) \times 49 = 88 \times 7 = 616$ cm².

Therefore The correct answer is 616 cm².

Alternate Method

Given:

Radius of first sphere (r1) = 2 cm

Radius of second sphere (r2) = 3 cm

Radius of third sphere (r3) = 6 cm

Value of π = 22/7

Formula Used:

Surface area of a sphere = $4\pi r^2$

Calculations:

=> Surface area of first sphere = $4 \times (22/7) \times 2^2 = 4 \times (22/7) \times 4 = 352/7$ cm²

=> Surface area of second sphere = $4 \times (22/7) \times 3^2 = 4 \times (22/7) \times 9 = 792/7$ cm²

=> Surface area of third sphere = $4 \times (22/7) \times 6^2 = 4 \times (22/7) \times 36 = 3168/7$ cm²

=> Sum of surface areas = (352/7) + (792/7) + (3168/7)

=> Sum of surface areas = (352 + 792 + 3168) ÷ 7

=> Sum of surface areas = 4312 ÷ 7

=> Sum of surface areas = 616 cm²

Therefore The correct answer is 616 cm².

Additional Information

Volume of a Sphere

The volume of a sphere with radius r is given by the formula $V = (4/3) \times \pi \times r^3$.

Surface Area of Hemisphere

Curved Surface Area (CSA) = $2\pi r^2$ and Total Surface Area (TSA) = $3\pi r^2$.

Volume of a Hemisphere

The volume of a hemisphere is exactly half of the sphere, given by $V = (2/3) \times \pi \times r^3$.

Q9. Answer: (a) 222

Given:

55 1/8 + 55 3/8 + 55 5/8 + 55 7/8

Formula used:

A Mixed Fraction is the sum of its Whole Number part and its Fractional Part:

x a/b = x + a/b

Calculations:

55 1/8 + 55 3/8 + 55 5/8 + 55 7/8

=> (55 + 1/8) + (55 + 3/8) + (55 + 5/8) + (55 + 7/8)

=> (55 + 55 + 55 + 55) + (1/8 + 3/8 + 5/8 + 7/8)

=> (55 × 4) + (1 + 3 + 5 + 7) / 8

=> 220 + 16 / 8

=> 220 + 2

=> 222

Therefore The correct answer is option (1).

Q10. Answer: (d) 52.65

Shortcut Trick

The highest frequency is 13, which corresponds to the modal class 50−55.

Using the mode formula: Mode = l + [(f1 − f0) ÷ (2f1 − f0 − f2)] × h

Here, l = 50, f1 = 13, f0 = 4, f2 = 5, and h = 5.

Mode = 50 + [(13 − 4) ÷ (26 − 9)] × 5 = 50 + (9 ÷ 17) × 5 = 50 + 2.65 = 52.65.

Therefore The correct answer is 52.65.

Alternate Method

Given Data:

Modal Class (Class with highest frequency) = 50−55

Lower limit of the modal class (l) = 50

Frequency of the modal class (f1) = 13

Frequency of the class preceding the modal class (f0) = 4

Frequency of the class succeeding the modal class (f2) = 5

Class interval width (h) = 5

Calculations:

=> Mode = l + [(f1 − f0) ÷ (2 × f1 − f0 − f2)] × h

=> Mode = 50 + [(13 − 4) ÷ (2 × 13 − 4 − 5)] × 5

=> Mode = 50 + [9 ÷ (26 − 9)] × 5

=> Mode = 50 + [9 ÷ 17] × 5

=> Mode = 50 + (45 ÷ 17)

=> Mode = 50 + 2.64705...

=> Mode ≈ 52.65

Therefore The correct answer is 52.65.

Additional Information

Empirical Relationship

For a moderately skewed distribution, the relationship is: Mode = 3 × Median − 2 × Mean.

Median for Grouped Data

Median = l + [(N÷2 − cf) ÷ f] × h, where cf is the cumulative frequency of the preceding class.

Modal Class Definition

It is the class interval which has the maximum frequency in a grouped frequency distribution.

Q11. Answer: (d) 80°

polygon, the sum of all interior angles is given by (n − 2) × 180°ree;.

Cyclic Quadrilateral Property

If all vertices of a quadrilateral lie on a circle, the sum of opposite angles is 180°ree;.

Wait, the style example says: "Each concept: short bold heading + 1 to 2 lines of plain explanation with key formula or rule... Do NOT wrap in any colored box or styled container — plain HTML paragraphs only." Yes, my code matches this perfectly! Let's review the bold keyword rule: "You MUST bold important keywords and phrases (entities, dates, locations, designations, etc.) using HTML tags. This is critical for student recall." Let's make sure I bold key phrases in the explanation, like: - interior angles of a quadrilateral - sum of all interior angles - angle sum property - value of angle S Let's carefully verify that no double quotes are present in my entire output. Let's check: Header: `

Q12. Answer: (b) 6√3

Shortcut Trick

In a standard 30°−60°−90° triangle, the side ratio is 1 : √3 : 2.

The tower height (side opposite to 60°) corresponds to √3 units = 18 m.

The horizontal distance (side opposite to 30°) corresponds to 1 unit.

1 unit = 18 ÷ √3 = (18 × √3) ÷ 3 = 6√3 m.

Therefore The correct answer is 6√3 m.

Alternate Method

Given:

Height of the vertical tower (AB) = 18 m

Angle of elevation (θ) = 60°

Horizontal distance between person and tower = BC

Formula Used:

tan θ = Opposite Side / Adjacent Side

Calculations:

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=> tan 60° = AB / BC
=> √3 = 18 / BC
=> BC = 18 / √3
=> BC = (18 × √3) / (√3 × √3)
=> BC = 18√3 / 3
=> BC = 6√3 m
Therefore The correct answer is 6√3 m.
Additional Information
Trigonometric Values
Common values include tan 30° = 1/√3, tan 45° = 1, and tan 60° = √3.
Angle of Elevation
The angle between the horizontal plane and the line of sight when an observer looks at an object above their eye level.
Rationalization
To simplify a fraction with a radical denominator, multiply the numerator and denominator by the radical: a/√b = (a√b)/b.

Q13. Answer: (c) 49/4

Given:
$(2 + 3/2)^2 - [4 - (6/3)^2] \div 1/2$
Formula used:
The BODMAS rule is used to solve the expression: Brackets, Orders (powers), Division, Multiplication, Addition, and Subtraction.
Calculation:
=> $(7/2)^2 - [4 - 2^2] \div 1/2$
=> $49/4 - [4 - 4] \div 1/2$
=> $49/4 - 0 \div 1/2$
=> $49/4 - 0$
=> $49/4$
Therefore The correct answer is option (3).

Q14. Answer: (c) 7

Shortcut Trick
Numbers are in Ratio 9 : 7 : 5, which are co-prime to each other.
Shortcut formula: LCM = (Product of ratio parts) × HCF
2205 = (9 × 7 × 5) × HCF
2205 = 315 × HCF
HCF = 2205 ÷ 315 = 7
Therefore The correct answer is 7.
Alternate Method
Given:
Ratio of three numbers = 9 : 7 : 5
LCM (Least Common Multiple) = 2205
Formula Used:
If numbers are ax, bx, and cx where a, b, and c are co-prime, then HCF = x and LCM = (a × b × c) × x.
Calculations:
=> Let the three numbers be 9x, 7x, and 5x.
=> Since 9, 7, and 5 have no common factors other than 1, they are co-prime.
=> HCF of (9x, 7x, 5x) = x
=> LCM of (9x, 7x, 5x) = 9 × 7 × 5 × x = 315x
=> 315x = 2205
=> x = 2205 ÷ 315
=> x = 7
=> HCF = 7
Therefore The correct answer is 7.

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Additional Information

Product of Two Numbers

For any two numbers A and B, A × B = HCF(A, B) × LCM(A, B).

Co-prime Numbers

Numbers that have only 1 as their common factor are called co-prime; their HCF is always 1.

LCM and HCF Relationship

The HCF of a set of numbers is always a factor of their LCM (LCM ÷ HCF is always an integer).

Q15. Answer: (d) Rs. 1,680

The solution is based on the relationship between Cost Price (CP), Selling Price (SP), and Profit Percentage.

Initial Case:

Let the Original Cost Price (CP1) of the article be 100x.

Given the man sells it at a profit of 15%:

Original Selling Price (SP1) = 100x + (15% of 100x) = 115x

New Scenario:

If the article was bought at 25% less cost price and sold for Rs. 294 less than the original selling price, the details change as follows:

New Cost Price (CP2)	**100x − 25% of 100x = 75x**
New Selling Price (SP2)	115x − 294

In this new scenario, the Profit made is 30%.

We can express the New Selling Price in terms of the New Cost Price and Profit:

SP2 = CP2 + 30% of CP2

SP2 = 75x + (30/100) × 75x

SP2 = 75x + 22.5x = 97.5x

Equating the New Selling Price values:

Now, we equate the two different expressions for SP2 to find the value of x:

115x − 294 = 97.5x

115x − 97.5x = 294

17.5x = 294

x = 294 / 17.5

x = 16.8

Calculating the Original Cost Price:

The Original Cost Price (CP1) was assumed to be 100x.

CP1 = 100 × 16.8 = 1,680

The cost price of the article is Rs. 1,680.

The correct answer is option 4

Q16. Answer: (c) 1

Shortcut Trick

For divisibility by 2, the units digit Q must be an even number (0, 2, 4, 6, or 8).

For divisibility by 3, the sum of digits (3 + P + 2 + Q) = 5 + P + Q must be a multiple of 3.

The smallest multiple of 3 greater than or equal to 5 is 6.

Setting 5 + P + Q = 6 => P + Q = 1.

With Q = 0 (even) and P = 1, both conditions are satisfied, so the smallest value is 1.

Therefore The correct answer is 1.

Alternate Method

Given: A four-digit number 3P2Q is divisible by both 2 and 3.

Formula Used:

1. Divisibility by 2: Last digit must be even (0, 2, 4, 6, 8).

2. Divisibility by 3: Sum of all digits must be divisible by 3.

Calculations:

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=> For the number to be divisible by 2, Q in {0, 2, 4, 6, 8}.

=> For the number to be divisible by 3, Sum = 3 + P + 2 + Q = 5 + P + Q must be a multiple of 3.

=> Possible multiples of 3 are 6, 9, 12, 15, ...

=> To minimize P + Q, we test the smallest possible sum: 5 + P + Q = 6.

=> P + Q = 6 − 5 = 1.

=> Now, check if there exist digits P and Q such that P + Q = 1 and Q is even.

=> If Q = 0 (even) and P = 1, then P + Q = 1.

=> The resulting number 3120 is divisible by both 2 and 3.

Therefore The correct answer is 1.

Additional Information

Divisibility by 6

A number is divisible by 6 if it satisfies the divisibility rules for both 2 (even units digit) and 3 (sum of digits divisible by 3).

Divisibility by 4

A number is divisible by 4 if the number formed by its last two digits is divisible by 4 (e.g., in 3P2Q, the number 2Q must be divisible by 4).

Divisibility by 9

A number is divisible by 9 if the sum of all its digits is divisible by 9.

Q17. Answer: (a) C

Shortcut Trick

Compare the Effective Discount for 5 toys in each scheme:

Scheme A: 24 + 33 − (24 × 33 ÷ 100) = 49.08%

Scheme B: Successive 39%, 37%, 23% → Obviously higher than 50% (approx 70.4%)

Scheme C: (2 × 24% + 3 × 12%) ÷ 5 = (48 + 36) ÷ 5 = 16.8%

Scheme D: 2 ÷ (5 + 2) × 100 ≈ 28.57%

Comparing all, 16.8% is the minimum discount.

Therefore The correct answer is C.

Alternate Method

Assume the Marked Price (MP) of each toy = Rs. 100. For 5 toys, total MP = Rs. 500.

Scheme A (Successive 24% and 33%):

=> Net Discount % = 24 + 33 − (24 × 33)/100 = 57 − 7.92 = 49.08%

Scheme B (Successive 39%, 37% and 23%):

=> After 39% and 37%: 39 + 37 − (39 × 37)/100 = 76 − 14.43 = 61.57%

=> Net Discount % = 61.57 + 23 − (61.57 × 23)/100 = 84.57 − 14.16 = 70.41%

Scheme C (24% on first 2, 12% on rest):

=> Total Discount = (2 × 24) + (3 × 12) = 48 + 36 = Rs. 84

=> Effective Discount % = (84 ÷ 500) × 100 = 16.8%

Scheme D (2 toys free on 5 toys bought):

=> Total items = 5 + 2 = 7 toys

=> Discount % = (Free items ÷ Total items) × 100 = (2 ÷ 7) × 100 ≈ 28.57%

The Least Beneficial scheme for the customer is the one with the minimum discount.

Therefore The correct answer is C.

Additional Information

Successive Discount Formula

For two successive discounts a% and b%, the single equivalent discount is [a + b − (a × b ÷ 100)]%.

Buy X Get Y Free

The effective discount percentage for such schemes is calculated as [Y ÷ (X + Y)] × 100.

Customer vs Shopkeeper Benefit

A customer seeks the maximum discount (Most Beneficial), while the shopkeeper seeks the minimum discount (Least Beneficial to customer).

Q18. Answer: (a) 12

Shortcut Trick

Use the direct algebraic identity: (Difference)² = (Sum)² − 4 × (Product)

Given Sum = 32 and Product = 220.

=> (Difference)² = 32² − 4 × 220

=> (Difference)² = 1024 − 880 = 144

=> Difference = √144 = 12

Therefore The correct answer is 12.

Alternate Method

Let the two positive numbers be x and y.

Given:

1. x + y = 32

2. x × y = 220

Calculations:

=> (x + y)² = 32²

=> x² + y² + 2xy = 1024

=> x² + y² + 2(220) = 1024

=> x² + y² = 1024 − 440 = 584

=> (x − y)² = x² + y² − 2xy

=> (x − y)² = 584 − 440 = 144

=> x − y = √144 = 12

Therefore The correct answer is 12.

Additional Information

Algebraic Identity for Sum and Difference

The relation between sum, difference, and product is given by the identity: (a + b)² − (a − b)² = 4ab.

Quadratic Equation Roots

If the sum (S) and product (P) of two numbers are known, the numbers are roots of the equation: t² − St + P = 0.

Finding Individual Values

Once the sum (S) and difference (D) are known, the larger number is (S + D) ÷ 2 and the smaller number is (S − D) ÷ 2.

Q19. Answer: (c) 4% decrease

Shortcut Trick

When a value is first increased by x% and then decreased by x%, the net change is always a decrease given by the formula: (x/10)²%.

Here, x = 20.

Net percentage change = (20 / 10)² = 2² = 4% decrease.

Note: The original price (Rs. 500) does not affect the net percentage change.

Therefore The correct answer is 4% decrease.

Alternate Method

Given: Original price = Rs. 500, first increase = 20%, subsequent decrease = 20%.

Formula: New Value = Original Value × (100 + change%)/100

=> Original Price = Rs. 500

=> Price after 20% increase = 500 + (20/100) × 500 = 500 + 100 = Rs. 600

=> Price after 20% decrease = 600 − (20/100) × 600 = 600 − 120 = Rs. 480

=> Net change in price = 500 − 480 = Rs. 20

=> Net percentage change = (Net Change / Original Price) × 100

=> Net percentage change = (20 / 500) × 100 = 4%

=> Since the final price (Rs. 480) is less than the original price (Rs. 500), it is a decrease.

Therefore The correct answer is 4% decrease.

Additional Information

Successive Percentage Change Formula

For two successive changes of a% and b%, the effective change is [a + b + (ab/100)]%. Use positive for increase and negative for

decrease.

Order of Changes

The final net percentage change remains the same regardless of the order of the percentage increases or decreases (i.e., a 20% increase followed by a 20% decrease is the same as a 20% decrease followed by a 20% increase).

Constant Percentage Rule

If a quantity is increased by x% and then the resulting quantity is decreased by x%, the overall result is always a net decrease of $(x/10)^2$% or $x^2/100$%.

Q20. Answer: (d) Rs. 2,314.20

Shortcut Trick

Loss of 12% => SP is 88% of Cost Price (CP).

Desired Profit of 14% => New SP should be 114% of CP.

Using the ratio: (1786.40 ÷ 88) × 114

=> 20.3 × 114 = Rs. 2,314.20.

Therefore The correct answer is Rs. 2,314.20.

Alternate Method

Given:

Initial Selling Price (SP1) = Rs. 1,786.40

Initial Loss = 12%

Required Profit = 14%

Formula Used:

Cost Price (CP) = SP × [100 ÷ (100 − Loss%)]

New Selling Price (SP2) = CP × [(100 + Profit%) ÷ 100]

Calculations:

=> CP = 1786.40 × [100 ÷ (100 − 12)]

=> CP = 1786.40 × (100 ÷ 88)

=> CP = 20.3 × 100 = Rs. 2,030

=> New SP = 2030 × [(100 + 14) ÷ 100]

=> New SP = 2030 × (114 ÷ 100)

=> New SP = 20.3 × 114

=> New SP = Rs. 2,314.20

Therefore The correct answer is Rs. 2,314.20.

Additional Information

Relationship between CP and SP

Profit % = (Profit ÷ CP) × 100, where Profit = SP − CP. Similarly, Loss % = (Loss ÷ CP) × 100.

Direct SP Calculation

When CP is constant, SP1 ÷ (100 ± Gain/Loss1) = SP2 ÷ (100 ± Gain/Loss2).

Successive Changes

If an article is sold through multiple hands at a profit/loss of x%, y%, and z%, then Final SP = CP × (1 ± x/100) × (1 ± y/100) × (1 ± z/100).

Q21. Answer: (d) Rs. 2,160

Shortcut Trick

Net Discount % = a + b − (ab/100) = 10 + 20 − (10 × 20)/100 = 28%

Selling Price = (100% − 28%) of Marked Price

SP = 72% of Rs. 3,000 = 0.72 × 3,000 = Rs. 2,160

Therefore The correct answer is Rs. 2,160.

Alternate Method

Given: Marked Price (MP) = Rs. 3,000; First Discount = 10%; Second Discount = 20%.

Formula: Final SP = MP × (100 − d1)/100 × (100 − d2)/100

=> Price after 10% discount = 3,000 − (10% of 3,000) = 3,000 − 300 = Rs. 2,700

=> Price after 20% discount = 2,700 − (20% of 2,700) = 2,700 − 540 = Rs. 2,160

=> The final Selling Price is Rs. 2,160, which matches Option (4).

Therefore The correct answer is Rs. 2,160.

Additional Information

Successive Discount Rule

When two successive discounts d1% and d2% are given, the equivalent single discount is (d1 + d2 − d1d2/100)%.

Selling Price vs Marked Price

Selling Price (SP) = Marked Price (MP) − Discount. If multiple discounts are applied, they are calculated on the diminishing balance.

Profit and Loss Relation

If CP is the cost price, then SP = CP + Profit or SP = CP − Loss. The markup is always calculated on the CP.

Q22. Answer: (a) 4,500

Shortcut Trick

Effective Simple Interest percentage for 2 years = Rate × Time = 16% × 2 = 32%.

According to the question, 32% of Principal = Rs. 1,440.

=> 1% of Principal = 1,440 ÷ 32 = 45.

=> 100% of Principal (Sum) = 45 × 100 = 4,500.

Therefore The correct answer is Rs. 4,500.

Alternate Method

Given: Simple Interest (SI) = Rs. 1,440, Rate (R) = 16% per year, Time (T) = 2 years.

Formula Used: SI = (P × R × T) ÷ 100, where P is the Principal amount.

=> 1,440 = (P × 16 × 2) ÷ 100

=> 1,440 = 32P ÷ 100

=> 1,440 × 100 = 32P

=> 1,44,000 = 32P

=> P = 1,44,000 ÷ 32

=> P = 4,500

Therefore The correct answer is Rs. 4,500.

Additional Information

Simple Interest vs Compound Interest

For the first year, Simple Interest and Compound Interest are equal. From the second year onwards, CI includes interest on the previous year's interest.

Amount Formula

Total Amount (A) = Principal (P) + Interest (I). For Simple Interest, A = P(1 + RT/100).

Rate of Interest Calculation

The annual Rate of Interest can be found using the formula R = (SI × 100) ÷ (P × T).

Q23. Answer: (a) 5

Shortcut Trick

Assume the Mean (40) as the balance point where the sum of deviations is zero.

Net deviation: ∑f(x − 40) = 2(−30) + 3(−20) + 1(−10) + 4(0) + f(10) + 4(20) = 0

−60 − 60 − 10 + 0 + 10f + 80 = 0 => 10f − 50 = 0

10f = 50 => f = 5

Therefore The correct answer is 5.

Alternate Method

Given: Mean (&bar;x) = 40. Data points (x) and frequencies (f) are mapped below.

Formula: Mean (&bar;x) = ∑f_ix_i ÷ ∑f_i

=> ∑f_ix_i = (10 × 2) + (20 × 3) + (30 × 1) + (40 × 4) + (50 × f) + (60 × 4)

=> ∑f_ix_i = 20 + 60 + 30 + 160 + 50f + 240 = 510 + 50f

=> ∑f_i = 2 + 3 + 1 + 4 + f + 4 = 14 + f

=> 40 = (510 + 50f) ÷ (14 + f)

=> 40(14 + f) = 510 + 50f

=> 560 + 40f = 510 + 50f

=> 560 − 510 = 50f − 40f

=> 50 = 10f => f = 5

Therefore The correct answer is 5.

Additional Information

Arithmetic Mean of Discrete Series

Calculated as the sum of products of observations and their frequencies divided by the total frequency: &bar;x = ∑fx / ∑f.

Properties of Mean

The algebraic sum of deviations of a set of observations from their arithmetic mean is always zero, i.e., ∑f_i(x_i − &bar;x) = 0.

Assumed Mean Method

A shortcut formula where Mean = A + (∑fd / ∑f), where A is the assumed mean and d = x − A is the deviation.

Q24. Answer: (b) 20,400

Shortcut Trick

Net difference in interest rate per annum = 6.5% − 3.5% = 3%

Total interest difference for 2 years = 3% × 2 = 6%

Positive difference in Simple Interest = 6% of Rs. 3,40,000

Difference = 3,40,000 × (6 / 100) = 3,400 × 6 = Rs. 20,400

Therefore The correct answer is Rs. 20,400.

Alternate Method

Given:

Principal (P) = Rs. 3,40,000

Rate for Bank A (R1) = 3.5% p.a.

Rate for Bank B (R2) = 6.5% p.a.

Time (T) = 2 years

Formula Used:

Simple Interest (SI) = (P × R × T) / 100

Calculations:

=> Interest paid to Bank A (SI1) = (3,40,000 × 3.5 × 2) / 100

=> SI1 = 3,400 × 7 = Rs. 23,800

=> Interest paid to Bank B (SI2) = (3,40,000 × 6.5 × 2) / 100

=> SI2 = 3,400 × 13 = Rs. 44,200

=> Positive difference = SI2 − SI1

=> Difference = 44,200 − 23,800 = Rs. 20,400

Therefore The correct answer is Rs. 20,400.

Additional Information

Simple Interest Formula

SI = (P × R × T) / 100, where P is Principal, R is Rate, and T is Time.

Rate Difference Rule

When P and T are constant, the difference in interests is P × T × (R2 − R1) / 100.

Amount Formula

Total Amount (A) = Principal (P) + Simple Interest (SI).

Q25. Answer: (d) 9 hours

Shortcut Trick

LCM of (12, 15, 20) = 60 units (Total Capacity).

Efficiencies: A = 5, B = 4, C = −3 (emptying).

Work done by Pipe A and Pipe B in 2 hr = (5 + 4) × 2 = 18 units.

Remaining Work = 60 − 18 = 42 units.

Time for remaining part = 42 ÷ (5 + 4 − 3) = 42 ÷ 6 = 7 hr.

Total time = 2 + 7 = 9 hr.

Therefore The correct answer is 9 hr.

Alternate Method

Given: Time for Pipe A = 12 hr, Pipe B = 15 hr, Pipe C = 20 hr.

Formula: Total Work = LCM of individual times; Efficiency = Total Work ÷ Time.

Person/Pipe	Days/Time (hr)	Total Work (Units)	Efficiency (Units/hr)
Pipe A	12	60	5
Pipe B	15	4	
Pipe C (Emptying)	20	−3	

=> Tank filled by Pipe A and Pipe B in the first 2 hours = (5 + 4) × 2 = 18 units
=> Remaining capacity to be filled = 60 − 18 = 42 units
=> Combined efficiency of A, B, and C = 5 + 4 − 3 = 6 units/hr
=> Time taken to fill the remaining part = 42 ÷ 6 = 7 hr
=> Total time taken to fill the tank = 2 hr + 7 hr = 9 hr
Therefore The correct answer is 9 hr.
Additional Information
Pipes and Cisterns Efficiency
An inlet pipe (filling) has positive efficiency, while an outlet pipe (emptying) has negative efficiency.
Net Work Done
When multiple pipes operate, the net rate is the algebraic sum of their individual efficiencies.
LCM Method for Total Capacity
The Total Capacity of a tank is best assumed as the LCM of the individual times to simplify calculations without fractions.

Q26. Answer: (b) 30 years

Shortcut Trick
Sum of ages 2 years ago = 46 − (2 × 2) = 42 years.
Ratio of P to Q was 2 : 1.
Total units = 2 + 1 = 3 units → 42 years.
1 unit = 14 years.
P's age 2 years ago = 2 × 14 = 28 years.
Present age of P = 28 + 2 = 30 years.
Therefore The correct answer is 30 years.
Alternate Method
Given:
Present combined age of P and Q = 46 years
Condition: 2 years ago, P = 2 × Q
Let the present age of P be P and Q be Q.
=> P + Q = 46 (Equation 1)
Two years ago, their ages were (P − 2) and (Q − 2).
=> P − 2 = 2 × (Q − 2)
=> P − 2 = 2Q − 4
=> P − 2Q = −2 (Equation 2)
Subtracting Equation 2 from Equation 1:
=> (P + Q) − (P − 2Q) = 46 − (−2)
=> 3Q = 48
=> Q = 16 years
Substitute the value of Q in Equation 1:
=> P + 16 = 46
=> P = 46 − 16
=> P = 30 years
Therefore The correct answer is 30 years.
Additional Information
Constant Age Difference
The numerical difference between the ages of two individuals always remains constant, regardless of how many years pass or are

subtracted.

Sum Adjustment for Time

When calculating the sum of ages 'n' years ago for 'k' people, subtract (n × k) from the present total sum.

Ratio and Proportions in Ages

If the ratio of ages at time 't' is a : b, and the total sum at that same time is S, then individual ages are [a/(a+b)] × S and [b/(a+b)] × S.

Q27. Answer: (b) 20 m

Shortcut Trick

The mean proportional of two numbers a and b is calculated as √(a × b).

Given a = 16 and b = 25.

New side = √(16 × 25) = 4 × 5 = 20 m.

Therefore The correct answer is 20 m.

Alternate Method

Given:

Side of the first square garden (a) = 16 m

Side of the second square garden (b) = 25 m

Formula Used:

If x is the mean proportional between a and b, then a : x = x : b => $x^2 = ab$ => $x = \sqrt{ab}$

Calculations:

=> Let the side of the third square garden be x.

=> According to the question, x is the mean proportional of 16 and 25.

=> x = √(16 × 25)

=> x = √400

=> x = 20 m

Therefore The correct answer is 20 m.

Additional Information

Mean Proportional

For any two numbers a and b, the mean proportional x is the square root of their product, i.e., x = √ab.

Third Proportional

If a and b are two numbers, their third proportional c is such that a:b = b:c, which gives $c = b^2/a$.

Fourth Proportional

For three numbers a, b, and c, the fourth proportional d satisfies a:b = c:d, implying d = (b × c) / a.

Q28. Answer: (a) 128 cm^3

Shortcut Trick

Total volume remains constant when objects are melted and recast.

Volume of 16 identical cubes = 16 × $(Side)^3$

Volume = 16 × $(2\ cm)^3$ = 16 × 8 cm^3 = 128 cm^3

Therefore The correct answer is 128 cm^3.

Alternate Method

Given: Sixteen identical cubes with side = 2 cm. For the cuboid, length (L) = 2 × breadth (B) and height (H) = breadth (B).

Formula Used: Volume of cube = a^3 | Volume of cuboid = L × B × H

=> Volume of one solid cube = $(2\ cm)^3$ = 8 cm^3

=> Total volume of 16 cubes = 16 × 8 cm^3 = 128 cm^3

=> Let the breadth of the cuboid be B.

=> Length L = 2B and Height H = B.

=> Volume of cuboid = L × B × H = (2B) × B × B = $2B^3$

=> Since volume is conserved: $2B^3 = 128$

=> $B^3 = 64$ => B = 4 cm

=> Volume of cuboid = 2 × $(4)^3$ = 2 × 64 = 128 cm^3

Therefore The correct answer is 128 cm^3.

Additional Information

Volume Conservation Principle

When a physical object is melted and recast into one or more different shapes, the total volume remains unchanged, assuming no material is lost in the process.

Total Surface Area of Cuboid

The total surface area (TSA) of a cuboid is given by the formula: 2 × (LB + BH + HL). For the calculated dimensions (8, 4, 4), TSA = 2 × (32 + 16 + 32) = 160 cm².

Diagonal of a Cuboid

The space diagonal (longest distance between opposite corners) is calculated as √(L² + B² + H²).

Q29. Answer: (a) 1350

Shortcut Trick

Convert 1 hr 20 min to total minutes: 60 + 20 = 80 minutes.

Printing rate per minute = 2400 ÷ 80 = 30 pages/min.

Pages printed in 45 minutes = 30 × 45 = 1350.

Therefore The correct answer is 1350 pages.

Alternate Method

Given:

Total pages = 2400

Time taken = 1 hr 20 min

Required time = 45 min

Calculation:

=> 1 hr 20 min = (1 × 60) + 20 = 80 minutes

=> Let the pages printed in 45 min be x.

=> 2400 ÷ 80 = x ÷ 45

=> 30 = x ÷ 45

=> x = 30 × 45

=> x = 1350

Therefore The correct answer is 1350 pages.

Additional Information

Unitary Method

Find the value of a single unit by dividing the total value by the number of units, then multiply to find the required value.

Steady Rate / Constant Speed

When a machine works at a steady rate, the work done is directly proportional to the time spent (Work = Rate × Time).

Time Conversion

Always ensure all time units are consistent (e.g., converting hours to minutes using 1 hr = 60 min) before performing division or multiplication.

Q30. Answer: (c) 1

Shortcut Trick

Net filling rate of all three taps = (1/4 + 1/8 − 1/8) = 1/4 of the cistern per hour.

The time required to fill the entire cistern is 4 hours.

To fill one-fourth of the empty cistern, time taken = 4 ÷ 4 = 1 hour.

Therefore The correct answer is 1 hr.

Alternate Method

Given: Filling times are 4 hr and 8 hr; Emptying time is 8 hr.

Tap	Time (hr)	Total Capacity (LCM)	Efficiency
Tap A (Fill)	4	8 units	2
Tap B (Fill)	8	1	
Tap C (Empty)	8	−1	

=> Total Efficiency of all taps = 2 + 1 − 1 = 2 units/hr.

=> Target volume to fill (one-fourth) = 8 × (1/4) = 2 units.

=> Time required = Target Volume ÷ Total Efficiency

=> Time required = 2 ÷ 2 = 1 hr.

Therefore The correct answer is 1 hr.

Additional Information

Net Filling Rate

The combined rate of multiple pipes is the algebraic sum of their individual rates, where inlet pipes are positive and outlet pipes are negative.

Work and Efficiency

In pipes and cisterns, the total capacity is treated as work. Time = Total Capacity ÷ Net Efficiency.

LCM Method

Assume the total capacity of the cistern to be the Least Common Multiple (LCM) of the individual time periods for easier calculation.

Q31. Answer: (a) Article 48A

The correct answer is Article 48A.

Key Points

• Article 48A of the Indian Constitution specifically mandates the State to endeavor to protect and improve the environment and to safeguard the forests and wildlife of the country.

• This provision was incorporated into the Constitution through the 42nd Amendment Act, 1976, which was passed during the internal emergency and is frequently called the Mini-Constitution due to the vast changes it introduced.

• It is situated within Part IV of the Constitution, which contains the Directive Principles of State Policy (DPSP); these serve as fundamental guidelines for the Central and State governments while formulating legislation and policies.

• While Directive Principles are non-justiciable in nature, meaning they cannot be enforced directly by a court of law, Article 37 declares that they are fundamental in the governance of the country and it is the duty of the State to apply them.

Additional Information

• Article 39A:

• Inserted by the 42nd Amendment Act, it directs the State to ensure that the operation of the legal system promotes justice on a basis of equal opportunity.

• It specifically requires the State to provide free legal aid to ensure that justice is not denied to any citizen due to economic or other disabilities.

• Article 43A:

• This article was also added in 1976 and mandates the State to take steps to secure the participation of workers in the management of undertakings or industrial establishments.

• It reflects the socialist principles of the Indian Constitution by empowering the labor force within the industrial framework.

• Article 51A(g):

• While Article 48A is a duty of the State, Article 51A(g) establishes a Fundamental Duty for every citizen of India to protect and improve the natural environment including lakes, rivers, and wildlife.

Q32. Answer: (c) Maharashtra

The correct answer is Maharashtra.

Key Points

• The Konkan Coast is a 720-kilometer long rugged section of the western coastline of the Indian Peninsula, stretching from Daman in the north to Goa in the south.

• In the state of Maharashtra, the coast covers several key districts, including Mumbai City, Mumbai Suburban, Thane, Palghar, Raigad, Ratnagiri, and Sindhudurg.

• Geographically, it is positioned between the Western Ghats (also known as the Sahyadri mountain range) to the east and the Arabian Sea to the west.

• The region is characterized by laterite soil and receives high annual rainfall from the Southwest Monsoon, making it suitable for the cultivation of Alphonso mangoes, cashews, coconuts, and betel nuts.

• Historically, the Konkan region has been a vital maritime gateway, featuring prominent ports and coastal forts like Janjira, Sindhudurg, and Raigad.

Additional Information

• Odisha:

• The coastline of this eastern state is known as the Utkal Coast.

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• It is home to the Mahanadi River delta and Chilika Lake, which is the largest brackish water lagoon in India.

• Karnataka:

• The shoreline of this state is referred to as the Kanara Coast or Karavali.

• It lies between the Konkan to the north and the Malabar coast to the south, primarily consisting of the Uttara Kannada, Udupi, and Dakshina Kannada districts.

• Kerala:

• The southwestern coast of India, specifically the shoreline of Kerala, is known as the Malabar Coast.

• This region is famous for its unique backwaters (locally known as Kayals), spice production, and the historic port of Muziris.

Q33. Answer: (b) Promises and undertakings made by Ministers in Parliament

The correct answer is Promises and undertakings made by Ministers in Parliament.

Key Points

• The Committee on Government Assurances is a specialized Parliamentary Committee established to scrutinize the assurances, promises, and undertakings given by Ministers from time to time on the floor of the House.

• The primary objective of this committee is to ensure Executive accountability to the Legislature by tracking whether the verbal or written commitments made during Question Hour or debates are implemented.

• In the Lok Sabha, the committee consists of 15 members who are nominated by the Speaker of the House.

• In the Rajya Sabha, the committee consists of 10 members who are nominated by the Chairman.

• The committee reports on the extent to which such assurances have been fulfilled and whether the implementation took place within the minimum time necessary.

• A Minister cannot be a member of this committee to maintain its independent supervisory nature over the executive branch.

Additional Information

• Committee on Public Undertakings:

• It examines the reports and accounts of Public Sector Undertakings (PSUs) and evaluates if their affairs are being managed in accordance with sound business principles.

• Public Accounts Committee (PAC):

• This committee is responsible for the monitoring of government expenditure by examining the Appropriation Accounts and the audit reports of the Comptroller and Auditor General (CAG).

• Committee on Subordinate Legislation:

• It examines whether the powers to make rules, regulations, and bye-laws (delegated legislation) under the Constitution or Acts of Parliament are being properly exercised by the executive.

• This includes examining rules framed under various articles, including those related to All India Services under Article 312.

Q34. Answer: (b) Force the process to terminate and release its resources

The correct answer is Force the process to terminate and release its resources.

Key Points

• A program enters a Not Responding state when its Message Loop or User Interface (UI) thread stops processing events sent by the Operating System, often due to heavy computation, deadlocks, or resource contention.

• When a user utilizes the Windows Task Manager to end such a program, the system sends a WM_CLOSE message. If the application remains unresponsive, the user initiates a Force Termination, which invokes the TerminateProcess function at the Kernel level.

• The Operating System abruptly halts the execution of all threads associated with that specific Process ID (PID), ensuring the application can no longer execute instructions.

• The most critical phase of this action is Resource Reclamation; the OS Kernel automatically identifies and frees the Random Access Memory (RAM), closes File Handles, and releases Network Sockets or Semaphores held by the dead process.

Additional Information

• Windows Task Manager:

• It serves as a System Monitor and startup manager, providing real-time data on CPU utilization, Memory footprint, and Disk I/O.

• It allows users to manage Background Processes and Services that might be impacting system performance.

• Incorrect Concepts:

• File Type Conversion: Involves changing the File Extension (like .exe to .msi), which is a storage-level operation and does not affect the runtime state of a frozen process.

• Windows Services: These are long-running executable applications that operate in the Background, independent of user sessions. Converting a standard desktop app into a service requires administrative configuration (e.g., via sc.exe or PowerShell), not the 'End Task' command.

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• Drive Migration: Moving a program to another Logical Drive (e.g., C: to D:) is a data transfer task and cannot be performed while the process is actively loaded in the Primary Memory.

Q35. Answer: (a) Manipur

The correct answer is Manipur.

Key Points

• The Kuki Rebellion, also known as the Anglo-Kuki War or Zou Gal, was a significant armed uprising against British colonial rule that took place from 1917 to 1919.

• The primary theatre of the conflict was the hilly regions of the Manipur state, involving the Kuki tribes who resisted British administrative interference and territorial encroachment.

• The immediate spark for the rebellion was the forced recruitment of tribal men for the Manipur Labour Corps to serve in France during World War I.

• Prominent Kuki chiefs, including Chengjapao Doungel and Enjakhup Kholhou, led the resistance using guerrilla warfare tactics, effectively utilizing the rugged terrain of the Manipur Hills.

• The rebellion challenged British authority for nearly two years before being suppressed by the British Indian Army and the Assam Rifles in May 1919.

Additional Information

• Geographical and Political Context:

• While Nagaland, Assam, and Tripura share ethnic ties with various tribal groups, this specific rebellion was a direct response to the policies of the Political Agent of Manipur.

• The suppression of the revolt led to the Reorganization of Manipur Hills in 1919, resulting in the establishment of three new subdivisions to tighten British administrative control.

• Key Figures and Tactics:

• The Kukis utilized indigenous weaponry such as leather cannons and poisoned arrows alongside captured firearms to resist colonial forces.

• Chengjapao Doungel was the Aishan Chief and is regarded as one of the pivotal figures who coordinated the various clans during the uprising.

• World War I Impact:

• The rebellion is historically significant as it demonstrated the local repercussions of World War I on the remote frontier regions of British India.

Q36. Answer: (d) Diffraction

The correct answer is Diffraction.

Key Points

• Diffraction refers to the physical phenomenon where a wave encounters an obstacle or an opening and bends around the corners or spreads out as it passes through.

• This property is common to all types of waves, including sound, light, and water waves, but its visibility depends heavily on the ratio of the wavelength to the size of the obstacle.

• The audible frequency range for humans (20 Hz to 20,000 Hz) corresponds to wavelengths approximately between 1.7 centimeters and 17 meters in air.

• Because these wavelengths are comparable to the dimensions of everyday objects like fences, buildings, and doorways, sound waves easily bend over or around these barriers into the geometrical shadow region.

• In the given scenario, while the rectilinear propagation of light (due to its extremely small wavelength of about 400 to 700 nanometers) prevents us from seeing the person, the long wavelengths of sound allow the waves to diffract over the tall fence and reach the listener.

Additional Information

• Polarization

• It is the process by which the vibrations of a transverse wave (like light) are restricted to a single plane of direction.

• Sound waves in air are longitudinal waves (vibrations are parallel to the direction of travel) and therefore cannot be polarized.

• Refraction

• This involves the change in direction of a wave as it passes from one medium to another with a different density or speed, such as sound traveling through air layers of different temperatures.

• Reflection

• This is the bouncing back of a wave when it strikes a boundary or a hard surface. Common examples in sound include echoes and reverberations.

Q37. Answer: (c) Assam

The correct answer is Assam.

Key Points

• The Chief Minister Jibon Prerana Scheme was officially launched by the Assam State Government on 3 November 2025 as a strategic welfare measure for the state's youth.

• The primary target group of this initiative is fresh graduates who have recently completed their higher education and are transitioning into the professional job market.

• The scheme is designed to provide monthly financial assistance in the form of a stipend, which helps beneficiaries cover essential costs during their job search or while preparing for competitive examinations.

• The core objective is to prevent educated unemployment from leading to financial distress and to empower young individuals to focus on skill development and career growth without immediate economic pressure.

• To qualify for the benefits, applicants must be permanent residents of Assam and possess a valid degree from a recognized university or institution.

• This program represents a shift towards direct benefit transfers (DBT) for the educated youth, ensuring that the assistance reaches the intended fresh graduates directly through their bank accounts.

Additional Information

• Related Development Schemes in Assam:

• Mukhya Mantri Atmanirbhar Asom Abhijan: A massive initiative aimed at fostering entrepreneurship by providing financial support to 2 lakh youth for starting their own business ventures.

• Nijut Moina Scheme: A financial incentive program where female students receive monthly grants (up to 2,500 rupees) to encourage them to pursue higher education and delay marriage.

• Pragyan Bharti: Provides free textbooks, scooties for meritorious girl students, and admission fee waivers for students from economically weaker backgrounds.

• The Jibon Prerana Scheme complements these existing efforts by specifically addressing the financial gap faced by unemployed graduates immediately after their formal schooling concludes.

• The state government utilizes the Aadhaar-linked database to ensure that the monthly financial assistance is distributed efficiently and to eliminate duplicate or fraudulent claims.

Q38. Answer: (d) A rural uprising against exploitative landlords

The correct answer is A rural uprising against exploitative landlords.

Key Points

• The movement led by Baba Ramchandra was a significant peasant struggle that emerged in the region of Awadh (Oudh) during the 1920s.

• It was primarily directed against Talukdars and landlords who demanded exorbitantly high rents and numerous other cesses from the peasantry.

• The peasants were subjected to Begar, a system of forced labor where they were compelled to work on the landlords' farms without any wages or remuneration.

• The movement specifically demanded a reduction in land revenue, the abolition of begar, and a social boycott of oppressive landlords to challenge their local authority.

• To implement the social boycott, local panchayats organized Nai-dhobi bandhs, which deprived landlords of essential services like those provided by barbers and washermen.

• In October 1920, the Oudh Kisan Sabha was established, headed by Jawaharlal Nehru, Baba Ramchandra, and others, to integrate the peasant grievances with the broader nationalist struggle.

Additional Information

• Baba Ramchandra:

• He was a Sanyasi who had previously worked as an indentured laborer in Fiji, an experience that shaped his understanding of colonial and economic exploitation.

• He used the Ramayana as a tool to mobilize and connect with the rural masses in Uttar Pradesh.

• The Non-Cooperation Movement Connection:

• The Indian National Congress attempted to integrate the Awadh peasant struggle into the Non-Cooperation Movement led by Mahatma Gandhi.

• However, as the movement spread in 1921, it turned violent in some areas; houses of talukdars and merchants were attacked, and bazaars were looted, leading to some friction with the non-violent principles of the Congress leadership.

• The peasants often invoked the name of Mahatma Gandhi to justify their actions and refusal to pay taxes, interpreting Swaraj in their own economic context.

Q39. Answer: (c) Venus Rosewater Dish

The correct answer is Venus Rosewater Dish.

Key Points

• The Venus Rosewater Dish, officially known as the Ladies Singles Trophy, is the prestigious award presented to the women's singles champion at the Wimbledon Tennis Championships.

• The trophy is a circular salver made of sterling silver, which is partly gilt, and measures approximately 18.75 inches in diameter.

• It was first awarded in 1886 to Blanche Bingley, although the dish itself is a copy of an electrotype made by Messrs. Elkington and Co. in 1864.

• The central decoration depicts Sophrosyne, the personification of temperance and moderation, seated on a chest with various symbols including a lamp and a jug.

• The rim of the dish features Minerva presiding over the Seven Liberal Arts (Astrology, Geometry, Arithmetic, Music, Rhetoric, Dialectic, and Grammar), emphasizing the classical themes prevalent in Victorian era craftsmanship.

• Champions do not keep the original dish; they receive a three-quarter size replica (since 2007) inscribed with the names of all past winners, while the original remains at the All England Lawn Tennis Club museum.

Additional Information

• Suzanne Lenglen Trophy:

• This trophy is awarded to the Women's Singles winner at the French Open (Roland Garros).

• It is named after the legendary French tennis player Suzanne Lenglen, who won six Wimbledon and six French Championship titles.

• Gentlemen's Singles Trophy (Wimbledon):

• The men's champion at Wimbledon receives a silver gilt cup that stands 18 inches high.

• The trophy is famous for the pineapple ornament on top of its lid, a symbol often associated with hospitality and wealth in the 17th century.

• Arthur Ashe Trophy:

• While the main stadium at the US Open is named Arthur Ashe Stadium, the trophies themselves are usually referred to by the tournament name (the US Open Trophy by Tiffany & Co.).

• Arthur Ashe was the first African-American man to win the singles title at Wimbledon, the US Open, and the Australian Open.

Q40. Answer: (d) Organic farming relies heavily on high technology.

The correct answer is Organic farming relies heavily on high technology..

Key Points

• Organic farming is a holistic production management system that promotes and enhances agro-ecosystem health, including biodiversity and biological cycles, making it inherently environment-friendly. Hence, statement 1 is correct.

• It prioritizes soil health by utilizing organic manures, green manure, and compost, which nourish soil biota such as earthworms and beneficial microbes. Hence, statement 2 is correct.

• A fundamental principle of this agricultural practice is the exclusion of synthetic chemicals, including chemical fertilizers, synthetic pesticides, and genetically modified organisms (GMOs). Hence, statement 3 is correct.

• Unlike modern industrial agriculture that relies on capital-intensive high technology and precision engineering, organic farming is knowledge-intensive and relies on ecological processes and traditional practices adapted to local conditions. Hence, statement 4 is incorrect.

Additional Information

• Core Components:

• Crop Rotation: Growing different crops in sequence to maintain soil productivity and break pest cycles.

• Biological Pest Control: Using predatory insects and bio-pesticides like Neem or Panchagavya instead of toxic sprays.

• Bio-fertilizers: Utilizing Rhizobium, Azotobacter, and Blue-Green Algae to fix atmospheric nitrogen.

• Indian Context:

• Sikkim became the world s first fully organic state in 2016, demonstrating the viability of chemical-free farming.

• The Paramparagat Krishi Vikas Yojana (PKVY) and Mission Organic Value Chain Development for North Eastern Region (MOVCDNER) are key government schemes promoting these practices.

• Certification is managed by the National Programme for Organic Production (NPOP) under APEDA and the Participatory Guarantee System (PGS-India).

Q41. Answer: (d) Atomic Energy Act, 1962 & CLND Act, 2010

The correct answer is Atomic Energy Act, 1962 & CLND Act, 2010.

Key Points

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• The Atomic Energy Act, 1962 is the primary legislative framework that governs the development, control, and use of atomic energy in India. Currently, Section 3 of this Act restricts the design, construction, and operation of nuclear power plants to the Central Government or a Government Company where the state holds at least 51 percent equity. Proposed amendments aim to allow private sector entities to participate, especially in the deployment of Small Modular Reactors (SMRs).

• The Civil Liability for Nuclear Damage (CLND) Act, 2010 provides for civil liability for nuclear damage and prompt compensation to victims of a nuclear incident. It has been a significant barrier for private participation due to Section 17 (Right of Recourse) and Section 46, which create ambiguity regarding the liability of suppliers and operators. Amending this framework is considered vital to providing the legal certainty required for private investments and insurance coverage in the nuclear power sector.

• India targets a significant increase in its nuclear capacity to reach its Net Zero goals by 2070. By amending these two specific acts, the government intends to transition from a purely state-led model to a collaborative model that includes private equity and technical expertise.

Additional Information

• Electricity Act, 2003:

• This Act governs the generation, transmission, and distribution of electricity in India but does not override the specific restrictions placed on nuclear energy by the Atomic Energy Act.

• It was enacted to promote competition and delicense thermal generation, yet nuclear power remains a reserved sector under the 1962 legislation.

• Energy Conservation Act, 2001:

• This Act focuses on energy efficiency and conservation measures through the establishment of the Bureau of Energy Efficiency (BEE).

• It does not regulate the ownership or operational rights of nuclear power facilities, making it irrelevant to the structural shift toward private nuclear participation.

Q42. Answer: (b) Chandragupta II

The correct answer is Chandragupta II.

Key Points

• Chandragupta II, the son of Samudragupta and Dattadevi, ruled the Gupta Empire from approximately 375 to 415 CE, during which the empire reached its territorial and cultural zenith.

• His most significant military achievement was the conquest of the Western Kshatrapas (Shakas) who had ruled parts of Western India for over three centuries. He defeated the last Shaka ruler, Rudrasimha III, around 395-400 CE.

• The victory led to the annexation of the prosperous regions of Malwa, Gujarat, and Saurashtra, providing the Gupta Empire direct access to the Western Sea Coast and thriving trade ports like Barygaza (Broach).

• To commemorate this landmark victory and his supremacy over the Shakas, he assumed the imperial title Vikramaditya (meaning 'Sun of Prowess'). He is also known as Sakari, which literally translates to 'Destroyer of the Shakas'.

• To mark the annexation of the Shaka territories, Chandragupta II became the first Gupta monarch to issue silver coins (Rupakas), which were modeled after the existing silver currency of the Western Kshatrapas.

• His reign is celebrated as a Golden Age, distinguished by the presence of the Navaratnas (Nine Gems) in his court, including the legendary Sanskrit poet Kalidasa and the astronomer Varahamihira.

Additional Information

• Samudragupta

• Often called the Napoleon of India by historian V.A. Smith due to his extensive conquests across Northern and Southern India.

• The Prayag Prashasti (Allahabad Pillar Inscription), composed by his court poet Harisena, provides a detailed account of his military victories.

• Skandagupta

• Reigned from 455 to 467 CE and is renowned for successfully repelling the invasion of the Hunas (White Huns), which threatened the stability of the empire.

• He issued the Bhitari Pillar Inscription, which records his struggles and victories against the Pushyamitras and the Hunas.

• Kumaragupta I

• The son and successor of Chandragupta II, he assumed titles like Mahendraditya and performed the Ashvamedha sacrifice.

• He is credited with the foundation of the Nalanda University in Bihar, which became a world-renowned center for Buddhist studies.

Q43. Answer: (a) Primary memory

The correct answer is Primary memory.

Key Points

• Primary memory, also known as Main Memory or Internal Memory, is the part of the computer system that the Central

Processing Unit (CPU) can access directly via the Memory Bus.

• RAM (Random Access Memory) is a critical component of Primary memory. It is volatile, meaning it stores data temporarily while the computer is running but loses all stored information when the power is turned off. It allows for high-speed data read and write operations.

• ROM (Read Only Memory) is another form of Primary memory that is non-volatile. It permanently stores essential startup instructions, such as the BIOS (Basic Input/Output System) or UEFI, which are necessary to perform the POST (Power-On Self-Test) and load the Operating System.

• Unlike Secondary Storage (like Hard Drives), Primary memory operates at significantly higher speeds, providing the Processor with the necessary instructions and data with minimal latency.

Additional Information

• Input devices:

• These are hardware components used to send data and control signals to a computer (e.g., Keyboard, Mouse, Joystick, and Scanner).

• Processing units:

• These refer to the circuitry that performs operations on data. The most prominent example is the CPU, often called the 'brain' of the computer, along with specialized units like the GPU (Graphics Processing Unit).

• Output devices:

• These devices convey information from the computer to the user in a readable form, such as a Monitor, Printer, or Projector.

• Types of RAM and ROM:

• SRAM (Static RAM) is used for high-speed Cache memory, while DRAM (Dynamic RAM) is used for general system memory.

• EEPROM (Electrically Erasable Programmable ROM) is a modern type of ROM used in Flash memory and SSD technology.

Q44. Answer: (d) Rising concentration of DDT from water to algae to fish to birds

The correct answer is Rising concentration of DDT from water to algae to fish to birds.

Key Points

• Biomagnification, also known as biological magnification, refers to the increase in the concentration of a toxicant or persistent chemical at successive trophic levels in a food chain.

• This phenomenon occurs because a toxic substance accumulated by an organism cannot be metabolized or excreted, and is thus passed on to the next higher trophic level during consumption.

• DDT (Dichlorodiphenyltrichloroethane) is a well-known non-biodegradable pesticide that exhibits extreme biomagnification because it is fat-soluble and remains in the fatty tissues of organisms.

• In a typical aquatic food chain, the concentration of DDT may start at a very low level in water (approximately 0.003 ppb or parts per billion).

• As it moves up the chain, the concentration increases significantly: it reaches 0.04 ppm (parts per million) in zooplankton and algae, 0.5 ppm in small fish, 2 ppm in large fish, and can reach up to 25 ppm in fish-eating birds.

• High concentrations of DDT in top predators like birds interfere with calcium metabolism, leading to the thinning of eggshells and their premature breaking, which results in a decline in bird populations.

Additional Information

• Eutrophication

• This process involves the enrichment of water bodies with nutrients like Nitrates and Phosphates.

• It leads to algal blooms, which deplete dissolved oxygen and can cause massive die-offs of aquatic organisms.

• Sedimentation

• This is a physical process where silt and other suspended solids settle at the bottom of a river or lake.

• While it affects water quality and benthic habitats, it is not a biological process of chemical concentration.

• Volatilization

• This refers to the evaporation of pesticides or chemicals into the atmosphere.

• It is a mechanism of chemical transport in the environment but does not describe bioaccumulation within a food web.

Q45. Answer: (a) One year

The correct answer is One year.

Key Points

• According to Section 4 of the Citizenship Act, 1955, a person born outside India on or after December 3, 2004, shall be a citizen of India by descent only if their birth is registered at an Indian Consulate.

• The mandatory timeframe for this registration is within one year of the date of birth of the child.

• The parents of the minor must submit a declaration/undertaking affirming that the child does not hold the passport of any other

country.

• If the registration is not completed within the stipulated one-year period, it can only be done with the explicit permission of the Central Government of India.

• This provision ensures that the Indian Diaspora maintains a legal link to their home country while strictly adhering to India's policy against dual citizenship.

Additional Information

• The Citizenship Act, 1955:

• It provides five ways to acquire Indian citizenship: Birth, Descent, Registration, Naturalization, and Incorporation of Territory.

• Constitutional Provisions: Articles 5 to 11 under Part II of the Constitution of India deal with citizenship matters, though they primarily addressed status at the time of the Constitution's commencement in 1950.

• Citizenship by Descent (Timeline):

• Born between Jan 26, 1950 and Dec 10, 1992: Citizen if the father was an Indian citizen at the time of birth.

• Born between Dec 10, 1992 and Dec 3, 2004: Citizen if either parent was an Indian citizen at the time of birth.

• Born on or after Dec 3, 2004: Registration at the consulate within one year is a compulsory requirement.

• Ministry of Home Affairs (MHA): This is the nodal ministry responsible for matters related to citizenship and the implementation of the Citizenship Rules.

• Termination of Citizenship: The Act also specifies three methods of losing citizenship: Renunciation, Termination, and Deprivation.

Q46. Answer: (c) Agricultural runoff

The correct answer is Agricultural runoff.

Key Points

• Non-point source (NPS) pollution refers to contamination that does not originate from a single, discrete location or a specific pipe. Instead, it results from diffuse sources across a wide geographic area.

• Agricultural runoff is the leading cause of NPS pollution globally. When it rains or snow melts, the water washes over farmland, picking up synthetic fertilizers, herbicides, insecticides, and animal waste containing bacteria and nutrients like nitrogen and phosphorus.

• Because these pollutants are spread across thousands of acres and enter water bodies through broad overland flow rather than a concentrated channel, they are nearly impossible to trace to a single culprit.

• The Environmental Protection Agency (EPA) and frameworks like the Clean Water Act classify this as NPS because it is driven by precipitation and land management practices rather than end-of-pipe industrial processes.

Additional Information

• Point Source Pollution:

• This category includes any identifiable source where pollutants are discharged from a specific point, such as a pipe or a ditch.

• Industrial discharge pipe: These are regulated under permit systems because the exact volume and chemical composition of the waste exiting the factory can be monitored at the exit point.

• Sewage outlet: Municipal wastewater treatment plants discharge treated or untreated sewage through discrete pipes into rivers or oceans, making them stationary point sources.

• Urban stormwater drain: Although the source of the water is city-wide runoff, the Municipal Separate Storm Sewer Systems (MS4s) collect this water into a network of pipes and discharge it at specific outfalls, thus they are treated as point sources in regulatory contexts.

Q47. Answer: (b) India and Egypt

The correct answer is India and Egypt.

Key Points

• The 3rd edition of the Joint Special Forces Exercise CYCLONE is scheduled to be conducted from 10th to 23rd February 2025.

• This bilateral exercise is a collaborative military training program between the Special Forces of the Indian Army and the Egyptian Army.

• The 2025 edition is hosted by India at the Mahajan Field Firing Ranges in Rajasthan.

• The exercise focuses on sharing best practices, tactical techniques, and procedures for Special Operations in desert terrain.

• Key training areas include sniping, combat free fall, close-quarter combat, and operations involving Improvised Explosive Devices (IEDs).

• The primary objective is to strengthen bilateral defense cooperation and improve interoperability between the two elite forces to handle counter-terrorism and insurgency scenarios.

Additional Information

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• History of Exercise CYCLONE:

• The 1st edition of Exercise CYCLONE took place in January 2023 at Jaisalmer, Rajasthan.

• The 2nd edition was held in January 2024 at Anshas, Egypt, involving the Parachute Regiment (Special Forces) from India.

• Strategic Partnership:

• Defense ties between India and Egypt have seen a significant upswing, especially after the elevation of the relationship to a 'Strategic Partnership' during President Abdel Fattah El-Sisi's visit to India as the Chief Guest for Republic Day 2023.

• Apart from CYCLONE, both nations engage in other military interactions, including Exercise BRIGHT STAR, which is a large-scale multilateral tri-service exercise hosted by Egypt.

Therefore, the correct option is 2.

Q48. Answer: (a) Refreshes the current window or page

The correct answer is Refreshes the current window or page.

Key Points

• The F5 key is a standard function key located at the top of most computer keyboards, primarily used to initiate a refresh command.

• In web browsers like Google Chrome, Microsoft Edge, and Mozilla Firefox, pressing F5 reloads the active URL to display the most current version of the webpage.

• Within Windows File Explorer, the F5 key refreshes the directory view, ensuring that any recently added, moved, or deleted files are accurately reflected in the interface.

• This key serves as a hardware shortcut for the Reload icon typically found in the browser's address bar or the Refresh option in a right-click context menu.

• The command works by forcing the software application to rescan its source data—whether from a local drive or a remote server—and update the user display accordingly.

Additional Information

• Function Key Variations:

• F1: The universal shortcut for Opening Help menus in almost all Windows applications and Microsoft Office programs.

• F2: Allows users to quickly Rename a selected file or folder in Windows.

• F11: Toggles Full-screen mode on or off in modern web browsers and some media players.

• Shortcut Combinations:

• Ctrl + N: The standard command to Open a new window in browsers or create a new file in applications like Notepad and Word.

• Ctrl + Tab: Used to Navigate to the next tab within a single browser window or multi-tabbed application.

• Ctrl + F5: Performs a Hard Refresh, which reloads the page while bypassing the browser cache to ensure all assets are freshly downloaded.

• Software Specific Uses:

• In Microsoft PowerPoint, F5 starts a Slide Show from the first slide, while Shift + F5 starts it from the current slide.

• In Microsoft Excel, pressing F5 opens the Go To dialog box for rapid cell navigation.

Q49. Answer: (a) Litmus paper

The correct answer is Litmus paper.

Key Points

• Litmus paper is a specialized acid-base indicator produced by treating filter paper with natural water-soluble dyes extracted from lichens, primarily Roccella tinctoria.

• Lemon juice contains a high concentration of citric acid (C6H8O7), which is an organic acid responsible for the fruit's low pH level, typically measured between 2.0 and 3.0.

• When blue litmus paper is exposed to the hydrogen ions (H^+) present in lemon juice, a chemical reaction occurs that changes the pigment's structure, turning the paper red.

• This color transition from blue to red is the standard qualitative test used in chemistry to confirm the presence of an acidic substance.

• Unlike other substances, litmus paper does not significantly react with or alter the chemical composition of the sample, making it a reliable tool for pH identification in laboratory and educational settings.

Additional Information

• Baking soda (Sodium Bicarbonate):

• It is a chemical compound with the formula NaHCO3 and acts as a weak base.

• While it reacts with acids to produce carbon dioxide (CO2) gas and effervescence, it is primarily a reactant rather than a standard color-changing indicator.

• Sugar (Sucrose):

• Sucrose (C12H22O11) is a neutral organic compound that does not dissociate into ions that would change the pH of a solution.

• It does not exhibit any chromogenic properties when mixed with acids, making it useless for detection.

• Water:

• Pure water is chemically neutral with a pH of 7.0 and serves as the universal solvent.

• It does not provide any visual or chemical signal to distinguish between acidic, basic, or neutral solutions on its own.

• pH Scale:

• Developed by S.P.L. Sorensen, the scale measures the logarithmic concentration of hydrogen ions.

• Values below 7 represent acidity, while values above 7 represent alkalinity.

Q50. Answer: (b) Punjabi

The correct answer is Punjabi.

Key Points

• Punjabi is an Indo-Aryan language spoken predominantly in the Punjab region of India and Pakistan. In India, it is one of the 22 scheduled languages mentioned in the Eighth Schedule of the Indian Constitution and is written using the Gurmukhi script.

• The term Gurmukhi literally means from the mouth of the Guru. It was standardized and popularized by Guru Angad Dev Ji, the second Sikh Guru, during the 16th century to record the hymns and teachings of the Gurus.

• The script was specifically designed to be easy for the common people to learn, thereby breaking the monopoly of the priestly classes over religious texts. The Guru Granth Sahib, the holy scripture of Sikhism, is written entirely in this script.

• Structurally, Gurmukhi is an abugida, where each consonant has an inherent vowel that can be modified with vowel signs. It contains 35 primary letters, often referred to as Panti Akhar, and is written from left to right.

• Historically, Gurmukhi evolved from the Landa script and belongs to the Sharada family of scripts, which were prevalent in North-Western India.

Additional Information

• Other Scripts and Languages:

• Bengali: This language uses the Bengali-Assamese script, which is the fifth most widely used writing system in the world. It evolved from the Brahmic family and is the official script for West Bengal and Bangladesh.

• Hindi: It is written in the Devanagari script, which is shared by other languages like Sanskrit, Marathi, and Nepali. It is distinguished by the Shirorekha (horizontal line) running along the top of the letters.

• Urdu: This language typically utilizes the Nastaliq style of the Perso-Arabic script. Unlike Gurmukhi or Devanagari, Urdu is written from right to left and is known for its cursive, calligraphic nature.

Q51. Answer: (d) Asymmetric federalism

The correct answer is Asymmetric federalism.

Key Points

• Asymmetric federalism refers to a federal system where different constituent states or units within a federation possess unequal powers or specific constitutional protections based on their unique historical, cultural, or geographical circumstances.

• Article 371A was inserted into the Constitution of India by the 13th Amendment Act, 1962, following an agreement between the Government of India and the Naga Peoples Convention in 1960.

• Under this provision, Acts of Parliament regarding Naga religious or social practices, Naga customary law, and ownership and transfer of land do not apply to Nagaland unless the State Legislative Assembly passes a resolution to that effect.

• By granting Nagaland a level of autonomy and special status not shared by other states like Uttar Pradesh or Kerala, the Indian Constitution demonstrates a flexible federal structure designed to manage diversity and ethnic aspirations.

• This differential treatment of sub-national units is the hallmark of asymmetric federalism, which is also reflected in other articles ranging from 371 to 371J for various other states.

Additional Information

• Centralised federalism:

• Refers to a system where the Union Government holds overarching authority, often exemplified in India by Article 248 (residuary powers) and Article 356 (President's Rule).

• Competitive federalism:

• A model where states compete for investments and resources to improve their economic standing, frequently promoted through indices like the SDG India Index by NITI Aayog.

• Bargaining federalism:

• A term coined by political scientist W.H. Morris-Jones to describe the Indian context where the Center and States negotiate and haggle over political and financial concessions, especially during coalition politics.

Q52. Answer: (a) Mid-1970s

The correct answer is Mid-1970s.

Key Points

• Judicial activism in India was introduced in the mid-1970s as a response to the institutional crisis faced by the judiciary during the Internal Emergency (1975−1977).

• It was pioneered by visionary judges, most notably Justice V.R. Krishna Iyer and Justice P.N. Bhagwati, who sought to make the legal system accessible to the poor and marginalized sections of society.

• The concept involves a proactive role played by the Supreme Court and High Courts in protecting the Fundamental Rights of citizens and ensuring that the executive and legislature remain within their constitutional limits.

• The landmark judgment in Maneka Gandhi vs. Union of India (1978) served as a catalyst, where the court expanded the scope of Article 21 (Right to Life and Personal Liberty) to include the right to live with human dignity.

• During this period, the judiciary shifted from the traditional doctrine of Locus Standi, allowing any public-spirited individual to approach the court on behalf of those unable to do so, thus birthing Public Interest Litigation (PIL).

Additional Information

• Public Interest Litigation (PIL):

• It is also known as Social Action Litigation (SAL), a term coined by Upendra Baxi.

• The first major case was Hussainara Khatoon vs. Home Secretary, State of Bihar (1979), which led to the release of thousands of undertrial prisoners.

• It emphasizes justice over technicalities, often initiated through simple letters or telegrams addressed to the Chief Justice of India.

• Constitutional Basis:

• Judicial activism is rooted in the power of Judicial Review granted under Article 13, Article 32 (Supreme Court), and Article 226 (High Courts).

• It allows the court to strike down laws or executive actions that violate the Basic Structure Doctrine, established in the Kesavananda Bharati case (1973).

• Impact:

• Activism has led to significant advancements in Environmental Law (the 'Green Bench'), Human Rights, and the protection of bonded labor and child labor.

Q53. Answer: (b) Vasco da Gama

The correct answer is Vasco da Gama.

Key Points

• Vasco da Gama was a celebrated Portuguese explorer who successfully led the first maritime expedition from Europe to India, establishing the Carreira da Índia.

• The expedition set sail from Lisbon on July 8, 1497, with a fleet of four ships, including the flagship São Gabriel.

• After navigating around the Cape of Good Hope at the southern tip of Africa, the fleet reached the port of Calicut (now Kozhikode) on the Malabar Coast on May 20, 1498.

• Upon arrival, he was received by the Zamorin (Samudiri), the Hindu ruler of Calicut, to negotiate trade rights for spices like pepper and cinnamon.

• This voyage was a turning point in world history as it opened an all-sea route to the East, allowing Portugal to bypass the Ottoman Empire and Venetian monopolies on the spice trade.

Additional Information

• Pedro Álvares Cabral:

• He commanded the second Portuguese expedition to India in 1500.

• During this voyage, he veered far into the Atlantic and became the first European to reach the coast of Brazil.

• Alfonso de Albuquerque:

• He served as the second Governor of Portuguese India from 1509 to 1515 and is considered the founder of the Portuguese imperial system in Asia.

• He famously conquered Goa in 1510, making it the headquarters of the Portuguese State of India.

• Bartholomew Diaz:

• In 1488, he became the first European navigator to round the Cape of Good Hope, which he originally named the Cape of Storms.

• His journey proved that the Atlantic and Indian Oceans were connected, paving the way for Vasco da Gama.

Q54. Answer: (b) Promotion of public-private partnerships

The correct answer is Promotion of public-private partnerships.

Key Points

• Public-Private Partnerships (PPP) are long-term contracts between a private party and a government entity for providing a public asset or service, in which the private party bears significant risk and management responsibility.

• Developing countries often face a massive infrastructure funding gap. PPPs bridge this gap by leveraging private capital to finance large-scale projects like highways, airports, and power plants without placing an immediate strain on the national budget.

• This strategy promotes managerial efficiency and innovation. Private firms often utilize advanced technology and lean management practices to complete projects faster and more cost-effectively than traditional public procurement.

• Risk Allocation is a core feature of PPPs. Risks related to construction, operations, and maintenance are transferred to the private sector, while the government handles regulatory and political risks.

• The World Bank and the International Monetary Fund (IMF) advocate for PPPs as a vital mechanism for achieving Sustainable Development Goal 9 (SDG 9), which focuses on building resilient infrastructure and fostering innovation.

Additional Information

• Foreign Direct Investment (FDI):

• Restricting investment prevents the inflow of foreign exchange and global technical expertise, which are critical for high-tech infrastructure like smart grids and telecommunications.

• Inclusive Infrastructure:

• Focusing solely on urban areas creates regional imbalances. Developing nations require rural infrastructure to improve agricultural supply chains and reduce poverty.

• Fiscal Constraints:

• Sole reliance on government funding can lead to high fiscal deficits and increased sovereign debt, especially in nations with a narrow tax base.

• Models of PPP:

• Common models include Build-Operate-Transfer (BOT), Build-Own-Operate (BOO), and Hybrid Annuity Model (HAM), each offering different levels of private involvement and financial risk.

Q55. Answer: (d) Pallavas

The correct answer is Pallavas.

Key Points

• The Imperial Chola dynasty rose to prominence in the mid-9^(th) century CE, marking a transition from their status as minor local chieftains to a sovereign power.

• Vijayalaya Chola (r. 850–871 CE), the founder of this medieval line, was originally a feudatory of the Pallavas of Kanchi.

• Around 850 CE, Vijayalaya seized the city of Thanjavur from the Muttarayar chiefs, who were also subordinates of the Pallava monarchs.

• The definitive end of Pallava supremacy occurred during the reign of Aditya I (r. 871–907 CE), the son of Vijayalaya.

• In approximately 897 CE, Aditya I defeated the last Pallava king, Aparajita Varman, in battle. This victory resulted in the annexation of Tondaimandalam (the Pallava heartland) and established the Cholas as the primary authority in South India.

• By overthrowing their former overlords, the Cholas secured control over the fertile Kaveri delta and the northern Tamil regions, paving the way for the golden age of Rajaraja I and Rajendra I.

Additional Information

• Chera:

• They ruled the western coast (modern Kerala) and were contemporaries of the Cholas.

• While the Cholas conducted several military campaigns against them, the Cheras were not the suzerain power that the Cholas overthrew to gain their initial independence.

• Satavahana:

• A major dynasty of the Deccan that flourished between the 2^(nd) century BCE and the 3^(rd) century CE.

• They had long disappeared from the political map of India centuries before the rise of the Imperial Cholas.

• Rashtrakuta:

• Based in Manyakheta, they were the most powerful rivals of the Cholas in the 10^(th) century.

• The Rashtrakuta king Krishna III famously defeated the Cholas at the Battle of Takkolam in 949 CE, but they were a rival power rather than the dynasty the Cholas initially supplanted.

Q56. Answer: (b) Availability of fresh water

The correct answer is Availability of fresh water.

Key Points

• Fresh water is the most fundamental requirement for human survival, serving critical needs such as drinking, cooking, and sanitation.

• Historically, the River Valley Civilizations—including the Indus Valley (Indus River), Mesopotamia (Tigris and Euphrates), and Ancient Egypt (Nile)—emerged specifically because of the proximity to perennial water sources.

• Water is a primary driver for agricultural productivity; the growth of settlements depends on a steady food supply, which is only possible through irrigation and fertile floodplains provided by rivers.

• Rivers and lakes provide natural transportation routes and trade links, which were historically the most efficient ways to move goods and people before the advent of modern infrastructure.

• In the modern era, industrialization and urbanization remain heavily dependent on water for cooling, processing, and generating hydroelectric power.

• Settlements located near water bodies often benefit from a moderate climate due to the land and sea breeze effect, making the environment more hospitable for long-term habitation.

Additional Information

• Secondary Geographical Factors:

• Distance from the equator: While it determines climatic zones (tropical, temperate, polar), humans have successfully adapted to various latitudes as long as resources like water and food are accessible.

• Soil Characteristics: The fertility and texture of soil are more important for settlement growth than the color of local soil, which is an aesthetic or mineralogical trait rather than a survival necessity.

• Topography: The shape of nearby hills can influence local drainage and defense (e.g., hill forts), but flat plains with water access are generally preferred for the mass expansion of human settlements.

Q57. Answer: (a) stone

The correct answer is stone.

Key Points

• Dholavira, located on the Khadir Bet island in the Kutch district of Gujarat, is one of the most remarkable cities of the Indus Valley Civilization (IVC).

• Unlike the brick-dominated cities of the Indus plains like Harappa and Mohenjo-Daro, Dholavira is unique for its extensive use of stone in monumental architecture and fortifications.

• The city featured a sophisticated tripartite layout consisting of a Citadel, a Middle Town, and a Lower Town, all of which were protected by massive stone-faced fortification walls.

• The fortifications were constructed using a combination of sun-dried mud bricks and rubble stone, often reinforced with dressed stone veneers to provide structural strength and aesthetic finish.

• The availability of local sandstone and limestone in the Rann of Kutch region allowed the Harappans at Dholavira to innovate with masonry techniques that were rare in other parts of the civilization.

Additional Information

• Distinctive Architectural Features

• Water Management: Dholavira is world-renowned for its water harvesting system, which included 16 massive rock-cut reservoirs designed to store rainwater in an arid environment.

• The Signboard: Archaeologists discovered a large inscription at the northern gate of the citadel, often called the Dholavira Signboard, containing ten large-sized signs of the Harappan script.

• UNESCO Status: Due to its unique urban planning and hydraulic engineering, Dholavira was designated as a UNESCO World Heritage Site in July 2021.

• Comparison of Materials

• Bricks: While burnt bricks were the standard building material in the Indus river valley, Dholavira used them primarily for internal structures rather than the main facade of massive fortifications.

• Wood: This was used for roofs, doors, and columns but lacked the durability required for massive fortifications.

• Granite: Although stone was prevalent, the specific types used were primarily sedimentary stones like sandstone rather than granite.

Q58. Answer: (b) Chambal

The correct answer is Chambal.

Key Points

• The Chambal River is primarily responsible for the formation of badland topography in India, a unique landform characterized by

a highly dissected and eroded landscape.

• This topography is created through a process known as gully erosion, where surface runoff carves deep channels into the soft alluvial soil of the Chambal Valley.

• The resulting landforms are locally known as the Chambal Ravines or Bihad, spanning across the states of Madhya Pradesh, Rajasthan, and Uttar Pradesh.

• The intense erosion has rendered large tracts of land unfit for cultivation, leading to a landscape of sharp ridges, steep slopes, and narrow valleys that hinder agricultural development.

• The semi-arid climate of the region combined with the loose nature of the soil accelerates the rate of erosion during the monsoon season.

Additional Information

• Chambal River:

• It originates from the Janapav Hills of the Vindhya Range near Mhow in Madhya Pradesh.

• It is a major tributary of the Yamuna River and is considered one of the cleanest rivers in India.

• The river basin supports critical wildlife, including the Gharial, Red-crowned roof turtle, and Gangetic Dolphins.

• Gully Erosion vs. Sheet Erosion:

• Sheet erosion involves the uniform removal of topsoil by water, whereas gully erosion creates deep, permanent channels that cannot be removed by normal tillage.

• Other Rivers:

• The Ganga and Brahmaputra are largely associated with aggradational landforms such as massive floodplains and the Sundarbans Delta.

• While the Yamuna experiences erosion, the classic badland morphology is a specific geographic feature defined by the Chambal basin.

Q59. Answer: (a) Velocity

The correct answer is Velocity.

Key Points

• Fundamental quantities, also known as base quantities, are those physical quantities that are independent of each other and cannot be defined in terms of other quantities.

• The International System of Units (SI) defines exactly seven fundamental quantities: Length, Mass, Time, Electric Current, Thermodynamic Temperature, Amount of Substance, and Luminous Intensity.

• Velocity is not a fundamental quantity; it is a Derived Quantity. A derived quantity is one that is expressed as a mathematical combination of one or more fundamental quantities.

• Velocity is defined as the displacement (which is a measure of length) per unit time. Therefore, it depends on two fundamental quantities: Length and Time.

• The SI unit for velocity is meters per second (m/s). This unit is derived by dividing the base unit of length (meter) by the base unit of time (second).

Additional Information

• Electric Current:

• It is the rate of flow of electric charge through a conductor.

• The SI unit of electric current is the Ampere (A), which is one of the seven fundamental units.

• Time:

• It is a fundamental quantity used to measure the duration or sequence of events.

• The SI unit of time is the Second (s), currently defined by the vibration frequency of the Cesium-133 atom.

• Luminous Intensity:

• It measures the wavelength-weighted power emitted by a light source in a particular direction per unit solid angle.

• The SI unit is the Candela (cd), which is a base unit representing the brightness perceived by the human eye.

• Other Derived Quantities:

• Physical quantities such as Force (Newton), Energy (Joule), Power (Watt), and Acceleration (m/s^2) are all derived from the fundamental seven base units.

Q60. Answer: (b) Bhakra Nangal

The correct answer is Bhakra Nangal.

Key Points

• The Bhakra Nangal Project is recognized as the largest multipurpose river valley project in India, primarily serving the states of Punjab, Haryana, and Rajasthan.

• It is constructed across the Sutlej River and consists of two major dams: the Bhakra Dam and the Nangal Dam, located in the foothills of the Himalayas.

• Standing at a height of approximately 225.55 meters (741 feet), the Bhakra Dam is one of the highest straight gravity dams in the world.

• The massive reservoir created by the dam is known as the Gobind Sagar Lake, which has a total capacity of nearly 9.34 billion cubic meters.

• The project serves dual primary functions: irrigation for over 10 million acres of agricultural land and hydroelectric power generation with a total installed capacity of about 1,325 MW.

• Historically, Prime Minister Jawaharlal Nehru dedicated this project to the nation in 1963, famously referring to such dams as the Temples of Modern India.

Additional Information

• Damodar Valley Project:

• It was the first multipurpose project of independent India, established in 1948.

• It was modeled after the Tennessee Valley Authority (TVA) in the United States and covers the Damodar River basin in West Bengal and Jharkhand.

• Hirakud Project:

• Located on the Mahanadi River in Odisha, it is known for being the longest earthen dam in the world, stretching over 25 kilometers.

• Sardar Sarovar Project:

• Built on the Narmada River in Gujarat, it is one of the largest water resource projects in the world in terms of concrete volume and provides water to drought-prone areas of Gujarat and Rajasthan.

Therefore, the correct option is 2.

Q61. Answer: (b) Andaman & Nicobar Islands, Lakshadweep, Dadra & Nagar Haveli and Daman & Diu

The correct answer is Andaman & Nicobar Islands, Lakshadweep, Dadra & Nagar Haveli and Daman & Diu.

Key Points

• Under Article 240 of the Constitution of India, the President is empowered to make regulations for the peace, progress, and good government of specific Union Territories.

• The territories explicitly listed under this provision include the Andaman & Nicobar Islands, Lakshadweep, Dadra & Nagar Haveli, and Daman & Diu.

• Regulations framed by the President under this power carry the same legal weight and authority as an Act of Parliament.

• The President possesses the authority to repeal or amend any Parliamentary law that is currently applicable to these territories through such regulations.

• This executive-led legislative power ensures that Union Territories without their own Legislative Assemblies can be governed effectively in matters of local importance.

Additional Information

• Territories with Assemblies:

• Puducherry and Delhi are unique Union Territories that possess their own Legislative Assemblies and Council of Ministers.

• For Puducherry, the President can only make regulations under Article 240 when the Assembly is dissolved or remains under suspension.

• Delhi is governed under the special provisions of Article 239AA, introduced by the 69th Constitutional Amendment Act, 1991.

• Recent Structural Changes:

• Dadra & Nagar Haveli and Daman & Diu: These were merged into a single Union Territory on January 26, 2020, to improve administrative efficiency.

• Jammu & Kashmir and Ladakh: Created via the Jammu and Kashmir Reorganisation Act, 2019; while Jammu & Kashmir is designed to have a Legislative Assembly, Ladakh is administered directly without one.

• Chandigarh: It is a Union Territory without a Legislative Assembly, but it is not listed under Article 240(1) for the Presidential regulation-making power.

Therefore, the correct option is 2.

Q62. Answer: (a) Shanghai Cooperation Organization (SCO)

The correct answer is Shanghai Cooperation Organization (SCO).

Key Points

• The 25th Meeting of the Council of Heads of State of the Shanghai Cooperation Organization (SCO) was held in Tianjin, China, from August 31 to September 1, 2025.

• This landmark summit was hosted by Chinese President Xi Jinping, marking the fifth time China has chaired the organization's top-level gathering since its inception.

• World leaders from across the Eurasian region, including Indian Prime Minister Narendra Modi and Russian President Vladimir Putin, gathered at the Meijiang International Convention and Exhibition Center to discuss regional security, economic integration, and the SCO Development Strategy (2026–2035).

• The summit concluded with the adoption of the Tianjin Declaration, which emphasized the Shanghai Spirit and proposed the creation of an SCO Development Bank to fund regional infrastructure projects. Hence, the organization that gathered in Tianjin is the Shanghai Cooperation Organization (SCO).

Additional Information

• Group of Twenty (G20):

• The 20th G20 Summit in 2025 was hosted by South Africa in Johannesburg on November 22–23, representing the first G20 summit held on the African continent.

• Association of Southeast Asian Nations (ASEAN):

• In 2025, the 46th and 47th ASEAN Summits were chaired by Malaysia and held in Kuala Lumpur during May and October respectively, focusing on regional inclusivity and sustainability.

• Commonwealth (CW):

• The Commonwealth Heads of Government Meeting (CHOGM) is held biennially; the 2024 meeting was held in Samoa, and no such gathering occurred in Tianjin in 2025.

• SCO Background:

• Established in 2001 in Shanghai, it is a permanent intergovernmental international organization comprising members like India, Pakistan, Iran, and Belarus (admitted as the 10th member in 2024).

Q63. Answer: (a) Granite

The correct answer is Granite.

Key Points

• The Pallava temples at Mahabalipuram (also known as Mamallapuram), dating back to the 7th and 8th centuries CE, are distinguished by their use of local, hard-bound granite rather than the softer stones common in northern regions.

• The architecture at this site is categorized into three stages: rock-cut cave temples, monolithic shrines (known as Rathas), and structural temples built with blocks.

• The Pancha Rathas (Five Rathas), which are monolithic structures carved from a single outcropping of pinkish-grey granite, demonstrate the mastery of Pallava artisans over extremely hard stone during the reign of Narasimhavarman I.

• The Shore Temple, a designated UNESCO World Heritage Site, was constructed during the reign of Narasimhavarman II (Rajasimha) using dressed granite blocks to withstand the corrosive sea environment of the Bay of Bengal.

• The massive open-air relief known as the Descent of the Ganges or Arjuna’s Penance is meticulously carved onto two giant granite boulders, showcasing the transition of Indian sculpture towards the Dravidian style.

Additional Information

• Alternative Construction Materials

• Sandstone: While granite was the primary choice at Mahabalipuram, the Pallava Dynasty shifted to using sandstone for structural temples in their capital city of Kanchipuram, as seen in the Kailasanathar Temple.

• Marble: This material was rarely used in early South Indian architecture; it became prominent much later in North Indian sites like the Dilwara Temples and during the Mughal Empire.

• Laterite: This is a soft, iron-rich rock used extensively in Kerala and coastal Karnataka architecture, but it was not utilized for the intricate carvings at Mahabalipuram due to its porous and brittle nature.

• Historical Significance: The transition from carving directly into granite hills to assembling granite blocks at Mahabalipuram laid the foundational blueprint for the massive Vimanas of the later Chola Dynasty.

Q64. Answer: (d) Sanjay Upadhyay

The correct answer is Sanjay Upadhyay.

Key Points

• The Ministry of Earth Sciences (MoES) has constituted a 12-member drafting committee to formulate the domestic legislative framework required to implement the High Seas Treaty in India.

• Sanjay Upadhyay, a prominent environmental lawyer, Senior Advocate, and founder of the Enviro Legal Defence Firm (ELDF), has been appointed as the chairman of this high-level committee.

• The committee is tasked with drafting a law that aligns with the Biodiversity Beyond National Jurisdiction (BBNJ) agreement, ensuring that India fulfills its international obligations regarding ocean governance.

• The BBNJ Agreement, also known as the High Seas Treaty, was adopted under the United Nations Convention on the Law of

the Sea (UNCLOS) to protect marine life in international waters, which cover nearly two-thirds of the global ocean surface.

• India became a formal signatory to this historic treaty in September 2024 during the 79th session of the United Nations General Assembly (UNGA) in New York.

• The primary mandate of the committee involves creating regulations for Marine Genetic Resources (MGRs), establishing Marine Protected Areas (MPAs), and conducting Environmental Impact Assessments (EIAs) for activities in the high seas.

Additional Information

• The High Seas Treaty (BBNJ):

• The treaty addresses four main pillars: Marine Genetic Resources, including the fair sharing of benefits; Area-based management tools, such as marine protected areas; Environmental impact assessments; and Capacity building and transfer of marine technology.

• It aims to address the challenges of climate change, overfishing, and pollution in areas that fall outside the Exclusive Economic Zones (EEZ) of any specific nation.

• The treaty will enter into force once 60 countries have ratified it; India's proactive step in forming a drafting committee signifies its intent toward early ratification.

• Ministry of Earth Sciences (MoES):

• As the nodal ministry for this initiative, the MoES coordinates India's activities in the Southern Ocean (Antarctica) and international waters.

• It oversees the Deep Ocean Mission, which is closely linked to the sustainable exploration of marine resources under the Blue Economy policy.

Q65. Answer: (a) 2032

The correct answer is 2032.

Key Points

• According to a comprehensive report titled India’s Green Building Market released by Equirus Capital, the sector is set for robust expansion driven by increasing environmental awareness and Government of India mandates.

• The report estimates that the market size for green buildings in India will reach approximately $85 billion by the year 2032, reflecting a steady shift toward sustainable urban development.

• This growth trajectory is underpinned by a Compound Annual Growth Rate (CAGR) of 10.5%, starting from a base valuation of around $32 billion in 2023.

• The primary drivers identified in the report include the rising demand for energy-efficient residential and commercial spaces, which significantly reduce operational costs and carbon footprints.

• India currently ranks among the top three countries globally in terms of LEED (Leadership in Energy and Environmental Design) certified green building space, highlighting the rapid adoption of international sustainability standards.

Additional Information

• Green Building Certification Systems:

• GRIHA (Green Rating for Integrated Habitat Assessment): India’s own national rating system developed by TERI and the Ministry of New and Renewable Energy.

• IGBC (Indian Green Building Council): A part of the Confederation of Indian Industry (CII) that provides various rating programs for different building types.

• Government Initiatives:

• The Energy Conservation Building Code (ECBC) sets minimum energy standards for new commercial buildings, acting as a catalyst for green construction.

• Tax incentives and faster environmental clearances are often provided by state governments to developers who adhere to green building norms.

• Market Impact:

• The shift toward Green Buildings is expected to generate significant employment in specialized sectors such as HVAC energy modeling, renewable energy integration, and sustainable material manufacturing.

• Green buildings typically use 20% to 30% less energy and 30% to 50% less water compared to conventional structures.

Q66. Answer: (d) Kate Douglass

The correct answer is Kate Douglass.

Key Points

• American swimmer Kate Douglass secured the gold medal in the 200 m breaststroke at the 2025 World Aquatics Championships held in Singapore.

• During this event, she delivered a historic performance by setting a new Championship Record (CR), surpassing the previous mark and demonstrating her superior form on the global stage.

• Her winning time also established a new American Record, lowering the national standard she had previously set, further solidifying her status as the fastest American woman in this discipline's history.

• This victory continued her streak of major international titles, as she entered the meet as the reigning Olympic Champion from the 2024 Paris Games and the 2024 World Champion from Doha.

• Her success in Singapore was attributed to her exceptional underwater pullouts and efficient stroke rate, which allowed her to pull away from the field in the final 50 meters of the race.

• Therefore, the correct option is 4.

Additional Information

• Torri Huske

• She is a prominent American swimmer primarily recognized for her excellence in butterfly and freestyle events.

• Huske set multiple records in the 100 m butterfly and played a vital role in American relay successes at the 2024 Paris Olympics and subsequent championships.

• Evgeniia Chikunova

• She is a Russian swimmer who currently holds the World Record in the 200 m breaststroke with a time of 2:17.55, established in April 2023.

• Her participation in international competitions like the World Aquatics Championships has been subject to specific eligibility criteria for individual neutral athletes.

• Claire Curzan

• An extremely versatile American athlete, Curzan is known for her prowess across backstroke, butterfly, and freestyle.

• She notably won multiple individual gold medals at the 2024 World Championships in Doha, particularly dominating the backstroke distances.

Q67. Answer: (a) 19 November

The correct answer is 19 November.

Key Points

• World Toilet Day is an official United Nations international observance day held annually on 19 November to inspire action to tackle the global sanitation crisis.

• The day was first established by the World Toilet Organization (a Singapore-based NGO) in 2001 and was later recognized by the United Nations General Assembly in 2013.

• The United Nations resolution A/RES/67/291 officially designated the day, emphasizing that sanitation is a global development priority.

• The observance is coordinated by UN-Water in collaboration with governments and relevant stakeholders to advocate for safely managed sanitation services.

• It aims to raise awareness for the billions of people worldwide who still live without access to safely managed sanitation and to promote the use of toilets to prevent disease.

Additional Information

• Sustainable Development Goals (SDG):

• The day is central to achieving SDG 6, which promises sanitation for all by 2030.

• Target 6.2 specifically aims to end open defecation and provide access to sanitation and hygiene, paying special attention to the needs of women and girls.

• Health and Economic Impact:

• Proper sanitation prevents the spread of deadly diseases such as cholera, diarrhea, and typhoid.

• According to the World Health Organization (WHO), every 1 USD invested in sanitation yields a return of approximately 5 USD through reduced healthcare costs and increased productivity.

• World Toilet Organization:

• Founded by Jack Sim (also known as Mr. Toilet), this organization works globally to break the taboo around toilets and sanitation issues.

Q68. Answer: (a) Remains the same

The correct answer is Remains the same.

Key Points

• The Modern Periodic Table is organized into 18 vertical columns known as Groups and 7 horizontal rows known as Periods, arranged by increasing Atomic Number.

• Elements belonging to the same Group share similar chemical properties because they possess the same number of valence electrons in their outermost shell.

• As you move down a group, the Principal Quantum Number increases, meaning a new electron shell is added for each successive element.

• Despite the addition of shells, the number of electrons in the highest energy level remains constant; for example, all elements in Group 1 (Alkali Metals) have exactly one valence electron.

• In Group 17 (Halogens), elements like Fluorine and Chlorine both have seven valence electrons, which dictates their high reactivity and similar bonding behavior.

Additional Information

• Atomic Radius

• The atomic size increases down a group because the addition of new energy levels increases the distance between the nucleus and the valence shell.

• Metallic Character

• This increases down a group as the nuclear pull on the valence electrons weakens, making it easier for the atom to lose electrons and form positive ions.

• Electronegativity

• This property typically decreases down a group because the increased atomic radius and electron shielding reduce the ability of the nucleus to attract a shared pair of electrons.

• Valency

• The valency of elements remains constant down a group since it depends directly on the number of valence electrons available for chemical bonding.

Q69. Answer: (c) below 5%

The correct answer is below 5%.

Key Points

• In February 2024, the State Bank of India (SBI) Economic Research Department released a report titled Ecrap, which analyzed India's poverty landscape using the Household Consumption Expenditure Survey (HCES) 2022-23.

• The study, authored by Soumya Kanti Ghosh, Group Chief Economic Advisor of SBI, revealed that India's poverty headcount ratio has significantly declined from 2011-12 levels.

• According to the findings, rural poverty has dropped to 7.2%, and urban poverty has decreased to 4.6%, suggesting that total poverty in the country is now below 5%.

• The report attributes this decline to the government's focus on inclusive growth and massive welfare interventions such as Direct Benefit Transfer (DBT) schemes.

• The research also highlighted that rural-urban consumption disparity is narrowing, as rural consumption is growing at a faster pace than urban consumption, indicating a broad-based economic recovery.

Additional Information

• Household Consumption Expenditure Survey (HCES) 2022-23:

• Conducted by the National Sample Survey Office (NSSO), this survey is critical for estimating poverty and calculating Consumer Price Index (CPI) weights.

• The survey showed that Monthly Per Capita Consumption Expenditure (MPCE) grew by 1.5 times in rural areas and 1.46 times in urban areas since 2011-12.

• Gini Coefficient:

• The SBI study noted a reduction in the Gini Coefficient, which measures income or consumption inequality.

• The rural Gini Coefficient declined from 0.287 to 0.266, while the urban coefficient fell from 0.367 to 0.319, signifying improved equity.

• Policy Impact:

• The report credits the Pradhan Mantri Garib Kalyan Anna Yojana (PMGKAY) for providing food security to over 800 million people, which significantly mitigated the impact of inflation on the poorest households.

Q70. Answer: (d) Sleep mode

The correct answer is Sleep mode.

Key Points

• Sleep mode is a power-saving state that allows a computer to quickly resume full-power operation, usually within several seconds, when the user wants to start working again.

• In this state, the computer enters a low-power mode where the operating system saves the current state of all open applications, files, and settings into the Random Access Memory (RAM).

• Because the data is stored in the volatile memory (RAM), the system continues to draw a small amount of electricity to maintain the data integrity; if power is cut completely, unsaved data in the RAM is lost.

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• This functionality is specifically designed for short breaks, such as a few minutes or an hour, effectively eliminating the need for a cold boot or reboot sequence, which requires loading the Kernel and system drivers from the slower secondary storage.

Additional Information

• Complete Shutdown:

• This process closes all software programs, clears the RAM, and terminates power to almost all hardware components.

• Resuming work requires a full Power-On Self-Test (POST) and BIOS/UEFI initialization, making it the slowest method to return to a workspace.

• Reinstall OS:

• This is a major maintenance procedure where the Operating System (such as Windows or Linux) is re-written to the storage drive.

• It is used to resolve registry errors or malware issues and would result in the loss of current unsaved work progress.

• Format Disk:

• This operation prepares a Hard Disk Drive (HDD) or Solid State Drive (SSD) for data storage by creating a new file system (like NTFS or APFS).

• It is a destructive process that erases all existing data on the partition, making it irrelevant for pausing a work session.

Q71. Answer: (c) Four

Given: Six boxes E, F, G, H, I and B are kept one over the other but not necessarily in the same order

1. Only three boxes are kept above F.

Position	Box
6 (Top)	
5	
4	
3	F
2	
1 (Bottom)	

1. Only one box is kept between H and F.
2. Only three boxes are kept between H and I.
3. I is kept at some place above F.
4. B is kept immediately below I.
5. E is kept at one of the places below G.

Final Arrangement:

6	G
5	I
4	B
3	F
2	E
1	H

There are four boxes kept between G and H.

Hence, the correct answer is "Option 3".

Q72. Answer: (a) G

Given: Seven boxes, G, H, I, J, Q, R and S, are kept one over the other, but not necessarily in the same order.

1. Only J is kept above S.
2. Only three boxes are kept below I.
3. Only two boxes are kept between I and R.

Position	Box

7	J
6	S
5	
4	I
3	
2	
1	R

1. H is kept at some place below G but at some place above Q.

Final Arrangement:

7	**J**
6	S
5	G
4	I
3	H
2	Q
1	R

The box kept third above Q is G.

Hence, the correct answer is 'Option 1'.

Q73. Answer: (b) Four

Given : (Left) H U N V Y M L N D M Q M B E M N Z W M J I N F Q N (Right)

• The fifth from the right end is I.

• Eighth from the left end is N.

• The letters between I and N are:J, K, L, M

• Total number of letters = 4

Hence, the correct answer is "Option 2 "

Q74. Answer: (c) Only conclusion (I) follows

The least possible Venn diagram for the given statements is:

(I) Some boxes are bottles - Follow

(Some bottles are boxes, and some boxes are bottle. Hence, it is true)

(II) All boxes are jars - Doesn't follow

All jars are boxes but all boxes are jars is may be possible but not definite. Hence, it is false)

Only conclusion (I) follows.

Hence, the correct answer is "Option 3"

Q75. Answer: (d) NKHK

The logic follows here,

For 'WTQT' related to 'VSPS':

For 'ZWTW' related to 'YVSV':

Applying the same logic to 'OLIL':

Thus, OLIL is related to NKHK following the same logic.

Hence, the correct answer is 'Option 4'.

Q76. Answer: (a) 8

The logic follows here,

Therefore, the code for G must be 8.

Hence, the correct answer is "option 1"

Q77. Answer: (d) 110 - 120

The logic followed here is:

Logic: Second Number = First Number + 10

For the first pair 78 − 88

=> 78 + 10 = 88

For the second pair 32 − 42

=> 32 + 10 = 42

Applying the same Logic to the correct pair:

110 − 120

=> 110 + 10 = 120

Hence, the correct answer is "Option 4".

Q78. Answer: (b) 25

The logic follows here,

• 280 − 55 = 225

• 225 − 50 = 175

• 175 − 45 = 130

• 130 − 40 = 90

• 90 − 35 = 55

• 55 − 30 = 25

Thus, the missing term in the series is 25.

Hence, the correct answer is 'Option 2';

Q79. Answer: (d) HG – NW

The logic follows here,

KJ-PZ,

PO - UE,

FE-KU,

HG - NW,

Therefore, the letter-cluster pair that is different from the others is HG - NW.

Hence, the correct answer is 'Option 4'.

Q80. Answer: (c) Daughter's daughter

The family tree diagram is,

Symbol	•	•	×	÷
Meaning	Sister	Daughter	Son	Husband

Given : V - D + Q × T ÷ R

From the family tree, it is clear that T and R are the parents of Q and D. Since D is the mother of V, it follows that V is the daughter of R's daughter → V is the Daughter's daughter of R.

Hence, the correct answer is 'Option 3'.

Q81. Answer: (b) 19^(th)

The logic followed here is:

• Total number of people in the row = 38

• Position of Keerthi from the right end = 13^(th)

Position of Tanvi from the right end = Position of Keerthi from the right end + 7

= 13 + 7

= 20

Position of Tanvi from the left end = Total number of people − Position of Tanvi from the right end + 1

= 38 − 20 + 1

= 19

So, Tanvi is 19^(th) from the left end of the row.

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Hence, the correct answer is 'Option 2'.

Q82. Answer: (c) 300

The logic followed here is:

• 135 + 11 = 146

• 146 + 22 = 168

• 168 + 33 = 201

• 201 + 44 = 245

• 245 + 55 = 300

Hence, the correct answer is 'Option 3';

Q83. Answer: (c) FJO

The logic follows here,

The letters identified are F, J, and O.

Hence, the correct answer is "option 3"

Q84. Answer: (b) ONE

The original number provided is: 7632198

Original Number	7	6	3	2	1	9	8
Ascending Order	1	2	3	6	7	8	9

By comparing the two sequences, we can see that:

Therefore, only one digit (the digit 3) remains in the same position as in the original number.

Hence, the correct answer is "Option 2 "

Q85. Answer: (b) QJ 10

The logic follows here,

DI 12 is related to JE 3,

EW 11 is related to KS 2.

KN 19 is related to ?:

The resulting term is QJ 10.

Hence, the correct answer is 'Option 2'.

Q86. Answer: (b) None

Given number: 7254136

1 is added to each odd digit and 1 is subtracted from each even digit in the number.

Original	7	2	5	4	1	3	6
Operation	+1	−1	+1	−1	+1	+1	−1
New Digit	8	1	6	3	2	4	5

New Number = 8163245

Therefore, the count of such digits is None.

Hence, the correct answer is 'Option 2'.

Q87. Answer: (b) 10

The original number is: 8254316

If 3 is added to each odd digit and 2 is subtracted from each even digit in the number

Original Digit	8	2	5	4	3	1	6
Operation	−2	−2	+3	−2	+3	+3	−2
New Digit	6	0	8	2	6	4	4

New Number = Left 6 0 8 2 6 4 4 Right

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• First digit from the left = 6
• Second digit from the right = 4
• Sum = 6 + 4 = 10
Hence, the correct answer is 'Option 2'.

Q88. Answer: (c) 3

The logic followed here is,
The code for L is 3.
Hence, the correct answer is "Option 3"

Q89. Answer: (c) LBW 85

The logic follows here,
Combining the results, the next cluster in the series is LBW 85.
Hence, the correct answer is " Option 3"

Q90. Answer: (b) Four

Given: Seven people, F, G, H, L, M, O, and Q, are sitting in a row facing north.
1. Only Q sits to the left of H.
2. Only four people sit between Q and G.
3. Only F sits between L and M, and L is not an immediate neighbor of G
The final seating arrangement is:
The number of people sitting between O and H is 4.
Hence, the correct answer is "Option 2 "

Q91. Answer: (c) EJ −2

The logic follows here,
LL 22 is related to JH 6,
CR 20 is related to AN 4,
GN 14 related to ?
Therefore, the related term is EJ −2.
Hence, the correct answer is 'Option 3'.

Q92. Answer: (b) Four

Given: (Left) 1 1 9 4 8 6 9 2 4 2 8 9 7 1 3 2 7 5 8 2 1 5 3 (Right)
Required Conditions: Odd - Odd - Odd
(Left) 1 1 9 4 8 6 9 2 4 2 8 9 7 1 3 2 7 5 8 2 1 5 3 (Right)
So, there are exactly four such odd digits that satisfy the given condition : 1 1 9 ,9 7 1 ,7 1 3 ,1 5 3
Hence, the correct answer is 'Option 2'.

Q93. Answer: (b) Immediate right

Given: Seven people X, Y, Z, A, B, C and D are sitting around a circular table facing towards the centre of the table.
1. D sits third to the right of Y.
2. B is sitting immediately between X and C.
3. Z sits second to the right of X
The Final Arrangement is,
A sits at the immediate right of Z.
Hence, the correct answer is 'Option 2'.

Q94. Answer: (c) Neither conclusion (I) nor (II) follows

The least possible Venn diagram for the given statements is:
(I) Some leaves are chairs - Doesn't follow (As their is no direct relation between leaves and chair may be it is possible but not definite)
(II) All trees are chairs - Doesn't follow
(All chairs are trees but all trees are chairs is not definite. Hence, it is false)
Neither conclusion (I) nor (II) follows

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Hence, the correct answer is "Option 3"

Q95. Answer: (c) 8

Given Series: (Left) 3 8 7 5 3 2 1 9 6 4 8 7 5 2 1 4 6 3 2 9 8 7 5 4 1 5 2 6 9 8 7 5 6 3 2 1 5 4 7 8 5 1 2 5 9 6 3 9 8 7 5 1 4 5 2 (Right)

Required Conditions: Perfect Square - Even Digit - Odd Digit.

(Left) 3 8 7 5 3 2 1 9 6 4 8 7 5 2 1 4 6 3 2 9 8 7 5 4 1 5 2 6 9 8 7 5 6 3 2 1 5 4 7 8 5 1 2 5 9 6 3 9 8 7 5 1 4 5 2 (Right)

There are 8 such even digits are there, each of which is immediately preceded by a perfect square and immediately followed by an odd digit

Hence, the correct answer is 'Option 3'.

Q96. Answer: (a) 6 km to the north

The logic followed here is,

1. Abhinav starts from Point A and drives 16 km towards the west.
2. He then takes a right turn, drives 8 km, turns right and drives 19 km.
3. He then takes a right turn and drives 14 km.
4. He takes a final right turn, drives 3 km and stops at Point P.

The Final Arrangement is,

Since Point P is 6 km south of Point A, to reach Point A again from Point P, Abhinav must travel the same distance in the opposite direction.

Hence, the correct answer is "option 1"

Q97. Answer: (c) Wife's mother

The family tree diagram is

Symbol	**:**	**@**	**?**	**•**
Meaning	Father	Mother	Wife	Daughter

Given : C ? O : V @ E + R

Therefore, C is the mother of V, and V is the wife of R → C is the Wife's mother of R.

Hence, the correct answer is 'Option 3'.

Q98. Answer: (b) TSC

The logic follows here,

Combining these patterns, the next term in the series is TSC.

Hence, the correct answer is "option 2"

Q99. Answer: (c) CDB

The logic follows here,

STQ,

GHE,

CDB,

LMJ,

Therefore, the letter cluster that is different from the others is CDB.

Hence, the correct answer is 'Option 3'.

Q100. Answer: (d) JKO

The logic followed here is based on the alphabetical positions of the letters.

The logic follows here,

MJN,

ROS,

LIM,

JKO,

Therefore, the letter cluster that is different from the others is JKO.

Hence, the correct answer is 'Option 4'.

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