RRB Group D Previous Year Paper (Held on: 23 Aug 2022 Shift 2)

RRB Group D • 2022 • 100 questions • 90 minutes • Answer key and solutions

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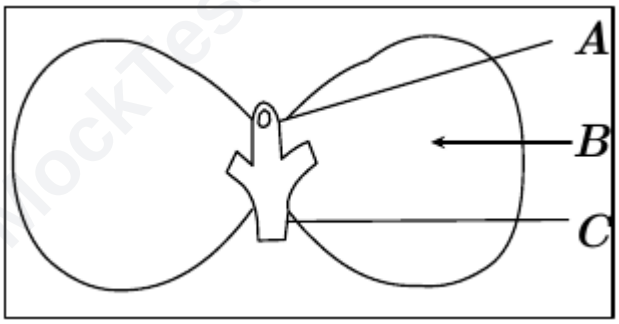
Practise under exam conditions, then review your answers after you submit.

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CBT

Q1. Study the diagram of a dicot seed given below. Select the correct option regarding the functions of the parts labelled A, B and C



(a) A - Stores food, B-Stores food, C - Future root
(b) A - Future shoot, B - Future root, C - Stores food
(c) A - Future root, B - Stores food, C - Future shoot
(d) A - Future shoot, B - Stores food, C - Future root

Q2. If a and b are the roots of the equation $x^2 - 7x + 12 = 0$, then the value of $(a^3+b^3)/(a^2+b^2+1)$ is:

(a) 5.2
(b) 2.6
(c) 3.5
(d) 4.4

Q3. Which tissue in the coconut husk makes it hard and stiff?

(a) Collenchyma
(b) Sclerenchyma
(c) Parenchyma
(d) Guard cells

Q4. A and B undertake to complete a piece of work for Rs. 600. A alone can complete it in 4 days while B alone can complete it in 6 days. With the help of C, they finish the work in 2 days. Find the share of C in the payment received.

(a) Rs. 200
(b) Rs. 78
(c) Rs. 100
(d) Rs. 300

Q5. The Indian Constitution includes borrowed features from how many countries?

(a) 06
(b) 07
(c) 10

(d) 13

Q6. Read the given statement and conclusions carefully. Assuming that the information given in the statements is true, decide which of the given conclusions logically follow(s) from the statement.

Statement:

In a recent survey on choice of drink, 65 percent of the people preferred tea, 28 percent preferred coffee, 5 percent preferred milk, while 2 percent were neutral.

Conclusions:

I. Tea is a better drink than coffee.

II. More people prefer to drink coffee as compared to milk.

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

Q7. Which of the following number will replace the question mark (?) and complete the given number series?

3, 6, 8, 16, 18, 36, ?

(a) 72
(b) 38
(c) 45
(d) 42

Q8. Select the option that is related to the fifth number in the same way as the second number is related to the first number and the fourth number is related to the third number.

20:42 :: 25 : 52 :: 18 : ?

(a) 34
(b) 38
(c) 60
(d) 54

Q9. The Easter basket is related to which of the following religions?

(a) Christianity
(b) Islam
(c) Sikhism
(d) Hinduism

Q10. Which of the following reactants will come in place of A and give a neutralization reaction?

$Ca(OH)2 + A \rightarrow CaCl2 + H2O$

(a) Hydrochloric acid
(b) Nitric acid
(c) Sulphuric acid
(d) Acetic acid

Q11. Which of following is NOT a part of the Dravidian language family's four largest languages?

(a) Malayalam
(b) Tamil
(c) Sanskrit
(d) Kannada

Q12. The total number of three-digit numbers divisible by 2 or 5 is

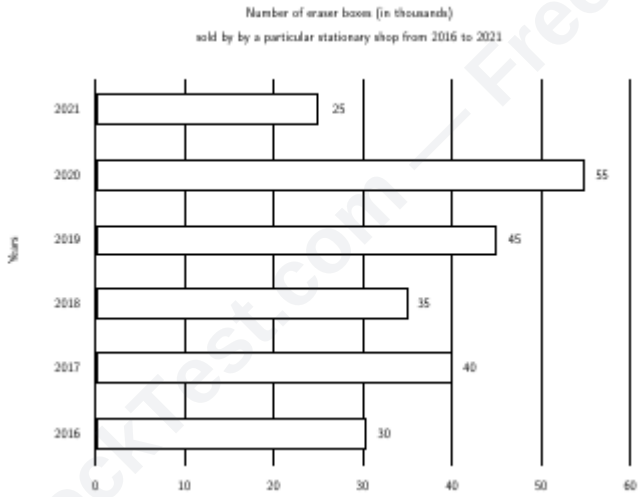
(a) 400
(b) 540
(c) 245
(d) 270

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Q13. The sum of the ages of a mother, son and daughter is 70 years. If the mother is thrice as old as her son, and the daughter is 5 years older than her brother, how old is the mother?

(a) 42 years
(b) 35 years
(c) 39 years
(d) 45 years

Q14. Study the following bar graph carefully and answer the question.



What is the approximate percentage increase in the number of the eraser boxes sold from 2018 to 2020?

(a) 50%
(b) 45%
(c) 57%
(d) 60%

Q15. _____ are used to make bidis.

(a) Tendu leaves
(b) Tamarind leaves
(c) Oak leaves
(d) Coconut leaves

Q16. In this question, a group of numbers/symbols is coded using letters as per the table given below and the conditions which follow. The correct combination of codes following the conditions is your answer.

Number/Symbol	**&**	**5**	**9**	**#**	**6**	**%**	**8**
Code	S	D	M	U	T	L	A

Conditions:

(i) If the first element is an even number and the last element is also an even number, the codes for these two (the first and the last elements) are to be interchanged.

(ii) If the second element is an even number and the fifth element is a symbol, the codes for these two (the second and the fifth elements) are to be interchanged.

(iii) If the fourth element is a symbol and the sixth element is also a symbol, both these elements (the fourth and the sixth elements) are to be coded as N.

Question: 8 5 & % 9 # 6 9

(a) M D S N M N T A
(b) A D S N M N T M
(c) A D S L M U T M
(d) A M S N D N T M

Q17. The normal systolic and diastolic pressure in humans is _____, respectively.

(a) 150 and 75 mm of Hg
(b) 140 and 90 mm of Hg
(c) 120 and 80 mm of Hg
(d) 100 and 60 mm of Hg

Q18. The value of $4^2+\sqrt{(8^2)}-4\sqrt{25}-10=$

(a) -32
(b) -6
(c) 12
(d) -25

Q19. Which of the following statements is/are true for a current carrying straight conductor?

(1) The magnetic field lines are concentric circles with conductor at the centre.
(ii) The strength of the magnetic field increases as we move away from the conductor.
(iii) The direction of magnetic field can be determined using right hand thumb rule.

(a) Only (i)
(b) Only (ii)
(c) Both (i) and (ii)
(d) Both (i) and (iii)

Q20. Select the correct combination of mathematical signs that can sequentially replace Y to balance the following equation.

32 Y 8 Y 16 Y 8 Y 8

(a) ×, =, -, ÷
(b) ÷, ×, =, ×
(c) ×, ÷, =, -
(d) ÷, ×, =, -

Q21. In December 2021, who launched India's Semiconductor Mission, which aims to manufacture a vibrant semiconductor and display ecosystem to enable India's emergence as a global hub for electronics manufacturing and design?

(a) Rajeev Chandrasekhar
(b) Anand Deshpande
(c) Ashwini Vaishnaw
(d) Rajendra Kumar

Q22. Which of the following is an example of a virus?

(a) AIDS
(b) Anthrax
(c) Elephantiasis
(d) HIV

Q23. Bhupesh suffered crop failure for few years. When he got the pH of the soil examined, it was about 11.6. Which of the following compounds can he use to treat the soil of his agricultural field?

(a) Ca(OH)2
(b) NaCl
(c) Al2(SO4)3
(d) Zn(OH)2

Q24. In February 2022, who was appointed as Chairman of the Insolvency and Bankruptcy Board of India?

(a) Shashank Saksena
(b) Anuradha Guru
(c) Ravi Mittal
(d) Krishnamurthy Subramanian

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Q25. Which of the following terms will replace the question mark (?) in the given series to make it logically complete?

GRM - 2, EPK - 6, CNI - 14, ALG - 30,?

(a) YJE - 62
(b) YJF - 64
(c) XJE - 60
(d) YKE - 62

Q26. Three bulbs A, B and C rated 40 W, 60 W and 100 W, respectively, are connected in parallel to a voltage source of 220 V. The bulb that glows with maximum brightness is:

(a) all bulbs will glow with equal brightness
(b) bulb C
(c) bulb A
(d) bulb B

Q27. In February 2022, Patanjali launched a co-branded contactless credit card with which bank?

(a) Axis Bank
(b) State Bank of India
(c) HDFC Bank
(d) Punjab National Bank

Q28. The splitting up of white light into seven components as it enters a glass prism is called:

(a) scattering of light
(b) reflection of light
(c) refraction of light
(d) dispersion of light

Q29. B was standing at a point, facing north. B turned and ran towards the east for 50 m, then turned towards the south and walked for 30 m. He then turned left and ran for 40 m, then turned right and ran for 50 m, turned right again and walked for 10 m and at last, turned right and walked for 20 m. How much distance did B cover only by walk and in which direction is he facing now?

(All turns are 90 degree turns only)

(a) 150 m, North
(b) 60 m, South
(c) 60 m, North
(d) 150 m, South

Q30. A statement is given, followed by four conclusions given in the options. Find out which conclusion is true based on the given statement.

Statement: V > R > N = U = H > C < G

(a) N > V
(b) R = H
(c) U > G
(d) N = H

Q31. Who bagged the women's singles title at Syed Modi International Badminton Tournament, 2022?

(a) Jwala Gutta
(b) Ameeta Singh
(c) Saina Nehwal
(d) PV Sindhu

Q32. Find the roots of $\sqrt{(2x + 9)} + x = 13$.

(a) 8 and 6
(b) 2 and 8
(c) 20 and 8
(d) 4 and 20

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Q33. If the area of an equilateral triangle is $25\sqrt{3}$ cm², then the length of each side of the triangle is:

(a) 10 cm
(b) 5 cm
(c) 12 cm
(d) 8 cm

Q34. Refer to the given letter and symbol series and answer the question that follows.

(Left) K ε T X @ * D X ¥ & J % Z Y $ & # S & $ F Ø G ^(Right)

How many such symbols are there in the series each of which is immediately preceded by a letter and also immediately followed by a letter?

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

Q35. How many physical regions are there in India?

(a) 5
(b) 6
(c) 3
(d) 8

Q36. In a certain code language, MONDAY is written as ZBEOPN and MARCH is written as IDSBN. How will APRIL be written in the same language?

(a) MKSVB
(b) MJSQB
(c) ZKSWC
(d) MJSWB

Q37. In October 2021, which portal was been launched by the Ministry of Social Justice and Empowerment to provide a platform for senior citizens in India seeking employment opportunities?

(a) SANCHAY
(b) SAMADHAN
(c) SACRED
(d) SANNIDHI

Q38. In the year 2021, Neeraj Chopra won India's first ever gold medal in athletics at the _____ Olympics.

(a) Tokyo
(b) Sydney
(c) Beijing
(d) London

Q39. Rani's sister's age is 4 years more than her age. If her sister's age is 28 years, then find Rani's age.

(a) 26 years
(b) 24 years
(c) 32 years
(d) 22 years

Q40. Select the option that is related to the fifth number in the same way as the second number is related to the first number and the fourth number is related to the third number.

14 : 203 :: 16 : 264 :: 18 : ?

(a) 347
(b) 353
(c) 423
(d) 333

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Q41. In which direction does a freely suspended bar magnet point?

(a) Geographical South - Geographical West
(b) Geographical South - Geographical East
(c) Geographical North - Geographical South
(d) Geographical North - Geographical West

Q42. A convex lens forms a real and inverted image twice the size of the object. The magnification produced by the lens is equal to:

(a) 1/2
(b) 2
(c) -2
(d) -1/2

Q43. Which of the following features is correct regarding the federal system of the Indian Constitution?

(a) Dual citizenship
(b) Equal representation of all states in the upper house of parliament
(c) Equal representation of all states in the lower house of parliament
(d) Dual government

Q44. On 20 January 2022, which court of India in Neil Aurelio Nunes and Ors vs. Union of India and Ors, upheld the constitutional validity of 27 per cent reservation for the Other Backward Classes (OBCs) in the All India Quota (AIQ) for undergraduate and postgraduate medical and dental courses?

(a) Bombay High Court
(b) Madras High Court
(c) Karnataka High Court
(d) Supreme Court

Q45. With which of the following has the Government of India signed a 115 million dollar Rejuvenating Watersheds for Agricultural Resilience through Innovative Development (REWARD) Program?

(a) World Bank
(b) Reserve Bank of India
(c) UNDP
(d) World Health Organization

Q46. Which of the following numbers is divisible by both, 7 and 11?

(a) 1771
(b) 3014
(c) 2684
(d) 2534

Q47. Six students, F, E, D, C, B and A, were studying around a square table in a college library, facing the centre. Four of them were sitting at the corners while two others were sitting at the exact centre of the sides. C and E were diagonally opposite to each other. A was not at any of the corner positions and was an immediate neighbour of both E and D. D was diagonally opposite to F. B was at the immediate right of F. No student sat between C and D as well as between E and F. Which student sat third to the left of B?

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

Q48. Which one of the following river marks the eastern-most boundary of the Himalayas?

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

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Q49. The value of √729+√1681+√576-√1849 is :

(a) 55
(b) 64
(c) 49
(d) 37

Q50. If 48 : x :: x : 75, and x > 0, then what is the value of x?

(a) 57
(b) 60
(c) 51
(d) 63

Q51. The magnification produced by a lens is 1/2. The nature and the relative size of the image formed by the lens in the respective order is:

(a) real, inverted and enlarged
(b) real, inverted and diminished
(c) virtual, erect and enlarged
(d) virtual, erect and diminished

Q52. In February 2022, where was India's first Biosafety Level-3 Mobile Laboratory inaugurated?

(a) Rajasthan
(b) Maharashtra
(c) Gujarat
(d) Jharkhand

Q53. If each of the letters in the word 'ANOTHER' is arranged in alphabetical order, then how many letters will be there in the English alphabetical series between the letter that is fourth from the left end and the one that is second from the right end?

(a) 5
(b) 2
(c) 4
(d) 3

Q54. Five persons, K, L, M, N and P, receive their salaries on five different dates of the same month, viz. 1^(st), 2^(nd), 3^(rd), 4^(th) and 5^(th). L receives salary on the date immediately after M. N receives salary on the date immediately before K. P receives salary on the date immediately after K. P receives salary on the 3rd of the month. On which date does M receive salary?

(a) 4th
(b) 2nd
(c) 1st
(d) 5th

Q55. If the surface area of a sphere is 36π cm^2, then the radius of the sphere is:

(a) 3 cm
(b) 5 cm
(c) 2 cm
(d) 4 cm

Q56. What day of the week was 10 January 2006 ?

(a) Thursday
(b) Tuesday
(c) Monday
(d) Wednesday

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Q57. If the perimeter of a circle is 88/7 cm, then find the perimeter (in cm) of the square the length of each of whose sides is equal to the radius of the given circle. [Use π = 22/7]

(a) 7
(b) 9
(c) 6
(d) 8

Q58. Seven boxes, P, Q, R, S, T, U and V, are kept one over the other but not necessarily in the same order. Only three boxes are kept below R. S is immediately below Q. V is immediately below T. P is immediately above Q. S is third box from top. T is not immediately below R. Which is the third box from the bottom?

(a) R
(b) U
(c) T
(d) S

Q59. The value of √(294/25) is:

(a) 5.6
(b) 5.4
(c) 5.2
(d) 5.5

Q60. If the simple interest on a certain sum for 18 months at 5.5% per annum exceeds the simple interest on the same sum for 14 months at 6% per annum by Rs. 62.50, then the sum is:

(a) Rs. 7,000
(b) Rs. 5,000
(c) Rs. 6,500
(d) Rs. 8,200

Q61. Write a balanced chemical equation with state symbols for the following reaction.

Potassium hydroxide solution (in water) reacts with nitric acid solution (in water) to produce potassium nitrate solution and water.

(a) 2 KOH + 2 HNO3 → 2 KNO3 + 2 H2O
(b) 2 KOH (aq) + 2 HNO3(aq) → 2 KNO3 (aq) + 2 H2O (l)
(c) 2 KOH (1) + 2 HNO3 (1) → 2 KNO3 (1) + 2 H2O (l)
(d) 2 KOH (aq) + 2 HNO3 (1) → 2 KNO3 (aq) + 2 H2O (aq)

Q62. A trader marked the price of an article at 12/5 times of its cost price and he sold it at 17/20 of the marked price. What is his gain percentage on that article?

(a) 17%
(b) 23%
(c) 20%
(d) 19%

Q63. Which of the following organisms has a longer small intestine?

(a) Tiger
(b) Cow
(c) Lion
(d) Human

Q64. A dishonest dealer professes to sell his goods at the cost price but uses a false weight and thus gains 25%. How much quantity of grains does he give for a kilogram?

(a) 900 grams
(b) 750 grams
(c) 975 grams
(d) 800 grams

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Q65. Which of the following is the common product produced during aerobic and anaerobic respiration initially in the first step?

(a) Water
(b) Pyruvate
(c) Lactic acid
(d) Ethanol

Q66. The leaves of the _____ plant contain methanoic acid.

(a) nettle
(b) orange
(c) tomato
(d) tamarind

Q67. If a^4 + 1/(a^4) = 34, then the value of a^6 + 1/(a^6) is :

(a) 185
(b) 243
(c) 198
(d) 216

Q68. Who was the Chairman of Union Carbide India Limited during The Bhopal Gas Tragedy in Bhopal?

(a) John Ervin
(b) J R Shah
(c) Warren Anderson
(d) Michal Bellay

Q69. The first Municipal Corporation was set up during the British era in the former Presidency Town of _____ in 1688.

(a) Calcutta
(b) Madras
(c) Bombay
(d) Nagpur

Q70. $HNO_3 (aq) + KOH(aq) \rightarrow KNO_3 (aq) + H_2O$ (1)

The above reaction is an example of:

(a) redox reaction
(b) decomposition reaction
(c) combination reaction
(d) neutralisation reaction

Q71. Which of the following statements is/are true for a number of resistors connected in parallel combination?

(i) All the resistors are connected between two given points.

(ii) The equivalent resistance of the circuit is more than the individual resistance.

(iii) The potential difference across each resistor is same.

(a) Both (i) and (iii)
(b) Only (i)
(c) Only (iii)
(d) Both (i) and (ii)

Q72. Consider the below statements and identify the correct answer.

Statement I: The Law of Octaves applied only up to calcium.

Statement II: After calcium, every eighth element did not possess properties similar to that of the first.

(a) Both Statements are correct. Statement I is correct explanation of Statement II.
(b) Only Statement I is correct.
(c) Both statements are correct. Statement II is correct explanation of Statement I.

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(d) Only Statement II is correct.

Q73. If the average of 5 consecutive even numbers is 10, then find the number at the centre when these five numbers are arranged in ascending order.

(a) 10
(b) 20
(c) 12
(d) 14

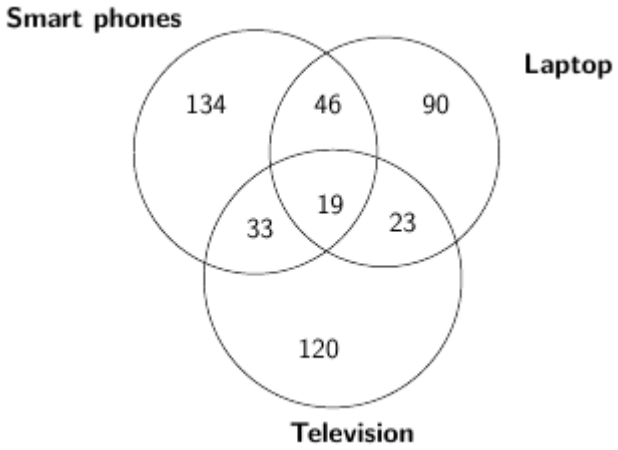
Q74. Eight friends, P, Q, R, S, T, U, V and W, are sitting around a square table facing the centre of the table. Four of them are sitting at the corners while the other four are sitting at the exact centre of the sides of the table. T is sitting at one of the corners. U is third to the right of T. S is to the immediate left of V. T is second to the right of V. Only U is between R and P. Only W is between T and R. Who is sitting to the immediate left of T?

(a) R
(b) W
(c) P
(d) Q

Q75. Find the curved surface area of a cylinder whose diameter of base is 14 m and height is 24 m. [Use π = 22/7]

(a) 1506 m2
(b) 1056 m2
(c) 1560 m2
(d) 1065 m2

Q76. Study the given diagram carefully and answer the following question. The numbers in different sections indicate the number of persons who use the electronic item.



How many people use both Laptop and Television?

(a) 19
(b) 23
(c) 42
(d) 56

Q77. A person has to cover a distance of 8 km in 1 hour. If he covers one-fourth of the distance in one-third of the total time, then what should his speed (in km/h) be to cover the remaining distance in the remaining time so that the person reaches the destination exactly on time?

(a) 6
(b) 8
(c) 7
(d) 9

Q78. Consider the below statements and identify the correct answer.

Statement I: Carbon has the unique ability to form bonds with other atoms of carbon, giving rise to large molecules.

Statement II: This property is called catenation.

(a) Both the statements are incorrect.
(b) Statement I is correct, and Statement II is incorrect.
(c) Both the statements are correct.
(d) Statement II is correct, and Statement I is incorrect.

Q79. Identify the INCORRECT relation between power (P), Current(I), Resistance (R) and potential difference (V).

(a) P = I2R
(b) P = V2/R
(c) P = VI
(d) P = IR2

Q80. What is the distance between the pole and focus of a spherical mirror?

(a) R
(b) 2R
(c) R/2
(d) R/4

Q81. Where is the National War Memorial located?

(a) Agra
(b) Delhi
(c) Kolkata
(d) Mumbai

Q82. Which of the following numbers will replace the question mark (?) in the given series?

7, 56, 28, 224, 112,?

(a) 896
(b) 920
(c) 846
(d) 900

Q83. What will come in place of the question mark (?) in the following equation, if '+' is interchanged with '×', and '÷' is interchanged with '-' ?

6 ÷ 16 × 4 ÷ 8 - 8 + 2 × 7 = ?

(a) -1
(b) 1
(c) 23
(d) 0

Q84. Which of the following options is the closest approximate value which will come in place of question mark (?) in the following equation?

11.998 ÷ 2.008 × 3.991 + 14.9929 – 10.002 = ?

(a) 29
(b) 34
(c) 24
(d) 21

Q85. If two parallel lines are intersected by a transversal, then which of the options below is necessarily true?

(a) The sum of the measures of a pair of alternate interior angles is 180°
(b) The sum of the measures of a pair of corresponding angles is 180°
(c) The sum of the measures of a pair of interior angles on the same side of the transversal is 180°
(d) The sum of the measures of a pair of vertically opposite angles is 180°

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Q86. Sheela was standing facing the morning sun. She started walking towards the morning sun and turned to her right side, where she walked for few minutes and then turned left and walked for 3 m and stopped. In which direction is Sheela facing right now?

(All turns are 90 degree turns only)

(a) East
(b) North
(c) West
(d) South

Q87. Three statements are given, followed by three conclusions numbered I, II and III. Assuming the statements to be true, even if they seem to be at variance with commonly known facts, decide which of the conclusions logically follow(s) from the statements.

Statements:

1. Some hills are plateaus.
2. Some plateaus are deserts.
3. All deserts are plains

Conclusions:

I. Some plains are plateaus.
II. Some plains are hills.
III. All deserts are hills.

(a) Only conclusion I follows
(b) Only conclusions II and III follow
(c) Only conclusions I and II follow
(d) Only conclusion II follows

Q88. This question is based on the five, three-digit numbers given below:

(Left) 815 458 512 630 235 (Right)

What will be the resultant if third digit of the second largest number is added to the second digit of smallest number?

(a) 3
(b) 6
(c) 5
(d) 2

Q89. KIT 20 is related to PRG 50 in a certain way. In the same way, ENT 16 is related to VMG 40. To which of the following is MFG 18 related following the same logic?

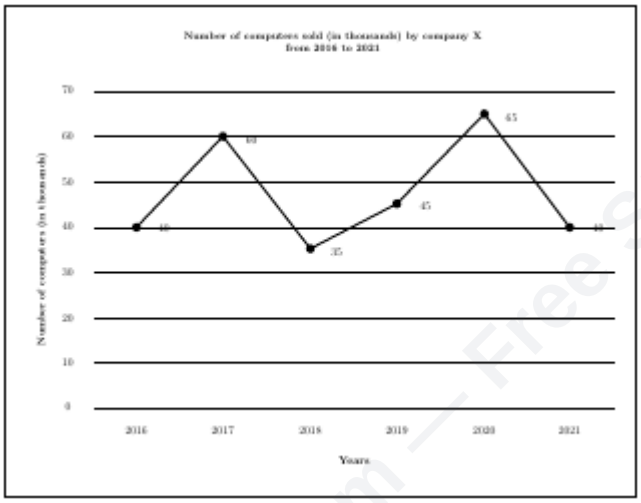
(a) QUT 45
(b) NVT 45
(c) NUT 45
(d) NUT 40

Q90. What is the ranking of India in wind power as on March 2021?

(a) 4^(th)
(b) 10th
(c) 8th
(d) 7th

Q91. Study the following line graph carefully and answer the given question.

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Find the difference between the number of computers sold for the year 2017 and 2021.

(a) 10000
(b) 20000
(c) 15000
(d) 25000

Q92. Three statements are followed by four conclusions numbered I, II, III and IV. You have to consider these statements to be true, even if they seem at variance from commonly known facts. Decide which of the given conclusions logically follow/s from the given statement.

Statements:

1. No paint is fresco.
2. No fresco is lacquer.
3. Some paints are lacquers.

Conclusions:

I. No lacquer is paint.

II. No lacquer is fresco.

III. Some frescos are paints.

IV. All lacquers are paints.

(a) Only conclusion II follows.
(b) Only conclusions I and II follow
(c) Only conclusion IV follows.
(d) Only conclusions I and IV follow

Q93. A statement is given, followed by four conclusions given in the options. Find out which conclusion is true based on the given statement.

Statement: R > G > A > B = D = F > S

(a) S > D
(b) F > R
(c) A > F
(d) A > R

Q94. The Aitareya Upanishad belongs to fourth, fifth and sixth chapters of the second book of Aitareya Aranyaka of the _____ and considered as the oldest Upanishads.

(a) Rig Veda
(b) Atharva Veda
(c) Yajur Veda
(d) Sama Veda

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Q95. Which of the following is a naturally occurring source of air pollution?

(a) Burning firewood
(b) Volcanic eruptions
(c) Automobile exhausts
(d) Power plants

Q96. If tan θ = 4, then value of (4cos θ + 2sin θ)/(2sin θ - cos θ) is :

(a) 12/7
(b) 12/8
(c) 12/5
(d) 12/10

Q97. 7 friends decided not to eat sweets on one day of their choice in the same week starting on Sunday and ending on Saturday. No one selected the same day of the week. P selected Saturday. Q selected Wednesday. R said that he will select the day immediately before P. S decided to select any available day between P's and Q's selection. T selected Sunday. U said that he will select the day immediately before Q. Which day is left for V to select?

(a) Thursday
(b) Tuesday
(c) Wednesday
(d) Monday

Q98. If the mean of 22, 25, 27, 24 and x is 26, then the value of x is:

(a) 32
(b) 35
(c) 28
(d) 41

Q99. P, Q and R jointly start a business. It was agreed that P would invest Rs. 25,000 for 6 months, Q Rs. 44,000 for 5 months and R Rs. 50,000 for 3 months. Out of total profit of Rs. 1,04,000, the amount received by P will be:

(a) Rs. 30,000
(b) Rs. 40,920
(c) Rs. 27,900
(d) Rs. 33,780

Q100. At present, _____ elements are known, of which _____ are naturally occurring elements.

(a) 114, 92
(b) 114, 94
(c) 118, 94
(d) 118, 92

ANSWER KEY

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

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SOLUTIONS

Q1. Answer: (d) A - Future shoot, B - Stores food, C - Future root

The correct answer is A - Future shoot, B - Stores food, C - Future root

Key Points

The diagram shows a dicot seed with parts labeled A, B, and C. The function of each parts are:

• Plumule: The plumule is the part of the seed that develops into the shoot system of the plant, including the stem and leaves.

• Cotyledon: Cotyledons are the seed leaves that provide nutrients to the developing seedling until it can produce its own food through photosynthesis.

• Radicle: The radicle is the part of the seed that develops into the root system of the plant.

• So, the correct option regarding the functions of the parts labeled A, B, and C is:

• A (Plumule): Develops into the shoot system.

• B (Cotyledon): Provides nutrients to the seedling.

• C (Radicle): Develops into the root system.

• Hence, the correct answer is option- 4 (A - Future shoot, B - Stores food, C - Future root).

Q2. Answer: (c) 3.5

Shortcut Trick

The roots of the equation x2 − 7x + 12 = 0 are 3 and 4 as 3 + 4 = 7 and 3 × 4 = 12.

Substitute a = 3 and b = 4 in the expression (a3 + b3) / (a2 + b2 + 1).

Required Value = (33 + 43) / (32 + 42 + 1) = (27 + 64) / (9 + 16 + 1).

Required Value = 91 / 26 = 3.5.

Therefore The correct answer is 3.5.

Alternate Method

Given: The quadratic equation is x2 − 7x + 12 = 0, and a, b are its roots.

Formula Used:

For a quadratic equation Ax2 + Bx + C = 0, Sum of roots (a + b) = −B/A and Product of roots (ab) = C/A.

Calculations:

=> Comparing x2 − 7x + 12 = 0 with Ax2 + Bx + C = 0, we get A = 1, B = −7, C = 12.

=> Sum of roots (a + b) = −(−7) / 1 = 7

=> Product of roots (ab) = 12 / 1 = 12

=> x2 − 3x − 4x + 12 = 0

=> x(x − 3) − 4(x − 3) = 0

=> (x − 3)(x − 4) = 0

=> The roots are a = 3 and b = 4.

=> a2 + b2 = 32 + 42 = 9 + 16 = 25

=> a3 + b3 = 33 + 43 = 27 + 64 = 91

=> Expression = (a3 + b3) / (a2 + b2 + 1)

=> Expression = 91 / (25 + 1) = 91 / 26

=> Expression = 3.5

Therefore The correct answer is 3.5.

Additional Information

Nature of Roots

For a quadratic equation, the nature of roots is determined by the discriminant D = B2 − 4AC. If D > 0, the roots are real and distinct.

Algebraic Identities

a2 + b2 = (a + b)2 − 2ab and a3 + b3 = (a + b)(a2 − ab + b2) or (a + b)3 − 3ab(a + b).

Relation between Roots and Coefficients

The sum of roots is −B/A and the product of roots is C/A for any quadratic equation of the form Ax2 + Bx + C = 0.

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Q3. Answer: (b) Sclerenchyma

The correct answer is Sclerenchyma

Key Points

• The tissue that makes the coconut husk hard and stiff is Sclerenchyma.

• Sclerenchyma is a type of plant tissue known for its thickened cell walls, which provide strength and support.

• These cells are typically dead at maturity and have heavily lignified walls that make them rigid.

• Sclerenchyma can be found in various parts of the plant, including the husk of coconuts, where it helps protect the seed inside.

Additional Information

• Collenchyma is another type of plant tissue that provides support, but it is not as rigid as sclerenchyma and is typically found in growing regions of the plant.

• Parenchyma is a versatile plant tissue involved in photosynthesis, storage, and tissue repair, but it does not provide significant structural support.

• Guard cells are specialized cells that control the opening and closing of stomata for gas exchange and are not involved in providing structural support.

Q4. Answer: (c) Rs. 100

Shortcut Trick

Find the LCM of days (4, 6, 2) = 12 units as Total Work.

Efficiency of A = 12 ÷ 4 = 3; Efficiency of B = 12 ÷ 6 = 2.

Combined Efficiency of A, B, and C = 12 ÷ 2 = 6.

Efficiency of C = 6 − (3 + 2) = 1.

Share of C = (C's Efficiency ÷ Total Efficiency) × Total Amount = (1 ÷ 6) × 600 = Rs. 100.

Therefore The correct answer is Rs. 100.

Alternate Method

Given: A's time = 4 days, B's time = 6 days, Combined time (A+B+C) = 2 days, Total Payment = Rs. 600.

Formula: Wages are distributed in the ratio of Efficiency (Work per day).

=> Total Work = LCM(4, 6, 2) = 12 units.

=> A's Efficiency = 12 ÷ 4 = 3 units/day.

=> B's Efficiency = 12 ÷ 6 = 2 units/day.

=> (A + B + C)'s Efficiency = 12 ÷ 2 = 6 units/day.

=> C's Efficiency = 6 − (3 + 2) = 1 unit/day.

=> Ratio of wages = A : B : C = 3 : 2 : 1.

=> Sum of ratio parts = 3 + 2 + 1 = 6 parts.

=> 6 parts = Rs. 600.

=> 1 part (C's share) = 600 ÷ 6 = Rs. 100.

Therefore The correct answer is Rs. 100.

Additional Information

Work and Wages Relationship

Wages are directly proportional to the amount of work done. If time is equal for all, wages are distributed in the ratio of their efficiencies.

Efficiency Formula

Efficiency = Total Work ÷ Time Taken. Higher efficiency means the person can complete the work in fewer days.

Combined Work Efficiency

Total Efficiency = Efficiency_A + Efficiency_B + Efficiency_C. Use this to find the missing efficiency of a partner.

Q5. Answer: (c) 10

The correct answer is 10

Key Points

• The Indian Constitution includes borrowed features from 10 countries.

• These features have been adopted to suit the unique needs and conditions of India while incorporating the best practices from around the world.

• The adopted features include parliamentary system, fundamental rights, directive principles, and federal structure, among others.

• Countries from which features have been borrowed include the United Kingdom, the United States, Canada, Ireland, Australia,

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and others.

Additional Information

• The Constitution of India was adopted by the Constituent Assembly on 26th November 1949 and came into effect on 26th January 1950.

• It lays down the framework defining fundamental political principles, establishes the structure, procedures, powers, and duties of government institutions, and sets out fundamental rights, directive principles, and the duties of citizens.

• The Constitution of India is the longest written constitution of any country in the world.

• It declares India a sovereign, socialist, secular, and democratic republic, assuring its citizens justice, equality, and liberty, and endeavors to promote fraternity.

• The Seventh Schedule of the Constitution contains three lists which delineate the subjects under the Union, State, and Concurrent lists.

• Amendments to the Constitution can be made through a process outlined in Article 368.

• The Union List has been amended several times to meet the evolving needs of the nation.

Q6. Answer: (b) Only conclusion II follows

I. Tea is a better drink than coffee - Does not follow (Because, Nothing mention in the given statement about which drink is better and no parameters of judgment are also mentioned. In other words, we can't conclude which drink is better based on their percentage of consumption)

II. More people prefer to drink coffee as compared to milk - Follows (Because, 28 percent preferred to drink coffee whereas 5 percent preferred to drink milk. We can clearly conclude from this that more people preferred to drink coffee than milk).

So, only conclusion II follows.

Hence, the correct answer is "Option 3".

Q7. Answer: (b) 38

The logic followed here is:

So, 38 is the missing number in the given series.

Hence, the correct answer is "Option 2".

Q8. Answer: (b) 38

The logic followed here is-

Logic: (First number x 2) + 2 = Second Number.

Now,

For, 20:42

=> (20 x 2) + 2

=> 40 + 2 = 42 (Second number)

For, 25:52

=> (25 x 2) + 2

=> 50 + 2 = 52 (Second number)

Similarly, for 18:?

=> (18 x 2) + 2

=> 36 + 2 = 38. (Second number)

Hence, the correct answer is "Option 2".

Q9. Answer: (a) Christianity

The correct answer is Christianity

Key Points

• The Easter basket is associated with the celebration of Easter, which is a significant festival in Christianity.

• Easter commemorates the resurrection of Jesus Christ from the dead, which is considered a cornerstone event in Christian beliefs.

• Traditionally, Easter baskets are filled with decorated eggs, candies, and other treats as part of the celebration.

• The use of baskets during Easter has origins in European traditions, where people carried their Easter feast foods to church to be blessed.

Additional Information

• Easter is celebrated on the first Sunday after the first full moon following the vernal equinox, which can fall between March 22 and April 25.

• It is preceded by the 40-day period of fasting, prayer, and penance called Lent, culminating in Holy Week, which includes Good Friday (commemorating the crucifixion of Jesus) and Easter Sunday.

• The Easter egg is a symbol of new life and rebirth, aligning with the theme of resurrection.

• In many cultures, Easter is also associated with various folk traditions, such as the Easter Bunny, which is said to bring Easter eggs.

Q10. Answer: (a) Hydrochloric acid

The correct answer is Hydrochloric acid

Key Points

• Hydrochloric acid reacts with calcium hydroxide to form calcium chloride and water, which is a neutralization reaction.

• The balanced chemical equation for this reaction is:

• $Ca(OH)2 + 2HCl \rightarrow CaCl2 + 2H2O$

• Neutralization reactions involve an acid and a base reacting to form water and a salt.

Additional Information

• Neutralization reactions are a type of chemical reaction in which an acid and a base react quantitatively with each other.

• In a reaction in water, neutralization results in there being no excess of hydrogen or hydroxide ions present in the solution.

• The pH of the neutralized solution depends on the acid strength of the reactants.

• Common examples of neutralization include the reaction of hydrochloric acid (HCl) and sodium hydroxide (NaOH).

Q11. Answer: (c) Sanskrit

The correct answer is Sanskrit

Key Points

• Sanskrit is not a part of the Dravidian language family's four largest languages.

• The four largest Dravidian languages are Malayalam, Tamil, Kannada, and Telugu.

• The Dravidian languages are predominantly spoken in Southern India and parts of Eastern and Central India.

• Sanskrit, on the other hand, is an ancient Indo-Aryan language and not related to the Dravidian language family.

Additional Information

• Sanskrit is one of the oldest languages in the world and has a rich literary tradition.

• It is the classical language of ancient Indian scriptures, including the Vedas and Upanishads.

• Sanskrit has influenced many modern Indian languages, but it is not classified under the Dravidian language family.

• The Dravidian languages have their own distinct history and development, separate from the Indo-Aryan languages like Sanskrit.

• Efforts have been made to revive and preserve Sanskrit, given its cultural and historical significance.

Q12. Answer: (b) 540

Shortcut Trick

Total three-digit numbers (100 to 999) = 900.

Numbers divisible by 2 = 900 ÷ 2 = 450.

Numbers divisible by 5 = 900 ÷ 5 = 180.

Numbers divisible by both (LCM of 2, 5 = 10) = 900 ÷ 10 = 90.

Total divisible by 2 or 5 = 450 + 180 − 90 = 540.

Therefore The correct answer is 540.

Alternate Method

Given: Three-digit numbers range from 100 to 999.

Formula Used: $n(A \cup B) = n(A) + n(B) - n(A \cap B)$

=> Total 3-digit numbers = 999 − 100 + 1 = 900

=> Let A be the set of numbers divisible by 2: $n(A) = 900 \div 2 = 450$

=> Let B be the set of numbers divisible by 5: $n(B) = 900 \div 5 = 180$

=> Intersection $(A \cap B)$ is numbers divisible by 10: $n(A \cap B) = 900 \div 10 = 90$

=> $n(A \cup B) = 450 + 180 - 90$

=> $n(A \cup B) = 630 - 90 = 540$

Therefore The correct answer is 540.

Additional Information

Inclusion-Exclusion Principle

For any two sets A and B, the number of elements in their union is n(A U B) = n(A) + n(B) − n(A ∩ B).

Arithmetic Progression (AP) Count

The number of terms in an AP is given by n = [(Last term − First term) ÷ Common Difference] + 1.

Divisibility by LCM

A number divisible by both x and y must be divisible by the Least Common Multiple (LCM) of x and y.

Q13. Answer: (c) 39 years

Shortcut Trick

Let the son's age be 1 unit.

Mother's age = 3 units, Daughter's age = 1 unit + 5 years.

Total age = 3 units + 1 unit + 1 unit + 5 = 5 units + 5 years.

5 units + 5 = 70 => 5 units = 65 => 1 unit = 13 years.

Mother's age = 3 units = 3 × 13 = 39 years.

Therefore The correct answer is 39 years.

Alternate Method

Given:

Sum of ages of mother (M), son (S), and daughter (D) = 70 years

Mother is thrice as old as her son: M = 3S

Daughter is 5 years older than her brother: D = S + 5

Mother

Son

Daughter

1 unit

1 unit

1 unit

1 unit

1 unit

• 5 yrs

Total = 70

Calculation:

=> Total Age = M + S + D = 70

=> Substituting the relations in terms of S:

=> (3S) + S + (S + 5) = 70

=> 5S + 5 = 70

=> 5S = 70 − 5

=> 5S = 65

=> S = 13 years

=> Mother's Age (M) = 3S

=> M = 3 × 13 = 39 years

Therefore The correct answer is 39 years.

Additional Information

Ratio based Age Problems

When ages are given in ratios, always convert them to a single variable format (e.g. x). For example, if A is twice as old as B, let B's age be x and A's age be 2x, simplifying calculations directly.

Sum of Ages over Time

If the sum of ages of n people is S today, their sum of ages t years from now will be S + nt, because every person's age increases by exactly t years.

Constant Age Difference

The numerical difference in ages between any two individuals remains absolutely constant throughout their lifetime, regardless of the time elapsed.

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Q14. Answer: (c) 57%

Given:

Number of eraser boxes sold:

2018: 35,000 boxes

2020: 55,000 boxes

Calculation:

Increase in the number of eraser boxes sold:

=> Increase = 55,000 - 35,000 = 20,000 boxes

Percentage Increase:

=> Percentage Increase = 20,000/ 35,000 × 100 = 57.14 %

=> Percentage Increase = approx 57.14 %

Therefore The approximate percentage increase in the number of eraser boxes sold from 2018 to 2020 is 57%.

Q15. Answer: (a) Tendu leaves

The correct answer is Tendu leaves

Key Points

• Tendu leaves are primarily used to make bidis.

• Bidis are a traditional form of tobacco wrapped in a leaf, and the tendu leaf provides a suitable wrapper due to its texture and strength.

• The tendu leaf is preferred over other types of leaves because it burns slowly and evenly, providing a better smoking experience.

• These leaves are sourced from the tendu tree (Diospyros melanoxylon), which is commonly found in central India.

• Tendu leaf collection is a significant source of livelihood for many tribal communities in India.

Additional Information

• Bidis are one of the most common forms of tobacco consumption in India, especially in rural areas.

• The tendu leaf trade is regulated by various state governments in India to ensure fair pricing and prevent exploitation of collectors.

• In some regions, the collection and sale of tendu leaves are managed by cooperatives to provide better returns to the collectors.

• Due to health concerns, there have been efforts to reduce bidi consumption through awareness campaigns and stricter regulations.

Q16. Answer: (b) A D S N M N T M

The given combination of codes is-

Number/Symbol	&	5	9	#	6	%	8
Code	S	D	M	U	T	L	A

The given conditions are-

CONDITIONS	CODED AS
The first element is an even number and the last element is also an even number.	The codes for these two (the first and the last elements) are to be interchanged.
The second element is an even number and the fifth element is a symbol.	The codes for these two (the second and the fifth elements) are to be interchanged.
The fourth element is a symbol and the sixth element is also a symbol.	Both these elements (the fourth and the sixth elements) are to be coded as N.

The given sequence is - 8 5 & % 9 # 6 9

Now, in the above sequence, we notice that the third condition is applicable.

Therefore, both the elements '%' and '#' will be coded as N.

Then, the final code for '8 5 & % 9 # 6 9' is 'A D S N M N T M'.

Hence, the correct answer is 'Option 2'.

Q17. Answer: (c) 120 and 80 mm of Hg

The correct answer is 120 and 80 mm of Hg

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Key Points

• 120 and 80 mm of Hg are the normal systolic and diastolic pressures in humans, respectively.

• Systolic pressure (120 mm of Hg) is the pressure in the arteries when the heart beats.

• Diastolic pressure (80 mm of Hg) is the pressure in the arteries when the heart rests between beats.

• Maintaining normal blood pressure is crucial for health as high or low blood pressure can lead to various health issues.

• Regular monitoring and a healthy lifestyle can help maintain normal blood pressure levels.

Additional Information

• Blood pressure is measured in millimeters of mercury (mm of Hg) and recorded with two numbers.

• The first number (systolic pressure) measures the pressure in your blood vessels when your heart beats.

• The second number (diastolic pressure) measures the pressure in your blood vessels when your heart rests between beats.

• High blood pressure, or hypertension, can lead to serious health problems such as heart disease, stroke, and kidney disease.

• Low blood pressure, or hypotension, can cause dizziness and fainting and may indicate underlying health issues.

• Factors influencing blood pressure include diet, exercise, stress, and genetics.

Q18. Answer: (b) -6

Given:

Expression: $4^2+\sqrt{(8^2)} -4\sqrt{25}-10=$

Calculation:

$4^2 = 16$

$\sqrt{(8^2)} = \sqrt{64} = 8$

$4\sqrt{25} = 4 \times 5 = 20$

=> Expression = 16 + 8 - 20 - 10

=> Expression = 24 - 20 - 10

=> Expression = 4 - 10

=> Expression = - 6

Therefore The value of the expression is - 6.

Q19. Answer: (d) Both (i) and (iii)

The correct answer is 4 Both (i) and (iii).

Key Points

• Statement (i): The magnetic field lines around a current-carrying straight conductor are concentric circles with the conductor at the center: This statement is correct. This is a fundamental concept in electromagnetism.

• Statement (ii): The strength of the magnetic field increases as we move away from the conductor: This statement is incorrect. The strength of the magnetic field decreases as we move away from the conductor. This is described by Ampere's circuital law, which states that the magnetic field strength is inversely proportional to the distance from the conductor.

• Statement (iii): The direction of the magnetic field around a current-carrying conductor can indeed be determined using the right-hand thumb rule: This statement is correct. According to this rule, if you hold the conductor with your right hand such that the thumb points in the direction of the current, the fingers curled around the conductor will point in the direction of the magnetic field lines.

Conclusion: Therefore, statements (i) and (iii) are correct, making option 4 the right choice.

Q20. Answer: (b) ÷, ×, =, ×

Given equation: 32 Y 8 Y 16 Y 8 Y 8

The BODMAS rule is given as follows:

Let's check the options, one by one as follows:

Option 1) ×, =, -, ÷

Now placing these signs in place of Y in the given equation, we get-

32 × 8 = 16 - 8 ÷ 8

=> 256 = 16 - 1

=> 256 ≠ 15

Hence, LHS ≠ RHS

Option 2) ÷, ×, =, ×

Now placing these signs in place of Y in the given equation, we get-

32 ÷ 8 × 16 = 8 × 8

=> 4 × 16 = 8 × 8

=> 64 = 64

LHS = RHS

Option 3) ×, ÷, =, -

Now placing these signs in place of Y in the given equation, we get-

32 × 8 ÷ 16 = 8 - 8

=> 32 × 0.5 = 0

=> 16 ≠ 0

LHS ≠ RHS

Option 4) ÷, ×, =, -

Now placing these signs in place of Y in the given equation, we get-

32 ÷ 8 × 16 = 8 - 8

=> 4 × 16 = 0

=> 64 ≠ 0

LHS ≠ RHS

Hence, the correct answer is "Option 2".

Q21. Answer: (c) Ashwini Vaishnaw

The correct answer is Ashwini Vaishnaw

Key Points

• Ashwini Vaishnaw launched India's Semiconductor Mission in December 2021.

• The mission aims to create a vibrant semiconductor and display ecosystem to position India as a global hub for electronics manufacturing and design.

• This initiative is part of the government's broader objective to boost the electronics sector and reduce dependency on imports.

• It includes incentives for companies to set up semiconductor and display fabrication units in India.

Additional Information

• Ashwini Vaishnaw is the Minister of Railways, Communications, and Electronics & Information Technology in the Government of India.

• The semiconductor mission is a strategic move to enhance India's capabilities in the technology sector and achieve self-reliance (Atmanirbhar Bharat).

• India's push towards semiconductor manufacturing also aligns with global supply chain diversification efforts.

• The mission is expected to attract significant investments and generate employment opportunities in the high-tech sector.

Q22. Answer: (d) HIV

The correct answer is HIV

Key Points

• HIV (Human Immunodeficiency Virus) is an example of a virus.

• HIV attacks the body's immune system, specifically the CD4 cells (T cells), which can lead to AIDS (Acquired Immunodeficiency Syndrome) if not treated.

• Unlike other options such as AIDS, Anthrax, and Elephantiasis, which are diseases or conditions, HIV is the actual virus that causes AIDS.

• Effective antiretroviral therapy (ART) can control the virus, allowing individuals to live longer, healthier lives.

Additional Information

• AIDS is a condition caused by the HIV virus, which leads to a severe weakening of the immune system.

• Anthrax is a serious infectious disease caused by gram-positive, rod-shaped bacteria known as Bacillus anthracis.

• Elephantiasis is caused by parasitic worms and results in extreme swelling of body parts, typically the legs.

• HIV is primarily transmitted through unprotected sex, sharing needles, and from mother to child during birth or breastfeeding.

• Early detection and consistent treatment of HIV can prevent the progression to AIDS.

Q23. Answer: (c) Al2(SO4)3

The correct answer is Al2(SO4)3

Key Points

• Bhupesh's agricultural field has soil of pH 11.6 which is basic in character.

• He will need to add some acidic salt decrease the pH of soil for better crop.

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• Aluminum sulfate (Al2(SO4)3) is a salt formed by reaction of aluminum hydroxide (a base) with sulfuric acid.
• Since aluminum hydroxide is a weak base and sulfuric acid is a strong acid, the salt is acidic.
• Thus aluminum sulfate is an acidic salt.
• So, the best option for him is to add Aluminum sulfate (Al2(SO4)3) in his field.

Additional Information

• Calcium hydroxide (Ca(OH)2), also known as slaked lime is a source of hydroxide ions when dissolved in aqueous solutions.
• Therefore, this compound is a base.
• NaCl (Sodium chloride) is a salt that doesn't show acidic or basic nature.
• It is neutral with a pH of about 7.
• It is made with the combination of hydrochloric acid (HCl) and sodium hydroxide (NaOH).
• Both of them having a strong nature, neutralizes each other and produces neutral salt NaCl and water.
• Zinc hydroxide (Zn(OH)2) is a slightly soluble salt but is also a base.
• This level of insolubility makes zinc hydroxide a weak electrolyte. Since it is a weak electrolyte, it is also a weak base.

Q24. Answer: (c) Ravi Mittal

The correct answer is Ravi Mittal

Key Points

• Ravi Mittal was appointed as the Chairman of the Insolvency and Bankruptcy Board of India (IBBI) in February 2022.
• The Insolvency and Bankruptcy Board of India (IBBI) is a regulatory body established under the Insolvency and Bankruptcy Code, 2016.
• The IBBI oversees the implementation of the insolvency and bankruptcy process in India, ensuring effective resolution of insolvency cases.
• Ravi Mittal succeeded M.S. Sahoo as the Chairman of IBBI.

Additional Information

• The Insolvency and Bankruptcy Code (IBC) was enacted in 2016 to consolidate and amend the laws relating to reorganization and insolvency resolution of corporate persons, partnership firms, and individuals in a time-bound manner.
• The IBBI's role is to regulate insolvency professionals, insolvency professional agencies, and information utilities under the IBC.
• It also frames and enforces rules for processes related to corporate insolvency resolution, liquidation, individual insolvency resolution, and bankruptcy.
• The IBBI aims to promote a robust and efficient insolvency resolution framework to improve the ease of doing business in India.

Q25. Answer: (a) YJE - 62

The English alphabetical series is given as-

The logic followed here is-

So, YJE - 62 will replace the question mark in the given series.

Hence, the correct answer is "Option 1".

Q26. Answer: (b) bulb C

The correct answer is bulb C

Key Points

• Bulb C will glow with maximum brightness.
• In a parallel circuit, each bulb receives the full voltage of the source (220 V in this case).
• The power rating of a bulb indicates the power it consumes when connected to its rated voltage.
• Since bulb C has the highest power rating (100 W), it will consume more power and therefore glow brighter than bulbs A (40 W) and B (60 W).

Additional Information

• When bulbs are connected in parallel, the voltage across each bulb is the same.
• The brightness of a bulb is proportional to its power consumption, which is a product of voltage and current.
• Higher power consumption results in higher brightness.
• Therefore, bulb C, with the highest power rating, will glow the brightest.

Q27. Answer: (d) Punjab National Bank

The correct answer is Punjab National Bank

Key Points

• In February 2022, Patanjali launched a co-branded contactless credit card with Punjab National Bank (PNB).

• The launch of this credit card aims to provide a seamless and efficient payment solution for Patanjali's customers.

• This collaboration between Patanjali and PNB is expected to leverage the strengths of both organizations to offer a unique value proposition to the cardholders.

• The cardholders can avail of various benefits and rewards on purchases made using the co-branded credit card.

• This initiative is part of Patanjali's broader strategy to expand its footprint in the financial services sector.

Additional Information

• Patanjali Ayurved Limited is an Indian multinational consumer packaged goods company, based in Haridwar, India.

• Founded by Baba Ramdev and Acharya Balkrishna in 2006, the company has grown to become one of the leading FMCG brands in India.

• Punjab National Bank (PNB) is a state-owned commercial bank in India, established in 1894.

• PNB provides a range of banking and financial services to its customers, including retail banking, corporate banking, and treasury services.

• The co-branded credit card with Patanjali is one of the many initiatives taken by PNB to diversify its product offerings and enhance customer experience.

Q28. Answer: (d) dispersion of light

The correct answer is dispersion of light

Key Points

• The splitting up of white light into seven components as it enters a glass prism is called dispersion of light.

• This phenomenon occurs because different colors of light have different wavelengths and thus, they refract by different amounts when passing through a medium like glass.

• As a result, the white light is separated into its constituent spectral colors: red, orange, yellow, green, blue, indigo, and violet, commonly remembered by the acronym ROYGBIV.

• Dispersion is a key concept in the study of optics and is fundamental to understanding how prisms and other optical devices work.

Additional Information

• Isaac Newton was the first to demonstrate that white light is composed of different colors using a prism.

• This discovery was crucial in the development of the field of spectroscopy, which analyzes the light spectrum to understand the properties of light-emitting substances.

• Dispersion is not limited to prisms; it can also be observed in natural phenomena such as rainbows, where water droplets in the atmosphere act as prisms.

• In addition to prisms, other devices like diffraction gratings can also disperse light into its spectral components.

Q29. Answer: (c) 60 m, North

Given:

B was standing at a point, facing north.

Then, B turned and ran towards the east for 50 m,

then turned towards the south and walked for 30 m.

He then turned left and ran for 40 m,

then turned right and ran for 50 m,

turned right again and walked for 10 m,

and at last, turned right and walked for 20 m.

So, at his final position, B is facing the North direction.

Also, total distance that B has walked is = 30m + 10m + 20m = 60m.

Therefore, B has walked a total distance of 60m and is facing the North at last.

Hence, the correct answer is "Option 3".

Q30. Answer: (d) N = H

Given Statement: V > R > N = U = H > C < G

Now,

Conclusions:

1. N > V → False (V > R > N. This clearly gives us N < V.)

2. R = H → False (R > N = U = H. This clearly gives us R > H.)

3. U > G → False (U = H > C < G. There are opposite sign between U and G and no direct relationship can be formed.)

4. N = H → True (N = U = H. This gives us N = H)

Here, Conclusions 4 follows.

Hence, the correct answer is "Option 4".

Q31. Answer: (d) PV Sindhu

The correct answer is PV Sindhu

Key Points

• PV Sindhu won the women's singles title at the Syed Modi International Badminton Tournament, 2022.

• She defeated Malvika Bansod in the final to clinch the title.

• The Syed Modi International Badminton Tournament is an annual event held in India and is part of the Badminton World Federation (BWF) Tour.

• PV Sindhu is one of India's most successful badminton players, having won multiple international titles including the World Championships and an Olympic silver medal.

Additional Information

• PV Sindhu has been awarded several honors by the Government of India, including the Padma Bhushan, Padma Shri, and Rajiv Gandhi Khel Ratna.

• The Syed Modi International Badminton Tournament is named after Syed Modi, an Indian badminton player who was a national champion and won the All England Championship in 1981.

• The tournament attracts top badminton players from around the world and is a significant event in the badminton calendar.

• PV Sindhu's victory at the Syed Modi International Badminton Tournament, 2022, adds to her illustrious career and highlights her consistent performance in the sport.

Q32. Answer: (c) 20 and 8

Shortcut Trick

To find the roots quickly, substitute the values from the options into the equation $\sqrt{(2x + 9)} + x = 13$.

For x = 8: $\sqrt{(2 \times 8 + 9)} + 8 = \sqrt{25} + 8 = 5 + 8 = 13$. (Satisfied)

The quadratic equation derived from squaring is $x^2 - 28x + 160 = 0$.

Using the factorization method, the sum of roots is 28 and the product is 160, which gives 20 and 8.

Therefore The correct answer is 20 and 8.

Alternate Method

Given: $\sqrt{(2x + 9)} + x = 13$

Formula Used: $(a - b)^2 = a^2 - 2ab + b^2$

Calculations:

=> $\sqrt{(2x + 9)} = 13 - x$

=> Squaring both sides: $(\sqrt{(2x + 9)})^2 = (13 - x)^2$

=> $2x + 9 = 169 - 26x + x^2$

=> $x^2 - 26x - 2x + 169 - 9 = 0$

=> $x^2 - 28x + 160 = 0$

=> $x^2 - 20x - 8x + 160 = 0$

=> $x(x - 20) - 8(x - 20) = 0$

=> $(x - 20)(x - 8) = 0$

=> x = 20 or x = 8

Therefore The correct answer is 20 and 8.

Additional Information

Quadratic Roots ($ax^2 + bx + c = 0$)

For a quadratic equation, the sum of roots is given by $-b/a$ and the product of roots is given by c/a.

Discriminant (D)

The value $D = b^2 - 4ac$ determines the nature of roots: real and distinct if D > 0, real and equal if D = 0, and imaginary if D < 0.

Extraneous Roots

When solving radical equations, squaring can introduce extra solutions that must be checked against the original equation's domain.

Q33. Answer: (a) 10 cm

Shortcut Trick

Area of equilateral triangle = (√3/4) × side²

25√3 = (√3/4) × a²

a² = 25 × 4 = 100

a = √100 = 10 cm

Therefore The correct answer is 10 cm.

Alternate Method

Given:

Area of equilateral triangle = 25√3 cm²

Formula Used:

Area = (√3/4) × a², where 'a' is the side length.

Calculations:

=> Area = (√3/4) × a²

=> 25√3 = (√3/4) × a²

=> 25 = a² / 4

=> a² = 25 × 4

=> a² = 100

=> a = √100

=> a = 10 cm

Therefore The correct answer is 10 cm.

Additional Information

Height of Equilateral Triangle

The altitude or height (h) is given by h = (√3/2) × side.

Perimeter of Equilateral Triangle

Since all three sides are equal, the perimeter (P) = 3 × side.

Inradius and Circumradius

Inradius (r) = a / (2√3) and Circumradius (R) = a / √3.

Q34. Answer: (b) 3

Given: (Left) K ε T X @ * D X ¥ & J % Z Y $ & # S & $ F Ø G ^(Right)

Now,

Symbols, which are immediately preceded by a letter and also immediately followed by a letter.

So, the needed pattern is: Letter - Symbol - Letter.

There are 3 Symbols which are preceded by a letter and also immediately followed by a letter.

Hence, the correct answer is *'Option 2'.*

Q35. Answer: (b) 6

The correct answer is 6

Key Points

• There are 6 physical regions in India.

• The six physical regions of India are:

• The Northern Mountains

• The Northern Plains

• The Peninsular Plateau

• The Indian Desert

• The Coastal Plains

• The Islands

• Each of these regions has distinct geographical features and climate conditions.

Additional Information

• The Northern Mountains include the Himalayas, which are the highest mountain range in the world.

• The Northern Plains are formed by the alluvial deposits of the Indus, Ganga, and Brahmaputra rivers.

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• The Peninsular Plateau is the oldest landmass and is rich in minerals.
• The Indian Desert, also known as the Thar Desert, is located in the state of Rajasthan.
• The Coastal Plains lie on either side of the Peninsular Plateau and have fertile soil.
• The Islands consist of the Andaman and Nicobar Islands in the Bay of Bengal and the Lakshadweep Islands in the Arabian Sea.

Q36. Answer: (b) MJSQB

The English alphabetical order is given as-
The logic followed here is-
For 'MONDAY is written as ZBEOPN ', we get-
For 'MARCH is written as IDSBN', we get-
Similarly, for 'APRIL', we get-
So, 'APRIL' will be written as 'MJSQB'.
Hence, the correct answer is 'Option 2'.

Q37. Answer: (c) SACRED

The correct answer is SACRED
Key Points
• SACRED is the portal launched by the Ministry of Social Justice and Empowerment in October 2021.
• The SACRED (Senior Able Citizens for Re-Employment in Dignity) portal aims to provide a platform for senior citizens in India seeking employment opportunities.
• This initiative is part of the government's efforts to support the elderly in finding suitable jobs and ensuring their economic independence.
• The portal connects senior citizens with employers who are looking for experienced and skilled workers.
Additional Information
• The Ministry of Social Justice and Empowerment is responsible for the welfare, social justice, and empowerment of disadvantaged and marginalized sections of society.
• The SACRED portal is part of the ministry's broader strategy to address the issues faced by senior citizens, including financial insecurity and social isolation.
• The portal allows senior citizens to register and create profiles showcasing their skills and experience, making it easier for employers to find suitable candidates.
• Employers can post job vacancies on the portal and search for potential employees from the pool of registered senior citizens.
• This initiative also aims to promote intergenerational bonding and ensure that the valuable experience of senior citizens is utilized for the benefit of society.

Q38. Answer: (a) Tokyo

The correct answer is Tokyo
Key Points
• Neeraj Chopra won India's first-ever gold medal in athletics at the Tokyo Olympics in 2021.
• He competed in the javelin throw event and secured the gold medal with a throw of 87.58 meters.
• This victory marked a historic achievement for India in the field of athletics on the global stage.
• The Tokyo Olympics were originally scheduled for 2020 but were postponed to 2021 due to the COVID-19 pandemic.
Additional Information
• The Tokyo Olympics took place from July 23 to August 8, 2021.
• Neeraj Chopra's gold medal was India's seventh medal in the Tokyo Olympics, contributing to the country's best-ever Olympic performance.
• Neeraj Chopra is a Subedar in the Indian Army and has been recognized for his contributions to Indian sports with numerous awards and honors.

Q39. Answer: (b) 24 years

Shortcut Trick
Rani's age is the base value.
Sister is 4 years older than Rani.
Rani's age = Sister's age − 4
Rani's age = 28 − 4 = 24 years.
Therefore The correct answer is 24 years.

Alternate Method

Given:

Sister's age = 28 years

Difference between sister and Rani = 4 years

Calculations:

=> Let Rani's age be x years.

=> According to the question, Sister's age = x + 4

=> 28 = x + 4

=> x = 28 − 4

=> x = 24 years

Therefore The correct answer is 24 years.

Additional Information

Linear Equations in One Variable

Equations where the highest power of the variable is 1, used to find unknown ages or quantities.

Age Difference Property

The difference between the ages of two people remains constant regardless of the number of years passed.

Ratio of Ages

If the ratio of ages is given as a:b, then ages can be assumed as ax and bx for calculation.

Q40. Answer: (d) 333

The logic that is followed here is-

Logic: (1st Number)² + (1st number ÷ 2) = Second Number.

Now,

For 14 : 203,

=> $14^2 + (14 \div 2)$

=> 196 + 7 = 203

For 16:264,

=> $16^2 + (16 \div 2)$

=> 256 + 8 = 264

Similarly, for 18:?

=> $18^2 + (18 \div 2)$

=> 324 + 9 = 333

Hence, the correct answer is "Option 4".

Q41. Answer: (c) Geographical North - Geographical South

The correct answer is Geographical North - Geographical South

Key Points

• A freely suspended bar magnet aligns itself in the Geographical North - Geographical South direction.

• This phenomenon occurs because the Earth itself acts like a giant magnet with its magnetic field.

• The end of the bar magnet that points towards the geographical north is called the North Pole or North-seeking pole.

• Similarly, the end pointing towards the geographical south is known as the South Pole or South-seeking pole.

• This alignment is due to the magnet's interaction with the Earth's magnetic field, which exerts a torque on the magnet until it aligns with the field.

Additional Information

• The Earth's magnetic field is not perfectly aligned with its geographical axis; it is tilted by about 11 degrees.

• The geographical north corresponds to the magnetic south pole, and the geographical south corresponds to the magnetic north pole.

• This is why the north pole of a magnet points towards the geographical north, as opposite poles attract.

• Understanding this property of magnets is fundamental in navigation and has been utilized for centuries in compasses.

Q42. Answer: (c) -2

The correct answer is 2

Key Points

• Magnification (m) is defined as the ratio of the height of the image to the height of the object.
• For a real and inverted image, the magnification is given a negative sign.
• In this case, the image is twice the size of the object, hence the magnification is -2.
• The formula for magnification (m) is: m = - (Image Height) / (Object Height).

Additional Information

• The lens formula is given by 1/f = 1/v - 1/u, where f is the focal length, v is the image distance, and u is the object distance.
• In this problem, knowing the magnification helps in understanding the relationship between the object and image distances.
• Convex lenses can produce both real and virtual images depending on the position of the object relative to the focal point.

Q43. Answer: (d) Dual government

The correct answer is Dual government

Key Points

• The Indian Constitution establishes a dual government system, also known as federalism, where powers are divided between the central government and the state governments.
• Unlike some other federal systems, India does not have dual citizenship; citizens are only recognized as Indian citizens.
• Representation in the upper house of parliament (Rajya Sabha) is based on the population of each state, not equal representation.
• Representation in the lower house of parliament (Lok Sabha) is also based on population, ensuring more populous states have more representatives.

Additional Information

• The Constitution of India was adopted by the Constituent Assembly on 26th November 1949 and came into effect on 26th January 1950.
• It establishes the structure, procedures, powers, and duties of government institutions, and sets out fundamental rights, directive principles, and duties of citizens.
• The Indian Constitution is the longest written constitution of any country in the world.
• It declares India a sovereign, socialist, secular, and democratic republic, assuring its citizens justice, equality, and liberty, and endeavors to promote fraternity.
• The Seventh Schedule of the Constitution contains three lists which delineate the subjects under the Union, State, and Concurrent lists.
• Amendments to the Constitution can be made through a process outlined in Article 368.

Q44. Answer: (d) Supreme Court

The correct answer is Supreme Court

Key Points

• On 20 January 2022, the Supreme Court of India upheld the constitutional validity of 27 per cent reservation for the Other Backward Classes (OBCs) in the All India Quota (AIQ) for undergraduate and postgraduate medical and dental courses.
• This decision was made in the case of Neil Aurelio Nunes and Ors vs. Union of India and Ors.
• The ruling was significant in affirming the central government's policy on reservations in educational institutions.
• The Supreme Court's decision ensures that OBC candidates will continue to benefit from the reservation in the AIQ seats.

Additional Information

• The All India Quota (AIQ) was introduced in 1986 under the directions of the Supreme Court to provide for domicile-free merit-based opportunities to students from any state aspiring to study in a good medical college located in another state.
• The AIQ consists of 15% of total available undergraduate seats and 50% of total available postgraduate seats in government medical colleges.
• The Supreme Court's decision supports the implementation of reservation policies aimed at promoting educational opportunities for historically disadvantaged communities.
• This case highlights the ongoing efforts to balance merit-based admissions with the need for social justice and inclusion in education.

Q45. Answer: (a) World Bank

The correct answer is World Bank

Key Points

• The Government of India has signed a 115 million dollar agreement for the Rejuvenating Watersheds for Agricultural Resilience through Innovative Development (REWARD) Programme with the World Bank.
• The REWARD program aims to improve watershed management practices and enhance agricultural resilience.

• This initiative is part of broader efforts to ensure sustainable agricultural practices and water resource management in India.

• The World Bank's involvement signifies international support and collaboration in India's environmental and agricultural sectors.

Additional Information

• The World Bank is an international financial institution that provides loans and grants to the governments of poorer countries for the purpose of pursuing capital projects.

• It comprises two institutions: the International Bank for Reconstruction and Development (IBRD), and the International Development Association (IDA).

• The World Bank's stated goal is to reduce poverty by providing loans to developing countries for development programs (e.g., bridges, roads, schools, etc.) that are expected to improve the economic prospects and quality of life for people in those countries.

• The REWARD program is expected to benefit a significant number of farmers and improve the efficiency of water use in agriculture.

Q46. Answer: (a) 1771

Shortcut Trick

For a number to be divisible by both 7 and 11, it must be divisible by their LCM, which is 77.

Check 1771 ÷ 77: 77 × 2 = 154; 177 − 154 = 23; Bring down 1 → 231. 77 × 3 = 231.

Since 1771 is perfectly divisible by 77, it is the answer.

Therefore The correct answer is 1771.

Alternate Method

Given Numbers: 1771, 3014, 2684, 2534

Divisibility Rules:

Rule for 11: (Sum of digits at odd places) − (Sum of digits at even places) should be 0 or a multiple of 11.

Rule for 7: (Units digit × 2) subtracted from the remaining number should be 0 or a multiple of 7.

Checking each option for 11 first:

=> (1) 1771: (1+7) − (7+1) = 8 − 8 = 0 (Divisible by 11)

=> (2) 3014: (3+1) − (0+4) = 4 − 4 = 0 (Divisible by 11)

=> (3) 2684: (2+8) − (6+4) = 10 − 10 = 0 (Divisible by 11)

=> (4) 2534: (2+3) − (5+4) = 5 − 9 = −4 (Not Divisible by 11)

Now check (1), (2), and (3) for 7:

=> (1) 1771: 177 − (1 × 2) = 175; 17 − (5 × 2) = 7 (Divisible by 7)

=> (2) 3014: 301 − (4 × 2) = 293; 29 − (3 × 2) = 23 (Not Divisible by 7)

=> (3) 2684: 268 − (4 × 2) = 260; 26 − (0 × 2) = 26 (Not Divisible by 7)

Therefore The correct answer is 1771.

Additional Information

Divisibility by 77

If a number is divisible by coprime factors a and b, it is also divisible by their product (a × b). Since 7 and 11 are prime, we check for 77.

Rule of 7, 11, 13

For larger numbers, divide the digits into groups of three from right to left and find the alternating sum; if the result is divisible by 7, 11, or 13, the number is too.

Co-prime Numbers

Numbers whose only common factor is 1. All prime numbers are co-prime to each other.

Q47. Answer: (c) A

Given: Six students, F, E, D, C, B and A, were studying around a square table in a college library, facing the centre.

Four of them were sitting at the corners while two others were sitting at the exact centre of the sides.

1) B was at the immediate right of F.

2) D was diagonally opposite to F.

3) C and E were diagonally opposite to each other.

4) No student sat between C and D as well as between E and F.

5) A was not at any of the corner positions and was an immediate neighbour of both E and D.

So, 'A' student sat third to the left of B.

Hence, the correct answer is "Option 3".

Q48. Answer: (c) Brahmaputra

The correct answer is Brahmaputra

Key Points

• The Brahmaputra river marks the eastern-most boundary of the Himalayas.

• The river originates from the Angsi Glacier in Tibet, where it is known as the Yarlung Tsangpo River.

• It flows across southern Tibet to break through the Himalayas in great gorges and into Arunachal Pradesh (India), where it is known as the Dihang.

• From Arunachal Pradesh, it flows southwest through the Assam Valley as Brahmaputra and south through Bangladesh as the Jamuna.

• The river is crucial for the ecosystems and the livelihoods of millions of people in the regions it flows through.

Additional Information

• The Ganga river is one of the major rivers in India but does not mark the eastern boundary of the Himalayas.

• The Godavari river is the second longest river in India but is located in central India.

• The Chambal river is a tributary of the Yamuna river in central India.

• The Brahmaputra river has a total length of about 2,900 km (1,800 mi) and is one of the major rivers of the world in terms of discharge and sediment transport.

Q49. Answer: (c) 49

Concept:

Square root and BODMAS

Calculation:

√729+√1681+√576-√1849

=> 27 + 41 + 24 - 43

=> (27 + 41 + 24) - 43

=> 92 - 43 = 49

Therefore The value of √729+√1681+√576-√1849 is 49.

Q50. Answer: (b) 60

Shortcut Trick

In a mean proportion x of two numbers a and b, where a : x :: x : b, the value of x is always √(a × b).

x = √(48 × 75)

x = √(16 × 3 × 3 × 25) = 4 × 3 × 5

x = 60

Therefore The correct answer is 60.

Alternate Method

Given: 48 : x :: x : 75 and x > 0.

Formula Used: Product of Extremes = Product of Means

=> 48 / x = x / 75

=> x2 = 48 × 75

=> x2 = 3600

=> x = √3600

=> x = 60

Therefore The correct answer is 60.

Additional Information

Mean Proportion

If b is the mean proportion between a and c, then a : b = b : c, which implies b2 = ac or b = √(ac).

Third Proportion

For two numbers a and b, the third proportion c is such that a : b = b : c, giving c = b2 / a.

Fourth Proportion

If a : b = c : d, then d is the fourth proportion, calculated as d = (b × c) / a.

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Q51. Answer: (d) virtual, erect and diminished

The correct answer is Option 4

Key Points

• The magnification produced by a lens is given as 1/2, which means the image is half the size of the object.

• Magnification (m) is positive for virtual and erect images and negative for real and inverted images.

• Here, the magnification is positive (1/2), indicating that the image is virtual and erect.

• Since the image is smaller than the object, it is also diminished.

• Thus, the nature and the relative size of the image formed by the lens are virtual, erect, and diminished.

Additional Information

• Magnification (m) is calculated using the formula: m = -v/u, where v is the image distance and u is the object distance.

• A concave lens always forms a virtual, erect, and diminished image regardless of the object's position.

• Convex lenses can form real and inverted images when the object is placed outside the focal length, but this scenario does not apply here as the magnification is positive.

Q52. Answer: (b) Maharashtra

The correct answer is Maharashtra

Key Points

• India's first Biosafety Level-3 Mobile Laboratory was inaugurated in Maharashtra in February 2022.

• The laboratory aims to investigate emerging viral infections that are highly infectious and pose a significant threat to public health.

• Equipped with advanced testing and diagnostic facilities, the mobile lab can be deployed to remote areas to conduct on-site testing and research.

• This initiative is part of India's ongoing efforts to enhance its ability to respond to biological threats and improve public health infrastructure.

Additional Information

• Biosafety Level-3 (BSL-3) laboratories are designed to work with infectious agents that may cause serious or potentially lethal diseases through inhalation.

• Such laboratories have stringent safety protocols and containment measures to prevent the release of pathogens into the environment.

• The mobile laboratory in Maharashtra is a significant step towards bolstering India's capacity to handle biothreats and conduct crucial research in virology.

• BSL-3 labs are essential for diagnosing and researching diseases like tuberculosis, SARS, COVID-19, and other viral hemorrhagic fevers.

Q53. Answer: (d) 3

The English alphabetical series is given as-

The given word is: ANOTHER

Now, the rearranged sequence according to the English alphabetical order is - (left end) A E H N O R T (right end)

In the rearranged sequence, the letter that is fourth from the left end is N and the letter that is second from the right end is R.

Now, from the given English alphabetical series we see that there are 3 letters in between N and R.

Hence, the correct answer is "Option 4".

Q54. Answer: (a) 4th

Given: Five persons, K, L, M, N and P, receive their salaries on five different dates of the same month, viz. 1^(st), 2^(nd), 3^(rd), 4^(th) and 5^(th).

Based on the given conditions, we get the following tables-

1. P receives salary on the 3rd of the month. P receives salary on the date immediately after K. From these, we get-

DATE	PERSON
1^(st)	
2^(nd)	K
3^(rd)	P
4^(th)	

5^(th)	

2. L receives salary on the date immediately after M. N receives salary on the date immediately before K. From these, we get the final scheduling table as follows-

DATE	PERSON
1^(st)	N
2^(nd)	K
3^(rd)	P
4^(th)	M
5^(th)	L

So, we see that M receives salary on the 4^(th) of the month.

Hence, the correct answer is "Option 1".

Q55. Answer: (a) 3 cm

Shortcut Trick

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

Given $4\pi r^2 = 36\pi$

$r^2 = 36 \div 4 = 9$

$r = \sqrt{9} = 3$ cm

Therefore The correct answer is 3 cm.

Alternate Method

Given:

Surface area of the sphere = 36π cm²

Formula Used:

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

Calculations:

$\Rightarrow 4 \times \pi \times r^2 = 36 \times \pi$

$\Rightarrow 4r^2 = 36$

$\Rightarrow r^2 = 36 \div 4$

$\Rightarrow r^2 = 9$

$\Rightarrow r = \sqrt{9}$

$\Rightarrow r = 3$ cm

Therefore The correct answer is 3 cm.

Additional Information

Volume of Sphere

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

Hemisphere Properties

Curved Surface Area = $2\pi r^2$; Total Surface Area = $3\pi r^2$; Volume = $(2/3)\pi r^3$.

Circle Comparison

The surface area of a sphere is exactly 4 times the area of its great circle (πr^2).

Q56. Answer: (b) Tuesday

Given date: 10 January 2006.

Year	Odd Days
100	5 odd days
200	3 odd days
300	1 odd days
400	0 odd days

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Now,

Till 2005 → 2000 + 5

Leap Year	2 Odd days
Ordinary Year	1 Odd days

=> 0 + 6

=> 6 odd days.

And, till 10th January 2006, we have 10 odd days.

Therefore, total number of odd days → 6 + 10 = 16 days = 16/7 = 2 weeks and 2 odd days.

→ 2 represents a Tuesday.

So, 10th January, 2006 was a Tuesday.

Hence, the correct answer is "Option 2".

Q57. Answer: (d) 8

Shortcut Trick

Circle Perimeter = 2 × (22/7) × r = 88/7 => r = 2 cm.

Square side (a) = Radius (r) = 2 cm.

Square Perimeter = 4 × a = 4 × 2 = 8 cm.

Therefore The correct answer is 8 cm.

Alternate Method

Given:

Perimeter (Circumference) of circle = 88/7 cm

Side of square (a) = Radius of circle (r)

Formula Used:

Circumference of circle = 2πr

Perimeter of square = 4a

Calculations:

=> 2 × (22/7) × r = 88/7

=> (44/7) × r = 88/7

=> r = (88/7) × (7/44)

=> r = 2 cm

=> Since side of square a = r, therefore a = 2 cm

=> Perimeter of square = 4 × 2

=> Perimeter of square = 8 cm

Therefore The correct answer is 8 cm.

Additional Information

Circle Properties

Area of a circle is πr^2 and the diameter is 2r.

Square Properties

Area of a square is a^2 and the diagonal is $a\sqrt{2}$.

Ratio of Perimeters

When the side of a square equals the radius of a circle, the ratio of the circle's circumference to the square's perimeter is π : 2.

Q58. Answer: (b) U

Given: Seven boxes, P, Q, R, S, T, U and V, are kept one over the other but not necessarily in the same order.

Based on the given conditions in the question, we get the following arrangement-

1. Only three boxes are kept below R. S is third box from top. S is immediately below Q. From these, we get-

BOX NAME
Q
S

R

2. P is immediately above Q. From this, we get-

BOX NAME
P
Q
S
R

3. T is not immediately below R. V is immediately below T. From these, we get the final arrangement as follows-

BOX NAME
P
Q
S
R
U
T
V

So, the third box from the bottom is U.

Hence, the correct answer is “Option 2”.

Q59. Answer: (b) 5.4

Calculation:

=> √(294/25)

=> √29.16

=> 5.4

Therefore The correct answer is 5.4

Q60. Answer: (b) Rs. 5,000

Shortcut Trick

Net interest percentage 1 = 5.5% × (18 ÷ 12) = 5.5% × 1.5 = 8.25%

Net interest percentage 2 = 6% × (14 ÷ 12) = 6% × 1.166... = 7%

Difference in percentage = 8.25% − 7% = 1.25%

According to the question: 1.25% of Sum = Rs. 62.50

Sum (100%) = (62.50 ÷ 1.25) × 100 = 50 × 100 = Rs. 5,000

Therefore The correct answer is Rs. 5,000.

Alternate Method

Given:

Case 1: Rate (R1) = 5.5%, Time (T1) = 18 months = 1.5 years

Case 2: Rate (R2) = 6%, Time (T2) = 14 months = 14/12 years

Difference in Simple Interest = Rs. 62.50

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Formula Used: SI = (P × R × T) ÷ 100

Calculations:

=> Let the Sum be P.

=> SI1 = (P × 5.5 × 1.5) ÷ 100 = 8.25P ÷ 100

=> SI2 = (P × 6 × 14/12) ÷ 100 = (P × 7) ÷ 100 = 7P ÷ 100

=> SI1 − SI2 = 62.50

=> (8.25P ÷ 100) − (7P ÷ 100) = 62.50

=> 1.25P ÷ 100 = 62.50

=> 1.25P = 6250

=> P = 6250 ÷ 1.25

=> P = 5000

Therefore The correct answer is Rs. 5,000.

Additional Information

Effective Rate of Simple Interest

For simple interest, the effective interest rate for the total period is simply the product of the annual rate and the time in years (R × T).

Conversion of Time

While calculating SI, always ensure Time is in years. If given in months, divide by 12; if given in days, divide by 365.

Difference between SI and CI

The difference between SI and CI for 2 years on a sum P at rate R% is given by the formula: D = P(R ÷ 100)².

Q61. Answer: (b) 2 KOH (aq) + 2 HNO3(aq) → 2 KNO3 (aq) + 2 H2O (l)

The correct answer is option 2

Key Points

• The balanced chemical equation for the reaction is 2 KOH (aq) + 2 HNO3 (aq) → 2 KNO3 (aq) + 2 H2O (l).

• Potassium hydroxide (KOH) and nitric acid (HNO3) are both in aqueous solutions.

• The products of the reaction are potassium nitrate (KNO3) in aqueous solution and water (H2O) in liquid form.

• This reaction is a typical acid-base neutralization reaction where an acid reacts with a base to form a salt and water.

Additional Information

• In a neutralization reaction, the hydrogen ions (H^+) from the acid react with the hydroxide ions (OH^−) from the base to form water.

• Potassium nitrate (KNO3) is commonly used in fertilizers and as a preservative in food.

• Water formed in the reaction is in the liquid state, denoted by (l).

• State symbols in chemical equations provide information about the physical state of the reactants and products: (s) for solid, (l) for liquid, (g) for gas, and (aq) for aqueous solution.

Q62. Answer: (d) 19%

Shortcut Trick

Let Cost Price (CP) be 100.

Marked Price (MP) = 100 × 1(2/5) = 100 × 1.4 = 140.

Selling Price (SP) = MP × (17/20) = 140 × (17/20) = 7 × 17 = 119.

Gain% = [(SP − CP) ÷ CP] × 100 = [(119 − 100) ÷ 100] × 100 = 19%.

Therefore The correct answer is 19%.

Alternate Method

Given → MP = 7/5 CP and SP = 17/20 MP.

Formulas: Profit% = (Net Factor − 1) × 100 | SP = CP × (Multiplier).

=> Multiplier (CP to MP) = 7/5.

=> Multiplier (MP to SP) = 17/20.

=> Overall Multiplier (CP to SP) = (7/5) × (17/20) = 119/100.

=> Since SP/CP = 119/100, the Profit = 119 − 100 = 19.

=> Profit% = (19 ÷ 100) × 100 = 19%.

Therefore The correct answer is 19%.

Additional Information

Marked Price & Discount

MP is the price printed on the label. Discount is always calculated on the MP: SP = MP × (100 − D%) ÷ 100.

Markup Percentage

It is the percentage by which CP is raised: Markup% = [(MP − CP) ÷ CP] × 100.

Q63. Answer: (b) Cow

The correct answer is Cow.

Key Points

• The cow has a longer small intestine compared to a tiger, lion, or human.

• This is because cows are herbivores and require a longer digestive tract to break down and absorb nutrients from plant material.

• In contrast, carnivores like tigers and lions have shorter digestive tracts as their diet of meat is easier to digest.

• Humans, being omnivores, have a small intestine length that is shorter than herbivores but longer than carnivores.

Additional Information

• The small intestine is the part of the gastrointestinal tract where most of the end absorption of nutrients occurs.

• In herbivores, the longer length allows for more time and surface area for the fermentation and breakdown of cellulose from plants.

• Cows have a specialized stomach with four compartments to aid in the digestion of tough plant material, further necessitating a longer small intestine for nutrient absorption.

• The length and complexity of the digestive system in different animals are directly related to their dietary requirements and feeding habits.

Q64. Answer: (d) 800 grams

Shortcut Trick

Gain% = (Error ÷ True Value − Error) × 100

Let the quantity given be x grams. Error = (1000 − x) grams.

25 = ((1000 − x) ÷ x) × 100 => 25x = 100000 − 100x

125x = 100000 => x = 100000 ÷ 125 = 800 g.

Therefore The correct answer is 800 g.

Alternate Method

Given: Gain% = 25%, True weight = 1 kg = 1000 g.

Formulas: Gain% = (Error ÷ Weight Used) × 100 | Weight Used = True Weight − Error.

=> Let CP of 1000 g be 1000. Dealer sells x g for 1000.

=> Profit% = 25%, so Ratio of CP : SP = 100 : 125 = 4 : 5.

=> Since SP is same as CP of total (professes CP), 5 units = 1000 g.

=> 1 unit = 200 g.

=> Quantity given (CP units) = 4 units = 4 × 200 = 800 g.

Therefore The correct answer is 800 g.

Additional Information

Dishonest Dealer Concept

When a dealer sells at CP but uses less weight, the Effective Gain% is calculated on the Actual Weight delivered, not the true weight.

Profit in Terms of Weight

If a dealer sells at x% profit and uses y% less weight, Net Profit% = [(x+y) ÷ (100−y)] × 100.

Q65. Answer: (b) Pyruvate

The correct answer is Pyruvate

Key Points

• Pyruvate is the common product produced during both aerobic and anaerobic respiration initially in the first step.

• During glycolysis, one molecule of glucose is broken down into two molecules of pyruvate.

• In aerobic respiration, pyruvate is further oxidized to produce energy, while in anaerobic respiration, it is converted into lactic acid or ethanol.

• This initial step of glycolysis occurs in the cytoplasm of the cell and does not require oxygen.

• Glycolysis is a universal pathway and is the first step in cellular respiration for both prokaryotic and eukaryotic organisms.

Additional Information

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• Glycolysis is a ten-step process where enzymes break down glucose into pyruvate, yielding ATP and NADH.

• In the presence of oxygen, pyruvate enters the mitochondria for the Krebs cycle and oxidative phosphorylation, producing a large amount of ATP.

• In the absence of oxygen, pyruvate undergoes fermentation to produce either lactic acid (in animals) or ethanol and carbon dioxide (in yeast and plants).

• The end products of glycolysis are critical for cellular metabolism and energy production.

• Understanding glycolysis and its products is fundamental in fields like biochemistry, physiology, and medicine.

Q66. Answer: (a) nettle

The correct answer is nettle

Key Points

• The leaves of the nettle plant contain methanoic acid, also known as formic acid.

• Methanoic acid is responsible for the stinging sensation when the leaves come into contact with the skin.

• This acid is a defense mechanism for the plant to deter herbivores from eating it.

• Nettle plants are commonly found in Europe, Asia, North America, and northern Africa.

Additional Information

• Methanoic acid is the simplest carboxylic acid and has the chemical formula HCOOH.

• It is used in various industries, including leather production, textile dyeing, and as a preservative in livestock feed.

• Despite its stinging properties, nettle leaves are also used in traditional medicine and as a food source after proper preparation.

• The leaves are rich in vitamins A, C, K, and several B vitamins, as well as minerals like iron, calcium, magnesium, and potassium.

Q67. Answer: (c) 198

Shortcut Trick

If $a^2 + 1/a^2 = k$, then $a^6 + 1/a^6 = k^3 - 3k$.

First, find $a^2 + 1/a^2$ by adding 2 and taking the square root: $\sqrt{(34 + 2)} = 6$.

Apply the trick: $6^3 - 3(6) = 216 - 18 = 198$.

Therefore The correct answer is 198.

Alternate Method

Given: $a^4 + 1/a^4 = 34$

Formula Used: $(x + 1/x)^2 = x^2 + 1/x^2 + 2$ and $x^3 + 1/x^3 = (x + 1/x)^3 - 3(x + 1/x)$

Calculations:

$\Rightarrow a^4 + 1/a^4 + 2 = 34 + 2$

$\Rightarrow (a^2 + 1/a^2)^2 = 36$

$\Rightarrow a^2 + 1/a^2 = 6$

Now, cubing both sides to find $a^6 + 1/a^6$:

$\Rightarrow (a^2 + 1/a^2)^3 = 6^3$

$\Rightarrow (a^2)^3 + (1/a^2)^3 + 3 \times a^2 \times (1/a^2) \times (a^2 + 1/a^2) = 216$

$\Rightarrow a^6 + 1/a^6 + 3 \times 1 \times 6 = 216$

$\Rightarrow a^6 + 1/a^6 + 18 = 216$

$\Rightarrow a^6 + 1/a^6 = 216 - 18$

$\Rightarrow a^6 + 1/a^6 = 198$

Therefore The correct answer is 198.

Additional Information

Algebraic Identity for Squares

$(x + 1/x)^2 = x^2 + 1/x^2 + 2$. This is used to increase or decrease the power by a factor of 2.

Algebraic Identity for Cubes

$(x + 1/x)^3 = x^3 + 1/x^3 + 3(x + 1/x)$. This identity relates a value to its cube.

Successive Power Conversion

To reach power 6 from power 4, we first move to power 2 (using square root) and then to power 6 (using cubing).

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Q68. Answer: (c) Warren Anderson

The correct answer is Warren Anderson

Key Points

• Warren Anderson was the Chairman of Union Carbide India Limited (UCIL) during the Bhopal Gas Tragedy in Bhopal.

• The Bhopal Gas Tragedy occurred on the night of 2-3 December 1984 at the Union Carbide India Limited (UCIL) pesticide plant in Bhopal, Madhya Pradesh, India.

• It is considered one of the world's worst industrial disasters, resulting in thousands of deaths and long-term health consequences for many survivors.

• Warren Anderson was charged with culpable homicide and other criminal offenses in India but was never extradited to face trial.

Additional Information

• Union Carbide Corporation (UCC) was a major American chemical company that sold its stake in UCIL to the Indian government after the tragedy.

• The disaster led to widespread criticism and significant changes in industrial safety standards and regulations worldwide.

• In 2010, seven former employees of UCIL were convicted of causing death by negligence and sentenced to two years imprisonment, but they were released on bail shortly after.

Q69. Answer: (b) Madras

The correct answer is Madras.

Key Points

• The first Municipal Corporation in India was established in Madras (now Chennai) in the year 1688.

• This was during the British colonial period when Madras was one of the major Presidency Towns.

• The establishment of the Municipal Corporation marked the beginning of municipal governance in India, aiming to improve urban administration and public services.

• The formation of the Municipal Corporation was followed by the establishment of similar bodies in Bombay (now Mumbai) and Calcutta (now Kolkata) in the early 18th century.

Additional Information

• The concept of municipal governance in India was introduced by the British to administer and manage urban areas efficiently.

• Municipal Corporations in India are responsible for providing essential services such as water supply, sanitation, waste management, and street lighting to urban populations.

• The governance structure of Municipal Corporations typically includes elected representatives and administrative officials.

• The role and functions of Municipal Corporations have evolved over time to address the growing needs and challenges of urbanization in India.

Q70. Answer: (d) neutralisation reaction

The correct answer is neutralisation reaction

Key Points

• The reaction between HNO_3 (aq) and KOH (aq) to form KNO_3 (aq) and H_2O (l) is an example of a neutralisation reaction.

• In a neutralisation reaction, an acid reacts with a base to produce a salt and water.

• Here, nitric acid (HNO_3) neutralises potassium hydroxide (KOH) to form potassium nitrate (KNO_3) and water (H_2O).

• Neutralisation reactions are a type of double displacement reaction where the hydrogen ions from the acid react with the hydroxide ions from the base to form water.

Additional Information

• Redox reactions involve the transfer of electrons between two species. In this case, there is no transfer of electrons, so it is not a redox reaction.

• Decomposition reactions involve a single compound breaking down into two or more simpler substances. The given reaction does not fit this description.

• Combination reactions involve two or more substances combining to form a single product. The given reaction does not fit this description either.

• Neutralisation reactions are important in various industrial and laboratory processes, including titration methods used to determine the concentration of an unknown acid or base.

Q71. Answer: (a) Both (i) and (iii)

The correct answer is 1) Both (i) and (iii).

Key Points

• Statement (i): All the resistors are connected between two given points. This is true because, in a parallel circuit, all resistors

share the same two nodes or points.

• Statement (iii): The potential difference across each resistor is the same. This is also true because, in a parallel circuit, each resistor is directly connected across the voltage supply, ensuring the potential difference across each resistor is equal.

• Statement (ii): The equivalent resistance of the circuit is more than the individual resistance. This is false because, in a parallel combination, the equivalent resistance is always less than the smallest individual resistance.

Therefore, the correct statements are (i) and (iii).

Q72. Answer: (c) Both statements are correct. Statement II is correct explanation of Statement I.

The correct answer is 3 Only.

Key Points

• Law of Octaves: The Law of Octaves was proposed by John Newlands in 1864. It stated that every eighth element had properties similar to the first element when arranged by increasing atomic weight.

• Limitation: The Law of Octaves was applicable only up to calcium. Beyond calcium, the elements did not exhibit the same periodicity in properties.

• Statement I: The Law of Octaves applied only up to calcium. This statement is correct as Newlands' observation was valid only for elements up to calcium.

• Statement II: After calcium, every eighth element did not possess properties similar to that of the first. This statement is also correct and it explains why Newlands' Law of Octaves was not applicable beyond calcium.

• Explanation: Since both statements are correct and Statement II correctly explains Statement I, the correct answer is option 3.

Q73. Answer: (a) 10

Shortcut Trick

In any Arithmetic Progression (AP) with an odd number of terms, the Average is always equal to the middle term.

Here, the total numbers (n) = 5 (which is odd).

Middle term (3^(rd) number) = Average of the series.

Given Average = 10.

Therefore The number at the centre = 10.

Therefore The correct answer is 10.

Alternate Method

Given:

Average of 5 consecutive even numbers = 10

Formula Used:

Average = Sum of observations ÷ Number of observations

Let the 5 consecutive even numbers be x, x+2, x+4, x+6, and x+8.

=> Average = (x + x+2 + x+4 + x+6 + x+8) ÷ 5

=> 10 = (5x + 20) ÷ 5

=> 10 × 5 = 5x + 20

=> 50 = 5x + 20

=> 5x = 50 − 20

=> 5x = 30

=> x = 6

Now, the centre number is the 3^(rd) term: x + 4

=> Centre number = 6 + 4 = 10

Therefore The correct answer is 10.

Additional Information

Average of Consecutive Numbers

For any sequence in Arithmetic Progression, the Average = (First Term + Last Term) ÷ 2.

Sum of Even Numbers

The sum of the first n consecutive even numbers is given by the formula: n(n + 1).

Even Number Property

Consecutive even numbers always have a common difference of 2. If x is even, the next even number is x + 2.

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Q74. Answer: (d) Q

Given: Eight friends, P, Q, R, S, T, U, V and W, are sitting around a square table facing the centre of the table. Four of them are sitting at the corners while the other four are sitting at the exact centre of the sides of the table.

Based on the given conditions, we get the following arrangements-

1. T is sitting at one of the corners. U is third to the right of T. T is second to the right of V. From these, we get-

2. Only W is between T and R. Only U is between R and P. From these, we get-

3. S is to the immediate left of V. From this, we get the final arrangement as follows-

So, we see that Q sits to the immediate left of T.

So, the correct answer is “Option 4”.

Q75. Answer: (b) 1056 m2

Shortcut Trick

Check for divisibility by 11 as the formula involves π (22/7).

Sum of digits at odd places − Sum of digits at even places = 0 or multiple of 11.

Option (2): 1056 → (1+5) − (0+6) = 6 − 6 = 0. This is the only option divisible by 11.

Therefore The correct answer is 1056 m².

Alternate Method

Given:

Diameter (d) = 14 m

Height (h) = 24 m

Radius (r) = Diameter ÷ 2 = 14 ÷ 2 = 7 m

Formula Used:

Curved Surface Area (CSA) of a cylinder = 2πrh

Calculations:

=> CSA = 2 × (22/7) × 7 × 24

=> CSA = 2 × 22 × 24

=> CSA = 44 × 24

=> CSA = 1056 m²

Therefore The correct answer is 1056 m².

Additional Information

Total Surface Area of Cylinder

It is the sum of the curved surface area and the areas of the two circular bases: TSA = 2πr(h + r).

Volume of Cylinder

The amount of space occupied by the cylinder: Volume = πr²h.

Hollow Cylinder

For a cylinder with internal radius r and external radius R, the volume is π(R² − r²)h.

Q76. Answer: (c) 42

According to the given Venn Diagram-

The shaded area shows 'the total number of persons using both laptop and television'.

So, the total number of 'persons using both laptop and television' = 19 + 23 = 42.

Hence, the correct answer is "Option 3".

Q77. Answer: (d) 9

Shortcut Trick

Remaining distance = (1 − 1/4) × 8 = 6 km

Remaining time = (1 − 1/3) × 1 = 2/3 hr

Required Speed = 6 ÷ (2/3) = (6 × 3) ÷ 2 = 9 km/h

Therefore The correct answer is 9 km/h.

Alternate Method

Given:

Total Distance = 8 km | Total Time = 1 hr

Formula:

Speed = Distance ÷ Time

Step-by-step Calculations:

=> First part distance = 1/4 × 8 = 2 km

=> First part time = 1/3 × 1 = 1/3 hr

=> Remaining distance = 8 − 2 = 6 km

=> Remaining time = 1 − 1/3 = 2/3 hr

=> Required speed = 6 ÷ (2/3)

=> Required speed = 6 × (3/2) = 18 ÷ 2 = 9 km/h

Therefore The correct answer is 9 km/h.

Additional Information

Average Speed

It is the total distance covered divided by the total time taken. Average Speed = Total Distance ÷ Total Time.

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

If two bodies move in the same direction, relative speed = (u − v). If they move in opposite directions, relative speed = (u + v).

Q78. Answer: (c) Both the statements are correct.

The correct answer is 3 Only.

Key Points

• Carbon Bonding: Carbon has the unique ability to form bonds with other atoms of carbon, giving rise to large molecules. This property is crucial for the formation of a vast array of organic compounds.

• Catenation: This property of carbon is called catenation. Catenation is the ability of an element to form bonds with itself, leading to the formation of long chains or rings of atoms.

• Hence, the correct answer is option 3.

Q79. Answer: (d) P = IR2

The correct answer is $P = IR^2$.

Key Points

• Option 4 ($P = IR^2$) is incorrect because it does not correctly represent the relationship between power (P), current (I), and resistance (R).

• The correct formulas are:

• $P = I^2R$ - Power is equal to the square of the current multiplied by the resistance.

• $P = V^2/R$ - Power is equal to the square of the voltage divided by the resistance.

• $P = VI$ - Power is equal to the voltage multiplied by the current.

• In the incorrect formula $P = IR^2$, the exponent on resistance (R) should not be squared when calculating power.

Additional Information

• The power formulas are derived from Ohm's Law and the basic definition of electrical power.

• Ohm's Law: $V = IR$, which states that voltage (V) is the product of current (I) and resistance (R).

• By substituting Ohm's Law into the power formula $P = VI$, we get the other two correct formulas:

• Substitute $V = IR$ into $P = VI$ to get $P = I(IR) = I^2R$.

• Substitute $I = V/R$ into $P = VI$ to get $P = V(V/R) = V^2/R$.

Q80. Answer: (c) R/2

The correct answer is R/2

Key Points

• The distance between the pole and the focus of a spherical mirror is known as the focal length.

• For a spherical mirror, the focal length (f) is related to the radius of curvature (R) by the formula f=R2f=R2f=R2f=R2f=R2.

• Therefore, the correct distance between the pole and the focus of a spherical mirror is R2.

Additional Information

• A spherical mirror can be either concave or convex.

• In a concave mirror, the focus is located on the same side as the object, whereas, in a convex mirror, the focus is located on the opposite side.

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• The radius of curvature (R) of a spherical mirror is the distance from the mirror's surface to its center of curvature.

• Understanding the relationship between the focal length and the radius of curvature is crucial in various optical applications and calculations.

Q81. Answer: (b) Delhi

The correct answer is Delhi

Key Points

• National War Memorial is located in Delhi, India.

• It is a monument built to honor and remember the soldiers of the Indian Armed Forces who have made the supreme sacrifice in the line of duty post-independence.

• The memorial is spread over 40 acres and is situated near India Gate, another prominent war memorial in Delhi.

• It was inaugurated by Prime Minister Narendra Modi on 25th February 2019.

• The design of the National War Memorial includes four concentric circles: the "Amar Chakra" (Circle of Immortality), the "Veerta Chakra" (Circle of Bravery), the "Tyag Chakra" (Circle of Sacrifice), and the "Rakshak Chakra" (Circle of Protection).

Additional Information

• The National War Memorial also includes a central obelisk, an eternal flame, and six bronze murals depicting famous battles fought by the Indian Army, Navy, and Air Force.

• The memorial is open to the public, and it serves as a place for citizens to pay their respects to the fallen soldiers.

• Special ceremonies are held on national days like Republic Day and Independence Day to honor the sacrifices of the armed forces.

• The memorial also serves an educational purpose, providing visitors with information about the history and valor of the Indian Armed Forces.

Q82. Answer: (a) 896

The given series is - 7, 56, 28, 224, 112,?

The logic that is followed here is-

So, '896' is the missing answer in the given series.

Hence, the correct answer is "Option 1".

Q83. Answer: (a) -1

BODMAS Table:

Given equation: 6 ÷ 16 × 4 ÷ 8 - 8 + 2 × 7 = ?

Now, if '+' is interchanged with '×', and '÷' is interchanged with '-', then:

=> 6 - 16 + 4 - 8 ÷ 8 × 2 + 7 = ?

=> 6 - 16 + 4 - 1 × 2 + 7 = ?

=> 6 - 16 + 4 - 2 + 7 = ?

=> 17 - 18 = -1

Hence, the correct answer is "Option 1".

Q84. Answer: (a) 29

Given:

11.998 ÷ 2.008 × 3.991 + 14.9929 − 10.002 = ?

Concept Used:

To find the value of the expression, perform the operations in the correct order: division, multiplication, addition, and subtraction.

Calculation:

11.998 ÷ 2.008 × 3.991 + 14.9929 – 10.002 = ?

Closest approximate value :

11.998 = 12

3.991 = 4

14.9929 = 15

According to the BODMAS

=> 12 ÷ 2 × 4 + 15 - 10

=> (12/2 × 4) + 15 - 10

=> 24 + 15 - 10

=> 39 - 10

=> 29

Therefore The closest approximate value is 29.

Q85. Answer: (c) The sum of the measures of a pair of interior angles on the same side of the transversal is 180°

Shortcut Trick

When two parallel lines are intersected by a transversal, the following properties hold true:

1. Corresponding angles are equal.

2. Alternate interior angles are equal.

3. Interior angles on the same side of the transversal are supplementary (sum = 180°).

4. Vertically opposite angles are equal.

Therefore The correct answer is The sum of the measures of a pair of interior angles on the same side of the transversal is 180°.

Alternate Method

Given: Two parallel lines L1 and L2 and a transversal T.

Formula Used: Consecutive Interior Angles Theorem states that if two parallel lines are cut by a transversal, then the pairs of consecutive interior angles are supplementary.

=> Let the interior angles on the same side be angle 4 and angle 6.

=> Since L1 || L2, by the Consecutive Interior Angles Theorem:

=> angle 4 + angle 6 = 180°

=> This property is always true for any pair of parallel lines and a transversal.

Therefore The correct answer is The sum of the measures of a pair of interior angles on the same side of the transversal is 180°.

Additional Information

Corresponding Angles

Angles in the same relative position at each intersection. When lines are parallel, these angles are equal.

Q86. Answer: (a) East

Given: Sheela was standing facing the morning sun.

She started walking towards the morning sun and turned to her right side,

where she walked for few minutes,

and then turned left and walked for 3 m and stopped.

Also, we know that the morning Sun rises in the east.

Based on the given statements, the final direction diagram is as follows-

So, we see that Sheela is facing the East right now.

Hence, the correct answer is "Option 1".

Q87. Answer: (a) Only conclusion I follows

Given statements:

1. Some hills are plateaus.

2. Some plateaus are deserts.

3. All deserts are plains.

The least possible Venn Diagram from the given statements is as follows-

Conclusions:

I. Some plains are plateaus. True. (Because, some plateaus are deserts and all deserts are plains, so, some plains are also plateaus.)

II. Some plains are hills. False. (Because, this is a possibility but not a definite conclusion. The relation between hills and plains are not directly given.)

III. All deserts are hills. False. (Because, there is no direct relation given between deserts and hills and so we cannot take this as a definite conclusion.)

So, only Conclusion I follows.

Hence, the correct answer is "Option 1".

Q88. Answer: (a) 3

The given sequence is- (Left) 815 458 512 630 235 (Right)

From the given sequence, the second largest number is → 630.

The third digit of the second largest number is → 0.

From the given sequence, the smallest number is → 235.

The second digit of the smallest number is → 3.

Now, if we add these respective digits we get => 0 + 3 = 3.

Hence, the correct answer is "Option 1".

Q89. Answer: (c) NUT 45

The English Alphabetical series is given as-

The logic followed here is-

For, KIT 20 is related to PRG 50-

For, ENT 16 is related to VMG 40-

For, MFG 18 is related to?

So, we see that NUT 45 is related to MFG 18 in the same way.

Hence, the correct answer is "Option 3".

Q90. Answer: (a) 4^(th)

The correct answer is 4th

Key Points

• India ranks 4th globally in wind power as of March 2021.

• The country has made significant strides in renewable energy, particularly in wind power generation.

• Wind energy contributes a substantial portion to India's renewable energy capacity.

• The ranking reflects India's commitment to increasing its renewable energy footprint to combat climate change.

Additional Information

• India's wind energy capacity is primarily concentrated in states like Tamil Nadu, Gujarat, Maharashtra, Karnataka, and Rajasthan.

• The Indian government has set ambitious targets to further increase the capacity of wind power installations.

• India's renewable energy sector is one of the fastest-growing markets in the world, attracting significant domestic and international investments.

• Government policies and incentives have played a crucial role in promoting the development of wind energy in the country.

Q91. Answer: (b) 20000

Given:

Number of computers sold in 2017 = 60,000

Number of computers sold in 2021 = 40,000

Concept:

Calculate the difference between the number of computers sold in 2017 and 2021.

Calculation:

Difference = Number of computers sold in 2017 - Number of computers sold in 2021

=> Difference = 60,000 - 40,000

=> Difference = 20,000

Therefore The difference between the number of computers sold in 2017 and 2021 is 20,000.

Q92. Answer: (a) Only conclusion II follows.

Given Statements:

1. No paint is fresco.

2. No fresco is lacquer.

3. Some paints are lacquers.

The least possible Venn Diagram for the given statements is as follows-

Conclusions:

Conclusion I: No lacquer is paint.

From statement 3 ("Some paints are lacquers"), we know that there is some overlap between paints and lacquers. So, it is incorrect to say that no lacquer is paint.

Conclusion I is false.

Conclusion II: No lacquer is fresco.

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From statement 2 ("No fresco is lacquer"), we know that lacquers and frescos have no overlap. Therefore, this conclusion is true.

Conclusion II is true.

Conclusion III: Some frescos are paints.

From statement 1 ("No paint is fresco"), we know that there is no overlap between paints and frescos. So, this conclusion is false.

Conclusion III is false.

Conclusion IV: All lacquers are paints.

Statement 3 tells us that "some paints are lacquers," but it doesn't mean that all lacquers are paints. So, this conclusion is false.

Conclusion IV is false.

So, only Conclusion II follows.

Hence, the correct answer is "Option 1".

Q93. Answer: (c) A > F

Given Statement: R > G > A > B = D = F > S

Now,

Conclusions:

1. S > D → False (D = F > S. This clearly implies that S is smaller than D.)

2. F > R → False (R > G > A > B = D = F. This clearly implies that R is greater than F.)

3. A > F → True (A > B = D = F. From this, we see that A is definitely greater than F.)

4. A > R → False (R > G > A. This clearly states the opposite that is R is greater than A.)

Here, Conclusions 3 follows.

Hence, the correct answer is "Option 3".

Q94. Answer: (a) Rig Veda

The correct answer is Rig Veda

Key Points

• The Aitareya Upanishad is associated with the Rig Veda.

• It is found in the fourth, fifth, and sixth chapters of the second book of the Aitareya Aranyaka.

• The Aitareya Upanishad is considered one of the oldest Upanishads.

• It primarily deals with the philosophical concepts of the self and the universe.

• The teachings in this Upanishad are delivered through various narratives and metaphysical discussions.

Additional Information

• The Upanishads are a collection of ancient Sanskrit texts that contain some of the central philosophical concepts and ideas of Hinduism.

• They are considered the end part of the Vedas and are sometimes referred to as Vedanta, meaning the conclusion of the Vedas.

• There are more than 200 known Upanishads, but the principal Upanishads, including the Aitareya, are the most important and influential.

• The Rig Veda, to which the Aitareya Upanishad belongs, is one of the oldest known texts in human history, dating back to the early Vedic period.

Q95. Answer: (b) Volcanic eruptions

The correct answer is Volcanic eruptions.

Key Points

• Natural sources of air pollution include volcanic eruptions, forest fires, and dust storms.

• Volcanic eruptions release ash, sulfur dioxide, and other gases into the atmosphere.

• These emissions can cause respiratory problems, acid rain, and climate change.

• Forest fires release smoke, particulate matter, and other pollutants into the atmosphere. These emissions can cause respiratory problems, visibility problems, and climate change.

• Dust storms release dust and other particulate matter into the atmosphere. These emissions can cause respiratory problems and visibility problems.

Additional Information

• Burning firewood: Burning firewood releases particulate matter, carbon monoxide, and other pollutants into the atmosphere. These emissions can cause respiratory problems and climate change.

• Automobile exhausts: Automobile exhausts release carbon monoxide, nitrogen oxides, particulate matter, and other pollutants into the atmosphere. These emissions can cause respiratory problems, smog, and climate change.

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• Power plants: Power plants release sulfur dioxide, nitrogen oxides, particulate matter, and other pollutants into the atmosphere. These emissions can cause respiratory problems, acid rain, and climate change.

Q96. Answer: (a) 12/7

Shortcut Trick

Divide the numerator and denominator of the expression by cos θ.

Expression = (4 + 2 tan θ) ÷ (2 tan θ − 1)

Substitute tan θ = 4: (4 + 2 × 4) ÷ (2 × 4 − 1) = 12 ÷ 7

Therefore The correct answer is 12/7.

Alternate Method

Given: tan θ = 4

Formula Used: tan θ = Perpendicular / Base | sin θ = P/H | cos θ = B/H

=> Let Perpendicular = 4 and Base = 1

=> Hypotenuse = $\sqrt{(4^2 + 1^2)} = \sqrt{17}$

=> sin θ = $4/\sqrt{17}$ and cos θ = $1/\sqrt{17}$

=> Expression = $[4(1/\sqrt{17}) + 2(4/\sqrt{17})] \div [2(4/\sqrt{17}) - 1/\sqrt{17}]$

=> Expression = $[(4 + 8)/\sqrt{17}] \div [(8 - 1)/\sqrt{17}]$

=> Expression = 12/7

Therefore The correct answer is 12/7.

Additional Information

Trigonometric Ratios

Fundamental ratios: tan θ = sin θ / cos θ and cot θ = cos θ / sin θ.

Pythagorean Identities

$\sin^2\theta + \cos^2\theta = 1$, $1 + \tan^2\theta = \sec^2\theta$, and $1 + \cot^2\theta = \text{cosec}^2\theta$.

Q97. Answer: (d) Monday

Given: 7 friends decided not to eat sweets on one day of their choice in the same week starting on Sunday and ending on Saturday. No one selected the same day of the week.

Based on the given conditions, we get the following tables-

1. P selected Saturday. Q selected Wednesday. R said that he will select the day immediately before P. From these, we get-

DAY	PERSON
SUNDAY	
MONDAY	
TUESDAY	
WEDNESDAY	Q
THURSDAY	
FRIDAY	R
SATURDAY	P

2. S decided to select any available day between P's and Q's selection. T selected Sunday. From these, we get-

DAY	PERSON
SUNDAY	T
MONDAY	
TUESDAY	
WEDNESDAY	Q
THURSDAY	S
FRIDAY	R
SATURDAY	P

3. U said that he will select the day immediately before Q. From this, we get the final scheduling table as follows-

DAY	PERSON
SUNDAY	T
MONDAY	V
TUESDAY	U
WEDNESDAY	Q
THURSDAY	S
FRIDAY	R
SATURDAY	P

So, the only available day for V to select is Monday.

Hence, the correct answer is "Option 4".

Q98. Answer: (a) 32

Shortcut Trick

Assume the Mean is 26. Calculate the Net Deviation of given numbers from 26.

Deviations: (22−26) = −4, (25−26) = −1, (27−26) = +1, (24−26) = −2

Sum of Deviations = −4 − 1 + 1 − 2 = −6.

Since the Total Deviation must be zero, the deviation for x must be +6.

Therefore x = 26 + 6 = 32.

Therefore The correct answer is 32.

Alternate Method

Given: Mean of 22, 25, 27, 24, and x is 26.

Formula Used: Mean = (Sum of all observations) ÷ (Total number of observations)

=> Total Number of observations (n) = 5

=> Sum of observations = 22 + 25 + 27 + 24 + x

=> Mean = (98 + x) ÷ 5

=> 26 = (98 + x) ÷ 5

=> 26 × 5 = 98 + x

=> 130 = 98 + x

=> x = 130 − 98

=> x = 32

Therefore The correct answer is 32.

Additional Information

Properties of Arithmetic Mean

If every observation in a data set is increased or decreased by a constant k, the Mean also increases or decreases by k.

Sum of Deviations

The sum of the deviations of a set of values from their Arithmetic Mean is always zero (Σ(x_i − Mean) = 0).

Missing Value Calculation

To find a missing value when the mean is given, use the relationship: Missing Value = (Mean × Total Count) − (Sum of known values).

Q99. Answer: (a) Rs. 30,000

Shortcut Trick

Profit ratio of P : Q : R = (25 × 6) : (44 × 5) : (50 × 3).

Simplifying the ratios: 150 : 220 : 150 = 15 : 22 : 15.

Total ratio parts = 15 + 22 + 15 = 52 units.

Given 52 units = Rs. 1,04,000 => 1 unit = Rs. 2,000.

P share = 15 units × 2,000 = Rs. 30,000.

Therefore The correct answer is Rs. 30,000.

Alternate Method

Given: Investment of P = Rs. 25,000 (6 months), Q = Rs. 44,000 (5 months), R = Rs. 50,000 (3 months). Total Profit = Rs. 1,04,000.

Formula: Profit Share = Investment × Time Period

=> Ratio of Profit = (25000 × 6) : (44000 × 5) : (50000 × 3)

=> Ratio = 1,50,000 : 2,20,000 : 1,50,000

=> Ratio = 15 : 22 : 15

=> P share = [15 ÷ (15 + 22 + 15)] × 1,04,000

=> P share = (15 ÷ 52) × 1,04,000

=> P share = 15 × 2,000 = Rs. 30,000

Therefore The correct answer is Rs. 30,000.

Additional Information

Partnership Concept

In a partnership, the profit is distributed in the ratio of the product of investment and time. If the time period is the same for all, profit is divided simply in the ratio of investments.

Ratio and Proportion

To find an individual share: Individual Share = (Individual Ratio ÷ Sum of Ratios) × Total Amount.

Q100. Answer: (d) 118, 92

The correct answer is 118, 92

Key Points

• 118 elements are currently known.

• Out of these, 92 elements are naturally occurring.

• The remaining elements are synthetic and have been created in laboratories.

• These synthetic elements are typically produced through nuclear reactions or particle accelerators.

• The periodic table is continuously updated as new elements are discovered and confirmed by the scientific community.

Additional Information

• The discovery of elements is a significant scientific achievement and often involves international collaboration.

• Elements are named by their discoverers and approved by the International Union of Pure and Applied Chemistry (IUPAC).

• The periodic table organizes elements by increasing atomic number and groups elements with similar chemical properties together.

• Understanding the properties and behavior of elements is crucial for advancements in chemistry, physics, and various applied sciences.

• The periodic table is a fundamental tool in education and research, providing a comprehensive overview of the known elements and their relationships.

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