RRB Group D Previous Year Paper (Held on: 25 Aug 2022 Shift 1)

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

Take this paper as a timed mock test

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

yourmocktest.com/pyq/rrb-group-d/rrb-group-d-previous-year-paper-held-on-25-aug-2022-shift-1

Scan the QR code or click the link to open it.

YourMockTest.com — Free Study Material

CBT

Q1. Six poles, A, B, C, D, E and F, are located in the same colony. B is 20 m to the west of C. F is 60 m to the south of E. C is 30 m to the north of E. A is 60 m to the west of B. D is 30 m to the south of B. In which direction is A with reference to C?

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

Q2. Which of the following is/are weak acid(s)?

HCl, CH_3COOH, H_2SO_4, HNO_3, H_2CO_3, H_2SO_3

(a) CH_3COOH, H_2CO_3
(b) HCl, CH_3COOH, H_2SO_4
(c) CH_3COOH, H_2SO_4, HNO_3, H_2CO_3
(d) H_2SO_4, HNO_3, H_2CO_3

Q3. If the time in the mirror image of a 12-hour clock is 3:55, what is the actual time?

(a) 7 : 25
(b) 8 : 25
(c) 7 : 05
(d) 8 : 05

Q4. We should refrain from using plastics because _____.

(a) enzymes are unable to break down plastics
(b) plastics are water soluble
(c) plastics are not long-lasting
(d) plastics are easily degraded by insects

Q5. In January 2022, who released 'Banking on electric vehicles in India' report in collaboration with Rocky Mountain Institute and RMI India?

(a) Ministry of Road Transport and Highways
(b) Ministry of Finance
(c) NITI Aayog
(d) DRDO

Q6. Three resistors of 9 Ω each are connected in parallel. Their equivalent resistance is:

(a) 3 Ω
(b) 18 Ω
(c) 9 Ω
(d) 27 Ω

Q7. What is the least 5-digit number, which when divided by 15, 24, 35 and 42, the remainder in each case is 13?

(a) 10067
(b) 10093
(c) 10106
(d) 10073

Q8. The Digambara sect belongs to which of the following religions?

(a) Sikhism
(b) Buddhism
(c) Islam
(d) Jainism

Q9. Who among the following became the first para-athlete of India to receive the Padma Bhushan in the year 2022?

(a) Pramod Bhagat
(b) Devendra Jhajharia
(c) Harvinder Singh
(d) Manoj Sarkar

Q10. Which of the following is NOT TRUE about vegetative propagation in plants?

(a) Plants bear flowers and fruits earlier than those produced from seeds.
(b) Plants produced are genetically different from the parent plant.
(c) Plants are grown from root, stem and leaves.
(d) Plants that have lost the capacity to produce seeds can be grown.

Q11. Select the option that represents the letters that, when placed from left to right in the same sequence in the blanks below, will complete the letter series.

F_LN_SV_ZC_

(a) IQXF
(b) IPYF
(c) IPXF
(d) IPXE

Q12. The doldrums are an area of _____ pressure around the equator, where prevailing winds are calm.

(a) low
(b) Constant
(c) fluctuating
(d) high

Q13. Which of the following is the first indigenous RT-PCR kit developed by 'CSIR - Central Drug Research Institute' for testing the omicron variant?

(a) Cowin
(b) Shanti
(c) VinCom
(d) INDICoV-Om

Q14. 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	**8**	**3**	**!**	**&**	**4**	**#**	**6**	**@**	**$**	**7**
Code	Q	W	E	R	T	Y	U	L	P	K

Conditions:

(i) If the second element is a symbol and the last is also a symbol, then these two symbols do not require coding.

(ii) If the first element is an even number and the last is a symbol, the codes of the first and last elements are to be interchanged.

YourMockTest.com — Free Study Material

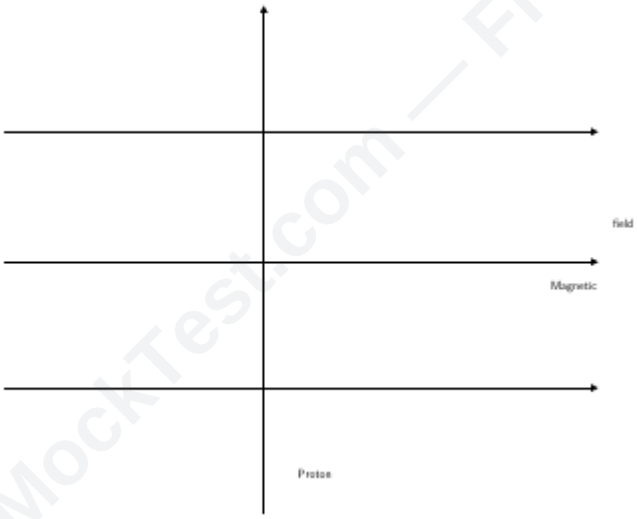
(iii) If the question has more than two odd numbers, then all even numbers do not require coding.

(iv) if none of the conditions apply, use the codes directly

Question: 7 # $ 4 6 @ 4 ! 8 3

(a) KYPTULTEQW
(b) KYP46L4E8W
(c) WYP4UL4EQK
(d) KYPYULTEQW

Q15. A proton is projected into a magnetic field as shown in the figure, the direction of force experienced by it is:



(a) in the direction of motion of proton
(b) into the plane of paper
(c) against the direction of motion of proton
(d) outside the plane of paper

Q16. The following table shows the number of two-wheelers sold by five automobile companies named K, L, M, N and O in three different years from 2019, 2020, 2021.

Companies	Year		
2019	2020	2021	
K	210	240	320
L	655	345	225
M	235	340	765
N	265	325	650
O	650	345	555

What is the percentage share of sale of company M done in the year 2019 in the total sale of Company M in all three years taken together?

(a) 16.40%
(b) 19.80%
(c) 15.3%
(d) 17.5%

Q17. Which of the following options is the closest approximate value which will come in place of question mark(?) in the following equation?

12.998 + 20.009 ÷ 4.998 - 2.999 × 2.998 = ?

(a) 8
(b) 19
(c) 12

(d) 16

Q18. Select the element with the highest valency from among the following.

(a) Ca
(b) N
(c) Al
(d) Li

Q19. J, K, L, M, N, O and P are seven comedians sitting in a straight row facing north. O and L are immediate neighbours. Only two people sit to the left of K. L is to the immediate right of N. P is an immediate neighbour of both K and N. If J is at the extreme left end of the row, who sits at the extreme right end?

(a) N
(b) M
(c) O
(d) P

Q20. A statement is given followed by two possible conclusions I and II. Read all the information given in the statement carefully and decide which of the given conclusions can be concluded from the given information.

Statement:

An online teaching platform has reported to earn almost double through subscriptions ever since they started LIVE problem-solving classes on the platform.

Conclusions:

I. No other online teaching platform offers LIVE problem-solving classes.

II. Students who opt for LIVE problem-solving sessions on the said platform have to pay double the fees as compared to those who opt for regular classes.

(a) Neither I nor II can be concluded
(b) Only I can be concluded
(c) Only II can be concluded
(d) Both I and II can be concluded

Q21. Find the roots of $\sqrt{3}m^2 + 10m + 7\sqrt{3} = 0$.

(a) $-7/\sqrt{3}$ and $-\sqrt{3}$
(b) $-7/\sqrt{3}$ and $\sqrt{3}$
(c) $7/\sqrt{3}$ and $-\sqrt{3}$
(d) $-7/\sqrt{3}$ and $-2\sqrt{3}$

Q22. In July 2022, the Lok Sabha passed the Family Courts (Amendment) Bill, 2022, to overcome the issue of lack of jurisdiction of Family Courts in the States of Himachal Pradesh and _____.

(a) Meghalaya
(b) Mizoram
(c) Nagaland
(d) Sikkim

Q23. Which of the following is NOT a change that marks the onset of puberty

(a) change in voice
(b) Growth of nails
(c) change in body shape
(d) Sudden increase in height

Q24. On what date were the Consumer Protection (Direct Selling) Rules, 2021 introduced by the Government of India?

(a) 28 December 2021
(b) 25 December 2021
(c) 26 December 2021
(d) 24 December 2021

Q25. The frequency distribution here gives the monthly consumption of electricity of 60 consumers of a locality. What is the median of the data?

Monthly Consumption (in Units)	Number of Consumers
50-60	6
60-70	8
70-80	15
80-90	20
90-100	11

(a) 83.1
(b) 82.4
(c) 80.5
(d) 81.2

Q26. In which one of the following state will you experience 'Kaal Baisakhi'?

(a) Gujarat
(b) Punjab
(c) West Bengal
(d) Tamil Nadu

Q27. _____ is an Indian regional political party in the state of Tamil Nadu and the union territory of Puducherry, established in 1972.

(a) INLD
(b) AIADMK
(c) DMDK
(d) BJD

Q28. Three statements are given followed by three conclusions I, II and III. You have to consider these statements to be true, even if they seem at variance from commonly known facts. Choose which of the given conclusions logically follow/s from the given statements.

Statements:

1. All sugars are jaggery.
2. No jaggery is sweetener.
3. All sweeteners are fruits.

Conclusions:

I. No sugar is sweetener.
II. Some jaggeries are sweeteners.
III. Some jaggeries are sugars.

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

Q29. A certain number of people are sitting in a row, facing the north. Rahul is at the 8^(th) place from the left end of the row. Only 11 persons are sitting between Rahul and Samar. Samar is at some place towards the right of Rahul. Mohit is to the immediate left of Zeeshan, who is sitting at the extreme right end. Samar is at the 9^(th) place from the extreme right end. If no other person is sitting in the row, what is the total number of persons seated?

(a) 26
(b) 27
(c) 29
(d) 28

YourMockTest.com — Free Study Material

Q30. If p, q, r and s, the measures of the four angles of a quadrilateral, are in the ratio 3 : 5 : 4 : 6, then the value of 3p + 2r is:

(a) 330º
(b) 310º
(c) 340º
(d) 360º

Q31. The sum of two positive integers is 55. If their HCF and LCM are 5 and 120, respectively, then the sum of their reciprocals is _____.

(a) 12/13
(b) 11/120
(c) 14/6
(d) 120/13

Q32. 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.

6 : 150 : : 4 : 36 : : 5 : ?

(a) 84
(b) 78
(c) 82
(d) 80

Q33. Which of the following is an example of combination reaction?

(a) $ZnCO_3 \rightarrow ZnO + CO_2$
(b) $N_2 + H_2 \rightarrow 2NH_3$
(c) $MgCl_2 + Na \rightarrow 2NaCl + Mg$
(d) $2NaCl \rightarrow 2Na + Cl_2$

Q34. This question is based on the following three-letter words:

(Left) NAT PAL COT TAN (Right)

If in each of the words, each letter is changed to the next letter in the English alphabetical order, how many words thus formed will have no vowel?

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

Q35. Which Amendment in the Indian Constitution substituted the words 'sovereign democratic republic' with the words 'sovereign socialist secular democratic republic' and 'unity of the Nation' with the words 'unity and integrity of the Nation"?

(a) 53rd
(b) 42nd
(c) 31st
(d) 64th

Q36. Select the set in which the numbers are related in the same way as are the numbers of the following sets.

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

(12, 61, 7)

(15, 51, 6)

(a) (20, 54, 5)
(b) (14, 78, 8)
(c) (12, 46, 4)

YourMockTest.com — Free Study Material

(d) (16, 70, 9)

Q37. A shopkeeper allows successive discount of 20% and 15% on an item of marked price Rs. 2,000. At what price did he sell the item?

(a) Rs. 1,360
(b) Rs. 1,300
(c) Rs. 1,240
(d) Rs. 1,200

Q38. A concave mirror forms a real, inverted and diminished image of an object. Where is the object placed?

(a) Between pole and focus
(b) Between focus and centre of curvature
(c) Beyond centre of curvature
(d) At focus

Q39. One year ago, Krishna was four times as old as his daughter Kavitha. Six years hence, Krishna's age will be 12 years more than his daughter's age. Find the ratio of the present ages of Krishna and his daughter.

(a) 12 : 5
(b) 11 : 3
(c) 9 : 2
(d) 17 : 5

Q40. Select the triad which follows the same pattern as that followed by the two triads given below, Both triads follow the same pattern.

PY - RW - TU

EN - GL - IJ

(a) MT - OR - QP
(b) DE - EF - FG
(c) XC - YB - ZA
(d) UV - TU - ST

Q41. A cube made of edge 18 m is completely filled with milk. The milk is transferred into a cuboid of length 27 m and height 7 m. The width of the cuboid is

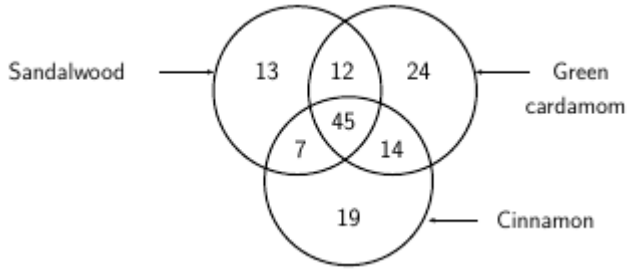
(a) 30.8 m
(b) 72.5 m
(c) 54.6 m
(d) 12.7 m

Q42. Based on the given statement, four conclusions are drawn. Find out which conclusion is true based on the statement.

Statement: $J > H = N \geq B \leq C < E$

(a) $H < B$
(b) $N > C$
(c) $N > E$
(d) $B < J$

Q43. Study the given diagram carefully and answer the following question. The numbers in different sections indicate the number of recipes in a cook book using the given ingredients.



How many recipes use exactly any two of the given ingredients?

(a) 7
(b) 33
(c) 14
(d) 12

Q44. The _____ city has been named as the host of the International Olympic Committee session in 2023?

(a) New Delhi
(b) Bengaluru
(c) Mumbai
(d) Pune

Q45. Which of the following is a use of plaster of Paris?

(i) Manufacture of glass, soap and paper
(ii) As a cleaning agent for domestic purposes
(iii) Making toys, materials for decoration and for making surfaces smooth
(iv) For baking

(a) only i
(b) only ii
(c) only iii
(d) only iv

Q46. Which cell organelle detoxifies toxins and drugs?

(a) Endoplasmic reticulum
(b) Mitochondria
(c) Golgi bodies
(d) Ribosomes

Q47. Five-fourths of a number is greater than three-fourths of the number by 6. Find the number.

(a) 14
(b) 12
(c) 8
(d) 10

Q48. Each of A, B, C, D, E, F and G has an exam on a different day of a week starting from Monday and ending on Sunday of the same week, C has the exam on Tuesday. Only one person has the exam between A and G, A has exam before G. D has the exam on the day immediately before A, but not on Thursday. F's exam is on one of the days before E but after B. E has exam on Sunday. Who among the following has the exam on Monday?

(a) F
(b) B
(c) D
(d) E

Q49. 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	**6**	**5**	**4**	**3**	**%**	**#**	**8**
Codes	R	G	U	W	K	P	B

Conditions:

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

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

YourMockTest.com — Free Study Material

(iii) If the third element is a number and the fourth element is a symbol, both these elements (the third and the fourth elements) are to be coded as Y.

Question: 6 # % 3 8 5 # 4

(a) R B Y Y P G P U
(b) R P K W B G P U
(c) R B K W P G P U
(d) B U K W P G P R

Q50. Which of the following formulae does NOT represent the heat produced in a conductor due to flow of electric current?

(a) $H = (V^2)/R\ t$
(b) H = I2Rt
(c) H = VIt
(d) H = IR2t

Q51. The magnetic field strength inside a current carrying solenoid is:

(a) uniform and non-zero
(b) more at ends and less at centre
(c) less at ends and more at centre
(d) zero

Q52. Seven boxes, A, B, C, D, E, F and G, are kept one over the other but not necessarily in the same order. Exactly two boxes are kept between C and D with C placed above D. F is immediately below A. G is immediately above B. B is the third box from the top. Exactly two boxes are kept between D and E with D placed above E. Only one box is kept between E and A. Which box is kept just above E?

(a) C
(b) G
(c) F
(d) D

Q53. Carbonisation is a term used to describe the process of transforming dead plants into _____ over a long period of time.

(a) fossil
(b) diesel
(c) coal
(d) petrol

Q54. In which of the following states did NESTLE India Ltd. set up its first factory in 1961?

(a) Kerala
(b) Madhya Pradesh
(c) Punjab
(d) Haryana

Q55. Pipe A is 3 times faster than pipe B. Both pipes together fill a tank in 36 min. How much time will pipe A alone take to fill the tank?

(a) 156 min
(b) 48 min
(c) 100 min
(d) 80 min

Q56. Ten years ago, a son was 1/8th of his father's age. Now, he is 9/37th of his father's present age. Find the present age of the father.

(a) 57 years
(b) 87 years
(c) 74 years
(d) 67 years

YourMockTest.com — Free Study Material

Q57. Which of the following stores starch, proteins and oil granules in a plant cell?

(a) Leucoplast
(b) Chloroplast
(c) Protoplast
(d) Chromoplast

Q58. The value of 1 + 3 + 5 + 7 + ... + 21 =

(a) 211
(b) 144
(c) 121
(d) 108

Q59. _____ reduce (s) the size of large fat globules, allowing enzymes to work more effectively.

(a) Hydrochloric acid
(b) Pancreatic juice
(c) Bile salts
(d) Succus entericus

Q60. In plants, the cells of meristematic tissue undergo a process wherein they lose their ability to divide, take up a permanent shape and size and specialise to perform a specific function. What is this process known as?

(a) Regeneration
(b) Development
(c) Differentiation
(d) Proliferation

Q61. The table given below shows the number of students (girls and boys), in thousand numbers, who got admissions on merit basis in a certain well-recognised university 'XYZ' from four different places - J, K, L and M - over the years. Study the table and answer the question.

Place/Year	**J**	**K**	**L**	**M**				
Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	
2016	12.5	10	14	7.5	7	10	6	9
2017	10	9	13	7	8.5	11	8	7
2018	11	9	10	8.5	8	6	5	4
2019	9.5	7	11	9	9	8	10	11
2020	10.5	6	12	10.5	10.5	9.5	14	12
2021	12	8	10	9.5	11	10	15	18

The total number of boys who got admission from places J and M in 2017 was exactly equal to the total number of girls who got admission from place M in which of the following years?

(a) 2017
(b) 2021
(c) 2020
(d) 2019

Q62. If A is an acute angle of triangle ABC, the (cos A−sin A+1)/(cos A+sin A−1) is equal to:

(a) cos A + cosec A
(b) cot A + cosec A
(c) tan A + cos A
(d) cot A + sec A

YourMockTest.com — Free Study Material

Q63. Which festival revives and preserves the rich culture of Nagaland, and showcases its extraordinary traditions?

(a) Thaipusam Festival
(b) Thrissur Pooram Festival
(c) Losar Festival
(d) Hornbill Festival

Q64. Which of the following numbers will replace the question mark (?) in the given series?

43, 80, 117, 154, ?

(a) 193
(b) 190
(c) 191
(d) 196

Q65. Which of the following is an example of 'Electrolytic Decomposition Reaction'?

(a) $ZnCO3 \rightarrow ZnO + CO2$
(b) $2KClO3 \rightarrow 2KCl + 3O2$
(c) $2H2O \rightarrow 2H2 + O2$
(d) $2AgBr \rightarrow 2Ag + Br2$

Q66. If 1 is added to each odd digit and 1 is subtracted from each even digit in the number given below, what will be the difference in the digits that are third from the left and third from the right in the new number thus formed?

(Left) 86547231 (Right)

(a) 3
(b) 5
(c) 4
(d) 6

Q67. The portion of agricultural product that is sold by farmers in market is popularly known as _____.

(a) marketed surplus
(b) minimum marketed product
(c) marketable agriculture product
(d) permitted agriculture product

Q68. A pair of parallel lines is intersected by a transversal such that angle 1 and angle 2 form a pair of interior angles on the same side of the transversal. If m angle 1 = 35º, what is the measure of angle 2?

(a) 55º
(b) 65º
(c) 145º
(d) 35º

Q69. If the mean of a data is 65 and its mode is 23 then the median using empirical formula is:

(a) 52
(b) 53
(c) 51
(d) 54

Q70. Simplify: $a^2 + 9b^2 + c^2 - 6ab + 6bc - 2ac =$

(a) $(a - 3b - 2c)^2$
(b) $(a - 3b - c)^2$
(c) $(a + 3b + c)^2$
(d) $(a - 3b + c)^2$

YourMockTest.com — Free Study Material

Q71. The refractive indices of turpentine oil and glass are 1.47 and 1.52, respectively. A ray of light passes from turpentine oil to glass. The refractive index of glass with respect to turpentine oil is _____ and the ray bends _____ the normal in glass.

(a) 1.03, towards
(b) 0.97, away from
(c) 1.03, away from
(d) 0.97, towards

Q72. An object is placed on the principal axis of a concave lens of focal length 20 cm, at a distance of 10 cm. The magnification produced by the lens is _____ and the image is _____.

(a) more than 1, inverted
(b) less than 1, erect
(c) less than 1, inverted
(d) more than 1, erect

Q73. _____ make an isomeric pair.

(a) Butane and 2-methyl propane
(b) Propane and butane
(c) Butane and 2-ethyl butane
(d) Propane and 2-methyl propane

Q74. What is the full form of NABARD?

(a) National Bank for Agriculture and Rural Development
(b) National Bank for Agriculture and Regional Development
(c) National Agriculture Bank Authority for Rural Development
(d) National Bank for Rural Development

Q75. The value of 2/3 + 1/(1 + 4/5) - 5/6 is:

(a) 11/18
(b) 7/18
(c) 5/18
(d) 13/18

Q76. Three statements are given, followed by two conclusions numbered I and II. 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:

All wires are switches.

No switch is a pipe.

All bulbs are pipes.

Conclusions:

I. No wire is a pipe.

II. No bulb is a switch.

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

Q77. Which Article of the Indian Constitution envisages the Election Commission of India (ECI), a constitutional body established by the Constitution of India, to conduct and regulate elections in the country?

(a) Article 324
(b) Article 148
(c) Article 350 B
(d) Article 76

YourMockTest.com — Free Study Material

Q78. Which of the following groups represents zero valency?

(a) 18
(b) 14
(c) 12
(d) 16

Q79. Five girls, Beena, Elisa, Hema, Ketaki and Zoya, are sitting around a circular table facing the centre of the table. Beena is sitting to the immediate left of Ketaki. Hema is sitting to the immediate right of Zoya. Only Ketaki is sitting between Beena and Elisa. Who is sitting to the immediate right of Elisa?

(a) Hema
(b) Beena
(c) Zoya
(d) Ketaki

Q80. India and which country among the following agreed to line up a joint task force on a "proposal to construct a hydropower project" from investments of both countries in February 2022?

(a) Myanmar
(b) Bhutan
(c) Nepal
(d) Bangladesh

Q81. Which type of forest is most commonly home to the Royal Bengal tiger?

(a) Mangrove Forests
(b) Thorn Forests
(c) Deciduous Forests
(d) Mountain Forests

Q82. Find the surface area of a sphere whose radius is 7 cm. [Use $\pi = (22)/(7)$]

(a) 616 cm2
(b) 661 cm2
(c) 166 cm2
(d) 666 cm2

Q83. As long as MP (marginal product) remains higher than the average product (AP), the average product _____.

(a) falls with diminishing rate
(b) remains constant
(c) continues to fall
(d) continues to rise

Q84. If $x : y = 7 : 3$, then $(x^2 + y^2) : (x^2 - y^2) = ?$

(a) 29 : 20
(b) 5 : 2
(c) 25 : 4
(d) 5 : 1

Q85. A tradesman marked his goods at 26% above its cost price and then allowed a discount of 13%. His gain (in %) is:

(a) 9.62
(b) 6.29
(c) 6.92
(d) 9.26

Q86. Which of the following numbers will replace the question mark (?) in the given series?

11, 31, 55, 84, 119, ?

(a) 131
(b) 157

YourMockTest.com — Free Study Material

(c) 161
(d) 142

Q87. If one root of a quadratic equation, α, is half of the other root of the same equation, then find the quadratic equation.
(a) $x^2 - 3\alpha x - 2\alpha^2 = 0$
(b) $x^2 - 3\alpha x + 2\alpha^2 = 0$
(c) $x^2 + 3\alpha x + 2\alpha^2 = 0$
(d) $x^2 + 3\alpha x - 2\alpha^2 = 0$

Q88. Two trains of same length are running on parallel tracks in the same direction at speeds of 56 m/s and 46 m/s. The faster train crosses the slower train in 26 sec. The length of each train is:
(a) 140 m
(b) 120 m
(c) 100 m
(d) 130 m

Q89. Match the following:

Formula	Name		
i.	CH3COOH	a.	Methane
ii.	CHCl3	b.	Ethanol
iii.	CH3CH2OH	c.	Acetic acid
iv.	CH4	d.	Chloroform

(a) i - a, ii - b, iii - c, iv - d
(b) i - a, ii - c, iii - b, iv - d
(c) i - c, ii - d, iii - a, iv - b
(d) i - c, ii - d, iii - b, iv - a

Q90. Mohan gets 12% increase in his sale amount in the first year and 15% increase in the second year, with that his present sale is Rs. 1,28,800, what was his sale two years ago?
(a) Rs. 1,50,000
(b) Rs. 1,25,000
(c) Rs. 1,00,000
(d) Rs. 1,75,000

Q91. The smallest whole number that must be multiplied to 1083 to make it a perfect square, is:
(a) 3
(b) 11
(c) 4
(d) 2

Q92. Based on the given statement, two conclusions are drawn. Find out which conclusion is true based on the statement.
Statement: $T \geq C, B < D, C > B$
Conclusions:
1. $D = C$
2. $T > B$
(a) Only conclusion 2 is true
(b) Only conclusion 1 is true
(c) Neither conclusion 1 nor 2 is true
(d) Both conclusions 1 and 2 are true

YourMockTest.com — Free Study Material

Q93. Which Indian language is also recognised as an official language of Singapore and Sri Lanka?

(a) Bengali
(b) Kannada
(c) Telugu
(d) Tamil

Q94. Two banks, A and B, offered loans at 4.5% and 5.5% per annum, respectively. Ramesh borrowed an amount of Rs. 2,00,000 from each bank. Find the positive difference in the amounts of simple interest paid to the two banks by Ramesh after 2 years.

(a) Rs. 2,000
(b) Rs. 4,000
(c) Rs. 8,000
(d) Rs. 6,000

Q95. Two bulbs A and B are rated 100 W and 25 W, respectively, at a given voltage. The ratio of resistance of bulb A to that of bulb B is:

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

Q96. Parvati starts walking from point A and covers 35 m towards the south. From there, she takes a left turn and walks 60 m. Then, she takes a left turn and walks 15 m. After that, she takes a left turn and walks 90 m. Finally, she takes a right turn and walks 20 m to reach point D. How far and in which direction is point D from point A? (All turns are 90 degree turns only)

(a) 20 m, West
(b) 20 m, South
(c) 30 m, East
(d) 30 m, West

Q97. The position of how many letters will remain unchanged if each of the letters in the word 'ANOTHER' is arranged in alphabetical order?

(a) None
(b) 1
(c) 2
(d) 3

Q98. An object, 1.0 cm in height, is placed at a distance of 18.0 cm in front of a concave mirror of focal length 10.0 cm, on its principal axis. Its image has a height of _____ and is _____.

(a) less than 1.0 cm, inverted
(b) less than 1.0 cm, erect
(c) more than 1.0 cm, erect
(d) more than 1.0 cm, inverted

Q99. If 1 is added to each even digit and 1 is subtracted from each odd digit in the number 457943246, what will be the sum of the digits that are fourth from the left and fourth from the right?

(a) 12
(b) 16
(c) 10
(d) 8

Q100. How many such pairs of letters are there in the word 'ROASTERS' (in both forward and backward directions) which have as many letters between them in the word as there are in the English alphabetical order?

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

YourMockTest.com — Free Study Material

(d) Two

ANSWER KEY

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

SOLUTIONS

Q1. Answer: (a) West

According to the given information,

1) B is 20 m to the west of C.

2) C is 30 m to the north of E.

3) F is 60 m to the south of E.

4) A is 60 m to the west of B.

5) D is 30 m to the south of B.

Here, we can see that A is in west direction with reference to C.

Hence, the correct answer is "West".

Q2. Answer: (a) CH3COOH, H2CO3

The correct answer is CH3COOH, H2CO3

Key Points

• CH3COOH (acetic acid) and H2CO3 (carbonic acid) are weak acids.

• Weak acids only partially ionize in water, meaning they do not completely dissociate into their ions.

• HCl (hydrochloric acid), H2SO4 (sulfuric acid), and HNO3 (nitric acid) are strong acids, which completely ionize in water.

• Weak acids have higher pKa values and lower ionization constants (Ka) compared to strong acids.

• Weak acids are important in various chemical and biological processes due to their ability to act as buffering agents, maintaining pH levels within a narrow range.

Additional Information

• Acids are classified based on their ability to donate protons (H^+) in an aqueous solution.

• The strength of an acid is determined by its ionization constant (Ka) and its ability to donate protons.

• In aqueous solutions, strong acids completely dissociate, leading to a higher concentration of hydrogen ions (H^+), while weak acids only partially dissociate.

• The pH of a solution containing a weak acid is higher (less acidic) compared to a solution of the same concentration containing a strong acid.

• Common examples of weak acids include acetic acid (vinegar), citric acid (found in citrus fruits), and carbonic acid (found in carbonated beverages).

• Understanding the difference between strong and weak acids is crucial in fields such as chemistry, biology, environmental science, and medicine.

Q3. Answer: (d) 8 : 05

According to the given information,

The reflection effect can be found by subtracting the given time from 12:00, since in a mirror image, every hour has an opposite

position. Start with the given time, 3:55.

Formula: 11 : 60 - Given Time

Subtract 3:55 from 12:00 to determine the actual time: First, subtract the minutes: [{60 minutes (in 1 hour)} - 55 {minutes} = 5 minutes}]

Since we borrowed 1 hour to do the minute subtraction, we have to subtract 1 hour from 12 hours: [11 {hours} - 3 {hours} = 8 hours}]

So, the actual time is 8:05.

Hence, the correct answer is "8 : 05".

Q4. Answer: (a) enzymes are unable to break down plastics

The correct answer is enzymes are unable to break down plastics

Key Points

• We should refrain from using plastics because enzymes are unable to break down plastics.

• Plastics are synthetic materials made from polymers, which are long chains of molecules.

• These polymers are not easily broken down by natural processes, leading to their accumulation in the environment.

• The inability of natural enzymes to degrade plastics means they persist for hundreds of years, causing significant environmental pollution.

• Plastics can harm wildlife, contaminate water sources, and enter the food chain, posing health risks to humans and animals.

Additional Information

• Efforts are being made to develop biodegradable plastics and promote recycling to mitigate the environmental impact of plastic waste.

• Biodegradable plastics are designed to be broken down by natural processes, reducing their persistence in the environment.

• Recycling helps to reduce the amount of plastic waste that ends up in landfills and oceans, conserving resources and energy.

• Public awareness and policies aimed at reducing plastic use, such as bans on single-use plastics, are crucial steps toward addressing plastic pollution.

Q5. Answer: (c) NITI Aayog

The correct answer is NITI Aayog

Key Points

• NITI Aayog released the 'Banking on electric vehicles in India' report in collaboration with Rocky Mountain Institute and RMI India in January 2022.

• The report focuses on the financial sector's role in accelerating India's electric vehicle (EV) adoption.

• It provides a roadmap for banks and non-banking financial companies (NBFCs) to increase their lending to the EV sector.

• The report highlights the importance of financing in achieving India's EV goals and reducing carbon emissions.

Additional Information

• NITI Aayog stands for National Institution for Transforming India.

• It was established in 2015 to replace the Planning Commission with the aim of fostering cooperative federalism.

• NITI Aayog acts as a policy think tank of the Government of India and provides directional and policy inputs.

• Rocky Mountain Institute (RMI) is a US-based non-profit organization that focuses on sustainability and energy efficiency.

• RMI India is the Indian subsidiary of Rocky Mountain Institute, working on similar goals within the Indian context.

Q6. Answer: (a) 3 Ω

The correct answer is 3 Ω.

Key Points

• The formula for equivalent resistance (R_eq) in a parallel circuit is 1/R_eq = 1/R1 + 1/R2 + 1/R3.

• For three resistors of 9 Ω each connected in parallel, the calculation becomes 1/R_eq = 1/9 + 1/9 + 1/9.

• This simplifies to 1/R_eq = 3/9, hence R_eq = 3 Ω.

• The equivalent resistance is always less than the resistance of the smallest individual resistor in a parallel circuit.

• For resistors in parallel, the total resistance decreases as more resistors are added to the circuit.

Additional Information

• Ohm’s Law

• It defines the relationship between voltage (V), current (I), and resistance (R): V = I × R.

• It is a fundamental principle used in circuit analysis and design.

• Parallel Circuit

• In a parallel circuit, the total voltage across all components is the same, but the total current is the sum of the individual currents.
• The equivalent resistance decreases as more resistors are added in parallel.
• Resistance
• Resistance is a measure of how much a material opposes the flow of electric current.
• It is measured in ohms (Ω) and can be calculated using Ohm's law.
• Calculating Total Resistance in Parallel
• The total resistance in a parallel circuit is always less than the smallest resistance in the circuit.
• This is because the current has multiple paths to flow through, reducing overall resistance.

Q7. Answer: (b) 10093

Shortcut Trick

Find the LCM of 15, 24, 35, and 42.

LCM(15, 24, 35, 42) = 840.

Smallest 5-digit number (10000) ÷ 840 gives remainder 760.

Number = 10000 + (840 − 760) + 13 = 10093.

Therefore The correct answer is 10093.

Alternate Method

Given: Divisors are 15, 24, 35, 42 and the remainder is 13.

Formula: Required number = (Multiple of LCM of divisors) + Remainder

=> Prime factors: 15 = 3 × 5, 24 = 2^3 × 3, 35 = 5 × 7, 42 = 2 × 3 × 7

=> LCM = 2^3 × 3 × 5 × 7 = 8 × 3 × 5 × 7 = 840

=> Divide 10000 by 840: 10000 = 840 × 11 + 760

=> Next multiple of 840 = 840 × 12 = 10080

=> Required Number = 10080 + 13 = 10093

Therefore The correct answer is 10093.

Additional Information

LCM Method for Remainders

When a number leaves the same remainder 'r' for divisors a, b, c, the general form is k × LCM(a, b, c) + r.

Smallest n-digit number

To find the smallest n-digit number divisible by L, use 10^(n-1) + (L − Remainder of 10^(n-1)/L).

Divisibility Rule of 3 and 5

For a remainder of 13 when divided by 15, the number must end in 3 or 8 (based on 5) and sum of digits minus 13 must be divisible by 3.

Q8. Answer: (d) Jainism

The correct answer is Jainism

Key Points

• The Digambara sect is one of the two main sects in Jainism.
• Digambara means "sky-clad" and its monks traditionally do not wear any clothes, symbolizing their renunciation of worldly possessions.
• This sect believes that women must be reborn as men to achieve liberation.
• The other main sect in Jainism is the Svetambara sect, which differs in its practices and beliefs regarding asceticism and liberation.
• Both sects follow the teachings of Lord Mahavira, the 24th Tirthankara in Jainism.

Additional Information

• Jainism is an ancient Indian religion that emphasizes non-violence, truth, and asceticism.
• The religion is known for its teachings on the five great vows: non-violence (Ahimsa), truth (Satya), non-stealing (Asteya), celibacy (Brahmacharya), and non-possessiveness (Aparigraha).
• Jain temples are often characterized by their intricate architecture and detailed carvings.
• Jains celebrate various festivals such as Paryushana and Mahavir Jayanti, which honor the teachings and life of Lord Mahavira.
• The Jain community is known for its contributions to Indian art, culture, and philosophy.

YourMockTest.com — Free Study Material

Q9. Answer: (b) Devendra Jhajharia

The correct answer is Devendra Jhajharia

Key Points

• Devendra Jhajharia became the first para-athlete of India to receive the Padma Bhushan in the year 2022.

• The Padma Bhushan is the third-highest civilian award in India, recognizing distinguished service of a high order in any field.

• Devendra Jhajharia is a javelin thrower and has won multiple medals in the Paralympics, including gold medals in 2004 and 2016.

• His achievements have been a source of inspiration for many aspiring para-athletes in India.

Additional Information

• Pramod Bhagat is a para-badminton player who has also made significant contributions to Indian sports.

• Harvinder Singh is known for his achievements in para-archery.

• Manoj Sarkar is another notable para-badminton player from India.

• The Padma Awards are one of the highest civilian honors in India and are announced annually on the eve of Republic Day.

Q10. Answer: (b) Plants produced are genetically different from the parent plant.

The correct answer is Plants produced are genetically different from the parent plant.

Key Points

• In vegetative propagation, plants bear flowers and fruits earlier than those produced from seeds.

• Plants produced through vegetative propagation are genetically identical to the parent plant, making option 2 incorrect.

• Plants can be grown from root, stem, and leaves using vegetative propagation methods.

• Vegetative propagation allows the growth of plants that have lost the capacity to produce seeds.

Additional Information

• Vegetative propagation is a type of asexual reproduction in plants where new plants grow from parts of the parent plant.

• This method is commonly used in horticulture to produce plants with desirable traits.

• Examples of vegetative propagation include the growth of new plants from cuttings, tubers, runners, and bulbs.

• It is an efficient way to propagate plants that do not produce viable seeds or have a long seed germination period.

Q11. Answer: (c) IPXF

The logic followed here is,

Hence, the correct answer is "IPXF".

Q12. Answer: (a) low

The correct answer is low

Key Points

• The doldrums are an area of low pressure around the equator.

• This region is characterized by calm prevailing winds, which can lead to periods of no wind at all.

• The calm conditions are caused by the convergence of trade winds from both the Northern and Southern Hemispheres.

• The doldrums are known for their unpredictable weather and can pose challenges for maritime navigation.

Additional Information

• The doldrums are also referred to as the Intertropical Convergence Zone (ITCZ).

• This zone migrates with the seasons, moving north during the Northern Hemisphere summer and south during the Northern Hemisphere winter.

• The doldrums can significantly impact global weather patterns and are linked to the formation of tropical storms.

Q13. Answer: (d) INDICoV-Om

The correct answer is INDICoV-Om

Key Points

• INDICoV-Om is the first indigenous RT-PCR kit developed by 'CSIR - Central Drug Research Institute' for testing the omicron variant.

• The development of this kit marks a significant achievement in India's efforts to combat the COVID-19 pandemic, particularly the detection of the highly transmissible omicron variant.

• The RT-PCR kit is designed to provide accurate and quick results, enhancing the country's testing capabilities.

• This indigenous development reduces dependency on imported testing kits and boosts local innovation and production capabilities.

YourMockTest.com — Free Study Material

Additional Information

• The CSIR - Central Drug Research Institute (CDRI) is one of the premier research organizations in India, focusing on drug research and development.

• CDRI has been actively involved in various research initiatives to address the challenges posed by the COVID-19 pandemic.

• The institute's contributions include the development of diagnostic kits, therapeutic drugs, and vaccines.

• The introduction of the INDICoV-Om RT-PCR kit aligns with the government's 'Make in India' initiative, promoting self-reliance in critical healthcare technologies.

Q14. Answer: (a) KYPTULTEQW

Given codes for the number/ symbol is shown below,

Number/ symbol	**8**	**3**	**!**	**&**	**4**	**#**	**6**	**@**	**$**	**7**
Code	Q	W	E	R	T	Y	U	L	P	K

The given question to be coded: 7 # $ 4 6 @ 4 ! 8 3

→ Here, we can see that the condition (iv) applies here. So, the codes will be used directly.

Number/ symbol	**7**	**#**	**$**	**4**	**6**	**@**	**4**	**!**	**8**	**3**
Code	K	Y	P	T	U	L	T	E	Q	W

Hence, the correct answer is "KYPTULTEQW".

Q15. Answer: (b) into the plane of paper

The correct answer is into the plane of paper.

We can use vec F= q (vec v × vec B)

Taking the curl we get the direction. if velocity is in +y direction and magnetic field is in x direction then the curl of them will be into the plane

Key Points

• To determine the direction of the force experienced by a proton moving in a magnetic field, we can use the right-hand rule.

• Point your fingers in the direction of the proton's velocity. In the diagram, the proton's velocity is pointing upward.

• Point your palm in the direction of the magnetic field. The magnetic field is directed to the right.

• The direction your thumb points is the direction of the force on a positive charge (proton).

• Applying the right-hand rule to this scenario:

• Fingers point up (proton's velocity).

• Palm faces right (magnetic field direction).

• Thumb points into the screen (towards you).

• Therefore, the force experienced by the proton will be into the screen (towards the observer).

Q16. Answer: (d) 17.5%

Given:

Company M sales:

2019 = 235

2020 = 340

2021 = 765

Total sales of Company M (2019-2021) = 235 + 340 + 765 = 1340

Formula used:

Percentage share = (Sales in 2019)/(Total sales) × 100

Calculations:

Percentage share of 2019 sales = 235/1340 × 100

=> Percentage share = 17.54%

Therefore The percentage share of sales of Company M in 2019 is 17.54%.

Q17. Answer: (a) 8

Given:

12.998 + 20.009 ÷ 4.998 - 2.999 × 2.998 = ?

Formula Used:

Order of Operations (BODMAS/BIDMAS): Brackets, Orders (i.e., powers and square roots, etc.), Division and Multiplication, Addition and Subtraction.

Calculation:

We have,

=> 12.998 + 20.009 ÷ 4.998 - 2.999 × 2.998

First, perform the division:

=> 20.009 ÷ 4.998 ≈ 4

Next, perform the multiplication:

=> 2.999 × 2.998 ≈ 9

Now, substitute these values back into the equation:

=> 12.998 + 4 - 9

Perform the addition and subtraction from left to right:

=> 12.998 + 4 = 16.998

=> 16.998 - 9 = 7.998

Since we need the closest approximate value:

=> 7.998 ≈ 8

Therefore The correct answer is option 1.

Q18. Answer: (b) N

The correct answer is N

Key Points

• Nitrogen (N) has the highest valency among the given elements.

• Valency is the combining capacity of an element, and it typically corresponds to the number of electrons an atom can lose, gain, or share.

• Nitrogen has a valency of 3 or 5, depending on the compound it forms, while the other elements (Ca, Al, Li) have lower valencies.

• Calcium (Ca) has a valency of 2, Aluminum (Al) has a valency of 3, and Lithium (Li) has a valency of 1.

Additional Information

• Valency and oxidation states are fundamental concepts in chemistry that help in understanding how elements interact and form compounds.

• Valency is often determined by the number of electrons in the outermost shell of an atom.

• Elements in the same group of the periodic table typically have similar valencies.

• Understanding valency is crucial for predicting the types of bonds that an element can form.

Q19. Answer: (c) O

According to the given information,

1) Only two people sit to the left of K.

2) J is at the extreme left end of the row.

3) P is an immediate neighbour of both K and N.

4) L is to the immediate right of N.

5) O and L are immediate neighbours.

Thus, the final arrangement is,

Here, we can see that O sits at the extreme right end.

Hence, the correct answer is "O".

Q20. Answer: (a) Neither I nor II can be concluded

The given statement is: An online teaching platform has reported to earn almost double through subscriptions ever since they started LIVE problem-solving classes on the platform.

Conclusions:

I. No other online teaching platform offers LIVE problem-solving classes → False (The statement does not provide any information

about other online teaching platforms or their offerings).

II. Students who opt for LIVE problem-solving sessions on the said platform have to pay double the fees as compared to those who opt for regular classes → False (There is no specific mention of fee structures or comparative pricing between LIVE problem-solving sessions and regular classes. The increase in platform earnings could be due to a higher number of subscriptions, not necessarily the cost difference between classes).

Hence, the correct answer is "Neither I nor II can be concluded".

Q21. Answer: (a) −7/√3 and −√3

Shortcut Trick

Multiply the coefficient of m^2 ($\sqrt{3}$) and the constant term ($7\sqrt{3}$) to get the product: $\sqrt{3} \times 7\sqrt{3} = 21$.

Find two factors of 21 that sum up to the middle coefficient (10): These are 7 and 3.

Divide the factors by the coefficient of m^2 and change their signs to find the roots.

Roots => $m1 = -7/\sqrt{3}$ and $m2 = -3/\sqrt{3} = -\sqrt{3}$.

Therefore The correct answer is $-7/\sqrt{3}$ and $-\sqrt{3}$.

Alternate Method

Given Equation: $\sqrt{3}m^2 + 10m + 7\sqrt{3} = 0$

Method: Factorisation by Splitting the Middle Term.

$=> \sqrt{3}m^2 + 3m + 7m + 7\sqrt{3} = 0$

$=> \sqrt{3}m(m + \sqrt{3}) + 7(m + \sqrt{3}) = 0$

$=> (m + \sqrt{3})(\sqrt{3}m + 7) = 0$

=> Case 1: $m + \sqrt{3} = 0 => m = -\sqrt{3}$

=> Case 2: $\sqrt{3}m + 7 = 0 => \sqrt{3}m = -7 => m = -7/\sqrt{3}$

Therefore The correct answer is $-7/\sqrt{3}$ and $-\sqrt{3}$.

Additional Information

Standard Quadratic Equation

Any equation of the form $am^2 + bm + c = 0$ is a quadratic equation where $a \neq 0$.

Discriminant and Nature of Roots

The term $D = b^2 - 4ac$ determines the nature. If $D > 0$, roots are real and unequal; if $D = 0$, roots are real and equal.

Sum and Product of Roots

For the equation $am^2 + bm + c = 0$, the Sum of roots = $-b/a$ and the Product of roots = c/a.

Q22. Answer: (c) Nagaland

The correct answer is Nagaland

Key Points

• In July 2022, the Lok Sabha passed the Family Courts (Amendment) Bill, 2022.

• This amendment was necessary to address the issue of lack of jurisdiction of Family Courts in the States of Himachal Pradesh and Nagaland.

• The amendment validates the existence and functioning of Family Courts in these states retrospectively.

• Family Courts are established to promote conciliation and secure speedy settlement of disputes relating to marriage and family affairs.

Additional Information

• The Family Courts Act was enacted in 1984 to provide for the establishment of Family Courts with a view to promote conciliation and secure speedy settlement of disputes relating to marriage and family affairs.

• The amendment ensures that all the actions taken by the Family Courts in Himachal Pradesh and Nagaland are validated from the date of their respective establishments.

• This move is expected to enhance the accessibility and efficiency of the judicial system in addressing family-related cases in these states.

Q23. Answer: (b) Growth of nails

The correct answer is Growth of nails

Key Points

• Growth of nails is a continuous process that happens throughout life and is not specifically a change that marks the onset of puberty.

• Puberty is characterized by several physiological changes, such as a change in voice, change in body shape, and a sudden

increase in height.

• These changes are driven by hormonal changes in the body during adolescence.

• Understanding the distinct changes that occur during puberty helps in identifying the normal developmental process.

Additional Information

• Puberty typically begins between ages 8 and 14 for girls and 9 and 16 for boys.

• It is initiated by the release of hormones such as estrogen in girls and testosterone in boys.

• Other changes that occur during puberty include the development of secondary sexual characteristics, such as breast development in girls and facial hair growth in boys.

• Emotional and psychological changes also accompany the physical changes during this period.

Q24. Answer: (a) 28 December 2021

The correct answer is Dec 28 2021

Key Points

• Dec 28 2021 is the date on which the Consumer Protection (Direct Selling) Rules, 2021 were introduced by the Government of India.

• These rules are part of the Consumer Protection Act, which aims to protect the interests of consumers in India.

• The rules provide a regulatory framework for direct selling and aim to prevent unfair trade practices.

• They also ensure that direct sellers and direct selling entities comply with certain obligations to safeguard consumer interests.

• The introduction of these rules marks a significant step in enhancing consumer rights and promoting fair trade practices in the direct selling industry.

Additional Information

• The Consumer Protection Act, 2019 was enacted to replace the Consumer Protection Act, 1986, and it came into force on 20th July 2020.

• The Act provides for the establishment of the Central Consumer Protection Authority (CCPA) to promote, protect, and enforce the rights of consumers.

• The Act includes provisions for the prevention of unfair trade practices, product liability, and the establishment of consumer dispute redressal commissions.

• The Consumer Protection (Direct Selling) Rules, 2021 are part of the comprehensive legal framework aimed at strengthening consumer protection in India.

• Direct selling entities must adhere to these rules to operate legally in India, ensuring transparency and accountability in their business practices.

• The rules also mandate that direct sellers provide accurate information about the products and services they offer, thereby protecting consumers from misleading claims.

Q25. Answer: (c) 80.5

Shortcut Trick

Total frequency n = 60, so n/2 = 30.

Cumulative frequency (cf) before the 80-90 class is 6 + 8 + 15 = 29.

Since 30 falls after 29, the Median Class is 80-90.

Applying the linear interpolation: Median = 80 + [(30 − 29) ÷ 20] × 10.

Median = 80 + (1 ÷ 20) × 10 = 80 + 0.5 = 80.5.

Therefore The correct answer is 80.5 units.

Alternate Method

Given: Monthly consumption distribution of 60 consumers.

Formula Used: Median = l + [((n ÷ 2) − cf) ÷ f] × h

Where: l = lower limit of median class, n = total frequency, cf = cumulative frequency of preceding class, f = frequency of median class, h = class size.

Step-by-step Calculations:

=> Total Consumers (n) = 6 + 8 + 15 + 20 + 11 = 60

=> n ÷ 2 = 60 ÷ 2 = 30

=> Cumulative Frequencies (cf): 6, 14, 29, 49, 60

=> Median class is 80-90 (as cf 49 > 30)

=> l = 80, cf = 29, f = 20, h = 10

=> Median = 80 + [(30 − 29) ÷ 20] × 10

=> Median = 80 + [1 ÷ 20] × 10

=> Median = 80 + 0.5 = 80.5 units

Therefore The correct answer is 80.5 units.

Additional Information

Empirical Relationship

The relationship between central tendencies is given by: Mode = 3 Median − 2 Mean.

Mode of Grouped Data

Calculated as: Mode = l + [(f1 − f0) ÷ (2f1 − f0 − f2)] × h, where f1 is the frequency of the modal class.

Mean of Grouped Data

The Mean is calculated using the Direct Method: $\Sigma f_i x_i \div \Sigma f_i$, where x_i is the class mark.

Q26. Answer: (c) West Bengal

The correct answer is West Bengal

Key Points

• Kaal Baisakhi is a local term for the pre-monsoon thunderstorms that occur in the Indian state of West Bengal.

• These storms typically occur in the late afternoon or evening and are characterized by strong winds, heavy rain, and sometimes hail.

• Kaal Baisakhi is most common during the months of April and May, just before the onset of the monsoon season.

• It is also known as the "Nor'wester" due to the direction from which the storms usually approach.

Additional Information

• West Bengal is located in the eastern part of India and shares its borders with Bangladesh, Bhutan, and Nepal.

• The state experiences a tropical climate, with hot summers, heavy monsoon rains, and mild winters.

• West Bengal is known for its rich cultural heritage, including its contributions to literature, music, and art.

• The state capital, Kolkata, is one of the largest cities in India and an important cultural and economic hub.

• In addition to Kaal Baisakhi, West Bengal also experiences other weather phenomena such as the monsoon season and occasional cyclones.

Q27. Answer: (b) AIADMK

The correct answer is AIADMK

Key Points

• AIADMK (All India Anna Dravida Munnetra Kazhagam) is a regional political party in the Indian state of Tamil Nadu and the union territory of Puducherry.

• The party was established in 1972 by M.G. Ramachandran, a popular actor and politician in Tamil Nadu.

• AIADMK has been a significant player in Tamil Nadu politics and has formed the state government multiple times.

• The party's symbol is "Two Leaves" and it has a strong base among the rural and urban population in Tamil Nadu.

Additional Information

• AIADMK has been known for its welfare schemes and populist measures aimed at improving the socio-economic conditions of the people in Tamil Nadu.

• The party has faced several internal splits and leadership challenges, especially after the demise of its prominent leaders.

• AIADMK has also played a crucial role in national politics, often aligning with major national parties to form coalition governments.

• The party's influence extends to cultural and social spheres, with strong ties to the Tamil film industry.

• AIADMK's rival party in Tamil Nadu is the DMK (Dravida Munnetra Kazhagam), and the political landscape of the state is often dominated by the contest between these two major parties.

Q28. Answer: (d) Only conclusion I and III follow.

The least possible venn diagram is shown below,

Conclusions:

I. No sugar is sweetener → True (All sugars are jaggery and no jaggery is sweetener implies that no sugar is sweetener).

II. Some jaggeries are sweeteners → False (No jaggery is sweetener implies that some jaggery can't be sweetener).

III. Some jaggeries are sugars → True (All sugars are jaggery implies that some jaggeries are definitely sugar).

Hence, the correct answer is "Only conclusion I and III follow".

Q29. Answer: (d) 28

According to the give information,

1) Rahul is at the 8th place from the left end of the row.

2) Only 11 persons are sitting between Rahul and Samar.

3) Samar is at some place towards the right of Rahul.

4) Mohit is to the immediate left of Zeeshan, who is sitting at the extreme right end.

5) Samar is at the 9th place from the extreme right end.

The total number of persons seated here = (7 + 1 + 11 + 1 + 6 + 1 + 1) = 28

Hence, the correct answer is "28".

Q30. Answer: (c) 340º

Shortcut Trick

Sum of ratio parts = 3 + 5 + 4 + 6 = 18 units.

Total sum of angles in a quadrilateral = 360º.

Value of 1 unit = 360º ÷ 18 = 20º.

Required value (3p + 2r) in units = 3(3) + 2(4) = 9 + 8 = 17 units.

Final value = 17 × 20º = 340º.

Therefore The correct answer is 340º.

Alternate Method

Given: Ratio of angles p : q : r : s = 3 : 5 : 4 : 6.

Formula Used: Sum of interior angles of a quadrilateral = 360º.

=> Let the measures of the angles be 3x, 5x, 4x, and 6x.

=> 3x + 5x + 4x + 6x = 360º

=> 18x = 360º

=> x = 360º ÷ 18 = 20º

=> p = 3x = 3 × 20º = 60º

=> r = 4x = 4 × 20º = 80º

=> Value of 3p + 2r = 3(60º) + 2(80º)

=> 3p + 2r = 180º + 160º = 340º

Therefore The correct answer is 340º.

Additional Information

Angle Sum Property of Polygons

The sum of the interior angles of a polygon with n sides is (n − 2) × 180º. For a quadrilateral, n = 4, so (4 − 2) × 180º = 360º.

Ratio and Proportion

If quantities are in the ratio a : b : c, they can be represented as ax, bx, and cx, where x is a common constant multiplier.

Types of Quadrilaterals

Common types include Parallelogram, Rectangle, Square, Rhombus, and Trapezium, all of which follow the 360º angle sum rule.

Q31. Answer: (b) 11/120

Shortcut Trick

Sum of two numbers (a + b) = 55

Product of two numbers (a × b) = HCF × LCM = 5 × 120 = 600

Sum of reciprocals = (a + b) ÷ (a × b)

Sum of reciprocals = 55 ÷ 600 = 11/120

Therefore The correct answer is 11/120.

Alternate Method

Given:

Sum of two numbers (x + y) = 55

HCF = 5, LCM = 120

Formula Used:

Product of two numbers = HCF × LCM

Sum of reciprocals = (1/x) + (1/y) = (x + y) / (xy)

YourMockTest.com — Free Study Material

Calculations:

=> Product of numbers = 5 × 120 = 600

=> Sum of reciprocals = (x + y) ÷ (xy)

=> Sum of reciprocals = 55 ÷ 600

=> Sum of reciprocals = (11 × 5) ÷ (120 × 5)

=> Sum of reciprocals = 11/120

Therefore The correct answer is 11/120.

Additional Information

HCF and LCM Relationship

For any two numbers a and b, Product of Numbers = HCF(a, b) × LCM(a, b).

Reciprocal Property

The sum of reciprocals of two numbers is always equal to (Sum of numbers) / (Product of numbers).

Co-prime Factors

Numbers can be represented as Hx and Hy where x and y are co-prime integers and H is the HCF.

Q32. Answer: (d) 80

The logic followed here is:

Logic: (Second number) = (First number - 1)² × (First number)

6 : 150

→ 150 = (6 - 1)² × 6

→ 150 = (5)² × 6

→ 150 = 25 × 6

4 : 36

→ 36 = (4 - 1)2 × 4

→ 36 = (3)2 × 4

→ 36 = 9 × 4

Similarly,

5 : ?

→ ? = (5 - 1)2 × 5

→ ? = (4)2 × 5

→ ? = 16 × 5 = 80

Hence, the correct answer is "80".

Q33. Answer: (b) N2 + H2 → 2NH3

The correct answer is N2 + H2 → 2NH3

Key Points

• Combination reactions are chemical reactions where two or more substances combine to form a single product.

• In the given options, option 2 (N2 + H2 → 2NH3) is an example of a combination reaction as nitrogen and hydrogen combine to form ammonia.

• Other options represent different types of reactions:

• Option 1 (ZnCO3 → ZnO + CO2) is a decomposition reaction.

• Option 3 (MgCl2 + Na → 2NaCl + Mg) is a displacement reaction.

• Option 4 (2NaCl → 2Na + Cl2) is also a decomposition reaction.

Additional Information

• Combination reactions are also known as synthesis reactions.

• These reactions are generally exothermic in nature, meaning they release heat.

• Examples of combination reactions include the formation of water (H2 + O2 → H2O) and the formation of calcium carbonate (CaO + CO2 → CaCO3).

Q34. Answer: (d) One

The given three letter words are: (Left) NAT PAL COT TAN (Right)

If in each of the words, each letter is changed to the next letter in the English alphabetical order, we get:

→ (Left) OBU QBM DPU UBO (Right)

Here, we can see that there is one word (QBM) which has no vowel.

Hence, the correct answer is "One".

Q35. Answer: (b) 42nd

The correct answer is 42nd Amendment

Key Points

• The 42nd Amendment to the Indian Constitution is also known as the Constitution (Forty-second Amendment) Act, 1976.

• This amendment is one of the most comprehensive amendments and is often referred to as a "mini-Constitution" due to its wide-ranging impact.

• It substituted the words 'sovereign democratic republic' with 'sovereign socialist secular democratic republic' in the Preamble of the Constitution.

• It also replaced the words 'unity of the Nation' with 'unity and integrity of the Nation' in the Preamble.

• This amendment was enacted during the Emergency period under Prime Minister Indira Gandhi's tenure.

• It aimed at reducing the power of the judiciary and increasing the power of the central government.

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.

Q36. Answer: (b) (14, 78, 8)

The logic followed here is:

Logic: Second number = First number + (Third number)²

(12, 61, 7)

→ 61 = 12 + (7)²

→ 61 = 12 + 49

(15, 51, 6)

→ 51 = 15 + (6)2

→ 51 = 15 + 36

Now, let's check each option,

1) (20, 54, 5)

→ 54 = 20 + (5)2

→ 54 ≠ 20 + 25

2) (14, 78, 8)

→ 78 = 14 + (8)2

→ 78 = 14 + 64 => Follows the logic.

3) (12, 46, 4)

→ 46 = 12 + (4)2

→ 46 ≠ 12 + 16

4) (16, 70, 9)

→ 70 = 16 + (9)2

→ 70 ≠ 16 + 81

Here, we can see that only Option 2 follows the logic.

Hence, the correct answer is "(14, 78, 8)".

YourMockTest.com – Free Study Material

Q37. Answer: (a) Rs. 1,360

Shortcut Trick

Net discount percentage = a + b − (a × b) ÷ 100

Net discount = 20 + 15 − (20 × 15) ÷ 100 = 35 − 3 = 32%

Selling Price (SP) = 100% − 32% = 68% of Marked Price (MP)

SP = 68% of 2,000 = (68 ÷ 100) × 2,000 = 1,360

Therefore The correct answer is Rs. 1,360.

Alternate Method

Given → Marked Price (MP) = Rs. 2,000 | First Discount (d1) = 20% | Second Discount (d2) = 15%

Formulas: SP = MP × (100 − d1)% × (100 − d2)%

=> Step 1: Price after 20% discount = 2,000 − (20% of 2,000) = 2,000 − 400 = 1,600

=> Step 2: Price after second 15% discount = 1,600 − (15% of 1,600) = 1,600 − 240

=> Final SP = 1,360

Therefore The correct answer is Rs. 1,360.

Additional Information

Successive Discounts

When a series of discounts are applied, each subsequent discount is calculated on the reduced price after the previous discount. The order of application does not change the final price.

Marked Price & Selling Price

Marked price is the price printed on an item. The selling price is the final amount paid by the customer after all discounts: SP = MP × (1 − d1/100) × (1 − d2/100).

Q38. Answer: (c) Beyond centre of curvature

The correct answer is Beyond centre of curvature

Key Points

• A concave mirror forms a real, inverted, and diminished image of an object when the object is placed beyond the centre of curvature.

• In this position, the rays of light converge at a point between the focus and the centre of curvature after reflecting from the mirror, forming a smaller image.

• This characteristic of concave mirrors is utilized in devices such as telescopes and certain types of cameras.

Additional Information

• Concave mirrors have a reflecting surface that curves inward, resembling a portion of the interior of a sphere.

• The focus of a concave mirror is the point where light rays parallel to the principal axis converge after reflection.

• The centre of curvature is the center of the sphere of which the mirror is a part, and it lies on the principal axis.

• When the object is placed at the centre of curvature, the image formed is real, inverted, and of the same size as the object.

• If the object is placed between the focus and centre of curvature, the image formed is real, inverted, and magnified.

• When the object is placed at the focus, the reflected rays become parallel, and the image is formed at infinity.

• Concave mirrors are commonly used in applications requiring focused light, such as in headlights, solar furnaces, and shaving mirrors.

Q39. Answer: (d) 17 : 5

Shortcut Trick

The age difference between two people remains constant regardless of time.

Age difference = 12 years (given for 6 years hence, so it is the same now and 1 year ago).

1 year ago: Krishna (4x) and Kavitha (x). Difference = 3x = 12 => x = 4.

1 year ago: Krishna = 16, Kavitha = 4. Present ages: Krishna = 17, Kavitha = 5.

Therefore The correct answer is 17 : 5.

Alternate Method

Given:

Ratio 1 year ago = 4 : 1

Difference 6 years hence = 12 years

Calculations:

=> Let ages 1 year ago be 4x and x.

=> Age difference = 4x − x = 3x.

=> Since age difference is constant, 3x = 12 => x = 4.

=> Krishna's age 1 year ago = 4 × 4 = 16 years.

=> Kavitha's age 1 year ago = 1 × 4 = 4 years.

=> Present age of Krishna = 16 + 1 = 17 years.

=> Present age of Kavitha = 4 + 1 = 5 years.

=> Required Ratio = 17 : 5.

Therefore The correct answer is 17 : 5.

Additional Information

Constant Age Difference

The difference between the ages of two individuals never changes over time. If A is 10 years older than B today, A will always be 10 years older than B.

Ratio Balancing

When solving age problems with ratios, ensure the difference between ratio parts is consistent with the actual age difference to simplify calculations.

Q40. Answer: (a) MT - OR - QP

PY - RW - TU

EN - GL - IJ

Now, let's check each option,

1) MT - OR - QP

=> Follows the logic.

2) DE - EF - FG

3) XC - YB - ZA

4) UV - TU - ST

Here, we can see that only Option 1 follows the logic.

Hence, the correct answer is "MT - OR - QP".

Q41. Answer: (a) 30.8 m

Shortcut Trick

Volume of Cube = Volume of Cuboid

$Side^3$ = Length × Width × Height

18 × 18 × 18 = 27 × Width × 7

Width = (18 × 18 × 18) ÷ (27 × 7) = (2 × 18 × 18) ÷ (3 × 7) = 216 ÷ 7 ≈ 30.85 m

Therefore The correct answer is 30.8 m.

Alternate Method

Given:

Edge of Cube (a) = 18 m

Length of Cuboid (L) = 27 m

Height of Cuboid (H) = 7 m

Formula Used:

Volume of Cube = a^3

Volume of Cuboid = L × B × H

Calculations:

=> Volume of Milk = 18 × 18 × 18 = 5832 m^3

=> Volume of Cuboid = 27 × Width × 7

=> 5832 = 189 × Width

=> Width = 5832 ÷ 189

=> Width = 30.857... m

=> Width ≈ 30.8 m

Therefore The correct answer is 30.8 m.

Additional Information

Surface Area of Cube

YourMockTest.com — Free Study Material

Total surface area of a cube is $6a^2$ and lateral surface area is $4a^2$.

Surface Area of Cuboid

Total surface area of a cuboid is $2(LB + BH + HL)$.

Diagonal of Cube and Cuboid

Diagonal of cube is $\sqrt{3} \times a$ and diagonal of cuboid is $\sqrt{(L^2 + B^2 + H^2)}$.

Q42. Answer: (d) B < J

The given statement is: $J > H = N \geq B \leq C < E$

Now, let's check each option,

1) $H < B \rightarrow$ False (There is a definite relation; $H = N \geq B$)

2) $N > C \rightarrow$ False (The relation is uncertain between them; $N \geq B \leq C$)

3) $N > E \rightarrow$ False (There is a definite relation; $N \geq B \leq C < E$)

4) $B < J \rightarrow$ True (There is a definite relation; $J > H = N \geq B$)

Hence, the correct answer is "B < J".

Q43. Answer: (b) 33

The venn diagram representing recipes using exactly any two of the given ingredients is shown below,

Hence, the correct answer is "33".

Q44. Answer: (c) Mumbai

The correct answer is Mumbai

Key Points

• Mumbai has been named as the host of the International Olympic Committee session in 2023.

• This marks a significant event as it is the first time in four decades that India will host such a session.

• The last time India hosted an IOC session was in 1983 in New Delhi.

• The decision was made during the 139th IOC Session held in Beijing, China.

• Mumbai was selected unanimously, reflecting the city's robust infrastructure and capacity to host international events.

Additional Information

• The International Olympic Committee (IOC) is a non-governmental sports organization based in Lausanne, Switzerland.

• Founded by Pierre de Coubertin and Demetrios Vikelas in 1894, the IOC is the authority responsible for organizing the modern Olympic Games.

• IOC sessions are significant as they involve discussions and decisions regarding the Olympic movement, including the selection of host cities for future games.

• Hosting an IOC session is a prestigious event and provides the host city with an opportunity to showcase its culture and infrastructure to a global audience.

• India's selection as a host reflects its growing importance and influence in the global sports arena.

Q45. Answer: (c) only iii

The correct answer is 3 Only.

Key Points

• Plaster of Paris is a quick-setting gypsum plaster consisting of a fine white powder (calcium sulfate hemihydrate), which hardens when moistened and allowed to dry.

• It is commonly used for making toys, materials for decoration, and for making surfaces smooth. Hence, Option 3 is correct.

• It is not used in the manufacture of glass, soap and paper as mentioned in Option 1.

• Plaster of Paris is not a cleaning agent for domestic purposes as stated in Option 2.

• It is also not used for baking as mentioned in Option 4.

Q46. Answer: (a) Endoplasmic reticulum

The correct answer is Endoplasmic reticulum

Key Points

• Endoplasmic reticulum (ER) is the cell organelle responsible for detoxifying toxins and drugs.

• The ER is divided into two types: rough ER and smooth ER.

• The smooth ER is particularly involved in the detoxification process.

• It contains enzymes that facilitate the breakdown and removal of harmful substances.

YourMockTest.com — Free Study Material

• These detoxifying enzymes in the smooth ER convert lipid-soluble toxins into water-soluble substances that can be easily excreted from the cell.

Additional Information

• The rough ER is studded with ribosomes and is involved in protein synthesis.

• The smooth ER also plays a role in lipid metabolism and calcium ion storage.

• Other cell organelles like mitochondria are mainly involved in energy production, while Golgi bodies are involved in packaging and transport of proteins.

• Ribosomes are the sites of protein synthesis and do not play a role in detoxification.

Q47. Answer: (b) 12

Shortcut Trick

Difference in fractions = 5/4 − 3/4 = 2/4 = 1/2

Given that 1/2 of the number is 6.

Full number (1 unit) = 6 × 2 = 12

Therefore The correct answer is 12.

Alternate Method

Let the number be x.

According to the question:

=> (5/4) × x − (3/4) × x = 6

=> (5x − 3x) / 4 = 6

=> 2x / 4 = 6

=> x / 2 = 6

=> x = 12

Therefore The correct answer is 12.

Additional Information

Fraction basics

When denominators are the same, subtract or add the numerators directly over the common denominator.

Linear Equations

Translate greater than as an equation where (Value 1) − (Value 2) = Difference.

Q48. Answer: (b) B

According to the given information,

1) C has the exam on Tuesday.

2) E has exam on Sunday.

Monday	
Tuesday	C
Wednesday	
Thursday	
Friday	
Saturday	
Sunday	E

3) Only one person has the exam between A and G, A has exam before G.

4) D has the exam on the day immediately before A, but not on Thursday.

Monday	
Tuesday	C
Wednesday	D
Thursday	A
Friday	

Saturday	G
Sunday	E

5) F's exam is on one of the days before E but after B.

Monday	**B**
Tuesday	C
Wednesday	D
Thursday	A
Friday	F
Saturday	G
Sunday	E

Here, we can see that B has the exam on Monday.

Hence, the correct answer is "B".

Q49. Answer: (c) R B K W P G P U

The given codes of the number/symbol is shown below,

Number/Symbol	**6**	**5**	**4**	**3**	**%**	**#**	**8**
Codes	R	G	U	W	K	P	B

The given question to be coded is: 6 # % 3 8 5 # 4

→ Here, we can see that condition (ii) applies here. So, the codes of second and the fifth elements are to be interchanged.

Now, the code of the given question →

Number/Symbol	**6**	**#**	**%**	**3**	**8**	**5**	**#**	**4**
Codes	R	B	K	W	P	G	P	U

Hence, the correct answer is "R B K W P G P U".

Q50. Answer: (d) H = IR2t

The correct answer is H = IR2t

Key Points

• The formula H = IR^2t does not correctly represent the heat produced in a conductor due to the flow of electric current.

• The correct formulae to represent the heat produced in a conductor are H = $(V^2/R)t$, H = I^2Rt, and H = VIt.

• These formulae are derived from the principles of Joule's law of heating, which states that the heat produced in a conductor is proportional to the square of the current, the resistance of the conductor, and the time for which the current flows.

Additional Information

• Joule's law of heating states that the heat produced in a resistor is directly proportional to the square of the current passing through it, the resistance of the resistor, and the time for which the current passes through it.

• The formula H = I^2Rt is the most direct representation of Joule's law, where H is the heat produced, I is the current, R is the resistance, and t is the time.

• The formula H = $(V^2/R)t$ is derived from Ohm's law, where V is the voltage across the conductor.

• The formula H = VIt is another representation that combines both voltage and current to calculate the heat produced.

Q51. Answer: (a) uniform and non-zero

The correct answer is uniform and non-zero

Key Points

• The magnetic field strength inside a current carrying solenoid is uniform and non-zero.

• A solenoid is a long coil of wire wound in the form of a helix, and when an electric current passes through it, a magnetic field is generated.

• Inside the solenoid, the magnetic field lines are parallel and evenly spaced, indicating a uniform field.

YourMockTest.com — Free Study Material

• The strength of the magnetic field inside the solenoid is given by the formula: B = μ0nI, Where: B is the magnetic field, μ0 is the permeability of free space, n is the number of turns per unit length, and I is the current.

• This uniform magnetic field is a result of the superposition of the magnetic fields created by each turn of the wire.

Additional Information

• At the ends of the solenoid, the magnetic field lines start to spread out, causing the field to become weaker and less uniform.

• Outside the solenoid, the magnetic field is much weaker compared to the inside.

• Solenoids are widely used in various applications such as electromagnets, inductors, and transformers.

• The concept of a solenoid is fundamental in electromagnetism and is essential for understanding the behavior of magnetic fields in different configurations.

Q52. Answer: (c) F

According to the given information,

1) B is the third box from the top.

2) G is immediately above B.

G
B

3) Exactly two boxes are kept between C and D with C placed above D.

4) Exactly two boxes are kept between D and E with D placed above E.

C
G
B
D
E

5) F is immediately below A.

C
G
B
D
A
F
E

Here, we can see that Box F is just above Box E.

Hence, the correct answer is "F".

Q53. Answer: (c) coal

The correct answer is coal

Key Points

• Carbonisation is a process in which dead plant material is converted into coal over millions of years.

• This process involves the decomposition of plant material in the absence of oxygen, leading to the formation of carbon-rich substances.

• The stages of coal formation include peat, lignite, bituminous coal, and anthracite, with each stage representing a higher degree of carbon content.

• Coal is a crucial fossil fuel used for electricity generation, steel production, and as a source of energy in various industries.

Additional Information

• Coal formation is a slow geological process that takes millions of years.

• Different types of coal have varying uses; for instance, anthracite is used in residential heating due to its high carbon content and low impurities.

• The carbonisation process is crucial for the fossil fuel industry and plays a significant role in the global energy supply.

• Coal mining and usage have environmental impacts, including greenhouse gas emissions and habitat destruction, necessitating efforts for sustainable and cleaner energy alternatives.

Q54. Answer: (c) Punjab

The correct answer is Punjab

Key Points

• NESTLE India Ltd. set up its first factory in 1961 in the state of Punjab.

• This factory marked the beginning of Nestle's manufacturing operations in India.

• The choice of Punjab was strategic due to its rich agricultural base, which provided easy access to raw materials.

• The factory primarily focused on producing dairy products, which aligned with the state's strong dairy industry.

• Nestle's establishment in Punjab contributed to the industrial growth of the region and provided employment opportunities.

Additional Information

• NESTLE India Ltd. is a subsidiary of Nestlé S.A., a Swiss multinational food and drink processing conglomerate.

• The company has a significant presence in India with multiple manufacturing facilities across various states.

• Besides dairy products, NESTLE India Ltd. produces a wide range of products including beverages, prepared dishes, and cooking aids, chocolates, and confectioneries.

• The establishment of the factory in Punjab was a part of Nestle's broader strategy to cater to the Indian market and expand its global footprint.

Q55. Answer: (b) 48 min

Shortcut Trick

Ratio of efficiency (A : B) = 3 : 1

Total combined efficiency = 3 + 1 = 4 units/min

Total work (Capacity) = Combined efficiency × Time = 4 × 36 = 144 units

Time taken by Pipe A alone = Total Work ÷ Efficiency of A = 144 ÷ 3 = 48 min

Therefore The correct answer is 48 min.

Alternate Method

Given:

Efficiency of Pipe A is 3 times that of Pipe B.

Time taken by (A + B) together = 36 min.

Formula Used:

Total Work = Efficiency × Time

Time = Total Work ÷ Efficiency

Pipe	Efficiency (Units/min)	Total Work (Units)	Time (min)
Pipe A	3	144	144 ÷ 3 = 48
Pipe B	1	144 ÷ 1 = 144	

Calculations:

=> Let Efficiency of Pipe B = 1 unit/min

=> Efficiency of Pipe A = 3 × 1 = 3 units/min

=> Combined Efficiency (A + B) = 3 + 1 = 4 units/min

=> Total Capacity of tank = 4 × 36 = 144 units

=> Time taken by Pipe A = 144 ÷ 3 = 48 min

Therefore The correct answer is 48 min.

Additional Information

Efficiency and Time Relation

Efficiency is inversely proportional to the time taken. If efficiency ratio is x : y, the time ratio is y : x.

Pipes and Cisterns Concept

Inlet pipes have positive efficiency while outlet/leakage pipes have negative efficiency.

Work Equivalence

Total Work = (E1 × T1) = (E2 × T2). This constant can be used to find any unknown variable.

Q56. Answer: (c) 74 years

Shortcut Trick

Age ratio 10 years ago: Son : Father = 1 : 8 (Difference = 7 units)

Present age ratio: Son : Father = 9 : 37 (Difference = 28 units)

Equalize differences: Multiply 10-year ago ratio by 4 → 4 : 32

Increase in units = 37 − 32 = 5 units. Given 5 units = 10 years => 1 unit = 2 years

Present age of Father = 37 × 2 = 74 years.

Therefore The correct answer is 74 years.

Alternate Method

Given: Ratio 10 years ago = 1/8; Present Ratio = 9/37.

Formula Used: Age Equation Method.

Let the present age of the Father be F and Son be S.

=> S = (9/37)F

=> 10 years ago: (S − 10) = (1/8) × (F − 10)

=> 8 × ((9F/37) − 10) = F − 10

=> (72F / 37) − 80 = F − 10

=> (72F / 37) − F = 80 − 10

=> (72F − 37F) / 37 = 70

=> 35F / 37 = 70

=> F = (70 × 37) / 35

=> F = 2 × 37 = 74 years.

Therefore The correct answer is 74 years.

Additional Information

Ratio Difference Method

To solve age problems quickly, always equalize the difference between the ratio parts for different time periods as the age gap remains constant.

Algebraic Verification

If present ages are in ratio a:b, then after 'n' years the ratio becomes (ax+n)/(bx+n) = c/d.

Linear Equations in Ages

Most age problems can be modeled as linear equations with one or two variables, where time shifts apply equally to all persons involved.

Q57. Answer: (a) Leucoplast

The correct answer is Leucoplast

Key Points

• Leucoplasts are a type of plastid found in plant cells.

• They are primarily involved in the storage of starch, proteins, and oil granules.

• Leucoplasts are colorless and found in non-photosynthetic tissues of plants, such as roots, seeds, and tubers.

• They play a crucial role in the storage and synthesis of essential biomolecules.

Additional Information

• Chloroplasts are involved in photosynthesis and contain chlorophyll, giving them a green color.

• Chromoplasts contain pigments that give flowers and fruits their distinctive colors.

• Protoplasts refer to the living part of the cell that is enclosed by the plasma membrane, excluding the cell wall.

• Plastids are classified into different types based on their functions and the pigments they contain, such as chloroplasts,

YourMockTest.com – Free Study Material

chromoplasts, and leucoplasts.

Q58. Answer: (c) 121

Shortcut Trick

Sum of first n odd natural numbers = n^2.

Number of terms (n) = [(Last term − First term) ÷ Difference] + 1

n = [(21 − 1) ÷ 2] + 1 = 11.

Sum = 11^2 = 121.

Therefore The correct answer is 121.

Alternate Method

Given: Arithmetic Progression (AP) = 1, 3, 5, 7, ..., 21

Formula Used: Sum of AP (S_n) = (n/2) × [a + l], where a is the first term and l is the last term.

=> First term (a) = 1

=> Last term (l) = 21

=> Common difference (d) = 3 − 1 = 2

=> l = a + (n − 1)d

=> 21 = 1 + (n − 1) × 2

=> 20 = (n − 1) × 2

=> 10 = n − 1

=> n = 11

=> S_{11} = (11/2) × [1 + 21]

=> S_{11} = (11/2) × 22

=> S_{11} = 11 × 11 = 121

Therefore The correct answer is 121.

Additional Information

Sum of first n natural numbers

The sum is calculated using the formula: S_n = [n(n + 1)] ÷ 2.

Sum of first n even natural numbers

The sum is calculated using the formula: S_n = n(n + 1).

Sum of squares of first n natural numbers

The sum is calculated using the formula: S_n = [n(n + 1)(2n + 1)] ÷ 6.

Q59. Answer: (c) Bile salts

The correct answer is Bile salts

Key Points

• Bile salts reduce the size of large fat globules, allowing enzymes to work more effectively.

• Bile salts are a component of bile, which is produced by the liver and stored in the gallbladder.

• They play a crucial role in the digestion and absorption of fats in the small intestine.

• By emulsifying fats, bile salts increase the surface area available for enzyme action, particularly for the enzyme lipase.

Additional Information

• Hydrochloric acid is secreted by the stomach and helps in the digestion of proteins but does not emulsify fats.

• Pancreatic juice contains enzymes that digest carbohydrates, proteins, and fats but does not emulsify fats.

• Succus entericus is the intestinal juice that contains various digestive enzymes but does not emulsify fats.

• Emulsification of fats is essential for the efficient digestion and absorption of dietary fats.

Q60. Answer: (c) Differentiation

The correct answer is Differentiation

Key Points

• Differentiation is the process in plants where cells of meristematic tissue lose their ability to divide, take up a permanent shape and size, and specialize to perform a specific function.

• This process is crucial for the development of various tissues and organs in plants, allowing them to perform specialized functions.

• Meristematic tissues are regions of active cell division, and as cells differentiate, they transition into permanent tissues with

YourMockTest.com — Free Study Material

specific roles.

• Examples of differentiated cells include xylem and phloem, which are specialized for water and nutrient transport, respectively.

Additional Information

• Regeneration refers to the process of renewal, restoration, and growth of cells or tissues.

• Development is the overall process by which an organism grows and develops, involving cell division and differentiation.

• Proliferation is the rapid multiplication of cells.

• Meristematic tissues are found in zones of the plant where growth can take place, such as the tips of roots and shoots.

• Plants have three main types of meristematic tissues: apical meristems, lateral meristems, and intercalary meristems.

Q61. Answer: (b) 2021

Given:

Total number of boys from places J and M in 2017 = Boys from J (2017) + Boys from M (2017)

Boys from J in 2017 = 10 thousand

Boys from M in 2017 = 8 thousand

Total number of boys in 2017 from J and M = 10 + 8 = 18 thousand

Girls from M in 2016 = 9 thousand

Girls from M in 2017 = 7 thousand

Girls from M in 2018 = 4 thousand

Girls from M in 2019 = 11 thousand

Girls from M in 2020 = 12 thousand

Girls from M in 2021 = 18 thousand

Therefore The year is 2021 when the total number of girls from M is 18 thousand.

Q62. Answer: (b) cot A + cosec A

Shortcut Trick

Put a specific value for acute angle A, say A = 45°.

Expression = (cos 45° − sin 45° + 1) ÷ (cos 45° + sin 45° − 1)

=> (1/√2 − 1/√2 + 1) ÷ (1/√2 + 1/√2 − 1) = 1 ÷ (√2 − 1)

=> Rationalizing: 1 × (√2 + 1) = √2 + 1

Check options at A = 45°: cot 45° + cosec 45° = 1 + √2. Matches.

Therefore The correct answer is cot A + cosec A.

Alternate Method

Given: (cos A − sin A + 1) ÷ (cos A + sin A − 1)

Formula Used: $\text{cosec}^2A - \cot^2A = 1$

Divide numerator and denominator by sin A:

=> (cos A/sin A − sin A/sin A + 1/sin A) ÷ (cos A/sin A + sin A/sin A − 1/sin A)

=> (cot A − 1 + cosec A) ÷ (cot A + 1 − cosec A)

=> [cot A + cosec A − ($\text{cosec}^2A - \cot^2A$)] ÷ (cot A + 1 − cosec A)

=> [(cot A + cosec A) − (cosec A − cot A)(cosec A + cot A)] ÷ (cot A + 1 − cosec A)

=> (cot A + cosec A)[1 − (cosec A − cot A)] ÷ (cot A + 1 − cosec A)

=> (cot A + cosec A)(1 − cosec A + cot A) ÷ (1 − cosec A + cot A)

=> cot A + cosec A

Therefore The correct answer is cot A + cosec A.

Additional Information

Trigonometric Identities

Standard identities: $\sin^2A + \cos^2A = 1$, $1 + \tan^2A = \sec^2A$, and $1 + \cot^2A = \text{cosec}^2A$.

Complementary Angles

For an acute angle A, sin(90°−A) = cos A and tan(90°−A) = cot A.

Reciprocal Relations

cosec A = 1/sin A, sec A = 1/cos A, and cot A = 1/tan A = cos A/sin A.

Q63. Answer: (d) Hornbill Festival

The correct answer is Hornbill Festival

Key Points

• The Hornbill Festival is celebrated in Nagaland, India, every December.

• It is named after the hornbill bird, which is a symbol of the state.

• This festival plays a crucial role in reviving, protecting, and sustaining the rich culture and traditions of Nagaland.

• It showcases the heritage of Nagaland's 16 tribes through traditional music, dance, food, and crafts.

• The festival attracts tourists from all over the world, promoting cultural exchange and tourism in the region.

Additional Information

• Nagaland is known for its diverse indigenous tribes, each with its own unique culture and traditions.

• The Hornbill Festival is often referred to as the "Festival of Festivals" in Nagaland.

• It is organized by the State Tourism and Art & Culture Departments and is held at the Naga Heritage Village, Kisama, about 12 km from Kohima, the state capital.

• The festival provides a platform for the tribes to display their traditional arts, dances, folk songs, and games.

• It also includes a variety of other activities such as rock concerts, fashion shows, and traditional wrestling.

Q64. Answer: (c) 191

The logic followed here is,

Hence, the correct answer is "191".

Q65. Answer: (c) 2H2O → 2H2 + O2

The correct answer is option 3

Key Points

• Electrolytic Decomposition Reaction involves the decomposition of a compound using electric current.

• Option 3: 2H2O → 2H2 + O2 is an example of electrolytic decomposition where water is decomposed into hydrogen and oxygen gases by passing an electric current through it.

• Other options represent different types of decomposition reactions but not electrolytic decomposition.

Additional Information

• In electrolytic decomposition, the electrolyte is usually in a molten or dissolved state to allow the flow of ions and electric current.

• This process is used in various applications such as electrolysis of water for hydrogen production, electrorefining, and electroplating.

• Electrolytic decomposition is distinct from thermal decomposition, which requires heat, and photochemical decomposition, which requires light.

Q66. Answer: (b) 5

The given numbers are: (Left) 86547231 (Right)

If 1 is added to each odd digit and 1 is subtracted from each even digit in the number, we get → (Left) 75638142 (Right)

Digit which is third from the left → 6

Digit which is third from the right → 1

Difference between the digits = (6 - 1) = 5

Hence, the correct answer is "5".

Q67. Answer: (a) marketed surplus

The correct answer is marketed surplus

Key Points

• The portion of agricultural product that is sold by farmers in the market is popularly known as marketed surplus.

• Marketed surplus refers to the quantity of produce that is sold off by the farmers after meeting their own consumption needs.

• This surplus is crucial as it forms the basis of the agricultural supply in the market and affects the overall food security and economy.

• Understanding marketed surplus helps in planning and policy-making for agricultural marketing, pricing, and storage.

Additional Information

• Marketed surplus is different from marketable surplus, which is the total quantity of produce that can be sold in the market after accounting for storage, wastage, and other losses.

• The concept of marketed surplus is significant for understanding the market dynamics and the income of farmers.

YourMockTest.com – Free Study Material

• Policies to improve the marketed surplus can include better storage facilities, efficient transportation, and fair pricing mechanisms.

• Accurate data on marketed surplus helps in framing agricultural policies and ensuring that farmers get a fair price for their produce.

Q68. Answer: (c) 145º

Shortcut Trick

For parallel lines, the sum of interior angles on the same side of the transversal is always 180°.

mangle 1 + mangle 2 = 180°

35° + mangle 2 = 180°

mangle 2 = 180° − 35° = 145°

Therefore The correct answer is 145°.

Alternate Method

Given:

mangle 1 = 35°

angle 1 and angle 2 are consecutive interior angles.

Formula Used:

Sum of consecutive interior angles = 180°

Calculations:

=> mangle 1 + mangle 2 = 180°

=> 35° + mangle 2 = 180°

=> mangle 2 = 180° − 35°

=> mangle 2 = 145°

Therefore The correct answer is 145°.

Additional Information

Corresponding Angles

When two parallel lines are cut by a transversal, the

Q69. Answer: (c) 51

Shortcut Trick

Apply the direct relation: Median = (Mode + 2 × Mean) ÷ 3

Median = (23 + 2 × 65) ÷ 3

Median = (23 + 130) ÷ 3 = 153 ÷ 3

Median = 51

Therefore The correct answer is 51.

Alternate Method

Given:

Mean = 65

Mode = 23

Formula Used:

The Empirical Formula relating the three measures of central tendency is:

Mode = 3 × Median − 2 × Mean

Calculations:

=> 23 = 3 × Median − 2 × 65

=> 23 = 3 × Median − 130

=> 3 × Median = 23 + 130

=> 3 × Median = 153

=> Median = 153 ÷ 3

=> Median = 51

Therefore The correct answer is 51.

Additional Information

Empirical Relationship

In a moderately skewed distribution, the distance between mean and median is about one-third of the distance between mean and

mode.

Symmetrical Distribution

For a perfectly symmetrical frequency distribution (like a Normal Distribution), the values of Mean, Median, and Mode are all equal (Mean = Median = Mode).

Skewness Property

If Mean > Median > Mode, the distribution is positively skewed. If Mean < Median < Mode, it is negatively skewed.

Q70. Answer: (b) (a - 3b - c)²

Shortcut Trick

Identify the signs of the cross-product terms in the expression: −6ab, +6bc, and −2ac.

The term +6bc is positive, which implies that b and c must have the same sign.

The terms −6ab and −2ac are negative, which implies that a must have the opposite sign of b and c.

Looking at the options, only $(a - 3b - c)^2$ satisfies these conditions (positive a, negative b and c).

Therefore The correct answer is $(a - 3b - c)^2$.

Alternate Method

Given Expression: $a^2 + 9b^2 + c^2 - 6ab + 6bc - 2ac$

Formula Used: $(x + y + z)^2 = x^2 + y^2 + z^2 + 2xy + 2yz + 2zx$

We need to represent the given terms as squares and pairs:

=> $x^2 = a^2 \rightarrow x = a$

=> $y^2 = 9b^2 = (-3b)^2 \rightarrow y = -3b$ (chosen negative to match the −6ab term)

=> $z^2 = c^2 = (-c)^2 \rightarrow z = -c$ (chosen negative to match the −2ac and +6bc terms)

Now, verify the cross-products:

=> $2xy = 2 \times a \times (-3b) = -6ab$

=> $2yz = 2 \times (-3b) \times (-c) = +6bc$

=> $2zx = 2 \times a \times (-c) = -2ac$

All terms match the original expression, so:

=> $a^2 + 9b^2 + c^2 - 6ab + 6bc - 2ac = (a + (-3b) + (-c))^2$

=> $(a - 3b - c)^2$

Therefore The correct answer is $(a - 3b - c)^2$.

Additional Information

Square of a Trinomial

The general expansion is $(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$. The sign of the squared terms is always positive for real numbers.

Sign Convention

When one or more variables are negative, the sign of the product terms (ab, bc, ca) changes accordingly. For example, $(a - b + c)^2 = a^2 + b^2 + c^2 - 2ab - 2bc + 2ca$.

Perfect Square Identification

To identify a perfect square trinomial, check if the square root of the squared terms, when multiplied by 2 in pairs, matches the remaining terms of the expression.

Q71. Answer: (a) 1.03, towards

The correct answer is 1.03, towards.

Key Points

• The refractive index of a medium is a measure of how much the speed of light is reduced when it travels through that medium compared to a vacuum.

• The refractive index of turpentine oil is given as 1.47, and the refractive index of glass is given as 1.52.

• The refractive index of glass with respect to turpentine oil is calculated using the formula:

Refractive index (glass w.r.t. turpentine oil) = (Refractive index of glass) / (Refractive index of turpentine oil) = 1.52 / 1.47 ≈ 1.03.

• When light travels from a medium with a lower refractive index (turpentine oil) to a medium with a higher refractive index (glass), it bends towards the normal. This is because the speed of light decreases as it enters the denser medium (glass).

• Hence, the correct refractive index is 1.03, and the light bends towards the normal.

Additional Information

• Refractive Index:

• The refractive index is a dimensionless quantity and is a fundamental property of transparent materials.

• It is defined as the ratio of the speed of light in a vacuum to the speed of light in the given medium. Formula: n = c/v, where c is the speed of light in a vacuum, and v is the speed of light in the medium.

• Snell's Law:

• Snell's Law governs the refraction of light as it passes between two media with different refractive indices. It states:

n1 sinθ1 = n2 sinθ2, where n1 and n2 are the refractive indices of the two media, and θ1 and θ2 are the angles of incidence and refraction, respectively.

• If n2 > n1, the light bends towards the normal. If n2 < n1, the light bends away from the normal.

• Practical Applications of Refractive Index:

• Used in designing lenses for spectacles, cameras, and microscopes to control the bending of light.

• Helps in determining the purity of liquids like oils and alcohols based on their refractive indices.

• Plays a crucial role in fiber optics technology for efficient signal transmission.

Important Points

• Refractive Index of Common Materials:

• Vacuum: 1 (absolute reference).

• Air: Approximately 1.0003 (close to vacuum).

• Water: 1.33.

• Glass: Varies between 1.5 to 1.9 depending on the type of glass.

• Bending of Light:

• Light bends towards the normal when it enters a denser medium (higher refractive index).

• Light bends away from the normal when it enters a rarer medium (lower refractive index).

• Critical Angle and Total Internal Reflection:

• The critical angle is the angle of incidence beyond which light is totally reflected back into the denser medium.

• This phenomenon is used in optical fibers and prism-based instruments.

Q72. Answer: (b) less than 1, erect

The correct answer is less than 1, erect.

Key Points

• The focal length of the concave lens is –20 cm (negative for concave lens).

• The object is placed at a distance of 10 cm (object distance u = –10 cm). Using the lens formula: 1/f = 1/v - 1/u.

• Substituting values: 1/(-20) = 1/v - 1/(-10). Solving for v, we get the image distance v = -6.67 cm (negative, meaning the image is virtual and formed on the same side as the object).

• The magnification (m) is given by: m = -v/u. Substituting the values: m = -(-6.67)/(-10) = 0.667, which is less than 1.

• The image is virtual, erect, and diminished (as magnification is less than 1).

Additional Information

• Concave Lens:

• Also known as a diverging lens.

• Always forms a virtual, erect, and diminished image for any object placed in front of it.

• Has a negative focal length.

• Lens Formula:

• 1/f = 1/v - 1/u, where f is the focal length, v is the image distance, and u is the object distance.

• Sign convention: For concave lenses, focal length is negative, object distance is negative when the object is in front of the lens, and image distance is negative for virtual images.

• Magnification:

• m = -v/u. The magnification indicates the size and orientation of the image.

• For concave lenses, the magnification is always less than 1 (diminished) and positive for virtual, erect images.

• Virtual Images:

• Formed when the rays diverge after passing through the lens, but they appear to converge on the same side of the object.

• Always upright and smaller than the object for concave lenses.

Q73. Answer: (a) Butane and 2-methyl propane

The correct answer is Option 1

Key Points

• Butane and 2-methyl propane are isomers of each other, meaning they have the same molecular formula but different structural formulas.

• An isomeric pair consists of two compounds that share the same molecular formula but differ in the arrangement of atoms within the molecules.

• Butane (C4H10) and 2-methyl propane (C4H10) both have four carbon atoms and ten hydrogen atoms, but their structures are different.

• In butane, the carbon atoms are arranged in a straight chain, whereas in 2-methyl propane, the carbon atoms form a branched chain.

Additional Information

• Isomers are important in chemistry because they can have significantly different chemical and physical properties despite having the same molecular formula.

• There are different types of isomers including structural isomers, geometric isomers, and stereoisomers. Butane and 2-methyl propane are examples of structural isomers.

• The concept of isomerism is crucial in the study of organic chemistry and is widely applied in the synthesis and analysis of chemical compounds.

Q74. Answer: (a) National Bank for Agriculture and Rural Development

The correct answer is National Bank for Agriculture and Rural Development

Key Points

• National Bank for Agriculture and Rural Development (NABARD) is an apex development financial institution in India.

• It was established on 12 July 1982 by a special act of the Parliament.

• NABARD is responsible for the development of the small industries, cottage industries, and any other such village or rural projects.

• The organization provides financial support and policy guidance to various institutions in the rural sector.

• NABARD also plays a crucial role in implementing government schemes and initiatives aimed at rural development.

Additional Information

• The establishment of NABARD was recommended by the B. Sivaraman Committee (Committee to Review Arrangements for Institutional Credit for Agriculture and Rural Development).

• NABARD's headquarters is located in Mumbai, Maharashtra.

• The institution also focuses on innovation and technology in agriculture, promoting sustainable and inclusive growth.

• NABARD's initiatives include microfinance, financial inclusion, and capacity building programs for rural communities.

• It also supports agricultural research and development to enhance productivity and efficiency in the sector.

Q75. Answer: (b) 7/18

Formula Used:

To solve this, we need to perform operations on fractions step by step.

Calculation:

We have,

=> 2/3 + 1/(1 + 4/5) - 5/6

First, simplify 1/[(1 + 4/5]

=> 1 + 4/5 = 5/5 + 4/5 = 9/5

=>1)/(9/5) = 5/9

So, the expression becomes:

=> 2/3 + 5/9 - 5/6

Find the common denominator (LCM of 3, 9, and 6 is 18):

=> (2 × 6)/(3 × 6) + (5 × 2)/(9 × 2) - (5 × 3)/(6 × 3)

=> 12/18 + 10/18 - 15/18

Combine the fractions:

=> (12 + 10 - 15)/(18)

=> 7/18

Hence, the correct answer is option 2 i.e : 7/18.

YourMockTest.com - Free Study Material

Q76. Answer: (d) Both conclusions I and II follow

The logic followed here is,

Conclusions:

I. No wire is a pipe → True (All wires are switches and no switch is a pipe implies that no wire is a pipe).

II. No bulb is a switch → True (All bulbs are pipes, and no switch is a pipe implies that no bulb is a switch).

Hence, the correct answer is "Both conclusions I and II follow".

Q77. Answer: (a) Article 324

The correct answer is Article 324

Key Points

• Article 324 of the Indian Constitution envisages the Election Commission of India (ECI).

• The Election Commission of India is a constitutional body established to conduct and regulate elections in the country.

• It ensures free and fair elections to the Parliament, State Legislatures, and the offices of the President and Vice-President in India.

• The ECI operates under the authority of the Constitution per Article 324, ensuring the electoral process is transparent and impartial.

Additional Information

• The Election Commission of India was established on 25th January 1950.

• Article 324(1) states that the superintendence, direction, and control of the preparation of the electoral rolls and the conduct of elections shall be vested in the Election Commission.

• The ECI is an autonomous constitutional authority responsible for administering election processes in India at both the national and state levels.

• The Commission consists of the Chief Election Commissioner and such number of other Election Commissioners as the President may from time to time fix.

• The Chief Election Commissioner and the Election Commissioners are appointed by the President of India.

• The ECI ensures the model code of conduct is followed by political parties and candidates during elections.

• The Constitution of India mandates that elections to the House of the People and to the Legislative Assemblies of States be held on the basis of adult suffrage.

Q78. Answer: (a) 18

The correct answer is Option 1

Key Points

• Group 18 of the periodic table represents elements with zero valency.

• This group is also known as the noble gases which include Helium, Neon, Argon, Krypton, Xenon, and Radon.

• Noble gases are characterized by their inert nature due to having a complete valence shell, making them highly stable and unlikely to react with other elements.

• These elements are used in various applications such as lighting, welding, and in inert gas shields for arc welding.

Additional Information

• The concept of valency is crucial in understanding how elements interact and bond with each other to form compounds.

• Elements in Group 18 are often used in scientific experiments where a non-reactive environment is required.

• Due to their stability, noble gases are also used in the preservation of historical documents and in the filling of incandescent light bulbs to prevent oxidation of the filament.

• Helium, a noble gas, is also utilized in cryogenics and as a cooling medium for nuclear reactors.

Q79. Answer: (c) Zoya

According to the given information,

1) Beena is sitting to the immediate left of Ketaki.

2) Only Ketaki is sitting between Beena and Elisa.

3) Hema is sitting to the immediate right of Zoya.

Here, we can see that Zoya is sitting to the immediate right of Elisa.

Hence, the correct answer is "Zoya".

Q80. Answer: (c) Nepal

The correct answer is Nepal

Key Points

YourMockTest.com — Free Study Material

• India and Nepal agreed to line up a joint task force on a "proposal to construct a hydropower project" from investments of both countries in February 2022.

• This initiative aims to enhance bilateral cooperation in the energy sector and promote sustainable hydropower development.

• The task force will explore potential projects, investment opportunities, and address any challenges in the implementation of such projects.

• This agreement further strengthens the longstanding relationship between India and Nepal, particularly in the area of energy cooperation.

Additional Information

• India and Nepal share a long history of cooperation in the hydropower sector, with several joint projects already in operation or under development.

• The collaboration between the two countries in the energy sector is seen as a key driver for economic growth and development in the region.

• Hydropower projects are crucial for Nepal as they provide a sustainable and renewable source of energy, contributing to the country's energy security.

• For India, such collaborations help in meeting its growing energy demands and also strengthen regional ties.

• The agreement to form a joint task force signifies a commitment to work together towards mutual benefits and addressing common challenges in the hydropower sector.

Q81. Answer: (a) Mangrove Forests

The correct answer is Mangrove Forests

Key Points

• Mangrove Forests are the most commonly home to the Royal Bengal tiger.

• The Sundarbans, which is the largest mangrove forest in the world, is the primary habitat of the Royal Bengal tiger.

• Mangrove forests provide a unique ecosystem that supports a diverse range of wildlife, including the Bengal tiger.

• The dense mangrove vegetation and the intricate network of waterways create an ideal environment for the tigers to thrive.

Additional Information

• The Sundarbans is a UNESCO World Heritage Site and is located in the delta region of Padma, Meghna, and Brahmaputra river basins.

• It spans across India and Bangladesh and is renowned for its unique flora and fauna.

• Conservation efforts are in place to protect the Royal Bengal tiger and its habitat in the Sundarbans.

• The mangrove ecosystem also acts as a natural barrier against coastal erosion and storm surges, providing environmental protection to the region.

Q82. Answer: (a) 616 cm2

Shortcut Trick

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

For r = 7 cm, Area = $4 \times (22/7) \times 7 \times 7$

Area = $88 \times 7 = 616$ cm²

Therefore The correct answer is 616 cm².

Alternate Method

Given:

Radius (r) = 7 cm

$\pi = 22/7$

Formula Used:

Total Surface Area (A) = $4\pi r^2$

Calculations:

=> Surface Area = $4 \times (22/7) \times (7)^2$

=> Surface Area = $4 \times (22/7) \times 7 \times 7$

=> Surface Area = $4 \times 22 \times 7$

=> Surface Area = 88×7

=> Surface Area = 616 cm²

Therefore The correct answer is 616 cm².

Additional Information

Volume of Sphere

The amount of space occupied by a sphere is given by V = (4/3)πr³.

Hemisphere Properties

For a hemisphere, Curved Surface Area = 2πr² and Total Surface Area = 3πr².

Circle Area vs Sphere Area

The surface area of a sphere is exactly 4 times the area of its great circle (πr²).

Q83. Answer: (d) continues to rise

The correct answer is continues to rise

Key Points

• As long as MP (marginal product) remains higher than the average product (AP), the average product continues to rise.

• This is because the marginal product contributes positively to the average product when it is higher than the current average.

• Once the marginal product falls below the average product, the average product will start to decline.

• The relationship between marginal product and average product is crucial in understanding the stages of production and efficiency in economics.

• Monitoring these metrics helps businesses optimize their production processes and resource allocation.

Additional Information

• Marginal Product (MP) is the additional output produced by adding one more unit of a specific input, keeping all other inputs constant.

• Average Product (AP) is the total output produced divided by the number of units of the input used.

• The Law of Diminishing Marginal Returns states that as more units of an input are added, the additional output produced by each additional unit will eventually decrease.

• Understanding MP and AP helps in determining the most efficient level of production and the optimal combination of inputs.

Q84. Answer: (a) 29 : 20

Shortcut Trick

Put the values of x = 7 and y = 3 directly into the expression.

Expression = $(7^2 + 3^2) \div (7^2 - 3^2)$

Expression = (49 + 9) ÷ (49 − 9) = 58 ÷ 40

Simplified Ratio = 29 ÷ 20

Therefore The correct answer is 29 : 20.

Alternate Method

Given: x : y = 7 : 3

Formula Used: Ratio Substitution Method

=> Let x = 7k and y = 3k

=> $(x^2 + y^2) = (7k)^2 + (3k)^2 = 49k^2 + 9k^2 = 58k^2$

=> $(x^2 - y^2) = (7k)^2 - (3k)^2 = 49k^2 - 9k^2 = 40k^2$

=> Required Ratio = $58k^2 : 40k^2$

=> Required Ratio = 58 : 40 = 29 : 20

Therefore The correct answer is 29 : 20.

Additional Information

Componendo and Dividendo

If a/b = c/d, then (a+b)/(a−b) = (c+d)/(c−d). This rule is useful for simplifying expressions involving fractions and ratios.

Homogeneous Functions

In expressions where the sum of powers in every term of the numerator and denominator is the same, constant k cancels out, allowing direct substitution of ratio values.

Duplicate Ratio

The duplicate ratio of a : b is $a^2 : b^2$. Here, $x^2 : y^2 = 49 : 9$.

Q85. Answer: (a) 9.62

Shortcut Trick

Net Profit or Loss% = a + b + (a × b) ÷ 100

Where a is the markup percentage (+26) and b is the discount percentage (−13).

Net Gain% = 26 − 13 + (26 × (−13)) ÷ 100

Net Gain% = 13 − (338 ÷ 100) = 13 − 3.38 = 9.62%.

Therefore The correct answer is 9.62.

Alternate Method

Given: Markup Percentage = 26%, Discount Percentage = 13%.

Formulas: Marked Price (MP) = CP × (100 + Markup%) ÷ 100 | Selling Price (SP) = MP × (100 − Discount%) ÷ 100 | Gain% = (SP − CP) ÷ CP × 100

=> Let Cost Price (CP) = 100.

=> Marked Price (MP) = 100 + 26% of 100 = 126.

=> Selling Price (SP) = 126 − 13% of 126.

=> SP = 126 − 16.38 = 109.62.

=> Gain% = (109.62 − 100) ÷ 100 × 100 = 9.62%.

Therefore The correct answer is 9.62.

Additional Information

Successive Percentage Change

When a value is increased by x% and then decreased by y%, the net change is given by [x − y − (xy/100)]%.

Relationship between CP, MP, and SP

The ratio of CP to MP can be expressed as: CP/MP = (100 − Discount%)/(100 + Profit%).

Q86. Answer: (c) 161

The logic followed here is,

Hence, the correct answer is "161".

Q87. Answer: (b) $x^2 - 3\alpha x + 2\alpha^2 = 0$

Shortcut Trick

Let the roots of the equation be α and 2α (as α is half of 2α).

Sum of roots = α + 2α = 3α.

Product of roots = α × 2α = $2\alpha^2$.

Quadratic formula: x^2 − (Sum)x + (Product) = 0.

Therefore The correct answer is $x^2 - 3\alpha x + 2\alpha^2 = 0$.

Alternate Method

Given:

One root of the quadratic equation = α

This root is half of the other root.

Formula Used:

If r1 and r2 are roots, the equation is: x^2 − (r1 + r2)x + (r1r2) = 0

Calculations:

=> Let the other root be r2.

=> α = r2 / 2 → r2 = 2α

=> Sum of roots = α + 2α = 3α

=> Product of roots = α × 2α = $2\alpha^2$

=> Substituting in formula: x^2 − (3α)x + ($2\alpha^2$) = 0

=> $x^2 - 3\alpha x + 2\alpha^2 = 0$

Therefore The correct answer is $x^2 - 3\alpha x + 2\alpha^2 = 0$.

Additional Information

Relationship between Roots and Coefficients

For a quadratic equation $ax^2 + bx + c = 0$, the sum of roots is −b/a and the product of roots is c/a.

Discriminant and Nature of Roots

The value $D = b^2 - 4ac$ determines root types: D > 0 (Real & Distinct), D = 0 (Real & Equal), and D < 0 (Imaginary).

Standard Form

Every quadratic equation with roots p and q can be expressed as k[x^2 − (p+q)x + pq] = 0 where k is a constant.

YourMockTest.com — Free Study Material

Q88. Answer: (d) 130 m

Shortcut Trick

Relative Speed in same direction = 56 − 46 = 10 m/s.

Total distance covered = Relative Speed × Time = 10 × 26 = 260 m.

Since both trains have the same length, Length of each train = 260 ÷ 2 = 130 m.

Therefore The correct answer is 130 m.

Alternate Method

Given: Speed of faster train (S1) = 56 m/s, Speed of slower train (S2) = 46 m/s, Time taken (t) = 26 sec.

Formula Used: Distance = Relative Speed × Time; Total Distance = L1 + L2

=> Let the length of each train be L.

=> Relative Speed = S1 − S2 = 56 − 46 = 10 m/s.

=> Total Distance = L + L = 2L.

=> 2L = 10 × 26

=> 2L = 260

=> L = 130 m.

Therefore The correct answer is 130 m.

Additional Information

Relative Speed Concept

When two objects move in the same direction, relative speed is the difference of their speeds (u − v). When they move in opposite directions, it is the sum (u + v).

Train Crossing Distance

When a train crosses another train or a platform, the total distance covered is always the sum of the lengths of both objects.

Unit Conversion

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

Q89. Answer: (d) i - c, ii - d, iii - b, iv - a

The correct answer is i - c, ii - d, iii - b, iv - a.

Key Points

• CH_3COOH is the chemical formula for Acetic acid. This is a common organic acid found in vinegar and is known for its sour taste and strong odor. Hence, i matches with c.

• $CHCl_3$ is the chemical formula for Chloroform. It is a colorless, sweet-smelling organic compound that is used as a solvent and was once used as an anesthetic. Hence, ii matches with d.

• CH_3CH_2OH is the chemical formula for Ethanol. This is a type of alcohol found in alcoholic beverages and is also used as a fuel and in thermometers. Hence, iii matches with b.

• CH_4 is the chemical formula for Methane. It is a simple hydrocarbon and the main component of natural gas, used as a fuel. Hence, iv matches with a.

Additional Information

• Acetic Acid (CH_3COOH):

• Acetic acid is used in the production of chemical compounds, as a solvent for inks, paints, and coatings, and in the food industry as a preservative and flavoring agent.

• Chloroform ($CHCl_3$):

• Chloroform is used in the production of refrigerants, as a solvent in the pharmaceutical industry, and in laboratories for various chemical reactions.

• Ethanol (CH_3CH_2OH):

• Ethanol is widely used in the manufacture of alcoholic beverages, as a solvent in the pharmaceutical and cosmetic industries, and as a fuel or fuel additive.

• Methane (CH_4):

• Methane is an important fuel source, used for heating, electricity generation, and as a chemical feedstock in the production of various chemicals and materials.

Q90. Answer: (c) Rs. 1,00,000

Shortcut Trick

Net multiplier for successive increases of 12% and 15%:

Base sale × (112/100) × (115/100) = Present sale

Base sale × (28/25) × (23/20) = 1,28,800
Base sale × (644/500) = 1,28,800 => 1 unit = 200
Therefore The correct answer is Rs. 1,00,000.
Alternate Method
Given:
First year increase = 12%
Second year increase = 15%
Present sale = Rs. 1,28,800
Let the sale 2 years ago be x.
=> x × (1 + 12/100) × (1 + 15/100) = 1,28,800
=> x × (112/100) × (115/100) = 1,28,800
=> x × 1.12 × 1.15 = 1,28,800
=> x × 1.288 = 1,28,800
=> x = 1,28,800 ÷ 1.288
=> x = 1,00,000
Therefore The correct answer is Rs. 1,00,000.
Additional Information
Successive Percentage Change
If a value changes by a% and then by b%, the effective change is (a + b + (a × b)/100)%.
Reverse Percentage Calculation
To find the initial value after a percentage increase, use: Initial = Final ÷ (1 + r/100).
Compound Growth
Population or sale growth over years follows the same logic as Compound Interest: A = P(1 + r1/100)(1 + r2/100).

Q91. Answer: (a) 3

Shortcut Trick
Perform Prime Factorization of the number 1083.
1083 = 3 × 361 = 3 × 19 × 19
Pairing factors: (19 × 19) is a pair, but 3 is unpaired.
To make it a perfect square, we must multiply by the unpaired factor.
Therefore The correct answer is 3.
Alternate Method
Given: The number is 1083.
Method: Find the prime factors and identify the factor with an odd power.
=> Prime factors of 1083 = $3^1 \times 19^2$
=> For a number to be a perfect square, all prime factors must have even exponents.
=> Here, the exponent of 3 is 1 (odd).
=> Smallest whole number to multiply = 3^((2−1)) = 3.
=> Resulting number = 1083 × 3 = 3249 = $(57)^2$.
Therefore The correct answer is 3.
Additional Information
Perfect Square Property
A number is a perfect square if and only if every prime factor in its prime factorization has an even power.
Smallest Multiplier/Divisor
To find the smallest number to multiply or divide to make a number a perfect square, identify the factors with odd powers; their product is the required number.
Ending Digits
A perfect square never ends in the digits 2, 3, 7, or 8.

Q92. Answer: (a) Only conclusion 2 is true

The given statements are: T ≥ C, B < D, C > B
On combining we get: T ≥ C > B < D

Conclusions:

1. D = C → False (It has an uncertain relation; C > B < D)

2. T > B → True (It has a definite relation; T ≥ C > B)

Hence, the correct answer is "Only conclusion 2 is true".

Q93. Answer: (d) Tamil

The correct answer is Tamil

Key Points

• Tamil is officially recognized in both Singapore and Sri Lanka.

• In Singapore, Tamil is one of the four official languages, alongside English, Malay, and Mandarin.

• In Sri Lanka, Tamil is one of the two official and national languages, the other being Sinhala.

• Tamil has a rich literary tradition and is one of the longest-surviving classical languages in the world.

Additional Information

• The Tamil language has official status in the Indian state of Tamil Nadu and the Union Territory of Puducherry.

• It is also spoken by significant populations in Malaysia, Mauritius, Fiji, and South Africa.

• Tamil is one of the 22 scheduled languages of India and was declared a classical language by the Government of India in 2004.

• The Tamil script is used to write the Tamil language and is known for its unique and intricate characters.

Q94. Answer: (b) Rs. 4,000

Shortcut Trick

Difference in interest rates = 5.5% − 4.5% = 1%

Total difference in percentage for 2 years = 1% × 2 = 2%

Difference in Simple Interest = 2% of Rs. 2,00,000

Difference = (2 ÷ 100) × 2,00,000 = 2 × 2,000 = 4,000

Therefore The correct answer is Rs. 4,000.

Alternate Method

Given:

Principal (P) = Rs. 2,00,000 for each bank

Rate for Bank A (R1) = 4.5% p.a.

Rate for Bank B (R2) = 5.5% p.a.

Time (T) = 2 years

Formula Used:

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

Calculations:

=> SI from Bank A = (2,00,000 × 4.5 × 2) ÷ 100

=> SI from Bank A = 2,000 × 9 = Rs. 18,000

=> SI from Bank B = (2,00,000 × 5.5 × 2) ÷ 100

=> SI from Bank B = 2,000 × 11 = Rs. 22,000

=> Positive Difference = Rs. 22,000 − Rs. 18,000

=> Difference = Rs. 4,000

Therefore The correct answer is Rs. 4,000.

Additional Information

Simple Interest Formula

Simple Interest is calculated only on the initial principal amount. Formula: SI = (P × R × T) ÷ 100.

Total Amount

The total amount (A) to be paid after the time period is the sum of the Principal and the Simple Interest: A = P + SI.

Rate Difference Property

When the principal and time are constant, the difference in interest is directly proportional to the difference in rates: ΔSI = P × (ΔR) × T ÷ 100.

Q95. Answer: (a) 1 : 4

Concept:

• Power and Resistance Relationship: The power consumed by an electrical device is related to its resistance and the voltage

applied across it. The formula for power is given by:

• P = V2 / R, where P is power, V is voltage, and R is resistance.

Calcualtion:

$R_A = V^2 / P_A$

RB = V2 / PB

So, $R_A : R_B$

$\Rightarrow V^2/P_A : V^2/PB$

$\Rightarrow 1/PA : 1/PB$

$\Rightarrow PB : PA$

$\Rightarrow 25 : 100 = 1 : 4$

Hence, the ratio of the resistance of bulb A to that of bulb B is 1 : 4.

Additional Information

• The resistance of a bulb determines how much current it will draw for a given voltage. Higher resistance means less current and vice versa.

• In practical scenarios, the wattage rating of a bulb indicates how much power it will consume when connected to its rated voltage.

Q96. Answer: (d) 30 m, West

According to the given information,

1) Parvati starts walking from point A and covers 35 m towards the south.

2) From there, she takes a left turn and walks 60 m.

3) Then, she takes a left turn and walks 15 m.

4) After that, she takes a left turn and walks 90 m.

5) Finally, she takes a right turn and walks 20 m to reach point D.

Here, we can see that point D is 30m in west direction from point A.

Hence, the correct answer is "30 m, West".

Q97. Answer: (b) 1

According to the given information,

Letters	A	N	O	T	H	E	R
In Alphabetical order	A	E	H	N	O	R	T

Here, we can see that the position of one letter remains unchanged.

Hence, the correct answer is "1".

Q98. Answer: (d) more than 1.0 cm, inverted

The correct answer is more than 1.0 cm, inverted.

Key Points

• The object is placed at a distance of 18.0 cm in front of a concave mirror with a focal length of 10.0 cm.

• Using the mirror formula: 1/f = 1/v + 1/u, where f = -10.0 cm (concave mirror, negative focal length), u = -18.0 cm (object distance).

• Substituting the values: 1/(-10) = 1/v + 1/(-18), solving for v gives: v = - 45/2 cm (negative, meaning the image is real and formed on the same side as the object).

• The magnification (m) is given by: m = -v/u. Substituting the values: m = -(-45/2)/(-18) = 1.25, which is more than 1, indicating the image is larger than the object.

• The image is real, inverted, and larger (more than 1.0 cm in height).

Additional Information

• Concave Mirror:

• Also known as a converging mirror.

• Forms real, inverted, and diminished images when the object is placed beyond the focal point.

• The image distance is negative when the image is real and formed in front of the mirror.

• Mirror Formula:

• The mirror formula is 1/f = 1/v + 1/u, where f is the focal length, v is the image distance, and u is the object distance.

YourMockTest.com — Free Study Material

• For concave mirrors, the focal length (f) is negative and the object distance (u) is also negative when the object is in front of the mirror.
• Magnification:
• Magnification (m) is given by m = -v/u.
• If the magnification is less than 1, the image is diminished; if greater than 1, the image is enlarged.
• A negative magnification indicates an inverted image, and a positive magnification indicates an erect image.
• Image Characteristics in Concave Mirrors:
• When the object is beyond the focal point, the image is real, inverted, and diminished.
• If the object is at the focal point, no image is formed.
• If the object is between the focal point and the mirror, the image is virtual, erect, and magnified

Q99. Answer: (c) 10

The given number is: 457943246

If 1 is added to each even digit and 1 is subtracted from each odd digit in the number, we get: 546852357

Digit which is fourth from the left → 8

Digit which is fourth from the right → 2

Sum of the digits = (8 + 2) = 10

Hence, the correct answer is "10".

Q100. Answer: (c) Three

The given word is: ROASTERS

The pair of letters which have as many letters between them in the word as there are in the English alphabetical order is shown below,

Hence, the correct answer is "Three".

More previous year papers and mock tests: **www.yourmocktest.com/pyq**