RRB Group D Previous Year Paper (Held on: 8 Sept 2022 Shift 2)

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

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CBT

Q1. Washing soda is used in the manufacture of which of the following compounds?

(a) Borax
(b) Green vitriol
(c) Bleaching powder
(d) Blue vitriol

Q2. The curved surface area of a cylinder having radius 15 cm and height 32 cm is:

(a) 860 π cm^2
(b) 960 π cm2
(c) 760 π cm2
(d) 1060 π cm2

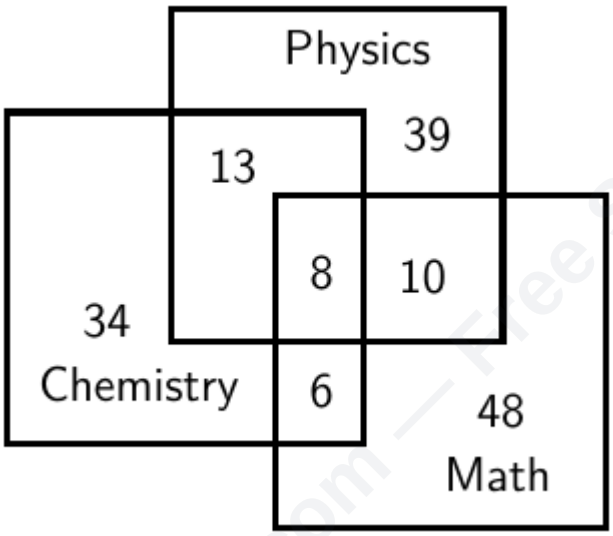
Q3. Which of the following teams won the Tata Indian Premier League (IPL) 2022?

(a) Chennai Super Kings (CSK)
(b) Rajasthan Royals (RR)
(c) Gujarat Titans (GT)
(d) Kolkata Knight Riders (KKR)

Q4. The Eleventh Schedule to the Constitution of India lists _____ subjects.

(a) 21
(b) 29
(c) 23
(d) 26

Q5. The diagram given below represents those students who study Physics, Chemistry and Math. Find the number of students who study Physics and Chemistry but not Math.



(a) 6
(b) 8
(c) 10
(d) 13

Q6. Which of the following options is the closest approximate value which will come in place of question mark(?) in the following equation?

7.98 - (6.064 + 6.003 ÷ 6.003) + 2.003 - 1.02 = ?

(a) 22
(b) 8
(c) 12
(d) 2

Q7. In which stage of production does the marginal product curve become negative?

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

Q8. Six years ago, the average age of L and M was 39 years and the average of the present ages of L, M and N is 54 years. What will be the age of N 5 years from now?

(a) 77 years
(b) 92 years
(c) 72 years
(d) 97 years

Q9. Three statements are followed by three conclusions numbered I, II and III. You have to consider these statements to be true, even if they seem to be at variance with commonly known facts. Decide which of the given conclusions logically follow(s) from the given statement.

Statements:

Few melons are bananas

No banana is a cherry

All cherries are litchis

Conclusions:

(I) Some litchis are not bananas

(II) All bananas are melons

(III) All litchis are cherries

(a) Only conclusion I follows

(b) Only conclusion I and III follows
(c) Only conclusion II follows
(d) None of the conclusions follow

Q10. In the given letter-cluster triads, the letter-clusters in a particular triad are related following a certain logic. Study the given triads carefully and from the given options, select the triad that follows the same logic.

(ACE : BDF : CEG)

(SUW : TVX : UWY)

(a) (SUW : TVX : YAC)
(b) (QRS : TUV : WXY)
(c) (ACF : BDE : CFH)
(d) (KMO : LNP : MOQ)

Q11. Which of the following options is the closest approximate value which will come in place of question mark(?) in the following equation?

4.99 + .99 - 4.01 × 2 + 3.59 = ?

(a) 3
(b) 2
(c) 1
(d) 5

Q12. Refer to the following letter, symbol series and answer the question.

D & C N ^ E G ^ Y T % @ G R I & * H K & Z $ P * ^

How many consonants are there that are immediately preceded by a consonant and immediately followed by symbol?

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

Q13. Seven people are sitting in a straight row all facing towards north. E is not an immediate neighbour of M and N. N is also not an immediate neighbour of M. M is sitting 4th to the right of L. I is sitting on extreme right end of the row. N is sitting fourth to the left of B. P is sitting third to the left of M and second to the right of N. Who is sitting at extreme left ends?

(a) N
(b) P
(c) I
(d) E

Q14. There is an aqueous solution X, whose pH is 2.6. It represents that the solution is:

(a) weakly basic in nature
(b) strongly acidic in nature
(c) strongly basic in nature
(d) neutral in nature

Q15. When a coil carrying a current is placed in a magnetic field, a force is produced on it. This is the working principle of:

(a) motor
(b) turbine
(c) cooler
(d) generator

Q16. If one root of the equation $4x^2 - 2x + k - 4 = 0$ is reciprocal of the other, the value of k is:

(a) 4
(b) -8
(c) -4

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(d) 8

Q17. Amongst six friends G, H, I, J, K and L, each has a different height. G is taller than only two other friends. I is shorter than only one friend. K is shorter than G but taller than J. H is shorter than L. Who is the shortest among all the friends?

(a) L
(b) G
(c) J
(d) K

Q18. Three children are making cards for people at an old age home. They take 12 min, 18 min and 20 min respectively to complete a card. If they start making the cards at the same time, after how many minutes, will they again start a new card together?

(a) 140 min
(b) 180 min
(c) 110 min
(d) 130 min

Q19. Refer to the following number-symbol series and answer the question that follows.

1 * 2 9 8 4 ! ^ 3 5 4 # 9 ! 3¹ 3 9 6 8 * $ 9 3

How many such symbols are there that are immediately preceded by a number and immediately followed by a number?

(a) 6
(b) 3
(c) 2
(d) 4

Q20. Gopal went to a bank to withdraw Rs. 4,000. He asked the cashier to give the cash in Rs. 50 and Rs. 100 notes only. Gopal got 50 notes in all. How many Rs. 50 notes did he receive?

(a) 20
(b) 30
(c) 32
(d) 24

Q21. For excellence in the field of medical services, which of the following awards is given?

(a) Daly Memorial Award
(b) Dhanvantari Award
(c) Shanti Swarup Bhatnagar Award
(d) Borlaug Award

Q22. If the angles (3x - 5)° and 80° form a pair of supplementary angles, then the value of x is:

(a) 35°
(b) 90°
(c) 50°
(d) 45°

Q23. The circumference of the base of a solid right circular cylinder is 136.4 cm and its height is 50 cm. What is the volume (in cm^3) of the cylinder? (Take $\pi = 22/7$).

(a) 31713
(b) 10571
(c) 63426
(d) 73997

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Q24. A hollow spherical shell is made of a metal of density 6 g/cm³. Its internal and external radii are 8 cm and 9 cm, respectively. What is the weight (in kg) of the shell (take π = 22/7)?

(a) 4.546
(b) 6.642
(c) 6.462
(d) 5.456

Q25. In February 2022, the Ministry of Women and Child Development, Government of India extended the PM Cares for Children Scheme till _____.

(a) 28 February 2022
(b) 31 December 2022
(c) 31 March 2022
(d) 30 June 2022

Q26. What will come in place of the question mark (?) in the following equation, if '+' and '-' are interchanged and also '×' and '÷' are interchanged?

17 ÷ 5 + 216 × 3 + 33 - 930 × 3 + 28 = ?

(a) 222
(b) 246
(c) 262
(d) 232

Q27. Mendeleev's Periodic Law could not explain the position of _____ in the periodic table.

(a) Isobars
(b) Isotopes
(c) Isodiaphers
(d) Isotones

Q28. Match the following characteristics in Modern Periodic Table:

i.	**smallest atom**	**a.**	**cesium**
ii.	metalloid	b.	Fluorine
iii.	most metallic natural element	c.	silicone
iv.	most electronegative	d.	iodine
v.	least electronegative	e.	lithium

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

Q29. In which of the following countries was the Men's T-20 ICC World Cup-2021 staged?

(a) South Africa - Namibia
(b) Oman - UAE
(c) India - Bangladesh
(d) Sri Lanka - Maldives

Q30. The amount of carbon dioxide in the atmosphere is _____.

(a) 0.3%
(b) 0.03%
(c) 71%
(d) 21%

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Q31. If the current passing through a heater is tripled by keeping resistance and time of the current flow unaltered, then the heat produced is:

(a) Becomes nine times
(b) Doubled
(c) Becomes six times
(d) Tripled

Q32. A person can complete a journey in 14 hours. He covers the first one-third of the distance at the rate of 40 km/h and the remaining distance at the rate of 60 km/h. What is the total distance of his journey?

(a) 720 km
(b) 480 km
(c) 540 km
(d) 360 km

Q33. Which of the following numbers will replace the question mark (?) in the given series?

33, 36, 42, 51, 63, ?

(a) 80
(b) 78
(c) 75
(d) 79

Q34. Complete the double displacement reaction.

2NaOH + CuSO4 → X + Na2SO4, here X will be _____.

(a) CuCl2
(b) Cu(OH)2
(c) Ca(OH)2
(d) CaCl2

Q35. The value of 2 + [2 + 2 ÷ {2 + 2 ÷ (2 + 1 over3)}] is:

(a) 47 over10
(b) 37 over10
(c) 67 over10
(d) 57 over10

Q36. The sum of the age of A and twice the age of B is 42 years. When two times the age of A is added to three times the age of B, the result is 69 years. The sum of the ages (in years) of A and B is:

(a) 29
(b) 30
(c) 27
(d) 31

Q37. Each of P, Q, R, S, T, U and V has an exam on a different day of a week, starting from Monday and ending on Sunday of the same week.

S has the exam on Thursday. Only one person has the exam between S and V. Q has the exam on the day immediately before V but not on a Monday. Only two people have exams between Q and U. P's exam is on one of the days before T but on one of the days after R. Who among the following has the exam on Monday?

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

Q38. Given below is a statement followed by two possible underlying assumptions I and II. Read the information carefully and select the correct option.

Statement:

As per reports by International recruiters, around 25% of the candidates are rejected just on the basis of insufficient

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data in their CVs or due to the format of the CVs auto-created by some websites.

Which of the following can be assumed from the given statement?

I. CVs manually created by job seekers have more chances of being viewed / selected than auto created CVs.

II. No criteria other than insufficient information and formatting results in rejection of CVs.

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

Q39. A sum of Rs. 5,800 is invested at 6% per annum simple interest. How much will the sum become after 4 years?

(a) Rs. 8,192
(b) Rs. 7,192
(c) Rs. 6,192
(d) Rs. 9,192

Q40. What is the product of UV radiations acting on oxygen molecules at higher levels of the atmosphere?

(a) Ozone
(b) Chlorofluorocarbons
(c) Water
(d) Carbon dioxide

Q41. Amongst six friends B, I, H, J, O and U, each has a different height. H is taller than only four other friends. O is taller than only one friend. B is taller than U but shorter than J. J is not the tallest. Who is the shortest among all the friends?

(a) U
(b) I
(c) H
(d) B

Q42. A light ray is incident from air to the surface of water kept in a jar at an angle of 30°. The ray will be refracted at an angle of _____ in the water, and will be _____ in the plane of the incident ray.

(a) less than 30°, not locate
(b) More than 30°, locate
(c) More than 30°, not locate
(d) less than 30°, locate

Q43. A can do a piece of work in 12 days, B can do the same work in 15 days. C can do the same work in 9 days. The time taken by them to finish the same work if they work together is:

(a) 3 39/47 days
(b) 5 39/47 days
(c) 4 39/47 days
(d) 2 39/47 days

Q44. A train overtakes two persons who are walking at 15 m/s and 35 m/s, respectively, in the same direction as that of the train in 20 seconds and 40 seconds. respectively, the length of the train is:

(a) 700 m
(b) 1000 m
(c) 800 m
(d) 900 m

Q45. Which of the following is the the world's largest basaltic impact crater lake found in India?

(a) Loktak Lake
(b) Pulicat Lake
(c) Lonar Lake
(d) Wular Lake

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Q46. Two identical bulbs are connected in parallel to a battery of 4 V. If the current in the circuit is 0.2 A, the power dissipated by the battery is:

(a) 0.8 W
(b) 10 W
(c) 0.05 W
(d) 20 W

Q47. Which of the following is/are NOT a source of geothermal energy?

(a) Geysers
(b) Lava flows
(c) Biomass
(d) Fumaroles

Q48. Under which Article of the Indian Constitution is the annual financial statement prepared?

(a) Article 112
(b) Article 130
(c) Article 140
(d) Article 101

Q49. The value of

$5^3 - 9^2 + (12 \div 4)^2 - 32 + 8 \times 0 =$

(a) 61
(b) 25
(c) -15
(d) 21

Q50. In a certain code language, the numbers/symbols are coded using letters as per the table given below and as per the given conditions.

Number\Symbol	**•**	**1**	**&**	**2**		**3**	**^**	**4**	**%**	**5**	**$**	**11**	**#**	**6**	**@**	**7**	**!**	**8**
Code	Q	A	Z	X	S	W	E	D	C	V	F	R	T	G	B	N	H	Y

Conditions:

I. If the first element is an odd number and the last also is an odd number, the code for the first element will be P and for the last element will be K.

II. If the last two elements are numbers the codes for these two are to be interchanged.

III. If the first two elements are symbols, both these elements will be coded as UU.

What will be the code for 3$7%68 ?

(a) WUNCYG
(b) WFNCGY
(c) PFNCGK
(d) WFNCYG

Q51. Express 0.35959... in the form p over q, where p and q are integers and $q \neq 0$.

(a) 179 over 495
(b) 178 over 495
(c) 359 over 990
(d) 119 over 330

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Q52. Five boxes A, B, C, D and E are kept one over the other but not necessarily in the same order. A is kept third from the bottom. Only one box is kept between A and B. There are only three boxes between D and B. C is placed immediately above B. How many boxes are placed between A and D?

(a) 1
(b) 0
(c) 3
(d) 2

Q53. Pole E is to the east of pole R. Pole G is to the west of pole R and north of pole A. Pole T is to the south of pole A. What is the position of pole R with respect to pole A?

(a) South-east
(b) North
(c) North-east
(d) North-west

Q54. In a code language. the numbers/symbols are coded using letters as per the table given below and as per the given conditions.

Number\Symbol	2	$	7	@	4	#	9	&	1	!	3	•
Code	T	D	C	R	G	B	Y	H	N	J	P	L

Conditions:

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

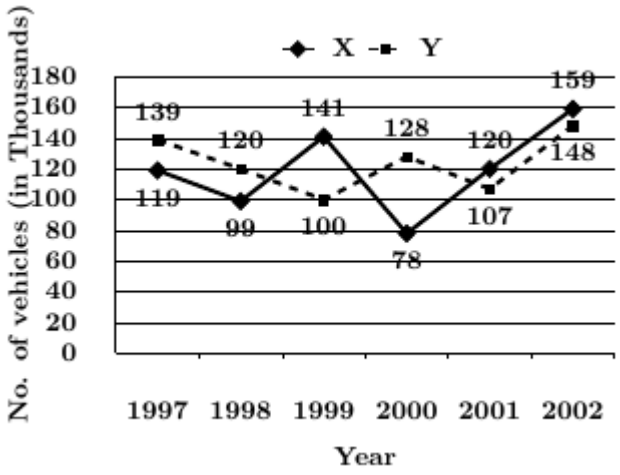
ii. If the first element is an odd number and the last, an even number, the first and last elements are to be coded as ©.

iii. If both the second and third elements are perfect squares, the third element is to be coded as the code for the second element.

What will be the code for @4#3*9 ?

(a) RGBPLY
(b) YGCPLR
(c) YGBPLR
(d) RGCPLY

Q55. The number of vehicles caught for speeding in different years in two cities X and Y are shown in the following graph. Study the graph and answer the question.



Which city has more total number of vehicles which are caught speeding between the years 1998 - 2001? In which year, the difference in the number of vehicles caught between the two cities is maximum?

(a) Y, 1999
(b) Y, 2000

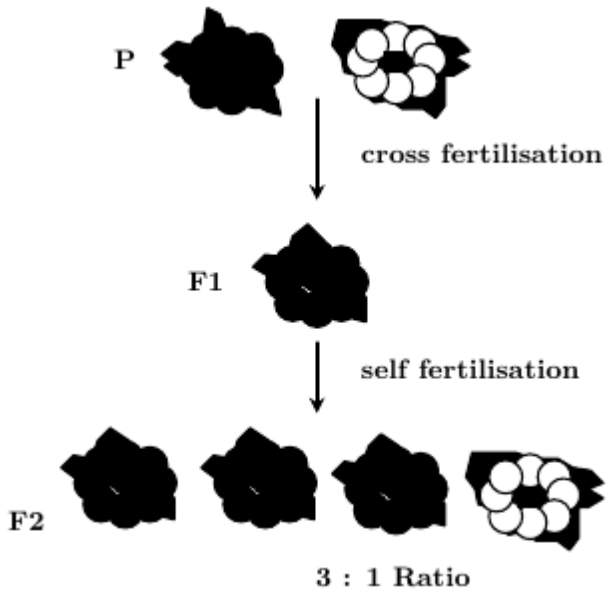
(c) X, 1999
(d) X, 2000

Q56. Gulshan drove his car for 77 km towards north, then he turned left and drove for 109 km. Again, he turned left and drove yet another 77 km. Again, he turned left, drove his car 127 km and stopped. What is the shortest distance between the starting point and the stopping point?
(All turns are 90 degree turns only)
(a) 18 km
(b) 109 km
(c) 154 km
(d) 127 km

Q57. 8 : 4 :: 3.2 : x and 3 : 6 :: 6 : y. What is the ratio of x to y?
(a) 1 : 3
(b) 4 : 9
(c) 3 : 8
(d) 2 : 15

Q58. Consider the following statements about a commercial motor:
(a) It uses an electromagnet in place of a permanent magnet.
(b) It uses a soft-iron core.
Which of the above statements is/are correct?
(a) Neither (a) nor (b)
(b) Only (a)
(c) Both (a) and (b)
(d) Only (b)

Q59. The image below shows a cross between two plants up to F2 generation. Some conclusions that can be drawn from this cross are stated below. Which option gives the INCORRECT conclusion?



(a) Traits are inherited but not expressed.
(b) Both red and green are dominant though less number of green are produced.
(c) Only red colour is dominant.
(d) Green is recessive.

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Q60. What will be the next homologous member of compound CH3OH?

(a) C2H5OH
(b) C3H5OH
(c) C3H7OH
(d) C2H3OH

Q61. What would be the colour of the sky as viewed by an astronaut at the International Space Station?

(a) Blue
(b) Red
(c) White
(d) Black

Q62. Which of the following is a classical Dravidian language?

(a) Odia
(b) Tamil
(c) Gujarati
(d) Bengali

Q63. Why do we measure the presence of starch in the experiments of photosynthesis?

(a) Glucose formed is converted into starch
(b) Starch is soluble in water
(c) Starch is formed as a result of photosynthesis
(d) Glucose is insoluble in water

Q64. Two positive numbers differ by 3422. When the greater number is divided by the smaller number, the quotient is 4 and the remainder is 290. What is the HCF of the greater of the two given numbers and 4292?

(a) 148
(b) 58
(c) 116
(d) 74

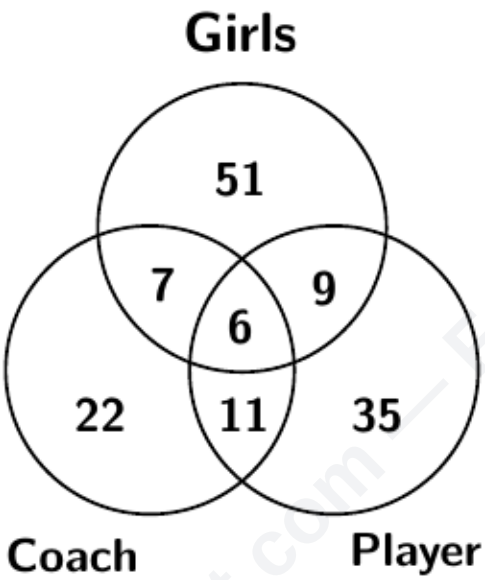
Q65. A ray of light is incident on a concave mirror (pole P) of radius of curvature 8 cm, parallel to its principal axis. After reflection, it passes through a point Q on its principal axis. Following New Cartesian Sign Convention, PQ = _____.

(a) 8 cm
(b) -4 cm
(c) -8 cm
(d) 4 cm

Q66. Study the given diagram carefully and answer the questions. The numbers in different sections indicate the number of persons.

In the following Venn diagram, how many girls are there who are players but not coaches?

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(a) 9
(b) 7
(c) 11
(d) 6

Q67. Consider the below statements and identify the correct answer.
Statement I: The reaction between an acid and a base to form salt and water is known as a neutralisation reaction.
Statement II: A neutralisation reaction can be written as: Acid + Base → Salt + Water
(a) Both statements are incorrect.
(b) Statement I is correct, and Statement II is incorrect.
(c) Both statements are correct.
(d) Statement II is correct, and Statement I is incorrect.

Q68. Select the term from among the given options that can replace the question mark (?) in the following series.
A3J5R, E6K6S, I9L7T, O12M8U, ?, A18O10W
(a) U15N9A
(b) U15N9V
(c) U15N10A
(d) P15N9A

Q69. A school has four sections i.e. A, B, C, D in Class IX. The result of annual exams and half yearly exams for the students of these four sections is given in the following table. Study the table carefully and answer the question that follows.

Result	**No. of Students**			
Section A	Section B	Section C	Section D	
Students failed in both exams	27	25	23	26
Students failed in half-yearly but passed in annual exams	17	15	18	19
Students passed in half-yearly but failed in annual exams	6	8	9	7
Students passed in both exams	62	57	60	59

A student is declared pass if he passes in at least one of the two examinations (half-yearly/annual). Which section has the maximum pass percentage?

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

Q70. India's first fisheries business incubator was inaugurated by the Union Minister of Fisheries, Animal Husbandry and Dairying in _____.

(a) Rohtak
(b) Karnal
(c) Gurugram
(d) Noida

Q71. Seven people, A, B, C, D, E, F and G, are sitting in a straight row, facing north. Only three people sit between B and D. Only two people sit to the left of B. F is not an immediate neighbour of D. F sits second to the right of G. A sits to the immediate right of E. Who sits at the extreme left end of the row?

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

Q72. Which Indian River that starts from Gangotri is polluted largely by human activities and industries?

(a) Cauvery
(b) Krishna
(c) Ganga
(d) Brahmaputra

Q73. 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.

(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 is not allowed)

1 : 10 :: 3 : 18 :: 9 : ?

(a) 79
(b) 54
(c) 42
(d) 71

Q74. What is the mode of the following data?

43, 41, 46, 48, 43, 50, 54, 41, 48, 54, 46, 43, 48, 50, 46, 48, 50, 54

(a) 48
(b) 46
(c) 54
(d) 50

Q75. Which of the following is not a part of the human excretory system?

(a) ureter
(b) Trachea.
(c) urethra
(d) urinary bladder

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Q76. The drug Diclofenac is one of the prime reasons for wiping out most of the _____ population in India.

(a) vulture
(b) one-horned rhinoceros
(c) sparrow
(d) blackbuck

Q77. During which period were the Khilafat movement and Non-Cooperation movement organised to oppose British rule in India?

(a) 1919-1922
(b) 1931-1933
(c) 1850-1857
(d) 1943-1947

Q78. Select the number from among the given options that can replace the question mark (?) in the following series.

5, 12, ?, 96, 285, 852

(a) 56
(b) 27
(c) 33
(d) 48

Q79. Refer to the following letter, symbol series and answer the question.

D & C N E ^ & G ^ Y % % @ G Y & I & * H K Z

How many consonants are there that are immediately preceded by a symbol?

(a) Six
(b) Five
(c) Eight
(d) Four

Q80. The value of [(cos 40°)/(1+sin 40°)] + [(1+sin 40°)/(cos 40°)] is:

(a) 2 cosec 40°
(b) 2 cot 40°
(c) 2 tan 40°
(d) 2 sec 40°

Q81. Which constitutional authority established under Article 148 of the Constitution of India, has the power to audit the receipts and expenditure of the Central and the Governments of each State and Union Territory?

(a) Attorney General of India
(b) Advocate General of the India
(c) Finance Commission of India
(d) Comptroller and Auditor General of India

Q82. As per Article 51A (d) of the Constitution of India, _____.

(a) the State shall not deny to any person equality before the law or the equal protection of the laws within the territory of India
(b) a citizen of the country must defend the country and render national service when called upon to do so
(c) untouchability is abolished and its practice in any form is forbidden
(d) every adult is entitled to be registered as a voter at an election

Q83. If Rs. 2,400 is to be distributed between A and B in the ratio of 7 : 5, then the share of B is:

(a) Rs. 1,300
(b) Rs. 1,600
(c) Rs. 1,900
(d) Rs. 1,000

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Q84. The list price of an article is Rs. 1,200 and a discount of 15% is offered on the list price. What additional discount per cent on the already discounted price must be offered to a customer to bring the net selling price to Rs. 887.40?

(a) 11.5%
(b) 12.5%
(c) 12%
(d) 13%

Q85. Which of the following is a quadratic equation whose roots are 7 and 12?

(a) $x^2 - 14x + 84 = 0$
(b) x2 - 19x + 34 = 0
(c) 2x2 - 19x + 84 = 0
(d) x2 - 19x + 84 = 0

Q86. How many petroleum products were kept outside the purview of GST as on 31^(st) December 2021?

(a) 9
(b) 3
(c) 5
(d) 12

Q87. Which of the following banks was the organiser of the global hackathon, HARBINGER 2021 - Innovation for Transformation, with the theme ‘Smarter Digital Payments’?

(a) Reserve Bank of India
(b) State Bank of India
(c) HDFC Bank
(d) HSBC Bank

Q88. How do contraceptive pills help in birth control?

(a) By preventing release of eggs from the ovary
(b) By killing the zygote
(c) By inhibiting menstruation
(d) By blocking sperm production

Q89. Plants use a completely different process for excretion as compared to animals. Which of the following processes is NOT followed by plants for excretion?

(a) Store waste products in Vacuoles
(b) Filter toxic substances through the leaves
(c) Excrete some waste into the soil
(d) Excess water thrown out by transpiration

Q90. The ‘Stree Manoraksha’ project aimed at extending mental health training to 6000 OSC (One Stop Centre) functionaries across India was launched by _____ in March 2022.

(a) Amit Shah
(b) Smriti Zubin Irani
(c) Dr. Mansukh Mandaviya
(d) Narendra Modi

Q91. The then Indonesian President _____ was the first chief guest to grace Republic Day of India in 1950.

(a) Abdurrahman Wahid
(b) Sukarno
(c) B.J. Habibie
(d) Suharto

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Q92. This question is based on the five, three-digit numbers given below.

(Left) 577 534 249 842 718 (Right)

(Example: 697 - first digit = 6, second digit = 9, third digit = 7)

NOTE: All operations to be done from left to right.

If 2 is added to the second digit of every number, in how many numbers will the second digit be exactly divided by the first digit of that number?

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

Q93. The focus of a convex mirror is at a distance of 30 cm from its pole. Its centre of curvature will be at a distance of _____ from the focus.

(a) 45 cm
(b) 60 cm
(c) 30 cm
(d) 15 cm

Q94. A bulb draws a current of 5 A when connected to a battery of 12 V. The power of the bulb is:

(a) 60 W
(b) 1.2 W
(c) 2.4 W
(d) 0.41 W

Q95. Each of D, E, F, G, H, I and J has a football match to participate on a different day of a week, starting from Monday to Sunday of the same week. E has a match on the day immediately after I. G has a match immediately after H. J has a match immediately after E, but not on Sunday. D has a match on Wednesday. Who among the following has a match on Sunday?

(a) G
(b) E
(c) F
(d) H

Q96. An article is sold at a profit of 28% and the selling price is reduced by Rs. 72, then the profit would be 12%. What is cost price?

(a) 400
(b) 350
(c) 480
(d) 450

Q97. The total expenditure of Krishna in a year is Rs. 4,20,000. If his salary per month is Rs. 45,000, then find his average savings per month.

(a) Rs. 10,000
(b) Rs. 16,000
(c) Rs. 14,000
(d) Rs. 12,000

Q98. Which of the following Vedas is also called "Book of Songs", "Veda of Mantras" or "Yoga of Songs"?

(a) Yajurveda
(b) Rigveda
(c) Atharvaveda
(d) Samveda

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Q99. Which of the following has the fastest breathing rate?

(a) Pigeon
(b) Fish
(c) Human
(d) Elephant

Q100. 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.

4 : 20 :: 15 : 240 :: 19 : ?

(a) 390
(b) 391
(c) 388
(d) 380

ANSWER KEY

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

SOLUTIONS

Q1. Answer: (a) Borax

The correct answer is 'Borax'.

Key Points

• Uses of washing soda:
• Sodium carbonate (washing soda) is used in the glass, soap, and paper industries.
• It is used in the manufacture of sodium compounds such as borax.
• Sodium carbonate can be used as a cleaning agent for domestic purposes.
• It is used for removing the permanent hardness of the water.
• The Washing Soda's chemical name is sodium carbonate (Na2CO3).

Additional Information

• Borax is a white crystalline solid of the chemical formula Na2B4O7.10H2O.
• On heating, it loses water of crystallization.
• The molecular formula for Borax is- H20B4Na2O_(17')
• It is used:
• as an alkaline buffer in dyeing and bleaching processes
• as a preservative in the manufacture of optical and borosilicate glasses
• as a flux, and in making glazes for pottery and tiles

Q2. Answer: (b) 960 π cm2

Shortcut Trick

Curved Surface Area (CSA) of a cylinder is given by 2πrh.

Given: radius (r) = 15 cm and height (h) = 32 cm.
CSA = 2 × π × 15 × 32
CSA = 30 × 32 × π = 960π cm².
Therefore The correct answer is 960π cm².
Alternate Method
Given:
Radius (r) of the cylinder = 15 cm
Height (h) of the cylinder = 32 cm
Formula Used:
Curved Surface Area (CSA) = 2πrh
Calculations:
=> CSA = 2 × π × 15 × 32
=> CSA = (2 × 15) × 32 × π
=> CSA = 30 × 32 × π
=> CSA = 960π cm²
Therefore The correct answer is 960π cm².
Additional Information
Total Surface Area of Cylinder
The total area including the two circular bases: TSA = 2πrh + 2πr² = 2πr(h + r).
Volume of Cylinder
The space occupied by the cylinder: Volume = πr²h.
Hollow Cylinder CSA
For a cylinder with internal radius r and external radius R: External CSA = 2πRh and Internal CSA = 2πrh.

Q3. Answer: (c) Gujarat Titans (GT)

The correct answer is 'Gujarat Titans (GT)'.
Key Points
• Gujrat Titans(GT) won the Tata Indian Premier League (IPL) 2022.
• GT won IPL 2022 by 7 wickets from Rajasthan Royals under the captaincy of Hardik Pandya.
• GT played 14 matches and won 10 of them to become the leading team of the year.
Additional Information
• 2022 was the debut year of Gujrat Titans.
• IPL is a mega cricket event which is organized annually in India on a very large scale
Important Points
• Here is a look at various award winners after the final match in Ahmedabad:

IPL 2022 champions	Gujarat Titans
Fairplay award	Gujarat Titans and Rajasthan Royals
Emerging player of the season	Umran Malik
Super Striker of the season	Dinesh Karthik
Game changer of the season	Jos Buttler
Perfect Catch of the Season	Evin Lewis
Purple cap	Yuzvendra Chahal
Orange cap	Jos Buttler
Most Valuable Player	Jos Buttler
Super Striker of the Season	Jos Buttler

Q4. Answer: (b) 29

The correct answer is '29'.
Key Points

• The Eleventh Schedule of the Indian Constitution was added in 1992 by the 73rd Constitution Amendment Act.
• This schedule contains a total of 29 subjects.
• It covers important topics such as rural development, poverty elevation, panchayat's power, drinking water, roads, etc.
Additional Information
• Some of the 29 subjects of the 11th schedule are as follows:
1. Agriculture (inc. agricultural expansion)
2. Fishery Industry
3. Land improvement, implementation of land reforms, land consolidation and soil conservation.
4. Safe water for drinking
5. Social forestry and farm forestry
6. Rural electrification, etc.

Q5. Answer: (d) 13

The students who study Physics and Chemistry but not Math are highlighted as follows:
Therefore, there are 13 students who study Physics and Chemistry but not Math.
Hence, the correct answer is Option (4).

Q6. Answer: (d) 2

Given:
7.98 - (6.064 + 6.003 ÷ 6.003) + 2.003 - 1.02
using the BODMAS rule,
= 7.98 - (6.064 + 6.003 ÷ 6.003) + 2.003 - 1.02
= 7.98 - (6.064 + 1) + 2.003 - 1.02
= 7.98 - 7.064 + 2.003 - 1.02
= 0.916 + 2.003 - 1.02
= 2.919 - 1.02
= 1.899
Here, the closest approximate value for 1.899 is 2.
Hence, “2” is the correct answer.

Q7. Answer: (d) Stage 3

The correct answer is 'Stage 3'.
Key Points
• The onset of stage 3 results due to the negative marginal curve product.
• The increase in output per unit increase in input is called as Marginal Product.
• The marginal product curve first increases, reaches its maximum and then declines.
• The law of diminishing marginal returns drives the marginal product to a point in short-run production when it turns out to be negative.
• Stage 3 is not at all feasible for the operation of any firm as the total product starts to decline and the marginal product becomes negative.

Q8. Answer: (a) 77 years

Shortcut Trick
Present sum of L + M = (39 × 2) + (6 × 2) = 78 + 12 = 90 years.
Present sum of L + M + N = 54 × 3 = 162 years.
Present age of N = 162 − 90 = 72 years.
Age of N after 5 years = 72 + 5 = 77 years.
Therefore The correct answer is 77 years.
Alternate Method
Given:
Average age of L and M 6 years ago = 39 years.
Average of present ages of L, M, and N = 54 years.
Calculations:

=> Sum of ages of L and M 6 years ago = 39 × 2 = 78 years.
=> Sum of present ages of L and M = 78 + (6 + 6) = 90 years.
=> Sum of present ages of L, M, and N = 54 × 3 = 162 years.
=> Present age of N = (Sum of L, M, N) − (Sum of L, M) = 162 − 90 = 72 years.
=> Age of N 5 years from now = 72 + 5 = 77 years.
Therefore The correct answer is 77 years.
Additional Information
Average Age Concept
If the average age of 'n' persons is 'x' years, then 'k' years later, their average age will be (x + k) years.
Sum of Ages
Total Sum = Average × Number of persons. When moving 't' years forward for 'n' people, add (n × t) to the total sum.
Weighted Average
Combined Average = (n1x1 + n2x2) ÷ (n1 + n2), used when combining different groups.

Q9. Answer: (a) Only conclusion I follows

Statements:
Few melons are bananas.
No banana is a cherry.
All cherries are litchis.
The least possible diagram for the given statements is as follows:
Conclusions:
(I) Some litchis are not bananas → True (Some litchis are cherries, and no banana is a cherry. Thus, some litchis are not bananas is definitely true).
(II) All bananas are melons → False (As Few melons are bananas,All bananas are melons is possible but not definitely true).
(III) All litchis are cherries → False (All cherries are litchis, So All litchis are cherries is possible but not definitely true).
Hence, 'Only conclusion I follows'.

Q10. Answer: (d) (KMO : LNP : MOQ)

The pattern followed here is:
And
Thus, the correct pattern is:
Hence, the correct answer is Option (4).

Q11. Answer: (b) 2

Given:
4.99 + .99 - 4.01 × 2 + 3.59
After replacing the signs from left to right and using the BODMAS rule,
= 4.99 + .99 - 4.01 × 2 + 3.59
= 4.99 + .99 - 8.02 + 3.59
= 5.98 - 8.02 + 3.59
= -2.04 + 3.59
= 1.55
The closest approximate value for 1.55 is 2.
Hence, “ option 2” is the correct answer.

Q12. Answer: (d) Three

letters that are immediately preceded by a letter and immediately followed by a symbol are shown as follows:
Thus, there are five such pairs:
1. C N ^
2. Y T %
3. H K &
4. EG ^
5. RI&

But we have to find Consonants - Consonants - Symbol

1. C N ^

2. Y T %

3. H K &

Hence, the correct answer is Option (4).

Q13. Answer: (a) N

Seven people are sitting in a straight row all facing towards north.

1. E is not an immediate neighbour of M and N.

2. N is also not an immediate neighbour of M.

3. M is sitting 4th to the right of L.

4. I is sitting on extreme right end of the row.

5. N is sitting fourth to the left of B.

6. P is sitting third to the left of M and second to the right of N.

If this is the arrangement of P, then case 1 will not be further applicable, thus case 2 is the correct arrangement of seven people.

7. As, E is not an immediate neighbour of M and N. The final arrangement of seven people is:

Thus, N is sitting at extreme left ends.

Hence, the correct answer is Option (1).

Q14. Answer: (b) strongly acidic in nature

The correct answer is 'strongly acidic in nature '.

Key Points

• The pH of a solution varies from 0 to 14.

• Solutions having a value of pH ranging from 0 to 7 on the pH scale are termed as acidic.

• The value of pH ranging from 7 to 14 on the pH scale is known as basic solutions.

• Solutions having a value of pH equal to 7 on the pH scale are known as neutral solutions.

• Solutions having a value of pH equal to or close to 0 are known to be strongly acidic solutions. Further, the acidity decreases as the value of pH increases from 0 to 7.

• Solutions with a value of pH equal to or close to 14 are termed strongly basic solutions.

Q15. Answer: (a) motor

The correct answer is 'motor'.

Key Points

• The electric motor is an electrical device that is capable of converting electrical energy into mechanical energy by using the magnetic effect of electric current.

• In an electric motor, we place a current-carrying conductor in a magnetic field that experiences a force.

• When an electric current is passed through a rectangular coil, this current produces a magnetic field around the coil. Thereafter the magnetic field of the magnet interacts with the magnetic field of the coil and causes the coil to rotate continuously.

• the working of the electric motor is purely based on Faraday’s law of electromagnetic induction where the magnetic effect of electric current is involved.

• The law states that the changing fields produce electromotive force or emf.

Q16. Answer: (d) 8

Shortcut Trick

For any quadratic equation $ax^2 + bx + c = 0$, if one root is the reciprocal of the other, their product of roots is 1.

The product of roots is given by the formula c/a.

Therefore, c/a = 1 => c = a.

In the equation $4x^2 - 2x + (k - 4) = 0$, we have a = 4 and c = k − 4.

Equating them: k − 4 = 4 => k = 8.

Therefore The correct answer is 8.

Alternate Method

Given: The quadratic equation is $4x^2 - 2x + k - 4 = 0$.

Formula Used: For a standard quadratic equation $ax^2 + bx + c = 0$, the product of roots $(\alpha\beta) = c/a$.

=> Let the roots of the given equation be α and 1/α.

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=> The product of these roots = α × (1/α) = 1.
=> From the given equation: a = 4, b = −2, and the constant term c = k − 4.
=> According to the formula: Product = c/a = (k − 4) / 4.
=> Setting the product equal to 1: (k − 4) / 4 = 1.
=> k − 4 = 4.
=> k = 4 + 4 = 8.
Therefore The correct answer is 8.
Additional Information
Relationship Between Roots and Coefficients
For the equation $ax^2 + bx + c = 0$, the Sum of roots is $-b/a$ and the Product of roots is c/a.
Nature of Roots
The nature is determined by the Discriminant $D = b^2 - 4ac$. If $D \geq 0$, roots are real; if $D < 0$, roots are complex/imaginary.
Roots Equal in Magnitude but Opposite in Sign
If the roots are α and −α, their sum is 0, which implies −b/a = 0, or simply the coefficient of x (b) must be zero.
Condition for Reciprocal Roots
Whenever one root is the reciprocal of the other, the coefficient of x^2 (a) is always equal to the constant term (c).

Q17. Answer: (c) J

According to given information, we have the possible arrangements as follows:
1. G is taller than only two other friends.
_ > _ > _ > G > _ > ___
2. I is shorter than only one friend.
_ > I > _ > G > _ > _
3.K is shorter than G but taller than J.
_ > I > _ > G > K > J
4. H is shorter than L.
L > I > H > G > K > J
Thus, J is the shortest among all the friends.
Hence, the correct answer is Option (3).

Q18. Answer: (b) 180 min

Shortcut Trick
To find the time when they start a new card together again, we need the LCM of their individual times.
Individual times: 12 min, 18 min, 20 min.
LCM(12, 18, 20) = LCM($2^2\times3$, 2×3^2, $2^2\times5$) = $2^2\times3^2\times5 = 4\times9\times5 = 180$.
Therefore The correct answer is 180 min.
Alternate Method
Given:
Time taken by Child 1 = 12 min
Time taken by Child 2 = 18 min
Time taken by Child 3 = 20 min
Formula Used:
The time interval after which repetitive events coincide is the Least Common Multiple (LCM) of the individual intervals.
Calculations:
=> Prime factorization of 12 = $2 \times 2 \times 3 = 2^2 \times 3^1$
=> Prime factorization of 18 = $2 \times 3 \times 3 = 2^1 \times 3^2$
=> Prime factorization of 20 = $2 \times 2 \times 5 = 2^2 \times 5^1$
=> LCM = 2^(highest power) × 3^(highest power) × 5^(highest power)
=> LCM = $2^2 \times 3^2 \times 5^1$
=> LCM = 4 × 9 × 5 = 180 min
Therefore The correct answer is 180 min.
Additional Information

LCM Applications

Used in problems involving traffic lights, bells tolling at intervals, or runners on a circular track meeting at the starting point.

HCF vs LCM

HCF is used for dividing items into the largest possible equal groups, while LCM is used for finding common multiples of different time cycles.

Product Rule

For two numbers a and b: HCF(a, b) × LCM(a, b) = a × b.

Q19. Answer: (d) 4

Symbols that are immediately preceded by a number and immediately followed by a number are highlighted below:

Number => Symbol => Number

There are 4 such patterns:

1. 1 * 2

2. 4 # 9

3. 3 ^ 1

4. 3 & 9

Hence, the correct answer is Option (4).

Q20. Answer: (a) 20

Shortcut Trick

Assume all 50 notes are of the higher denomination, i.e., Rs. 100.

Total assumed amount = 50 × 100 = Rs. 5000.

Difference from actual amount = 5000 − 4000 = Rs. 1000.

Difference between denominations = 100 − 50 = Rs. 50.

Number of Rs. 50 notes = 1000 ÷ 50 = 20 notes.

Therefore The correct answer is 20 notes.

Alternate Method

Given: Total amount = Rs. 4,000, Total notes = 50, Denominations = Rs. 50 and Rs. 100.

Formula: Alligation Method (Ratio of quantities = Difference of mean and second value : Difference of first value and mean).

=> Mean value per note = 4000 ÷ 50 = Rs. 80.

=> Ratio of Rs. 50 notes to Rs. 100 notes = (100 − 80) : (80 − 50) = 20 : 30 = 2 : 3.

=> Total ratio parts = 2 + 3 = 5 parts.

=> 5 parts = 50 notes.

=> 1 part = 50 ÷ 5 = 10 notes.

=> Number of Rs. 50 notes = 2 × 10 = 20 notes.

Therefore The correct answer is 20 notes.

Additional Information

Linear Equation Method

Let x be Rs. 50 notes and y be Rs. 100 notes. Equations: x + y = 50 and 50x + 100y = 4000.

Alligation Rule

When two ingredients are mixed, the ratio of quantity = (Higher value − Mean) : (Mean − Lower value).

Denomination Strategy

To minimize notes, use higher denominations; to maximize, use lower denominations for the same total sum.

Q21. Answer: (b) Dhanvantari Award

The correct answer is Dhanvantari Award.

Key Points

• For excellence in medical services, Dhanvantari Award is given.

• Dhanvantari is the 'Hindu god of medicines and the physicians of the god' and this award is named after this legendry god.

• Every year on Ayurveda Day, the Ministry of AYUSH offers the Dhanwantri Award that it established.

• It is given to Ayurveda professionals who have made significant contributions to the field and who meet the requirements listed in the IMCC Act's II, III, and IV schedule.

• The awardees receive a citation and a monetary prize of Rs. 5 lacs.

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Additional Information

• Daly Memorial Award:

• For excellence in undergraduate research in psychological science.

• This scholarship intends to offer financial support to deserving Wah Yan students who lack the resources to continue their further education, whether at home or abroad.

• Two components make up the prize.

• Initially, the recipient of the award receives a diploma and a financial prize at the graduation-related commemoration events.

• A plaque that is permanently displayed at the psychology department will also have the name of the prize recipient etched on it.

• Shanti Swarup Bhatnagar Award:

• The Council of Scientific and Industrial Research (CSIR) in India awards the Shanti Swarup Bhatnagar Prize for Science and Technology (SSB) every year for noteworthy and excellent research in the fields of biology, chemistry, environmental science, engineering, mathematics, medicine, and physics, whether it is applied or fundamental.

• For excellence in the field of science and technology.

• Borlaug Award:

• The Borlaug Award is an honor given to distinguished Indian scientists for their work and contributions in the fields of agriculture and the environment by the fertilizer business Coromandel International.

• The award was established in 1972 and is named in honor of Nobel Prize winner Norman E. Borlaug.

Q22. Answer: (a) 35°

Shortcut Trick

Supplementary angles always sum up to 180°.

Subtracting the known angle: 180° − 80° = 100°.

The expression (3x − 5) must equal 100°.

Adding 5 to 100 gives 3x = 105.

Dividing 105 by 3 gives x = 35.

Therefore The correct answer is 35°.

Alternate Method

Given:

Angle 1 = (3x − 5)°

Angle 2 = 80°

Formula Used:

Sum of supplementary angles = 180°

Calculations:

=> (3x − 5) + 80 = 180

=> 3x + 75 = 180

=> 3x = 180 − 75

=> 3x = 105

=> x = 105 ÷ 3

=> x = 35

Therefore The correct answer is 35°.

Additional Information

Complementary

Q23. Answer: (d) 73997

Shortcut Trick

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

Volume = $\pi r^2 h$ → 11 × 2 ÷ 7 × r^2 × 50

Option (4): 7 + 9 + 7 = 23; 3 + 9 = 12. Difference: 23 − 12 = 11 (Divisible by 11).

Therefore The correct answer is 73997 cm^3.

Alternate Method

Given: Circumference = 136.4 cm, Height (h) = 50 cm, π = 22/7

Formula Used: Circumference = 2πr | Volume = $\pi r^2 h$

=> 2 × (22/7) × r = 136.4

=> (44/7) × r = 136.4

=> r = (136.4 × 7) ÷ 44 = 3.1 × 7 = 21.7 cm

=> Volume = (22/7) × $(21.7)^2$ × 50

=> Volume = (22/7) × 21.7 × 21.7 × 50

=> Volume = 22 × 3.1 × 21.7 × 50

=> Volume = 68.2 × 1085 = 73997 cm^3

Therefore The correct answer is 73997 cm^3.

Additional Information

Cylinder Surface Area

Curved Surface Area (CSA) = 2πrh and Total Surface Area (TSA) = 2πr(h + r).

Volume of Hollow Cylinder

Volume = $\pi(R^2 - r^2)h$, where R is the outer radius and r is the inner radius.

Unit Conversion

1 Liter = 1000 cm^3 | 1 m^3 = 1,000,000 cm^3.

Q24. Answer: (d) 5.456

Shortcut Trick

Volume of metal ≈ 4 × π × $R_(avg)^2$ × thickness

Thickness = 9 − 8 = 1 cm, $R_(avg)$ = 8.5 cm

Volume ≈ 4 × (22/7) × $(8.5)^2$ × 1 ≈ 909.14 cm^3

Weight = Volume × Density = 909.14 × 6 = 5454.8 g ≈ 5.455 kg

Therefore The correct answer is 5.456 kg.

Alternate Method

Given: Internal radius (r) = 8 cm, External radius (R) = 9 cm, Density (ρ) = 6 g/cm^3

Formula: Volume of hollow sphere = $4/3\pi(R^3 - r^3)$

=> Volume = (4/3) × (22/7) × (9^3 − 8^3)

=> Volume = (88/21) × (729 − 512)

=> Volume = (88/21) × 217

=> Volume = 88 × (217/21) = 88 × 10.333 = 909.333 cm^3

=> Weight = Volume × Density = 909.333 × 6 = 5456 g

=> Weight in kg = 5456 ÷ 1000 = 5.456 kg

Therefore The correct answer is 5.456 kg.

Additional Information

Volume of Solid Sphere

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

Surface Area of Sphere

The total surface area of a solid sphere is $4\pi R^2$, and for a hollow shell, it is $4\pi(R^2 + r^2)$.

Mass, Density, and Volume Relation

Mass (Weight) = Density × Volume. Ensure units are consistent (e.g., g/cm^3 and cm^3 results in grams).

Q25. Answer: (a) 28 February 2022

The correct answer is '28 February 2022'.

Key Points

• In February 2022, the Ministry of Women and Child Development, Government of India extended the PM Cares for Children Scheme till 28 February 2022.

• Earlier, the scheme was valid only till 31st December 2021.

• The scheme covers all children who have lost:

1. Both parents or

2. Surviving parent or

3. Legal guardian/adoptive parents/single adoptive parent

• due to the COVID-19 pandemic, starting from 11.03.2020 the date on which WHO declared and characterized COVID-19 as a pandemic till 28.02.2022.

• This is a kind of comprehensive support for children which ensures their care and protection.

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Q26. Answer: (c) 262

Decoding the information,

Sign	•	×
Means	•	÷

Given:

17 ÷ 5 + 216 × 3 + 33 - 930 × 3 + 28

After replacing the signs from left to right and using the BODMAS rule,

17 × 5 - 216 ÷ 3 - 33 + 930 ÷ 3 - 28

= 17 × 5 - 72 - 33 + 310 - 28

= 85 - 72 - 33 + 310 - 28

= 310 - 48

= 262

Hence, the correct answer is Option (3).

Q27. Answer: (b) Isotopes

The correct answer is 'Isotopes'.

Key Points

• Mendeleev arranges the elements in the increasing order of their atomic masses. According to Mendeleev, the physical and chemical properties are the periodic function of their atomic mass.

• The limitations of Mendeleev's periodic tables are as under:

• Position of hydrogen: The position of a hydrogen atom is uncertain because it shows a resemblance with alkali metals and halogens. But in Mendeleev's periodic table, Hydrogen is placed with alkali metals in group 1A.

• Position of isotopes: There is no separate position given to the isotopes of an element.

• Cause of periodicity: Mendeleev's periodic table does not explain successfully the cause of periodicity. Some dissimilar elements are placed together. Some elements having higher atomic mass are placed before the elements with lower atomic mass.

Additional Information

• Isobars:

• Isobars are atoms (nuclides) of different chemical elements that have the same number of nucleons.

• Correspondingly, isobars differ in atomic number (or number of protons) but have the same mass number.

• An example of a series of isobars is ^(40)S, ^(40)Cl,^(40)Ar, ^(40)K, and ^(40)Ca.

• Isodiaphers :

• Isodiaphers are a pair of nuclides with the identical number of protons and neutrons in the atom's nucleus.

• Although the nuclei of both nuclides have different numbers of protons and neutrons, the difference between them is the same.

• An example of a series of isodiaphers is Thorium-234 and Uranium-238.

• Isotones:

• Two nuclides to be isotones if they have the same neutron number N, but different proton number Z.

• For example, boron-12 and carbon-13 nuclei both contain 7 neutrons,

• Similarly, ³^6S, ³^7Cl, ³^8Ar, ³^9K, and ^4^0Ca nuclei are all isotones of 20 because they all contain 20 neutrons.

Q28. Answer: (b) i - e, ii - c, iii - a, iv - b, v - d

The correct answer is 'i - e, ii - c, iii - a, iv - b, v - d'.

Key Points

The correct match will be:

i.	smallest atom	a.	lithium
ii.	metalloid	b.	Silicone
iii.	most metallic natural element	c.	Cesium
iv.	most electronegative	d.	Fluorine
v.	least electronegative	e.	Iodine

Additional Information

• Smallest atom:-

• atoms are made up of three particles: protons, neutrons and electrons which are composed of even smaller particles, such as quarks.

• The name of the smallest atom among above is Lithium. Lithum is a chemical element with the symbol Li and atomic number 3.

• Metalloid:

• Metalloids can be defined as chemical elements whose physical and chemical properties fall in between the metal and non-metal categories.

• Boron, germanium, silicon, antimony, arsenic, tellurium and pollanium are the seven most widely recognized metalloids.

• most metallic natural element:

• Metallic character of elements increases down a group and decreases from left to right across a period.

• The alkali metals in group 1 are the most metallic elements, and caesium is the last element in the group.

• Electronegative:

• The tendency of an atom in a molecule to attract the shared pair of electrons towards itself is known as electronegativity.

• Fluorine is the most electronegative element on the periodic table. Its electronegativity value is 3.98.

• Iodine is the least electronegative element. Its electronegativity value is 0.79.

Q29. Answer: (b) Oman - UAE

The correct answer is 'Oman - UAE'.

Key Points

• The Men's T-20 ICC World Cup-2021 was staged in Oman, UAE.

• It was the 7th T20 Men's World Cup Tournament.

• Matches were played from 17 October 2021 to 14 November 2021 in the United Arab Emirates(UAE).

• After defeating England by five wickets in the semi-finals, New Zealand became the first team to reach the final.

• New Zealand have never before qualified to a T20 World Cup final.

• Australia, which defeated Pakistan by five wickets in the second semifinal, joined them in the championship match.

• Australia won the first T20 World Cup after defeating New Zealand by eight wickets in the championship match.

• David Warner was voted Player of the Tournament, and Mitchell Marsh was chosen Player of the Match.

Q30. Answer: (b) 0.03%

The correct answer is '0.03%'

Key Points

• Carbon Dioxide in the Atmosphere:

• The amount of carbon dioxide (CO_2) in the Earth's atmosphere is approximately 0.03%, which is a trace amount but has a significant impact on the climate and greenhouse effect.

• CO_2 is a key greenhouse gas, meaning it traps heat in the atmosphere and contributes to global warming.

• Though its concentration is low, CO_2 levels have increased due to human activities such as burning fossil fuels, deforestation, and industrial processes.

Additional Information

• Other Major Gases in the Atmosphere:

• Nitrogen (78%) and oxygen (21%) make up the majority of the Earth's atmosphere, while trace gases like carbon dioxide, argon, and neon contribute the remaining 1%.

• Although CO_2 is present in small amounts, its role in maintaining Earth's temperature is disproportionally large due to its greenhouse properties.

• Impact of Increased CO_2 Levels:

• The increase in CO_2 levels due to human activities has been a major factor in the rise of global temperatures, leading to climate change and other environmental impacts.

• Efforts to mitigate CO_2 emissions include transitioning to renewable energy, improving energy efficiency, and implementing policies like carbon pricing and carbon capture technologies.

Q31. Answer: (a) Becomes nine times

The correct answer is 'Becomes nine times'.

Key Points

• Hence the heating effect produced by an electric current, I through a conductor of resistance, R for a time, t is given by $H = I^2Rt$.

• This equation is called Joule’s equation of electrical heating.

• Heat produced in the resistor $H = I^2RT$

H = I2RT

• Heat produced after current is tripled.

• So Given I_(new) = 3I

H_(new) = I_(new)2RT

H_(new) = (3I)2RT

H_(new) = 9 I2RT

H_(new) = 9 H

So, heat produced in the resistor becomes 9 times if the current in the resistor is tripled.

Q32. Answer: (a) 720 km

Shortcut Trick

Assume total distance is 3d. Parts are d and 2d.

Total Time = (d ÷ 40) + (2d ÷ 60) = 14

=> (3d + 4d) ÷ 120 = 14 => 7d = 14 × 120 => d = 240 km

Total distance = 3 × 240 = 720 km

Therefore The correct answer is 720 km.

Alternate Method

Given:

Total time = 14 hours. Let total distance be D km.

Speed 1 = 40 km/h for distance D/3.

Speed 2 = 60 km/h for distance 2D/3.

Formula Used:

Time = Distance ÷ Speed

Calculations:

=> (D/3 ÷ 40) + (2D/3 ÷ 60) = 14

=> D/120 + 2D/180 = 14

=> D/120 + D/90 = 14

=> (3D + 4D) ÷ 360 = 14

=> 7D ÷ 360 = 14

=> D = (14 × 360) ÷ 7

=> D = 2 × 360 = 720 km

Therefore The correct answer is 720 km.

Additional Information

Average Speed

Average speed is defined as total distance divided by total time. For two equal halves of a journey, it is given by 2xy/(x+y).

Relative Speed

When objects move in the same direction, relative speed is the difference (u − v). In opposite directions, it is the sum (u + v).

Unit Conversion

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

Q33. Answer: (b) 78

The logic followed here is:

Thus, 78 will replace the question mark in the series.

Hence, the correct answer is Option (2).

Q34. Answer: (b) Cu(OH)2

The correct answer is 'Cu(OH)2'.

Key Points

• Here, the number of Na, O, and H atoms is different in the LHS & RHS of the given equation.

• We need to take 2 moles of NaOH to balance those atoms.

• Hence, the balanced equation is:

• CuSO4 + 2NaOH → Cu(OH)2 + Na2SO4

Additional InformationDouble Displacement reaction :

• A double displacement reaction is a type of reaction where part of one reactant is replaced by part of another reactant.
• Double displacement reactions take the form: AB + CD → AD + CB
• Example: AgNO3 + NaCl → AgCl + NaNO3

Q35. Answer: (a) 47 over10

Given:
=>2+ [2+2÷ {2 +2 ÷ (2+ 1over3)}]
Calculation:
Follow the BODMAS rule to solve this question as per the order:
=>2+ [2+2÷ {2 +2 ÷ (2+ 1over3)}]
=>2+[2+2 ÷{2+2 ÷(6+1over3)}]
=>2+[2+2÷{2+2÷ 7over3 }]
=>2+[2+2÷{2+(0.86)}]
=>2+[2+2÷{2.86}]
=>2+[2+0.69]
=>2+2.69
=>4.69 approximately 4.7
The value is ' 47over 10 '.

Q36. Answer: (c) 27

Shortcut Trick
Equation 1: A + 2B = 42
Equation 2: 2A + 3B = 69
Subtract Eq 1 from Eq 2: (2A + 3B) − (A + 2B) = 69 − 42
=> A + B = 27
Therefore The correct answer is 27 years.
Alternate Method
Given:
Sum of age of A and twice the age of B is 42.
Two times the age of A added to three times the age of B is 69.
Calculations:
=> A + 2B = 42 ....(i)
=> 2A + 3B = 69 ....(ii)
To find A and B individually, multiply Eq (i) by 2:
=> 2A + 4B = 84 ....(iii)
Subtract Eq (ii) from Eq (iii):
=> (2A + 4B) − (2A + 3B) = 84 − 69
=> B = 15
Substitute B = 15 in Eq (i):
=> A + 2(15) = 42
=> A + 30 = 42
=> A = 12
Sum of their ages = A + B
=> 12 + 15 = 27
Therefore The correct answer is 27 years.
Additional Information
Linear Equations in Two Variables
Standard form is ax + by = c. Methods to solve include Substitution, Elimination, and Cross-multiplication.
Ages Problems
Always assume present age as a variable. If age 'n' years ago is needed, subtract n; for 'n' years hence, add n.
Ratio of Ages
If ratio of ages of A and B is x:y, their ages can be taken as xk and yk respectively.

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Q37. Answer: (b) R

Given statement: Each of P, Q, R, S, T, U and V has an exam on a different day of a week, starting from Monday and ending on Sunday of the same week.

I. S has the exam on Thursday.

Case - 1	
Day	Persons
Monday	
Tuesday	
Wednesday	
Thursday	S
Friday	
Saturday	
Sunday	

II. Only one person has the exam between S and V.

Case - 1	**Case - 2**		
Day	Persons	Day	Persons
Monday		Monday	
Tuesday		Tuesday	V
Wednesday		Wednesday	
Thursday	S	Thursday	S
Friday		Friday	
Saturday	V	Saturday	
Sunday		Sunday	

III. Q has the exam on the day immediately before V but not on a Monday.

As, Q's exam is not on a Monday, Case 2 is eliminated here.

Case - 1	
Day	Persons
Monday	
Tuesday	
Wednesday	
Thursday	S
Friday	Q
Saturday	V
Sunday	

IV. Only two people have exams between Q and U.

Case - 1	
Day	Persons
Monday	
Tuesday	U

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Wednesday	
Thursday	S
Friday	Q
Saturday	V
Sunday	

V. P's exam is on one of the days before T but on one of the days after R.

Case - 1	
Day	Persons
Monday	R
Tuesday	U
Wednesday	P
Thursday	S
Friday	Q
Saturday	V
Sunday	T

Therefore, R has exam on Monday.

Hence, the correct answer is Option (2).

Q38. Answer: (a) Only I can be assumed

Statement:

As per reports by international recruiters, around 25% of the candidates are rejected just on the basis of insufficient data in their CVs or due to the format of the CVs auto-created by some websites.

Assumptions:

I. CVs manually created by job seekers have more chances of being viewed / selected than auto created CVs. → True (Due to the format of auto-created CV's by website, 25% of the candidates gets rejected).

II. No criteria other than insufficient information and formatting results in rejection of CVs. → False (There is one more criterion, i.e., due to the format of the CVs auto-created by some websites).

Hence, 'Only I can be assumed'.

Q39. Answer: (b) Rs. 7,192

Shortcut Trick

Total Simple Interest percentage for 4 years = Rate × Time = 6% × 4 = 24%.

The total Amount becomes 100% (Principal) + 24% (Interest) = 124% of the Principal.

Total Amount = 124% of 5,800 = 1.24 × 5800.

Total Amount = 124 × 58 = 7,192.

Therefore The correct answer is Rs. 7,192.

Alternate Method

Given:

Principal (P) = Rs. 5,800

Rate (R) = 6% per annum

Time (T) = 4 years

Formula Used:

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

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

Calculations:

=> SI = (5800 × 6 × 4) ÷ 100

=> SI = 58 × 24

=> SI = Rs. 1,392

=> Amount = 5800 + 1392

=> Amount = Rs. 7,192

Therefore The correct answer is Rs. 7,192.

Additional Information

Direct Amount Formula

The total amount can be calculated directly using A = P(1 + RT/100).

SI vs CI Difference

For the first year, Simple Interest and Compound Interest are equal if the interest is compounded annually.

Rate and Time Calculation

If the amount is given, the rate R = (SI × 100) ÷ (P × T) and time T = (SI × 100) ÷ (P × R).

Q40. Answer: (a) Ozone

The correct answer is 'Ozone'.

Key Points

• Ozone at the higher levels of the atmosphere is a product of UV radiation acting on oxygen O2 molecules. O2 is an O molecule that is a reactive agent.

• O2 → O+O

• O+O2 → O3 (Ozone)

• The sun propagates ultraviolet radiation which has an adverse effect on living beings.

• This layer absorbs the radiations and prohibits them from entering the outer surface of the earth.

Additional Information

• Chlorofluorocarbons:

• Chlorofluorocarbons (CFCs) are nontoxic, nonflammable chemicals containing atoms of carbon, chlorine, and fluorine.

• They are used in the manufacture of aerosol sprays, blowing agents for foams and packing materials, as solvents, and as refrigerants.

• Chlorofluorocarbons are the ozone-depleting substances released from refrigerators and air conditioners.

• The (CFCs) produce “active Chlorine” (Cl and ClO radicals) in the presence of UVradiations, which react with ozone and destroy ozone catalytically by converting it into oxygen.

• Water:

• Water is an inorganic compound with the chemical formula H2O.

• It is a transparent, tasteless, odorless, and nearly colorless chemical substance,

• Climate change affects the world's water in complex ways. From unpredictable rainfall patterns to shrinking ice sheets, rising sea levels, floods and droughts.

• Carbon dioxide:

• Carbon dioxide is a chemical compound made up of molecules that each have one carbon atom covalently double bonded to two oxygen atoms.

• Atmospheric CO2 is the primary carbon source for life on Earth.

• Carbon dioxide (CO2) is an important heat-trapping gas, or greenhouse gas.

• CO2 comes from the extraction and burning of fossil fuels (such as coal, oil, and natural gas), from wildfires, and from natural processes like volcanic eruptions.

Q41. Answer: (a) U

According to given information, we have the possible arrangements as follows:

1. H is taller than only four other friends.

_ > H > _ > _ > _ > ___

2. O is taller than only one friend.

_ > H > _ > _ > O > _

3. B is taller than U but shorter than J. J is not the tallest.

___ > H > J > B > O > U

4. Thus, the final arrangement of heights is as follows:

I > H > J > B > O > U

Therefore, U is the shortest among all the friends.

Hence, the correct answer is Option (1).

Q42. Answer: (d) less than 30°, locate

The correct answer is 'located at less than 30°'.

Key Points

Refraction of light: When a ray of light passes from one transparent medium to another, it bends its path. This phenomenon is called refraction.

Snell's law: When light passes from one medium 1 (refractive index n1) to water medium 2 (refractive index n2), then

n1 Sin i = n2 Sin r,

Here i is the angle of incidence, r is the angle of refraction.

Here light passes from one medium 1 (refractive index n1) to water medium 2 (refractive index n2), then the ray will be refracted at an angle less than 30° in water, and will lie in the plane of the incident ray.

Q43. Answer: (a) 3 39/47 days

Shortcut Trick

Total Work = LCM(12, 15, 9) = 180 units.

Efficiency of A = 15, B = 12, C = 20.

Combined Efficiency = 15 + 12 + 20 = 47 units/day.

Total Time = 180 ÷ 47 = 3 ^(39)/47 days.

Therefore The correct answer is 3 ^(39)/47 days.

Alternate Method

Given:

Time taken by A = 12 days

Time taken by B = 15 days

Time taken by C = 9 days

Person	Days	Total Work	Efficiency
A	12	180	15
B	15	12	
C	9	20	

Calculations:

=> Total work (LCM of 12, 15, 9) = 180 units

=> Total efficiency of (A + B + C) = 15 + 12 + 20 = 47 units/day

=> Time taken together = Total Work ÷ Total Efficiency

=> Time = 180 ÷ 47

=> Time = 3 ^(39)/47 days

Therefore The correct answer is 3 ^(39)/47 days.

Additional Information

Total Work Concept

Total work is always considered as the Least Common Multiple (LCM) of the individual days to simplify efficiency calculations.

Efficiency Relation

Efficiency is inversely proportional to Time. Efficiency = Work ÷ Time.

Combined Work Formula

If three people take x, y, and z days, the time taken together is 1 ÷ (1/x + 1/y + 1/z).

Q44. Answer: (c) 800 m

Shortcut Trick

Speed of train = (S2T2 − S1T1) ÷ (T2 − T1)

Speed of train = (35 × 40 − 15 × 20) ÷ (40 − 20) = (1400 − 300) ÷ 20 = 55 m/s

Length of train = (Relative Speed) × Time = (55 − 15) × 20 = 40 × 20 = 800 m

Therefore The correct answer is 800 m.

Alternate Method

Given:

Speed of first person (S1) = 15 m/s, Time (T1) = 20 s

Speed of second person (S2) = 35 m/s, Time (T2) = 40 s

Formula Used:

Distance (Length of train) = Relative Speed × Time

Let the speed of the train be V m/s and length be L meters.

=> L = (V − 15) × 20 --- (i)

=> L = (V − 35) × 40 --- (ii)

=> (V − 15) × 20 = (V − 35) × 40

=> V − 15 = 2 × (V − 35)

=> V − 15 = 2V − 70

=> V = 55 m/s

=> L = (55 − 15) × 20 = 40 × 20 = 800 m

Therefore The correct answer is 800 m.

Additional Information

Relative Speed

When two objects move in the same direction, relative speed is the difference of their speeds (V1 − V2).

Train Overtaking Person

When a train crosses a moving person, the distance covered is equal to the length of the train itself.

Unit Conversion

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

Q45. Answer: (c) Lonar Lake

The correct answer is 'Lonar Lake'.

Key Points

• The world's largest basaltic impact crater lake found in India is Lonar Lake.

• As per scientists, the crater was formed after the area was hit by a comet or an asteroid at a speed of around 90000 km per hour.

• The lake's mean diameter is around 1.2 km and the diameter of the crater on which the lake sits is 1.8 km.

• The lake is both saline and alkaline in nature.

• The outer region has pH 7 and is a neutral region.

• The inner region of the lake has a pH of 11 and is alkaline in nature.

Q46. Answer: (a) 0.8 W

The correct answer is '0.8 W'

Key PointsCalculation:

Given,

The potential difference, V = 4V

Steady current flowing, I = 0.2 A

According to Ohm's law,

Power(P) = Voltage(v) x current(I)

P = V x I

P= 4 x 0.2 = 0.8 W

Additional Information

• Ohm’s law states that the voltage across a conductor is directly proportional to the current flowing through it, provided all physical conditions and temperatures remain constant.

• Mathematically, this current-voltage relationship is written as,

• V = IR

• Power: The capacity to do work is termed Energy. The Energy expended to do work in unit time is termed as Power. It is represented as P.

• Power Formula is articulated as

• P = V I

• P = (IR) I

• P = I^2 R

Q47. Answer: (c) Biomass

The incorrect answer is 'Biomass'.

Key Points

• Geothermal energy is naturally occurring thermal energy formed within rocks, and heat is continuously formed inside rocks.

• it's a free and renewable and versatile source of energy.

• since it's always available electricity can be produced round the clock and cheaply.

• The four types of geothermal energy resources are hydrothermal, geo-pressurized brines(Geysers, Fumaroles), hot dry rocks, and magma.

Q48. Answer: (a) Article 112

The correct answer is 'Article 112'.

Key Points

• Article 112 in the Constitution of India, 1949 states that:

• The President shall in respect of every financial year cause to be laid before both Houses of Parliament a statement of the estimated receipts and expenditure of the Government of India for that year, in this Part referred to as the annual financial statement.

• The estimates of expenditure embodied in the annual financial statement shall show separately:

• The sums required to meet expenditure described by the Condition as expenditure charged upon the Consolidated Fund of India.

• The sums required to meet other expenditures proposed to be made from the Consolidated Fund of India, and shall distinguish expenditure on revenue account from other expenditure, etc.

• Thus, under Article 112 of the Indian Constitution, the annual financial statement is prepared.

Additional Information

• Article 130:

• The Supreme Court shall sit in Delhi or in such other place or places, as the Chief Justice of India may, with the approval of the President, from time to time, appoint.

• Article 140:

• Parliament may by law make provision for conferring upon the Supreme Court such supplemental powers not inconsistent with any of the provisions of this Constitution as may appear to be necessary or desirable for the purpose of enabling the Court more effectively to exercise the jurisdiction conferred upon it by or under this Constitution.

• Article 101:

• No person shall be a member of both Houses of Parliament and provision shall be made by Parliament by law for the vacation by a person who is chosen a member of both Houses of his seat in one House or the other.

Q49. Answer: (d) 21

Given:

=>53 - 92 + (12 ÷ 4)2 - 32 + 8 × 0

Calculation:

Follow BODMAS rule to solve this question as per the order:

=>53 - 92 + (12 ÷ 4)2 - 32 + 8 × 0

=>53 - 92 + (3)2 - 32 + 8 × 0

=>53 - 92 + 9 - 32 + 8 × 0

=>125 - 81 + 9 - 32 + 0

=>134 - 113 + 0

=>21

The value is '21'.

Q50. Answer: (d) WFNCYG

Given:

Number\Symbol	•	1	&	2	3	^	4	%	5	$	11	#	6	@	7	!	8
Number\Symbol			&					%						@			

Code	Q	A	Z	X	S	W	E	D	C	V	F	R	T	G	B	N	H	Y

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Number\Symbol	•	1	&	2		3	^	4	%	5	$	11	#	6	@	7	!	8
Code	Q	A	Z	X	S	W	E	D	C	V	F	R	T	G	B	N	H	Y

Conditions:

Conditions	Code
I. If the first element is an odd number and the last also is an odd number.	the code for the first element will be P and for the last element will be K.
II. If the last two elements are numbers	the codes for these two are to be interchanged.
III. If the first two elements are symbols	both these elements will be coded as UU.

Given set of elements: 3$7%68

• Condition 1 is not applicable for given set of elements as the last number is not an odd number.

• Condition 3 is not applicable as the first two elements are not symbols.

• Only Condition 2 will be followed as the last two elements are numbers. So, code of 6,8 will be interchanged.

Thus, the code for 3$7%68 will be: WFNCYG.

Hence, the correct answer is Option (4).

Q51. Answer: (b) 178 over 495

Shortcut Trick

For a mixed recurring decimal, the fraction is (Total number − Non-recurring part) ÷ (9 for each recurring digit followed by 0 for each non-recurring decimal digit).

Number = 0.3595959... = 0.359 (bar on 59)

Numerator = 359 − 3 = 356

Denominator = 990 (two 9s for 59 and one 0 for 3)

Fraction = 356 ÷ 990 = 178 ÷ 495

Therefore The correct answer is 178/495.

Alternate Method

Given: x = 0.3595959...

Formula: Multiplying by powers of 10 to eliminate the recurring part.

=> Let x = 0.3595959...

=> 1000x = 359.595959...

=> 10x = 3.595959...

=> 1000x − 10x = 359.5959... − 3.5959...

=> 990x = 356

=> x = 356 ÷ 990

=> x = 178 ÷ 495

Therefore The correct answer is 178/495.

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Additional Information

Pure Recurring Decimal

A decimal in which all digits after the decimal point repeat, e.g., 0.444... = 4/9.

Mixed Recurring Decimal

A decimal in which at least one digit after the decimal point is non-recurring, e.g., 0.1222... = (12−1)/90 = 11/90.

Rational Numbers (p/q)

All terminating and recurring decimals can be expressed as rational numbers where q ≠ 0.

Q52. Answer: (a) 1

Given statement: Five boxes A, B, C, D and E are kept one over the other but not necessarily in the same order.

I. A is kept third from the bottom.

Case - 1	
Floor	Box
5	
4	
3	A
2	
1	

II. Only one box is kept between A and B.

Case - 1	**Case - 2**		
Floor	Box	Floor	Box
5		5	B
4		4	
3	A	3	A
2		2	
1	B	1	

III. There are only three boxes between D and B.

Case - 1	**Case - 2**		
Floor	Box	Floor	Box
5	D	5	B
4		4	
3	A	3	A
2		2	
1	B	1	D

IV. C is placed immediately above B. If B is on the top, no box can be placed above it, thus Case 2 gets eliminated here.

Case - 1	
Floor	Box
5	D
4	
3	A
2	C
1	B

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Thus, the final arrangement is:

Floor	Box
5	D
4	E
3	A
2	C
1	B

Therefore, there is only 1 box between A and D, i.e., E.

Hence, the correct answer is Option (1).

Q53. Answer: (c) North-east

Diagrams are drawn according to the given statement as follows:

• Pole E is to the east of pole R.

• Pole G is to the west of pole R and north of pole A.

• Pole T is to the south of pole A.

• Position of R with respect to A is:

Thus, Pole R is in north-east direction with respect to Pole A.

Hence, the correct answer is Option (3).

Q54. Answer: (c) YGBPLR

Given:

Number\Symbol	2	$	7	@	4	#	9	&	1	!	3	•
Code	T	D	C	R	G	B	Y	H	N	J	P	L

Conditions:

Rule no	Condition	Result
1.	the first element is a symbol and the last, a number	the codes for these two (the first and the last elements) are to be interchanged.
2.	the first element is an odd number and the last, an even number	the first and last elements are to be coded as ©
3.	both the second and third elements are perfect squares	the third element is to be coded as the code for the second element

Here,

1st rule applies i.e. the first element is a symbol (@) and the last a number (9) in given code @4#3*9.

2nd rule does not apply i.e. the first element is an odd number (but it is a Symbol @) and the last an even number(9 not a even number) in given code @4#3*9.

3rd rule does not apply i.e. both the second (4 a perfect squares) and third elements (# a symbol not a square) are perfect squares in given code @4#3*9.

Hence, '@4#3*9' will be coded as 'YGBPLR '.

Q55. Answer: (b) Y, 2000

Given:

The number of vehicles caught for speeding in different years in two cities X and Y are shown in the graph years 1998 - 2001.

Calculation:

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vehicles which are caught speeding between the years 1998 - 2001 are:

Total number of vehicles in X city = (99 + 141 + 78 + 120) = 438

Total number of vehicles in Y city = (120 + 100 + 128 + 107) = 455

More total number of vehicles which are caught speeding between the years 1998 - 2001 is 'Y'.

In which year, the difference in the number of vehicles caught between the two cities is maximum are:

=>1997 = 139 -119 = 20

=>1998 = 120 - 99 =21

=>1999 = 141 - 100 = 41

=>2000 =128 - 78 = 50

=>2001 =120 -107 =13

=>2002 =159 - 148 =11

The year in which the difference in the number of vehicles caught between the two cities is maximum is '2000'.

More total number of vehicles which are caught speeding between the years 1998 - 2001 is 'Y' and the difference in the number of vehicles caught between the two cities is the maximum is '2000'.

Q56. Answer: (a) 18 km

Drawing the diagram according to the given information,

1. Gulshan drove his car for 77 km towards north,

2. then he turned left and drove for 109 km. Again,

3. he turned left and drove yet another 77 km. Again,

4. he turned left, drove his car 127 km and stopped.

Therefore, '18' is the shortest distance between the starting point and the stopping point.

Hence, the correct answer is Option (1).

Q57. Answer: (d) 2 : 15

Shortcut Trick

For Proportion a : b :: c : d, the product of Extremes = product of Means (a × d = b × c).

From 8 : 4 :: 3.2 : x => x = (4 × 3.2) ÷ 8 = 1.6.

From 3 : 6 :: 6 : y => y = (6 × 6) ÷ 3 = 12.

Ratio x : y = 1.6 : 12 = 16 : 120 = 2 : 15.

Therefore The correct answer is 2 : 15.

Alternate Method

Given: 8 : 4 :: 3.2 : x and 3 : 6 :: 6 : y

Formula Used: If a : b :: c : d, then a/b = c/d

Calculations:

=> 8 / 4 = 3.2 / x

=> 2 = 3.2 / x

=> x = 3.2 / 2 = 1.6

=> 3 / 6 = 6 / y

=> 1 / 2 = 6 / y

=> y = 6 × 2 = 12

Required Ratio (x : y):

=> x / y = 1.6 / 12

=> x / y = 16 / 120

=> x / y = 2 / 15

Therefore The correct answer is 2 : 15.

Additional Information

Fourth Proportional

The fourth proportional 'd' of three numbers a, b, and c is such that a : b = c : d, calculated as d = (b × c) / a.

Mean Proportional

The mean proportional between two numbers a and b is √(a × b). In the second part of the question, 6 is the mean proportional between 3 and y.

Third Proportional

If a : b :: b : c, then c is called the third proportional to a and b, where $c = b^2 / a$.

Q58. Answer: (c) Both (a) and (b)

The correct answer is 'Both (a) and (b)'.

Key Points

• A commercial electric motor is one which uses the following:

• An electromagnet in place of a permanent magnet.

• A large number of turns of the conducting wire in the current carrying coil.

• A soft iron core on which the coil is wound. The combination of a soft iron core and coil is called an armature. It enhances the power of the motor.

• Thus, commercial electric motors do not use a permanent magnet to rotate the armature because permanent magnets are weak and do not produce a strong magnetic field in the region.

Q59. Answer: (b) Both red and green are dominant though less number of green are produced.

The incorrect answer is 'Both red and green are dominant though less number of green are produced'.

Key Points

• F1 produced all colored flowers. So it is a dominant trait and the Green flower is recessive. Thus Only the Red color is dominant. The recessive nature of the green flower made his traits not expressive.

• F2 produced colored flowered plants Red and Green flowered plants in a 3:1 ratio.

Q60. Answer: (a) C2H5OH

The correct answer is 'C2H5OH'.

Key Points

• Homologue differs by −CH2 group.

• The next higher homologue of methanol is ethanol (C2H5OH).

Additional Information

• Homologue:

• The term homologue is used to describe a compound belonging to a series of compounds differing from each other by a repeating unit, such as a methylene group, a peptide residue, etc.

Q61. Answer: (d) Black

The correct answer is 'Black'.

Key Points

• The actual colour of the sky as viewed by an astronaut at the International Space Station is Black.

• The blue colour of the sky which we see daily is the result of the scattering of light from the atmosphere.

• As there is no atmosphere in space, no scattering is observed due to which the sky appears dark.

Q62. Answer: (b) Tamil

The correct answer is 'Tamil'.

Key Points

• Dravidian languages are a family of around 70 languages spoken primarily in South Asia.

• These languages are divided into 4 main groups:

• South

• South-Central

• Central

• North

• These groups are further divided into 24 sub-groups.

• The four major and classical Dravidian languages are:

• Telugu

• Tamil

• Malayalam

• Kannada

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Q63. Answer: (a) Glucose formed is converted into starch

The correct answer is 'Glucose formed is converted into starch'.

Key Points

• Starch is a white and powdery substance.

• It houses glucose, which plants use for food.

• The presence of starch in a leaf is reliable evidence of photosynthesis.

• That's because starch formation requires photosynthesis.

Q64. Answer: (b) 58

Shortcut Trick

Let the smaller number be y. The difference between the numbers is 3422, so x − y = 3422.

Applying the division rule: x = 4y + 290.

Substituting x gives: 3y + 290 = 3422 => 3y = 3132 => y = 1044.

The greater number x = 1044 + 3422 = 4466.

The HCF of 4466 and 4292 must be a factor of their difference (4466 − 4292 = 174).

Among the given options, only 58 divides 174 completely. Thus, HCF is 58.

Therefore The correct answer is 58.

Alternate Method

Given:

Difference between the two positive numbers = 3422

When the greater number is divided by the smaller, Quotient = 4, Remainder = 290

Formula Used:

Dividend = (Divisor × Quotient) + Remainder

y y y y 290 Greater Number (x) y Smaller Number (y) Difference = 3y + 290 = 3422 HCF (4466, 4292) = 58

Calculations:

=> Let the greater number be x and the smaller number be y.

=> x − y = 3422 --- (Equation 1)

=> x = 4y + 290 --- (Equation 2)

=> Substituting Equation (2) into Equation (1):

=> (4y + 290) − y = 3422

=> 3y + 290 = 3422

=> 3y = 3422 − 290

=> 3y = 3132

=> y = 1044

=> Finding the greater number (x):

=> x = 1044 + 3422 = 4466

=> Now, we must find the Highest Common Factor (HCF) of 4466 and 4292.

=> Using the difference method: Difference = 4466 − 4292 = 174

=> The HCF must be a factor of their difference (174).

=> We check the given options (148, 58, 116, 74) to see which one perfectly divides 174.

=> 174 ÷ 58 = 3. Only 58 is a perfect divisor of 174.

=> Therefore, the HCF is 58.

Therefore The correct answer is 58.

Additional Information

Division Algorithm

For any given dividend and divisor, the relationship is firmly established as: Dividend = (Divisor × Quotient) + Remainder. The remainder must always be strictly less than the divisor.

HCF Difference Method

The Highest Common Factor (HCF) of two numbers is always a perfect divisor of the difference between those two numbers. If a > b, then HCF(a, b) will definitively divide perfectly into (a − b).

Prime Factorization for HCF

The HCF is the product of the lowest powers of shared prime factors. By identifying the factors of the difference (e.g., 174 = 2 × 3

× 29), we can quickly limit the potential candidates for the HCF without processing the primary large numbers individually.

Q65. Answer: (b) -4 cm

The correct answer is '-4 cm'.

Key Points

• A ray of light is made incident on a concave mirror, parallel to its principal axis.

• After reflection, it will pass through the principal focus for point Q(given in question).

• • The relation between focal length (f) and radius of curvature (R) of a Concave mirror is that the focal length is equal to half of the radius of curvature i.e. f=R/2

PQ = f = 8over 2 = 4cm

• Sign convention in the case of the concave mirror:

• Since the object is always placed in front of the mirror hence the sign of the object is taken as negative. Since, the center of curvature and focus lie in front of the concave mirror, signs of the radius of curvature and focal length are taken as negative in the case of the concave mirror.

• When an image is formed in front of the mirror, the distance of the image is taken as – (negative), and when the image is formed behind the mirror, the distance of the image is taken as + (positive).

Therefore, New Cartesian Sign Convention, PQ = -4 cm.

Q66. Answer: (a) 9

• The shaded part represents girls are there who are players but not coaches.

• The number representing girls are there who are players but not coaches = 9

Hence, the correct answer is 'Option 1'.

Q67. Answer: (c) Both statements are correct.

The correct answer is 'Both statements are correct'.

Key Points

• Neutralization reaction:

• When acids react with base, they neutralize each other's effect and thus it is called as neutralization reaction, energy is released during this reaction and hence it is exothermic in nature.

• Example, Formation of Sodium Chloride (Common Salt):

• HCl + NaOH → NaCl + H2O

• The products formed by this reaction are salt and water.

• Acid + Base → Salt + Water

Q68. Answer: (b) U15N9V

Given: A3J5R, E6K6S, I9L7T, O12M8U, ?, A18O10W

Solution:

The logic follows here is :-

Hence, 'U15N9V' is the correct answer.

Q69. Answer: (c) Section C

Given:

A school has four sections i.e. A, B, C, D in Class IX.

The result of annual exams and half yearly exams for the students of these four sections is given in the table and a student is declared pass if he passes in at least one of the two examinations (half-yearly/annual)

Calculation:

As Students failed in both exams is least in section C that is 23.

Students who failed half-yearly but passed in annual exams is highest in section C that is 18.

Students who passed in half-yearly but failed in annual exams is highest in section C that is 9.

Students passed both exams in section C which is 60.

As, compared to other sections students are passed more and fail less in section C.

Section that has the maximum pass percentage is 'section C'.

Alternate MethodSection A:

Total number of students = 27 + 17 + 6 + 62 = 112

Students who passed the exam = 17 + 6 + 62 = 85

Pass percentage of section A = (85/112)×100 = 75.89%

Section B:

Total number of students = 25 + 15 + 8 + 57 = 105

Students who passed the exam = 15 + 8 + 57 = 80

Pass percentage of section B = (80/105)×100 = 76.19%

Section C:

Total number of students = 23 + 18 + 9 + 60 = 110

Students who passed the exam = 60 + 18 + 9 = 87

Pass percentage of Section C = (87/110)×100 = 79.09%

Section D:

Total number of students = 26 + 19 + 7 + 59 = 111

Students who passed the exam = 19 + 7+ 59 = 85

Pass percentage of section D = (85/111)×100 = 76.57%.

Section that has the maximum pass percentage is 'section C'.

Q70. Answer: (c) Gurugram

The correct answer is 'Gurugram'.

Key Points

• India's first fishery business incubator was inaugurated by the Union Minister of Fisheries, Animal Husbandry and Dairying in Gurugram in 2021.

• The government is expecting 22 million tonnes of fish production and Rs. One Lakh Crore export by 2025.

• The incubation unit can serve as a milestone for the future of the fishery sector.

Important Points

• Shri Parshottam Rupala is the Minister for Fisheries, Animal Husbandry & Dairying.

• Ministers of State for Fisheries, Animal Husbandry & Dairying namely Dr. Sanjiv Kumar Balyan and Dr. L Murugan.

Q71. Answer: (a) C

Given:

Seven people, A, B, C, D, E, F and G, are sitting in a straight row, facing north.

Solution steps by steps:

(1.) Only three people sit between B and D.

(2.) Only two people sit to the left of B.

Only case 1 is qualified because in Case 2, more than two people sit to let of B.

(3.) F is not an immediate neighbour of D and F sits second to the right of G.

(4.) A sits to the immediate right of E.

(5.) Now only unoccupied position C is the left extreme.

Hence, 'C' sits at the extreme left end of the row.

Hence, the correct answer is option 1.

Q72. Answer: (c) Ganga

The correct answer is Ganga.

Key Points

• The Gangotri glacier is one of the primary sources of the river Ganga.

• Over the years, Ganga has been largely polluted by human activities and industries.

• Ganga river is severely polluting, in regard to which Ganga Action Plan was launched.

• Industrial waste is the main cause of pollution in the Ganga.

• Numerous businesses that produce things like rubber, plastic, and leather have popped up along the river's bank and dump their trash into the water.

• Life beneath the ocean suffers as a result.

• Fish growth has substantially slowed.

• A recent survey estimates that the river receives almost 1 billion gallons of raw, untreated sewage.

Additional Information

• Cauvery:

• Cauveri or Kaveri River is a significant river in India that runs through the states of Tamil Nadu and Karnataka.

• Talakaveri, in the Brahmagiri range of the Western Ghats, Kodagu district in the state of Karnataka, is where the Kaveri River rises.

• The elevation of the Cauvery River is 1,341 metres.

• The river's whole length, from its source to its outfall, is 800 km.

• Krishna:

• The Krishna River, which flows through the Deccan Plateau, is India's third-longest river after the Ganges and the Godavari.

• After the Ganges, Indus, and Godavari, it is also the fourth-largest river basin in terms of water inflows.

• The 1,400 km (870 mi) long river is commonly known as Krishnaveni.

• It is one of the largest rivers in central-southern India.

• Brahmapurta:

• The Brahmaputra is a trans-boundary river that passes through Tibet, Bangladesh, and Northeastern India.

• The Brahmaputra River rises in the vast glacier mass south of Konggyu Tsho Lake and north of the Kailash mountains of the Himalayas (5,150 m).

• Additionally it is known as the Yarlung Tsangpo in Tibetan, Siang/Dihang River in Arunachali, Luit and Brahmaputra in Assamese, and Jamuna River in Bangla.

• By discharge, it is the ninth-largest river in the world.

Q73. Answer: (c) 42

Given: 1 : 10 :: 3 : 18 :: 9 : ?

Solution:

The logic follows here is:-

Hence, '42' is the correct answer.

Q74. Answer: (a) 48

Shortcut Trick

Mode is simply the value that appears most frequently in the given data set.

Count the occurrences: 41(2), 43(3), 46(3), 48(4), 50(3), 54(3).

Since 48 occurs the maximum number of times (4 times), it is the Mode.

Therefore The correct answer is 48.

Alternate Method

Given Data: 43, 41, 46, 48, 43, 50, 54, 41, 48, 54, 46, 43, 48, 50, 46, 48, 50, 54

Step-by-step counting of frequencies:

=> Value 41: II (2 times)

=> Value 43: III (3 times)

=> Value 46: III (3 times)

=> Value 48: IIII (4 times)

=> Value 50: III (3 times)

=> Value 54: III (3 times)

=> Maximum Frequency = 4, which corresponds to the value 48.

Therefore The correct answer is 48.

Additional Information

Empirical Relationship

For a moderately skewed distribution, the relationship between measures of central tendency is: Mode = 3 × Median − 2 × Mean.

Median

The middle value of a data set when arranged in ascending or descending order. For even n, it is the average of the (n/2)^(th) and (n/2 + 1)^(th) terms.

Bimodal Data

If two different values in a data set have the same maximum frequency, the data set is called bimodal.

Q75. Answer: (b) Trachea.

The correct answer is option (2) i.e. 'Trachea'.

Key Points

• In humans, the kidney is one of the main organs of the excretory system.

• The function of the kidney is to filter the blood and remove waste (toxic) products.

• Waste products and excess fluids are removed through urine.

• If the kidney gets damaged then the person has to undergo dialysis.

• Dialysis is a treatment that filters and purifies the blood using a machine.

• The human excretory system consists of organs that remove wastes such as salts, carbon dioxide, urea, uric acid, and water produced by the body.

• The route of urine in the human excretory system is After being filtered by

• kidney → urine through ureter → stored in bladder → out through urethra.

Q76. Answer: (a) vulture

The correct answer is 'vulture'.

Key Points

• Diclofenac was once used as a livestock anti-inflammatory drug, but its usage has been banned in India since 2006.

• The vulture got exposed to this drug by eating the carcass of animals that have been treated with diclofenac in recent times.

• Diclofenac leads to renal failure in vultures damaging their excretory system.

• Thus, it leads to the wiping out of most of the vulture population in India.

Q77. Answer: (a) 1919-1922

The correct answer is '1919-1922'.

Key Points

• Two mass movements namely Khilafat and Non-Cooperation movements were organized during 1919-1922.

• They started to oppose British rule in India.

• Despite having different concerns, they adopted a unified plan of non-violence and non-cooperation.

• The Muslim League and Congress unified during this time. With the help of both of these political parties, numerous protests were held.

Q78. Answer: (c) 33

Given: 5, 12, ?, 96, 285, 852

Solution:

The logic follows here is :-

Hence, '33' is the correct answer.

Q79. Answer: (b) Five

Given: D & C N E ^ & G ^ Y % % @ G Y & I & * H K Z

Condition: consonants are there that are immediately preceded by a symbol.

Solution:

The logic follows here is:-

Symbol → Consonant

here, 5 consonants are there that are immediately preceded by a symbol.

Hence, the correct answer is 'option 2'.

Q80. Answer: (d) 2 sec 40°

Shortcut Trick

The expression is in the form (x/y) + (y/x) where x = cos 40° and y = 1 + sin 40°.

Simplified form: $(x^2 + y^2) / (xy) = (\cos^2 40° + (1 + \sin 40°)^2) / (\cos 40° (1 + \sin 40°))$.

Numerator expands to 1 + 1 + 2 sin 40° = 2(1 + sin 40°).

Final simplified value = 2 / cos 40° = 2 sec 40°.

Therefore The correct answer is 2 sec 40°.

Alternate Method

Given: [cos 40° / (1 + sin 40°)] + [(1 + sin 40°) / cos 40°]

Formula Used: $\sin^2\theta + \cos^2\theta = 1$ and $\sec\theta = 1/\cos\theta$

=> Let the expression be E.

=> $E = [\cos^2 40° + (1 + \sin 40°)^2] / [\cos 40° \times (1 + \sin 40°)]$

=> $E = [\cos^2 40° + 1 + \sin^2 40° + 2 \sin 40°] / [\cos 40° (1 + \sin 40°)]$

=> Since $\sin^2 40° + \cos^2 40° = 1$:

=> $E = [1 + 1 + 2 \sin 40°] / [\cos 40° (1 + \sin 40°)]$

=> $E = [2 + 2 \sin 40°] / [\cos 40° (1 + \sin 40°)]$

=> $E = [2(1 + \sin 40°)] / [\cos 40° (1 + \sin 40°)]$

=> $E = 2 / \cos 40°$

=> $E = 2 \sec 40°$

Therefore The correct answer is 2 sec 40°.

Additional Information

Trigonometric Identities

Fundamental identity: $\sin^2\theta + \cos^2\theta = 1$. Other variations include $1 + \tan^2\theta = \sec^2\theta$ and $1 + \cot^2\theta = \text{cosec}^2\theta$.

Reciprocal Relations

The reciprocal of $\cos\theta$ is $\sec\theta$, and the reciprocal of $\sin\theta$ is $\text{cosec}\,\theta$.

Algebraic Expansion

The identity $(a + b)^2 = a^2 + b^2 + 2ab$ is frequently used to simplify trigonometric sums involving squares.

Q81. Answer: (d) Comptroller and Auditor General of India

The correct answer is 'Comptroller and Auditor General of India '.

Key Points

• Article 148 of the Constitution of India establishes the authority of the Comptroller and Auditor General of India office.

• It states the following points in relation to powers of CAG.

• The powers and functions of the CAG are subject to the provisions of the Indian Constitution and any Acts of Parliament, along with the service conditions for the Indian Audits and Accounts Department. The rules governing these would be prescribed by the President in consultation with the incumbent.

• CAG has the power to audit the receipts and expenditures of the Central and the Governments of each State and Union Territory

• The expenses on the administration of this office including all allowances, salaries and pensions would be charged to the Consolidated Fund of India.

Additional Information

• The establishment and qualifications:

• The CAG is appointed by the President of India and can be removed from office only in the manner and on the grounds that a Judge of the Supreme Court is removed.

• The person appointed to this office should take an oath of office before the President or any other person appointed by the office of the President.

• The salary, service conditions, leaves of absence, pension, and age of retirement are determined by the Parliament of India and specified in the Second Schedule such that the service conditions and salary will not be modified to the disadvantage of the incumbent during their tenure.

• The CAG is not eligible for any further office after the end of their tenure either in the Government of India or any State Government.

• The incumbent is appointed for a period of 6 years or until attaining the age of 65 years whichever is earlier.

Q82. Answer: (b) a citizen of the country must defend the country and render national service when called upon to do so

The correct answer is 'option 2'.

Key Points

• The list of 11 Fundamental Duties under article 51-A to be obeyed by every Indian citizen is given in the table below:

1. Abide by the Indian Constitution and respect its ideals and institutions, the National Flag and the National Anthem

2. Cherish and follow the noble ideals that inspired the national struggle for freedom

3. Uphold and protect the sovereignty, unity and integrity of India

4. Defend the country and render national service when called upon to do so.

5. Promote harmony and the spirit of common brotherhood amongst all the people of India transcending religious, linguistic and regional or sectional diversities and to renounce practices derogatory to the dignity of women

6. Value and preserve the rich heritage of the country's composite culture

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7. Protect and improve the natural environment including forests, lakes, rivers and wildlife and to have compassion for living creatures

8. Develop scientific temper, humanism and the spirit of inquiry and reform

9. Safeguard public property and to abjure violence

10. Strive towards excellence in all spheres of individual and collective activity so that the nation constantly rises to higher levels of endeavour and achievement

11. Provide opportunities for education to his child or ward between the age of six and fourteen years.

Additional Information

• Background:

• The Fundamental Duties are dealt with Article 51A under Part-IV A of the Indian Constitution.

• 42nd Amendment Act of 1976 added 10 Fundamental Duties to the Indian Constitution. 86th Amendment Act 2002 later added 11th Fundamental Duty to the list.

• Swaran Singh Committee in 1976 recommended Fundamental Duties, the necessity of which was felt during the internal emergency of 1975-77.

Q83. Answer: (d) Rs. 1,000

Shortcut Trick

Total ratio parts = 7 + 5 = 12 units

Given: 12 units = Rs. 2,400

=> 1 unit = Rs. 200

Share of B = 5 units = 5 × Rs. 200 = Rs. 1,000

Therefore The correct answer is Rs. 1,000.

Alternate Method

Given:

Total amount to be distributed = Rs. 2,400

Ratio of distribution (A : B) = 7 : 5

Formula Used:

Individual Share = (Individual Ratio / Sum of Ratios) × Total Amount

Calculations:

=> Sum of ratio parts = 7 + 5 = 12

=> Share of B = (5 / 12) × 2,400

=> Share of B = 5 × 200

=> Share of B = Rs. 1,000

Therefore The correct answer is Rs. 1,000.

Additional Information

Ratio and Proportion

Ratio is the comparison of two quantities of the same kind. If a value X is divided into a : b, the parts are [a/(a+b)] × X and [b/(a+b)] × X.

Compound Ratio

For two ratios a : b and c : d, the compound ratio is (ac) : (bd).

Direct Proportion

Two quantities are in direct proportion if an increase in one leads to a corresponding increase in the other at a constant rate.

Q84. Answer: (d) 13%

Shortcut Trick

First Discounted Price = 1200 − (15% of 1200) = 1200 − 180 = Rs. 1,020.

Net Selling Price required = Rs. 887.40.

Additional Discount = 1020 − 887.40 = Rs. 132.60.

Additional Discount % = (132.60 ÷ 1020) × 100 = 13.26 × 10 ÷ 10.2 = 13%.

Therefore The correct answer is 13%.

Alternate Method

Given: List Price (MP) = Rs. 1,200, First Discount = 15%, Final SP = Rs. 887.40.

Formulas: SP = MP × (100 − D1)% × (100 − D2)%

=> 887.40 = 1200 × (85 ÷ 100) × [(100 − x) ÷ 100]

=> 887.40 = 12 × 85 × [(100 − x) ÷ 100]

=> 88740 = 1020 × (100 − x)

=> 100 − x = 88740 ÷ 1020 = 87

=> x = 100 − 87 = 13%

Therefore The correct answer is 13%.

Additional Information

Successive Discounts

When two discounts a% and b% are given, the single equivalent discount is calculated as (a + b − ab/100)%.

Marked Price & Discount

Discount is always calculated on the Marked Price (List Price). SP = MP × (100 − Discount%)/100.

Q85. Answer: (d) x2 - 19x + 84 = 0

Shortcut Trick

For any quadratic equation with roots α and β, the equation is given by x2 − (Sum of roots)x + (Product of roots) = 0.

Sum of roots = 7 + 12 = 19

Product of roots = 7 × 12 = 84

Equation => x2 − 19x + 84 = 0

Therefore The correct answer is x2 − 19x + 84 = 0.

Alternate Method

Given:

First root (α) = 7

Second root (β) = 12

Formula Used:

A quadratic equation can be expressed as: x2 − (α + β)x + (αβ) = 0

Calculations:

=> Sum of roots (α + β) = 7 + 12 = 19

=> Product of roots (α × β) = 7 × 12 = 84

=> Substituting these values into the standard form:

=> x2 − (19)x + (84) = 0

=> x2 − 19x + 84 = 0

Therefore The correct answer is x2 − 19x + 84 = 0.

Additional Information

Standard Form of Quadratic Equation

The general form is ax2 + bx + c = 0, where sum of roots = −b/a and product of roots = c/a.

Nature of Roots

The nature is determined by the Discriminant (D = b2 − 4ac). If D > 0 roots are real/distinct, if D = 0 roots are real/equal, and if D < 0 roots are imaginary.

Factor Theorem

If k is a root of a polynomial P(x), then (x − k) is a factor of that polynomial.

Q86. Answer: (c) 5

The correct answer is '5'.

Key Points

• The government should make a proposal to consider petroleum products under GST as a welcome move toward the regime.

• Products like kerosene, naphtha and LPG will be under the GST regime.

• Five items like crude oil, natural gas, aviation fuel, diesel, and petrol are kept out of the GST regime on 31st December 2021.

Additional Information

• Goods and Service Tax:

• In the words of Prime Minister Narendra Modi, the Goods and Services Tax (GST) is “a path-breaking legislation for New India”.

• This revolutionary taxation system was rolled out on the midnight of 1 July, 2017 in a ceremony held in the Central Hall of Parliament.

• GST is not merely a tax reform but a milestone in realizing Sardar Vallabhbhai Patel’s dream of building ‘Ek Bharat – Sreshtha

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Bharat'.

• Need for GST:

• Before 1 July 2017, Indian indirect tax regime was highly fragmented. Centre and States were separately taxing goods and services.

• There were many taxes like excise duty, service tax, VAT, CST, purchase tax, entertainment tax etc.

• In addition, there was multiplicity of rates, laws and procedures.

• This caused heavy compliance burden. Imposition of tax on tax was another serious problem.

• For example, VAT was levied on a value that included excise duty.

• Input tax credit chain broke as goods moved from one state to another, resulting in hidden cost for the business.

• There were tax nakas at every inter-state border, creating bottlenecks in inter-state transport of goods.

• Every state was effectively a distinct market for the industry as well as consumer.

• Industry's choice of locating factories or warehouses was heavily influenced by the prevailing tax regime rather than pure business consideration, making the industry uncompetitive.

Q87. Answer: (a) Reserve Bank of India

The correct answer is 'Reserve Bank of India'.

Key Points

• Reserve Bank is organising its first global hackathon – "HARBINGER 2021 – Innovation for Transformation" with the theme 'Smarter Digital Payments'.

• Objective:

• The Hackathon invites participants to identify and develop solutions that have the potential to m digital payments accessible to the under-served and enhance the ease of payments and user experience while strengthening the security of digital payments and promoting customer protection.

• HARBINGER 2021 invites innovative ideas for the following problem statements in the payment and settlement system landscape:

• Innovative, easy-to-use, non-mobile digital payment solutions for converting small-ticket cash transactions to d mode.

• Context-based retail payments to remove the physical act of payment.

• The alternate authentication mechanism for digital payments.

• Social Media Analysis Monitoring tool for detection of digital payment fraud and disruption.

• Prizes:

• Being part of HARBINGER 2021 gives an opportunity to the participants to get mentored by industry experts and exhibit innovative solutions before an eminent jury and win exciting prizes in each category.

• Winner: Rs. 40 lakh

• Runner-up: Rs. 20 lakh

Q88. Answer: (a) By preventing release of eggs from the ovary

The correct answer is 'By preventing the release of eggs from the ovary '.

Key Points

• Contraceptive pills are hormonal pills that prevent ovulation.

• The primary mechanism of action of hormonal contraceptives is that they suppress the secretion of gonadotropins (Follicle Stimulating Hormone, FSH and Luteinizing Hormone, LH).

• The contraceptive pills contain both progesterone and estrogen and the lower levels of estrogen in birth control pills suppress FSH and LH, "fooling" the pituitary gland into thinking a woman is pregnant.

• Ovulation will then not occur, which prevents pregnancy.

• Oral contraceptive pills do not kill sperm or ova.

Q89. Answer: (b) Filter toxic substances through the leaves

The incorrect answer is 'Filter toxic substances through the leaves'.

Key Points In plant excretion:

• They get rid of excess water through transpiration

• The plant cannot selectively filter toxic substances through its leaves.

• Store waste products in Vacuoles

• Waste products are stored as resins and gums in old xylem.

• They excrete waste substances into the soil around them.

Q90. Answer: (b) Smriti Zubin Irani

The correct answer is 'Smriti Zubin Irani'.

Key Points

• The Ministry of Women and Child Development is celebrating International Women's Day week from 1st to 8th March 2022 as a part of nationwide celebrations of 'Azadi Ka Amrit Mahotsav'.

• In collaboration with NIMHANS, the "Stree Manoraksha project" was launched by the Union Minister for Women and Child Development, Smriti Zubin Irani.

• The project is aimed at extending mental health training to 6000 OSC functionaries across India.

• Later in the day, a consultative conclave on capacity building of OSCs was organised in collaboration with NALSA.

• The event was attended by Government officials, representatives of NIMHANS, NALSA and the representatives of OSCs from across the country

Q91. Answer: (b) Sukarno

The correct answer is 'Sukarno'.

Key Points

• The first Republic Day Parade was held on 26 January 1950, during which the President of Indonesia Sukarno was the chief guest.

• Between 1950 and 1954, Republic Day parades were held at Irwin Stadium (now National Stadium), Kingsway, Red Fort and Ramlila Maidan.

• Dr Rajendra Prasad began his first tenure as President of the Indian Union on this day.

• The President addresses the country on the eve of Republic Day.

• The republic day celebrations are majorly divided into three parts i.e.

• the Republic Day Parade.

• the Beating Retreat.

• the Award Distributions.

Q92. Answer: (c) 2

Given numbers: 577 534 249 842 718

Calculation:

According to the question,

If 2 is added to the second digit of every number,

Here, in 554, 5 is divisible by 5 and in 269, 6 is divisible by 2.

Therefore, only in 2nd and 3rd numbers, second digit be exactly divided by the first digit of that number.

hence, the correct answer is 'option 3'.

Q93. Answer: (c) 30 cm

The correct answer is '30 cm'.

Key Points

• A ray of light is made incident on a convex mirror, parallel to its principal axis.

• After reflection, it will pass through the principal focus for point Q(given in question).

• • The relation between the focal length (f) and radius of curvature (R) of a Concvex mirror is that the focal length is equal to half of the radius of curvature i.e. R=2f.

R = 2 x 30 = 60cm

The center of curvature will be at a distance equal to the focus length from the focus. i.e CF = R - f = 60- 30 = 30 cm.

Therefore, 'option 3' is correct.

Q94. Answer: (a) 60 W

Given:

The potential difference, V = 12V

Steady current flowing, I = 5 A

Formula used:

Power(P) = Voltage(v) x current(I)

Calculation:

=> P = V x I

=> P= 12 x 5 = 60 W

Hence, the correct answer is '60 W'.

Q95. Answer: (c) F

Given:

Each of D, E, F, G, H, I and J has a football match to participate on a different day of a week, starting from Monday to Sunday of the same week.

Solution:

(1.) D has a match on Wednesday.

(2.) E has a match on the day immediately after I.

(3.) J has a match immediately after E, but not on Sunday.

Therefore, I surely will play on Thursday. so E on Friday and so on.

(4.) G has a match immediately after H. H will definitely plays on Mondays because G will be plays immediately after H.

(5.) Only Sunday is vacant. Thus F will participate on Sunday.

Hence, 'F' has a match on Sunday.

So 'option 3' is the correct answer.

Q96. Answer: (d) 450

Shortcut Trick

Difference in Profit Percentage = 28% − 12% = 16%.

According to the question, this 16% difference is due to the reduction of Rs. 72 in the selling price.

Using Unitary Method: 16% of CP = Rs. 72.

1% of CP = 72 ÷ 16 = 4.5.

100% (Cost Price) = 4.5 × 100 = 450.

Therefore The correct answer is Rs. 450.

Alternate Method

Given: Initial Profit = 28%, New Profit = 12%, Reduction in SP = Rs. 72.

Formulas: SP = CP × (100 + P%) ÷ 100 | Difference in SP = SP1 − SP2.

=> Let Cost Price (CP) be x.

=> Initial SP1 = 1.28x.

=> New SP2 = 1.12x.

=> SP1 − SP2 = 72.

=> 1.28x − 1.12x = 72 => 0.16x = 72.

=> x = 72 ÷ 0.16 = 450.

Therefore The correct answer is Rs. 450.

Additional Information

Cost Price and Profit Relationship

Profit is always calculated on the Cost Price unless otherwise stated. If CP is constant, the change in SP is directly proportional to the change in profit percentage.

Ratio Method

If profit changes from P1% to P2%, the Change in SP = CP × (P1 − P2) ÷ 100.

Q97. Answer: (a) Rs. 10,000

Shortcut Trick

Monthly Expenditure = 4,20,000 ÷ 12 = Rs. 35,000.

Monthly Savings = Monthly Salary − Monthly Expenditure

Average Monthly Savings = 45,000 − 35,000 = Rs. 10,000.

Therefore The correct answer is Rs. 10,000.

Alternate Method

Given:

Total Annual Expenditure = Rs. 4,20,000

Monthly Salary = Rs. 45,000

Formula Used:

Total Annual Income = Monthly Salary × 12

Average Monthly Savings = (Total Annual Income − Total Annual Expenditure) ÷ 12

Calculations:

=> Total Annual Income = 45,000 × 12 = Rs. 5,40,000

=> Total Annual Savings = 5,40,000 − 4,20,000 = Rs. 1,20,000

=> Average Monthly Savings = 1,20,000 ÷ 12

=> Average Monthly Savings = Rs. 10,000

Therefore The correct answer is Rs. 10,000.

Additional Information

Income, Expenditure and Savings Relationship

The fundamental relation is Income = Expenditure + Savings. To find savings, use Savings = Income − Expenditure.

Conversion of Time Periods

Always ensure all units (monthly or annual) are uniform. To convert monthly to annual, multiply by 12. To convert annual to monthly, divide by 12.

Savings Percentage

Savings % = (Savings ÷ Income) × 100. In this case, Savings % = (10,000 ÷ 45,000) × 100 ≈ 22.22%.

Q98. Answer: (d) Samveda

The correct answer is Samveda.

Key Points

• "Samveda" is an ancient Hindu text and one of the four main Vedas of Hinduism.

It is a collection of tunes and chants, and is also called the "Book of Songs", the "Veda of Chants" or even the "Yoga of Songs".

It is basically the words of "Rigveda" set to music.

The Gandharvaveda deals with various aspects of Saundasau Ryashastra including art forms like music, dance, poetry, sculpture, erotica etc. It is related to the Samaveda.

Additional Information

• Rigveda:

• The Rigveda is the oldest of the four Vedas and one of the most important texts in the Hindu tradition.

• It is a large collection of hymns in praise of the deities, which are chanted in various rituals.

• Ayurveda is the Upaveda of Rigveda.

• Atharvaveda:

• The Atharvaveda is commonly referred to as the "Veda of magical formulas".

• All the routines of life are described in detail in this Veda.

• It consists of the three fundamental Upanishads – the Mundaka Upanishad, the Mandukya Upanishad and the Prasna Upanishad – and is known as the Veda of magical formulas.

• Yajurveda:

• The text in the Yajurveda ("worship knowledge" or "ritual knowledge") consists of ritual worship aphorisms, mantras and chants directly involved in worship services.

• Yajurveda was composed by Ved Vyas.

Q99. Answer: (b) Fish

The correct answer is 'Fish'.

Key Points

• The smaller the size of the animal, the higher is the metabolic rate and the higher the respiratory (breathing) rate.

• This is because a smaller size means a higher surface area to volume ratio and, therefore, a higher need for oxygen to be supplied to the different tissues.

• Since fishes are smaller in size they will have a much higher breathing rate.

• So, the correct option is 'fish'.

Additional Information

• Difference in breathing rate of terrestrial and aquatic animal:

• The breathing rate of aquatic animals is faster than that of terrestrial animals because the amount of dissolved oxygen in the water in much less than the amount on land, so they have to breathe more in order to get more oxygen.

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Q100. Answer: (d) 380

The logic is followed here:

• (First number + 1) x First number = Second number.

Hence, '380' is the correct answer.

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