RRB ALP CBT-I 2024 Official Paper (Held On: 25 Nov, 2024 Shift 2) (Previous Year Paper)

RRB Group D • 2024 • 75 questions • 60 minutes • Answer key and solutions

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STAGE I (CBT I)

Q1. Which award has been conferred to Ram Chet Chaudhary in the field of Science and Engineering in 2024?

(a) Padma Vibhusan
(b) Padma Shri
(c) Padma Bhusan
(d) Bharat Ratna

Q2. The average of all the prime numbers between 30 and 50 is:

(a) 40.2
(b) 40.4
(c) 38.9
(d) 39.8

Q3. If $4\sin^2\theta = 1$ and θ is an acute angle, then the value of $\cos^2\theta + \tan^2\theta$ = _____.

(a) 13/12
(b) 5/13
(c) 1/3
(d) 1/4

Q4. The division of labour occurs in:

(a) only unicellular organisms
(b) only multicellular organisms
(c) neither unicellular nor in multicellular organism
(d) both unicellular and multicellular organisms

Q5. The value of M in (p/q)^(2M+2) = (q/p)^(9-M)

(a) -7/2
(b) -11
(c) 6
(d) 5

Q6. Which of the following options should come in place of the question mark (?) in the given series to make it logically complete?

361, 348, 335, 322, 309,?

(a) 290
(b) 300
(c) 296
(d) 294

Q7. A man sold an article for Rs. 247.50, there by gaining 12.5%. The cost of the article was:

(a) Rs. 220
(b) Rs. 225
(c) Rs. 210
(d) Rs. 224

Q8. If each letter of the word TYPING, is changed to the letter immediately preceding it in the English alphabetical order and the new group of letters thus formed is rearranged in English alphabetical order, then which letter is first to the right in the new rearranged group of letters?

(a) O
(b) X
(c) M
(d) S

Q9. Read the given statements and conclusions carefully. You have to take the given statements to be true even if they seem to be at variance from commonly known facts and decide which conclusion(s) logically follow(s) from the given statements.

Statements:

All lemons are potatoes.

Some lemons are papayas.

Conclusions:

(I) Some potatoes are papayas.

(II) All papayas are potatoes

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

Q10. Which of the following options represents sub-atomic particles found in Thomson's model of an atom?

(a) Only electrons
(b) Protons and neutrons both
(c) Only protons
(d) Electrons and protons both

Q11. Seven boxes A, B, C, D, E, F and G are kept one over the other but not necessarily in the same order. F is kept third from the top. Only two boxes are kept between B and G. D is kept immediately above G. Only three boxes are kept between E and A. D is kept at one of the positions below F. E is not kept at the top-most position.

Which box is kept fourth from the top?

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

Q12. The sum of three consecutive multiples of 8 is 2424, find the largest one.

(a) 824
(b) 848
(c) 810
(d) 816

Q13. Which of the following environmental factors plays a role in sex determination of few reptiles?

(a) Pressure
(b) Water
(c) Soil
(d) Temperature

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Q14. Gastric glands present in the wall of the stomach do NOT release:

(a) saliva
(b) pepsin
(c) hydrochloric acid
(d) mucus

Q15. In the following number-pairs, the second number is obtained by applying certain mathematical operations to the first number. Which numbers should replace X and Y so that the pattern followed by the two numbers on the left side of :: is the same as that on the right side of :: ?

(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.)

X : 128 :: 146 : Y

(a) X = 164, Y = 92
(b) X = 146, Y = 98
(c) X = 174, Y = 84
(d) X = 156, Y = 86

Q16. Select the correct balanced equation for the reaction $Al_2(SO_4)_3 + BaCl_2 \rightarrow AlCl_3 + BaSO_4$.

(a) $Al_2(SO_4)_3 + 3BaCl_2 \rightarrow 3AlCl_3 + 2BaSO_4$
(b) $2Al_2(SO_4)_3 + 3BaCl_2 \rightarrow 2AlCl_3 + 3BaSO_4$
(c) $Al_2(SO_4)_3 + 2BaCl_2 \rightarrow 2AlCl_3 + 3BaSO_4$
(d) $Al_2(SO_4)_3 + 3BaCl_2 \rightarrow 2AlCl_3 + 3BaSO_4$

Q17. L, P, R, V, X, Y and Z are sitting around a circular table facing the centre. Only one person sits between V and L, when counted from the right of V. Only one person sits between L and X. Only one person sits between V and Z. Only two people sit between R and X. Only one person sits between P and Z. Who sits to the immediate right and left of Y, respectively?

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

Q18. The discussion paper titled '____' was released by NITI Aayog on 15 January 2024.

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

Q19. The tax on a commodity is reduced by 20% and its consumption is increased by 15%. What is the effect on tax revenue?

(a) It increases by 10%
(b) It decreases by 8%
(c) It increases by 8%
(d) No change

Q20. A diver rowing at the speed of 3 km/h in still water takes double the time going 50 km upstream compared to going 50 km downstream. The speed of the diver downstream is:

(a) 9/2 km/h
(b) 4 km/h
(c) 7/2 km/h
(d) 10/3 km/h

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Q21. Two successive discounts of 40% and 60% on a deal are equivalent to a single discount of:

(a) 70%
(b) 66%
(c) 76%
(d) 80%

Q22. Simplify the following expression:

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

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

Q23. The LCM of 84, 105 and 140 is:

(a) 360
(b) 240
(c) 120
(d) 420

Q24. When we are travelling in a bus, we tend to move forward when the bus is stopped suddenly. This is because of _____.

(a) Newton's third law of motion
(b) acceleration due to gravity
(c) the inertia of our body
(d) Newton's second law of motion

Q25. Which of the following Sustainable Development Goals is highlighted as needing targeted efforts due to its score being below 50?

(a) Goal 5 (Gender Equality)
(b) Goal 15 (Life on Land)
(c) Goal 13 (Climate Action)
(d) Goal 8 (Decent Work and Economic Growth)

Q26. Find the number of bricks, each measuring 24 cm × 12 cm × 8 cm, required to construct a wall 24 m long, 8m high and 60 cm thick if 10% of the wall is filled with mortar?

(a) 45000
(b) 450000
(c) 450
(d) 4500

Q27. Select the incorrect statement:

(a) Male germ-cells are produced by pollen grain
(b) Female gamete is present in the stigma
(c) Fertilisation gives us zygote
(d) The fusion of male gamete and female gamete is known as fertilisation

Q28. Given below is a statement followed by two possible reasons numbered I and II. Read the statement carefully and decide which of the two explain(s) the event/observation/information given in the statement.

Statement - The railway authorities have decided to run two holiday special trains on Tuesdays and Fridays from City A to City B from 19th October 2023 to 5th January 2024.

Reasons:

(I) Flights from City A to City C are booked to capacity, and airlines are planning to increase the number of flights operating between City A and City C from August 2023.

(II) Many migrants from City B who work in city A, travel back to City B on trains from October to January for the festivals. The existing trains cannot accommodate this increase in passenger demand.

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(a) Neither I nor II is a possible reason.
(b) Only I is a possible reason.
(c) Only II is a possible reason.
(d) Both I and II are possible reasons.

Q29. KBWJ is related to MZZG in a certain way based on the English alphabetical order. In the same way, OXCD is related to QVFA. To which of the following options is STIX related, following the same logic?
(a) VRKU
(b) URLU
(c) VSLT
(d) TSLV

Q30. A total of _____ Arjun awards were conferred during the National Sports Awards 2023.
(a) 21
(b) 31
(c) 26
(d) 18

Q31. Two trains, each 250 m in length, are running on parallel lines in opposite directions at speeds of 90 km/h and 60 km/h respectively. In how many seconds will they cross each other completely?
(a) 15 sec
(b) 18 sec
(c) 10 sec
(d) 12 sec

Q32. In May 2024, DRDO handed over _____ defence technology projects to IIT Bhubaneswar.
(a) nine
(b) seven
(c) five
(d) eleven

Q33. Which two numbers should be interchanged to make the given equation correct?
72 – 56 + (13 + 19) × 2 - 95 ÷ 5 + 17 = 76
(Note: Interchange should be done of the entire number and not individual digits of a given number.)
(a) 19 and 5
(b) 19 and 17
(c) 17 and 56
(d) 13 and 17

Q34. Based on the English alphabetical order, three of the following four letter-cluster pairs are alike in a certain way and thus form a group. Which pair does not belong to that group?
(Note: The odd one out is not based on the number of consonants/vowels or their position in the letter cluster.)
(a) QV-SX
(b) KP-MR
(c) AD-CG
(d) BG-DI

Q35. In a certain code language, ‘FEND’ is coded as ‘9735’ and ‘FEUD’ is coded as ‘3769’. What is the code for ‘U’ in the given code language?
(a) 7
(b) 6
(c) 3
(d) 9

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Q36. We observe geometrical shadow of an opaque object when light is incident on it. This is due to _____.

(a) diffraction of the light
(b) dispersion of the light by an object
(c) light travelling in a straight line
(d) reflection of the light

Q37. In a certain code language,

A+B means ‘A is the mother of B,
A-B means ‘A is the brother of B,
A x B means ‘A is the wife of B’,
A÷B means ‘A is the father of B,
and A # B means 'A is the daughter of B'.
How is R related to T if ‘Q#R × P÷K × T"?

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

Q38. Nalin starts from Point Y and drives 8 km towards North. He then takes a right turn, drives 23 km, turns right and drives 29 km. He then takes a left turn and drives 14 km. He takes a left turn, drives 21 km and stops at Point Z. How far (shortest distance) and towards which direction should he drive in order to reach Point Y again? (All turns are 90 degrees)

(a) 29 km towards the south
(b) 37 km towards the west
(c) 26 km towards the north
(d) 21 km towards the east

Q39. Fruits and seeds have a high concentration of which of the following plant hormones?

(a) Auxin
(b) Gibberellin
(c) Cytokinin
(d) Abscisic acid

Q40. Last year, there were 610 boys in a school. The number decreased by 20% this year. How many girls are there in the school if the number of girls is 175% of the total number of boys in the school this year?

(a) 854
(b) 798
(c) 782
(d) 848

Q41. Which of the following numbers is divisible by 4?

(a) 987654
(b) 8978624
(c) 7864534
(d) 9876342

Q42. The work done by the motor per unit time is called _____.

(a) power
(b) energy
(c) acceleration
(d) momentum

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Q43. Refer to the given number and symbol series and answer the question that follows. Counting to be done from left to right only.

(Left) 7 3 @ 1 7 3 ^ 4 & 3 Ω 9 # * £ 5 (Right)

How many such symbols are there, each of which is immediately preceded by a number and also immediately followed by a number?

(a) Four
(b) Three
(c) Five
(d) More than five

Q44. Read the given statements and conclusions carefully. You have to take the given statements to be true even if they seem to be at variance from commonly known facts and decide which conclusion(s) logically follow(s) from the given statements.

Statements:

Some giraffes are rhinos.

All rhinos are tigers.

Conclusions:

(I) Some tigers are giraffes.

(II) All tigers are rhinos.

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

Q45. In a certain code language, ‘ARGOT’ is coded as ‘12497’ and ‘GRAFT’ is coded as ‘29743’. What is the code for ‘F’ in the given code language?

(a) 7
(b) 3
(c) 2
(d) 4

Q46. If + means −, − means ×, × means ÷, ÷ means +, then what will come in place of the question mark (?) in the following equation?

62 - 2 ÷ 7 + 14 × 7 = ?

(a) 129
(b) 133
(c) 143
(d) 131

Q47. The sides of a rectangle are in the ratio 8 : 10 and its perimeter is 90 cm. The area of this rectangle is:

(a) 550 cm^2
(b) 450 cm^2
(c) 520 cm^2
(d) 500 cm^2

Q48. Which of the following is formed by the action of chlorine on dry slaked lime?

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

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Q49. A sum of money doubles itself at a certain rate of compound interest in 12 years when the interest is compounded annually. In how many years will it become eight times of itself?

(a) 36
(b) 12
(c) 48
(d) 24

Q50. Which of the following is NOT an example of homogenous mixture?

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

Q51. In the following number-pairs, the second number is obtained by applying certain mathematical operations to the first number. Which numbers should replace X and Y so that the pattern followed by the two numbers on the left side of :: is the same as that on the right side of :: ?

X:125: :13:Y

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

Q52. When an object is kept at a distance 20 cm in front of a concave mirror, a real image is formed at the centre of curvature of the mirror. Magnification produced by the mirror is _____.

(a) -20
(b) -1
(c) -10
(d) -0.5

Q53. Which of the following options should come in place of the question mark (?) in the given series based on the English alphabetical order?

BEG, CFH. DGI EHJ, ?

(a) FGK
(b) FIK
(c) FKL
(d) FGL

Q54. Select the INCORRECT pair.

(a) Primary consumer - second trophic level
(b) Autotrophs - first trophic level
(c) Small carnivorous - third trophic level
(d) Bacteria - fourth trophic level

Q55. Which of the following is the general formula of alkenes?

(a) C_nH_(2n+1)
(b) C_(2n)H_(2n)
(c) C_nH_n
(d) C_nH_(2n)

Q56. If 25 people working 15 hours a day can complete 5 units of work in 8 days, how many days would be required by 12 persons to complete 10 units of work, working 20 hours a day?

(a) 20 days
(b) 25 days
(c) 22 days
(d) 24 days

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Q57. The average marks of the students of a class in a particular exam is 80. If 5 students whose average marks in that exam is 40 are excluded, the average marks of the remaining students will be 90. Find the number of students who wrote the exam.

(a) 25
(b) 20
(c) 15
(d) 35

Q58. What will happen during the free fall of a massive object under the influence of gravitational force of the earth?

(a) Velocity of the massive object increases.
(b) Velocity of the massive object decreases.
(c) Mass of the object increases.
(d) Mass of the object decreases.

Q59. Which of the following statements is INCORRECT?

(a) The strength of the force of attraction between the particles of matter varies from one kind of matter to another.
(b) The force acting between the particles of matter keeps them together.
(c) The strength of the force of attraction between the particles of matter is constant, irrespective of the kind of matter.
(d) The particles of matter have force acting between them.

Q60. UPTQ is related to OJNK in a certain way based on the English alphabetical order. In the same way, RMQN is related to LGKH. To which of the following options is NIMJ related, following the same logic?

(a) HCGD
(b) CHDG
(c) CHGD
(d) HCDG

Q61. Seven people, A, B, C, D, E, F and G, are sitting in a row, facing north. Only five people sit between C and D. B sits third from the right end. G sits to the immediate right of C. E sits third to the right of A. How many people sit between G and F?

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

Q62. Who among the following is the Non-Playing Captain and Coach of Indian Chess team at Chess Olympiad 2024?

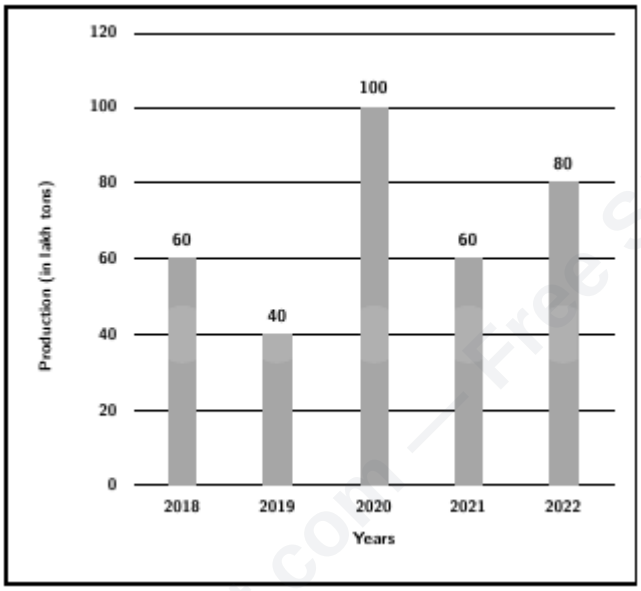
(a) Vikram Singh
(b) Srinath Narayanan
(c) Abhijit Ganguly
(d) Pendyala Harikrishna

Q63. Study the following graph and answer the given question.

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

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

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(a) 270
(b) 240
(c) 250
(d) 260

Q64. Which of the following electrolytes is used in the electrolytic refining of copper?
(a) Sodium sulphate
(b) Cuprous chloride
(c) Copper oxide
(d) Copper sulphate

Q65. Which Sikkimese craftsman, renowned for his skill in creating the 'Sumak Thyakutuk' (Lepcha traditional hat), was awarded the Padma Shri in 2024 for his contributions to art and cultural heritage?
(a) Jordan Lepcha
(b) Karma Wangchuk
(c) Sonam Tshering
(d) Tashi Namgyal

Q66. The resistance of a 10 m long copper wire is R ohm. What will be the resistance of a 5 m long copper wire?
(a) 0.5R ohm
(b) R ohm
(c) 5R ohm
(d) 2R ohm

Q67. Which of the following devices does NOT make use of current carrying conductor in a magnetic field?
(a) Electric motor
(b) Electric fan
(c) Electric generator
(d) Electric heater

Q68. Which of the following options should come in place of the question mark (?) in the given series based on the English alphabetical order?
YUS, WSQ, UQO, SOM, ?
(a) QMK
(b) QOL
(c) RML
(d) QKL

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Q69. If two interior angles on the same side of a transversal intersecting two parallel lines are in the ratio 2 : 3, then the greater of the two angles is:

(a) 108°
(b) 54°
(c) 136°
(d) 120°

Q70. In 2023, which institution implemented two-factor authentication for all e-way bill and e-invoice systems?

(a) RBI
(b) CBDT
(c) CBIC
(d) SEBI

Q71. Based on the English alphabetical order, three of the following four letter-cluster pairs are alike in a certain way and thus form a group. Which pair does not belong to that group?

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

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

Q72. Which Indian Bharatanatyam dancer and film star, already awarded the Padma Shri in 1968, was honored with the Padma Vibhushan in 2024 during the Civil Investiture Ceremony?

(a) Rukmini Devi Arundale
(b) Vyjayanthimala
(c) Shobana
(d) Hema Malini

Q73. Who was appointed as the Director General of the Narcotics Control Bureau on 17 September 2024?

(a) Anurag Garg
(b) Sanjay Arora
(c) Samant Goel
(d) Rakesh Asthana

Q74. If 18 : 24 :: 24 : y, what is the value of y?

(a) 36
(b) 18
(c) 24
(d) 32

Q75. In the word MASTER, each consonant is changed to the letter immediately preceding it in the English alphabetical order and each vowel is changed to the letter immediately succeeding it in the English alphabetical order. How many consonants are present in the new group of letters thus formed?

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

ANSWER KEY

1	b	2	d	3	a	4	d	5	b	6	c	7	a	8	b	9	a	10	a
11	b	12	d	13	d	14	a	15	a	16	d	17	c	18	b	19	b	20	b
21	c	22	c	23	d	24	c	25	a	26	a	27	b	28	c	29	b	30	c
31	d	32	a	33	b	34	c	35	b	36	c	37	b	38	b	39	c	40	a

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41	b	42	a	43	a	44	c	45	b	46	a	47	d	48	d	49	a	50	d
51	b	52	b	53	b	54	d	55	d	56	b	57	a	58	a	59	c	60	a
61	c	62	b	63	b	64	d	65	a	66	a	67	d	68	a	69	a	70	c
71	d	72	b	73	a	74	d	75	a										

SOLUTIONS

Q1. Answer: (b) Padma Shri

The correct answer is Padma Shri.

Key Points

• For the year 2024, the President approved conferment of 132 Padma awards, up from 106 such awards last year.

• The list comprises five Padma Vibhushan, 17 Padma Bhushan and 110 Padma Shri awards.

• While 30 awardees are women, the list also includes nine persons from the category of “Foreigners/NRI/PIO/OCI” and nine posthumous awardees.

• Late M Fathima Beevi, the first female of the Supreme Court of India and the first Muslim woman to be appointed to any of the higher judiciary in the country, who passed away recently, has been awarded Padma Bhushan (posthumously).

• Gouri Lakshmi Bayi, has written on the temples of erstwhile Travancore and Kerala, besides anthologies in English.

Additional Information

• The following are the names of Padma Award 2024 recipients:

Padma Vibhushan	Padma Bhushan	Padma Shri
1. Vyjayantimala Bali	1. M Fathima Beevi	1. Khalil Ahamad
2. Konidela Chiranjeevi	2. Hormusji N Cama	2. Badrappan M
3. M Venkaiah Naidu	3. Mithun Chakraborty	3. Kaluram Bamaniya
4. Bindeshwar Pathak	4. Sitaram Jindal	4. Rezwana Choudhury Bannya
5. Padma Subrahmanyam	5. Young Liu	5. Naseem Bano
	6. Ashwin Balachand Mehta	6. Ramlal Bareth
	7. Satyabrata Mookherjee	7. Gita Roy Barman
	8. Ram Naik	8. Parbati Baruah
	9. Tejas Madhusudan Patel	9. Sarbeswar Basumatary
	10. Olanchery Rajagopal	10. Som Datt Battu
	11. Dattatray Ambadas Mayaloo Alias Rajdutt	11. Takdira Begum
	12. Togdan Rinpoche	12. Sathyanarayana Beleri
	13. Pyarelal Sharma	13. Drona Bhuyan
	14. Chandreshwar Prasad Thakur	14. Ashok Kumar Biswas
	15. Usha Uthup	15. Rohan Machanda Bopanna
	16. Vijaykanth	16. Smriti Rekha Chakma
	17. Shri Kundan Vyas	17. Narayan Chakraborty
		18. A Velu Ananda Chari
		19. Ram Chet Chaudhary
		20. K Chellammal
		21. Joshna Chinappa
		22. Charlotte Chopin

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		23. Raghuveer Choudhary
		24. Joe D Cruz
		25. Ghulam Nabi Dar
		26. Chitta Ranjan Debbarma
		27. Uday Vishwanath Deshpande
		28. Prema Dhanraj
		29. Radha Krishan Dhiman
		30. Manohar Krishana Dole
		31. Pierre Sylvain Filliozat
		32. Mahabir Singh Guddu
		33. Anupama Hoskere
		34. Yazdi Maneksha Italia
		35. Rajaram Jain
		36. Jankilal
		37. Ratan Kahar
		38. Yashwant Singh Kathoch
		39. Zahir I Kazi
		40. Gaurav Khanna
		41. Surendra Kishore
		42. Dasari Kondappa
		43. Sridhar Makam Krishnamurthy
		44. Yanung Jamoh Lego
		45. Jordan Lepcha
		46. Satendra Singh Lohia
		47. Binod Maharana
		48. Purnima Mahato
		49. Uma Maheshwari D
		50. Dukhu Majhi
		51. Ram Kumar Mallick
		52. Hemchand Manjhi
		53. Chandrashekhar Mahadeorao Meshram
		54. Surendra Mohan Mishra
		55. Ali Mohammed & Shri Ghani Mohammed (Duo)
		56. Kalpana Morparia
		57. Chami Murmu
		58. Sasindran Muthuvel
		59. G Nachiyar
		60. Kiran Nadar

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		61. Pakaravur Chithran Namboodiripad (Posthumous)
		62. Narayanan E P
		63. Shailesh Nayak
		64. Harish Nayak
		65. Fred Negrit
		66. Hari Om
		67. Bhagabat Padhan
		68. Sanatan Rudra Pal
		69. Shankar Baba Pundlikrao Papalkar
		70. Radhe Shyam Pareek
		71. Dayal Mavjibhai Parmar
		72. Binod Kumar Pasayat
		73. Silbi Passah
		74. Shanti Devi Paswan & Shri Shivan Paswan (Duo)
		75. Sanjay Anant Patil
		76. Muni Narayana Prasad
		77. K S Rajanna
		78. Chandrashekar Channapatna Rajannachar
		79. Bhagwatilal Rajpurohit
		80. Romalo Ram
		81. Navjivan Rastogi
		82. Nirmal Rishi
		83. Pran Sabharwal
		84. Gaddam Sammaiah
		85. Sangthankima
		86. Machihan Sasa
		87. Omprakash Sharma
		88. Eklabya Sharma
		89. Ram Chander Sihag
		90. Harbinder Singh
		91. Gurvinder Singh
		92. Godawari Singh
		93. Ravi Prakash Singh
		94. Seshampatti T Sivalingam
		95. Somanna
		96. Kethavath Somlal
		97. Shashi Soni

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		98. Urmila Srivastava
		99. Nepal Chandra Sutradhar (Posthumous)
		100. Gopinath Swain
		101. Laxman Bhatt Tailang
		102. Maya Tandon
		103. Aswathi Thirunal Gouri Lakshmi Bayi Thampuratty
		104. Jagdish Labhshanker Trivedi
		105. Sano Vamuzo
		106. Balakrishnan Sadanam Puthiya Veetil
		107. Kurella Vittalacharya
		108. Kiran Vyas
		109. Jageshwar Yadav
		110. Babu Ram Yadav

Q2. Answer: (d) 39.8

Shortcut Trick

List all prime numbers between 30 and 50: 31, 37, 41, 43, 47.

Total count of prime numbers (n) = 5.

Sum of these primes = 31 + 37 + 41 + 43 + 47 = 199.

Average = Sum ÷ n = 199 ÷ 5 = 39.8.

Therefore The correct answer is 39.8.

Alternate Method

Given: The range of numbers is between 30 and 50.

Formula Used: Average = (Sum of all observations) ÷ (Total number of observations)

=> Identify Prime Numbers between 30 and 50: 31, 37, 41, 43, and 47.

=> Count of these numbers (n) = 5

=> Sum = 31 + 37 + 41 + 43 + 47

=> Sum = 199

=> Average = 199 ÷ 5

=> Average = 39.8

Therefore The correct answer is 39.8.

Additional Information

Prime Numbers Definition

A prime number is a natural number greater than 1 that has no positive divisors other than 1 and itself.

Even Prime Number

The number 2 is the only even prime number. All other prime numbers are odd numbers.

Sum of First N Primes

There is no simple polynomial formula for the sum of the first n prime numbers, so they must be listed and summed individually.

Average of a Set

The arithmetic mean or average of a set is always greater than the smallest number and less than the largest number in the set.

Q3. Answer: (a) 13/12

Shortcut Trick

Given $4\sin^2\theta = 1 \Rightarrow \sin^2\theta = 1/4 \Rightarrow \sin\theta = 1/2$.

For an acute angle, $\sin\theta = 1/2$ implies $\theta = 30°$.

Substitute $\theta = 30°$ into the expression $\cos^2\theta + \tan^2\theta$.

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Value = $\cos^2(30°) + \tan^2(30°) = (3/4) + (1/3) = 13/12$.

Therefore The correct answer is 13/12.

Alternate Method

Given: $4\sin^2\theta = 1$ and θ is an acute angle.

Formula Used:

1. $\sin^2\theta + \cos^2\theta = 1$

2. $\tan^2\theta = \sin^2\theta / \cos^2\theta$

Calculations:

$\Rightarrow 4\sin^2\theta = 1$

$\Rightarrow \sin^2\theta = 1/4$

$\Rightarrow \cos^2\theta = 1 - \sin^2\theta = 1 - 1/4 = 3/4$

$\Rightarrow \tan^2\theta = \sin^2\theta / \cos^2\theta = (1/4) / (3/4) = 1/3$

$\Rightarrow$ Required Value = $\cos^2\theta + \tan^2\theta$

$\Rightarrow$ Required Value = $3/4 + 1/3$

$\Rightarrow$ Required Value = $(9 + 4) / 12 = 13/12$

Therefore The correct answer is 13/12.

Additional Information

Trigonometric Identity

For any angle θ, the identity $\sin^2\theta + \cos^2\theta = 1$ always holds true, which can be rearranged as $\cos^2\theta = 1 - \sin^2\theta$.

Specific Angle Values

At $\theta = 30°$, the basic ratios are: $\sin 30° = 1/2$, $\cos 30° = \sqrt{3}/2$, and $\tan 30° = 1/\sqrt{3}$.

Double Angle Formula

The formula for $\cos 2\theta$ is given by $\cos^2\theta - \sin^2\theta$, or $1 - 2\sin^2\theta$, or $2\cos^2\theta - 1$.

Q4. Answer: (d) both unicellular and multicellular organisms

The correct answer is option 4.

Key Points

• The division of labour can occur in both unicellular organisms as well as in multicellular organisms.

• In unicellular organisms, organelles perform specialized functions, which is a form of division of labour.

• In multicellular organisms, different cells, tissues, and organs have specialized functions, leading to a higher level of division of labour.

• This specialization increases efficiency and allows organisms to perform complex tasks.

• Examples include specialized cells like nerve cells for signal transmission and muscle cells for movement in multicellular organisms.

Additional Information

• Unicellular Organisms

• Examples include bacteria, amoeba, and yeast.

• These organisms carry out all life processes within a single cell.

• Multicellular Organisms

• Examples include plants, animals, and fungi.

• These organisms have specialized cells that perform different functions, contributing to the overall survival and efficiency of the organism.

• Cell Specialization

• Specialization allows cells to become more efficient in performing specific tasks.

• Examples include red blood cells specialized for oxygen transport and white blood cells specialized for immune response.

Q5. Answer: (b) -11

Given:

The equation is:

(p/q)^(2M+2) = (q/p)^(9-M)

Formula used:

Using the property of exponents:

a^m × a^n = a^(m+n) and a^(-n) = $1/a^n$

Calculation:

(p/q)^(2M+2) = (q/p)^(9-M)

=> (p/q)^(2M+2) = (p/q)^(-(9-M))

=> 2M + 2 = -(9 - M)

=> 2M + 2 = -9 + M

=> 2M - M = -9 - 2

=> M = -11

Therefore The value of M is -11.

Q6. Answer: (c) 296

The logic followed here is:

Hence, the correct answer is "296".

Q7. Answer: (a) Rs. 220

Shortcut Trick

Convert percentage to fraction: 12.5% = 1/8.

If Cost Price (CP) = 8 units, then Gain = 1 unit and Selling Price (SP) = 9 units.

Given SP = 9 units = Rs. 247.50 => 1 unit = 247.50 ÷ 9 = Rs. 27.50.

Cost Price (8 units) = 8 × 27.50 = Rs. 220.

Therefore The correct answer is Rs. 220.

Alternate Method

Given:

Selling Price (SP) = Rs. 247.50

Gain percentage = 12.5%

Formula Used:

Cost Price (CP) = [Selling Price ÷ (100 + Gain%)] × 100

Calculations:

=> CP = [247.50 ÷ (100 + 12.5)] × 100

=> CP = [247.50 ÷ 112.5] × 100

=> CP = 2.2 × 100

=> CP = Rs. 220

Therefore The correct answer is Rs. 220.

Additional Information

Profit and Loss Basics

Profit occurs when Selling Price (SP) > Cost Price (CP). Profit = SP − CP. Loss occurs when CP > SP. Loss = CP − SP.

Fractional Conversions

Standard fractions for competitive exams: 12.5% = 1/8, 37.5% = 3/8, 62.5% = 5/8, and 87.5% = 7/8.

Percentage Change Rule

To find the original value after an x% increase: Original Value = Final Value ÷ (1 + x/100).

Q8. Answer: (b) X

If each letter of the word TYPING, is changed to the letter immediately preceding it in the English alphabetical order and the new group of letters thus formed is rearranged in English alphabetical order,

Then, letter X is first to the right in the new rearranged group of letters.

Hence, the correct answer is "X".

Q9. Answer: (a) Only conclusion (I) follows.

Statements:

All lemons are potatoes.

Some lemons are papayas.

The least possible Venn diagram is as follows:

Conclusions:

(I) Some potatoes are papayas. - True (because All lemons are potatoes, and Some lemons are papayas given. So, Some

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potatoes are papayas too)

(II) All papayas are potatoes - False (because All lemons are potatoes, and Some lemons are papayas given. So, All papayas are potatoes it is not true and it can be possible only).

Hence, the correct answer is "Only conclusion (I) follows".

Q10. Answer: (a) Only electrons

The correct answer is Only electrons.

Key Points

• Thomson's model of the atom is also known as the "plum pudding model."

• According to Thomson's model, the atom is composed of electrons embedded within a positively charged "soup."

• The electrons in Thomson's model are scattered throughout the atom like plums in a pudding, giving the model its name.

• Thomson discovered the electron through his experiments with cathode rays in 1897.

• Thomson's model does not include protons or neutrons, as these particles were discovered later by Rutherford and Chadwick, respectively.

Additional Information

• Rutherford's Model

• Rutherford proposed the nuclear model of the atom, where a small, dense nucleus is surrounded by orbiting electrons.

• His gold foil experiment led to the discovery of the nucleus.

• Bohr's Model

• Bohr refined Rutherford's model by introducing quantized electron orbits.

• Electrons orbit the nucleus in specific energy levels without radiating energy.

• Chadwick's Discovery of the Neutron

• James Chadwick discovered the neutron in 1932.

• Neutrons are neutral particles found in the nucleus alongside protons.

Q11. Answer: (b) B

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

F is kept third from the top.

D is kept at one of the positions below F.

Floors	Boxes Case 1	Boxes Case 2	Boxes Case 3	Boxes Case 4
7				
6				
5	F	F	F	F
4	D			
3		D		
2			D	
1				D

Only two boxes are kept between B and G.

D is kept immediately above G. Here case 2 and 4 get eliminated.

Floors	Boxes Case 1	Boxes Case 3
7		
6	B	
5	F	F
4	D	B
3	G	
2		D
1		G

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Only three boxes are kept between E and A.

E is not kept at the top-most position.

Here case 1 gets eliminated.

Floors	Boxes Case 3
7	A
6	
5	F
4	B
3	E
2	D
1	G

Thus, final arrangement:

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

So, box B is kept fourth from the top.

Hence, the correct answer is "B".

Q12. Answer: (d) 816

Shortcut Trick

In a set of consecutive terms in an arithmetic progression, the average is the middle term.

Average (Middle Term) = 2424 ÷ 3 = 808.

The numbers are consecutive multiples of 8, so the difference is 8.

Largest Multiple = Middle Term + 8 = 808 + 8 = 816.

Therefore The correct answer is 816.

Alternate Method

Given: The sum of three consecutive multiples of 8 is 2424.

Formula Used: Sum of terms = n × Average (for an odd number of terms in AP, Average = Middle Term).

=> Let the three consecutive multiples of 8 be (x − 8), x, and (x + 8).

=> Sum = (x − 8) + x + (x + 8) = 2424

=> 3x = 2424

=> x = 2424 ÷ 3

=> x = 808

=> The largest multiple is (x + 8) = 808 + 8 = 816.

Therefore The correct answer is 816.

Additional Information

Arithmetic Progression (AP)

A sequence where the difference between any two consecutive terms is constant. For consecutive multiples of 'n', the common difference is always 'n'.

Middle Term Property

For any odd number of terms (n) in an AP, the middle term is equal to the Sum ÷ n.

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Sum of n terms in AP

The sum can be calculated using $S_n = (n/2) \times [2a + (n-1)d]$, where 'a' is the first term and 'd' is the common difference.

Q13. Answer: (d) Temperature

The correct answer is Temperature.

Key Points

• Temperature-dependent sex determination (TSD) is a phenomenon where the environmental temperature during a critical period of embryonic development determines the sex of the offspring.

• This type of sex determination is observed in some reptiles, including certain species of turtles, crocodiles, and lizards.

• The specific temperature range and the critical period for sex determination can vary among different species.

• In many cases, higher temperatures tend to produce one sex (often females), while lower temperatures produce the other sex (often males).

• TSD is an important adaptive mechanism that helps maintain a balanced sex ratio in natural populations.

Additional Information

• Genetic Sex Determination (GSD)

• In GSD, sex is determined by specific chromosomes (e.g., XX/XY system in mammals).

• This type of sex determination is common in birds, mammals, etc.

• Environmental Factors Other Than Temperature

• Other environmental factors such as the availability of resources, population density, and social interactions can also influence sex ratios in some species.

• These factors can impact the development and survival of offspring, indirectly affecting sex determination.

• Conservation Implications

• Understanding TSD is crucial for the conservation of endangered reptile species, as changes in environmental temperatures due to climate change can skew sex ratios.

• Conservation efforts may involve managing nesting sites to ensure balanced sex ratios for population stability.

Q14. Answer: (a) saliva

The correct answer is saliva.

Key Points

• The gastric glands present in the wall of the stomach are responsible for secreting various substances essential for the digestive process.

• Pepsin, an enzyme released by the gastric glands, helps in the digestion of proteins.

• Hydrochloric acid, also secreted by the gastric glands, creates an acidic environment that activates digestive enzymes and breaks down food.

• Mucus is produced by the gastric glands to protect the stomach lining from the acidic environment and digestive enzymes.

• Saliva, however, is not released by the gastric glands; it is produced by the salivary glands in the mouth and helps in the initial process of digestion.

Additional Information

• Salivary Glands

• These glands are located in the mouth and are responsible for the production of saliva, which contains enzymes like amylase that begin the process of starch digestion.

• Saliva also helps in lubricating food for easier swallowing.

• Duodenum

• The first segment of the small intestine where a significant amount of digestion and absorption of nutrients occur.

• It receives partially digested food from the stomach and digestive enzymes from the pancreas and bile from the liver.

• Pancreas

• This organ plays a crucial role in digestion by releasing digestive enzymes into the small intestine.

• The pancreas also produces insulin and glucagon, which regulate blood sugar levels.

Q15. Answer: (a) X = 164, Y = 92

The logic followed here is:

Logic: 1st number × 2 - 200 = 2nd number.

146 : Y

→ (146 × 2) - 200 = Y

→ 292 - 200 = 92 = Y

Y = 92.

Similarly,

Through the Option of Y = 92 and X = 164

X : 128

→ (164 × 2) - 200 = X

→ 328 - 200 = 128 = X

Hence, the correct answer is "X = 164, Y = 92".

Q16. Answer: (d) Al2(SO4)3 + 3BaCl2 → 2AlCl3 + 3BaSO4

The correct answer is Al2(SO4)3 + 3BaCl2 → 2AlCl3 + 3BaSO4.

Key Points

• The given reaction involves aluminum sulfate reacting with barium chloride to produce aluminum chloride and barium sulfate.

• The balanced equation ensures that the number of atoms of each element is the same on both sides of the reaction.

• In the correct balanced equation, the coefficients are adjusted to balance the atoms: 1 molecule of Al2(SO4)3 reacts with 3 molecules of BaCl2 to produce 2 molecules of AlCl3 and 3 molecules of BaSO4.

• Aluminum (Al) has a +3 charge, sulfate (SO4) has a -2 charge, barium (Ba) has a +2 charge, and chloride (Cl) has a -1 charge, which helps in balancing the equation.

• Balancing chemical equations is essential for accurately representing the conservation of mass and charge in a chemical reaction.

Additional Information

• Stoichiometry

• It is the calculation of reactants and products in chemical reactions.

• Stoichiometric coefficients in a balanced equation indicate the proportion of moles of each substance involved in the reaction.

• Precipitation Reactions

• These reactions occur when two soluble salts react to form an insoluble solid called a precipitate.

• In the given reaction, barium sulfate (BaSO4) is the precipitate formed.

• Balancing Equations

• Balancing involves making sure that the number of atoms for each element is equal on both sides of the equation.

• It ensures the law of conservation of mass is satisfied in a chemical reaction.

Q17. Answer: (c) V and Z

Given: L, P, R, V, X, Y and Z are sitting around a circular table facing the centre.

1) Only one person sits between V and L, when counted from the right of V.

2) Only one person sits between L and X.

3) Only one person sits between V and Z.

4) Only two people sit between R and X.

5) Only one person sits between P and Z.

Thus, final arrangement:

Thus, V and Z sit to the immediate right and left of Y, respectively.

Hence, the correct answer is "V and Z".

Q18. Answer: (b) Multidimensional Poverty in India since 2005-06

The correct answer is Multidimensional Poverty in India since 2005-06.

Key Points

• The National establishment for the reworking Republic of India, conjointly known as NITI Aayog, was fashioned via a resolution of the Union cupboard on Jan one, 2015.

• NITI Aayog is that the premier policy 'Think Tank' of the govt of the Republic of India, providing each directional and policy inputs. Whereas coming up with strategic and long-run policies and programs for the Govt of the Republic of India, NITI Aayog conjointly provides relevant technical recommendations to the Centre and States.

• NITI Aayog Chairperson: Narendra Modi.

• NITI Aayog Headquarter: New Delhi.

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Q19. Answer: (b) It decreases by 8%

Shortcut Trick

Use the successive percentage formula: Net Change = a + b + (ab ÷ 100)%.

Here, tax is reduced by 20% (=> a = −20) and consumption increased by 15% (=> b = +15).

Net Change = −20 + 15 + [(−20 × 15) ÷ 100] = −5 + [−300 ÷ 100] = −5 − 3 = −8%.

A negative result indicates a decrease in total revenue.

Therefore The correct answer is It decreases by 8%.

Alternate Method

Given: Reduction in tax = 20%, Increase in consumption = 15%.

Formula Used: Total Revenue = Tax Rate × Consumption Quantity

=> Let initial Tax Rate = Rs. 100 and initial Consumption = 100 units.

=> Initial Revenue = 100 × 100 = Rs. 10,000.

=> New Tax Rate = 100 − 20 = Rs. 80.

=> New Consumption = 100 + 15 = 115 units.

=> New Revenue = 80 × 115 = Rs. 9,200.

=> Change in Revenue = 9,200 − 10,000 = −Rs. 800.

=> Percentage Effect = (−800 ÷ 10,000) × 100 = −8%.

Therefore The correct answer is It decreases by 8%.

Additional Information

Net Percentage Change

When a product depends on two factors (X × Y), and X changes by a% and Y changes by b%, the net result is always calculated using a + b + (ab/100)%.

Fraction Method

20% decrease = 4/5 multiplier. 15% increase = 23/20 multiplier. Combined effect = (4/5) × (23/20) = 92/100, which is an 8% decrease.

Revenue Elasticity

If the decrease in tax rate is not compensated by a higher proportionate increase in consumption, the total revenue will always fall.

Q20. Answer: (b) 4 km/h

Shortcut Trick

Ratio of Time (Upstream : Downstream) = 2 : 1

Since Distance is constant, the ratio of Speed (Upstream : Downstream) = 1 : 2

Still water speed of the diver = (Upstream speed + Downstream speed) ÷ 2 = (1 + 2) ÷ 2 = 1.5 units

Given, 1.5 units = 3 km/h => 1 unit = 2 km/h

Downstream speed = 2 units = 2 × 2 = 4 km/h

Therefore The correct answer is 4 km/h.

Alternate Method

Given:

Speed of the diver in still water (u) = 3 km/h

Distance covered (d) = 50 km

Let the speed of the stream be 'v' km/h.

Formula Used:

Time = Distance ÷ Speed

Upstream speed (v_u) = (u − v) = (3 − v) km/h

Downstream speed (v_d) = (u + v) = (3 + v) km/h

Calculations:

=> Time taken upstream = 2 × Time taken downstream

=> 50 ÷ (3 − v) = 2 × [50 ÷ (3 + v)]

=> 1 ÷ (3 − v) = 2 ÷ (3 + v)

=> (3 + v) = 2 × (3 − v)

=> 3 + v = 6 − 2v

=> v + 2v = 6 − 3

=> 3v = 3

=> v = 1 km/h

=> Downstream speed = u + v = 3 + 1 = 4 km/h

Therefore The correct answer is 4 km/h.

Additional Information

Speed in Still Water

The speed of a boat or person in still water is calculated as u = (Downstream Speed + Upstream Speed) ÷ 2.

Speed of the Current

The speed of the stream or current is calculated as v = (Downstream Speed − Upstream Speed) ÷ 2.

Distance-Speed Relation

When the distance is constant, the time taken is inversely proportional to the speed (Time prop. to 1 ÷ Speed).

Q21. Answer: (c) 76%

Shortcut Trick

Use the Successive Discount Formula: Net Discount = (x + y − (x × y)/100)%

Here, x = 40 and y = 60

Net Discount = (40 + 60 − (40 × 60)/100)%

Net Discount = (100 − 24)% = 76%

Therefore The correct answer is 76%.

Alternate Method

Given:

First discount (d1) = 40%

Second discount (d2) = 60%

Formula Used:

Final Selling Price = Marked Price × (100 − d1)/100 × (100 − d2)/100

Calculations:

=> Let the Marked Price (MP) of the deal be 100 units.

=> Price after first discount of 40% = 100 − (40% of 100) = 100 − 40 = 60 units.

=> Price after second discount of 60% = 60 − (60% of 60) = 60 − 36 = 24 units.

=> Total Single Equivalent Discount = Initial MP − Final Price

=> Total Discount = 100 − 24 = 76 units.

=> Equivalent Discount Percentage = (76 / 100) × 100 = 76%

Therefore The correct answer is 76%.

Additional Information

Successive Discount for Three Terms

If three successive discounts x%, y%, and z% are given, first find the equivalent of x and y, then use that result with z using the formula: Net = A + z − (A × z)/100.

Fractional Method

Convert percentages to fractions (40% = 2/5, 60% = 3/5). Multiplying factor for SP = (1 − 2/5) × (1 − 3/5) = 3/5 × 2/5 = 6/25. Discount = 1 − 6/25 = 19/25 = 76%.

Marked Price vs Selling Price

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

Q22. Answer: (c) $29y^2+4z^2$

Shortcut Trick

Apply the Brahmagupta−Fibonacci identity: $(az − by)^2 + (bz + ay)^2 = (a^2 + b^2)(z^2 + y^2)$.

Here, a = 2 and b = 5. Therefore, $(2z − 5y)^2 + (5z + 2y)^2 = (2^2 + 5^2)(z^2 + y^2) = 29(z^2 + y^2)$.

The expression becomes: $29z^2 + 29y^2 − 25z^2$.

Simplifying the like terms: $(29 − 25)z^2 + 29y^2 = 4z^2 + 29y^2$.

Therefore The correct answer is $29y^2 + 4z^2$.

Alternate Method

Given: $(2z − 5y)^2 + (5z + 2y)^2 − 25z^2$

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

=> $[(2z)^2 - 2(2z)(5y) + (5y)^2] + [(5z)^2 + 2(5z)(2y) + (2y)^2] - 25z^2$

=> $[4z^2 - 20zy + 25y^2] + [25z^2 + 20zy + 4y^2] - 25z^2$

=> $4z^2 + 25z^2 - 25z^2 - 20zy + 20zy + 25y^2 + 4y^2$

=> $(4z^2 + 0) + (29y^2) + 0$

=> $4z^2 + 29y^2$

Therefore The correct answer is $29y^2 + 4z^2$.

Additional Information

Standard Algebraic Identities

The square of a sum is $(a+b)^2 = a^2+2ab+b^2$ and the square of a difference is $(a-b)^2 = a^2-2ab+b^2$.

Combining Like Terms

Terms having the same variables and exponents can be added or subtracted by operating on their coefficients.

Sum of Squares Identity

The identity $(a+b)^2 + (a-b)^2 = 2(a^2+b^2)$ is a useful tool for simplifying symmetric algebraic expressions.

Q23. Answer: (d) 420

Shortcut Trick

Identify the largest number among 84, 105, and 140, which is 140.

Check the multiples of 140: 140, 280, 420...

Test 420: 420 ÷ 84 = 5 and 420 ÷ 105 = 4 and 420 ÷ 140 = 3.

Since 420 is the least value divisible by all three numbers, it is the LCM.

Therefore The correct answer is 420.

Alternate Method

Given: The numbers are 84, 105, and 140.

Method: Prime Factorization method involves expressing each number as a product of its prime factors.

=> $84 = 2 \times 2 \times 3 \times 7 = 2^2 \times 3^1 \times 7^1$

=> $105 = 3 \times 5 \times 7 = 3^1 \times 5^1 \times 7^1$

=> $140 = 2 \times 2 \times 5 \times 7 = 2^2 \times 5^1 \times 7^1$

=> To find the LCM, take the highest power of all prime factors (2, 3, 5, and 7) present in any of the numbers.

=> $LCM = 2^2 \times 3^1 \times 5^1 \times 7^1$

=> $LCM = 4 \times 3 \times 5 \times 7$

=> $LCM = 12 \times 35 = 420$

Therefore The correct answer is 420.

Additional Information

Least Common Multiple (LCM)

The LCM of two or more numbers is the smallest positive integer that is perfectly divisible by each of the given numbers.

Highest Common Factor (HCF)

The HCF is the greatest number that divides two or more numbers without leaving a remainder. For 84, 105, and 140, the HCF is 7.

Product Rule

For any two numbers 'a' and 'b', the relationship is: HCF(a, b) × LCM(a, b) = a × b. Note that this rule does not directly apply to three or more numbers.

Q24. Answer: (c) the inertia of our body

The correct answer is the inertia of our body.

Key Points

• Inertia is the property of an object to resist changes in its state of motion.

• When the bus stops suddenly, our body tends to remain in its state of motion due to inertia, causing us to move forward.

• This phenomenon is explained by Newton's First Law of Motion, which states that an object will remain at rest or in uniform motion unless acted upon by an external force.

• The force that causes us to move forward when the bus stops is due to the sudden deceleration of the bus.

• Inertia of motion is what makes passengers lurch forward when a moving vehicle comes to a sudden halt.

Additional Information

• Newton's Third Law of Motion

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• It states that for every action, there is an equal and opposite reaction.
• This law explains the mutual forces of action and reaction between two interacting bodies.
• Acceleration Due to Gravity
• This refers to the acceleration that is imparted to objects due to the gravitational pull of the Earth.
• It is approximately 9.8 m/s² near the surface of the Earth.
• Newton's Second Law of Motion
• This law states that the force acting on an object is equal to the mass of that object times its acceleration (F = ma).
• It explains how the velocity of an object changes when it is subjected to an external force.

Q25. Answer: (a) Goal 5 (Gender Equality)

The correct answer is Goal 5 (Gender Equality).

Key Points

• Goal 5 of the Sustainable Development Goals (SDGs) aims to achieve gender equality and empower all women and girls.
• This goal focuses on ending all forms of discrimination against women and girls everywhere.
• It also includes eliminating all forms of violence against women, such as trafficking and sexual exploitation.
• Ensuring equal opportunities for leadership at all levels of decision-making in political, economic, and public life is also a part of this goal.
• Providing universal access to sexual and reproductive health and reproductive rights is another target of Goal 5.

Additional Information

• Goal 15 (Life on Land)
• This goal aims to protect, restore, and promote sustainable use of terrestrial ecosystems.
• It includes managing forests sustainably, combating desertification, and halting and reversing land degradation and biodiversity loss.
• Goal 13 (Climate Action)
• This goal focuses on taking urgent action to combat climate change and its impacts.
• It involves integrating climate change measures into national policies, strategies, and planning.
• Goal 8 (Decent Work and Economic Growth)
• This goal aims to promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all.
• It includes targets such as achieving higher levels of economic productivity and promoting development-oriented policies.

Q26. Answer: (a) 45000

Shortcut Trick

Number of bricks = (90% of Wall Volume) ÷ (Brick Volume)

Volume of wall = 2400 × 800 × 60 cm³ (Converting m to cm)

Number of bricks = (0.9 × 2400 × 800 × 60) ÷ (24 × 12 × 8)

Number of bricks = 0.9 × 100 × 100 × 5 = 45000

Therefore The correct answer is 45000 bricks.

Alternate Method

Given:

Brick dimensions: 24 cm × 12 cm × 8 cm

Wall dimensions: 24 m × 8 m × 60 cm

Mortar usage: 10% of wall volume

Formula Used:

Volume of Cuboid = length × breadth × height

Available volume for bricks = Total wall volume − Mortar volume

Calculations:

=> Total Wall Volume = 2400 × 800 × 60 cm³ = 115,200,000 cm³

=> Mortar Volume = 10% of 115,200,000 = 11,520,000 cm³

=> Volume occupied by bricks = 115,200,000 − 11,520,000 = 103,680,000 cm³

=> Volume of one brick = 24 × 12 × 8 = 2304 cm³

=> Total number of bricks = 103,680,000 ÷ 2304

=> Total number of bricks = 45000

Therefore The correct answer is 45000 bricks.

Additional Information

Volume of a Cuboid

The volume of a cuboid is calculated by multiplying its three dimensions: Volume = Length × Width × Height.

Unit Conversion

Always ensure all measurements are in the same unit before calculation. 1 meter = 100 centimeters; 1 m^3 = 1,000,000 cm^3.

Percentage Deduction

If x% of the space is taken by another material, the remaining (100 − x)% is the effective volume available for the primary objects.

Q27. Answer: (b) Female gamete is present in the stigma

The correct answer is Female gamete is present in the stigma.

Key Points

• Male germ-cells are produced by pollen grains, which are the male reproductive parts of flowering plants.
• Female gametes are actually located in the ovule, which is inside the ovary of the flower, not in the stigma.
• The stigma is the part of the flower that receives pollen during fertilization.
• Fertilization in plants involves the fusion of male and female gametes to form a zygote.
• The zygote then develops into a seed, leading to the formation of a new plant.

Additional Information

• Pollination
• Pollination is the process of transferring pollen from the male part of the flower (anther) to the female part (stigma).
• This is a crucial step in the sexual reproduction of flowering plants.
• Double Fertilization
• In flowering plants, double fertilization occurs when one sperm fertilizes the egg cell and the other fuses with two other nuclei to form the endosperm.
• This process is unique to angiosperms and results in the formation of seeds and fruit.
• Ovule
• The ovule is the structure within the ovary of a flower that contains the female gamete (egg cell).
• After fertilization, the ovule develops into a seed.

Q28. Answer: (c) Only II is a possible reason.

As per the given information:

The statement mentions running additional trains between City A and City B due to increased demand.

Reason (I) is about flights to City C, which is unrelated to the train service between City A and City B.

Reason (II) explains the increased passenger demand from City B to City A during the festival season, which justifies the decision to run special trains.

Hence, the correct answer is "Only II is a possible reason."

Q29. Answer: (b) URLU

The logic followed here is:

KBWJ is related to MZZG

OXCD is related to QVFA

Similarly, STIX will be related,

Hence, the correct answer is "URLU".

Q30. Answer: (c) 26

The correct answer is 26.

Key Points

• List of Arjun Awardees: Mohammed Shami (cricket), Ajay Reddy (blind cricket) Ojas Pravin Deotale (archery), Aditi Gopichand Swami (archery), Sheetal Devi (para archery), Parul Chaudhary and Murali Sreeshankar (athletics), Mohd Hussamuddin (boxing), R Vaishali (chess), Divyakriti Singh and Anush Agarwalla (equestrian), Diksha Dagar (golf), Krishan Bahadur Pathak (hockey), Sushila Chanu (hockey), Pinky (lawn ball), Aishwary Pratap Singh Tomar (shooting), Antim Panghal (wrestling), Ayhika Mukherjee (table tennis).

Additional Information

Awards	Disciplines

Arjuna Award	To recognise outstanding achievements in sports.
Dronacharya Award	Honour for coaches in sports.
Dhyan Chand Award	Lifetime Achievement Award in sports and games.
Norman Borlaug Award	Outstanding contributions in the fields of agriculture and environment.

Q31. Answer: (d) 12 sec

Shortcut Trick

Relative speed in opposite direction = 90 + 60 = 150 km/h.

Total distance to cover = Sum of train lengths = 250 + 250 = 500 m.

Time = 500 ÷ (150 × 5/18) = 500 × 18 ÷ 750.

Time = 2 × 18 ÷ 3 = 12 sec.

Therefore The correct answer is 12 sec.

Alternate Method

Given:

Length of Train 1 (L1) = 250 m

Length of Train 2 (L2) = 250 m

Speed of Train 1 (S1) = 90 km/h

Speed of Train 2 (S2) = 60 km/h

Formula Used:

Relative Speed (Opposite) = S1 + S2

Time = (Total Length) ÷ (Relative Speed)

Conversion: 1 km/h = 5/18 m/s

Calculations:

=> Total Distance = L1 + L2 = 250 + 250 = 500 m

=> Relative Speed = 90 + 60 = 150 km/h

=> Relative Speed in m/s = 150 × (5/18) = 125/3 m/s

=> Time = 500 ÷ (125/3)

=> Time = (500 × 3) ÷ 125

=> Time = 4 × 3 = 12 sec

Therefore The correct answer is 12 sec.

Additional Information

Relative Speed Concepts

When two objects move in opposite directions, their relative speed is the sum of their individual speeds (S1 + S2). When they move in the same direction, it is the difference (S1 − S2).

Total Distance for Crossing

When two trains cross each other completely, the total distance covered is always the sum of their lengths, regardless of the direction of travel.

Unit Conversion Shortcut

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

Q32. Answer: (a) nine

The correct answer is nine.

Key Points

• The primary objective of the collaboration between IIT-Bhubaneswar and the Defence Research and Development Organisation (DRDO) is to enhance research and development in defense applications, supporting the 'Atma Nirbhar Bharat' initiative, which aims to make India self-reliant in various sectors, including defense.

• This collaboration is focused on creating a sustainable defense research program and contributes directly to the nation-building ecosystem.

Additional Information

• DRDO is a military research and development wing of the Ministry of Defence, headquarters in New Delhi, India.

• It was founded in 1958.

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• It has the vision to empower India with cutting-edge defence technologies and a mission to achieve self-reliance in critical defence technologies and systems.

• DRDO has developed an antibody detection-based kit called DIPCOVAN.

• Current Chief: Samir V Kamat

Q33. Answer: (b) 19 and 17

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

Option 1) 19 and 5

Two numbers need to be interchanged then:

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

=> 72 – 56 + (18) × 2 - 5 + 17 = 76

=> 72 – 56 + 36 - 5 + 17 = 76

=> 125 - 61 = 75

=> 64 ≠ 75

Option 2) 19 and 17

Two numbers need to be interchanged then:

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

=> 72 – 56 + (30) × 2 - 19 + 19 = 76

=> 72 – 56 + 60 - 19 + 19 = 76

=> 151 - 75 = 76

=> 76 = 76

Option 3) 17 and 56

Two numbers need to be interchanged then:

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

=> 72 – 17 + 32 × 2 - 19 + 56 = 76

=> 72 – 17 + 64 - 19 + 56 = 76

=> 192 - 36 = 76

=> 156 ≠ 76

Option 4) 13 and 17

Two numbers need to be interchanged then:

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

=> 72 – 56 + 36 × 2 - 19 + 13 = 76

=> 72 – 56 + 72 - 19 + 13 = 76

=> 157 - 75 = 76

=> 82 ≠ 76

Hence, the correct answer is "19 and 17".

Q34. Answer: (c) AD-CG

The logic followed here is:

1) QV-SX

2) KP-MR

3) AD-CG

4) BG-DI

Hence, the correct answer is "AD-CG".

Q35. Answer: (b) 6

The logic followed here is:

Thus, the code for ‘U’ = 6

Hence, the correct answer is "6".

Q36. Answer: (c) light travelling in a straight line

The correct answer is light travelling in a straight line.

Key Points

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• The geometrical shadow is formed because light travels in straight lines.
• When an opaque object blocks the path of light, it prevents the light from reaching a certain area, creating a shadow.
• The sharpness of the shadow depends on the size of the light source and the distance between the object and the surface where the shadow is formed.
• Diffraction, dispersion, and reflection of light do not contribute to the formation of a geometrical shadow.
• Geometrical shadows are a common observation in everyday life, such as the shadow of a person on a sunny day.

Additional Information

• Diffraction
• Diffraction is the bending of light waves around obstacles or through small openings.
• This phenomenon is more noticeable when the size of the obstacle or opening is comparable to the wavelength of the light.
• Dispersion
• Dispersion is the splitting of white light into its constituent colors when it passes through a prism.
• This occurs because different colors of light have different refractive indices in the prism material.
• Reflection
• Reflection is the bouncing back of light rays when they hit a smooth surface, like a mirror.
• The angle of incidence is equal to the angle of reflection in the case of a smooth reflective surface.

Q37. Answer: (b) Wife's mother

Family Chart:

Decoding the Symbols:

Symbol	•	•	×	÷	#
Meaning	Mother	Brother	Wife	Father	Daughter

Given: Q # R × P ÷ K × T

It means: Q is the daughter of R, R is the wife of P, P is the father of K and K is the wife of T.

So, R is the Wife's mother of T.

Hence, the correct answer is "Wife's mother".

Q38. Answer: (b) 37 km towards the west

As per the given information:

Nalin starts from Point Y and drives 8 km towards North.

He then takes a right turn, drives 23 km, turns right and drives 29 km.

He then takes a left turn and drives 14 km.

He takes a left turn, drives 21 km and stops at Point Z.

The shortest distance between Y and Z = 14 + 23 = 37

Thus, 37 km far and towards west direction should he drive in order to reach Point Y again.

Hence, the correct answer is "37 km towards the west".

Q39. Answer: (c) Cytokinin

The correct answer is Cytokinin.

Key Points

• Cytokinins are a group of plant hormones that promote cell division and growth in plant roots and shoots.
• They are known to delay the aging of plant tissues by inhibiting protein degradation and promoting protein synthesis and mobilization of nutrients.
• Cytokinins are synthesized in the roots and transported to other parts of the plant, including fruits and seeds, where they are present in high concentrations.
• In fruits and seeds, cytokinins play a crucial role in cell differentiation and development, as well as in the delay of senescence.
• They work synergistically with other hormones like auxins to regulate various growth processes and morphogenesis in plants.

Additional Information

• Auxin
• Auxins are another group of plant hormones that primarily regulate cell elongation, especially in the stem and root tips.
• They are involved in various growth processes including phototropism, gravitropism, and the formation of lateral and adventitious roots.

• Gibberellin

• Gibberellins are plant hormones that promote stem elongation, seed germination, and flowering.They help in breaking seed dormancy and are involved in the regulation of various developmental processes.

• Abscisic Acid (ABA)

• Abscisic acid is a plant hormone that primarily functions in stress responses, such as closing stomata during water stress.

• It also plays a role in seed dormancy and inhibition of growth, helping plants to survive adverse conditions.

Q40. Answer: (a) 854

Shortcut Trick

Total boys this year = 610 × 80% = 488.

Total girls this year = 488 × 175% = 488 × 7/4.

Required number of girls = 122 × 7 = 854.

Therefore The correct answer is 854.

Alternate Method

Given:

Number of boys last year = 610

Percentage decrease in boys = 20%

Number of girls = 175% of current year boys

Calculations:

=> Number of boys this year = 610 − (20% of 610)

=> Number of boys this year = 610 − 122 = 488

=> Number of girls this year = 175% of 488

=> Number of girls = (175/100) × 488

=> Number of girls = 1.75 × 488 = 854

Therefore The correct answer is 854.

Additional Information

Percentage Decrease Formula

New Value = Original Value × (100 − Decrease%)/100. For a 20% decrease, multiply by 0.8.

Fractional Equivalent of Percentages

Common fractions simplify calculations: 175% = 7/4, 20% = 1/5, 80% = 4/5.

Successive Percentage Logic

If A depends on B and B depends on C, then A = C × factor1 × factor2.

Q41. Answer: (b) 8978624

Shortcut Trick

To check divisibility by 4, focus only on the last two digits of the number.

Option 1: 54 ÷ 4 → Not divisible.

Option 2: 24 ÷ 4 = 6 → Divisible.

Option 3: 34 ÷ 4 → Not divisible.

Option 4: 42 ÷ 4 → Not divisible.

Therefore The correct answer is 8978624.

Alternate Method

Given: The numbers are 987654, 8978624, 7864534, and 9876342.

Rule: A number is divisible by 4 if the number formed by its last two digits is exactly divisible by 4 or if the last two digits are 00.

Checking each number step-by-step:

=> For 987654: Last two digits = 54. Since 54 ÷ 4 = 13 with remainder 2, it is not divisible.

=> For 8978624: Last two digits = 24. Since 24 ÷ 4 = 6 with remainder 0, it is divisible.

=> For 7864534: Last two digits = 34. Since 34 ÷ 4 = 8 with remainder 2, it is not divisible.

=> For 9876342: Last two digits = 42. Since 42 ÷ 4 = 10 with remainder 2, it is not divisible.

Therefore The correct answer is 8978624.

Additional Information

Divisibility by 2

A number is divisible by 2 if its last digit is an even number (0, 2, 4, 6, or 8).

Divisibility by 8

A number is divisible by 8 if the number formed by its last three digits is divisible by 8.

Divisibility by 3 and 9

A number is divisible by 3 (or 9) if the sum of its digits is divisible by 3 (or 9).

Successive Powers of 2

Divisibility by 2^n depends on the last n digits. For 4 (2^2), check last 2 digits; for 8 (2^3), check last 3 digits.

Q42. Answer: (a) power

The correct answer is Power.

Key Points

• Power is defined as the rate at which work is done or energy is transferred in a system.

• In mathematical terms, Power = Work Done / Time Taken.

• Its SI unit is the watt (W), where 1 watt is equal to 1 joule per second.

• In the context of a motor, power refers to the amount of mechanical work the motor performs per unit time.

• For example, if a motor lifts a load, its power can be measured by the force it applies and the speed at which it lifts the load.

• Electric motors are often rated in terms of their power output, expressed in watts, kilowatts, or horsepower.

• Power is a key parameter in understanding the efficiency and performance of machines and systems.

Additional Information

• Energy

• Energy is the capacity to do work or produce heat. It exists in various forms such as kinetic energy, potential energy, thermal energy, and chemical energy.

• Unlike power, which is a rate, energy is a measure of the total amount of work done or heat produced.

• The SI unit of energy is the joule (J).

• Acceleration

• Acceleration refers to the rate of change of velocity of an object with respect to time.

• It is a vector quantity, meaning it has both magnitude and direction.

• The SI unit of acceleration is meters per second squared (m/s^2).

• Momentum

• Momentum is the product of an object's mass and velocity.

• It is a vector quantity and is conserved in isolated systems, as per the law of conservation of momentum.

• The SI unit of momentum is kilogram meter per second (kg·m/s).

Q43. Answer: (a) Four

Given series: (Left) 7 3 @ 1 7 3 ^ 4 & 3 Ω 9 # * £ 5 (Right)

such symbols are there, each of which is immediately preceded by a number and also immediately followed by a number

Condition to be checked: Number → Symbol → Number

(Left) 7 3 @ 1 7 3 ^ 4 & 3 Ω 9 # * £ 5 (Right)

Thus, Four symbols are there, each of which is immediately preceded by a number and also immediately followed by a number.

Hence, the correct answer is "Four".

Q44. Answer: (c) Only conclusion (I) follows

Statements:

Some giraffes are rhinos.

All rhinos are tigers.

The least possible Venn diagram is as follows:

Conclusions:

(I) Some tigers are giraffes.- True(because Some giraffes are rhinos, and All rhinos are tigers. So, Some tigers are giraffes too)

(II) All tigers are rhinos. - False (because All rhinos are tigers given. So, it can be possible but not definite)

Hence, the correct answer is "Only conclusion (I) follows".

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Q45. Answer: (b) 3

The logic followed here is:

Thus, the code for 'F' = 3

Hence, the correct answer is "3".

Q46. Answer: (a) 129

Given: 62 - 2 ÷ 7 + 14 × 7 = ?

Decoding the given information:

Symbol	•	•	×	÷
Means	•	×	÷	•

Now replacing the sign from left to right using BODMAS Rule, we get:

=> 62 × 2 + 7 - 14 ÷ 7

= 124 + 7 - 2

=> 131 - 2

= 129

Hence, the correct answer is "Option 1".

Q47. Answer: (d) 500 cm²

Shortcut Trick

Simplify the ratio of the sides: 8 : 10 → 4 : 5.

Sum of ratio parts = 4 + 5 = 9 units.

Semi-perimeter of the rectangle = 90 ÷ 2 = 45 cm.

Value of 1 unit = 45 ÷ 9 = 5 cm.

Sides of the rectangle = 4 × 5 = 20 cm and 5 × 5 = 25 cm.

Area = 20 × 25 = 500 cm².

Therefore The correct answer is 500 cm².

Alternate Method

Given:

Ratio of sides = 8 : 10

Perimeter of the rectangle = 90 cm

Formula Used:

Perimeter = 2 × (Length + Breadth)

Area = Length × Breadth

Calculations:

=> Let the sides of the rectangle be 8x and 10x.

=> 2 × (8x + 10x) = 90

=> 2 × (18x) = 90

=> 36x = 90

=> x = 90 ÷ 36 = 2.5

=> Length (l) = 10 × 2.5 = 25 cm

=> Breadth (b) = 8 × 2.5 = 20 cm

=> Area = l × b = 25 × 20 = 500 cm²

Therefore, the calculation shows that Option 4 is the correct one.

Therefore The correct answer is 500 cm².

Additional Information

Perimeter of a Rectangle

The total distance around the rectangle, calculated as P = 2(l + b), where l is length and b is breadth.

Area of a Rectangle

The total region occupied by the rectangle, calculated as Area = l × b.

Diagonal of a Rectangle

The distance between opposite corners, given by Pythagoras theorem: d = √(l² + b²).

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Q48. Answer: (d) Bleaching powder

The correct answer is Bleaching powder.

Key Points

• Bleaching powder is chemically known as Calcium hypochlorite ($Ca(OCl)_2$).
• It is formed by the action of chlorine gas on dry slaked lime ($Ca(OH)_2$).
• The chemical reaction is: $Ca(OH)_2 + Cl_2 \rightarrow Ca(OCl)_2 + H_2O$.
• Bleaching powder is used as a disinfectant and a bleaching agent due to its strong oxidizing properties.
• It is commonly used in water treatment plants to purify drinking water.

Additional Information

• Calcium Oxide (CaO)
• Also known as quicklime, it is produced by heating limestone ($CaCO_3$) in a kiln.
• Calcium oxide reacts with water to form slaked lime ($Ca(OH)_2$).
• Hydrochloric Acid (HCl)
• A strong acid that is commonly used in industrial and laboratory settings.
• It is produced by dissolving hydrogen chloride gas in water.
• Calcium Chloride ($CaCl_2$)
• It is a salt used for de-icing roads and as a drying agent due to its hygroscopic properties.
• Calcium chloride can be produced by neutralizing hydrochloric acid with calcium carbonate.

Q49. Answer: (a) 36

Shortcut Trick

If a sum becomes x times in T years, it will become x^n times in n × T years.

Given: Sum becomes 2 times in 12 years (x = 2, T = 12).

Target: Sum should become 8 times. Since $8 = 2^3$, the value of n = 3.

Required Time = n × T = 3 × 12 = 36 years.

Therefore The correct answer is 36 years.

Alternate Method

Given:

Time (t1) = 12 years | Amount (A1) = 2 × Principal (P)

Formula Used:

$A = P(1 + r/100)^n$, where A is Amount, P is Principal, r is Rate, and n is Time.

Calculations:

=> Case 1: $2P = P(1 + r/100)^{12}$

=> $2 = (1 + r/100)^{12}$ → (Equation 1)

=> Case 2: $8P = P(1 + r/100)^n$

=> $8 = (1 + r/100)^n$

=> $2^3 = (1 + r/100)^n$

Substituting the value of 2 from Equation 1:

=> $[(1 + r/100)^{12}]^3 = (1 + r/100)^n$

=> (1 + r/100)^(12 × 3) = $(1 + r/100)^n$

=> (1 + r/100)^(36) = $(1 + r/100)^n$

=> n = 36 years

Therefore The correct answer is 36 years.

Additional Information

Compound Interest (CI) Formula

Amount = Principal + Interest. $CI = P[(1 + r/100)^n - 1]$.

Difference between CI and SI for 2 years

Difference (D) = $P \times (r/100)^2$.

Rule of 72

To find the time required to double an investment, divide 72 by the annual interest rate: $t \approx 72 \div r$.

Compounding Periods

If interest is compounded half-yearly, the rate is halved (r/2) and the time is doubled (2n).

Q50. Answer: (d) Oil in water

The correct answer is Oil in water.

Key Points

• A homogenous mixture is a mixture that has the same uniform appearance and composition throughout.

• Examples of homogenous mixtures include solutions such as salt dissolved in water, sugar dissolved in water, and copper sulphate powder in water.

• Oil in water is not a homogenous mixture because oil and water do not mix evenly and form separate layers, making it a heterogeneous mixture.

• In a heterogeneous mixture, the components are not uniformly distributed and can often be easily separated.

• Homogenous mixtures have a single phase, whereas heterogeneous mixtures have two or more phases.

Additional Information

• Solutions

• These are homogenous mixtures where one substance (the solute) is dissolved in another substance (the solvent).

• Common examples include salt water and sugar water.

• Suspensions

• These are heterogeneous mixtures where solid particles do not dissolve but are suspended in a liquid or gas.

• Examples include sand in water or flour in water.

• Colloids

• These are mixtures where very small particles of one substance are evenly dispersed throughout another substance.

• Examples include milk, mayonnaise, and gelatin.

Q51. Answer: (b) X = 11, Y = 173

The logic followed here is: 1st number^2 + 4 = 2nd number

X:125 → $X^2 + 4 = 125$ → X2 = 125 - 4 = 121 → X = √121 = 11

Similarly,

13:Y → $13^2 + 4 = Y$ → 169 + 4 = Y → 173 = Y

Hence, the correct answer is "X = 11, Y = 173".

Q52. Answer: (b) -1

The correct answer is option 2.

Key Points

• Given that the object is placed at a distance of 20 cm in front of a concave mirror and the real image is formed at the center of curvature.

• The center of curvature is twice the focal length (C = 2f), which implies the focal length f is 10 cm.

• Since the image is formed at the center of curvature, the object distance (u) is equal to the radius of curvature (R = 2f = 20 cm).

• The magnification (m) produced by a concave mirror is given by the formula m = -v/u, where v is the image distance and u is the object distance.

• Here, v = -20 cm (real image and hence negative sign) and u = -20 cm, so m = -(-20)/-20 = -1.

Additional Information

• Concave Mirrors

• Concave mirrors are used to focus light and they can form real and virtual images depending on the object position relative to the focal point.

• They are commonly used in applications like telescopes, headlights, and shaving mirrors.

• Convex Mirrors

• Convex mirrors always form virtual, erect, and diminished images regardless of the position of the object.

• They are used in vehicle rear-view mirrors and in security applications because they provide a wider field of view.

• Mirror Formula

• The mirror formula relates the object distance (u), image distance (v), and focal length (f) as 1/f = 1/u + 1/v.

• This formula is crucial in determining the image characteristics formed by spherical mirrors.

Q53. Answer: (b) FIK

The logic followed here is:

Hence, the correct answer is "FIK".

Q54. Answer: (d) Bacteria - fourth trophic level

The correct answer is option 4.

Key Points

• Primary consumers typically occupy the second trophic level as they feed on autotrophs (plants).

• Autotrophs form the first trophic level since they produce their own food through photosynthesis or chemosynthesis.

• Small carnivores generally occupy the third trophic level as they prey on herbivores.

• Bacteria are not typically classified into a specific trophic level such as the fourth; they can be decomposers or participate in various trophic levels depending on the ecosystem.

Additional Information

• Producers (Autotrophs)

• They are the base of the food chain and create organic material from inorganic substances.

• Examples include plants, algae, and some bacteria.

• Primary Consumers (Herbivores)

• They directly consume autotrophs.

• Examples include insects, deer, and rabbits.

• Secondary and Tertiary Consumers (Carnivores)

• They feed on herbivores and other carnivores.

• Examples include wolves, lions, and eagles.

Q55. Answer: (d) C_nH_(2n)

The correct answer is CnH2n.

Key Points

• Alkenes are hydrocarbons that contain a carbon-carbon double bond (C=C).

• The general formula for alkenes is CnH2n, where n is the number of carbon atoms.

• Alkenes are unsaturated hydrocarbons because they have fewer hydrogen atoms than alkanes with the same number of carbon atoms.

• Examples of alkenes include ethene (C2H4), propene (C3H6), and butene (C4H8).

• Alkenes undergo addition reactions due to the presence of the double bond, making them more reactive than alkanes.

Additional Information

• Alkanes

• Alkanes are saturated hydrocarbons with single bonds between carbon atoms.

• The general formula for alkanes is CnH2n+2.

• Alkynes

• Alkynes are unsaturated hydrocarbons with at least one carbon-carbon triple bond (C≡C).

• The general formula for alkynes is CnH2n-2.

• Aromatic Hydrocarbons

• Aromatic hydrocarbons, also known as arenes, contain a conjugated ring of alternating double and single bonds, such as benzene.

• Benzene (C6H6) is the simplest aromatic hydrocarbon.

Q56. Answer: (b) 25 days

Shortcut Trick

Use the MDH/W relation: (M1 × D1 × H1) / W1 = (M2 × D2 × H2) / W2

=> (25 × 8 × 15) ÷ 5 = (12 × D × 20) ÷ 10

=> 600 = 24 × D

=> D = 600 ÷ 24 = 25 days

Therefore The correct answer is 25 days.

Alternate Method

Given:

Case 1: M1 = 25 persons, H1 = 15 hr/day, D1 = 8 days, W1 = 5 units

Case 2: M2 = 12 persons, H2 = 20 hr/day, W2 = 10 units, D2 = ?

Formula Used:

The work done is proportional to the product of persons, days, and hours: (M1 × D1 × H1) / W1 = (M2 × D2 × H2) / W2

Calculations:

=> (25 × 8 × 15) / 5 = (12 × D2 × 20) / 10

=> 5 × 8 × 15 = 12 × D2 × 2

=> 600 = 24 × D2

=> D2 = 600 ÷ 24

=> D2 = 25

Therefore The correct answer is 25 days.

Additional Information

The Chain Rule Formula

It is defined as M1D1H1E1/W1 = M2D2H2E2/W2, where E represents the efficiency of the workers.

Direct and Inverse Proportion

The number of men is inversely proportional to days and hours, but directly proportional to the work completed.

Work & Wages

Wages are generally distributed in the ratio of the total work done by each person or group (Efficiency × Time).

Q57. Answer: (a) 25

Shortcut Trick

Using the zero net deviation method around the overall average of 80:

Total deviation of 5 excluded students = 5 × (40 − 80) = −200.

Number of remaining students = Total required deviation ÷ Surplus per student = +200 ÷ (90 − 80) = 20.

Total number of students = 20 (remaining) + 5 (excluded) = 25.

Therefore The correct answer is 25 students.

Alternate Method

Given:

Overall average marks of the class = 80

Average marks of 5 excluded students = 40

Average marks of the remaining students = 90

Method Used:

We can solve this efficiently using the Rule of Alligation to find the ratio of the number of remaining students to the excluded students.

Remaining

Excluded

90

40

80

40

10

Ratio → 40 : 10 = 4 : 1

Calculations:

=> From the Alligation cross diagram, Ratio of (Remaining students) to (Excluded students) = (80 − 40) : (90 − 80)

=> Ratio = 40 : 10 = 4 : 1

=> Let the number of remaining students be 4x and the excluded students be 1x

=> We are given that the number of excluded students is 5, so 1x = 5

=> Total ratio parts for all students = 4x + 1x = 5x

=> Total number of students = 5 × 5 = 25

Therefore The correct answer is 25 students.

Additional Information

Combined Average Formula

If two groups have sizes n1 and n2 with averages A1 and A2, the combined average is given by: A = (n1A1 + n2A2) ÷ (n1 + n2).

Rule of Alligation

It is a quick method used to find the exact ratio in which two components or groups are mixed. The ratio is always taken as cross differences: (Higher Average − Combined Average) : (Combined Average − Lower Average).

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Zero Net Deviation Rule

The sum of algebraic deviations of all items in a group from their arithmetic mean is exactly zero. Any missing quantity or number of observations can be found by balancing the negative and positive deviations.

Q58. Answer: (a) Velocity of the massive object increases.

The correct answer is Velocity of the massive object increases.

Key Points

• Gravitational Force: between two masses m1 and m2 at the distance of R is given by:

$F=Gm1m2/(R^2)$

where F is the gravitational force, m1 and m2 are the masses, and G is the gravitational constant.

• The gravitational force is always attractive.

EXPLANATION:

• Masses always attract each other. So, the gravitational force is always attractive.

• If there were repulsive gravitation forces, it means an object has a negative mass. And it is not possible.

• So the gravitational force is attractive always.

Q59. Answer: (c) The strength of the force of attraction between the particles of matter is constant, irrespective of the ki...

The correct answer is option 3.

Key Points

• The strength of the force of attraction between the particles of matter varies from one kind of matter to another.

• The force acting between the particles of matter keeps them together.

• The strength of the force of attraction between the particles of matter is not constant; it depends on the type of matter.

• The particles of matter have force acting between them.

• Different kinds of matter exhibit different degrees of intermolecular forces.

Additional Information

• Solids

• In solids, the force of attraction between particles is very strong, which keeps them closely packed in a fixed position.

• Liquids

• In liquids, the force of attraction between particles is moderate, allowing them to move around freely while still being close to each other.

• Gases

• In gases, the force of attraction between particles is very weak, allowing them to move independently and occupy the entire volume of the container.

Q60. Answer: (a) HCGD

The logic followed here is:

UPTQ is related to OJNK

RMQN is related to LGKH

Similarly, NIMJ will be related:

Hence, the correct answer is "HCGD".

Q61. Answer: (c) One

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

Only five people sit between C and D.

G sits to the immediate right of C.

B sits third from the right end.

E sits third to the right of A.

Thus final arrangement:

So, One people sit between G and F.

Hence, the correct answer is "One

Q62. Answer: (b) Srinath Narayanan

The correct answer is Srinath Narayanan.

Key Points

• The 45th Chess Olympiad was held in Budapest, Hungary.

• India secured gold medals in both the open and women's categories.

• The open team, featuring players like Arjun Erigaisi and Gukesh D, claimed their first-ever gold after a critical win and China dropping points.

• The women's team, led by Harika Dronavalli, dominated Azerbaijan to secure their victory.

• This achievement marked India's first gold in the open section.

• PM Modi praised the teams for their stellar performances on social media.

Q63. Answer: (b) 240

Given:

Production of rice for the years:

2020 = 100 lakh tons

2021 = 60 lakh tons

2022 = 80 lakh tons

Formula used:

Total production = Sum of production for the given years

Calculation:

Total production = 100 + 60 + 80

=> Total production = 240 lakh tons

Therefore The total production of rice for the years 2020, 2021, and 2022 together is 240 lakh tons.

Q64. Answer: (d) Copper sulphate

The correct answer is Copper sulphate.

Key Points

• Copper sulphate ($CuSO_4$) is commonly used as the electrolyte in the electrolytic refining of copper.

• In this process, impure copper is used as the anode, and a pure copper sheet is used as the cathode.

• When an electric current is passed through the electrolyte solution, copper ions from the anode dissolve into the solution and are deposited on the cathode.

• Impurities present in the impure copper either remain in the solution or fall to the bottom as anode sludge.

• This process helps in obtaining high-purity copper from impure copper.

Additional Information

• Electrolytic Refining

• It is a process used to purify metals by electrolysis.

• This method is used for metals like copper, zinc, and aluminum.

• The process ensures the removal of impurities and produces high-purity metal.

• Copper Extraction

• Copper is extracted from its ores through processes like smelting and electrolysis.

• The extracted copper is further refined through electrolytic refining to achieve high purity.

• Applications of Copper

• Copper is widely used in electrical wiring due to its excellent electrical conductivity.

• It is also used in plumbing, roofing, and industrial machinery.

• Copper alloys, such as bronze and brass, have various applications in decorative arts and manufacturing.

Q65. Answer: (a) Jordan Lepcha

The correct answer is Jordan Lepcha.

Key Points

• For the year 2024, the President approved conferment of 132 Padma awards, up from 106 such awards last year.

• The list comprises five Padma Vibhushan, 17 Padma Bhushan and 110 Padma Shri awards.

• While 30 awardees are women, the list also includes nine persons from the category of "Foreigners/NRI/PIO/OCI" and nine posthumous awardees.

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• Late M Fathima Beevi, the first female of the Supreme Court of India and the first Muslim woman to be appointed to any of the higher judiciary in the country, who passed away recently, has been awarded Padma Bhushan (posthumously).

• Gouri Lakshmi Bayi, has written on the temples of erstwhile Travancore and Kerala, besides anthologies in English.

Additional Information

• The following are the names of Padma Award 2024 recipients:

Padma Vibhushan	Padma Bhushan	Padma Shri
1. Vyjayantimala Bali	1. M Fathima Beevi	1. Khalil Ahamad
2. Konidela Chiranjeevi	2. Hormusji N Cama	2. Badrappan M
3. M Venkaiah Naidu	3. Mithun Chakraborty	3. Kaluram Bamaniya
4. Bindeshwar Pathak	4. Sitaram Jindal	4. Rezwana Choudhury Bannya
5. Padma Subrahmanyam	5. Young Liu	5. Naseem Bano
	6. Ashwin Balachand Mehta	6. Ramlal Bareth
	7. Satyabrata Mookherjee	7. Gita Roy Barman
	8. Ram Naik	8. Parbati Baruah
	9. Tejas Madhusudan Patel	9. Sarbeswar Basumatary
	10. Olanchery Rajagopal	10. Som Datt Battu
	11. Dattatray Ambadas Mayaloo Alias Rajdutt	11. Takdira Begum
	12. Togdan Rinpoche	12. Sathyanarayana Beleri
	13. Pyarelal Sharma	13. Drona Bhuyan
	14. Chandreshwar Prasad Thakur	14. Ashok Kumar Biswas
	15. Usha Uthup	15. Rohan Machanda Bopanna
	16. Vijaykanth	16. Smriti Rekha Chakma
	17. Shri Kundan Vyas	17. Narayan Chakraborty
		18. A Velu Ananda Chari
		19. Ram Chet Chaudhary
		20. K Chellammal
		21. Joshna Chinappa
		22. Charlotte Chopin
		23. Raghuveer Choudhary
		24. Joe D Cruz
		25. Ghulam Nabi Dar
		26. Chitta Ranjan Debbarma
		27. Uday Vishwanath Deshpande
		28. Prema Dhanraj
		29. Radha Krishan Dhiman
		30. Manohar Krishana Dole
		31. Pierre Sylvain Filliozat
		32. Mahabir Singh Guddu
		33. Anupama Hoskere

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		34. Yazdi Maneksha Italia
		35. Rajaram Jain
		36. Jankilal
		37. Ratan Kahar
		38. Yashwant Singh Kathoch
		39. Zahir I Kazi
		40. Gaurav Khanna
		41. Surendra Kishore
		42. Dasari Kondappa
		43. Sridhar Makam Krishnamurthy
		44. Yanung Jamoh Lego
		45. Jordan Lepcha
		46. Satendra Singh Lohia
		47. Binod Maharana
		48. Purnima Mahato
		49. Uma Maheshwari D
		50. Dukhu Majhi
		51. Ram Kumar Mallick
		52. Hemchand Manjhi
		53. Chandrashekhar Mahadeorao Meshram
		54. Surendra Mohan Mishra
		55. Ali Mohammed & Shri Ghani Mohammed (Duo)
		56. Kalpana Morparia
		57. Chami Murmu
		58. Sasindran Muthuvel
		59. G Nachiyar
		60. Kiran Nadar
		61. Pakaravur Chithran Namboodiripad (Posthumous)
		62. Narayanan E P
		63. Shailesh Nayak
		64. Harish Nayak
		65. Fred Negrit
		66. Hari Om
		67. Bhagabat Padhan
		68. Sanatan Rudra Pal
		69. Shankar Baba Pundlikrao Papalkar
		70. Radhe Shyam Pareek
		71. Dayal Mavjibhai Parmar

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		72. Binod Kumar Pasayat
		73. Silbi Passah
		74. Shanti Devi Paswan & Shri Shivan Paswan (Duo)
		75. Sanjay Anant Patil
		76. Muni Narayana Prasad
		77. K S Rajanna
		78. Chandrashekar Channapatna Rajannachar
		79. Bhagwatilal Rajpurohit
		80. Romalo Ram
		81. Navjivan Rastogi
		82. Nirmal Rishi
		83. Pran Sabharwal
		84. Gaddam Sammaiah
		85. Sangthankima
		86. Machihan Sasa
		87. Omprakash Sharma
		88. Eklabya Sharma
		89. Ram Chander Sihag
		90. Harbinder Singh
		91. Gurvinder Singh
		92. Godawari Singh
		93. Ravi Prakash Singh
		94. Seshampatti T Sivalingam
		95. Somanna
		96. Kethavath Somlal
		97. Shashi Soni
		98. Urmila Srivastava
		99. Nepal Chandra Sutradhar (Posthumous)
		100. Gopinath Swain
		101. Laxman Bhatt Tailang
		102. Maya Tandon
		103. Aswathi Thirunal Gouri Lakshmi Bayi Thampuratty
		104. Jagdish Labhshanker Trivedi
		105. Sano Vamuzo
		106. Balakrishnan Sadanam Puthiya Veetil
		107. Kurella Vittalacharya

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		108. Kiran Vyas
		109. Jageshwar Yadav
		110. Babu Ram Yadav

Q66. Answer: (a) 0.5R ohm

The Correct answer is 0.5R ohm.

Key Points

• The resistance (R) of a wire is directly proportional to its length (L) and inversely proportional to its cross-sectional area (A).

• The relation is given by the formula: $R = \rho \times (L / A)$, where ρ is the resistivity of the material.

• If the length of the wire is halved (from 10 m to 5 m), keeping the material and cross-sectional area constant, the resistance will also be halved.

• Hence, the resistance of the 5 m long copper wire will be 0.5R, which is half the resistance of the 10 m long wire.

• This is because the resistance is directly proportional to the length of the wire, and reducing the length proportionally reduces the resistance.

• Copper, being a good conductor, has a low resistivity, ensuring minimal resistance even for longer wires.

• This principle is widely used in designing electrical systems, ensuring optimal wire lengths for specific applications.

Additional Information

• Resistance and Length Relation

• The resistance of a wire increases with its length because the electrons traveling through the material encounter more atoms and thus more resistance.

• This is an important principle for understanding the behavior of conductors and designing circuits.

• Applications of Copper Wires

• Copper wires are widely used in electrical wiring due to their high conductivity and low resistivity.

• They are used in power transmission, building wiring, motor windings, and telecommunications systems.

• Copper is also durable and resistant to corrosion, making it ideal for long-term electrical applications.

Q67. Answer: (d) Electric heater

The correct answer is Electric heater.

Key Points

• An electric heater works by converting electrical energy into heat energy using resistive heating elements.

• It does not rely on the interaction of a current-carrying conductor with a magnetic field to generate heat.

• Electric motors use current-carrying conductors in magnetic fields to produce mechanical motion.

• Electric fans use electric motors, which in turn use current-carrying conductors in magnetic fields to operate.

• Electric generators convert mechanical energy into electrical energy through the use of current-carrying conductors in magnetic fields.

Additional Information

• Electric Motor

• It operates on the principle of the Lorentz force, where a current-carrying conductor in a magnetic field experiences a force.

• Used in various applications including fans, pumps, and household appliances.

• Electric Generator

• Works on the principle of electromagnetic induction, where a conductor moving in a magnetic field induces an electromotive force (EMF).

• Commonly used to provide power in places without access to the electrical grid.

• Electric Fan

• Uses an electric motor to convert electrical energy into mechanical energy, causing the blades to rotate and move air.

• Electric fans are widely used for cooling and ventilation purposes.

Q68. Answer: (a) QMK

The logic followed here is:

Hence, the correct answer is "QMK".

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Q69. Answer: (a) 108°

Shortcut Trick

Sum of consecutive interior angles between parallel lines is 180°.

Sum of ratio parts = 2 + 3 = 5 units.

5 units → 180°

1 unit → 180° ÷ 5 = 36°

Greater angle = 3 units = 3 × 36° = 108°.

Therefore The correct answer is 108°.

Alternate Method

Given:

Ratio of interior angles on the same side = 2 : 3.

Formula Used:

When two parallel lines are cut by a transversal, the sum of the interior angles on the same side is always 180° (supplementary angles).

Calculations:

=> Let the two interior angles be 2x and 3x.

=> According to the property of parallel lines:

=> 2x + 3x = 180°

=> 5x = 180°

=> x = 180° ÷ 5

=> x = 36°

=> Smaller angle = 2x = 2 × 36° = 72°

=> Greater angle = 3x = 3 × 36° = 108°

Therefore The correct answer is 108°.

Additional Information

Consecutive Interior Angles

These are the pairs of angles on one side of the transversal and between the two lines. If the lines are parallel, they are supplementary (sum = 180°).

Alternate Interior Angles

When a transversal intersects two parallel lines, the alternate interior angles are equal in measure.

Corresponding Angles

Angles in the same relative position at each intersection where a straight line crosses two others. If the lines are parallel, these angles are equal.

Q70. Answer: (c) CBIC

The correct answer is CBIC.

Key Points

• CBIC stands for Central Board of Indirect Taxes and Customs.

• CBIC is a part of the Department of Revenue under the Ministry of Finance in India.

• It is responsible for the administration of indirect taxes such as Goods and Services Tax (GST), Customs, and Central Excise.

• CBIC also plays a crucial role in preventing smuggling and enforcing trade laws and regulations.

• The board is headed by a Chairperson and has several members who oversee different departments and functions related to indirect taxes and customs.

Additional Information

• RBI

• The Reserve Bank of India (RBI) is India’s central bank, also known as the banker’s bank.

• The RBI controls monetary and other banking policies of the Indian government.

• The Reserve Bank of India (RBI) was established on April 1, 1935, in accordance with the Reserve Bank of India Act, 1934.

• The Reserve Bank is permanently situated in Mumbai since 1937.

• The Reserve Bank is fully owned and operated by the Government of India.

• CBDT

• The event's theme is “CBIC-Uniting Markets, Bridging Borders.”

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• The event is held at 42nd India International Trade Fair in New Delhi.

• CBIC has set up 6 dedicated helpdesks on GST, Customs, GSTN, ICEGATE and CBIC Mitra to help-guide the taxpayers and public regarding rules/processes.

• Tutorial Videos on GST Registration, Composition Levy and India's AEO Programme released.

• SEBI

• The SEBI is the regulator of the securities and commodity market in the country owned by the Indian Government.

• SEBI stands for Securities and Exchange Board of India.

• SEBI was established on 12 April 1988 and its headquarters are located in Mumbai.

• The regional offices of SEBI are located in Ahmadabad, Kolkata, Chennai, and Delhi.

• On 30 January 1992, Statutory powers given to it through the SEBI Act, 1992.

Q71. Answer: (d) MS - LH

The logic followed here is:

1) QL - OJ

2) WR - UP

3) ID - GB

4) MS - LH

Hence, the correct answer is "MS - LH".

Q72. Answer: (b) Vyjayanthimala

The correct answer is Vyjayanthimala.

Key Points

• Vyjayanthimala

• Vyjayanthimala is a renowned Indian actress, accomplished Bharatanatyam dancer, and politician who has made significant contributions to the Indian film industry and the preservation of classical dance.

• She was honored with the Padma Vibhushan in 2024 for her exceptional contributions to the arts.

• Born on August 13, 1936, in Chennai, Tamil Nadu, Vyjayanthimala Bali began her artistic journey at a young age.

• She received her schooling at Sacred Heart Church Park Convent in Chennai.

• Her illustrious career spans across Tamil, Telugu, and Hindi films, where she left an indelible mark with her versatile acting.

• She is particularly known for her graceful dancing and expressive performances in films like "Devdas," "Madhumati," and "Sangam."

Q73. Answer: (a) Anurag Garg

The correct answer is Anurag Garg.

Key Points

• Anurag Garg, a 1993 batch IPS officer from the Himachal Pradesh cadre, has been appointed as the new Director General (DG) of the Narcotics Control Bureau (NCB).

Additional Information

• Anurag Garg was previously serving as Additional Director General in the Border Security Force (BSF) at its headquarters in New Delhi.

• His appointment was approved by the Appointments Committee of the Cabinet (ACC), and he will serve as NCB DG until May 23, 2026, or until further orders.

• He takes over from CRPF DG Anish Dayal Singh, who was holding the NCB DG position in an additional capacity after the retirement of S N Pradhan in August.

• The Narcotics Control Bureau, under the Ministry of Home Affairs, was established in 1986 and is responsible for combating drug trafficking and illegal substance use under the Narcotic Drugs and Psychotropic Substances Act.

Q74. Answer: (d) 32

Shortcut Trick

In a continued proportion a : b :: b : y, the value of the third proportional y is calculated as $b^2 \div a$.

Given 18 : 24 :: 24 : y, identify a = 18 and b = 24.

$y = (24 \times 24) \div 18 = 576 \div 18 = 32$.

Therefore The correct answer is 32.

Alternate Method

Given: The proportion is 18 : 24 :: 24 : y.

Formula Used: For any proportion a : b :: c : d, the Product of Extremes (a × d) must be equal to the Product of Means (b × c).

=> 18 / 24 = 24 / y

=> 18 × y = 24 × 24

=> 18 × y = 576

=> y = 576 ÷ 18

=> y = 32

Therefore The correct answer is 32.

Additional Information

Third Proportional

In a continued proportion a : b = b : c, the term 'c' is the third proportional to a and b, given by $c = b^2 \div a$.

Mean Proportional

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

Fourth Proportional

In a general proportion a : b :: c : d, 'd' is the fourth proportional and is calculated as $d = (b \times c) \div a$.

Q75. Answer: (a) Six

The logic follows here is :-

Given word: MASTER

Change each consonant to the letter immediately preceding it in the English alphabetical order and each vowel to the letter immediately succeeding it in the English alphabetical order.

Steps:

• M (consonant) changes to L

• A (vowel) changes to B

• S (consonant) changes to R

• T (consonant) changes to S

• E (vowel) changes to F

• R (consonant) changes to Q

New sequence: L B R S F Q

Now count the consonants in the new sequence:

• L (consonant)

• B (consonant)

• R (consonant)

• S (consonant)

• F (consonant)

• Q (consonant)

There are 6 consonants in the new group of letters.

Hence, the correct answer is "Option 1".

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