RRB NTPC CBT-I Official Paper (Held On: 19 Jan 2021 Shift 1) (Previous Year Paper)

RRB NTPC • 2021 • 100 questions • 90 minutes • Answer key and solutions

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

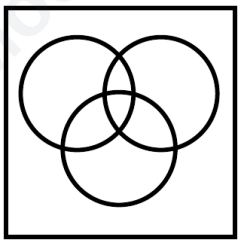
Q1. As per the Public Enterprise survey 2018-19, which is the most profitable PSU in India?

(a) IOC
(b) ONGC
(c) NTPC
(d) GAIL

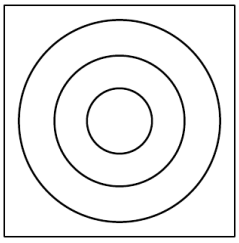
Q2. Select the Venn diagram that best represents the relationship between the following classes.

Plastic, Paper, Bag

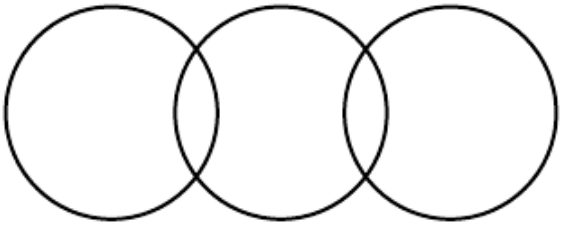
(a)



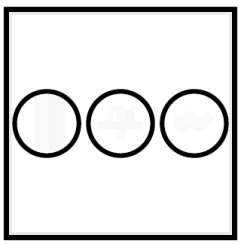
(b)



(c)



(d)



Q3. Which Indian state has the largest mica reserves?

(a) Jharkhand
(b) Odisha
(c) Andhra Pradesh
(d) Bihar

Q4. The Speaker of the Lok Sabha is elected by:

(a) President of India
(b) all the members of Lok Sabha
(c) members of majority party in Lok Sabha
(d) all the members of Parliament

Q5. Which of the following is NOT an example of refraction of light?

(a) Image formation by human eye
(b) Formation of rainbow
(c) Twinkling of stars
(d) Red colour of setting sun

Q6. Which UN Sustainable Development Goal deals with responsible consumption and production?

(a) SDG 17
(b) SDG 12
(c) SDG 13
(d) SDG 10

Q7. If N = 13 and GROUP = 58, then which among the given options will MOBILE be equal to:

(a) 100
(b) 51
(c) 116
(d) 106

Q8. If a : b = 3 : 4 and b : c = 5 : 7, then a : c = ?

(a) 15 : 28
(b) 10 : 28
(c) 28 : 15
(d) 28 : 10

Q9. Vikramaditya is another name of which famous Gupta ruler?

(a) Chandragupta I
(b) Ramagupta
(c) Kumaragupta II
(d) Chandragupta II

Q10. The 2021 United Nations Climate Change conference, also known as COP26 is Scheduled to be held at _____.

(a) Paris
(b) London
(c) Glasgow
(d) Geneva

Q11. Which country hosted Asia Badminton Championship in Feb 2020?

(a) Japan
(b) India
(c) South Korea
(d) Philippines

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Q12. In a certain code language, TRIM is written as GEVZ and FOCUS is written as SBPHF. How will UNIVERSITY be written as in that language?

(a) HAVIREFVGL
(b) HBXOPLKXST
(c) BTXMNOKXTS
(d) MTXLPOKXST

Q13. Who won the Oscar Award, 2020 for the Best Actress in a Leading Role?

(a) Renee Zellweger
(b) Rayka Zehtabchi
(c) Regina King
(d) Domee Shi

Q14. Ramu and Ravi met in the market on 5^(th) of a month. Ramu goes to the market every 4^(th) day and Ravi goes every 5^(th) day. On what day of the month will they meet again?

(a) 10^(th) day
(b) 25^(th) day
(c) 20^(th) day
(d) 14^(th) day

Q15. Out of the colours listed, three are alike in some manner and one is different. Select the odd one.

(a) Orange
(b) Red
(c) Blue
(d) Yellow

Q16. The value of ((-1/2)^5)/((-1/2)^4) + (-1/8)/(-1/4) is

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

Q17. Find the value of √2025.

(a) 55
(b) 25
(c) 65
(d) 45

Q18. The area of a circular park is 1386 m². If a path of the width 7 m is laid around and inside the park. Then the area of the path is:

(a) 780 m²
(b) 770 m²
(c) 760 m²
(d) 790 m²

Q19. Alignment of chromosomes in the center of the cell at the equatorial plate constitutes which stage of mitosis?

(a) Telophase
(b) Anaphase
(c) Prophase
(d) Metaphase

Q20. If sin A = 1/2 and cos B = 1/2 then find A + B.

(a) 30°
(b) 90°
(c) 75°

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(d) 60°

Q21. On 22April 2019, Ministry of AYUSH signed a MoU with which of the following organisations to promote research and education in traditional system of medicine and its integration with modern science?

(a) INSA
(b) DRDO
(c) NITI Aayog
(d) CSIR

Q22. Which one of the following is not a launch vehicle technology?

(a) GSLV
(b) ASLV
(c) PSLV
(d) MSLV

Q23. Lime water turns milky on passing carbon dioxide gas through it due to the formation of:

(a) $Ca(HCO3)2$
(b) CaO
(c) $Ca(OH)2$
(d) $CaCO3$

Q24. A, B and C can complete a piece of work in 10 days, 15 days and 20 days respectively. If they work together, then the work will be completed in:

(a) 4 7/13 days
(b) 4 6/13 days
(c) 4 8/13 days
(d) 4 9/13 days

Q25. If $\tan\theta = x - 1/4x$, then $\sec\theta - \tan\theta$ is equal to:

(a) -2x or -1/2x
(b) 2x or - 1/2x
(c) 2x or 1/2x
(d) • 2x or 1/2x

Q26. Which of the following tribes belongs to Nagaland?

(a) Bonda
(b) Limboo
(c) Rengma
(d) Pnar

Q27. Select the option that is related to the third term in the same way as the second term is related to the first term.

Book : Reading :: Poetry : ?

(a) Recitation
(b) Teaching
(c) Rhyming
(d) Singing

Q28. Out of the four words listed, three are alike in some manner and one is different. Select the odd one.

(a) Key
(b) Latch
(c) Seal
(d) Lock

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Q29. Which of the following was adopted by Lord Dalhousie to annex Indian states?

(a) Rowlatt Act
(b) The Doctrine of Lapse
(c) Policy of Subsidiary Alliance
(d) Policy of Permanent Settlement

Q30. Who among the following won a gold medal for India in Boxing in the 2018 Commonwealth Games?

(a) Vikas Krishan
(b) Naman Tanwar
(c) Manish Kaushik
(d) Mohamad Husamudin

Q31. A and B start a business by investing Rs. 1,00,000 and Rs. 1,50,000 respectively. Find the respective share of each out of a total profit of Rs. 24, 000.

(a) Rs. 9500 and Rs. 14,200
(b) Rs. 9400 and Rs. 14,000
(c) Rs. 9600 and Rs. 14,400
(d) Rs. 9300 and Rs. 14,100

Q32. The median of the data in ascending order 7, 11, 12, (x – y), (x + y), 20, 21, 29 is 16. Find the value of x.

(a) 16
(b) 14
(c) 15
(d) 12

Q33. Which is an international treaty among industrialized nations that sets mandatory limits on greenhouse gas emissions?

(a) Geneva Protocol
(b) Montreal Protocol
(c) Kyoto Protocol
(d) Bonn Agreement

Q34. A man completes a journey in 10 hours. He travels the first half of the journey at the rate of 20 km/h and the second half at the rate of 30 km/h. Find the total journey he travelled in kilometres?

(a) 320 km
(b) 240 km
(c) 300 km
(d) 200 km

Q35. Which country is the largest producer of wheat in the world?

(a) China
(b) Russia
(c) USA
(d) India

Q36. A rainfall of 0.896 cm was recorded in 7 h. What was the average amount of rain per hour?

(a) 0.182 cm
(b) 0.218 cm
(c) 0.112 cm
(d) 0.128 cm

Q37. Find the greatest number of five digits which is exactly divisibly by 6, 8, 12, 15 and 20.

(a) 99980
(b) 99920
(c) 99999

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(d) 99960

Q38. Select the combination of numbers, from the given options, that when sequentially placed in the blanks of the given series will complete the series.

3, 2, 13 / 5, 4, 41 /_, _, _.

(a) 7, 6, 85
(b) 8, 7, 105
(c) 6, 7, 85
(d) 7, 8, 105

Q39. If √15 = 3.88, then √(5/3) = ?

(a) 4.2933...
(b) 2.2933...
(c) 3.2933...
(d) 1.2933...

Q40. Who wrote the famous Sanskrit play Svapnavasavadattam?

(a) Shudraka
(b) Jayadev
(c) Kalidas
(d) Bhasa

Q41. Four friends J, Q, B and Z rolled the dice in alphabetical order.

The scores were:

1^(st) round: 3, 2, 5, 2

2^(nd) round: 1, 5, 1, 4

3^(rd) round: 4, 2, 1, 1

If each point on the dice would get 10 points, who won the maximum points after 3 rounds?

(a) J
(b) Q
(c) B
(d) Z

Q42. Under which Article of the Constitution, the Supreme Court of India may issue a writ for enforcement of Fundamental Rights?

(a) Article 30
(b) Article 44
(c) Article 139
(d) Article 32

Q43. Which of the following is NOT a style of Hindustani classical music?

(a) Alapana
(b) Thumri
(c) Dhrupad
(d) Tappa

Q44. The LCM of two numbers is the 20^(th) multiple of 3. If their HCF is 6 and one of the number is 12, then the second number is:

(a) 42
(b) 24
(c) 56
(d) 30

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Q45. Find the difference between the median and the mean of the following data:

12, 20, 3, 14, 5, 8, and 15

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

Q46. For a room, if length and breadth are given by L= (3x + 10) m and B = (2x + 5) m and the area of 4 of its walls together is (60x + 180) sq units, then the height of the room is:

(a) 8 m
(b) 6 m
(c) 9 m
(d) 5 m

Q47. In India, Core sector industries do NOT include:

(a) Cement
(b) Crude Oil
(c) Sugar
(d) Fertilizers

Q48. Find the equation of the tangents to the circle $x^2 + y^2 = 9$ at x = 2.

(a) -2x - √5y = 9
2x - √5y = 9
(b) 2x + √5y = 9
2x - √5y = 9
(c) -2x + √5y = 9
-2x - √5y = 9
(d) -2x + √5y = 9
2x - √5y = 9

Q49. Which of the following Articles of the Constitution of India provides provisions for creation of Legislative Councils in States?

(a) Article 216
(b) Article 151
(c) Article 169
(d) Article 195

Q50. Who became the first Viceroy of India?

(a) Lord Canning
(b) Lord Elgin
(c) Lord Cornwallis
(d) Lord Ripon

Q51. Which Indian satellite launched from French Guiana in early 2019 is the 40^(th) Communication Satellite of India?

(a) GSAT-31
(b) GSAT-6A
(c) GSAT-5P
(d) INSAT-4B

Q52. A container contains 80 litres of milk. From this container, 8 litres of milk is taken out and replaced by water. 8 litres of this mixture is now taken out and again replaced with water. This process is repeated once more. How much milk content in the Mixture now?

(a) 50.42 litres
(b) 48.32 litres
(c) 58.32 litres

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(d) 52.12 litres

Q53. On which river is Victoria Falls located in Africa?

(a) Congo
(b) Nile
(c) Zambezi
(d) Niger

Q54. Which instrument is used to show the direction of flow of current in a circuit?

(a) Galvanometer
(b) Ammeter
(c) Rheostat
(d) Voltmeter

Q55. If the degree of polynomial 9 x^5y²z^r is 15, then r = ?

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

Q56. Bananas are bought at the rate of 3 for Rs. 2 and sold at the rate of 2 for Rs. 3. Find the percentage gain.

(a) 135%
(b) 105%
(c) 115%
(d) 125%

Q57. Which type of storage device is a Hard Disc?

(a) Primary storage
(b) Tertiary storage
(c) Secondary storage
(d) Off-line storage

Q58. What is the full form of CLI in Computer terminology?

(a) Command Line Interface
(b) Central Line Interface
(c) Control Line Interface
(d) Code Line Interface

Q59. Select the option that is related to the third term in the same way as the second term is related to the first term.

Restaurant : Eat :: Gym : ?

(a) Treadmill
(b) Sweat
(c) Exercise
(d) Rowing Machine

Q60. A vendor bought bananas at the rate of 6 for Rs. 10 and sold them at the rate of 4 for Rs. 6. What is the percentage gain or loss?

(a) 20%
(b) 30%
(c) 90%
(d) 10%

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Q61. The sum of the place values of 9 in 96961 is:

(a) 18
(b) 9090
(c) 90900
(d) 9000

Q62. Human growth hormone is secreted by which gland?

(a) Posterior lobe of pituitary gland
(b) Anterior lobe of pituitary gland
(c) Thyroid gland
(d) Pancreas

Q63. Which is Asia's biggest bus terminus?

(a) Tel Aviv Central Bus Stand in Tel Aviv
(b) Kamppi Centre in Helsinki
(c) Port Authority Bus Terminal in New York City
(d) Chennai Mofussil Bus Terminus in Chennai

Q64. Select the number from among the given options that is related to the third number in the same way as the second number is related to the first number.

28 : 66 :: 31 : ?

(a) 72
(b) 62
(c) 92
(d) 42

Q65. A can complete a task in 40 days. If A and B can complete it together in 30 days, then in how many days can B alone complete the task?

(a) 100 days
(b) 150 days
(c) 120 days
(d) 125 days

Q66. To provide at least 100 days of guaranteed wage employment to every household in a financial year for unskilled manual work done by an adult is the objective of which flagship programme of the Government of India?

(a) NRHM
(b) PMKVY
(c) JNNURM
(d) MGNREGA

Q67. Who among the following ended the Kakatiya dynasty rule?

(a) Delhi Sultanate
(b) Guptas
(c) Chalukyas
(d) Cholas

Q68. The HCF and LCM of two numbers are 6 and 36 respectively. If one of the number is 12, then the other number is:

(a) 36
(b) 18
(c) 14
(d) 16

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Q69. Which committee was set up by Lord Chelmsford to enquire into Jallianwala Bagh incident in 1919?

(a) Hunter Committee
(b) Maclagan Committee
(c) Harshell Committee
(d) Muddiman Committee

Q70. According to the time by Rick's watch its quarter past eight. If the minute hand points towards the east, towards which direction would the hour hand point?

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

Q71. Which one of the following does NOT belong to the given set?

{3/6,5/10, 9/18, ...}

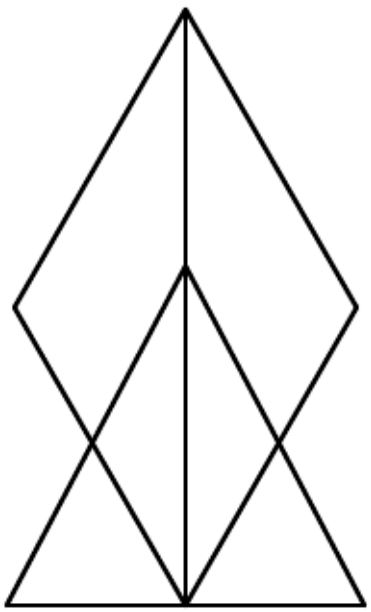
(a) 19/38
(b) 13/26
(c) 42/86
(d) 62/124

Q72. Study the given pattern carefully and select the number from among the given options that can replace the question mark (?) in it.

5	**5**	**?**	**5**	**5**
9	9	36	9	9
7	7	56	7	7

(a) 48
(b) 60
(c) 56
(d) 58

Q73.



How many triangles are there in the given diagram?

(a) 7
(b) 10
(c) 8

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(d) 9

Q74. 50% of a number is 21 less than 4/5 th of that number. Find the number.

(a) 40
(b) 70
(c) 60
(d) 50

Q75. What is the least possible number which must be subtracted from 16, 19 and 23, so that the resulting numbers are in continued proportion?

(a) 1
(b) 7
(c) 9
(d) 8

Q76. Select the combination of numbers from the given options, that when sequentially placed in the blanks of the given series will complete the series.

1, 2, 4 / 2, 3, 36 /,, __

(a) 3, 5, 225
(b) 2, 5, 100
(c) 3, 4, 144
(d) 4, 2, 64

Q77. Which of the following is NOT one of the Great Living Chola Temples?

(a) Kampahareswara
(b) Airavateswara
(c) Brihadeeshwara
(d) Gangaikondacholapuram

Q78. Which of the following is a surface-to-surface intercontinental range ballistic missile developed by India?

(a) Agni IV
(b) Shaurya
(c) Agni V
(d) Brahmos

Q79. As of October 2020, which of the following is a Maharatna PSU?

(a) Hindustan Aeronautical Limited
(b) Coal India Limited
(c) Bharat Electronics Limited
(d) Hindustan Petroleum Corporation Limited

Q80. Select the option that is related to the third term in the same way as the second term is related to the first term.

Water : Sea :: Ice : ?

(a) Glacier
(b) Refrigerator
(c) Cold
(d) Solid

Q81. In Δ ABC, angle A : angle B :angle C = 2 : 3 : 5, then find the measure of the supplementary angle of angle A.

(a) 36°
(b) 154°
(c) 54°
(d) 144°

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Q82. What is the average of 4.2, 3.8 and 7.6?

(a) 5.2
(b) 4.2
(c) 1.2
(d) 2.2

Q83. On which river is Idukki Dam built?

(a) Mahanadi
(b) Ghataprabha
(c) Krishna
(d) Periyar

Q84. Which of the following methods can be used for separating a mixture of NaCl and NH4Cl?

(a) Crystallisation
(b) Centrifugation
(c) Chromatography
(d) Sublimation

Q85. 1 Petabyte = _____

(a) 1024 TB
(b) 1024 KB
(c) 1024 GB
(d) 1024 MB

Directions

Study the given table and answer the question that follows.

This table shows the number of jobs created during the period 1940 - 1979.

Year	Job Creation (Millions)
1940	70
1944	80
1950	60
1958	55
1970	90
1979	75

Q86. In which of the following three years was the number of jobs created higher than the average job creation during the period 1940-79.

(a) 1940, 1950, 1958
(b) 1950, 1940, 1979
(c) 1940, 1950, 1970
(d) 1944, 1970, 1979

Q87. From the given options, the highest average number of jobs created were in which 3 years?

(a) 1944, 1950, 1970
(b) 1979, 1940, 1944
(c) 1958, 1970, 1979
(d) 1940, 1944, 1958

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Q88. As per the information provided in the given table, in which of the following three years was the average number of jobs created, the lowest.

(a) 1944, 1950, 1958
(b) 1958, 1970, 1979
(c) 1940, 1944, 1950
(d) 1950, 1958, 1970

Q89. As per the information provided in the given table, which of the two-year periods listed below had the highest average jobs created?

(a) 1940, 1970
(b) 1970, 1958
(c) 1940, 1944
(d) 1970, 1979

Q90. Select the number from the given options, that will come next in the following series.

7, 22, 45, 76, 115, ?

(a) 144
(b) 184
(c) 180
(d) 162

Q91. Select the option that is related to the third term in the same way as the second term is related to the first term.

Shoe : Rack :: Book : ?

(a) Cover
(b) Mark
(c) Store
(d) Shelf

Q92. Select the combination of numbers, from the given options, that when sequentially placed in the blanks of the given series will complete the series.

1, 7, 10, 4, 1,,

(a) 7, 10
(b) 8, 11
(c) 9, 16
(d) 6, 3

Q93. Select the number from the given options, that will come next in the following series.

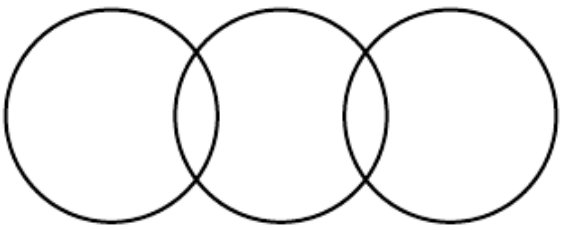
6, 16, 27, __

(a) 36
(b) 35
(c) 38
(d) 39

Q94. Identify the diagram that best represents the relationship among the given classes.

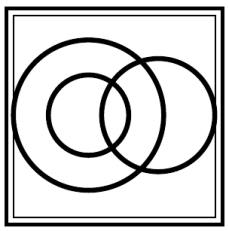
Mobile phone, Internet, Webmail

(a)

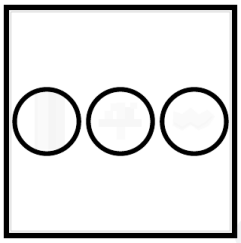


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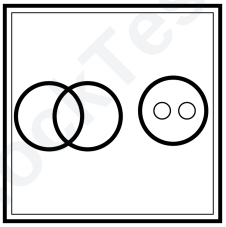
(b)



(c)



(d)



Q95. Select the option that is related to the third term in the same way as the second term is related to the first term.

Schoolbag : Books :: Suitcase : ?

(a) Journey
(b) Hotel
(c) Holiday
(d) Clothes

Q96. In the English alphabet written in order from left to right, if the first and third letters are interchanged. second and fourth letters are interchanged and so on, which of the following will be the thirteenth letter from the left?

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

Q97. Read the given statement and conclusions carefully and decide which of the conclusions logically follow(s) from the statement.

Statement:

Plastic is only one of the pollutants to the environment.

Conclusions:

I. Do not curb the use of plastic.

II. Impose a complete ban on plastic.

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

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Q98. Study the given pattern carefully and select the number from among the given options that can replace the question mark (?) in it.

4	7	13
5	7	13
6	9	?

(a) 12
(b) 13
(c) 9
(d) 7

Q99. In a certain code language, BOX is written as OBK, LAY is written as YNL and COP is written as PBC. How will HUNDRED be written in that language?

(a) QHUERAQ
(b) UHAQERQ
(c) HUAEQQR
(d) ERHUAQQ

Q100. Identify the number from the given options, that does NOT belong to the following series.

1, 7, 25, 61, 125

(a) 125
(b) 25
(c) 1
(d) 61

ANSWER KEY

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

SOLUTIONS

Q1. Answer: (b) ONGC

The correct answer is ONGC.

Key Points

• The Public Enterprise Survey is a comprehensive count of all Central Public Sector Enterprises (CPSEs). It collects vital statistical data on a variety of financial and physical aspects for all CPSEs.

• According to the Public Enterprises Survey 2018-19, which tracks all central PSUs' annual financial performance, the top ten firms in the red accounted for 94.04 percent of the total losses incurred by all 70 loss-making CPSEs throughout the year.

• Oil and Natural Gas Corporation (ONGC), Indian Oil Corporation, and NTPC, the top three profit-making PSUs, contributed 15.3 percent, 9.68 percent, and 6.73 percent, respectively, to the total profit made by all profitable CPSEs.

• For the third year in a row, BSNL, Air India, and MTNL suffered the most losses.

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• The total income of all CPSEs in 2018-19 was Rs 24,40,748 crore, up from Rs 20,32,001 crore in 2017-18, representing a 20.12% increase.

• Every year, the Ministry of Heavy Industries & Public Enterprises', Department of Public Enterprises (DPE) releases the Public Sector Enterprises Survey, which examines the performance of central public sector enterprises (CPSEs).

• According to the survey, there were 348 CPSEs in total as of March 31, 2019, with 249 of them functioning. The remaining 86 were under construction, with 13 in the process of being closed or liquidated.

Q2. Answer: (c) [figure]

Given: Plastic, Paper, Bag

• Some bags are made up of plastic.

• Some bags are made up of paper.

So the least possible diagram is as follows:

Hence, option (3) is the correct answer.

Q3. Answer: (c) Andhra Pradesh

The correct answer is Andhra Pradesh.

Key Points

• India has the largest reserve of mica in the world.

• The state of Andhra Pradesh is the largest producer of mica.

• Mica (crude) production is well-known in Andhra Pradesh's Nellore district.

• Other notable mica-producing districts include Vishakhapatnam, West Godavari, and Krishna.

• The states of Andhra Pradesh, Rajasthan, Bihar, and Jharkhand produce the majority of mica (waste and scrap).

• Andhra Pradesh ranks first among mica-producing states, generating 1,660 tonnes of crude mica and 7,626 tonnes of waste and scrap mica in the 2013-14 fiscal year.

• State-wise total resource distribution of Mica is as follows:-

• Andhra Pradesh leads with a 41% share of the country’s total resources followed by

• Rajasthan (21%)

• Odisha (20%)

• Maharashtra (15%)

• Bihar (2%) and

• The remaining 1% is in Jharkhand and Telangana together.

Additional Information

• Mica is India's most important export.

• Certain types of Indian mica are and will continue to be important to the global electrical industry.

• The ports of Kolkata and Vishakhapatnam handle the majority of exports.

• Japan (19%), the United States (17%), the United Kingdom, and other countries are major importers of Indian mica.

Q4. Answer: (b) all the members of Lok Sabha

The correct answer is all the members of Lok Sabha.

Key Points

• The Speaker is chosen by newly elected members of Lok Sabha.

• There are no specific requirements for becoming a speaker.

• The Speaker must only be a member of the House of Representatives, according to the constitution.

• An understanding of the country's Constitution and legislation, procedure, and conventions of Parliament is a vital asset for the speaker.

• A member belonging to the rulling party is elected.

• The Deputy speaker presides over the Lok sabha when the Speaker is absent from the sitting of the House

• Shri G.V. Mavalankar was the first Speaker of the Lok Sabha.

• Shri Om Birla is the current Speaker of the Lok Sabha.

Additional Information

• After the first General Elections, which took place from 25 October 1951 to 21 February 1952, the Lok Sabha (House of the People) was duly formed on 17 April 1952.

• The First Lok Sabha's first session began on May 13, 1952.

• The Lok Sabha is made up of people's representatives who are elected directly on the basis of adult suffrage. It is for this reason

that it is known as the popular chamber.

• The first Deputy Speaker of the Lok Sabha was Shri M. Ananthasayanam Ayyangar.

Q5. Answer: (d) Red colour of setting sun

The correct answer is Red colour of setting sun.

Key Points

• The phenomenon of refraction of light is the shift in the path of light as it travels from one medium to another.

• Red colour of setting sun:

• It is due to a phenomenon called Rayleigh scattering.

• The Sun is very low in the sky at sunrise and sunset.

• Because of its short wavelength, blue light is dispersed more forcefully by the atmosphere, and it tends to be scattered numerous times and redirected away in various directions before reaching us.

• We perceive the longer wavelength yellow and red light as the sunshine travels a larger distance.

• As a result, the sky appears to be red in colour.

• A pencil submerged in a glass of water appears bent at the water-air interface, for example.

• The ray of light bends towards normal as it moves from a rarer to a denser medium, and away from normal as it moves from a denser to a rarer medium.

• Lenses, magnifying glasses, prisms, and rainbows are all possible because of this bending through refraction.

• Laws of Refraction:

• The incident ray, the refracted ray, and the normal at the point of incidence, all lie in the same plane.

• The ratio of the sine of the angle of incidence and sine of the angle of refraction is constant.

• The ratio of the speed of light in a vacuum to the speed of light in the second medium of greater density is used to determine the Refractive Index.

• The higher the refractive index, the slower light travels, causing a proportionately greater change in light direction within the material.

• The velocity of light c of a particular wavelength in empty space divided by its velocity v in a substance, or n = c/v, is also known as the refractive index.

Additional Information

• Image formation by the human eye:

• The majority of refraction in the eye occurs when light rays pass through the eye's curved, front surface (cornea).

• Light rays converge most at the cornea and when entering and exiting the lens, forming a picture on the retina.

• Rays from the object's top and bottom are traced, resulting in an inverted actual image on the retina.

• Formation of the rainbow:

• Rainbows are created when sunlight is scattered by water droplets (such as raindrops or fog) in a process known as refraction.

• When sunlight passes through a medium denser than air, such as a raindrop, it refracts, changing its direction.

• When light enters the raindrop, it is refracted, reflected off the back, and then refracted again as it escapes and travels to our eyes.

• Twinkling of stars:

• The twinkling of a star is caused by starlight being refracted by the atmosphere.

• When starlight enters the earth's atmosphere, it undergoes constant refraction before reaching the surface.

• Atmospheric refraction takes place in a material with a fluctuating refractive index.

• The apparent location of the star differs significantly from its real position due to the atmosphere's bending of starlight towards the normal.

• When viewed near the horizon, the star appears slightly higher (above) than its real position.

• Because the stars are so far away, they resemble point sources of light.

• The apparent position of the star changes throughout time, as does the amount of starlight that enters the eye.

• The star flickers, seeming brighter and fainter at different periods, causing the twinkling effect.

Q6. Answer: (b) SDG 12

The correct answer is SDG 12.

Key Points

• The United Nations approved the Sustainable Development Goals (SDGs), also known as the Global Goals, in 2015 as a universal call to action to end poverty, safeguard the environment, and ensure that by 2030, everyone lives in peace and prosperity.

• The 17 SDGs are interconnected; they recognize that actions in one area have an impact on outcomes in others and that development in one area affects development in another.

• SDG 12: Ensure sustainable consumption and production patterns.

• Producers must grow more food while lowering negative environmental impacts such as soil, water, and nutrient loss, greenhouse gas emissions, and ecosystem deterioration to feed the world sustainably.

• The 17 sustainable development goals (SDGs) to transform our world:

• SDG 1: No Poverty

• SDG 2: Zero Hunger

• SDG 3: Good Health and Well-being

• SDG 4: Quality Education

• SDG 5: Gender Equality

• SDG 6: Clean Water and Sanitation

• SDG 7: Affordable and Clean Energy

• SDG 8: Decent Work and Economic Growth

• SDG 9: Industry, Innovation, and Infrastructure

• SDG 10: Reduced Inequality

• SDG 11: Sustainable Cities and Communities

• SDG 12: Responsible Consumption and Production

• SDG 13: Climate Action

• SDG 14: Life Below Water

• SDG 15: Life on Land

• SDG 16: Peace and Justice Strong Institutions

• SDG 17: Partnerships to Achieve the Goal

Q7. Answer: (d) 106

Given: N = 13 and GROUP = 58

The logic followed here is:

Addition of the reverse positional values, as shown below,

N = 13

And, GROUP = 58

GROUP = 20 + 9 + 12 + 6 + 11 = 58

Similarly,

MOBILE is coded as:

MOBILE = 14 + 12 + 25 + 18 + 15 + 22 = 106

Hence, 106 is the correct answer.

Q8. Answer: (a) 15 : 28

Given:

a : b = 3 : 4 and b : c = 5 : 7

Concept used:

Ratio and proportion

Calculation:

According to the question

=> a : b = 3 : 4

=> a/b = 3/4 ....(1)

And, b : c = 5 : 7

=> b/c = 5/7 .....(2)

Multiplying the equation (1) and (2), we get

=> (a/b) × (b/c) = (3/4 × 5/7)

=> a/c = 15/28

=> a : c = 15 : 28

Therefore The required ratio of a : c is 15 : 28

Q9. Answer: (d) Chandragupta II

The correct answer is Chandragupta II.

Key Points

• Chandragupta II, commonly known as Vikramaditya, was a great ruler of northern India who reigned from 380 AD to 415 AD.

• He was the grandson of Chandragupta I and the son of Samudra Gupta.

• Chandragupta-II's mother was queen Datta or Dattadevi, described as Mahadevi.

• The conquest of Sakas was the most significant event during Chandragupta II's reign.

• He issued silver coins in the memory of his victory over Sakas. He was the first Gupta ruler to issue silver coins and adopted the titles Sakari and Vikramaditya.

• His victory over Malwa aided the Malwa region's growth, and Ujjain became a commercial center.

• Mehrauli Iron Pillar Inscription (near Kutub Minar, Delhi) says that the king defeated the confederacy of Vangas and Vahilkas.

Additional Information

• Chandragupta I - He was the first Gupta ruler the title of Maharajadhiraja. He strengthened his kingdom by the matrimonial alliance with the powerful family of Lichchhavis who were the rulers of Mithila. His marriage to Lichchhvi princess Kumaradevi, brought him enormous power, resources, and prestige. He started the Gupta era in 319-320 AD.

• Ramagupta - According to 'Devi Chandragupta' (Vishakhadatta), Samudragupta was succeeded by Ramagupta. It seems that Ramagupta ruled for a very short period. He was the only Gupta ruler to issue 'copper' coins.

• Kumaragupta II - He was an emperor of the Gupta Empire. An image of Gautama Buddha at Sarnath notes that he succeeded Purugupta who was most likely his father. He was succeeded by Budhagupta. Several statues of the standing Buddha, representative of Gupta art, are known from the reign of Kumaragupta II, now in the Sarnath Museum.

Q10. Answer: (c) Glasgow

The correct answer is Glasgow.

Key Points

• COP stands for Conference of the Parties.

• The summit was attended by countries that signed the United Nations Framework Convention on Climate Change (UNFCCC), which entered into force in 1994.

• The United Kingdom and Italy collaborated to host the 26th COP summit.

• Due to delays caused by the COVID epidemic, the conference was held at the SEC Centre in Glasgow, Scotland, United Kingdom, from November 1 to 12, 2021, a year later than scheduled.

• The goals of the conference are to:

• Reach carbon neutrality by 2050 and keep 1.5 degrees within reach;

• adapt to protect communities and natural habitats;

• mobilise finance; and

• work together to deliver.

• COP26 will attempt to achieve the 2015 Paris Agreement's goal of keeping global temperature rise to "well below" 2.0 degrees Celsius over pre-industrial levels, as well as explore measures to keep temperature rises to 1.5 degrees Celsius.

• Various ways for achieving the goals of COP26:

• Promote and improve sustainable transportation solutions, such as electric cars, to decarbonize the transportation industry.

• Build defence mechanisms or switch to organic farming to protect and restore ecosystems.

• Encourage the use of renewable energy sources;

• Improve the energy efficiency of buildings by employing eco-construction methods, such as solar panel installation.

Q11. Answer: (d) Philippines

The correct answer is Philippines.

Key Points

• The Rizal Memorial Coliseum in Manila, Philippines, hosted the 2020 Badminton Asia Team Championships from February 11 to 16, 2020.

• This championship was organized by the Badminton Asia with Philippine Badminton Association as host organizer and sanctioned by the Badminton World Federation.

• This tournament served as the Asian qualifiers for the 2020 Thomas & Uber Cup in Denmark.

• In the men's and women's categories, Indonesia and Japan were the reigning champions.

• Champions:

Men's teams	**Indonesia**

Women's teams	Japan

Additional Information

• The 2022 Badminton Asia Team Championships were held from 15 to 20 February 2022 at the Setia City Convention Centre in Shah Alam, Selangor, Malaysia.

• This championship was organized by Badminton Asia with the Badminton Association of Malaysia as the host organizer.

• The Badminton World Federation sanctioned it.

• It served as the Asian qualifier for the Thomas & Uber Cup, which will be held in Thailand in 2022.

• Indonesia, the three-time champions, and Japan were the defending champions of the men's and women's category.

Q12. Answer: (a) HAVIREFVGL

Given: TRIM is written as GEVZ and FOCUS is written as SBPHF.

The logic followed here is:

Adding 13 to the positional values of the given letters, as shown below,

• TRIM is written as GEVZ.

And,

• FOCUS is written as SBPHF.

Similarly,

• UNIVERSITY is coded as:

Hence, HAVIREFVGL is the correct answer.

Q13. Answer: (a) Renee Zellweger

• The correct answer is Renee Zellweger.

Key Points

• The Academy of Motion Picture Arts and Sciences (AMPAS) hosted the 92nd Academy Awards on February 9, 2020, at the Dolby Theatre in Hollywood, Los Angeles, to recognise films released in 2019.

• List of winners:

• Best actor - Joaquin Phoenix, Joker

• Best actress - Renée Zellweger, Judy

• Best director - Bong Joon-ho, Parasite

• Best picture - Parasite

• Best supporting actor - Brad Pitt, Once Upon a Time in Hollywood

• Best animated feature - Toy Story 4

• Best original screenplay - Parasite

• Best adapted screenplay - Jojo Rabbit

• Best live-action short film - The Neighbors' Window

• Best animated short - Hair Love

• Best production design - Once Upon a Time in Hollywood

• Best costume design - Little Women

• Best c - American Factory

• Best documentary short - Learning to Skateboard in a Warzone (If You're a Girl)

• Best supporting actress - Laura Dern, Marriage Story

• Best cinematography - 1917

• Best sound editing - Ford v Ferrari

• Best sound mixing - 1917

• Best film editing - Ford v Ferrari

• Best visual effects - 1917

• Best makeup and hair - Bombshell

• Best international feature film - Parasite

• Best original score - Joker

• Best original song - I'm Gonna Love Me Again, Rocketman

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Q14. Answer: (b) 25^(th) day

Given: Ramu and Ravi met in the market on 5th of a month.

Now, according to the question,

Ramu goes to the market every 4th day and Ravi goes every 5th day.

LCM of 4 and 5 is 20.

Now,

The date of month they will meet again = 5 + 20

= 25

Thus, they will meet again on 25^(th) day of the month.

hence, the correct answer is "25^(th) day".

Q15. Answer: (a) Orange

The logic followed here is:

By checking all the options:

• All red, blue, and yellow are Primary Colors.

Whereas,

• Orange is a Secondary Color (Red +Yellow)

Hence, orange is the odd one out.

Important Points

• Primary Colors: any of a group of colours from which all other colours can be obtained by mixing, e.g., red, blue, yellow, etc.

• Secondary Colors: a colour resulting from the mixing of two primary colours.

Confusion PointsVIBGYOR concept is not used in this question as all the colours given in the options are part of VIBGYOR.

• V → Violet

• I → Indigo

• B → Blue

• G → Green

• Y → Yellow

• O → Orange

• R → Red

Q16. Answer: (a) 0

Given:

((-1/2)^5)/((-1/2)^4) + (-1/8)/(-1/4)

Calculation:

((-1/2)^5)/((-1/2)^4) + (-1/8)/(-1/4)

=> (-1/32)/(1/16) + (-1/8)/(-1/4)

=> (-1/32 × 16/1) + (-1/8 × -4/1)

=> -1/2 + 1/2

=> 0

Therefore The required value is 0

Q17. Answer: (d) 45

Given:

The number = √2025

Calculation:

The value of √2025

=> √(5 × 5 × 3 × 3 × 3 × 3)

=> (5 × 3 × 3)

=> 45

Therefore The required value of √2025 is 45

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Q18. Answer: (b) 770 m²

Given:

The area of a circular park = 1386 m²

A path of the width = 7 m

Formula used:

Area of circle = πr²

Calculation:

According to the question

Area of circle = πr²

=> 22/7 × r² = 1386 m²

=> 22r²/7 = 1386

=> r²/7 = 63

=> r² = 441

=> r = 21 m

Now,

Area of path = Area of larger circular park – Area of smaller circular park

=> 1386 – π(r – 7)²

=> 1386 – π(21 – 7)²

=> 1386 – π(14)²

=> 1386 – π(196)

=> 1386 – (22/7 × 196)

=> (1386 – 616) m²

=> 770 m²

Therefore The required area of the path is 770 m²

Q19. Answer: (d) Metaphase

The correct answer is Metaphase.

Key Points

• Mitosis is a kind of cell division in which one cell (the mother) divides to generate two genetically identical new cells (the daughters).

• Mitosis is the stage of the cell cycle's division process in which the DNA of the cell's nucleus is split into two equal sets of chromosomes.

• Mitotic divisions are a mode of reproduction for single-celled eukaryotes like yeast, contributing new individuals to the population.

• Phases of mitosis:

• Interphase:

• In preparation for cell division, the DNA in the cell is replicated, resulting in two identical full sets of chromosomes.

• Two centrosomes, each comprising a pair of centrioles, are located outside of the nucleus and are essential for cell division.

• Microtubules extend from these centrosomes during interphase.

• Prophase:

• Under a microscope, the chromosomes condense into X-shaped structures that are plainly visible.

• Each chromosome is made up of two sister chromatids, each of which contains the same genetic material.

• The chromosomes are paired up so that both copies of chromosome 1 are together, and so forth.

• The membrane around the nucleus in the cell dissolves at the conclusion of the prophase, freeing the chromosomes.

• The mitotic spindle, which is made up of microtubules and other proteins, spans the cell and connects the centrioles as they travel to opposite poles.

• Metaphase:

• The chromosomes are perfectly lined up end-to-end along the cell's equator.

• The mitotic spindle threads extend from the centrioles, which are now at opposing poles of the cell.

• The sister chromatids are connected by the mitotic spindle threads.

• Anaphase:

• The mitotic spindle then pulls the sister chromatids apart, pulling one chromatid to one pole and the other chromatid to the opposite pole.

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• Telophase:

• A complete pair of chromosomes assemble at each cell pole.

• To build two new nuclei, a membrane forms surrounding each set of chromosomes.

• The single-cell then pinches in the middle, separating into two daughter cells, each with a nucleus and a full set of chromosomes. Cytokinesis is the name for this process.

Q20. Answer: (b) 90°

Given:

sin A = 1/2 and cos B = 1/2

Formula used:

sin 30° = 1/2

cos 60° = 1/2

Calculation:

According to the question

sin A = 1/2 = 30°

cos B = 1/2 = 60°

Now,

=> (A + B) = (30° + 60°)

=> 90°

Therefore The required value is 90°

Q21. Answer: (d) CSIR

The correct answer is CSIR.

Key Points

• The Ministry of AYUSH and the Council of Scientific and Industrial Research (CSIR), New Delhi, signed a Memorandum of Understanding (MOU) for research and education in traditional systems of medicine and its integration with modern science.

• In the presence of top officials from both organisations, Vaidya Rajesh Kotecha, former secretary, Ministry of AYUSH, and Dr. Shekhar C. Mande, Director General, CSIR and Secretary, DSIR, signed the MoU.

• Previously, the CSIR and the Department of Ayush (now the Ministry) collaborated to create the Traditional Knowledge Digital Library (TKDL), a worldwide known proprietary database on Indian medical systems aimed at combating bio-piracy and misuse.

Additional Information

• AYUSH:

• AYUSH is an acronym for Ayurveda, Yoga and Naturopathy, Unani, Siddha, and Homeopathy.

• The Ministry of Ayush is a ministry of the Government of India, responsible for developing education, research, and propagation of indigenous and alternative medicine systems in India.

• The present Minister of AYUSH is Shri Sarbananda Sonowal.

• The Ministry of Ayush was formed on the 9th of November 2014.

• INSA:

• The Indian National Science Academy, based in New Delhi, is a national academy for Indian scientists working in all fields of science and technology.

• Dr. Chandrima Shaha was named president of the INSA in August 2019, making her the first woman to lead the INSA.

• It was founded on 7 January 1935.

• DRDO:

• The Defence Research and Development Organisation, located in Delhi, India, is the principal agency within the Ministry of Defence's Department of Defence Research and Development, which is responsible for the military's research and development.

• The year it was founded was 1958.

• The founder is Dr. APJ Abdul Kalam.

• Sameer V Kamat, Secretary, Department of Defence R&D and Chairman, DRDO, spearheads the indigenous development of defence systems and technologies.

• NITI Aayog:

• The National Institution for Transforming India, or NITI Aayog, was established on January 1, 2015, by a resolution of the Union Cabinet. The Government of India's top policy think tank, NITI Aayog, provides directional and policy suggestions.

• Shri Parmeswaran Iyer is the current CEO of the NITI Aayog.

• NITI Aaayog is based on the 7 pillars of effective governance – Pro-People, Pro-Activity, Participation, Empowering, Inclusion of

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all, Equality, and Transparency.

• CSIR:

• The Government of India founded the Council of Scientific and Industrial Research (CSIR) in September 1942 as an autonomous entity that has grown to become India's largest research and development organization.

• Nallathamby Kalaiselvi - Director-General of the Council of Scientific and Industrial Research (CSIR),

• The President of CSIR is Prime the Minister of India.

• The founder of CSIR is Shanti Swaroop Bhatnagar

• CSIR has a dynamic network of 38 National Research Laboratories which cover a wide spectrum of science and technology.

Q22. Answer: (d) MSLV

The correct answer is MSLV.

Key Points

• Launch vehicles or launch systems are used to transport spacecraft from the Earth's surface into space.

• To establish a sustainable orbit, a velocity of roughly Mach 25 or about 8 km/s is required.

• In 1964 during a test flight, NASA's largest launch vehicle, the Saturn SA-5, sent a record-breaking 19 tonnes into orbit. The first American Gemini flight, an unpiloted test that made four orbits and was successfully recovered, took place on April 8, 1964.

• The development of launch vehicles in India began in the early 1970s.

• In 1980, the first experimental Satellite Launch Vehicle (SLV-3) was built.

• In 1992, an augmented version of this, ASLV, was successfully introduced.

Additional Information

• The Satellite Launch Vehicle-3 (SLV-3):

• It was India’s first experimental satellite launch vehicle, which was an all solid, four-stage vehicle weighing 17 tonnes.

• It had a height of 22m and it was capable of placing 40 kg class payloads in Low Earth Orbit (LEO).

• The flight of SLV3, launch on July 18, 1980, from Sriharikota Range (SHAR), successfully placed Rohini satellite, RS-1, into orbit, thereby making India the sixth member of an exclusive club of space-faring.

• Augmented Satellite Launch Vehicle (ASLV):

• The Augmented Satellite Launch Spacecraft (ASLV) was created as a low-cost intermediate vehicle for demonstrating and validating key technologies.

• The 23.8 m tall ASLV was constructed as a five-stage, all-solid propellant vehicle with a mission of orbiting 150 kg class satellites into 400 km circular orbits, with a lift-off weight of 40 tonnes.

• Four developmental flights were carried out as part of the ASLV programme:

1. On March 24, 1987, the first developmental flight took place.

2. The second was on July 13, 1989.

3. On May 20, 1992, ASLV-D3 was successfully launched, with SROSS-C (106 kg) being placed into a 255 x 430 km orbit.

4. On May 4, 1994, ASLV-D4 orbited SROSS-C2, a 106-kilogram satellite. It operated for seven years and carried two payloads: the Gamma-Ray Burst (GRB) Experiment and the Retarding Potential Analyzer (RPA).

• Polar Satellite Launch Vehicle (PSLV):

• India's third-generation launch vehicle is the Polar Satellite Launch Vehicle (PSLV).

• It is the nation's first launch vehicle to have liquid stages.

• PSLV features four stages that cycle between solid and liquid propulsion technologies.

• PSLV's first successful launch was in October 1994, with 39 successful missions in a row by June 2017.

• Between 1994 and 2017, the vehicle launched 48 Indian spacecraft and 209 satellites for international customers.

• The vehicle was successful in launching two spacecraft — Chandrayaan-1 in 2008 and Mars Orbiter Spacecraft in 2013 – to the Moon and Mars, respectively.

• PSLV has acquired the nickname "ISRO's workhorse" for delivering various satellites to Low Earth Orbits, particularly the IRS series of satellites.

• Geosynchronous Satellite Launch Vehicle (GSLV):

• It is capable of launching 2-tonne satellites into Geosynchronous Transfer Orbit, such as the INSAT and GSAT series of communication satellites (GTO).

• The Geosynchronous Satellite Launch Vehicle Mark-II (GSLV Mk II) is India's largest and currently operational launch vehicle.

• The GSLV Mk-II is a fourth-generation launch vehicle capable of launching satellites with a lift-off mass of up to 2,500 kg to the GTO and up to 5,000 kg to the LEO.

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Q23. Answer: (d) CaCO3

The correct answer is CaCO3.

Key Points

• Limewater is an alkaline solution made from calcium hydroxide that is weakly soluble in water.

• The production of calcium carbonate occurs when carbon dioxide gas is passed through or over limewater.

• Carbon dioxide combines with limewater (a calcium hydroxide solution, Ca(OH)2) to generate a white calcium carbonate precipitate, CaCO3.

• When more carbon dioxide is added, the precipitate dissolves, forming a colourless calcium hydrogen carbonate solution.

Additional Information

• Ca(HCO3)2

• Calcium bicarbonate, also called calcium hydrogen carbonate, has the chemical formula Ca(HCO3)2.

• It is a white crystalline powder that is soluble in water.

• It is used as a food additive, as an anti-caking agent, and as a color stabilizer.

• Calcium bicarbonate causes the temporary hardness of the water.

• Calcium bicarbonate solution in water has health benefits due to the alkalizing effect and mineral content.

• CaO

• Calcium oxide (CaO), commonly known as quicklime or burnt lime, is a widely used chemical compound.

• It is a white, caustic, alkaline, crystalline solid at room temperature.

• It is widely used in industry, e.g., in making porcelain and glass; in purifying sugar; in preparing bleaching powder, calcium carbide, and calcium cyanamide; in water softeners; and in mortars and cement. In agriculture, it is used for treating acidic soils (liming).

• It is an amorphous white solid with a melting temperature of 2600 degrees Celsius.

• It's a compound that's extremely stable and can resist high temperatures.

• When it comes into contact with water, it becomes slaked lime.

• Calcium oxide is ionic because it is formed between a metal and non-metal.

• Ca(OH)2

• Calcium hydroxide is known as slaked lime or hydrated lime.

• Calcium oxide (also known as lime or quicklime) is blended or "slaked" with water to produce a colourless crystal or white powder.

• It can also be precipitated by combining an aqueous calcium chloride solution with an aqueous sodium hydroxide solution.

• A suspension of fine calcium hydroxide particles in water is called milk of lime.

• It turns milky if carbon dioxide is passed through, due to the precipitation of calcium carbonate.

Q24. Answer: (c) 4 8/13 days

Given:

Time taken by A to complete a work = 10 days

Time taken by B to complete a work = 15 days

Time taken by C to complete a work = 20 days

Formula used:

Work = Efficiency × Time

Calculation:

LCM of 10, 15 and 20 is 60

Efficiency of A = (60/10) = 6 unit/days

Efficiency of B = (60/15) = 4 unit/days

Efficiency of C = (60/20) = 3 unit/days

Time taken by A, B and C to complete the whole work = [60/(6 + 4 + 3)]

=> 60/13 days

=> 4 8/13 days

Therefore The required time is 4 8/13 days

Q25. Answer: (d) • 2x or 1/2x

Given:

tanθ = x - 1/4x

Formula used:

$\sec^2\theta = 1 + \tan^2\theta$

Calculation:

$\sec 2\theta = 1 + \tan 2\theta$

$\Rightarrow \sec^2\theta = 1 + (x - 1/4x)^2$

$\Rightarrow \sec^2\theta = 1 + x^2 + 1/16x^2 - 2 \times x \times 1/4x$

$\Rightarrow \sec^2\theta = 1 + x^2 + 1/16x^2 - 1/2$

$\Rightarrow \sec^2\theta = (1 - 1/2) + x^2 + 1/16x^2$

$\Rightarrow \sec^2\theta = (2 - 1)/2 + x^2 + 1/16x^2$

$\Rightarrow \sec^2\theta = 1/2 + x^2 + 1/16x^2$

$\Rightarrow \sec^2\theta = (x + 1/4x)^2$

$\Rightarrow \sec\theta = (x + 1/4x)$ or $-(x + 1/4x)$

Now,

$\sec\theta - \tan\theta$

On taking $\sec\theta = (x + 1/4x)$

$\Rightarrow x + 1/4x - (x - 1/4x)$

$\Rightarrow (x + 1/4x - x + 1/4x)$

$\Rightarrow (1/4x + 1/4x)$

$\Rightarrow 2/4x$

$\Rightarrow 1/2x$

Again,

On taking $\sec\theta = -(x + 1/4x)$

$\Rightarrow -(x - 1/4x) - (x - 1/4x)$

$\Rightarrow -x - 1/4x - x + 1/4x$

$\Rightarrow (-x - x)$

$\Rightarrow -2x$

Therefore The required value is - 2x or 1/2x

Q26. Answer: (c) Rengma

The correct answer is Rengma.

Key Points

• Nagaland consists of 16 (Sixteen) Administrative Districts, inhabited by 17 major tribes along with other sub-tribes.

• In Nagaland, the Konyak are the largest tribe, followed by the Ao, Tangkhul, Sema, and Angami. Lotha, Sangtam, Phom, Chang, Khiemnungam, Yimchungre, Zeliang, Chakhesang (Chokri), and Rengma are some of the other Naga tribes.

• Rengma Tribe:

• Rengma is a Naga tribe that lives in India's Nagaland and Assam states.

• Rengmas in Nagaland number 62,951 people, whereas Rengmas in Assam number roughly 22,000 people, according to the 2011 Indian Census.

• The Rengmas' headquarters in Nagaland is in Tseminyü District, whereas the Rengmas' headquarters in Assam is in Phentsero/Karenga Village.

• The Eastern Rengmas and the Western Rengmas are the two groups of Rengma Nagas.

• The Rengmas are terrace cultivation masters.

• The Rengmas' harvest festival is known as Ngada. The Ngada festival lasts eight days and symbolizes the end of the agricultural season. This harvest festival takes place near the end of November.

Additional Information

• Bonda Tribe:

• The Bonda are a Munda ethnic group who live in the isolated hill regions of southwestern Odisha's Malkangiri district, near the intersection of three states: Odisha, Chhattisgarh, and Andhra Pradesh.

• Dambaru Sisha took the oath of office as the first MLA from the Bonda tribe, which he descended from.

• Limbu Tribe:

• The Limbu or Yakthung is a Sino-Tibetan indigenous tribe (Bhot-Burmeli) of Eastern Nepal, Sikkim, and Western Bhutan in the Himalayan area.

• "Yakthung" or "Yakthum" is a derivative of Yaksha, according to ancient sources, and others translate it as "Yaksha winner."

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• It means "heroes of the hills" in the Limbu language which has a connection to the ancient Kiratis.
• Only Limbu village chiefs are awarded the title Subba by the Shah Kings.
• Pnar Tribe:
• The Pnar, also known as the Jaitia, is a Khasi sub-tribal group of Meghalaya, India.
• They speak the Pnar language, which is related to the Khasi language and belongs to the Austro-Asiatic language family.
• The Pnar are Meghalayans who live in the West Jaintia Hills and East Jaintia Hills districts.
• Their main festivals are Behdeinkhlam, Chad Sukra, Chad Pastieh and Laho Dance.

Q27. Answer: (a) Recitation

Given: Book : Reading :: Poetry : ?
The logic followed here is:
Reading is an occasion at which books are read to an audience.
• The books are read.
Similarly,
• Recitation is the repetition of a list of facts (poems).
Hence, recitation is the correct answer.

Q28. Answer: (a) Key

By checking options:
All latch, seal, and lock are used to fix or hold something up (lock).
Whereas,
Key is used to unlock something.
Hence, key is the odd one out.
Important PointsLatch: a metal bar with a catch and lever used for fastening a door or gate.

Q29. Answer: (b) The Doctrine of Lapse

The correct answer is The Doctrine of Lapse.
Key Points
• The Doctrine of lapse was a pro-imperialist strategy for expanding the British Kingdom's territory in India.
• Lord Dalhousie was the one who brought it up.
• The Doctrine equipped with an idea to annex those states which have no heir, get lapsed the right of ruling and it will not revert by adoption.
• The policy was not in favour of giving titles and pensions to monarchs' adopted children.
• The ruler's personal property would be passed down to the adopted heir.
• States that were annexed by Dalhousie by applying the ‘Doctrine of Lapse’ were - the States of Satara (1848 AD), Jaitpur (1849 AD), Sambhalpur (1849 AD), Bahat (1850 A.D), Udaipur (1852 AD), Jhansi (1853 AD) and Nagpur (1854 AD).
• Many people were incensed by this doctrine's "illegal" nature, which was one of the grounds of the Indian Revolt of 1857.
• The British faced issues with both Nana Sahib and the Rani of Jhansi, as the former's pension was discontinued once his foster father died, and the latter's adoptive son was denied the throne owing to the doctrine of lapse.
• After the Indian Revolt erupted in 1857, Dalhousie's leadership was severely criticized as one of the rebellion's causes.
Additional Information
• Rowlatt Act - The Anarchical and Revolutionary Crimes Act of 1919, popularly known as the Rowlatt Act, was a law that applied in British India. It was a legislative council act passed by the Imperial Legislative Council in Delhi on 18 March 1919, indefinitely extending the emergency measures of preventive indefinite detention, imprisonment without trial, and judicial review enacted in the Defence of India Act 1915 during the First World War.
• Policy of Subsidiary Alliance - Subsidiary Alliance was basically a treaty between the British East India Company and the Indian princely states, by virtue of which the Indian kingdoms lost their sovereignty to the English. It also was a major process that led to the building of the British Empire in India. It was framed by Lord Wellesley, the Governor-General of India from 1798 to 1805. It was actually used for the first time by the French Governor-General Marquis Dupleix. The Nawab of Awadh was the first ruler to enter into the subsidiary alliance with the British after the Battle of Buxar. However, the Nizam of Hyderabad was the first to accept a well-framed subsidiary alliance.
• Policy of Permanent Settlement - The zamindari system was introduced by Lord Cornwallis in 1793 through Permanent Settlement that fixed the land rights of the members in perpetuity without any provision for fixed rent or occupancy rights for actual cultivators. Under the Zamindari system, the land revenue was collected from the farmers by the intermediaries known as Zamindars. The share of the government in the total land revenue collected by the zamindars was kept at 10/11th, and the

remainder went to zamindars. The system was most prevalent in West Bengal, Bihar, Odisha, UP, Andhra Pradesh, and Madhya Pradesh.

Q30. Answer: (a) Vikas Krishan

The correct answer is Vikas Krishan.

Key Points

• Vikas Krishan Yadav is an Indian boxer from Haryana's Bhiwani area, which is home to some of the country's top boxers.

• At the 2010 Asian Games, he earned a gold medal in the Lightweight category.

• Vikas won a gold medal in the 2018 Commonwealth Games in Australia.

• He became the first Indian male boxer to win gold medals at both Asian and commonwealth games.

• In the Asian games 2018, he won bronze. He had to withdraw from further fights because of a serious eye injury.

• Vikas Krishan Yadav is the second Indian boxer to qualify for the Olympics for the third time, following Olympian Vijender Singh.

• He has been awarded Best Boxer, National Championships, New Delhi in 2010, and Arjuna Award in 2012.

Additional Information

• Naman Tanwar:

• Naman Tanwar is an Indian boxer who began his career in Bheem Stadium, Haryana, under the tutelage of Vishnu Bhagwan (Coach).

• In the Commonwealth Games in Gold Coast, Queensland, he earned a bronze medal.

• Manish Kaushik:

• Subedar Manish Kaushik is an Indian boxer who competes in the lightweight division.

• He is a Junior Commissioned Officer in the Indian Army (JCO).

• In his maiden international debut, Kaushik won the gold medal at the Doha International Boxing Tournament.

• At the 2017 National Boxing Games, Manish earned gold.

• Manish Kaushik went on to earn a silver medal for India at the 2018 Commonwealth Games.

• He represented India in the lightweight division at the 2020 Summer Olympics.

Q31. Answer: (c) Rs. 9600 and Rs. 14,400

Given:

Investment of A = Rs. 1,00,000

Investment of B = Rs. 1,50,000

Total profit = Rs. 24,000

Formula used:

Profit = Investment × time

Calculation:

Total investment of A and B = Rs. (1,00,000 + 1,50,000)

=> Rs. 2,50,000

Total profit = Rs. 24,000

Share of A = Rs. (1,00,000/2,50,000 × 24,000)

=> Rs, 9600

Share of B = Rs. (1,50,000/2,50,000 × 24,000)

=> Rs. 14,400

Therefore The required value is Rs. 9600 and Rs. 14,400

Q32. Answer: (a) 16

Given:

The median of the data in ascending order 7, 11, 12, (x – y), (x + y), 20, 21, 29 is 16

Formula used:

If n is odd

Median = (n + 1)/2^(th) terms

If n is even

Median = n/2^(th) term + [(n/2) + 1]^(th) term/2

Calculation:

The median of the data in ascending order 7, 11, 12, (x – y), (x + y), 20, 21, 29 is 16

Median = 16

Number of terms, n = 8, which is even

So,

Median = n/2th term + [(n/2) + 1]th term/2

=> 16 = (8/2) + [(8/2) + 1]/2

=> 16 = (4^(th) term + 5^(th) term)/2

=> 16 = (x – y + x + y)/2

=> 16 = 2x/2

=> 2x = 32

=> x = 16

Therefore The required value of x is 16

Q33. Answer: (c) Kyoto Protocol

The correct answer is Kyoto Protocol.

Key Points

• The Kyoto Protocol puts the United Nations Framework Convention on Climate Change into action by committing developed and developing countries to restrict and reduce greenhouse gas (GHG) emissions in accordance with agreed-upon individual targets.

• On December 11, 1997, the Kyoto Protocol was signed at the third session of the Conference of the Parties (COP 3) in Kyoto, Japan.

• It took effect on February 16, 2005, after a lengthy ratification procedure.

• The Kyoto Protocol now has 192 parties.

• The Kyoto Protocol's main characteristic is that it establishes binding objectives for decreasing greenhouse gas (GHG) emissions for 37 industrialised countries and the European Union.

• Over the five-year period 2008-2012, these increased by an average of 5% compared to 1990 levels.

• The targets cover emissions of the six main greenhouse gases:

• Carbon dioxide (CO2);

• Methane (CH4);

• Nitrous oxide (N2O);

• Hydrofluorocarbons (HFCs);

• Perfluorocarbons (PFCs); and

• Sulphur hexafluoride (SF6)

Additional Information

• The Montreal Protocol is an international treaty designed to protect the ozone layer by phasing out the production of numerous substances that are responsible for ozone depletion. It was agreed on 16 September 1987 and entered into force on 1 January 1989.

• The 1925 Geneva Protocol prohibits the use of chemical and biological weapons in war. The Protocol was drawn up and signed at a conference which was held in Geneva under the auspices of the League of Nations from 4 May to 17 June 1925, and it entered into force on 8 February 1928.

• The Bonn Agreement (officially the Agreement on Provisional Arrangements in Afghanistan Pending the Re-Establishment of Permanent Government Institutions) was the initial series of agreements passed on December 5, 2001 and intended to re-create the Islamic State of Afghanistan following the U.S. invasion of Afghanistan in response to the September 11, 2001, terrorist attacks.

Q34. Answer: (b) 240 km

Given:

Time taken by man to completes a journey = 10 hours

He travels the first half of the journey = 20 km/h

He travels the second half of the journey = 30 km/h

Calculation:

Let total distance be 2d km

According to the question

=> d/20 + d/30 = 10

=> (3d + 2d)/60 = 10

=> 5d/60 = 10

=> d/12 = 10

=> d = 120 km

Now,

The total distance = 2d = (2 × 120) km

=> 240 km

Therefore The total journey he travelled is 240 km

Q35. Answer: (a) China

The correct answer is China.

Key Points

• The total global wheat production in 2020 was 760 million tonnes.

• China, India, and Russia are the world's three greatest individual wheat producers, accounting for over 41% of global wheat production.

• Individually, the United States is the world's fourth-largest wheat producer.

• Wheat is the second most widely grown cereal grain after maize, and its global trade volume exceeds that of all other crops combined.

• Major wheat-growing states in India are Uttar Pradesh, Punjab, Haryana, Madhya Pradesh, Rajasthan, Bihar and Gujarat.

Additional Information

• Wheat is a principal rabi crop.

• Wheat plants have long, slender leaves and stems, as well as little flowers grown in spikelets.

• The portion of the plant taken for food is the seeds that develop on these spikelets.

• Wheat is the primary source of vegetable protein in human meals, with a protein level of around 13%.

• It is also a significant carbohydrate source.

• Depending on the climate and soil conditions, the crop takes between 110 and 130 days to mature from seed to harvest.

• The crop grows to be between 2 and 4 feet tall, with some kinds reaching up to 7 feet tall.

• Warmer temperatures (70° to 75° F) are ideal for growing the crop.

Q36. Answer: (d) 0.128 cm

Given:

A rainfall of 0.896 cm was recorded in 7 h.

Formula used:

Average = sum of observations/Number of observations

Calculation:

According to the question

Rainfall recorded in 7 hours = 0.896 cm

Now,

Average amount of rain per hour = (0.896/7) cm

=> 0.128 cm

Therefore The average amount of rain per hour is 0.128 cm

Q37. Answer: (d) 99960

Given:

The greatest number of five digits which is exactly divisibly by 6, 8, 12, 15 and 20.

Calculation:

LCM of 6, 8, 12, 15 and 20 is 120

Five digit largest number is 99999

Now,

=> 99999/120

=> 833.325

The correct number = (833 × 120)

=> 99960

Therefore The required number is 99960

Shortcut Trick

LCM = 2 × 2 × 2 × 3 × 5 = 120

As we know,

The greatest number of five digit = 99999

LCM of 6, 8, 12, 15 and 20 is 120

If we subtract 39 from 99999, then number become divisible by 120

=> 99999 – 39 = 99960

The greatest number of five digit that is exactly divisible by each of 6, 8, 12, 15 and 20.

Q38. Answer: (a) 7, 6, 85

Given: 3, 2, 13 / 5, 4, 41 /_, _, _.

The logic followed here is:

First number² + second number² = third number

First number - 1 = Second number

3, 2, 13 → $3^2 = 9$, $2^2 = 4$ → 9 + 4 = 13 and 3 - 1 = 2

5, 4, 41 → $5^2 = 25$, $4^2 = 16$ → 25 + 16 = 41 and 5 - 1 = 4

Similarly, by checking options:

(1) 7, 6, 85 → $7^2 = 49$, $6^2 = 36$ → 49 + 36 = 85 and 7 - 1 = 6

(2) 8, 7, 105 → $8^2 = 64$, $7^2 = 49$ → 64 + 49 = 113 ≠ 105

(3) 6, 7, 85 → $6^2 = 36$, $7^2 = 49$ → 36 + 49 = 85 but 6 - 1 = 5 ≠ 7

(4) 7, 8, 105 → $7^2 = 49$, $8^2 = 64$ → 49 + 64 = 113 ≠ 105

Hence, "7, 6, 85" is the correct answer.

Q39. Answer: (d) 1.2933...

Given:

√15 = 3.88

Calculation:

√5/3 = √5/(√3) × √3/(√3) [multiplying the numerator and denominator by √3]

=> √15/3

=> 3.88/3

=> 1.2933333

=> 1.2933...

Therefore The required value is 1.2933...

Q40. Answer: (d) Bhasa

The correct answer is Bhasa.

Key Points

• Predating Kalidasa, Bhasa is one of the earliest and most well-known Sanskrit playwrights in India.

• His name was already well-known by the 1st century BCE, and he most likely lived during the late Mauryan period (322-184 BCE).

• His plays had been lost for decades until Ganapati Shastri, an Indian scholar, found the manuscripts in 1913.

• Svapnavasavadattam is a six-act Sanskrit play written by Bhasa, an ancient Indian poet.

• It is a continuation of his prior drama, Pratijnayaugandharayana, in context.

Additional Information

• Shudraka:

• He was an Indian playwright who wrote three Sanskrit plays: Mrichchhakatika (The Little Clay Cart), Vinavasavadatta, and a Bhana (short one-act monologue), Padmaprabhritaka.

• He was a king, according to the prologue of Mrichchhakatika; one idea suggests he was an Abhira ruler from the third century.

• Jayadev:

• He was a Sanskrit poet during the 12th century.

• He is best known for his epic poem Gita Govinda, which focuses on Krishna's love for Radha, a gopi, at a spring rite.

• Jayadeva is the oldest known author of hymns found in the Guru Granth Sahib.

• Kalidas:

• Kalidasa was a Classical Sanskrit author who is often regarded as the greatest poet and playwright of ancient India.

• His plays and poetry are primarily based on the Vedas, the Rāmāyana, the Mahābhārata, and the Purānas.

Q41. Answer: (a) J

J, Q, B, Z when arranged in alphabetical order: B, J, Q, Z

Thus, we get the following points table:

Friends	B	J	Q	Z
Round 1	3	2	5	2
Round 2	1	5	1	4
Round 3	4	2	1	1

1. Points of B = (3 + 1 + 4) × 10 = 8 × 10 = 80
2. Points of J = (2 + 5 + 2) × 10 = 9 × 10 = 90 = maximum points
3. Points of Q = (5 + 1 + 1) × 10 = 7 × 10 = 70
4. Points of Z = (2 + 4 + 1) × 10 = 7 × 10 = 70

Hence, J is the correct answer.

Q42. Answer: (d) Article 32

The correct answer is Article 32.

Key Points

• Article 32:

• Article 32 deals with the 'Right to Constitutional Remedies' or affirms the right to move the Supreme Court by appropriate proceedings for the enforcement of the rights conferred in Part III of the Constitution.

• It states that the Supreme Court "shall have the power to issue directions or orders or writs, including writs in the nature of habeas corpus, mandamus, prohibition, quo warranto, and certiorari, whichever may be appropriate, for the enforcement of any of the rights conferred by this Part".

• The right guaranteed by this Article "shall not be suspended except as otherwise provided for by this Constitution".

• Article 30:

• All minorities, whether based on religion or language, shall have the right to establish and administer educational institutions of their choice.

• In making any law providing for the compulsory acquisition of any property of an educational institution established and administered by a minority referred to in clause (1), the State shall ensure that the amount fixed by or determined under such law for the acquisition of such property is such as would not restrict or abrogate the right guaranteed under that clause.

• The State shall not, in granting aid to educational institutions, discriminate against any educational institution on the ground that it is under the management of a minority, whether based on religion or language.

• Article 44:

• The State shall endeavour to secure for the citizens a uniform civil code throughout the territory of India.

• Article 139:

• Parliament may by law confer on the Supreme Court power to issue directions, orders, or writs, including writs in the nature of habeas corpus, mandamus, prohibition, quo warranto, and certiorari, or any of them, for any purposes other than those mentioned in clause (2) of Article 32.

Q43. Answer: (a) Alapana

The correct answer is Alapana.

Key Points

• Hindustani classical music is the classical music of the Indian subcontinent's northern regions.

• It's also known as Shastriya sangeet or North Indian classical music.

• Its roots can be traced back to the 12th century CE when it split from Carnatic music, the southern classical tradition.

• Dhrupad, Khyal, and Tarana are the three major vocal genres or styles associated with Hindustani classical music.

• Dhamar, Trivat, Chaiti, Kajari, Tappa, Tap-Khyal, Ashtapadis, Thumri, Dadra, Ghazal, and Bhajan are light classical genres that do not follow the strict principles of classical music.

• Tansen is widely regarded as the founder of Hindustani music.

• Alapana:

• The exposition of a raga or tone is known as alapana or ragam.

• It is the first element of Ragam Tanam Pallavi (RTP), which demonstrates a Carnatic musician's ability to comprehend a raga

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and compose music to accompany it.

Additional Information

• Thumri:

• Thumri is the most famous light-classical music form in North India, founded at the court of Lucknow's king Wajid Ali Shah in the 19th century.

• It has strong ties to kathak, the principal classical dance form of North India, of which the Shah was a leading exponent.

• The word "thumri" comes from the Hindi verb thumuknaa, which means "to walk with a dancing gait in such a way that the ankle-bells tinkle."

• Dhrupad:

• It is the oldest known style of major vocal style associated with Hindustani classical music, Haveli Sangeet of Pushtimarg Sampraday, and is also related to the South Indian Carnatic tradition.

• Apart from the Dagar tradition, the Darbhanga tradition is one of the two primary living Dhrupad Gharanas.

• Dhrupad's Darbhanga gharana is represented by the Mallik family.

• The founders of the tradition are Radha Krishna and Karta Ram, the court musicians for the Nawab of Darbhanga.

• The primary instrument used for dhrupad has been the Rudra Veena, but the surbahar and the Sursringar are also used.

• Tappa:

• Tappa is a type of semi-classical Indian vocal music.

• Its specialty is a rapid, nuanced, and knotty composition with a rolling rhythm.

• Its melodies are beautiful and pleasant, and they portray a lover's emotional outbursts.

• Tappe were usually sung in royal courts by songstresses known as Baigees.

• Shori Mian, also known as Mian Ghulam Nabi Shori, was an Indian Hindustani classical music composer who lived from 1742 to 1792.

• Asaf-Ud-Dowlah, Nawab of Awadh, employed him as a court singer. In Punjab, he composed tappa, one of the most difficult classical genres.

Q44. Answer: (d) 30

Given:

The LCM of two numbers is the 20th multiple of 3

HCF = 6

one number = 12

Formula used:

LCM × HCF = one number × second number

Calculation:

Let the second number be x

The LCM of two numbers is the 20th multiple of 3

=> LCM = (3 × 20) = 60

Now,

LCM × HCF = one number × second number

=> 60 × 6 = 12 × x

=> 360 = 12x

=> x = 30

Therefore The second number is 30

Q45. Answer: (c) 1

Given:

The number = 12, 20, 3, 14, 5, 8, and 15

Formula used:

If n is odd

Median = (n + 1)/2th terms

If n is even

Median = n/2th term + [(n/2) + 1]th term/2

Mean = sum of observations/Number of observations

Calculation:

Arrange the data in ascending order

=> 3, 5, 8, 12, 14, 15, 20

Number of terms, (n)= 7, which is odd

So,

Median = (n + 1)/2th terms

=> (7 + 1)/2 th terms

=> (8/2) th terms

=> 4th terms

=> Median = 12

Now,

Mean = sum of observations/Number of observations

=> (3 + 5 + 8 + 12 + 14 + 15 + 20)/7

=> 77/7

=> 11

Mean = 11

Now,

The difference between the median and the mean = (12 – 11)

=> 1

Therefore The required value is 1

Q46. Answer: (b) 6 m

Given:

L = (3x + 10) m

B = (2x + 5) m

Area of 4 walls = (60x + 180)

Formula used:

Area of 4 walls = 2(L + B) × h

Calculation:

According to the question

Area of 4 walls = 2(L + B) × h

=> (60x + 180) = 2(3x + 10 + 2x + 5) × h

=> (60x + 180) = 2(5x + 15) × h

=> (60x + 180) = (10x + 30) × h

=> 10(6x + 18) = 10(x + 3) × h

=> h = 6(x + 3)/(x + 3)

=> h = 6 m

Therefore The height of the room is 6 m

Q47. Answer: (c) Sugar

The correct answer is Sugar.

Key Points

• In India, there are eight sectors that are considered the core sectors.

• Electricity, steel, refinery products, crude oil, coal, cement, natural gas, and fertilisers are the Indian economy's eight core industries.

• The eight industries account for 40.27 percent of the Index of Industrial Production (IIP).

• The Index of Industrial Production (IIP) is an index that depicts the growth rates of various industry groupings in the economy over a given time period.

• The Central Statistical Organisation (CSO) calculates and publishes the IIP index on a monthly basis.

• Base Year for IIP is 2011-2012.

• IIP is utilised for policy-making by government agencies such as the Ministry of Finance, the Reserve Bank of India, and others.

• IIP is still very important for calculating GDP (Gross Domestic Product) estimates on a quarterly and advance basis.

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Q48. Answer: (b) 2x + √5y = 9 2x - √5y = 9

Given:

Equation of the circle = $x^2 + y^2 = 9$

Tangent passes through the point on the circle where x = 2

Concept used:

Slope = (y2 – y1)/(x2 – x1)

If two lines are perpendicular then the product of their slope = -1

Calculation:

As tangent passes through (2, y), as this point lie on the circle

Then it will satisfy the equation of the circle $x^2 + y^2 = 9$

=> $2^2 + y^2 = 9$

=> $4 + y^2 = 9$

=> $y^2 = 5$

=> y = +√5 or -√5

Now,

Slope of radius = (y2 – y1)/(x2 – x1) = (√5 – 0)/(2 – 0) = √5/2

Slope of radius = (y2 – y1)/(x2 – x1) = (-√5 – 0)/(2 – 0) = -√5/2

Slope of tangent × Slope of radius = -1

Slope of tangent (m1) = -1/√5/2

=> (-2)/(√ 5)

Slope of tangent (m2) = -1/-√5/2

=> 2/(√ 5)

Equation of tangent

=> y – y1 = m(x – x1)

=> y – √5 = (-2)/(√ 5) (x – 2) [on putting m = m1]

=> √5y – 5 = -2x + 4

=> 2x + √5y = 9

Again,

=> y – y1 = m(x – x1)

=> y – (-√5) = 2/(√ 5) (x – 2) [on putting m = m2]

=> y + √5 = 2/(√ 5) (x – 2)

=> √5y + 5 = 2x – 4

=> 2x – √5y = 9

Therefore The required value is 2x + √5y = 9 and 2x - √5y = 9

Q49. Answer: (c) Article 169

The correct answer is Article 169.

Key Points

• Article 169:

• Parliament may by law provide for the abolition of the Legislative Council of a State having such a Council or for the creation of such a Council in a State having no such Council if the Legislative Assembly of the State passes a resolution to that effect by a majority of the total membership of the Assembly and by a majority of not less than two-thirds of the members of the Assembly present and voting.

• Article 216:

• Constitution of High Courts: Every High Court shall consist of a Chief Justice and such other Judges as the President may from time to time deem it necessary to appoint.

• Article 151:

• Audit Reports: The reports of the Comptroller and Auditor-General of India relating to the accounts of the Union shall be submitted to the president, who shall cause them to be laid before each House of Parliament.

• The reports of the Comptroller and Auditor-General of India relating to the accounts of a State shall be submitted to the Governor of the State, who shall cause them to be laid before the Legislature of the State.

• Article 195:

• Members of the Legislative Assembly and the Legislative Council of a State shall be entitled to receive such salaries and

allowances as may from time to time be determined, by the Legislature of the State by law and, until provision in that respect is so made, salaries and allowances at such rates and upon such conditions as were immediately before the commencement of this Constitution applicable in the case of members of the Legislative Assembly of the corresponding Province.

Q50. Answer: (a) Lord Canning

The correct answer is Lord Canning.

Key Points

• In 1856, Lord Canning succeeded Lord Dalhousie as Governor-General of India.

• From 1856 to 1862, Lord Canning was the Governor General of India.

• During his reign, the Government of India Act of 1858 was passed, establishing the post of Viceroy, which was to be held by the same person who held the position of Governor-General of India.

• As a result, Lord Canning also served as India's first Viceroy.

• The Revolt of 1857 began when Lord Canning was just in his second year as Governor-General of India. As a result, he had to deal with it and make every attempt to conquer it.

Additional Information

• Lord Elgin:

• Thomas Bruce, 7th Earl of Elgin, was a British diplomat and art collector who is most known for acquiring the "Elgin Marbles," a collection of Greek sculptures.

• When Lord Elgin was named Viceroy in 1894, he was given the titles of Knight Grand Commander of the Order of the Star of India (GCSI) and Knight Grand Commander of the Order of the Indian Empire (GCIE).

• On his return to the United Kingdom in 1899, he was made a Knight of the Order of the Garter (KG).

• The Parthenon Marbles were stolen from Greece by Lord Elgin in 1801.

• On July 31, 1801, a shipwright, five crew men, and twenty Athenian labourers "climbed the walls" of the Parthenon and removed one of Greece's most important pieces of history, precious artefacts in the early morning light.

• Lord Cornwallis:

• Charles Cornwallis, 1st Marquess Cornwallis was appointed Governor-General of Fort William (Bengal) and Commander-in-Chief of British India on September 12, 1786.

• Warren Hastings established the civil service during the British Raj, while Charles Cornwallis restructured, modernised, and rationalised it.

• As a result, Charles Cornwallis is renowned as the "Father of Indian Civil Service."

• Cornwallis divided the Indian Civil Service into two categories: covenanted and uncovenanted.

• He took part in the negotiations that led to the Treaty of Amiens in 1802.

• Cornwallis was reappointed as Governor-General of India by King George III, but he died on October 5, 1805, at the age of 67, not long after his arrival. He is buried on the banks of the Ganges River in India.

• Lord Ripon:

• Under Gladstone's tenure, Lord Ripon (George Frederick Samuel Robinson, 1st Marquess of Ripon) served as Viceroy of India.

• Despite the fact that he is known in India as a Gladstone agent, he has proven to be a libertarian and a good administrator.

• Lord Ripon is credited with giving the Indians their first taste of freedom in 1882 when he established the Local Self Government.

• His scheme of local self-government developed the Municipal institutions which had been growing up in the country ever since India was occupied by the British Crown.

• Thus, Lord Ripon is regarded as the "Father of Local Self-Government."

Q51. Answer: (a) GSAT-31

The correct answer is GSAT-31.

Key Points

• GSAT-31, India's 40th communication satellite, was successfully launched into orbit by an Arianespace Ariane 5 rocket from the Kourou launch site in French Guiana.

• The GSAT-31, weighing 2,535 kg, would boost Ku-band transponder capacity in geostationary orbit.

• GSAT-31, which has a 15-year mission life, will serve VSAT networks, television uplinks, digital satellite news gathering, DTH television services, cellular backhaul connectivity, and other applications.

• The GSAT-31 will ensure that operational services of some in-orbit satellites are not disrupted.

• The two Ku-band beacon downlink signals are transmitted by the satellite for ground tracking purposes.

Q52. Answer: (c) 58.32 litres

Given:

A container contains 80 litres of milk.

8 litres of milk is taken out and replaced by water

8 litres of this mixture is now taken out and again replaced with water

This process is repeated once more

Formula used:

Amount of milk present in the mixture = $(1 – x/y)^n \times y$

Where, n = number of repeats

x = Amount to be replaced at a time

y = Total amount of milk

Calculation:

According to the question

Amount of milk present in the mixture = (1 – x/y)n × y

=> $(1 – 8/80)^3 \times 80$

=> $(72/80)^3 \times 80$

=> $(9/10)^3 \times 80$

=> (9/10 × 9/10 × 9/10 × 80)

=> (9 × 9 × 9 × 8)/100

=> 5,832/100

=> 58.32 litres

Therefore The required amount of milk content in the mixture is 58.32 litres

Q53. Answer: (c) Zambezi

The correct answer is Zambezi.

Key Points

• Victoria Falls is a beautiful waterfall located about halfway along the Zambezi River's course, on the border between Zambia and Zimbabwe to the north and south.

• 'Mosi-oa-Tunya' – 'The Smoke that Thunders' – was the name given to it by the Kololo tribe who lived in the area in the 1800s.

• In today's words, Victoria Falls is known as the world's largest curtain of falling water.

• The wide, basalt cliff over which the falls thunder, transforms the Zambezi from a placid river into a ferocious torrent cutting through a series of dramatic gorges.

Additional Information

• Africa is the second-largest continent after Asia and nine times the size of India.

• Africa belongs to all the four hemispheres and the bulk of the continent lies in the tropics.

• The Tropic of Cancer, the Equator, and the Tropic of Capricorn passes through it.

• The Strait of Gibraltar, Mediterranean Sea, Suez Canal, Red Sea, and the Arabian Sea separate it from Asia and Europe.

• Mt. Kilimanjaro and Mt. Kenya is the highest mountain peak in Africa. These two peaks are volcanic mountains.

• Nile, Limpopo, Niger, Senegal, Congo, Orange, and the Zambezi are the major rivers.

• Africa is home to the Nile River, the world's longest river. Its origin is Lake Victoria, and it empties into the Mediterranean Sea.

• The Congo River (also known as the Zaire River) is the second longest river in Africa.

• Victoria is Africa's largest lake. It is passed by the Equator.

• Rice, wheat, maize, sorghum, pearl millet, and finger millet are the most important food crops.

• Oil palm, groundnut, cocoa, coffee, cotton, and sisal are among the major cash crops.

• There are six different time zones and thirteen different names for them.

• Africa has 54 countries, according to the United Nations.

Q54. Answer: (a) Galvanometer

The correct answer is Galvanometer.

Key Points

• A galvanometer is a device that can detect and measure very tiny currents in an electrical circuit.

• A galvanometer is made up of a needle attached to a coil that is free to pivot within a magnetic field formed by the poles of one or more permanent magnets.

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• A moving coil galvanometer works on the principle of a torque being experienced by a current-carrying coil positioned in a magnetic field.

• The radial field and coil springs ensure that the deflection is proportional to the current strength.

• The sensitivity (i.e. current sensitivity) of a galvanometer is defined as the angle of deflection per unit current flowing through it.

• I = k n A B θ where θ is the angle of deflection, N is its turns, A is the area, B is magnetic induction & k is the couple per unit twist.

Additional Information

• Ammeter:

• An ammeter is a measuring instrument that is used to determine the amount of electricity flowing through a circuit.

• The resistance of an ammeter is low.

• To measure the electric current flowing through the load, the ammeter is linked in series with it.

• The principle of ammeter is that the resistance and inductive reactance must be very low.

• The ammeter has a very low impedance as the voltage drop across the ammeter should be low. The ammeter cannot be connected in parallel because of the above-mentioned reason.

• V = IR, where V is the potential difference across a resistance R through which a current I is flowing.

• Rheostat:

• A rheostat is an adjustable resistor that is used in applications that demand current modification or resistance variation in an electric circuit.

• The rheostat may control the speed of motors, modify generator characteristics, and dim lights.

• Ohm's law governs the functioning of a rheostat.

• At a certain temperature, Ohm's law asserts that current in a circuit is inversely proportional to resistance.

• The rheostat was designed by Sir Charles Wheatstone, who used a long tube with coiled wires around it and an adjustable slider.

• Voltmeter:

• A voltmeter is a device that detects the electrical potential difference between two points in a circuit.

• A basic analog voltmeter consists of a sensitive galvanometer (current meter) in series with high resistance.

• A voltmeter's internal resistance must be high. Otherwise, it will draw a substantial amount of current, causing the circuit under test to malfunction.

• The range of voltages that the metre can display is determined by the sensitivity of the galvanometer and the value of the series resistance.

Q55. Answer: (d) 8

Given:

The degree of polynomial 9 x5y2zr is 15

Calculation:

The degree of polynomial 9 x5y2zr is 15

=> (5 + 2 + r) = 15

=> 7 + r = 15

=> r = (15 – 7)

=> r = 8

Therefore The required value of r is 8

Q56. Answer: (d) 125%

Given:

CP of 3 bananas = Rs 2

SP of 2 bananas = Rs. 3

Formula used:

Gain = SP – CP

Gain% = Gain/CP × 100

Calculation:

CP of 3 bananas = Rs 2

CP of 1 banana = Rs. 2/3

SP of 2 bananas = Rs. 3

SP of 1 banana = Rs. 3/2

Now,

Gain = Rs. (3/2 – 2/3)

=> (9 – 4)/6

=> 5/6

Now,

Gain% = [(5/6)/(2/3) × 100]

=> (5/6 × 3/2 × 100)

=> (5 × 25)%

=> 125%

Therefore The percentage gain is 125%

Q57. Answer: (c) Secondary storage

The correct answer is Secondary storage.

Key Points

• A storage device is a component of a computer system that stores the data and instructions that will be processed.
• It can also temporarily and permanently store data and information.
• There are two types of computer storage:
• Primary Storage Devices: Internal memory and main memory are other names for it.
• The programme instructions, input data, and intermediate results are all stored in this portion of the CPU.
• It's usually a smaller size.
• Primary storage includes RAM (Random Access Memory) and ROM (Read Only Memory).
• Secondary Storage Devices:
• Secondary storage refers to memory that is kept outside of the computer.
• It is mostly used for long-term and permanent storage of programmes and data.
• Hard discs, CDs, DVDs, Pen/Flash drives, SSDs, and other storage devices are examples.

Additional Information

• RAM:
• It stands for Random Access Memory.
• It's used to store information that will be used right away, or we may call it a temporary memory.
• Computers load software from a hard disc into RAM so that it can be processed and used by the user.
• ROM:
• It stands for Read-Only Memory.
• The data written or saved in these devices is non-volatile, which means it can't be changed or removed once it's in the memory.
• It is the memory from which you can only read but not write. This is a non-volatile form of memory.
• The data is only saved once during the manufacturing process.
• The instructions for starting a computer are stored in the ROM.
• This operation is referred to as bootstrap.
• It is also used in other electronic items like washers and microwaves.
• Hard Drive:
• A hard disc drive (HDD) is a non-volatile computer storage device that consists of rotating magnetic discs or platters.
• It is a secondary storage device used to store data permanently.
• The term "non-volatile" refers to data that is kept even when the computer is shut off.

Q58. Answer: (a) Command Line Interface

The correct answer is Command Line Interface.

Key Points

• The command line interface (CLI) is a text-based interface that allows users to respond to visual prompts by putting single commands into the interface and receiving a response in the same manner.
• The command line interface (CLI) is not the same as the graphical user interface (GUI) used in today's operating systems.
• The teletypewriter machine was the first to use CLI. Batched processing was used in this system.
• CLI, batch processing, and GUI are all available in one interface on modern systems.

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• The command prompt, which is a sequence of characters used in the user interface, or shell, is another component of CLI. The command prompt informs users that the CLI is ready to take commands.

• MS-DOS is the best example of CLI.

Additional Information

• Graphical user interface (GUI)

• A graphical user interface (GUI) is a user interface that uses icons, menus, and other visual indicators or representations to allow users to interact with electronic devices such as computers and smartphones (graphics).

• Unlike text-based interfaces, where data and commands are purely in text, GUIs graphically show information and corresponding user controls.

• A pointing device, such as a mouse, trackball, stylus, or a finger on a touch screen, is used to manipulate GUI representations.

Q59. Answer: (c) Exercise

Given: Restaurant : Eat :: Gym : ?

The logic followed here is:

A restaurant is a place where people pay to sit and eat meals that are cooked and served on the premises.

Similarly,

A gym is a sports facility specialized for lifting weights and exercise.

Hence, Exercise is the correct answer.

Q60. Answer: (d) 10%

Given:

CP of 6 bananas = Rs 10

SP of 4 bananas = Rs. 6

Formula used:

Loss = CP – SP

Loss% = Loss/CP × 100

Calculation:

CP of 6 bananas = Rs 10

CP of 1 banana = Rs. 10/6

=> 5/3

SP of 4 bananas = Rs. 6

SP of 1 banana = Rs. 6/4

=> 3/2

Now,

Loss = Rs. (5/3 – 3/2)

=> (10 – 9)/6

=> 1/6

Now,

Loss% = [(1/6)/(5/3) × 100]

=> (1/6 × 3/5 × 100)

=> 10%

Therefore The percentage loss is 10%

Q61. Answer: (c) 90900

Given:

The sum of the place values of 9 in 96961

Calculation:

The sum of the place values of 9 in 96961

=> 90000 + 900

=> 90900

Therefore The required value is 90900

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Q62. Answer: (b) Anterior lobe of pituitary gland

The correct answer is Anterior lobe of pituitary gland.

Key Points

• The anterior pituitary is the front lobe of your pituitary gland, a small, pea-sized organ found beneath your hypothalamus at the base of your brain.

• Your pituitary gland is an endocrine gland that regulates the operation of several other endocrine glands.

• The anterior (front) lobe and posterior (back) lobe make up your pituitary gland.

• The anterior pituitary gland produces and releases a total of six hormones that govern a variety of cellular functions, including: growth, metabolic rate, reproduction, the body's reaction to stress or trauma and lactation.

• Your pituitary gland has a total diameter of roughly 1/3 of an inch, or about the size of a pea.

• The anterior pituitary is larger than the posterior pituitary and makes up roughly 80% of your pituitary gland's overall weight.

• Six major hormones produced and released (secreted) by the anterior pituitary:

• Adrenocorticotropic hormone (ACTH, or corticotropin) is a hormone produced by the adrenal glands. Your adrenal glands (the glands on top of your kidneys) are stimulated to generate cortisol and other hormones by this hormone.

• Follicle-stimulating hormone (FSH) is a hormone that stimulates the production of sperm in the testes and eggs and oestrogen in the ovaries.

• Luteinizing hormone (LH) encourages women to ovulate and men to produce testosterone.

• Growth hormone (GH) is a hormone that promotes growth in children. Growth hormone aids in the maintenance of healthy muscles and bones in adults, as well as influencing fat distribution.

• Prolactin is a hormone that increases the production of breast milk after a baby is born and can impact menstrual cycles, fertility.

• Thyroid-stimulating hormone (TSH) causes your thyroid to create hormones that control your metabolism, energy, and nervous system.

Q63. Answer: (d) Chennai Mofussil Bus Terminus in Chennai

The correct answer is Chennai Mofussil Bus Terminus in Chennai.

Key Points

• The Chennai Mofussil Bus Terminus (CMBT) is a bus terminal in Chennai, India, that offers inter-state bus services.

• It's between SAF Games Village and the Koyambedu Vegetable Market on the 100-foot (30-meter) inner-ring road (Jawaharlal Nehru Road) in Koyambedu.

• It is Asia's largest bus terminal.

• It is also India's second-largest bus depot, behind Delhi's Millennium Park Bus Depot.

• Since 2015, Chennai Metro Rail has operated a coach depot behind the bus terminal.

Additional Information

• The Governor of Tamil Nadu is Mr. R. N. Ravi and Chief Minister is M. K. Stalin.

• Tamil culture and tradition are inextricably linked to Jallikattu. For centuries, the sport of taming the bull has been organized and played. Special Bos indicus bulls are produced and used for the festival.

• Pongal is a harvest festival held in Chennai and is one of India's most popular holidays. It is a four-day fair during which farmers pray to God for a prosperous harvest.

• Bharatnatyam is the popular traditional dance of the state.

• Kolattam, Karagam, and Mayilattam are famous folk dances.

• Nuclear Power Stations in Tamil Nadu are Madras Atomic Power Station, Kalpakkam, and Kudankulam Nuclear Power Plant, Kudankulam.

• With many factories and numerous ports, Tamil is also one of the most industrialized states in India.

• Tamil has three major ports (Chennai, Ennore, and Tuticorin) — more than any other Indian state.

• Mudumalai National Park and Wildlife Sanctuary is a thick forest reserve that is home to Indian elephants, Bengal tigers, and Indian leopards.

• Tamil Nadu is home to over 30,000 Hindu temples, and many of them are centuries old. The Madurai Meenakshi Amman Temple is one of the most famous.

• Many minerals — including lignite, limestone, magnesite, mica, quartz, felspar, bauxite, and gypsum — are found in Tamil Nadu.

• Tamil Nadu is also an agricultural state. It’s the largest producer of bananas, turmeric, flowers, and tapioca in India. It’s also a major producer of mango, coconut, groundnut, coffee, and sugarcane.

Q64. Answer: (a) 72

Given: 28 : 66 :: 31 : ?

28 : 66

=> 28 × 3 – (28 – 10)

=> 84 – 18

=> 66

Similarly,

31 : ?

=> 31 × 3 – (31 – 10)

=> 93 – 21

=> 72

Therefore The required number is 72.

Q65. Answer: (c) 120 days

Given:

Time taken by A to complete a work = 40 days

Time taken by A and B to complete the work together = 30 days

Formula used:

Work = Efficiency × Time

Calculation:

LCM of 40 and 30 is 120

Efficiency of A = (120/40) = 3 unit/days

Efficiency of A and B = (120/30) = 4 unit/days

Now,

Time taken by B alone to complete the work = [120/(4 – 3)]

=> 120/1

=> 120 days

Therefore The required time taken by B is 120 days

Q66. Answer: (d) MGNREGA

The correct answer is MGNREGA.

Key Points

• The Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), also known as Mahatma Gandhi National Rural Employment Guarantee Scheme (MNREGS) is Indian legislation enacted on August 25, 2005.

• The Act's focus was to enhance livelihood stability in rural areas by ensuring that every household with adult members who volunteer to do unskilled manual labour receives at least 100 days of guaranteed pay employment in a fiscal year.

• The Act was first notified in 200 districts on February 2nd, 2006, and then extended to an additional 130 districts in the 2007-2008 fiscal year. With effect from April 1, 2008, the remaining districts have been notified under the MGNREGA.

• If employment is not provided within 15 days of an application for work, daily unemployment benefits must be paid in accordance with the Act.

• The states are responsible for the provision of unemployment benefits.

• Work should normally be available within a 5-kilometer radius of the village.

• If work is provided beyond 5 kilometres, an additional 10% compensation is payable to cover additional transportation and living expenses.

• Wages for agricultural labourers in the state are to be paid in accordance with the Minimum Wages Act 1948 unless the Centre issues a wage rate that is not less than Rs. 60 per day. Equal pay for men and women will be granted.

• Gram Panchayats will be responsible for completing at least half of the projects.

• Water and soil conservation, afforestation, and land development are all examples of permissible works.

• A pay and material ratio of 60:40 must be maintained. Contractors and machines are not permitted.

• The Central Government pays 100% of the wages for unskilled physical labour and 75% of the material costs, which includes wages for trained and semi-skilled personnel.

Additional Information

• The National Rural Health Mission (NRHM) was launched by the Hon’ble Prime Minister on 12th April 2005, to provide accessible, affordable and quality health care to the rural population, especially the vulnerable groups. The Union Cabinet vide its decision dated 1st May 2013, has approved the launch of National Urban Health Mission (NUHM) as a Sub-mission of an over-arching National Health Mission (NHM), with National Rural Health Mission (NRHM) being the other Sub-mission of National Health Mission.

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• Pradhan Mantri Kaushal Vikas Yojana (PMKVY) is the flagship scheme of the Ministry of Skill Development & Entrepreneurship (MSDE) implemented by National Skill Development Corporation. The objective of this Skill Certification Scheme is to enable a large number of Indian youth to take up industry-relevant skill training that will help them in securing a better livelihood. Individuals with prior learning experience or skills will also be assessed and certified under Recognition of Prior Learning (RPL). It was launched in 2015.

• The Jawaharlal Nehru National Urban Renewal Mission (JNNURM), launched on December 3rd 2005 is the largest national urban initiative to encourage reforms and fast track planned development of 63 identified cities. Focus is to be on efficiency in urban infrastructure and service delivery mechanisms, community participation and accountability of ULB's/Parastatal agencies towards citizens. It consists of two submissions – "Urban Infrastructure & Governance", and "Basic Services to the Urban Poor".

Q67. Answer: (a) Delhi Sultanate

The correct answer is Delhi Sultanate.

Key Points

• The Kakatiya dynasty was a well-known dynasty in Telugu or Andhra Pradesh.

• According to Vidyanadha's "Prataparudra Yashobhushanam," the Kakatiyas earned their name because they adored the goddess "Kakati."

• Earlier, the rulers like Betaraja I, Prolaraja I, Betaraja II and Durgaraja were the feudatories of the Western Chalukyas of Kalyana.

• Kakatiya Dynasty was created as a sovereign dynasty by Prola II.

• Ganapati was the most powerful of the Kakatiyas and the first after the Satavahanas to unite the Telugu region.

• In 1210 AD, he put a stop to the Velanati Cholas' rule.

• He compelled the Telugu Cholas of Vikramasimhapura to submit to his rule.

• Rudramba, his daughter, succeeded him in 1262 AD.

• In 1295 AD, Prataparudra succeeded his grandmother Rudramba and ruled until 1323 AD.

• He extended his kingdom's western frontier all the way to Raichur.

• He split the kingdom into 75 Nayakships, which the Rayas of Vijayanagara afterwards adopted and improved.

• Andhra Pradesh was the first state in India to be invaded by Muslims under his reign.

• Ala-ud-din Khilji, the Delhi Sultan, despatched an army to overrun the kingdom in 1303 AD, but Prataparudra beat them in Upparapalli in Karimnagar district.

• When a new army led by Malik Kafur stormed Warangal in 1310 AD, Prataparudra surrendered and promised to pay a substantial tribute.

• When Ala-ud-din Khilji died in 1318 AD, Prataparudra refused to pay the tribute.

• The Kakatiya Dynasty faced many attacks by the Delhi Sultanate in the 13th century, finally coming to an end in 1323 AD when Ghiyasuddin Tughlaq seized Warangal, the capital city. Ghiyasuddin's army was led by his son 'Ulugh Khan'.

Q68. Answer: (b) 18

Given:

HCF = 6

LCM = 36

one number = 12

Formula used:

HCF × LCM = one number × other number

Calculation:

Let the other number be x

According to the question

HCF × LCM = one number × other number

=> 6 × 36 = 12 × x

=> 216 = 12x

=> x = 18

Therefore The other number is 18

Q69. Answer: (a) Hunter Committee

The correct answer is Hunter Committee.

Key Points

• The Jallianwala Bagh massacre, also known as the Amritsar massacre, took place on 13 April 1919.

• A large peaceful crowd had gathered at the Jallianwala Bagh in Amritsar, Punjab to protest against the arrest of pro-Indian independence leaders Dr. Saifuddin Kitchlew and Dr. Satya Pal.

• To punish people for their 'disobedience,' British Brigadier-General Reginald Dyer ordered the army to fire into a crowd of thousands of unarmed Indians who had gathered to celebrate the Baisakhi festival, unknowing of the order.

• The colonial troops entered Jallianwala Bagh in Amritsar, Punjab, and shut the main entrance behind them so no one could evacuate before firing on the mob for around ten minutes.

• While the British government reported that about 350 persons were slain in the massacre, the Congress party alleged that the number could have been as high as 1,000.

• The Jallianwala Bagh Tragedy was investigated by the 7-member Hunter Committee, which was also known as the Disorders Inquiry Committee.

• The Hunter Report criticised most of General Dyer's choices, although it backed the implementation of martial law in Punjab.

• It also chastised Gandhi's Satyagraha strategy and held him partially accountable for the "deteriorating" law and order situation.

• The result was that Dyer was sent to England, relieved of his command.

• This miffed Gandhi and he returned the Kaisar-i-Hind Gold medal.

• As a result, the Indian National Congress teamed up with Khilafat leaders, and in the aftermath of resurgent Hindu-Muslim solidarity, Gandhi proposed a statewide non-cooperation campaign with the goal of achieving full Swaraj.

Additional Information

• Maclagan Committee - The Maclagan Committee of 1915 was appointed to review the performance of cooperative societies and suggest measures for strengthening them. The committee observed that such institutions were eminently suited to cater to the needs of the lower and middle-income strata of society and would inculcate the principles of banking amongst the middle classes.

• Harshell Committee - It was formed in 1893 to give suggestions regarding currency.

• Muddiman Committee - The British Government had set up a committee under Sir Alexander Muddiman to meet the demand of the Indian Leaders and in view of the resolution adopted by the Swaraj Party in the early 1920s.It also recommended the appointment of a Royal Commission. The Committee consisted of four Indian members other than British members.

Q70. Answer: (a) South-west

Given: Rick's watch is quarter past eight.

If the minute hand points towards the east, then

Hence, south-west is the correct answer.

Q71. Answer: (c) 42/86

Given:

{3/6,5/10, 9/18, ...}

Calculation:

{3/6,5/10, 9/18, ...}

In this question on dividing the numerator by the denominator, 1/2 is obtained.

Now,

According to the given options

Option (1) 19/38

=> On dividing the numerator by the denominator, 1/2 is obtained in options (1)

Option (2) 13/26

=> On dividing the numerator by the denominator, 1/2 is obtained in options (2)

Option (3) 42/86

=> On dividing the numerator by the denominator, 1/2 is not obtained in options (3), so it is not belong to this set.

Option (4) 62/124

=> On dividing the numerator by the denominator, 1/2 is obtained in options (4)

Therefore The required number is 42/86

Q72. Answer: (b) 60

The logic followed here is:

Row 2:

9, 9, 36, 9, 9 → 9 × 4 = 36 × 1 = 36

Row 3:

7, 7, 56, 7, 7 → 7 × 4 = 28 × 2 = 56

Similarly,

Row 1:

5, 5, ?, 5, 5 → 5 × 4 = 20 × 3 = 60

Hence, the correct answer is "60".

Shortcut Trick The logic followed here is:

For Second row: 36 is divisible by 9.

For Third row: 56 is divisible by 7.

Similarly,

For First row: 60 is divisible by 5.

Hence, the correct answer is "60".

Q73. Answer: (d) 9

By counting the triangles:

Hence, there are 9 triangles

Q74. Answer: (b) 70

Given:

50% of a number is 21 less than 4/5 th of that number.

Calculation:

Let the number be x

According to the question

=> x × 50/100 = x × 4/5 – 21

=> x/2 = 4x/5 – 21

=> 4x/5 – x/2 = 21

=> (8x – 5x)/10 = 21

=> 3x/10 = 21

=> 3x = 210

=> x = 70

Therefore The required number is 70

Q75. Answer: (b) 7

Given:

The least possible number which must be subtracted from 16, 19 and 23

Calculation:

Let the least possible number which must be subtracted from 16, 19 and 23, so that the resulting numbers are in continued proportion be k

Then,

=> (16 – k)/(19 – k) = (19 – k)/(23 – k)

Applying componendo and dividendo

=> (16 – k + 19 – k)/(16 – k – 19 – k) = (19 – k + 23 – k)/(19 – k – 23 – k)

=> (35 – 2k)/(16 – k – 19 + k) = (42 – 2k)/(19 – k – 23 – k)

=> (35 – 2k)/(16 – 19) = (42 – 2k)/(19 – 23)

=> (35 – 2k)/(-3) = (42 – 2k)/(-4)

=> (35 × 4 – 8k) = (42 × 3 – 6k)

=> 140 – 8k = 126 – 6k

=> 14 = 2k

=> k = 7

Therefore The least number is 7

Alternate Method Question can be directly solved by putting the option

=> 16 : 19 : : 19 : 23

Put option (2)

=> (16 – 7) : (19 – 7) : : (19 – 7) : (23 – 7)

=> 9 : 12 : : 12 : 16

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=> 9/12 = 12/16

=> b^2 = ac = (12 × 12) = (9 × 16)

=> 144 = 144

Therefore The least possible value is 7

Q76. Answer: (c) 3, 4, 144

Given: 1, 2, 4 / 2, 3, 36 /,, __

The logic followed here is:

(First number × Second number)^2 = Third number

First number + 1 = Second number

1, 2, 4 → 1 × 2 = 2 → 2^2 = 4 and 1 + 1 = 2

And,

2, 3, 36 → 2 × 3 = 6 → 6^2 = 36 and 2 + 1 = 3

Similarly, by checking options,

(1) 3, 5, 225 → 3 × 5 = 15 → 15^2 = 225 but 3 + 1 = 4 ≠ 5

(2) 2, 5, 100 → 2 × 5 = 10 → 10^2= 100 but 2 + 1 = 3 ≠ 5

(3) 3, 4, 144 → 3 × 4 = 12 → 12^2= 144 and 3 + 1 = 4

(4) 4, 2, 64 → 4 × 2 = 8 → 8^2 = 64 but 4 + 1 = 5 ≠ 2

Hence, "3, 4, 144" is the correct answer.

Q77. Answer: (a) Kampahareswara

The correct answer is Kampahareswara.

Key Points

• The Great Living Chola Temples are a series of Hindu temples from the Chola empire in Tamil Nadu.

• These temples have been designated as a UNESCO World Heritage Site.

• These were constructed by kings of the Chola Empire, which spanned southern India and the neighbouring islands.

• The site includes three magnificent 11th and 12th-century temples:

• Thanjavur's Brihadisvara Temple,

• Gangaikondacholisvaram's Brihadisvara Temple,

• Darasuram's Airavatesvara Temple.

• Rajendra I finished building the Gangaikondacholisvaram Temple in 1035.

• In contrast to Thanjavur's straight and harsh tower, its 53-meter vimana (sanctum tower) features recessed corners and a lovely upward curving movement.

• Rajaraja II built the Airavatesvara temple complex at Darasuram, which has a 24-meter vimana and a stone figure of Shiva.

• The temples provide witness to the Cholas' outstanding achievements in construction, sculpture, painting, and bronze casting.

• The Kampaheswarara Temple or kampa-hara-ishvarar is a Hindu temple dedicated to the god Shiva. It is situated in Thirubuvanam, a village in Thanjavur district in the South Indian State of Tamil Nadu, on the Mayiladuthurai-Kumbakonam road. It is not one of the Great Living Chola Temples.

Q78. Answer: (c) Agni V

The correct answer is Agni V.

Key Points

• India developed a surface-to-surface intercontinental-range ballistic missile AGNI V and test fired it on Oct 27, 2021.

• In India, Infantry Day is celebrated on the same day as this event.

• On October 27, 2021, the country commemorated its 75th Infantry Day.

• Agni-V is equipped with a three-stage solid-fuelled engine and uses improved guidance systems to reach targets with a high degree of accuracy.

• The missile was successfully launched from APJ Abdul Kalam Island, off the coast of Odisha.

• Under the Integrated Guided Missile Development Programme, the Defence Research and Development Organisation (DRDO) develops the Agni missiles, which are a family of medium to intercontinental-range ballistic missiles.

• From Dr. APJ Abdul Kalam Island, the DRDO tested a next-generation advanced ballistic missile type called Agni-P (Prime). This is a 'canisterized' surface-to-surface missile with a range of 1,000 to 2,000 kilometres.

• It has a new class of propulsion and guiding systems and can strike enemy ships as far as the Indo-Pacific.

• The Man-Portable Antitank Guided Missile (MPATGM) and the New Generation Akash Missile have also been tested by the

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DRDO (Akash-NG) this year.

Q79. Answer: (b) Coal India Limited

The correct answer is Coal India Limited.

Key Points

• PSUs are accorded Miniratna, Navratna, and Maharatna Status based on their performance.

• These are granted by the Ministry of Heavy Industries and Public Enterprises Department of Public Enterprises.

• In 2009, the "Maharatna" category for Central Public Sector Enterprises CPSEs was created with the goal of empowering big CPSEs to extend their operations and become global giants or Indian Multinational Companies (MNCs).

• CPSEs must meet the following conditions to be granted Maharatna status, according to government regulations:

• Having Navratna status.

• Average annual turnover of more than Rs. 25,000 crore, during last 3 years.

• Average annual net worth of more than Rs. 15,000 crore, during last 3 years.

• Average annual net profit after tax of more than Rs. 5,000 crore, during last 3 years.

• Should have a significant global presence and international operations.

• Listed on the Indian stock exchange with the minimum prescribed public shareholding limit under SEBI regulations.

• List of Maharatna Companies:

• Bharat Heavy Electricals Limited (BHEL),1964

• Bharat Petroleum Corporation Limited (BPCL),1952

• Coal India Limited (CIL),1975

• Gas Authority of India Limited (GAIL),1984

• Hindustan Petroleum Corporation Limited (HPCL),1974

• Indian Oil Corporation Limited (IOCL), 1959

• National Thermal Power Corporation Limited (NTPC), 1975

• Oil and Natural Gas Corporation Limited (ONGC), 1956

• Power Grid Corporation of India Limited (POWERGRID), 1989

• Steel Authority of India Limited (SAIL), 1954

Q80. Answer: (a) Glacier

Given: Water : Sea :: Ice : ?

The logic followed here is:

• Sea is accumulation of Water.

Similarly,

• Glacier is the accumulation of Ice.

Hence, Glacier is the correct answer.

Important Points

• Glacier: A glacier is a large, perennial accumulation of crystalline ice, snow, rock, sediment, and often liquid water that originates on land and moves down slope under the influence of its own weight and gravity.

Q81. Answer: (d) 144°

Given:

angle A : angle B :angle C = 2 : 3 : 5

Calculation:

According to the question

Let the ratio of angle A : angle B :angle C be 2x, 3x and 5x respectively

=> 2x + 3x + 5x = 180°

=> 10x = 180°

=> x = 18°

Now,

=> angle A = 2x = (2 × 18°) = 36°

=> angle B = 3x = (3 × 18°) = 54°

=> angle C = 5x = (5 × 18°) = 90°

Now

The measure of the supplementary angle of angle A = (180° – 36°)

=> 144°

Therefore The required measure of the supplementary angle of angle A is 144°

Q82. Answer: (a) 5.2

Given:

The number = 4.2, 3.8 and 7.6

Formula used:

Average = sum of observations/Number of observations

Calculation:

According to the question

The total sum = (4.2 + 3.8 + 7.6)

=> 15.6

Average = (15.6/3)

=> 5.2

Therefore The required average is 5.2

Q83. Answer: (d) Periyar

The correct answer is Periyar.

Key Points

• The Idukki Dam is a 168.91 m (554 ft) tall arch dam in Kerala, India.

• The dam is situated between the Kuravanmala (839) and Kurathimala (925) mountains.

• The Kerala State Electricity Board built it and now owns it.

• It is home to a hydroelectric power plant with a capacity of 780 MW.

• It is located on the Periyar River in Kerala, India, in a valley between the Kuravan and Kurathi Hills.

• It is Asia's third tallest arch dam.

• The three dams have combined to form a 60-square-kilometer artificial lake.

• The stored water is used to produce electricity at the Moolamattom Powerhouse, which is located inside nearby rocky caves.

• Prime Minister Indira Gandhi inaugurated the Indo-Canadian initiative on February 17, 1976.

• To augment the Idukki reservoir, the Narakakkanam, Azhutha, Vazhikkadavu, Vadakkepuzha, and Kuttiar diversion schemes were later added.

• Because the Idukki Arch dam lacks shutters, it must rely on the Cheruthoni dam to keep the reservoir water level constant.

Additional Information

• Mahanadi River, a river in central India, rises in the hills of southeastern Chhattisgarh state. It is also known for the Hirakud Dam in Odisha. The Mahanadi basin extends over the states of Chhattisgarh and Odisha and comparatively smaller portions of Jharkhand, Maharashtra, and Madhya Pradesh, draining an area of 1,41,589 Sq.km which is nearly 4.3% of the total geographical area of the country.

• The Ghataprabha river is an important right-bank tributary of the Krishna River and flows eastward for a distance of 283 kilometers before its confluence with the Krishna River at Chikksangam. The river basin is 8,829 square kilometers wide and stretches across Maharashtra and Karnataka states.

• The Krishna Basin extends over Andhra Pradesh, Maharashtra, and Karnataka having a total area of 2,58,948 Sq.km which is nearly 8% of the total geographical area of the country. The Krishna River rises from the Western Ghats near Jor village of Satara district of Maharashtra at an altitude of 1,337 m just north of Mahabaleshwar. Its principal tributaries joining from the right are the Ghatprabha, the Malprabha, and the Tungabhadra whereas those joining from the left are the Bhima, the Musi, and the Munneru are joining the river from left.

Q84. Answer: (d) Sublimation

The correct answer is Sublimation.

Key Points

• Sublimation is the process of converting stuff from a solid to a gaseous state without passing through a liquid state.

• Sublimation is the term used to describe the process of snow and ice converting into water vapour in the air without first melting into water.

• Sublimation can be used to separate an ammonium chloride and common salt mixture.

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• In a china dish, the mixture is set on a tripod stand.

• An inverted glass funnel is used to cover the china dish.

• To keep the ammonium chloride vapours from escaping into the atmosphere, a loose cotton plug is placed in the funnel's upper, open end.

• A burner is used to heat the china dish. Ammonium chloride transforms into white vapours when heated.

• When these vapours come into touch with the funnel's chilly inner walls, they rise up and transform to solid ammonium chloride.

• As a result, pure ammonium chloride sublimates on the inner walls of the funnel and can be removed.

• Common salt remains behind in the china dish.

Additional Information

• Crystallisation:

• Crystallization is the process by which a solid forms, where the atoms or molecules are highly organized into a structure known as a crystal.

• Precipitation from a solution, freezing, and, more rarely, direct deposition from a gas are some of the ways crystals form.

• Crystallization is a technique that has long been used in the purification of substances.

It is used daily in making- Steel, eggnog and hard tack candy.

• Centrifugation:

• Centrifugation is a mechanical process that separates particles from a solution based on their size, shape, density, medium viscosity, and rotor speed using centrifugal force.

• Putting milk into a machine to separate the cream from the milk is an example of centrifugation.

Centrifugation is a technique for treating wastewater and sewage.

• It is used to remove metal shavings and other particles from industrial lubricants.

• Chromatography:

• Chromatography is a technique for separating the components, or solutes, of a mixture based on the relative amounts of each solute distributed between a flowing fluid stream, known as the mobile phase, and a stationary phase that is contiguous.

• The mixture's various components move through the stationary phase at different speeds, leading them to separate from one another.

• Which substances go more swiftly or slowly, and how they are divided, is determined by the characteristics of the individual mobile and stationary phases.

• These different travel times are termed retention time.

Q85. Answer: (a) 1024 TB

The correct answer is 1024 TB.

Key Points

• 250 bytes is occasionally used to define a petabyte.

• The Base10 SI system (SI) and the Base2 IEC (IEC) systems are two alternative systems for measuring bytes.

• While 250 bytes is similar to 1015, it is larger and is referred to as a pebibyte (PiB).

• A petabyte is made up of 1,024 terabytes (TB) or roughly 1 million gigabytes (GB).

• One exabyte is made up of 1,024 petabytes.

• Traditional data backups are not suitable for a petabyte.

• A petabyte is thought to be the equivalent of 20 million tall filing cabinets or 500 billion pages of conventional written text, according to some estimations.

Q86. Answer: (d) 1944, 1970, 1979

Calculation:

The average job creation during the period 1940-79 = (70 + 80 + 60 + 55 + 90 + 75)/6

=> 430/6

=> 71.66

Now,

The three years was the number of jobs created higher than the average job creation during the period 1940-79 is 1944, 1970, 1979

Therefore The required year is 1944, 1970, 1979

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Q87. Answer: (a) 1944, 1950, 1970

Calculation:

From options,

(a) (80 + 60 + 90)/3 = 230/3

=> 76.6

(b) (75 + 70 + 80)/3 = 225/3

=> 75

(c) (55 + 90 + 75)/3 = 220/3

=> 73.33

(d) (70 + 80 + 55)/3 = 205/3

=> 68.33

Therefore The highest average number of jobs created in the year 1944, 1950, 1970

Q88. Answer: (a) 1944, 1950, 1958

Calculation:

From options,

(a) (80 + 60 + 55)/3 = 195/3

=> 65

(b) (55 + 90 + 75)/3 = 220/3

=> 73.33

(c) (70 + 80 + 60)/3 = 210/3

=> 70

(d) (60 + 55 + 90)/3 = 205/3

=> 68.33

Therefore The average number of jobs created the lowest is 1944, 1950, 1958

Q89. Answer: (d) 1970, 1979

Calculation:

The number of jobs created during the period 1940 and 1944 = (70 + 80) = 150

The average number of jobs created during the period 1940 and 1944 = (150/2) = 75

The number of jobs created during the period 1950 and 1958 = (60 + 55) = 115

The average number of jobs created during the period 1950 and 1958 = (115/2) = 57.5

The number of jobs created during the period 1970 and 1979 = (90 + 75) = 165

The average number of jobs created during the period 1970 and 1979 = (165/2) = 82.5

Therefore The two-year periods listed below had the highest average jobs created is 1970 and 1979

Q90. Answer: (d) 162

Given: 7, 22, 45, 76, 115, ?

The logic followed here is: double difference, as shown below,

Hence, 162 is the correct answer.

Q91. Answer: (d) Shelf

Given: Shoe : Rack :: Book : ?

The logic followed here is:

• Shoes are placed on a Rack.

Similarly,

• Books are placed on a Shelf.

Hence, Shelf is the correct answer.

Q92. Answer: (a) 7, 10

Given: 1, 7, 10, 4, 1,,

The logic followed here is:

Alternate Method

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Hence, "7, 10" is the correct answer.

Q93. Answer: (d) 39

Given: 6, 16, 27, __

The logic followed here is:

• Addition of natural numbers starting from 10, as shown below,

Hence, 39 is the correct answer.

Q94. Answer: (b) [figure]

Given: Mobile phone, Internet, Webmail

The logic followed here is:

Webmail requires Internet, Some mobile phones have internet and some don't have, some mobile phones have webmails.

So the least possible diagram is as follows:

Hence, option (2) is the correct answer.

Important Points

• Webmail: an email system in which a user can access their emails via a browser on any computer or device that is connected to the internet.

Q95. Answer: (d) Clothes

Given: Schoolbag : Books :: Suitcase : ?

The logic followed here is:

• A schoolbag is used to carry books.

Similarly,

• A suitcase is used to carry clothes.

Hence, Clothes is the correct answer.

Q96. Answer: (a) O

Given: In the English alphabet written in order from left to right, if the first and third letters are interchanged. second and fourth letters are interchanged and so on,

Now, by interchanging the positions according to the given condition,

We can say that, here we exchange 1st alphabet to 3rd, 5th to 7th, 9th to 11th, 13th to 15th. Therefore, the thirteenth letter from the left is O.

• First letter <=> third letter

• Second letter <=> fourth letter and so on.

After interchange we get:

Thus, we can see that the thirteenth letter from the left is O.

Hence, O is the correct answer.

Q97. Answer: (a) Neither conclusion I nor II follows.

1. Do not curb the use of plastic. - This is a course of action and not a conclusion. Therefore, it does not follow.

2. Impose a complete ban on plastic. - This is a course of action and not a conclusion. Therefore, it does not follow.

Hence, "neither conclusion I nor II follows" is the correct answer.

Confusion PointsIn the statement does not talk about the solution to pollution, that way all the conclusions are wrong.

Q98. Answer: (c) 9

The logic followed here is:

Row 1: 4, 7, 13

$4^2 = 16 \rightarrow 1 + 6 = 7$ (Second number)

$7^2 = 49 \rightarrow 4 + 9 = 13$ (Third number)

Row 2: 5, 7, 13

$5^2 = 25 \rightarrow 2 + 5 = 7$ (Second number)

$72 = 49 \rightarrow 4 + 9 = 13$ (Third number)

Similarly,

Row 3: 6, 9, ?

$32 = 9$ (Second number)

92 = 81 → 8 + 1 = 9 (Third number)

Hence, the correct answer is "9".

Q99. Answer: (b) UHAQERQ

Given: BOX is written as OBK, LAY is written as YNL, and COP is written as PBC.

The logic followed here is:

Adding 13 to the positional values of the given letters, as shown below,

• BOX is written as OBK,

• LAY is written as YNL

And,

• COP is written as PBC.

Similarly,

• HUNDRED is coded as:

Hence, UHAQERQ is the correct answer.

Q100. Answer: (a) 125

Given: 1, 7, 25, 61, 125

The logic followed here is:

Substracting the preceding number from the cube of the natural number, as shown below,

We can conclude the wrong term here is 125. Instead of 125, it should be 121 there.

Hence, 125 does not belong to the given series.

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