RRB NTPC CBT-I Official Paper (Held On: 8 Jan 2021 Shift 2) (Previous Year Paper)

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

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Q1. If cos x=(-1)/2 and π<x<3π/2, find the value of 4 tan²x - 3 cosec²x.

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

Q2. Which place was called the “nursery of the Bengal army"?

(a) Awadh
(b) Bengal
(c) Eastern Uttar Pradesh
(d) Punjab

Q3. If 6(sec2 59° - cot2 31°] + 2/3 × sin 90° - 3 × tan2 56° × y × tan2 34° = y/3 then the value of y is:

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

Q4. Which gas is needed for photosynthesis?

(a) Carbon dioxide
(b) Oxygen
(c) Hydrogen
(d) Carbon mono oxide

Q5. A alone can complete a work in 10 days and B can complete it in 15 days. A and B undertake the work for Rs. 4,800. With the help of C, they complete the work in 5 days. What amount is to be paid to C?

(a) Rs. 700
(b) Rs. 1200
(c) Rs. 800
(d) Rs. 600

Q6. Find the area of a rhombus whose side is 10 cm and the longest diagonal is 16 cm.

(a) 88 cm²
(b) 96 cm²
(c) 86 cm²
(d) 94 cm²

Q7. The compound interest on a certain sum of money at the rate of 11% p.a. for 2 years is Rs. 4642. Find its simple interest at the same rate and for the same period.

(a) Rs. 4400
(b) Rs. 3500
(c) Rs. 4500

(d) Rs. 4200

Q8. Which function key in Excel helps to switch to edit mode?

(a) F2
(b) F5
(c) F3
(d) F7

Q9. The 2020, UNESCO/Guillermo Cano Press Freedom Prize has been awarded to _____

(a) Jineth Bedoya Lima
(b) Cheng Yizhong
(c) Mahmud Abu Zeid
(d) Reeyot Alemu

Q10. Name the Buddhist text that comprises rules for monks.

(a) Tipitaka
(b) Vinaya Pitaka
(c) Sutta Pitaka
(d) Abhidhamma Pitaka

Q11. Name the cyclone that hit Odisha and West Bengal in May 2020.

(a) Fani
(b) Bulbul
(c) Amphan
(d) Hudhud

Q12. Which one of the following was a measure taken under the Rowlatt Act?

(a) Restriction on traveling abroad.
(b) Restriction on wearing Khadi.
(c) Forced to buy foreign goods.
(d) Imprisonment without trial.

Q13. The mean of a, b, c, d, e and f is 36. If the mean of b, d and f is 28, find the mean of a, c and e.

(a) 44
(b) 30
(c) 32
(d) 42

Q14. Which Indian female shooter had won the gold medal in individual 10 m air rifle women event at the 2019 ISSF World Cup in New Delhi?

(a) Anjum Moudgil
(b) Apurvi Chandela
(c) Heena Sidhu
(d) Manu Bhaker

Q15. Select the number from among the given options that will come next in the following series.

4, 16, 40, ?

(a) 88
(b) 98
(c) 68
(d) 48

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Q16. In an election the votes cast for two candidates were in the ratio 2 : 9. If the successful candidate received 984321 votes, find the total voters polled.

(a) 1230059
(b) 1203059
(c) 1302059
(d) 1320059

Q17. The length of a rectangle is 3/5 of the radius of a circle. The radius of a circle is equal to the side of a square whose area is 4900 m². What is the area of the rectangle if its breadth is 20 m.

(a) 840 m²
(b) 860 m²
(c) 480 m²
(d) 880 m²

Q18. Rahul is the brother of Raj. Radha is the sister of Raman. Raj is the son of Radha. Then how is Rahul related to Radha?

(a) Son
(b) Nephew
(c) Uncle
(d) Brother

Q19. If the length of side of a square is increased by 10%, what is the percentage increase in its area?

(a) 10%
(b) 21%
(c) 20%
(d) 15%

Q20. Which of the following has been written by Munshi Premchand?

(a) Chidambara
(b) Kamayani
(c) Sevasadan
(d) Yama

Q21. Select the option that is related to the third term in the same way as the second term is related to the first term.

paper : stapler :: clothes : ?

(a) Washing machine
(b) Dryer
(c) Detergent
(d) Hanger

Q22. If the sum of squares of two positive numbers is 2437 and square root of one number is 7, find the other number.

(a) 6
(b) 12
(c) 8
(d) 16

Q23. Ramesh Sharma borrows Rs. 8,000 for 3 years at 5% p.a. simple interest. He lends it to Manohar at 7% p.a. for 3 years. Find his gain.

(a) Rs. 580
(b) Rs. 480
(c) Rs. 450
(d) Rs. 460

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Q24. A train covers 400 km at a uniform speed. If the speed had been 10 km/h more, it would have taken 2 h less for the same journey. Find the speed of the train.

(a) 40 km/h
(b) 50 km/h
(c) 55 km/h
(d) 45 km/h

Q25. Nobel Laureate, Kailash Satyarthi is associated with which of the following organization?

(a) Beti Bachao, Beti Padhao
(b) SOS village
(c) Child Relief and You
(d) Bachpan Bachao Andolan

Q26. Name the recently added 17^(th)zone of the Indian Railway.

(a) East Central Railway
(b) Delhi Metro
(c) Kolkata Metro
(d) Konkan Railway

Q27. Which of the following is a cause for Migration of unskilled workers?

(a) Population
(b) Poverty
(c) Pollution
(d) Ambience

Q28. In a firm the ratio of male and female members was 4 : 5. The firm decided to increase the number of males by 80% and the number of females by 60%. What will be the new ratio of male members to female members in the firm?

(a) 8 : 10
(b) 15 : 16
(c) 18 : 15
(d) 9 : 10

Q29. A is 5 times as good as workman as B and therefore is able to complete a job in 60 days less than B. In how many days will they finish it working together?

(a) 121/2 days
(b) 12 days
(c) 141/2 days
(d) 14 days

Q30. What was India’s Rank in Human Development Index, 2019?

(a) 147
(b) 139
(c) 152
(d) 129

Q31. Name the youngest-ever UNICEF Goodwill Ambassador.

(a) Millie Bobby Brown
(b) Lily singh
(c) Lionel Messi
(d) Priyanka Chopra

Q32. In the following question, four letter pairs are given. The letters on left side of (-) is related to the letters on the right side of (-) with some Logic/Rule/Relation. Three are similar on basis of same Logic/Rule/Relation. Select the odd one out from the given alternatives.

(a) PSD - KYU

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(b) ZBN - EHU
(c) SJF - MPX
(d) NRB - IXS

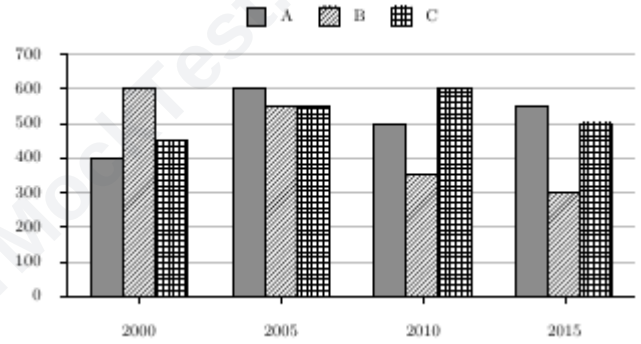
Q33. Which of the following Heritage sites has the Dravidian style of architecture?

(a) Hampi
(b) Ellora
(c) Khajuraho
(d) Konark

Q34. The smallest six-digit number which is completely divisible by 4, 8, 12 and 16 is:

(a) 100032
(b) 100900
(c) 100800
(d) 100700

Q35. Study the given diagram and answer the question that follows.



A, B and C are different cities and the given data is of the number of accidents that took place in the respective years 2000, 2005, 2010 and 2015.

On the basis of given data, which city can be said to have controlled accidents most effectively?

(a) A
(b) B
(c) A and C both
(d) C

Q36. If $\sqrt{(2116 \times \sqrt{(48 \div x)})} = 92$, find the value of x.

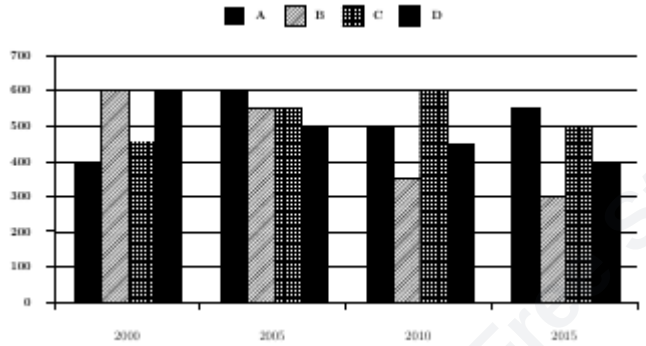
(a) 12
(b) 3
(c) 2
(d) 6

Q37. Which state in India has the biggest consumption of fertliser(in Kg Per hectare)?

(a) Haryana
(b) West Bengal
(c) Andhra Pradesh
(d) Punjab

Q38. Study the given diagram and answer the question that follow.

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A, B, C and D are different cities, and the given data is of the number of accidents that took place in the respective years 2000, 2005, 2010 and 2015.

If the data for 2020 follows the trend similar to that of 2015, which city is most likely to have a higher number of accidents?

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

Q39. If x^4 + x^(-4) = 1154 then the value of x + x^(-1) is:

(a) 5
(b) 12
(c) 6
(d) 8

Q40. Which famous revolutionary set up base near Satar river in Jhansi in the 1920's using the alias, Pandit Harishankar Brahmachari?

(a) Bhagat singh
(b) Udham singh
(c) Khudiram Bose
(d) Chandrashekhar Azad

Q41. In May 2019, the last captive White tiger of Mumbai died. What was the name of the tiger?

(a) Balaji
(b) Shivaji
(c) Vishwanath
(d) Bajirao

Q42. CSIR scientists have conducted a genetic study for the first time in India. Where has the study been conducted?

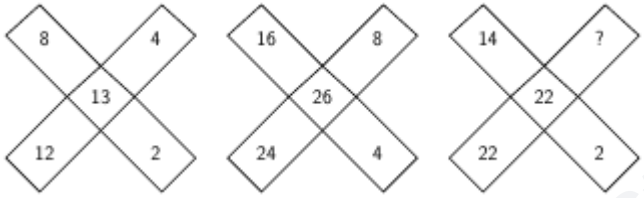
(a) Hyderabad
(b) Lakshwadeep
(c) Kochi
(d) Andaman

Q43. Which other movement was combined with the non-cooperation movement in 1920?

(a) Swadeshi Movement
(b) Khilafat Movement
(c) Home Rule Movement
(d) August Kranti

Q44. Study the given pattern carefully and select the number that can replace the question mark (?) in it.

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(a) 8
(b) 12
(c) 6
(d) 10

Q45. Find the sum of the numbers between 400 and 600 such that when they are divided by 6, 12 and 16, there will be no remainder.

(a) 2620
(b) 2016
(c) 2026
(d) 2610

Q46. Who said in the Constituent assembly debate on 27 August 1947, “I believe separate electorates will be suicidal to the minorities."

(a) R V dhulekar
(b) 'Govind Bhallabh Pant
(c) B. Pocker Bahadur
(d) Sardar Vallabhbhai Patel

Q47. Find the least number of five digits, which is exactly divisible by 472.

(a) 10284
(b) 10472
(c) 10184
(d) 10384

Q48. Due to 25% reduction in the price of wheat per kg, John is able to buy 5 kg more for Rs.600. What is the original price of wheat per kg?

(a) Rs. 60
(b) Rs. 45
(c) Rs. 40
(d) Rs. 50

Q49. On being criticized for borrowing features from other countries for the constitution, who said the following- “Nobody holds any patent rights in the fundamental ideas of a constitution.

(a) Sardar Vallabhbhai Patel
(b) Dr. BR Ambedkar
(c) C. Rajgopalachari
(d) Jawahar Lal Nehru

Q50. As per Public affair Index 2020 (PAI-2020), which of the following state emerged as the best governed state in the country?

(a) Kerala
(b) Maharashtra
(c) Gujrat
(d) Punjab

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Q51. As per flag code of India 2002, What should be the position of the Indian flag when it is displayed along with flags of other countries in a straight line?

(a) Anywhere in the row
(b) Extreme left
(c) Extreme right
(d) In the middle

Q52. From an external point P, tangents PA and PB are drawn to a circle with centre O. If angle PAB= 55°, find angle AOB.

(a) 110°
(b) 100°
(c) 35°
(d) 125°

Q53. The three laws of motion were proposed by:

(a) Galileo
(b) Aristole
(c) Edison
(d) Newton

Q54. The average weight of A, B, C, and D is 56 kg. If the average weight of A, B, and C is 52 kg and that of C and D is 48 kg. then the weight of C is:

(a) 36 kg
(b) 28 kg
(c) 30 kg
(d) 34 kg

Q55. Name the first student satellite built by Indian high school student team and launched by NASA.

(a) Kalamsat
(b) SRMsat
(c) Anusat
(d) Pratham

Q56. The least number which should be added to 4707 so that the sum is exactly divisible by 4, 5, 6 and 8 is:

(a) 83
(b) 73
(c) 63
(d) 93

Q57. Name the Kalvari class submarine launched in Mumbai in Nov 2020.

(a) INS Khanderi
(b) INS Vagir
(c) INS Arighat
(d) INS Karanj

Q58. What is the full form of COBOL?

(a) Common Business Organised Language
(b) Computer Business Oriented Language
(c) Computer Basic Operation Language
(d) Common Business Oriented Language

Q59. Study the given pattern carefully and select the number that can replace the question mark (?) in it.

9	**5**	**5**
5	7	?

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3	4	5
135	140	150

(a) 6
(b) 4
(c) 8
(d) 10

Q60. Simplify.

(6.25 + 5/7× 28 - 5)/(3/4 × (15.8 - 3.4) + 5 × 2.39)

(a) 4
(b) 1
(c) 3
(d) 5

Q61. What is the code name of India's first successful Nuclear test?

(a) Laughing Buddha
(b) Operation Shakti
(c) Smilling Buddha
(d) Operation Vijay

Q62. Whom did Mahatma Gandhi consider his mentor in politics?

(a) Gopal Krishna Gokhale
(b) Raychandbhai
(c) Lala Lajpat Rai
(d) Bal Gangadhar Tilak

Q63. Which is the longest railway line in the world?

(a) The Union- Pacific railway
(b) The Australian Trans-Continental Railway
(c) Trans-Canadian Railway
(d) Trans-Siberian Railway

Q64. Litmus solution is derived from _____

(a) Hydrangea
(b) Petunia
(c) Cabbage leaves
(d) Lichen

Q65. The region where farmers specialise in vegetables only, this type of farming is known as :

(a) Cooperative farming
(b) Mixed farming
(c) Truck farming
(d) Collective farming

Q66. Which of the following state has the highest wind energy production in India?

(a) Odisha
(b) Karnataka
(c) Maharashtra
(d) Tamil Nadu

Q67. Which city has bagged the second spot in the Swacch Sarvekshan award for 2020?

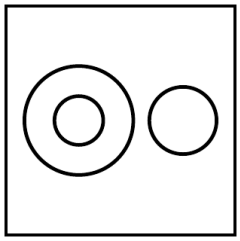
(a) Chandigarh
(b) Bhopal
(c) New Delhi

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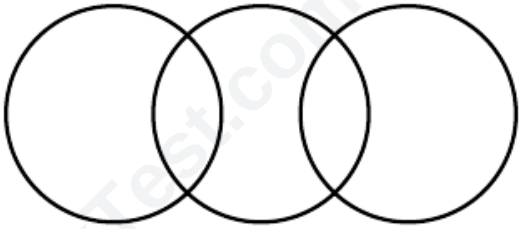
(d) Surat

Q68. Select the Venn diagram that best represents the relationship between the given set of classes.
Students, Interns and Research scholars

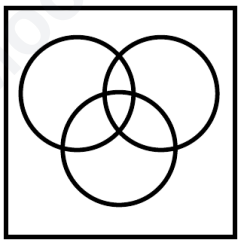
(a)



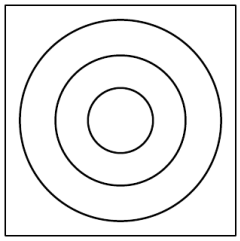
(b)



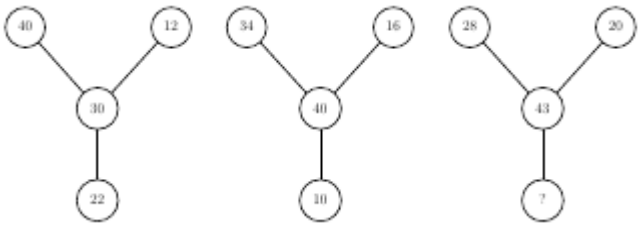
(c)



(d)



Q69. Study the given pattern carefully and select the number that can replace the question mark (?) in it.



(a) 5
(b) 11
(c) 7
(d) 9

Q70. 3^(71) + 3^(72) + 3^(73) + 3^(74) + 3^(75) is divisible by:

(a) 8
(b) 11
(c) 7

(d) 5

Q71. Study the given pattern carefully and select the number that can replace the question mark (?) in it.

4	3	8
9	7	2
8	6	4
44	27	?

(a) 20
(b) 84
(c) 14
(d) 64

Q72. The full form of BHEL is _____
(a) Bharat Heavy Electricals Limited
(b) Bharat Heavy Electronics Limited
(c) Bureau of Heavy Electronics Limited
(d) Bureau of Heavy Electricals Limited

Q73. Simplify.
17 × 8 - 6 + [(27 - 3) ÷ 6 - 4]
(a) 130
(b) 142
(c) 150
(d) 136

Q74. The perimeter of a right triangle is 60 cm and its hypotenuse is 26 cm. Find the area of the triangle.
(a) 240 cm^2
(b) 180 cm^2
(c) 160 cm^2
(d) 120 cm^2

Q75. If $a^2 + b^2 = 82$ and $ab = 9$, Find the value of $a^3 + b^3$.
(a) 720
(b) 830
(c) 730
(d) 750

Q76. Where was the first oil well discovered in Assam?
(a) Digboi
(b) Rudrasagar
(c) Naharkatiya
(d) Moran Hugrijan

Q77. Select the pattern that will come next in the following series.
CKV, DLW, EMX, ?
(a) FNY
(b) FLP
(c) HNZ
(d) BOI

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Q78. Who is considered the father of computers?

(a) Charles Babbage
(b) John Atanasoff
(c) Charles Bachman
(d) Alan turing

Q79. If A is equal to 1, M is equal to 13 and R is equal 18, how would you spell MISSION?

(a) 139191991314
(b) 149191991314
(c) 139191991514
(d) 129191991314

Q80. What is the momentum of an object having mass of 14 kg and velocity 28 m/s?

(a) 1/392 kg-m/s
(b) 2 kg-m/s
(c) 0.5 kg-m/s
(d) 392 kg-m/s

Q81. A man bought 2 articles for Rs. 3,000 each. He sold one article at 10% profit and another at 5% profit. Find the total percentage profit he earned.

(a) 15%
(b) 6.5%
(c) 7.5%
(d) 8.5%

Q82. Simplify.

(46+3/4×32-6)/(37-3/4×(34-6))

(a) 10
(b) 6
(c) 4
(d) 8

Q83. Select the option that is related to the third term in the same way as the second term is related to the first term.

BILR : EFOO :: CJPT : ?

(a) FGSQ
(b) QWNT
(c) MIEB
(d) NGDE

Q84. Ina code language, if KARAN is written as 45, then how will ARUN be written as in that language?

(a) 56
(b) 54
(c) 41
(d) 42

Q85. Which sector is the biggest emitter of greenhouse gases?

(a) Agriculture
(b) Waste
(c) Energy
(d) Land use change

Q86. Select the number that will come next in the following series.

2, 7, 14, 23, ?

(a) 33
(b) 34

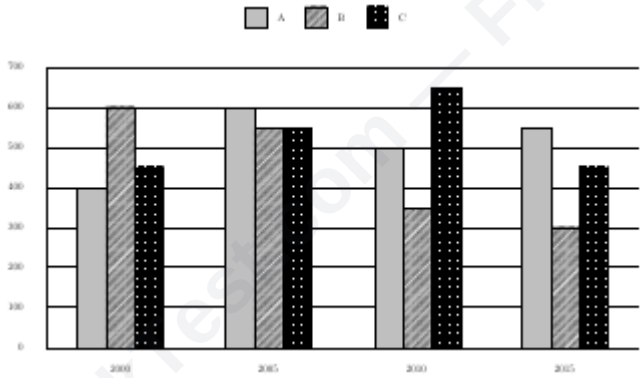
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(c) 30
(d) 13

Q87. If A is taller than B and B is taller than C. D is shorter than B but taller than C, then D is:

(a) taller than B
(b) the shortest
(c) taller than A and B
(d) taller than C

Q88. Study the given diagram and answer the question that follow.



A, B and C are different cities and the given data is of the number of accidents that took place in the respective years 2000, 2005, 2010 and 2015.

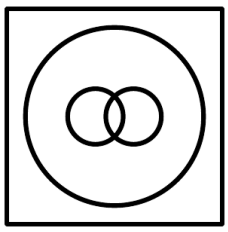
Which city has the highest number of accidents on an average?

(a) A and C both
(b) C
(c) B
(d) A

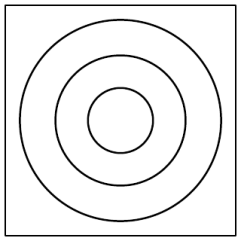
Q89. Select the Venn diagram that best represents the relationship between the given set of classes.

Short women, White-haired people, Indians

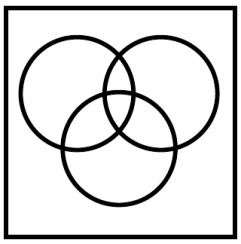
(a)



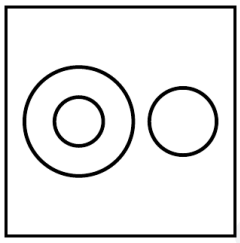
(b)



(c)



(d)



Q90. A question is given followed by two arguments. Decide which of the arguments is/are strong with respect to the question.

Question:

Should elections be conducted for student unions in educational institutions?

Arguments:

1. Yes, it is important to conduct elections so that the rights and complaints of the students can be heard by authorities.

2. No, it disrupts the educational environment and leads to chaos and violence in institutes which does not solve any problems but creates more issues.

(a) Neither 1 nor 2 is strong.
(b) Both, 1 and 2 are strong.
(c) Only 1 is strong
(d) Only 2 is strong

Q91. In a code language, if RAMAN is written as 47, then how will ARJUN be written as in that language?

(a) 44
(b) 74
(c) 54
(d) 64

Q92. Reading the English alphabet from left to right, what is the 5^(th) letter to the right of the 14^(th) letter?

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

Q93. In a code language, if FORWARD is written as 1234536 and WATER is written as 45783, how will RETARD be written as in that language?

(a) 386536
(b) 387536
(c) 387546
(d) 386546

Q94. In a code language, if LAST is written as 1234 and BOOK is written as 5667, how will TOAST be written as in that language?

(a) 45234
(b) 46234

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(c) 46324
(d) 47234

Q95. Select the number that will come next in the following series.

9, 81, 6561, ?

(a) 43046621
(b) 43046221
(c) 43046721
(d) 42046721

Q96. How many 3s are there in the given series that are followed by 9 and preceded by 8?

1839793997634983974583968300775368265969

(a) 1
(b) 3
(c) 4
(d) 5

Q97. Select the number from among the given options that will come next in the following series.

3, 27, 243, ?

(a) 2900
(b) 2187
(c) 2493
(d) 2100

Q98. If the south-east direction moves two places and becomes north-east; and north-west moves two places to become south-west, what would be the direction that west would become, assuming all other directions make similar movements?

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

Q99. Select the option that is related to the third term in the same way as the second term is related to the first term.

Hand : Thumb :: pen : ?

(a) paper
(b) Nib
(c) Finger
(d) Holder

Q100. After starting from a point, Naveen walks 3 km towards the east. Then turning to his left he moves 3 km. After this he again tums his left and moves 4 km. In which direction is he standing from his starting point?

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

ANSWER KEY

1	d	2	a	3	a	4	a	5	c	6	b	7	a	8	a	9	a	10	b
11	c	12	d	13	a	14	b	15	a	16	b	17	a	18	a	19	b	20	c
21	d	22	a	23	b	24	a	25	d	26	c	27	b	28	d	29	a	30	d
31	a	32	b	33	a	34	a	35	b	36	b	37	d	38	b	39	c	40	d
41	d	42	b	43	b	44	c	45	b	46	b	47	d	48	c	49	b	50	a

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51	c	52	a	53	d	54	b	55	a	56	d	57	b	58	d	59	a	60	b
61	c	62	a	63	d	64	d	65	c	66	d	67	d	68	c	69	a	70	b
71	a	72	a	73	a	74	d	75	c	76	a	77	a	78	a	79	c	80	d
81	c	82	c	83	a	84	b	85	c	86	b	87	d	88	b	89	c	90	b
91	d	92	a	93	b	94	b	95	c	96	b	97	b	98	a	99	b	100	d

SOLUTIONS

Q1. Answer: (d) 8

Given:

cos x=(-1)/2 where π<x<3π/2

Formula used:

cos(π + x) = - cos x Because [π<x<3π/2]

Calculation:

cos x = - 1/2

=> cos x = cos(π + π/3)

=> x = 4π/3

4 tan2x - 3 cosec2x

=> 4 × (√3)² - 3 × (- 2/√3)²

=> 4 × 3 - 3 × 4/3

=> 12 - 4

=> 8

Therefore The required value is 8.

Mistake PointsThe value of tan and cot is positive in the third quadrant.

Q2. Answer: (a) Awadh

The correct answer is Awadh.

Key Points

• Awadh was called the “nursery of the Bengal army".

• Awadh known in British historical texts as Avadh or Oudh is a region and proposed state in the modern Indian state of Uttar Pradesh.

• The changes that the families of the sepoys saw around them and the threats they perceived were quickly transmitted to the sepoy lines.

• The large majority of the sepoys of the Bengal Army were recruited from the villages of Awadh and eastern Uttar Pradesh. Many of them were Brahmins or from the “upper” castes. Awadh was, in fact, called the “nursery of the Bengal Army’’.

Additional Information

• Some following facts, Awadh was called “nursery of the Bengal army":-

• The Bengal Army of the East India Company was mainly recruited from high castes living in Bengal, Bihar, and the Awadh.

• The sepoys were Indian soldiers who were recruited into the Company's army just before the rebellion of 1857.

• The Bengal Army recruited higher castes, such as Brahmins, Rajputs, and Bhumihar, mostly from the Awadh and Bihar regions, and even restricted the enlistment of lower castes in 1855. A practice that continued for the next 75 years.

Q3. Answer: (a) 2

Given:

6(sec2 59° - cot2 31°] + 2/3 × sin 90° - 3 × tan2 56° × y × tan2 34° = y/3

Formulas used:

cosec(90°- A) = sec A

tan(90° - A) = cot A

cosec2A- cot2 A = 1

Calculation:

6(sec2 59° - cot2 31°] + 2/3 × sin 90° - 3 × tan2 56° × y × tan2 34° = y/3

=> 6[sec²(90°- 31°) - cot² 31°] + 2/3 × 1 - 3 × tan²(90°- 34°) × y × tan234° = y/3

=> 6[cosec²31°- cot2 31°] + 2/3 - 3 × cot²34°× y × tan234° = y/3

=> 6 × 1 + 2/3 - 3 × 1/tan234°× tan234° × y = y/3

=> 6 + 2/3 - 3y = y/3

=> 20/3 = y/3 + 3y

=> 20/3 = 10y/3

=> 20 = 10y

Therefore y = 2

Q4. Answer: (a) Carbon dioxide

The correct answer is Carbon dioxide.

Key Points

• Carbon dioxide gas is needed for photosynthesis.

• The raw materials required for photosynthesis are carbon dioxide, water, and sunlight primarily.

• Plants take in carbon dioxide (CO2) and water (H2O) from the air and soil during photosynthesis.

• During photosynthesis in the plant cell, the water is oxidized, meaning it loses electrons, while the carbon dioxide is reduced, meaning it gains electrons.

• This transforms the water into oxygen and the carbon dioxide into glucose. The plant then releases the oxygen back into the air, and stores energy within the glucose molecules.

Additional Information

Gas	Use in photosynthesis
Oxygen	Oxygen is evolved during photosynthetic electron transport when water is split by the oxygen-evolving complex to provide protons and electrons to the chloroplastic electron chain, thereby generating ATP and NADPH. the energy source and reducing power for plant metabolism.
Hydrogen	During photosynthesis, Hydrogen ions are vital in both aiding proton gradients to help drive the electron transport chain, and for plant respiration. Hydrogen is necessary for building sugars and other molecules to produce glucose for plant energy.
Carbon mono oxide	Carbon monoxide does not poison plants since it is rapidly oxidized to form carbon dioxide which is used for photosynthesis.

Q5. Answer: (c) Rs. 800

Given:

Time taken by A to do a work = 10 days

Time taken by B to do the same work = 15 days

Time taken by A, B and C do the same work = 5 days

Amount of earning = Rs.4800

Formula used:

Ratio of shares of A, B and C = Ratio of their Efficiency

Calculation:

Let total work be = 1 unit

One day work done by A = 1/10

One day work done by B = 1/15

One day work done by A, B and C = 1/5

=> One day work done by C = 1/5 - (1/10 - 1/15)

=> 1/30

Ratio of shares of A, B and C = Ratio of their one-day work efficiency

=> A : B : C = 1/10 : 1/15 : 1: 30

=> A : B : C = 3 : 2 : 1

Therefore C's share in earning = Rs.4800 × 1/6

=> Rs.800

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Q6. Answer: (b) 96 cm²

Shortcut Trick

Side (s) = 10 cm and half of longest diagonal = 16 ÷ 2 = 8 cm.

In a rhombus, diagonals bisect at 90°, forming right triangles with the side as hypotenuse.

Using Pythagorean triplet (6, 8, 10), the half of the other diagonal = 6 cm.

Length of second diagonal (d2) = 6 × 2 = 12 cm.

Area of rhombus = 1/2 × d1 × d2 = 1/2 × 16 × 12 = 96 cm².

Therefore The correct answer is 96 cm².

Alternate Method

Given:

Side (s) = 10 cm

Diagonal 1 (d1) = 16 cm

Formula Used:

Area of Rhombus = 1/2 × d1 × d2

Relation between side and diagonals: $s^2 = (d1/2)^2 + (d2/2)^2$

Side = 10 cm

8 cm

6 cm

d1 = 16 cm | d2 = 12 cm

Calculations:

=> (d1/2) = 16 ÷ 2 = 8 cm

=> $s^2 = (d1/2)^2 + (d2/2)^2$

=> $10^2 = 8^2 + (d2/2)^2$

=> $100 = 64 + (d2/2)^2$

=> $(d2/2)^2 = 100 - 64 = 36$

=> $d2/2 = \sqrt{36} = 6$ cm

=> d2 = 6 × 2 = 12 cm

=> Area = 1/2 × 16 × 12

=> Area = 8 × 12 = 96 cm²

Therefore The correct answer is 96 cm².

Additional Information

Properties of a Rhombus

All sides are equal in length and opposite sides are parallel. Diagonals bisect each other at right angles (90°).

Perimeter of a Rhombus

The perimeter is calculated as 4 × side. For this question, Perimeter = 4 × 10 = 40 cm.

Area using Trigonometry

Area can also be calculated as $s^2 \times \sin(\theta)$, where θ is any internal angle of the rhombus.

Pythagorean Relation

The sum of squares of the diagonals is equal to four times the square of the side: $d1^2 + d2^2 = 4s^2$.

Q7. Answer: (a) Rs. 4400

Given:

Compound Interest on a sum for 2 years at 11% p.a. = Rs.4642

Formulas used:

Compound Interest + Principal = Amount

=> Amount = Principal × $(1 + R/100)^n$

Simple Interest = Principal × Rate/100 × Time

Calculation:

$4642 + P = P \times (1 + 11/100)^2$

=> 4642 = P × 111/100 × 111/100 - P

=> 4642 = P(111/100 × 111/100 - 1)

=> 4642 = P(12321 - 10000)/10000

=> 4642 = P × 2321/10000

=> P = 4642 × 10000/2321

=> P = Rs.20000

Therefore Simple Interest = 20000 × 11/100 × 2 = Rs.4400

Alternate Method Percentage MethodCompound interest and simple interest both are calculated on Principal. Effective rate percent of compound interest for 2 years = R + R + (R × R)/100

=> 11 + 11 + (11 × 11)/100

=> 22 + 1.21 = 23.21%

Simple interest rate percent for 2 years = Rate % × Time = 11% × 2 = 22%

23.21% of Principal = Rs.4642

=> 22% of Principal = Rs.4642 × 22%/23.21% = Rs.4400

Therefore The simple interest is Rs.4400.

Q8. Answer: (a) F2

The correct answer is F2.

Key Points

• The function key in Excel helps to switch to edit mode, that is F2.

• The function key F2 allows to quickly and easily edit the data of a cell by activating Excel's edit mode and placing the insertion point at the end of the active cell's existing contents.

• Pressing the F2 key puts the cell in Excel's edit mode. If the cell contains a formula, We will see the formula in the cell and be able to edit it.

• Use the mouse to click the formula bar at the top of the window. The cell activates, and it switches to editing mode. We also double-click the cell to activate editing mode, or we can press the "F2" key.

Additional Information

Function key	Description
F5	The "F5" key displays the "Go-To" dialogue box. The "Go-To" box will list down the valid "named range" available in the opened Excel workbook.
F3	The "F3" key helps in Excel to paste the name or paste the list into the selected cell as displayed in the below image. This function key will not work until and unless the list that you have created is having a "named range".
F7	The "F7" key opens the "Spelling" option in excel using which you can check the spellings in your workbook. It provides the same output as you get by navigating to the "Review" Tab on the top of the excel ribbon and then clicking on the "Spelling" button.

Q9. Answer: (a) Jineth Bedoya Lima

The correct answer is Jineth Bedoya Lima.

Key Points

• 2020, UNESCO/Guillermo Cano Press Freedom Prize has been awarded to Jineth Bedoya Lima.

• Colombian investigative journalist Jineth Bedoya Lima has been named as the laureate of the 2020 UNESCO/Guillermo Cano World Press Freedom Prize on the recommendation of an independent international jury of media professionals.

• Jineth Bedoya Lima was born in 1974.

• Lima's reporting has focused on the armed conflict and peace process in Colombia and on sexual violence against women. Ms Bedoya Lima was herself a victim of sexual violence in 2000.

• The UNESCO/Guillermo Cano World Press Freedom Prize is awarded annually on the occasion of World Press Freedom Day, celebrated on 3 May.

• The $25,000 Prize recognizes a person, organization, or institution that has made an outstanding contribution to the defence or promotion of press freedom, especially in the face of danger.

• Bedoya’s work, activism, and bravery have seen her receive many awards, including the CJFE International Press Freedom Award in 2000, the Courage in Journalism Award of the International Women’s Media Foundation in 2001, and the International Women of Courage Award in 2012.

Additional Information

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Person	Description
Cheng Yizhong	Chinese journalist Cheng Yizhong was named as the laureate of the 2005 UNESCO/Guillermo Cano World Press Freedom Prize by UNESCO Director-General Koichiro Matsuura, on the recommendation of an independent jury of media professionals from all over the world.
Mahmud Abu Zeid	Mahmoud Abu Zeid, also known as Shawkan is an Egyptian photojournalist. He won UNESCO/Guillermo Cano World Press Freedom Prize in 2018 for his contributions and marked its detention as Human Rights abuse.
Reeyot Alemu	Reeyot Alemu won the UNESCO/Guillermo Cano World Press Freedom Prize in 2013. She is an Ethiopian journalist who served a 5-year prison sentence following an unfair trial in which anti-terrorism laws were used to silence her writing.

Q10. Answer: (b) Vinaya Pitaka

The correct answer is Vinaya Pitaka.

Key Points

• The Buddhist text that comprises rules for monks is Vinaya Pitaka.

• Vinaya Pitaka is the oldest and smallest of the three sections of the Buddhist canonical Tipitaka (“Triple Basket”) and the one that regulates monastic life and the daily affairs of monks and nuns according to rules attributed to the Buddha.

• Vinaya Pitaka is the first of the Tripitaka and it contains all the disciplinary rules of ecclesiastical acts and duties formulated by the Buddha himself for the conduct and guidance of monks and nuns.

• It consists of five books: Parajika, Pachittiya, Mahavagga, Chullavagga, and Parivara.

• Vinaya Pitaka tells that there were separate wings for both men and women in Buddhist Sangha. It tells how to behave with each other and within the society. In Vinaya Pitaka, all the rules for Buddhist Sangha were written down.

Additional Information

Buddhist text	Description
Tipitaka	It is the collection of primary Pali language texts which form the doctrinal foundation of Theravada Buddhism. Together with the ancient commentaries, they constitute the complete body of classical Theravada texts.
Sutta Pitaka	Sutta Pitaka is an extensive body of texts constituting the basic doctrinal section of the Buddhist canon.
Abhidhamma Pitaka	The Abhidhamma Pitaka is a collection of canonical texts in the Theravada Buddhist tradition. Together with the Vinaya Pitaka and the Sutta Pitaka, it comprises the Tipitaka, the "Three Baskets" of canonical Theravada Buddhist texts.

Q11. Answer: (c) Amphan

The correct answer is Amphan.

Key Points

• The cyclone that hit Odisha and West Bengal in May 2020 is "Amphan".

• The super cyclonic storm Amphan got this name from Thailand, The word 'Amphan' is pronounced as 'Um-pun' which means sky.

• Amphan originated from a low-pressure area persisting a couple of hundred miles (300 km) east of Colombo, Sri Lanka, on 13 May 2020.

• On 20 May 2020, Cyclone Amphan cut a swathe through the northern part of the Indian state of Odisha, before bearing down on the state of West Bengal, with a wind speed of 185 kilometres per hour.

• Coastal areas in West Bengal comprising East Midnapore, North 24 Parganas, South 24 Parganas, Kolkata, Hooghly, and Howrah as well as Odisha were affected by the cyclone. It also caused significant destruction in Bangladesh.

Additional Information

Cyclone Name	Description

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Fani	Extremely Severe Cyclonic Storm Fani was the worst tropical cyclone to strike the Indian state of Odisha since 26 April 2019. The highest wind speed was 250 Km/h. Affected areas: East India, Odisha, Bangladesh, Andhra Pradesh, Sri Lanka, and Bhutan.
Bulbul	The cyclone Bulbul hit the coastal districts of West Bengal and Odisha on 5 November 2019. It made landfall between the Sagar Islands of West Bengal and Khepupara in Bangladesh. The highest wind speed was 155 Km/h.
Hudhud	Hudhud was a strong tropical cyclone that caused widespread damage to the state of Andhra Pradesh in India on 8 October 2014. The most affected region was Visakhapatnam along with districts of Vizianagaram and Srikakulam of the state. The highest wind speed was 215 Km/h. The word Hudhud comes from Arabic and refers to the Hoopoe bird.

Q12. Answer: (d) Imprisonment without trial.

The correct answer is Imprisonment without trial.

Key Points

• Imprisonment without trial was one of the measures taken by the British government under the Rowlatt Act.

• This law was passed in March 1919 by the Imperial Legislative Council.

• The Rowlatt Act is also known as the Anarchical and Revolutionary Crimes Act of 1919.

• Rowlatt Satyagraha was started by Mahatma Gandhi in response to the British government enacting the Rowlatt Act.

Important Points

• The Rowlatt Commission was appointed by the British Government in 1918.

• It caused a wave of anger in all sections spreading a country-wide agitation by Gandhiji and marking the foundation of the Non-Cooperation Movement.

• Lord Chelmsford was the Viceroy when the Rowlatt Act was passed.

Q13. Answer: (a) 44

Given:

Mean of a, b, c, d, e and f = 36

Mean b, d and f = 28

Formula used:

Mean = Sum of observations/No of observations

Calculation:

Sum of a, b, c, d, e and f = 36 × 6 = 216

Sum of b, d and f = 28 × 3 = 84

Sum of a, c and e = Sum(a, b, c, d, e, f) - Sum(b, d, f)

=> 216 - 84 = 132

Therefore Mean of a, c and e = 132/3 = 44

Q14. Answer: (b) Apurvi Chandela

The correct answer is Apurvi Chandela.

Key Points

• Apurvi Chandela became the world number one in women's 10m Air Rifle category in the 2019 ISSF World Cup.

• She is an Indian athlete who competes in the event of 10-metre air rifle sport shooting.

• She belongs to Rajasthan state.

• She was awarded the Arjuna awards 2016.

• Her Achievements:

• 2019 ISSF World Cup - Gold

• 2014 Commonwealth Games - Gold

• 2015 World Cup Final - Silver

• She will be representing India again at the 2021 Tokyo Olympics.

Additional Information

• Shooting:

• It is an important Olympic sport in India.

• Some of the most prominent Indian shooters include Abhinav Bindra, Jitu Rai, Rajyavardhan Singh Rathore, Vijay Kumar, Apurvi Chandela, Anjali Bhagwat, and many others.

• Chandro Tomar and Prakashi Tomar are the oldest and second oldest most acclaimed international female veteran shooters from India.

Q15. Answer: (a) 88

The logic is:

4 × 2 + 8 = 8 + 8 = 16

16 × 2 + 8 = 32 + 8 = 40

40 × 2 + 8 = 80 + 8 = 88

Hence, '88' is the correct answer.

Q16. Answer: (b) 1203059

Given:

Ratio of the votes cast for two candidates = 2 : 9

The successful candidate received 984321 votes

Calculation:

The successful candidate gets more votes than the loser candidates.

=> Let the votes cast for two candidates were 2a and 9a respectively

9a = 984321 [Because 2a < 2b]

=> a = 984321/9 = 109369

Therefore Total votes polled = 2a + 9a = 11a

=> 11a = 11 × 109369 = 1203059

Shortcut Trick9 = 984321

=> 1 = 109369

Therefore 2 + 9 = 11 = 1×11 = 109369 × 11 = 1203059

Q17. Answer: (a) 840 m²

Shortcut Trick

Side of the square = √4900 = 70 m, which is also the radius of the circle.

Length of the rectangle = 3/5 × radius = 3/5 × 70 = 42 m.

Area of the rectangle = Length × Breadth = 42 × 20 = 840 m².

Therefore The correct answer is 840 m².

Alternate Method

Given:

Area of the square = 4900 m²

Radius of circle = Side of the square

Length of rectangle (L) = 3/5 × Radius of circle

Breadth of rectangle (B) = 20 m

Formula Used:

Area of square = a² (where a is side length)

Area of rectangle = L × B

Calculations:

=> a² = 4900

=> a = √4900 = 70 m

=> Radius of the circle (r) = 70 m

=> Length of the rectangle (L) = 3/5 × 70 = 3 × 14 = 42 m

=> Area of the rectangle = L × B

=> Area of the rectangle = 42 × 20 = 840 m²

Therefore The correct answer is 840 m².

Additional Information

Square Properties

A square has all four equal sides. Its Area = a^2 and Perimeter = 4a (where a is side length).

Circle Properties

The Area of a circle = πr^2 and its Circumference = $2\pi r$ (where r is the radius).

Rectangle Properties

A rectangle has opposite equal sides. Its Area = Length × Breadth and Perimeter = 2 × (Length + Breadth).

Q18. Answer: (a) Son

By using the symbols in the table given below, we can draw the following family tree:

Clearly, Rahul is Son of Radha.

Hence, 'Son' is the correct answer.

Q19. Answer: (b) 21%

Given:

Length of side of a square increases by 10%

Formula used:

Area of square = $(Side)^2$

Calculation:

Let the side of square be = 10 units

Area of the old square = 10 × 10 = 100 sq. units

=> Increased side of the square = 10 × 110/100 = 11 units

Area of the new square = 11 × 11 = 121 sq. units

Percentage increase of area = (New Area - Old Area)/Old Area × 100

Therefore The required increase in the area = (121 - 100)/100 = 21/100 × 100 = 21%

Alternate MethodEffective rate of increase = 10% + 10% + (10% × 10%)/100

=> 20% + 1% = 21%

Q20. Answer: (c) Sevasadan

The correct answer is Sevasadan.

Key Points

• Seva Sadan has been written by Munshi Premchand.

• In 1919, Premchand's first major novel Seva Sadan was published in Hindi.

• The novel was originally written in Urdu under the title Bazaar-e-Husn but was published in Hindi first by the name Sevasadan a Calcutta-based publisher.

• An English translation of this book was released by Oxford University Press, India in New Delhi in 2005.

• Sewasadan deals with poor conditions of women in society, child marriage, and dowry. It tells us about the Indian upper class and the opportunities they got from the British government. The novel was a shift from fantasy to a serious reflection of life.

• Dhanpat Rai was born on 31 July 1880 near Varanasi (Benares), his pen name is Premchand.

• He is one of the most celebrated writers of the Indian subcontinent, His works include more than a dozen novels, around 300 short stories, several essays, and translations of a number of foreign literary works into Hindi.

Additional Information

Book	Description
Chidambara	Chidambara is a collection of poems written by Sumitranandan Pant. Which was awarded the Jnanpith in 1968.
Kamayani	Kamayani is a Hindi epic poem by Jaishankar Prasad. It is considered one of the greatest literary works written in modern times in Hindi literature.
Yama	Yama has been written by Mahadevi Verma. In 1930, Nihar, in 1932, Rashmi, in 1933, Neerja were composed by her. In 1935, her collection of poems called Sandhyageet was published. In 1939, four poetic collections were published with their artworks under the title Yama.

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Q21. Answer: (d) Hanger

The logic is:

paper : stapler → A stapler is a mechanical device used for joining papers together.

Similarly,

clothes : ? → Hanger is a shaped piece of wood, plastic, or metal with a hook at the top, from which clothes may be hung in order to keep them in shape.

Hence, 'Hanger' is the correct answer.

Q22. Answer: (a) 6

Given:

Sum of square of two positive numbers = 2437

Square root of one number = 7

Formula used:

$\sqrt{a} = b$

$\Rightarrow a = b^2$

Calculation:

Let the two numbers be a and b respectively.

$a^2 + b^2 = 2437$

$\sqrt{a} = 7$

$\Rightarrow a = 7^2 = 49$

$49^2 + b^2 = 2437$

$\Rightarrow b^2 = 2437 - 2401 = 36$

$\Rightarrow b = \sqrt{36} = \pm 6$

Therefore The other number is + 6.

Q23. Answer: (b) Rs. 480

Given:

Principal of Rs.8000 borrowed for 3 years at 5% p.a. and the same sum was lent at 7% p.a. for the same time.

Formula used:

Simple Interest = $(P \times R \times T)/100$

Calculation:

Simple Interest paid by Ramesh = $8000 \times (5/100) \times 3$ = Rs.1200

Simple Interest earned by Ramesh = $8000 \times (7/100) \times 3$ = Rs.1680

Therefore Gain earned by Ramesh = Interest earned - Interest paid

$\Rightarrow$ 1680 - 1200 = Rs.480

Alternate MethodTotal interest percent = R% × T

Total interest percent to be paid = 5% × 3 = 15%

Total interest percent to be earned = 7% × 3 = 21%

Ramesh's gain = 21% - 15% = 6%

Therefore Gain in Rs. = 8000 × 6/100 = Rs.480

Q24. Answer: (a) 40 km/h

Given:

Distance covered = 400 km

Formula used:

Time = Distance/Speed

Calculation:

Let the speed of the train be = a km/h

As per the question;

$400/a - 400/(a + 10) = 2$

$\Rightarrow 1/a - 1/(a + 10) = 2/400$

$\Rightarrow (a + 10 - a)/a(a + 10) = 1/200$

$\Rightarrow 10/a(a + 10) = 1/200$

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=> $a^2 + 10a = 2000$

=> a2 + 10a - 2000 = 0

=> a2 + 50a - 40a - 2000 = 0

=> a(a + 50) - 40(a + 50) = 0

=> (a - 40)(a + 50) = 0

=> a = 40, a ≠ - 50

Therefore The speed of the train is 40 km/h.

Alternate MethodBy Value Putting Method;

By using the following equation.

=> 400/a - 400/(a + 10) = 2

Option 1: For a = 40, 400/40 - 400/(40 + 10) = 2

Option 2: For a = 50, 400/50 - 400/(50 + 10) ≠ 2

Option 3: For a = 55, 400/55 - 400/(55 + 10) ≠ 2

Option 4: For a = 45, 400/45 - 400/(45 + 10) ≠ 2

Q25. Answer: (d) Bachpan Bachao Andolan

The correct answer is Bachpan Bachao Andolan.

Key Points

• Nobel Laureate, Kailash Satyarthi is associated with the "Bachpan Bachao Andolan" organization.

• Kailash Satyarthi was born in the Vidisha district of Madhya Pradesh in India. After completing an electrical engineering degree, he worked as a teacher in the area. In 1980, he left teaching and founded the organization Bachpan Bachao Andolan.

• He has freed thousands of children from slave-like conditions. He has also been active in a wide range of other organizations working against child labor and for children's rights to education.

• He is the founder of multiple social activist organizations, including Bachpan Bachao Andolan, Global March Against Child Labour, Global Campaign for Education, and Kailash Satyarthi Children's Foundation.

• He has also contributed to the development of international conventions on the rights of children.

Additional Information

Organization	Description
Beti Bachao, Beti Padhao	Beti Bachao, Beti Padhao is a campaign of the Government of India. It aims to generate awareness and improve the efficiency of welfare services intended for girls in India. The Economic Survey 2019 has proposed a change in the Beti Bachao Beti Padhao (BBBP) scheme. The campaign, to be labelled BADLAV (Beti Aapki Dhan Lakshmi Aur Vijay Lakshmi).
SOS village	SOS Children's Villages is the world's largest non-governmental organization. SOS village independent, non-governmental, nonprofit international development organization and is headquartered in Innsbruck, Austria. It focuses on supporting children without parental care and families at risk.
Child Relief and You	Child Rights and You (CRY) is an Indian non-governmental organization (NGO) that works towards ensuring children's rights. The organization focuses on changing behaviours and practices at the grassroots level and influencing public policy at a systemic level, to create an environment where children are a priority.

Q26. Answer: (c) Kolkata Metro

The correct answer is Kolkata Metro.

Key Points

• The recently added 17th zone of the Indian Railway is Kolkata Metro.

• The Metro Railway of Kolkata, the country's oldest, Kolkata Metro has given December 29, 2010, became the 17th independent zone of the Indian Railways.

• "The making of Kolkata Metro as an independent zone was notified by the Railway Board on December 29, 2010.

• Railway Minister Mamata Banerjee announced that a Rs 10,000 crore project has been taken up for its expansion and infrastructure development.

Additional Information

Zone	Description
East Central Railway	The East Central Railway (ECR) is one of the 18 railway zones in India. It is headquartered at Hajipur and comprises Sonpur, Samastipur, Danapur, Mughalsarai, and Dhanbad divisions.
Delhi Metro	Delhi Metro Rail Corporation Limited (DMRC), is a company with equal equity participation from the Government of India and the Government of Delhi, built and operates the Delhi Metro.
Konkan Railway	The Konkan Railway is a subsidiary zone of the Indian Railways. It is one of the 17 zones of the Indian Railways but without any divisional structure unlike other railways zones in India. Its headquartered at CBD Belapur in Navi Mumbai, Maharashtra.

Q27. Answer: (b) Poverty

The correct answer is Poverty.

Key Points

• A cause for the Migration of unskilled workers in poverty.

• The unskilled workers migrate searching for ways to provide for their families and to escape unemployment, war, or poverty in their countries of origin.

• The Indian Census (2011) data calculated the total number of internal migrants accounting for inter and intra-state movement to be 450 million, an increase of 45% since the Census 2001 (De, 2019).

• Uttar Pradesh (UP), Bihar, Madhya Pradesh (MP), Rajasthan are among the major origin states of migration in India.

• Delhi, Kerala, Maharashtra, Gujarat, and Tamil Nadu are among the important destination states for these migrant workers.

Additional Information

• International Labour Organization brings together governments, employers and workers of 187 member States, to set labour standards, develop policies and devise programmes promoting decent work for all women and men.

• ILO was established in 1919 by the Treaty of Versailles as an affiliated agency of the League of Nations.

• Its headquarters are in Geneva, Switzerland.

• The President/ Director-General of ILO as of October 2021 is Mr Guy Ryder.

Q28. Answer: (d) 9 : 10

Given:

The ratio of male and female members = 4 : 5

Increase the percentage of males = 80%

Increase the percentage of females = 60%

Calculation:

Let the number of males and females be 40 and 50 respectively.

New number of males = 40 × 180/100 = 72

New number of females = 50 × 160/100 = 80

Therefore The new ratio of males to females = 72 : 80 = 9 : 10

Q29. Answer: (a) 121/2 days

Shortcut Trick

Efficiency ratio of A : B = 5 : 1 → Time ratio of A : B = 1 : 5.

Time difference = 5 − 1 = 4 units → 4 units = 60 days, so 1 unit = 15 days.

Time taken by A = 15 days, Time taken by B = 75 days.

Total work = LCM(15, 75) = 75 units.

Time taken together = Total Work ÷ Total Efficiency = 75 ÷ 6 = 12.5 days.

Therefore The correct answer is 12½ days.

Alternate Method

Given:

A is 5 times as efficient as B.

A takes 60 days less than B to complete the job.

Calculations:

=> Efficiency is inversely proportional to the time taken.

=> Ratio of efficiencies A : B = 5 : 1

=> Ratio of time taken A : B = 1 : 5

=> Difference in ratio parts = 5 − 1 = 4 parts

=> 4 parts = 60 days => 1 part = 15 days

=> Time taken by A = 1 × 15 = 15 days

=> Time taken by B = 5 × 15 = 75 days

Person	Days	Total Work	Efficiency
A	15	75	5
B	75	1	

=> Combined efficiency of A and B = 5 + 1 = 6 units/day

=> Time taken working together = Total Work ÷ Combined Efficiency

=> Time taken = 75 ÷ 6 = 25/2 = 12.5 days = 12½ days

Therefore The correct answer is 12½ days.

Additional Information

Efficiency & Time Relationship

Efficiency and time are strictly inversely proportional to each other. If the efficiency ratio of two workers is x : y, the ratio of the time taken by them to complete the same work will be y : x.

Total Work Formula

Total Work = Efficiency × Time Taken. To find the combined time taken by multiple workers, simply divide the total work by the sum of their individual efficiencies.

Alternate Day Work Concept

When workers work on alternate days, calculate the total work done in one complete cycle (e.g., 2 days for two workers) and scale it near to the total work before manually adding the remaining units.

Q30. Answer: (d) 129

The correct answer is 129.

Key Points

• India’s Rank in Human Development Index, 2019 is 129.

• Human Development Index, 2019 report said- India, Bhutan (129), Bangladesh (133), Nepal (142), and Pakistan (154) were ranked among countries with medium human development.

• Norway topped the index, while Niger is ranked last at 189.

• India's HDI value for 2019 is 0.645 which puts it in the medium human development category.

• India's Human Development Index or HDI position has marginally dropped after improving last year (2019). In the latest HDI ranking in 2020, India stands at 131. Last year India's ranking was 129.

• The life expectancy of Indians at birth in 2019 was 69.7 years while Bangladesh has a life expectancy of 72.6 years and Pakistan 67.3 years,

Additional Information

• Human Development Index is the measure of a nation's health, education, and standards of living.

• Countries ranked from 1 to 66 in the year 2019 are considered to be of very high HDI, ranked 67 to 119 are considered to be of high HDI, ranked 120 to 156 are considered to be of medium HDI and ranked 157 to 189 are considered to be of low HDI.

• The Human Development Report also reports the HDI for various groups of countries. These include regional groupings based on the UNDP regional classifications, HDI groups including the countries currently falling into a given HDI bracket, OECD members, and various other UN groupings.

• In 2020, the UNDP introduced another index, the planetary pressures–adjusted HDI (PHDI), which decreases the scores of countries with a higher ecological footprint.

Q31. Answer: (a) Millie Bobby Brown

The correct answer is Millie Bobby Brown.

Key Points

• The youngest-ever UNICEF Goodwill Ambassador is Millie Bobby Brown.

• Emmy Award-nominated actress Millie Bobby Brown has been announced as UNICEF's newest Goodwill Ambassador on 20 November 2018 in New York.

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• The appointment marked on World Children's Day at United Nations Headquarters and the Empire State Building in New York makes the 14-year-old UNICEF's youngest-ever Goodwill Ambassador.

• The British star will use her global platform to help raise awareness of children's rights and issues affecting youth, such as lack of education, safe places to play and learn, and the impact of violence, bullying, and poverty.

• Millie Bobby Brown was born in Marbella, Spain, on 19 February 2004, She is a British actress and model.

Additional Information

Personality	Description
Lily singh	Lilly Singh is a Canadian comedian, former talk show host, and a famous Youtuber.
Lionel Messi	He is a professional soccer player hailing from Argentina. Messi has claimed FIFA's player of the year award and the European Golden Shoe for top scorer on the continent six times, a record for each award.
Priyanka Chopra	She is a famous Indian actress and Miss World 2000 winner.

Q32. Answer: (b) ZBN - EHU

The pattern followed here is:

According to the alphabetical positions of the letters,

1.

2.

3.

4.

Hence, 'ZBN - EHU' is the odd one out.

Q33. Answer: (a) Hampi

The correct answer is Hampi.

Key Points

• The Heritage site that has the Dravidian style of architecture is Hampi.

• Hampi also referred to as the Group of Monuments at Hampi, is a UNESCO World Heritage Site located in Karnataka.

• The ruins at Hampi are a collection of heritage sites depicting the fine Dravidian style of art and architecture.

• The Virupaksha Temple is the most important heritage monument on this site, which continues to be a very important religious center for the Hindus.

• The Dravida style of architecture is an architectural idiom that emerged in the southern part of the Indian subcontinent or South India,

• The temples under the Dravida style were constructed in five different shapes such as square-shaped, rectangular-shaped, major circular, circular, and octagonal-shaped.

• Brihadishvara Temple, also called Rajarajesvaram or Peruvudaiyar Koyil, is dedicated to Shiva located in Thanjavur, Tamil Nadu, It is one of the largest South Indian temples and the Chennakesava Temple in Belur, Hoysaleswara temple in Halebidu, and the Kesava Temple in Somanathapura, etc an exemplary example of a fully realized Dravidian architecture.

Additional Information

Heritage site	Description
Ellora	Ellora, considered amongst the finest examples of rock-cut architecture, dates back to the Rashtrakuta dynasty, about 1,500 years ago. Maintained by the Archaeological Survey of India (ASI), The Ellora Caves were declared a World Heritage Site in 1983.
Khajuraho	The Khajuraho temples feature Nagara-style architectural symbols. They are best known for the erotic sculptures that adorn the temple walls. Built upon granite foundations, these temples are made using sandstone. Like most Hindu temples, the shrines at Khajuraho follow the Vastu-Purusha-Mandala design plan.
Konark	The Sun Temple in Konark exhibits the traditional Odisha style of architecture, also known as Kalinga architecture, on a grand scale.

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Q34. Answer: (a) 100032

Given:

Smallest six-digit number which is divisible by 4, 8, 12 and 16.

Concept:

LCM (Lowest Common Multiple)

Dividend = Divisor × Quotient + Remainder

Calculation:

LCM of 4, 8, 12 & 16 will be calculated by writing them as the product of their prime factors.

$4 = 2^2$

$8 = 2^3$

$12 = 2^2 \times 3$

16 = 2^4

So, LCM (4, 8, 12, 16) = 2^4 × 3 = 48

The smallest six-digit number is 100000.

By dividing 100000 by 48, we get the remainder 16.

So, we need to add the difference between the Divisor and Remainder to 100000 (Dividend) in order to get the smallest six-digit number divisible by 48.

=> 100000 + (48 - 16) = 48 × 2083 + 16 + (48 - 16)

=> 100032 = 48 × 2083 + 16 + 32

=> 100032 = 48 × 2083 + 48

=> 100032 = 48 × 2083 + 48

Therefore The smallest six-digit number which is completely divisible by 4, 8, 12 and 16 is 100032.

Q35. Answer: (b) B

Given:

Data related to accidents took place from 2000 to 2015 has been given in city A, B and C.

Calculation:

Number of accidents took place in city A from the year 2000 to 2015 = 400 + 600 + 500 + 550 = 2050

Number of accidents took place in city B from the year 2000 to 2015 = 600 + 550 + 350 + 300 = 1800

Number of accidents took place in city C from the year 2000 to 2015 = 450 + 550 + 650 + 450 = 2100

City B has the lowest number of accidents from 2000 to 2015.

Therefore City B can be said to have controlled accidents most effectively.

Q36. Answer: (b) 3

Given:

√(2116×√(48÷ x))=92

Formula used:

√a = b

=> $a = b^2$

Calculation:

√(2116×√(48÷ x))=92

By squaring both sides;

=> 2116 × √(48 ÷ x) = 92^2

=> 2116 × √(48 ÷ x) = 8464

=>√48 ÷ x = 8464/2116

=> √(48 ÷ x) = 4

=> 48/x = 4^2

=> 48/x = 16

=> x = 48/16

Therefore x = 3

Alternate MethodBy Value Putting Method

Option 1: For x = 12; √(2116 × √48 ÷ 12) ≠ 92

Option 2: For x = 3; √(2116 × √48 ÷ 3) = 92

Option 3: For x = 2; √(2116 × √48 ÷ 2) ≠ 92

Option 4: For x = 6; √(2116 × √48 ÷ 6) ≠ 92

Q37. Answer: (d) Punjab

The correct answer is Punjab.

Key Points

• In India, Punjab has the biggest consumption of fertilizer (in Kg Per hectare).

• Punjab state alone consumes about 9 per cent of the total fertilizers in India and the use is the highest on a per unit area basis at 190.1 kg/ha of the gross cropped area against 88.2 kg/ha in all India.

• The per-hectare consumption is more than 100 kg in Punjab (190 kg), Haryana (167 kg), Andhra Pradesh (138 kg), Uttar Pradesh, and Uttaranchal (127 kg), West Bengal (122 kg), and Tamil Nadu (112 kg).

• In the remaining states, the consumption per hectare is lower than the all-India average.

• The uses of major nutrients (N+P+K) went up from just 65.3 thousand tonnes in triennium ending (TE) 1968 to 1463.7 thousand tonnes in TE 2004. The use of K in Punjab soils is not high because soils are rich in K-illicit minerals.

Additional Information

State	Description
Haryana	Fertilizer per-hectare consumption in Haryana is 167 kg. Haryana ranks 11th in total fertilizer consumption.
West Bengal	Fertilizer per-hectare consumption in West Bengal is 122 Kg.
Andhra Pradesh	Fertilizer per-hectare consumption in Andhra Pradesh is 138 kg. Andhra Pradesh and Maharashtra account for the consumption of more than 3000 thousand tonnes of fertilizer per year each.

Q38. Answer: (b) A

Given:

The data for 2020 follows the trend similar to that of 2015

Calculation:

No of accidents in city A in 2020 = 550

No of accidents in city B in 2020 = 300

No of accidents in city C in 2020 = 500

No of accidents in city D in 2020 = 400

Therefore City A is most likely to have a higher number of accidents.

Q39. Answer: (c) 6

Given:

$x4 + x\text{-}4 = 1154$

Formula used:

$(a + b)^2 = a^2 + b^2 + 2ab$

Calculation:

$x4 + 1/x4 = 1154$ (1)

By adding 2 on both sides in equation (1)

$\Rightarrow x4 + 1/x4 + 2 = 1154 + 2$

$\Rightarrow (x^2 + 1/x^2)^2 = 1156$

$\Rightarrow (x2 + 1/x2) = \sqrt{1156} = 34$ (2)

By adding 2 on both sides in equation (2)

$\Rightarrow (x2 + 1/x2 + 2) = 34 + 2$

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

$\Rightarrow (x + 1/x) = \sqrt{36} = 6$

Therefore $x + x\text{-}1 = 6$

Q40. Answer: (d) Chandrashekhar Azad

The correct answer is Chandrashekhar Azad.

Key Points

• Indian revolutionary Chandrashekhar Azad set up a base near Satar river in Jhansi in the 1920s using the alias, Pandit Harishankar Brahmachari.

• Chandrashekhar Azad was born at Bhabra village in Madhya Pradesh on 23^(rd) July 1906.

• Bhavra also known as Bhabhra or Chandra Shekhar Azad Nagar is a town and a nagar panchayat in Alirajpur district in the state of Madhya Pradesh, where Azad reportedly lived incognito in the guise of a Sanyasi.

• Azad was involved in the 1925 Kakori Conspiracy wherein a train was robbed by Hindustan Republican Association (HRA).

• On 27 February 1931, Azad was killed in a gun battle with two police officers at Allahabad's Alfred Park.

Additional Information

Freedom Fighter	Important Points
Bhagat Singh	In 1928, he established the Hindustan Socialist Republican Association (HSRA) along with Sukhdev, Chandrashekhar Azad, and others. Bhagat Singh was also involved in the Central Assembly Bombing Case. He was hanged on 23rd March 1931. The day is observed as ‘Martyrs’ Day’ or ‘Shaheed Diwas’ or ‘Sarvodaya Day.'
Udham Singh	Udham Singh was a political activist who got associated with the Ghadar Party while in the US. He killed Michael O'Dwyer, former lieutenant governor of the Punjab, India in London to avenge the Jallianwala Bagh massacre. He was hanged to death on July 31, 1940, for committing a murder.
Khudiram Bose	Khudiram Bose was involved in the Muzaffar bombing to murder the Magistrate of Muzaffarpur, Kingsford. On 11 August 1908, one of India’s youngest revolutionary freedom fighters, Khudiram Bose was hanged by the British government (18 years of age).

Q41. Answer: (d) Bajirao

The correct answer is Bajirao.

Key Points

• In May 2019, the last captive White tiger of Mumbai died. The name of the tiger is Bajirao.

• The last captive white tiger inside Sanjay Gandhi National Park (SGNP) died of age-related complications. The animal was 18 years old.

• Bajirao was the eldest male in their enclosure.

• Bajirao’s carcass was burnt after the autopsy as per National Tiger Conservation Authority guidelines. There are six remaining Royal Bengal tigers at the park– four female and two male, all above 10 years of age.

Additional Information

• Bajirao was born in SGNP in 2001 to tigress Renuka and tiger Siddharth, both white tigers brought from Aurangabad Zoo in 1999.

• An expert advisory committee, comprising of senior veterinarians, both current and retired from SGNP and the Bombay Veterinary College (BVC), had been monitoring Bajirao’s health over the past four years.

• The tiger’s autopsy carried out by the pathology department of BVC indicated multiple organ failures along with old age as the probable cause of death. “The post mortem findings were suggestive of lesions (rotting or putrefied tissues) in visceral organs such as the kidney, heart, and liver,”

Q42. Answer: (b) Lakshwadeep

The correct answer is Lakshwadeep.

Key Points

• CSIR scientists have conducted a genetic study for the first time in Lakshwadeep, India.

• A team of researchers led by K Thangaraj at the Council of Scientific and Industrial Research (CSIR)-Centre for Cellular and Molecular Biology, Hyderabad have performed a genetic study on the Lakshadweep islanders.

• The genetic study on the Lakshadweep islanders for the first time and the results have been published in scientific reports on 6 May 2019.

• Centre for Cellular and Molecular Biology (CCMB), Hyderabad the first time has shown that a majority of human ancestry in

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Lakshadweep is largely derived from South Asia with minor influences from East and West Eurasia. And, there was no evidence of early human migration through the Lakshadweep islands.

• The authors have studied the major islands of Agatti, Andorth, Bitra, Chetlat, Kadmat, Kalpeni, Kiltan, and Minicoy of Lakshadweep and demonstrated a close genetic link of Lakshadweep islanders with people from the Maldives, Sri Lanka, and India.

Additional Information

• Lakshadweep is an archipelago of 36 islands, scattered over approximately 78,000 square km of the Arabian Sea, 200-440 km off the south-western coast of India, with a population of approximately 65,000.

• 'Lakshadweep' in Malayalam language and in Sanskrit means "Hundred Thousand Islands".

• DNA samples of 557 individuals from eight major islands for mitochondrial DNA and 166 individuals for Y chromosome markers were analyzed.

• The authors found a close genetic link of Lakshadweep islanders with people from the Maldives, Sri Lanka, and India. However, it did not find any evidence of early human migration through the Lakshadweep islands.

Q43. Answer: (b) Khilafat Movement

The correct answer is Khilafat Movement.

Key Points

• Another movement that was combined with the non-cooperation movement in 1920 was Khilafat Movement.

• The Khilafat Movement was launched by Muhammad Ali and Shaukat Ali.

• The movement finally collapsed when Ataturk abolished the caliphate altogether in 1924.

• Two mass movements that were organized in 1919-1922 to oppose the British rule in India were the Khilafat movement and Non-Cooperation Movement.

• The movements, despite having different issues, adopted a unified plan of action of non-violence and non-cooperation.

• In September 1920, at a special session in Calcutta, Congress approved a non-cooperation program till the Punjab and Khilafat wrongs were removed and swaraj was established.

• In December 1920, at the Nagpur session of the Indian National Congress, the program of non-cooperation was endorsed.

Additional Information

Movement	Description
Swadeshi Movement	Indian National Congress initiated the Swadeshi movement in Bengal against the announcement of the partition of Bengal in July 1905 by Lord Curzon. The Swadeshi movement was part of the Indian independence movement and contributed to the development of Indian nationalism.
Home Rule Movement	Indian independence movement witnessed the growth and spread of the home rule movement spearheaded by leaders like Bal Gangadhar Tilak and Annie Besant. Tilak launched the Indian Home Rule League in April 1916 at Belgaum. Annie Besant launched the Home Rule League in September 1916 at Madras.
August Kranti	The Quit India Movement was an important milestone in the Indian freedom struggle and is celebrated as August Kranti Day every year. On August 08, 1942. Mahatma Gandhi gave the clarion call of "Do or Die" to all Indians to drive away from British colonizers from the country.

Q44. Answer: (c) 6

The logic is:

Figure 1: (8 + 4 + 2 + 12) ÷ 2 = 26 ÷ 2 = 13

Figure 2: (16 + 8 + 4 + 24) = 52 ÷ 2 = 26

Similarly,

Let the missing number be a.

Figure 3: (14 + a + 2 + 22) ÷ 2 = 22

=> 38 + a = 22 × 2

=> 38 + a = 44

=> a = 44 - 38

=> a = 6

Hence, '6' is the correct answer.

Q45. Answer: (b) 2016

Shortcut Trick

Required numbers must be exactly divisible by the LCM of 6, 12, and 16, which is 48.

Multiples of 48 between 400 and 600 are 48 × 9, 48 × 10, 48 × 11, and 48 × 12.

Required Sum = 48 × (9 + 10 + 11 + 12)

Required Sum = 48 × 42 = 2016

Therefore The correct answer is 2016.

Alternate Method

Given:

Divisors = 6, 12, and 16

Range = Numbers strictly between 400 and 600

Concept Used:

A number is exactly divisible by a set of given numbers if it is a multiple of their Least Common Multiple (LCM).

Calculations:

=> Prime factorization of 6 = 2 × 3

=> Prime factorization of 12 = 2^2 × 3

=> Prime factorization of 16 = 2^4

=> LCM(6, 12, 16) = 2^4 × 3 = 16 × 3 = 48

=> We need to find all multiples of 48 that lie between 400 and 600.

=> Dividing 400 by 48, we get a quotient of 8.

=> The first multiple greater than 400 = 48 × 9 = 432

=> The maximum multiple less than 600 = 48 × 12 = 576

=> The valid numbers are: 432, 480, 528, 576

=> Sum of these numbers = 432 + 480 + 528 + 576 = 2016

Therefore The correct answer is 2016.

Additional Information

Least Common Multiple (LCM)

The smallest positive integer that is uniformly divisible by two or more numbers. It is obtained by taking the highest power of each prime factor involved in the numbers.

Sum of Arithmetic Progression (A.P.)

Consecutive multiples of a number always form an Arithmetic Progression. The sum can also be calculated using the formula: $S_n = n \div 2 \times (\text{first term} + \text{last term})$. Here, 4 ÷ 2 × (432 + 576) = 2 × 1008 = 2016.

Divisibility Rule

For a number to leave no remainder when divided by a group of divisors, it must be completely divisible by their LCM. If a remainder 'R' is specified, the general format of the number becomes (LCM × k) + R.

Q46. Answer: (b) 'Govind Bhallabh Pant

The correct answer is Govind Bhallabh Pant.

Key Points

• In the Constituent Assembly debate on 27 August 1947, Govind Bhallabh Pant said "I believe separate electorates will be suicidal to the minorities."

• Govind Ballabh Pant opposed the demand for separate electorates in the Constituent Assembly because:-

1. Govind Ballabh Pant was of the view that separate electorates would isolate the minorities permanently.

2. Minorities would become vulnerable.

3. The ruling government will not give them an opportunity to have a voice in the government.

4. It was also against the concept of a unified nation-state.

Additional Information

Person	Description
R V dhulekar	In 1946, Dhulekar was elected as a member of the Constituent Assembly of India. From 1920 to 1925, he published the Hindi newspapers Swaraja Prapti and Free India.

B. Pocker Bahadur	Sahib Bahadur was an Indian politician and social worker from Tellicherry, north Kerala, Madras Presidency.
Sardar Vallabhbhai Patel	He served as the First Deputy Prime Minister of India. He organized peasants from Kheda, Borsad, and Bardoli in Gujarat in non-violent civil disobedience against the British Raj. He was appointed as the 49th President of the Indian National Congress, organizing the party for elections in 1934 and 1937 while promoting the Quit India Movement.

Q47. Answer: (d) 10384

Given:

The least number of five digits, which is exactly divisible by 472.

Concept:

Dividend = Divisor × Quotient + Remainder

Calculation:

Least five-digit number = 10000

By dividing 10000 by 472;

=> 10000 = 472 × 21 + 88 (1)

By adding the difference of divisior and remainder that is, (472 - 88) 384 to both the sides in the above equation (1)

=> 10000 + 384 = 472 × 21 + 88 + 384

=> 10384 = 472 × 21 + 472

Therefore 10384 is the least five-digit number that is exactly divisible by 472.

Q48. Answer: (c) Rs. 40

Given:

Reduction percent in the price of wheat = 25%

Expenses on wheat = Rs.600

Formula used:

Expense = Price × Quantity

=> Quantity = Expense/Price

Calculation:

Let the original price = Rs.100a per kg

=> The reduced price of wheat = 100a × 75/100 = Rs.75a per kg

600/75a - 600/100a = 5

=> 104/3a - 26/a = 5

=> 8/a - 6/a = 5

=> 2/a = 5

=> a = 2/5

Therefore The original price per kg = 100a = 100 × 2/5 = Rs.40

Alternate MethodBy Ratio Method

25% = 25/100 = 1/4

Original Quantity = 3 × 5 = 15 kg

Expense = Rs.600

Therefore Original price of wheat per kg = Rs.600/15 = Rs.40

Q49. Answer: (b) Dr. BR Ambedkar

The correct answer is Dr. BR Ambedkar.

Key Points

• On being criticized for borrowing features from other countries for the constitution, Dr. BR Ambedkar said the following- “Nobody holds any patent rights in the fundamental ideas of a constitution".

• The Indian Constitution is known as a bag of borrowings and draws its features from the Constitutions of many countries. Dr. BR Ambedkar rightly said that it was created after ransacking the known Constitutions across the world.

• With 448 articles in 25 parts, 12 schedules, 5 appendices, and 98 amendments, the Constitution of India is the longest written constitution of any independent country in the world.

• It was adopted on November 26, 1949, while it came into force on January 26, 1950, when all the members of the Constituent Assembly signed the documents.

Additional Information

Person	Description
Dr. BR Ambedkar	He was the chairman of the Constitution drafting committee. He is also known as the 'Father of Constitution'. He was independent India's first law minister.
Sardar Vallabhbhai Patel	He served as the First Deputy Prime Minister of India. He organized peasants from Kheda, Borsad, and Bardoli in Gujarat in non-violent civil disobedience against the British Raj. He was appointed as the 49th President of the Indian National Congress, organizing the party for elections in 1934 and 1937 while promoting the Quit India Movement.
C. Rajgopalachari	He was also the first Indian Governor-General of the country. He founded the Swatantra Party in 1959, which favored classical liberal principles and free enterprise. He was the first one who received India's highest civilian award the Bharat Ratna.
Jawahar Lal Nehru	Jawaharlal Nehru (14 November 1889 – 27 May 1964) was the first Prime Minister of India. As Congress President in 1929, Nehru called for complete independence from the British Raj.

Q50. Answer: (a) Kerala

The correct answer is Kerala.

Key Points

• As per Public affair Index 2020 (PAI-2020), Kerala state emerged as the best-governed state in the country.

• The rankings were released by the Public Affairs Centre (PAC) in Bengaluru. Uttar Pradesh ended at the bottom in the large states category in the PAC ranking 2020.

• Four southern states - Kerala, Tamil Nadu, Andhra Pradesh, and Karnataka topped the list of 18 large states with a population of more than two crores. Uttar Pradesh, Odisha and Bihar were at the bottom of the ranking, scoring negative points in the category.

• The governance performance has been analyzed in the context of sustainable development defined by three pillars of equity, growth, and sustainability. The analysis used data from Central government sources.

Additional Information

• Four southern States Kerala 1.388 PAI Index point, Tamil Nadu 0.912 PAI Index point, Andhra Pradesh 0.531 PAI Index point, and Karnataka 0.468 PAI Index point stood in the first four ranks in the large State category in terms of governance.

• At the bottom, Uttar Pradesh (-1.461) PAI Index point, Odisha (-1.201) PAI Index point, and Bihar (-1.158) PAI Index point were at the bottom of the ranking.

• In the small State category, Goa ranked first with 1.745 PAI Index points, followed by Meghalaya (0.797,) and Himachal Pradesh (0.725). The worst performers with negative points were Manipur (-0.363), Delhi (-0.289), and Uttarakhand (-0.277).

• Chandigarh emerged at the top in the category of Union Territories with 1.05 PAI points, followed by Puducherry (0.52) and Lakshadweep (0.003). Dadar and Nagar Haveli (-0.69), Andaman, Jammu, and Kashmir (-0.50), and Nicobar (-0.30) were the worst performers.

Q51. Answer: (c) Extreme right

The correct answer is Extreme right.

Key Points

• As per the flag code of India 2002, the position of the Indian flag when it is displayed along with flags of other countries in a straight line is Extreme right.

• According to the flag code of India 2002, the general rule is that the Indian flag should be the starting point of all flags. When flags are placed in a straight line, the rightmost flag is the Indian flag, followed by other national flags in alphabetical order.

• When placed in a circle, the Indian flag is the first point and is followed by other flags alphabetically.

• When placed on crossed poles, the Indian flag should be in front of the other flag, and to the right (observer's left) of the other flag.

• The only exception to the preceding rule is when it is flown along with the flag of the United Nations, which may be placed to the right of the Indian flag.

Additional Information

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• The Flag Code of India, 2002, took effect from 26 January 2002 and superseded the "Flag Code-India" as it existed earlier.

• The Flag Code of India has been divided into three parts:-

1. First Part: General Description of the National Flag.

2. Second Part: Display of the National Flag by members of the public, private Organisations & educational institutions, etc.

3. Third Part: Display of National Flag by Union or State Governments and their organisations and agencies.

• As per the flag code of India, 2002 all other flags should be of approximately the same size with no other flag being larger than the Indian flag.

Q52. Answer: (a) 110°

Given:

PA and PB are the tangents to the circle with centre O.

angle PAB= 55°

Concept:

Tangents drawn from the same external point are equal in length.

A tangent perpendicular to the radius at the point of tangency.

Calculation:

Because angle PAB = 55°

Therefore angle PBA = 55° (PA = PB)

In triangle PAB,

angle APB + angle PAB + angle PBA = 180° (Angle Sum Property)

=> angle P + 55° + 55° = 180°

=> angle P = 70°

Also, angle AOB + angle APB = 180° (Sum of all the angles of a quadrilateral is 360° & angle P = 70° angle B = 90°)

=> angle AOB = 180° - 70° = 110

Therefore The measure of angle AOB = 110°

Q53. Answer: (d) Newton

The correct answer is Newton.

Key Points

• The three laws of motion were proposed by Sir Isaac Newton.

• Newton was born on January 4, 1643, in Woolsthorpe, Lincolnshire, England.

• Newton's three laws of motion are Law of Inertia, Law of Mass and Acceleration, and the Third Law of Motion.

• In developing his three laws Newton simplified objects, reducing them to mathematical points without size or rotation to let him ignore factors such as friction, air resistance, temperature, and material properties, and focus on outcomes that can be illustrated wholly with reference to mass, length and time.

• In 1687, Newton published Philosophiae Naturalis Principia Mathematica, most often known as Principia. Principia offers an exact quantitative description of bodies in motion, with three basic but important laws of motion:-

1. First Law A stationary body will stay stationary unless an external force is applied to it.

2. Second Law Force is equal to mass times acceleration, and a change in motion (i.e., change in speed) is proportional to the force applied.

3. Third Law For every action, there is an equal and opposite reaction.

Additional Information

Scientist	Description
Galileo	Galileo Galilei was Born on 15 February 1564, Pisa, Italy, and died on 8 January 1642, Arcetri, Italy. He is considered the father of modern science and made major contributions to the fields of physics, astronomy, cosmology, mathematics, and philosophy. Galileo invented the thermoscope and various military compasses and used the telescope for scientific observations of celestial objects.

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Aristotle	Aristotle was born in 384 BCE, Stagira, Chalcidice, Greece, and died 322, Chalcis, Euboea, He was an ancient Greek philosopher and scientist, one of the greatest intellectual figures of Western history. In metaphysics or the theory of the ultimate nature of reality, Aristotelianism involves belief in the primacy of the individual in the realm of existence, in the applicability to the reality of a certain set of explanatory concepts.
Edison	Edison was born on February 11, 1847, in Milan, Ohio, and died on October 18, 1931. He was an American inventor, scientist, and businessman whose inventions included the phonograph, the motion picture camera, and the light bulb. He held over 1,000 patents for his inventions.

Q54. Answer: (b) 28 kg

Given:

The average weight of A, B, C, and D = 56 kg

The average weight of A, B, and C = 52 kg

The average weight of C and D = 48 kg

Formula used:

Average weight = Total weight/No of persons

Calculation:

Total weight of A, B, C, & D = 56 kg × 4 = 224 kg (1)

Total weight of A, B, & C = 52 kg × 3 = 156 kg (2)

Total weight of C and D = 48 kg × 2 = 96 kg (3)

By (2) + (3) - (1)

=> (A + B + C) + (C + D) - (A + B + C + D) = 156 kg + 96 kg - 224 kg

=> A + B + 2C + D - A - B - C - D = 28 kg

=> C = 28 kg

Therefore The weight of C is 28 kg.

Q55. Answer: (a) Kalamsat

The correct answer is Kalamsat.

Key Points

• The first student satellite was built by an Indian high school student team and launched by NASA is Kalamsat.

• The satellite is named after former President and nuclear scientist Dr APJ Abdul Kalam and is called 'KalamSat'. It was flown into space in a NASA rocket.

• US space agency NASA has successfully launched the world's smallest and lightest satellite (Weighing just 64 grams.).

• The satellite was designed by 18-year-old Rifath Sharook along with six other teammates.

• The main role of the satellite is to demonstrate the performance of 3D-printed carbon fibre. It’s a 3D-printed satellite. It is for the first time that 3D printing technology is being used in space.

Additional Information

Satellite	Description
SRMsat	SRMsat is a Nanosatellite built by students at Sri Ramaswamy Memorial University(SRM Technology, Chennai) in India. The satellite is an Indian Technology demonstration and Earth observation satellite which is operated by the SRM Institute of Science and Technology.
Anusat	ANUsat (Anna University Satellite) is the first satellite built by an Indian University under the overall guidance of ISRO. It will demonstrate the technologies related to message store and forward operations.

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Pratham	Pratham is an Indian ionospheric research satellite that will be operated by the Indian Institute of Technology Bombay as part of the Student Satellite. It was conceptualized by a team of students under the supervision of Professor K. Sudhakar. Pratham was successfully launched on 26 September 2016 from Satish Dhawan Space Centre, Sriharikota, Andhra Pradesh along with 7 other satellites on PSLV C-35.

Q56. Answer: (d) 93

Given:

Number = 4707

Concept:

Dividend = Divisor × Quotient + Remainder

LCM = Lowest Common Multiple

It is the smallest positive number that is divisible by two or more numbers.

Calculation:

To find the least number which can be added to 4707 that is exactly divisible by 4, 5, 6 and 8, we need to find the LCM of these 4 numbers.

LCM of 4, 5, 6 and 8 can be calculated by prime factorization;

$4 = 2^2$

$5 = 5$

$6 = 2 \times 3$

$8 = 2^3$

=> LCM (4, 5, 6, 8) = $2^3 \times 3 \times 5 = 120$

When divided 4707 by 120, we get

=> 4707 = 120 × 39 + 27

By adding the difference of Divisor and remainder (120 - 27) = 93

=> 4707 + 93 = 120 × 39 + 27 + 93

=> 4800 = 120 × 39 + 120

=> 4800 = 120 (39 + 1)

=> 4800 = 120 × 40

Therefore The least number that should be added to 4707 so that the sum is exactly divisible by 4, 5, 6 and 8 is 93.

Q57. Answer: (b) INS Vagir

The correct answer is INS Vagir.

Key Points

• The Kalvari class submarine launched in Mumbai in Nov 2020 is INS Vagir.

• Indian Navy's fifth Kalvari-class Diesel Electric attack submarine INS Vagir was launched at Mazgaon Dock in Mumbai, The ship was launched on 12 November 2020.

• The submarine inherits its name from INS Vagir which served in the Navy from 1973–2001 and was named after a species of sandfish.

• It is the fifth among the six Kalvari-class submarines being constructed by the public sector shipbuilder Mazagon Dock Ltd (MDL) in Mumbai.

• The other vessels in the class are INS Kalvari, INS Khanderi, INS Karanj, INS Vela, and INS Vagsheer.

Additional Information

Submarine	Description
INS Khanderi	INS Khanderi is the second submarine of the first batch of six Kalvari-class submarines for the Indian Navy. The ship was launched in Mumbai on 12 January 2017. his named after Maratha King Shivaji Maharaj's island fort of Khanderi.

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INS Arighat	INS Arighat with a more efficient nuclear engine and potent long-range missiles is all set to be commissioned into India's strategic forces next year with INS Vikrant to be commissioned by August 15, 2022. It is the second nuclear-powered ballistic missile submarine being built by India under the Advanced Technology Vessel (ATV) project to build nuclear submarines at the Ship Building Centre in Visakhapatnam.
INS Karanj	INS Karanj is the third submarine of the first batch of six Kalvari-class submarines for the Indian Navy. The ship was launched in Mumbai on 31 January 2018. his named after Karanja island.

Q58. Answer: (d) Common Business Oriented Language

The correct answer is Common Business Oriented Language.

Key Points

• The full form of COBOL is Common Business Oriented Language.

• COBOL (Common Business-Oriented Language) is a high-level programming language for business applications.

• COBOL was the first popular language designed to be operating system-agnostic and is still in use in many financial and business applications today.

• COBOL is primarily used in business, finance, and administrative systems for companies and governments.

• Today many federal government agencies local banks, COBOL is still in use. For example, an estimated 43% of banking systems and 95% of ATM swipes utilize COBOL code.

Additional Information

• COBOL was designed in 1959 by CODASYL and was partly based on the programming language FLOW-MATIC designed by Grace Hopper.

• It was standardized in 1968 and has since been revised four times. The current standard is ISO/IEC 1989:2014.

• COBOL is a great candidate because it uses fixed-point decimal calculations as opposed to floating-point. A lot of modern languages like Java use floating-point, which means that their calculations are only accurate out to a certain “point”.

• Corporations use mainframes for applications that depend on scalability and reliability. For example, a banking institution could use a mainframe to host the database of its customer accounts, for which transactions can be submitted from any of thousands of ATM locations worldwide.

Q59. Answer: (a) 6

The logic is:

Column 1: 9 × 5 × 3 = 135

Column 2: 5 × 7 × 4 = 140

Similarly,

Let the missing number in column 3 be 'a'.

So, 5 × a × 5 = 150

=> 25 × a = 150

=> a = 150 ÷ 25

=> a = 6

Hence, ‘6’ is the correct answer.

Q60. Answer: (b) 1

Follow BODMAS rule to solve this question, as per the order given below,

Given:

(6.25+5/7×28-5)/(3/4×(15.8-3.4)+5×2.39)

Calculation:

(6.25+5/7×28-5)/(3/4×(15.8-3.4)+5×2.39)

=> (6.25 + 5 × 4 - 5)/(3/4 × (12.4) + 11.95)

=> (6.25 + 20 - 5)/(3 × 3.1 + 11.95)

=> (6.25 + 20 - 5)/(3 × 3.1 + 11.95)

=> 21.25/21.25

=> 1

Therefore The required result = 1

Q61. Answer: (c) Smilling Buddha

The correct answer is Smiling Buddha.

Key Points

• The code name of India's first successful Nuclear test was Smiling Buddha.

• India on May 18, 1974, conducted its first nuclear test, codenamed 'Smiling Buddha', in Rajasthan's Pokhran, becoming a nuclear power.

• The bomb was detonated on the army base Pokhran Test Range, in Rajasthan, by the Indian Army under the supervision of several key Indian generals.

• At the time of Indian Prime minister Indira Gandhi. The Indian Ministry of External Affairs (MEA) characterized this test as a "peaceful nuclear explosion".

• In May 1998, India again conducted a series of nuclear tests at the same location, it was called Pokhran-2 tests.

Additional Information

Code Name	Description
Laughing Buddha	The Laughing Buddha is a symbol of happiness, contentment, and prosperity. but Smiling Buddha was the assigned code name of India's first successful nuclear bomb test on 18 May 1974.
Operation Shakti	In May 1998, India again conducted a series of nuclear tests at the Pokhran, in Rajasthan, it was called Operation Shakti. These tests are also called Shakti–98, Shakti-I, Shakti-V, and Pokhran-2.
Operation Vijay	Operation Vijay (1961) was the operation by the Military of India that led to the capture of Goa, Daman, and Diu, and the Anjediva Islands. Operation Vijay (1999), which was the name of the Indian military operation to clear out the Kargil sector.

Q62. Answer: (a) Gopal Krishna Gokhale

The correct answer is Gopal Krishna Gokhale.

Key Points

• Mahatma Gandhi considers Gopal Krishna Gokhale his mentor in politics.

• Gopal Krishna Gokhale was the senior leader of the Indian National Congress and the founder of Servants of Indian Society. He is known to be a mentor to Mahatma Gandhi.

• Gopal Krishna Gokhale is known as "The Political Guru of Gandhi". He was the one who guided Mahatma Gandhi to travel around India in order to fight against the British.

• He was one of the social and political leaders during the Indian Independence Movement against the British Empire in India.

• He guided Mahatma Gandhi after he came back from South Africa. Gopal Krishna Gokhale had immense knowledge in the field of Indian politics.

Additional Information

• Gopal Krishna Gokhale was born on May 09, 1866, in Kotluk, in a Brahmin family of Maharashtra. He died on February 19, 1915, at the early age of 49.

• Gopal Krishna Gokhale was a mentor to both Mohammed Jinnah and Mahatma Gandhi.

• Gopal Krishna Gokhale was also a social reformer whose goals were to promote non-violence and reform within existing government institutions.

Person	Description
Raychandbhai	Raychandbhai, also known as Shrimad Rajachandra, was born on 11th November 1867 at Vavania, a small town of Saurashtra, situated in the state of Morvi. He was the spiritual guru of Gandhiji.
Lala Lajpat Rai	Lajpat Rai is remembered for his role during the Swadeshi movement and for his advocacy of education. He was also called 'Punjab Kesari' and 'Lion of Punjab'.
Bal Gangadhar Tilak	He was one of the founders of the Fergusson College in Pune. He gave the slogan, "Swaraj is my birthright and I shall have it."

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Q63. Answer: (d) Trans-Siberian Railway

The correct answer is Trans-Siberian Railway.

Key Points

• The longest railway line in the world is Trans-Siberian Railway.

• The Trans–Siberian Railway connects Moscow with the Russian far east. Its running distance is 9,259 kilometres or 5,753 miles. The journey takes (167 hours) 6 days to complete.

• The Trans-Siberian railway line has connected Moscow to Vladivostok since 1916, and it is still being expanded. There are also branch lines into Mongolia, China, and North Korea.

• Tsar Alexander III and his son personally appointed ministers to build this railway line from 1891 to 1916.

• Trans- Siberian Railway played an important role in World War II in supplying the powers fighting in Europe. It also transported Soviet troops west from the Far East to take part in the Soviet counteroffensive.

Additional Information

Railway line	Description
The Union-Pacific railway	Union Pacific Railroad is a U.S. Class I railroad owned by Union Pacific Corporation operating 31,800 route miles of track and covering 23 states in the western two-thirds of the United States.
The Australian Trans-Continental Railway	This is the longest route of Australia, connecting Sydney in the east to Perth in the west. Major junctions on this route are Broken Hill, Kalgoorlie, and Coolgardie. The route includes the longest length of straight track in the world- 478.193 kilometers (297.135 miles).
Trans-Canadian Railway	The longest trans-continental railway of North America is Trans-Canadian Railway. It has 7,000 kilometers long rail line. It runs between Halifax city of Nova Scotia and Prince Rupert of British Columbia. this line is the economic artery of Canada.

Q64. Answer: (d) Lichen

The correct answer is Lichen.

Key Points

• Litmus solution is derived from Lichen.

• Lichen is used to determine the solution is neutral/acidic/basic. It has a mauve (purple) colour in distilled water.

• When added to an acidic solution, it turns red. When added to a basic solution, it turns blue.

• Lichens are plants that belong to the Thallophyta group. To obtain a litmus solution, the crushing and grinding of lichens are done. The dyes are then added to neutral water to get the required litmus solution.

• Litmus solution is obtained from lichens. A natural dye extracted from lichens is dissolved in distilled water to obtain a litmus solution. For example, It is used as an indicator to distinguish between acids and bases.

Additional Information

• Litmus solution is a purple dye, which is extracted from lichen, a plant belonging to the division Thallophyta, and is commonly used as an indicator.

• There are many other natural materials like red cabbage leaves, turmeric, coloured petals of some flowers such as Hydrangea, Petunia, and Geranium, which indicate the presence of acid or base in a solution. These are called acid-base indicators or sometimes simply indicators.

• Most of the acid-base indicators that are commonly used are synthetic but nature has its own indicators. Hydrangea, petunia, and Geranium have the ability to act as indicators.

Q65. Answer: (c) Truck farming

The correct answer is Truck farming.

Key Points

• The farmers specialize in vegetables only, this type of farming is known as Truck farming.

• In the regions where farmers specialize in vegetables only, the farming is known as Truck farming, and the distance of truck farms from the market is governed by the distance that a truck can cover overnight, hence the name truck farming.

• Vegetable farms are in some regions known as truck farms: "truck" is a noun for which its more common meaning overshadows its historically separate use as a term for "vegetables are grown for the market".

• The production of crops of some vegetables on an extensive scale in regions especially suited to their culture primarily for shipment to distant markets known as Truck farming.

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• The major truck-farming areas are in California, Texas, Florida, along the Atlantic Coastal Plain, and in the Great Lakes area.

• Centres for specific crops vary with the season. Among the most important truck crops are tomatoes, lettuce, melons, beets, broccoli, celery, radishes, onions, cabbage, and strawberries.

Additional Information

Farming type	Description
Cooperative farming	Cooperative farming mainly refers to farming practices where farming operations are conducted cooperatively. These agricultural practices are conducted by individuals on their holdings jointly with certain common agencies.
Mixed farming	Mixed farming is a type of farming that involves both the growing of crops and the raising of livestock. For example, a mixed farm may grow cereal crops such as wheat or rye and also keep cattle, sheep, pigs, or poultry.
Collective farming	Collective farming is a farm or a group of farms that is organized as a unit and managed and worked cooperatively by a group of labourers under state supervision, especially in a communist country.

Q66. Answer: (d) Tamil Nadu

The correct answer is Tamil Nadu.

Key Points

• The highest wind energy production in India is in Tamil Nadu state.

• The south Indian state of Tamil Nadu tops the list, with an annual wind power output of around 9,000 MW per annum- recording 8,631 megawatts (MW) at the end of 2018 and 9,075 MW in 2019.

• Out of the state's total installed capacity for electricity generation (which was 30,447 MW by the end of 2018), the wind sector contributed 28.34%.

• The Government of Tamil Nadu realized the importance and need for renewable energy, and set up a separate Agency, as a registered society, called the Tamil Nadu Energy Development Agency (TEDA) as early as 1985.

• Boasting India's largest installed wind power generation capacity, Tamil Nadu has located in the district of Kanyakumari, it features several wind turbines varying from 200KW to 1,650KW.

Additional Information

State	Description
Odisha	The current installed capacity stands at 2.0 MW. Odisha has a wind power potential of 1700 MW.
Karnataka	The state of Karnataka is rich in wind farms compared with others in India. The state's present installed capacity as of March 2019 is nearly 4938 MW.
Maharashtra	Maharashtra is one of the prominent states that installed wind power projects second to Tamil Nadu in India. As of the end of March 2016, the installed wind power capacity is 4655.25 MW.

Q67. Answer: (d) Surat

The correct answer is Surat.

Key Points

• The second spot in the Swacch Sarvekshan award for 2020 is Surat city, Gujrat.

• In the fifth edition of the annual cleanliness survey (Swacch Sarvekshan) of the country in 2020, Madhya Pradesh's Indore was placed on the first spot, Gujarat's Surat on the second spot, and Maharashtra's Navi Mumbai on third.

• The title of the second cleanest city in India is held by Surat. This commercial city known for textiles and diamonds has undergone rapid development over the years.

• Municipal Corporation has ensured that the dynamic changes included maintaining cleanliness. Surat now attracts local and international tourists to visit its popular attractions such as Ambaji Temple, Swaminarayan Temple, Sarthana Nature Park, Vansda National Park. Sardar Patel Museum, Dutch Garden, and Dumas Beach.

Additional Information

• Swachh Survekshan is a ranking exercise taken up by the Government of India to assess rural and urban areas for their levels of

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cleanliness and active implementation of Swachhata mission initiatives in a timely and innovative manner.

• The objective of the survey is to encourage large-scale citizen participation and create awareness amongst all sections of society about the importance of working together towards making towns and cities a better place to live. the survey also intends to foster a spirit of healthy competition among towns and cities to improve their service delivery to citizens, towards creating cleaner cities and towns.

• Swachh Survekshan 2020 is the fifth edition of the annual cleanliness urban survey conducted by the Ministry of Housing and Urban Affairs (MoHUA), Government of India.

• Swachh Survekshan 2020 surveyed a total of 4242 cities, 62 Cantonment Boards, and 97 Ganga Towns and saw unprecedented participation of 1.87 crore citizens.

Q68. Answer: (c) [figure]

The Venn diagram that best represents the relationship between Students, Interns and Research scholars is shown below:

Some Research scholars are Students and Interns, some Interns are Research scholars and Students and some Students are Interns and Research scholars as well.

A research scholar is typically a college or graduate student who works under an advisor works on projects in a specific field of study, seeking to analyze and uncover new information that can be presented in academic or trade journals.

Hence, ‘option 3’ is the correct answer.

Q69. Answer: (a) 5

The logic is:

1st figure: (40 + 12) - 30 = 52 - 30 = 22

2nd figure: (34 + 16) - 40 = 50 - 40 = 10

Similarly,

3rd figure: (28 + 20) - 43 = 48 - 43 = 5

Hence, '5’ is the correct answer.

Q70. Answer: (b) 11

Given:

371 + 372 + 373 + 374 + 375

Formula used:

$a^n + a^{(n + 1)} = a^n(1 + a)$

Calculation:

371 + 372 + 373 + 374 + 375

=> $371(1 + 3 + 3^2 + 3^3 + 3^4)$

=> 371(1 + 3 + 9 + 27 + 81)

=> 371(1 + 3 + 9 + 27 + 81)

=>371×121

=>371×11×11

Therefore The expression 371×11×11 has 11 as its factor.

Therefore It is divisible by 11.

Q71. Answer: (a) 20

The logic is:

Column 1: 4 × 9 + 8 = 36 + 8 = 44

Column 2: 3 × 7 + 6 = 21 + 6 = 27

Similarly,

Column 3: 8 × 2 + 4 = 16 + 4 = 20

Hence, ‘20’ is the correct answer.

Q72. Answer: (a) Bharat Heavy Electricals Limited

The correct answer is Bharat Heavy Electricals Limited.

Key Points

• The full form of BHEL is Bharat Heavy Electricals Limited.

• BHEL is founded and owned by the Government of India, is a manufacturing and engineering company based in New Delhi, India.

• It was established in 1964 and it is the largest and oldest power generation equipment manufacturer in India. In 1974 Heavy Electricals Limited merged with BHEL.

• BHEL alone generates around 20,000 MW per annum out of the available 35,000 MW power generated in the country.

• BHEL is also one of the largest exporters of engineering products and services. It exports in more than 60 countries globally.

Additional Information

• BHEL is founded and owned by the Government of India. Mr. Atul Sobti is Chairman & Managing Director of Bharat Heavy Electricals Limited (BHEL), and the current CEO of BHEL is Nalin Singhal since 08, July 2019.

• BHEL is involved in engineering, manufacturing, construction, servicing, and transmission in addition to power plant service, and evaluation of various products from key economic sectors such as transportation like Railways, energy, water, oil and gas, defence.

• BHEL also offered thousands of electric locomotives and defence equipment to Indian Railways including the Super Rapid Gun Mount (SRGM) naval guns produced to the Indian Army in collaboration with the Indian Ordnance Factories and Defense Simulators.

Q73. Answer: (a) 130

Follow BODMAS rule to solve this question, as per the order given below,

Given:

17 × 8 - 6 + [(27 - 3) ÷ 6 - 4]

Calculation:

17 × 8 - 6 + [(27 - 3) ÷ 6 - 4]

=>136 - 6 + [24 ÷ 6 - 4]

=>130 + [4 - 4]

=> 130 + 0

=> 130

Therefore The required result = 130

Q74. Answer: (d) 120 cm²

Given:

Perimeter of a right triangle = 60 cm

Hypotenuse = 26 cm

Formulas used:

$(x + y)^2 = x^2 + y^2 + 2xy$

Perimeter of the right-angle triangle = Base + Height + Hypotenuse

Pythagoras Theorem:

$Base^2 + Height^2 = Hypotenuse^2$

Area of right-angle triangle = 1/2 × Base × Height

Calculation:

Let the base and height be x and y respectively

Sum of base and height (x + y) = 60 - 26 = 34 cm (1)

Also, $x^2 + y^2 = 26^2$

=> x2 + y2 = 676 (2)

From (1)

(x + y) = 34

By squaring both sides;

=> x2 + y2 + 2xy = 1156

=> 676 + 2xy = 1156 Because [x2 + y2 = 676]

=>xy = (1156 - 676)/2

=> xy = 240 (3)

Therefore Area of right-angle triangle = 1/2 × 240 = 120 cm²

Q75. Answer: (c) 730

Given:

a2 + b2 = 82

ab = 9

Formulas used:

$(a + b)^2 = a^2 + b^2 + 2ab$

$(a + b)^3 = a^3 + b^3 + 3ab(a + b)$

Calculation:

$(a + b)2 = 82 + 2 \times 9$

$=>(a + b)2 = 100$

$=> (a + b) = \sqrt{100} = 10$ (1)

$(a + b)3 = a3 + b3 + 3ab(a + b)$

$=> 10^3 = a3 + b3 + 3 \times 9 \times 10$

$=> 1000 = a3 + b3 + 270$

$=> a3 + b3 = 1000 - 270$

Therefore $a3 + b3 = 730$

Alternate MethodBy using formula $a3 + b3 = (a + b)(a^2 - ab + b^2)$

$=> a3 + b3 = 10 \times (82 - 9) = 10 \times 73$

Therefore $a3 + b3 = 730$

Q76. Answer: (a) Digboi

The correct answer is Digboi.

Key Points

• The first oil well was discovered in Assam in Digboi.

• Crude oil was discovered in Digboi in the late 19th century and the first oil well was dug in 1866.

• Digboi is known as the Oil City of Assam where the first oil well in Asia was drilled. The Assam Oil Company was established in 1899 to oversee production.

• In 1901, Digboi Refinery was commissioned supplanting the earlier refinery at Margharita.

• The Indian Oil Corporation Ltd (IOC) took over the refinery and marketing management of Assam Oil Company Ltd. with effect from 1981 and created a separate division. This division has both refinery and marketing operations.

• The refinery at Digboi had an installed capacity of 0.50 million tonnes per year.

• Assam has 4 refineries- Noonmati Refinery, Namuligarh Refinery, Bongaigaon Refinery, and Digboi Refinery.

Additional Information

Place	Description
Rudrasagar	Rudrasagar oil fields are located about 40 km and 20 km southwest of Moran respectively in the Sibsagar district. Rudrasagar field of North Assam shelf is one of the oldest fields of India and the first discovered field in Eastern India. The Field was discovered in 1960 and put on production in 1966 from 12 wells. The annual production of oil is 10 lakh tonnes from Rudrasagar.
Naharkatiya	Naharkatiya is one of the two famous oil fields of Assam. The Naharkatiya field is located at a distance of 32 km southwest of Digboi at the left bank of the Burhi Dibing river. The oil was discovered in 1953 and production started in 1954. The annual production is 2.5 million tonnes of oil and one million cubic meters of natural gas.
Moran Hugrijan	Moran Hugrijan is located about 40 km southwest of Naharkatiya, Assam. Oil at Moran Hugrijan field was discovered in 1953 and production started in 1956. Moran s potential may be estimated at one million tonnes per annum. As many as 20 wells have been drilled which yield oil as well as gas.

Q77. Answer: (a) FNY

The pattern followed here is:

According to the alphabetical positions of the letters,

Hence, ‘FNY’ is the correct answer.

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Q78. Answer: (a) Charles Babbage

The correct answer is Charles Babbage.

Key Points

• Charles Babbage is considered the father of computers.

• Charles Babbage invented the machine called the Analytical Engine, which is a model of today's computers. Since he was the first person who gave us the basic idea of computers, he is known as the 'father of computers.

• In 1837 the Analytical Engine contained an ALU (arithmetic logic unit), basic flow control, and integrated memory, hailed as the first general-purpose computer concept.

• Because of funding issues, this computer was not built while Charles Babbage was alive. However, in 1910 Henry Babbage, Charles Babbage's youngest son was able to complete a portion of the machine that could perform basic calculations.

• Although Babbage never completed his invention in his lifetime, his radical ideas and concepts of the computer are what make him the father of computing.

Additional Information

Person	Description
John Atanasoff	Atanasoff invented the first electronic digital computer in the 1930s. His special-purpose machine has come to be called the Atanasoff–Berry Computer.
Charles Bachman	Charles William Bachman was an American computer scientist, he was particularly known for his work in the early development of database management systems.
Alan Turing	Alan Turing was a Computer scientist. Turing was highly influential in the development of theoretical computer science. Turing is widely considered to be the father of theoretical computer science and artificial intelligence.

Q79. Answer: (c) 139191991514

The logic followed here is:

The positional value of the letter is given as their code.

As "A" is equal to 1, "M" is equal to 13 and "R" is equal 18.

A = 1 which means A positional value is given

M = 13 which means A positional value is given

R = 18 which means A positional value is given

Letter	Given code
A	1
M	13
R	18

Similarly,

MISSION → ?

Letter	Given code
M	13
I	9
S	19
S	19
I	9
O	15
N	14

Thus MISSION → 139191991514

Hence, the correct answer is "139191991514".

Q80. Answer: (d) 392 kg-m/s

??The correct answer is 392 kg-m/s.

Key Points

• The momentum of a particle is a measure of the time required for a constant force to bring it to rest.

• In terms of an equation, the momentum of an object is equal to the mass of the object times the velocity of the object.

• Momentum = Mass * Velocity

• In physics, the symbol for the quantity momentum is the lower case p. Thus, the above equation can be rewritten as p = m • v.

• Momentum is a vector quantity; i.e., it has both magnitude and direction.

Additional Information

• Isaac Newton's second law of motion states that the time rate of change of momentum is equal to the force acting on the particle.

• Conservation of momentum can be described by P1 (before) + P2 (before) = P1 (after) + P2 (after).

• Some of the examples of momentum include -

• A train moving at 100 km/h.

• A bullet fired from a gun.

• A baseball flying through the air.

Q81. Answer: (c) 7.5%

Given:

Cost Price of two articles = Rs.3000 each

Profit on one article = 10%

Profit on another article = 5%

Formulas used:

Selling Price = Cost Price × (100 + Profit)/100%

Profit = Selling Price - Cost Price

Profit percent = Profit/Cost Price × 100

Calculation:

Selling Price of one article at 10% profit = 3000 × 110/100 = Rs.3300

Selling Price of another article at 5% profit = 3000 × 105/100 = Rs.3150

Total Selling Price of both articles = 3300 + 3150 = Rs.6450

Total Cost Price of both articles = Rs.3000 + Rs.3000 = Rs.6000

Profit on both articles = Rs.6450 - Rs.6000 = 450

Therefore Profit Percent on both articles = 450/6000 × 100

=> 7.5%

Alternate MethodBy Average MethodWhen the Cost Price of both the articles is equal;

Average or aggregate profit on two articles = (Profit1 + Profit2)/2

=> (10% + 5%)/2 = 15%/2

=> 7.5%

Q82. Answer: (c) 4

Follow BODMAS rule to solve this question, as per the order given below,

Given:

(46+3/4×32-6)/(37-3/4×(34-6))

Calculation:

(46+3/4×32-6)/(37-3/4×(34-6))

=> (46 + 3 × 8 - 6)/(37 - 3/4 × (28)

=> (46 + 24 - 6)/(37 - 3/4 × 7)

=> (46 + 24 - 6)/(37 - 3 × 7)

=> 64/16

=> 4

Therefore The required result = 4

Q83. Answer: (a) FGSQ

The pattern followed here is:

According to the alphabetical positions of the letters,

Similarly,

Hence, ‘FGSQ’ is the correct answer.

Q84. Answer: (b) 54

The pattern followed here is:

According to the alphabetical positions of the letters,

KARAN → K (11) + A (1) + R (18) + A (1) + N (14) = 11 + 1 + 18 + 1 + 14 = 45

Similarly,

ARUN → A (1) + R (18) + U (21) + N (14) = 1 + 18 + 21 + 14 = 54

Hence, ‘54’ is the correct answer.

Q85. Answer: (c) Energy

The correct answer is Energy.

Key Points

• The energy sector is the largest contributor of greenhouse gases, accounting for two-thirds of the total emissions.

• It is followed by the Agriculture sector which accounts for around 20% of the greenhouse gases emission.

• Greenhouse gases absorb infrared energy (heat energy) emitted from the earth’s surface and reradiate it back to the earth’s surface.

• The greenhouse gases trap heat in the earth’s atmosphere and warm the planet.

• The Primary GHGs are:

• Water Vapour.

• Carbon dioxide.

• Methane.

• Nitrous oxide.

• Ozone

• Distribution of Greenhouse Gases

Q86. Answer: (b) 34

The logic is:

2 + 5 = 7

7 + 7 = 14

14 + 9 = 23

23 + 11 = 34

Hence, ‘34’ is the correct answer.

Q87. Answer: (d) taller than C

1. A is taller than B and B is taller than C.

A > B > C

2. D is shorter than B but taller than C.

B > D > C

From 1 and 2, we get:

A > B > D > C

Then D is:

1. taller than B → False (B is taller than D)

2. the shortest → False (C is the shortest)

3. taller than A and B → False (Both A and B is taller than D)

4. taller than C → True

Hence, ‘taller than C’ is the correct answer.

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Q88. Answer: (b) C

Given:

Number of accidents took place from the year 2000 to 2015 in city A = 400 + 600 + 500 + 550 = 2050

Number of accidents took place from the year 2000 to 2015 in city B = 600 + 550 + 350 + 300 = 1800

Number of accidents took place from the year 2000 to 2015 in city C = 450 + 550 + 650 + 450 = 2100

Formula used:

Average = Sum of observations over the years/ No of years

Calculation:

Average no of accidents in city A = 2050/4 = 512.5

Average no of accidents in city B = 1800/4 = 450

Average no of accidents in city C = 2100/4 = 525

Therefore City C has the highest number of accidents on an average.

Q89. Answer: (c) [figure]

The Venn diagram that best represents the relationship between Short women, White-haired people, and Indians is shown below:

Some Indian women are short. Some short women have white hair. Some Indian people have white hair.

Hence, ‘option 3’ is the correct answer.

Q90. Answer: (b) Both, 1 and 2 are strong.

Arguments:

1. Yes, it is important to conduct elections so that the rights and complaints of the students can be heard by authorities → Strong (as it gives a proper reason to conduct elections in educational institutions)

2. No, it disrupts the educational environment and leads to chaos and violence in institutes which does not solve any problems but creates more issues → Strong (as it gives a proper reason to why elections should not be conducted in educational institutions)

Hence, both 1 and 2 are strong.

Additional Information

1. The agreement which is the reconstruing part of the statement is a strong agreement.
2. The argument should not be imagined.
3. The relationship of the agreement should be direct from the statement.
4. The argument should be simple and clear.
5. The agreement should be based on scientific facts.
6. The statement in the argument should receive a logical answer.

Q91. Answer: (d) 64

The pattern followed here is:

According to the alphabetical positions of the letters,

RAMAN → R (18) + A (1) + M (13) + A (1) + N (14) = 18 + 1 + 13 + 1 + 14 = 47

Similarly,

ARJUN → A (1) + R (18) + J (10) + U (21) + N (14) = 1 + 18 + 10 + 21 + 14 = 64

Hence, ‘64’ is the correct answer.

Q92. Answer: (a) S

The pattern followed here is:

According to the alphabetical positions of the letters,

14th letter is N

5th letter to the right of the 14th letter = N + 5 = S

S is the 5th letter to the right of the 14th letter.

Hence, ‘S’ is the correct answer.

Q93. Answer: (b) 387536

The logic is:

F	O	R	W	A	R	D
1	2	3	4	5	3	6

W	A	T	E	R
4	5	7	8	3

Similarly,

R	E	T	A	R	D
3	8	7	5	3	6

Hence, '387536' is the correct answer.

Q94. Answer: (b) 46234

The logic is:

L	A	S	T
1	2	3	4

B	O	O	K
5	6	6	7

Similarly,

T	O	A	S	T
4	6	2	3	4

Hence, '46234' is the correct answer.

Q95. Answer: (c) 43046721

The logic is:

9 × 9 = 81

81 × 81 = 6561

6561 × 6561 = 43046721

Hence, '43046721' is the correct answer.

Q96. Answer: (b) 3

Required Pattern: 8 3 9

Given series: 1839793997634983974583968300775368265969

Clearly, three 3s are there in the given series that are followed by 9 and preceded by 8.

Hence, '3' is the correct answer.

Q97. Answer: (b) 2187

The logic is:

3 × 9 = 27

27 × 9 = 243

243 × 9 = 2187

Hence, '2187' is the correct answer.

Q98. Answer: (a) South

If the south-east direction moves two places and becomes north-east; and north-west moves two places to become south-west.

The above condition is true when each direction shifts its position by rotating 90º anti-clockwise.

So, the direction west would become South, assuming all other directions make similar movements.

Hence, 'South' is the correct answer.

Q99. Answer: (b) Nib

The logic is:

Hand : Thumb → Thumb is the initial part that is attached to the human hand.

Similarly,

Pen : ? → A nib is the initial part of a pen, through which we write.

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Hence, ‘Nib’ is the correct answer.

Q100. Answer: (d) North-west

We have drawn the figure according to the information given in the question,

(Let the turning points as shown in the figure)

Hence, Naveen is standing in the north-west direction from its starting point.

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