RRB NTPC CBT-I Official Paper (Held On: 27 Feb 2021 Shift 1) (Previous Year Paper)

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

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

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Q1. 10 is the mean of a set of 7 observations and 5 is the mean of another set of 3 observations. The mean of the combined set is:

(a) 7.5
(b) 10
(c) 15
(d) 8.5

Q2. The latest Mid day meal guidelines prescribe the nutritional content of ____ calories per child per day for primary classes.

(a) 475
(b) 345
(c) 450
(d) 300

Q3. The reciprocal of the sum of the reciprocals of 5/7 and 9/5 is:

(a) 45/88
(b) 88/35
(c) 35/88
(d) 88/45

Q4. If x = (√3)/2, then find the value of √(1 + x) + √(1 - x).

(a) 2 + √3
(b) (√3)/2
(c) √3
(d) 2 - √3

Q5. Read the given statements and conclusions carefully and decide which of the conclusions logically follow(s) from the statements.

Statements:

All girls in my class are talented.

Urmila has no talent.

Conclusions:

I. Urmila is not among the girls in my class.

II. Urmila must find a talent.

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

Q6. Read the given information and statements carefully and decide which option is correct with respect to the statements. If a circle has a radius (r), area (A) and circumference (C), then: Statements: 1. $A : C^2 = 1 : 4\pi$ 2. $A : C = r : 2$

(a) Only statement 1 is true.
(b) Both statements 1 and 2 are true.
(c) Only statement 2 is true.
(d) Both statements 1 and 2 are false.

Q7. Which is the most traded-around currency of the world?

(a) INR
(b) Dinar
(c) USD
(d) Euro

Q8. Name the elements that are required for Photosynthesis.

(a) Carbon dioxide, water and sunlight
(b) Sunlight, chloroflexi and water
(c) Water, oxygen and sunlight
(d) Oxygen, water and light

Q9. If $A + B = 45^o$, then $(1 + \tan A)(1 + \tan B) = ?$

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

Q10. If $\sqrt{(0.03 \times 0.3 \times p)} = 0.3 \times 0.03 \times \sqrt{q}$, then p/q is:

(a) 0.0009
(b) 0.09
(c) 0.009
(d) 0.9

Q11. The LCM of 4, 6 and x CANNOT be:

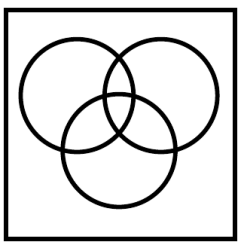
(a) 24
(b) 18
(c) 60
(d) 36

Q12. The capital required to earn a monthly interest of Rs. 1,500 at 12% per annum simple interest is:

(a) Rs. 25 lakhs
(b) Rs. 1.5 lakhs
(c) Rs. 1 lakh
(d) Rs. 15 lakhs

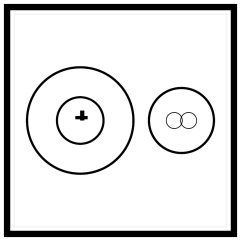
Q13. Which of the following best depicts the relationship between Children, Adult, Tall?

(a)

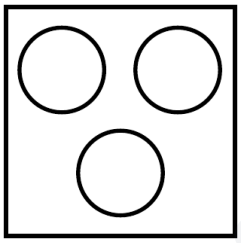


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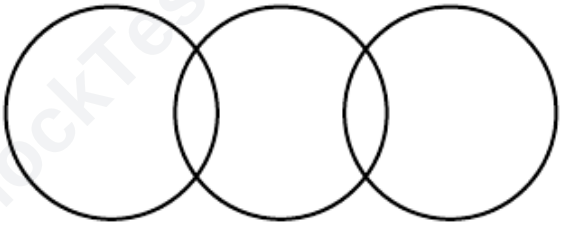
(b)



(c)



(d)



Q14. Who won the Jnanpith Award 2018 - The highest Literary Honour in India?

(a) Amitav Ghosh
(b) Rana Dasgupta
(c) Arundhati Roy
(d) Upmanyu Chatterjee

Q15. If the compound interest on a certain sum of money for 3 years at 5% per annum is Rs. 3,783, then what would be the simple interest on the same sum of money for the same period and at the same rate?

(a) Rs. 3,600
(b) Rs. 3,400
(c) Rs. 3,680
(d) Rs. 3,440

Q16. Read the given statements carefully and decide which option is correct with respect to the statements. Statements: 1. In any triangle, the concurrent point of medians is a centroid. 2. In any triangle, the concurrent point of altitudes is an orthocentre. 3. In any triangle, the concurrent point of internal angular bisectors is an in-centre.

(a) All statements 1, 2 and 3 are correct.
(b) Only statement 1 is correct.
(c) Only statement 2 is correct.
(d) Only statement 3 is correct.

Q17. The first nationalistic revolutionary movement in British India emerged from _____.

(a) Maharashtra
(b) Bengal
(c) Tamil Nadu
(d) Punjab

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Q18. The first Indian woman to win a gold in World Universiade in 2019 is:

(a) Sania Mirza
(b) Mary Kom
(c) Dutee Chand
(d) Saina Nehwal

Q19. If $a + b + c = 3$, $a^2 + b^2 + c^2 = 6$
and $1/a + 1/b + 1/c = 1$, where a, b and $c \neq 0$, then abc = ?

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

Q20. A alone can finish a job in 12 days, while B alone can finish it in 15 days. With the help of C, they can finish the same job in 5 days. If they are paid Rs. 2,880 for the whole job, what will be the share of C?

(a) Rs. 700
(b) Rs. 720
(c) Rs. 740
(d) Rs. 760

Q21. Who was the founder of the Forward Bloc party?

(a) Bipin Chandra Pal
(b) Subhas Chandra Bose
(c) Mahatma Gandhi
(d) Sarat Chandra Bose

Q22. Which of these is NOT an Endocrine Gland?

(a) Salivary
(b) Thyroid
(c) Adrenal
(d) Pineal

Q23. Find the value of $36 - 2 (20 + 12 \div 4 \times 3 - 2 \times 2) + 10$.

(a) -4
(b) 4
(c) 3
(d) -3

Q24. If a : b = 3 : 2, then (7a + 9b) : (5a + 7b) = ?

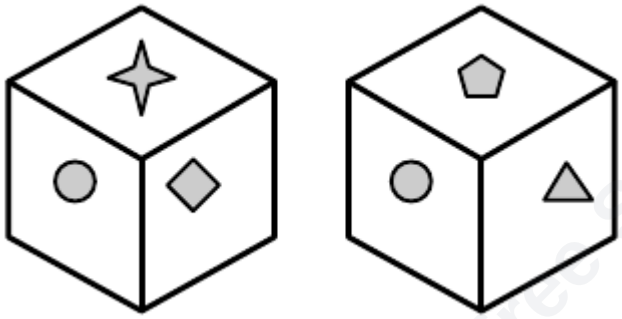
(a) 29 : 19
(b) 29 : 39
(c) 19 : 39
(d) 39 : 29

Q25. Which of the following is NOT an economic grouping formed by different nations to strengthen their economies?

(a) G7
(b) SAARC
(c) L8
(d) G20

Q26. Two positions of a rotated cube are shown below.

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Which shape will be at the bottom, when '



' is on the top?

(a)

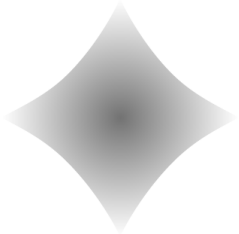
(b)



(c)



(d)



Q27. How many types of Indian river systems are there?

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

Q28. The World Hindi day is celebrated annually on _____.

(a) 10^(th) March
(b) 10^(th) January
(c) 10^(th) September
(d) 10^(th) April

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Q29. If $x^3 + y^3 = 36$ and $x + y = 6$, then $(1)/(x) + (1)/(y) = ?$

(a) (1)/(3)
(b) (5)/(6)
(c) 6
(d) (3)/(5)

Q30. Which of the following marine animals has no head, bone, eyes or nose?

(a) Starfish
(b) Crab
(c) Alaska fish
(d) Cat fish

Q31. In a triangle ABC, angle B = 90º, angle C = 45º and D is the midpoint of AC. If AC = 4√ 2 units, then BD is:

(a) 2√ 2 units
(b) √ 2 units
(c) 4√ 2 units
(d) 3√ 2 units

Q32. What is the sum of the squares of all two-digit numbers each of which is completely divisible by 4?

(a) 78320
(b) 78220
(c) 78324
(d) 78300

Q33. The value of $(0.3^4 - 0.2^4)/(0.3^2 + 0.2^2)$ is:

(a) 0.15
(b) 0.05
(c) 0.5
(d) 0.51

Q34. The HCF of two numbers is 30 and the LCM is 2310. If one of the numbers is 210, then the other number is:

(a) 220
(b) 440
(c) 550
(d) 330

Q35. Raju is thrice as good as a workman as Vinod and together they can finish a task in 21 days. In how many days can Vinod alone complete the work?

(a) 76
(b) 78
(c) 28
(d) 84

Q36. Which International tennis player was fined $10,000 for damaging the Wimbledon court in 2019?

(a) Rafael Nadal
(b) Naomi Osaka
(c) Serena Williams
(d) Roger Federer

Q37. A and B start driving simultaneously from point X and go towards point Y. X and Y are 60 km apart. A's speed is 4 km/h less than that of B. B, after reaching Y, returns and meets A at a point 12 km away from Y. Find the speed of A.

(a) 8 km/h
(b) 16 km/h
(c) 20 km/h
(d) 12 km/h

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Q38. Mahathi purchased a cooker at nine-tenth of its marked price and sold it for 8% more than its marked price. Find the gain percentage.

(a) 14%
(b) 10%
(c) 16%
(d) 20%

Q39. Read the given statements and conclusions carefully and decide which of the conclusions logically follow(s) from the statements.

Statements:

All girls are pretty.

X is pretty.

Conclusions:

I. X is a girl.

II. All pretty people are girls.

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

Q40. Which is the first element on the periodic table?

(a) Oxygen
(b) Hydrogen
(c) Carbon dioxide
(d) Nitrogen

Q41. If a and b are of the same sign and $(3a^2 - 8b^2) : (a^2 + 4b^2) = 2 : 1$, then a : b = ?

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

Q42. What does the Prasad Scheme of the Central Government focus on?

(a) Road safety
(b) Development of dams
(c) Panchayat Associations of India
(d) Development of pilgrimage destinations

Q43. If the sign + is interchanged with - and the number 9 is interchanged with 6, then which of the following four equations would be correct?

(a) 9 + 6 - 4 = 1
(b) 4 - 9 + 5 = 1
(c) 6 - 9 + 4 = 1
(d) 6 - 9 + 7 = 1

Q44. How will you write 8.17 hours in hours, minutes and seconds?

(a) 8 hours, 12 minutes
(b) 8 hours, 10 minutes, 12 seconds
(c) 8 hours, 17 minutes
(d) 8 hours, 10 minutes, 7 seconds

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Q45. If A and C interchange their places, B and D interchange their places, E and G interchange their places and so on for rest of the letters in the alphabet, then which letter will be 5^(th) to the left of O?

(a) R
(b) H
(c) T
(d) F

Q46. Which of these is NOT a part of the MS Office Suite?

(a) Projects
(b) Word
(c) Excel
(d) PowerPoint

Q47. A boy read three-eighth of a book on one day and four-fifth of the remainder of the book on the next day. If 45 pages still remain unread, how many pages does the book contain?

(a) 340
(b) 360
(c) 330
(d) 380

Q48. As of December 2020, who is the Lieutenant Governor of Jammu and Kashmir?

(a) Ram Madhav
(b) Arif Mohammad Khan
(c) Satya pal Malik
(d) Manoj Sinha

Q49. Who is known as the 'father of nuclear physics'?

(a) Isaac Newton
(b) E Rutherford
(c) James Watt
(d) JJ Thomson

Q50. When did Bangladesh emerge as an independent country?

(a) 1971
(b) 1972
(c) 1970
(d) 1975

Q51. On 25 April 1945, _____ governments met in San Francisco for a conference and started drafting the UN Charter.

(a) 25
(b) 60
(c) 50
(d) 45

Q52. The full form of IRDAI is:

(a) International Relations Development Authority of India
(b) Irrigation and Rural Development Authority of India
(c) Insurance Regulation and Developmental Authority of India
(d) Insurance Regulatory and Development Authority of India

Q53. Select an option that has the pair of letter clusters with same relation between the letter clusters as is seen in the following pair:

AFKP : ZUPK

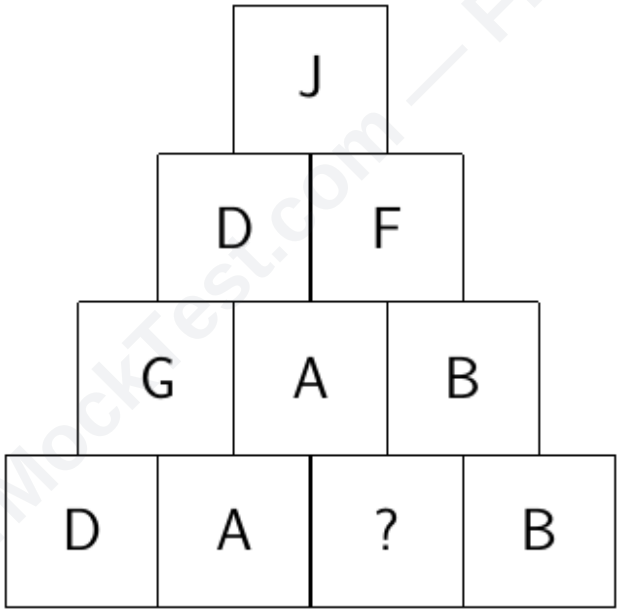
(a) EJOT : VWXY
(b) BGLQ : YTOJ

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(c) CHMR : WRMH
(d) DINS : XSNI

Q54. Which of these hormones stimulates uterine contractions and dilation of the cervix?
(a) ADH
(b) Oxytocin
(c) Progesterone
(d) Thyroxine

Q55. Which letter replaces the question mark in the given diagram?



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

Q56. Mb in computer language is the abbreviation of which of the following?
(a) Megaboast
(b) Masterboot
(c) Megabyte
(d) Megabit

Q57. There are five siblings: Raj, Rohan, Ram, Ritika, and Rani. All of the siblings have different heights. Raj's height is more than that of only one sibling. Rohan's height is more than that of Raj and Ritika but not more than that of Ram. Ritika's height is more than that of Raj. Ram is not the shortest. Who is the shortest among them?
(a) Rani
(b) Raj
(c) Ram
(d) Ritika

Q58. In which year will India host the G20 Summit?
(a) 2025
(b) 2022
(c) 2027
(d) 2023

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Q59. The institution responsible for construction and maintenance of India's highways is:

(a) Transport Authority of India
(b) National Highway Authority of India
(c) National Roads Safety Authority
(d) Highway Association of India

Q60. Three statements are given followed by two conclusions I and II. You have to consider the two statements to be true even if they seem to be at variance from commonly known facts and then decide which of the given conclusion(s) logically follows/follow from the given statements.

Statements:

1. All Trees are Flowers
2. No Flower is Plant.
3. Some Plants are Roots.

Conclusions:

I. Some Roots are Trees.

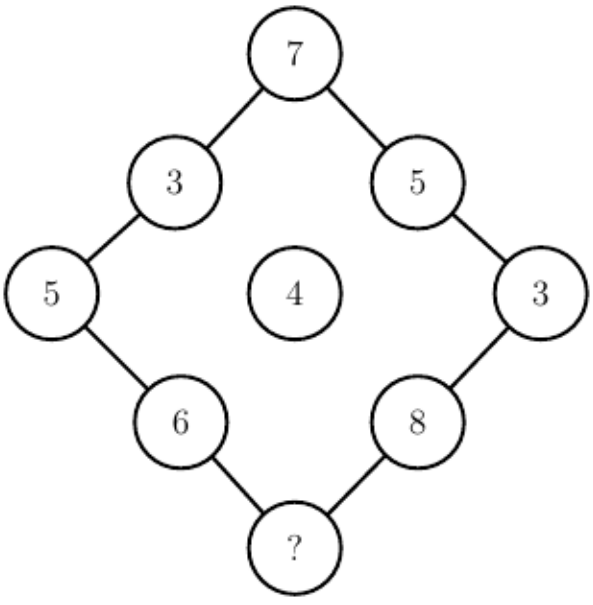
II. Some Plants are Trees.

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

Q61. Each side of an equilateral triangle is 3√ 3 cm. Find the altitude of the triangle.

(a) 4 cm
(b) 5.5 cm
(c) 5 cm
(d) 4.5 cm

Q62. What is the missing number in the given diagram?



(a) 6
(b) 5
(c) 4
(d) 8

Q63. Read the given information and statements carefully and decide which option is True with respect to the information.

If a sum of money is lent at simple interest, then the:

Statements:

1. Money gets doubled in 6 years if the rate of interest is 16%.
2. Money gets doubled in 5 years if the rate of interest is 18%.

(a) Only statement 2 is correct
(b) Only statement 1 is correct
(c) Both statements 1 and 2 are incorrect
(d) Both statements 1 and 2 are correct

Q64. What is the speed of sound in air?

(a) 434 m/sec
(b) 343 m/sec
(c) 383 m/sec
(d) 373 m/sec

Q65. Which of the following pigments are responsible to determine the colours of fruits and vegetables?

(a) Anthocyanins
(b) Hemocyanine
(c) Indocyanine
(d) Merocyanine

Q66. Which day is observed as Armed Forces Flag Day across all colleges in India?

(a) 15^(th) August
(b) 11^(th) December
(c) 7^(th) December
(d) 16^(th) November

Q67. Find the HCF of 3/2, 9/8, 81/16, 27/10.

(a) 80/3
(b) 3/80
(c) 1/40
(d) 2/81

Q68. As of October 2020, Kristalina Georgieva is Managing Director of:

(a) United Nations
(b) International Monetary Fund
(c) World Bank
(d) New Development Bank

Q69. The Union Government has appointed _____ as the chairperson of an empowered committee for the administration of Covid-19 vaccine.

(a) R S Sharma
(b) Piyush Goyal
(c) Rajiv Kumar
(d) Amit Shah

Q70. Which of the following is NOT a part of the alimentary canal of the human body?

(a) Rectum
(b) Oesophagus
(c) Pharynx
(d) Trachea

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Q71. Who said the following words: 'Indian nationalism is an elite phenomenon, a creation of lawyers and doctors and landlords'.

(a) Sardar Vallabhbhai Patel
(b) Mahatma Gandhi
(c) Rajendra Prasad
(d) Pt Jawahar Lal Nehru

Q72. As of October 2020, Mr. Shashi Shankar is the Chief Managing Director of:

(a) GAIL India
(b) Hindustan Petroleum
(c) ONGC
(d) OIL India

Q73. Rs. 200 was invested for 2 years on 10% compound interest per year. If the rate of interest had been 20%, then how much more would the investor have received as interest for the same period?

(a) Rs. 48
(b) Rs. 40
(c) Rs. 46
(d) Rs. 44

Q74. Which team won the Women's FIFA Football World Cup in 2019?

(a) China
(b) India
(c) New Zealand
(d) US

Q75. If $\cos 42^\circ = p$, then $\tan 48^\circ = ?$

(a) $(p)/(\sqrt{(1 - p^2)})$
(b) $(p^2)/(\sqrt{(1 - p^2)})$
(c) $(\sqrt{(1 - p^2)})/p$
(d) $(p + 1)/(\sqrt{(1 - p^2)})$

Q76. India Water Impact Summit 2019 was held in which city/state?

(a) Kolkata
(b) Delhi
(c) Hyderabad
(d) Mumbai

Q77. If $\sin 2A = \cos 75^\circ$, then the smallest positive value of A is:

(a) 15°
(b) 7.5°
(c) 75°
(d) 30°

Q78. Four terms have been given in options, out of which three are alike in some manner and one is different. Select the odd one.

(a) 13MN
(b) 3CX
(c) 11KP
(d) 9IH

Q79. Read the given statement and conclusions carefully and decide which of the conclusions logically follow(s) from the statements.

Statement:

"My husband will drive me to the Hudson Shopping Mall because my hand is not in a healthy condition to drive our

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car", X told Y.

Conclusions:

I. X will not go to Hudson Shopping Mall walking.

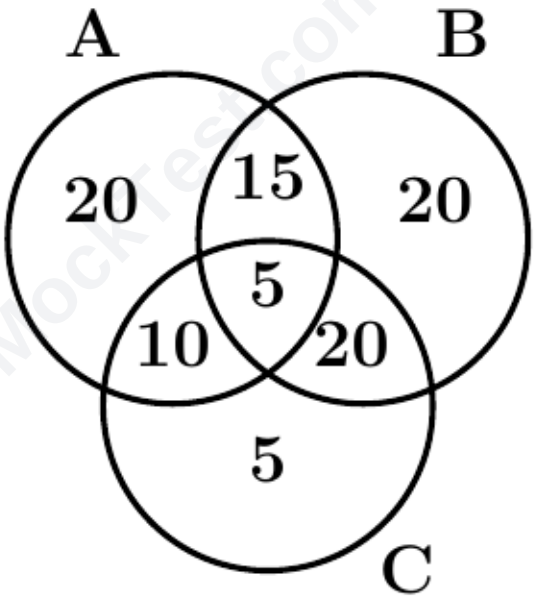
II. X is married.

III. Y is married.

IV. X knows how to drive a car.

(a) Only conclusions I, II and IV follow
(b) Only conclusions I and II follow
(c) Only conclusions II, III and IV follow
(d) Only conclusions II and Iv follow

Q80. Circle A, B and C represents singers, dancers and actors respectively. The total number of these are 50, 60 and 40 respectively. What is the number of people who are both singers and dancers but are not actors?



(a) 15
(b) 75
(c) 40
(d) 5

Q81. As per ministry of Road transport & Highways, National Highways carry _____ of India's total road traffic.

(a) 60%
(b) 50%
(c) 30%
(d) 40%

Q82. The Law of Gravitation was given by _____.

(a) Galileo Galilei
(b) Charles Darwin
(c) Albert Einstein
(d) Isaac Newton

Q83. A new dimension added by Amartya Sen to food security is:

(a) entitlements
(b) availability of food
(c) affordability
(d) sustainable livelihoods

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Q84. Sodium is a reactive metal, which if kept open reacts with _____ to explode and catch fire.

(a) phosphorous
(b) nitrogen
(c) hydrogen
(d) oxygen

Q85. The novel : 'A Prime Minister to Remember' was written by:

(a) Admiral Sushil Kumar
(b) Tavleen Singh
(c) Arundhati Roy
(d) Bipin Chandra Pal

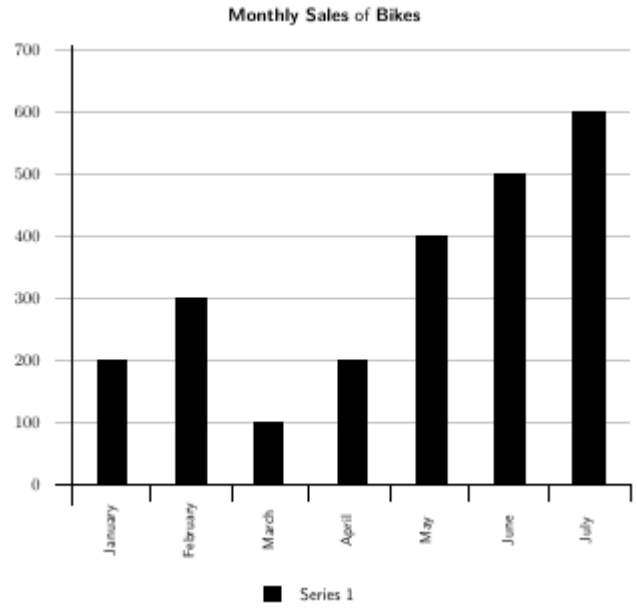
Q86. The following table shows the marks obtained by two students P and Q in different subjects

Subject	Student P	Maximum Marks	Student Q	Maximum Marks
Physics	50	100	65	100
Chemistry	85	100	90	100
Biology	55	100	50	100
Hindi	40	50	45	50

What is the approximate difference in the aggregate percentages of P and Q?

(a) 7%
(b) 6%
(c) 9%
(d) 10%

Q87. Below graph represents number of Bikes sold over a period of seven months. Observe the graph and answer the question given below.



Which of the following months individually accounts for the total sales in any of the other three months put together?

(a) June and July
(b) May, June and July
(c) Only July
(d) January, March and April

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Q88. Study the following table carefully to answer the question.

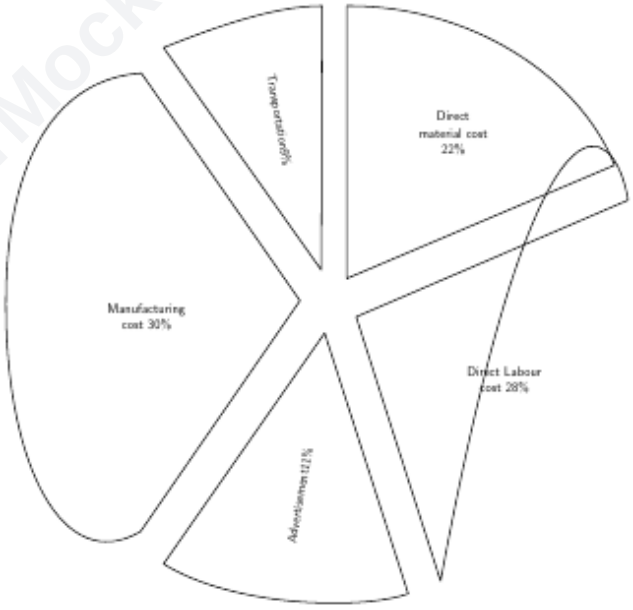
Expenditure (in million $) of a company A over the years

Items of expenditure	Years			
2012	2013	2014	2015	
Salary	145	115	200	255
Transport	48	60	71	82
Interest on loans	25	18	14	13
Taxes	4	3.5	2	6.5

What is the ratio between the expenditure on taxes in the year 2014 to the total expenditure on transport for all the years respectively?

(a) 1 : 130.5
(b) 1 : 133.5
(c) 1 : 135.5
(d) 1 : 131.5

Q89. The following pie-chart shows the percentage distribution of the expenditure incurred in manufacturing a ceiling fan. Study the pie-chart and answer the question.



If 10,000 ceiling fans are manufactured and the transportation cost on them amounts to Rs. 36,000, then what should the selling price of each ceiling fan be, so that the manufacturer can earn a profit of 50%?

(a) Rs. 75
(b) Rs. 60
(c) Rs. 40
(d) Rs. 50

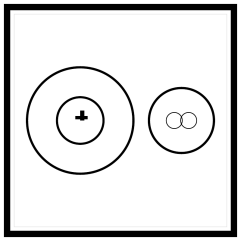
Q90. If I is J's maternal uncle, K's son, M's only sibling, L's father and N's nephew, how is M related to J?

(a) Mother
(b) Aunt
(c) Father
(d) Cousin

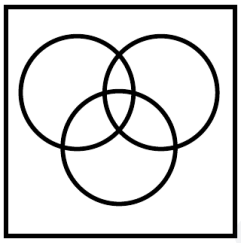
Q91. which of the following best depicts the relationship between Tiger, Tiger shark, Fish?

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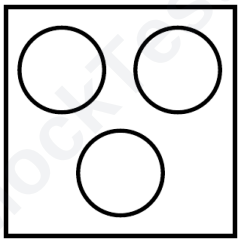
(a)



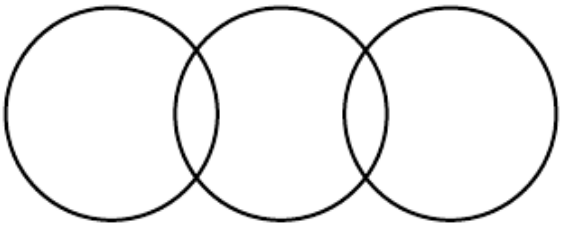
(b)



(c)



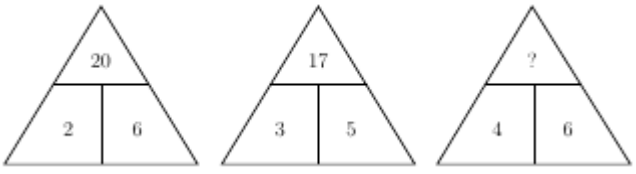
(d)



Q92. If 'HOTEL' is coded as 'CJOZG', how will 'HONOR' be written using the same coding language?

(a) CJIJM
(b) CJKJO
(c) CJJJN
(d) CJPJU

Q93. Which of the following numbers given in options will replace the question mark in the third diagram?



(a) 23
(b) 14
(c) 26
(d) 20

Q94. In a certain code language MEN is coded as 9 and WOMEN is coded as 25, then, which of the following will be the code for CHILDREN in that language?

(a) 64
(b) 48

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(c) 36
(d) 72

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

4704 : 336 : : 2590 : ?

(a) 180
(b) 185
(c) 188
(d) 158

Q96. If 'SKIRT' is coded as 'MECLN', how will 'BLOUSE' be written using the same coding language?

(a) VFIMOY
(b) VFOMIY
(c) VFMOIY
(d) VFIOMY

Q97. If the English alphabet is given in reverse order, then what is the 12^(th) letter to the right of O?

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

Q98. Select the option that will fill in the blank and complete the series correctly.

BAC, QRP, EDF, TUS, _____.

(a) WVX
(b) HIG
(c) HGI
(d) FGE

Q99. Select the option that is different from the rest in a certain way.

(a) Legislature
(b) Army
(c) Judiciary
(d) Executive

Q100. Select the option that is different from the rest in a certain way.

(a) Surat
(b) Gujarat
(c) Rajkot
(d) Ahmedabad

ANSWER KEY

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

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81	d	82	d	83	a	84	d	85	a	86	b	87	a	88	a	89	b	90	a
91	a	92	a	93	c	94	a	95	b	96	d	97	b	98	c	99	b	100	b

SOLUTIONS

Q1. Answer: (d) 8.5

Given:

Mean of the first set of 7 observations = 10

Mean of the second set of 3 observations = 5

Formula Used:

Mean of the combined set = (Sum of all observations in the first set + Sum of all observations in the second set) / (Number of observations in the first set + Number of observations in the second set)

Calculation:

Sum of all observations in the first set = 10 × 7 = 70

Sum of all observations in the second set = 5 × 3 = 15

Total number of observations = 7 + 3 = 10

Mean of the combined set = (70 + 15) / 10

=> Mean of the combined set = 85 / 10

=> Mean of the combined set = 8.5

The mean of the combined set is 8.5

Q2. Answer: (c) 450

The correct answer is 450 calories

Key Points

• The latest Mid day meal guidelines prescribe the nutritional content of 450 calories per child per day for primary classes.

• This measure ensures that children receive adequate nutrition to support their growth and learning.

• The Mid day meal program is an initiative by the government to provide free lunches to school children on working days.

• It aims to improve the nutritional status of children and encourage school attendance.

Additional Information

• The Mid day meal scheme was launched in India on 15th August 1995 as the National Programme of Nutritional Support to Primary Education (NP-NSPE).

• The program covers students in primary and upper primary classes in government and government-aided schools.

• It is one of the world's largest school meal programs, aiming to address hunger and malnutrition among school-aged children.

• The scheme also seeks to enhance socialization among children belonging to different social backgrounds.

Q3. Answer: (a) 45/88

Given:

The reciprocal of the sum of the reciprocals of (5/7) and (9/5).

Formula used:

Reciprocal of the sum of reciprocals = 1 / (1/a + 1/b)

Calculation:

Reciprocal of (5/7) = 7/5

Reciprocal of (9/5) = 5/9

=> Sum of the reciprocals = 7/5 + 5/9

=> Sum of the reciprocals = (63 + 25)/45 = 88/45

=> Reciprocal of the sum = 1 / (88/45)

=> Reciprocal = 45/88

Therefore The answer is 45/88.

Q4. Answer: (c) √3

Given:

We need to simplify the expression: √(1 + x) + √(1 - x).

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Step 1: Substituting the value of x

=> √(1 + √3/2) + √(1 - √3/2)

Step 2: Simplifying the terms

=> 1 + √3/2 = (2 + √3)/2 and 1 - √3/2 = (2 - √3)/2

Thus, the expression becomes:

=> √((2 + √3)/2) + √((2 - √3)/2)

Step 3: Further simplification

We factor out 1/√2 :

=> 1/√2 (√(2 + √3) + √(2 - √3))

Step 4: Squaring the terms

Square √(2 + √3) + √(2 - √3) :

=> (√(2 + √3) + √(2 - √3))² = (2 + √3) + (2 - √3) + 2 × √(2 + √3)(2 - √3)

Step 5: Simplifying the terms

=> 2 + √3 + 2 - √3 = 4

=> √(2 + √3)(2 - √3) = √(4 - 3) = √1

=> 2 × 1 = 2

Step 6: Final result of squaring

=> (√(2 + √3) + √(2 - √3))² = 4 + 2 = 6

Therefore:

=> √(2 + √3) + √(2 - √3) = √6

Step 7: Substituting back into the original expression

=> √6/√2

=> √6/√2 = √(6/2) = √3

Therefore The value of √(1 + x) + √(1 - x) is √3.

Q5. Answer: (a) Only conclusion I follows

The least possible Venn diagram for the given statements is as shown below :

Conclusions:

I. Urmila is not among the girls in my class → Follow (As all girls in my class are talented and Urmila has no talent. As all girls in my class comes in talented which cannot be Urmila, therefore it is true.)

II. Urmila must find a talent → Does not follow (As Urmila has no talent. As Urmila cannot be talented, therefore it is false.)

Therefore Here, Only conclusion I follows.

Hence, the correct answer is "Option 1"

Q6. Answer: (b) Both statements 1 and 2 are true.

Given:

If a circle has a radius (r), area (A) and circumference (C), then:

Statement 1: $A : C^2 = 1 : 4\pi$

Statement 2: $A : C = r : 2$

Formula Used:

Area of a circle, $A = \pi r^2$

Circumference of a circle, $C = 2\pi r$

Calculation:

For Statement 1:

$A = \pi r^2$

$C = 2\pi r$

$C^2 = (2\pi r)^2 = 4\pi^2 r^2$

$A : C^2 = \pi r^2 : 4\pi^2 r^2$

$A : C^2 = 1 : 4\pi$

Statement 1 is true.

For Statement 2:

$A = \pi r^2$

C = 2πr

A : C = πr² : 2πr

A : C = r : 2

Statement 2 is true.

Both statements 1 and 2 are true.

Q7. Answer: (c) USD

The correct answer is USD

Key Points

• USD is the most traded-around currency in the world.

• The USD, or United States Dollar, is widely used in international transactions and is the world's primary reserve currency.

• Its status as a global currency is backed by the economic strength of the United States, which is one of the largest economies in the world.

• The USD is involved in nearly 88% of all foreign exchange transactions according to the Bank for International Settlements (BIS).

Additional Information

• The Euro (EUR) is the second most traded currency in the world, followed by the Japanese Yen (JPY).

• The USD is also the most widely held reserve currency by central banks, making up about 60% of global foreign exchange reserves.

• The stability and liquidity of the USD make it a preferred currency for international trade and investment.

• Other major currencies include the British Pound (GBP), Swiss Franc (CHF), and Australian Dollar (AUD).

• The dominance of the USD is supported by the extensive US financial markets and the widespread use of the dollar in global trade and finance.

Q8. Answer: (a) Carbon dioxide, water and sunlight

The correct answer is Carbon dioxide, water and sunlight

Key Points

• Carbon dioxide, water and sunlight are essential elements required for photosynthesis.

• Photosynthesis is the process by which green plants and some other organisms use sunlight to synthesize foods with the help of chlorophyll.

• During photosynthesis, plants absorb carbon dioxide from the air and water from the soil, and with the help of sunlight, they produce glucose and oxygen.

• Chlorophyll, the green pigment in plants, plays a crucial role in capturing light energy to drive the photosynthesis process.

Additional Information

• Photosynthesis primarily occurs in the leaves of plants, specifically in the chloroplasts.

• The overall chemical reaction for photosynthesis can be represented as: 6CO2 + 6H2O + light energy → C6H12O6 + 6O2.

• This process is vital for the survival of life on Earth as it produces oxygen, which is essential for most living organisms.

• Photosynthesis also forms the base of the food chain, providing energy for herbivores, which in turn provide energy for carnivores.

Q9. Answer: (d) 2

Given:

A + B = 45º

Formula used:

tan(A + B) = (tan A + tan B) ÷ (1 - tan A tan B)

For A + B = 45º, tan(45º) = 1

Calculation:

1 = (tan A + tan B) ÷ (1 - tan A tan B)

=> 1 - tan A tan B = tan A + tan B

Now, expand (1 + tan A)(1 + tan B):

(1 + tan A)(1 + tan B) = 1 + tan A + tan B + tan A tan B

Substitute tan A + tan B = 1 - tan A tan B:

(1 + tan A)(1 + tan B) = 1 + (1 - tan A tan B) + tan A tan B

=> (1 + tan A)(1 + tan B) = 1 + 1 = 2

Therefore (1 + tan A)(1 + tan B) = 2.

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Q10. Answer: (c) 0.009

Given:

√(0.03 × 0.3 × p) = 0.3 × 0.03 × √q

Formula used:

Square both sides to remove the square root:

Calculation:

Square both sides:

(0.03 × 0.3 × p) = (0.3 × 0.03 × √q)²

=> 0.03 × 0.3 × p = 0.09 × 0.0009 × q

=> 0.009p = 0.000081q

Divide both sides by q:

=> p ÷ q = 0.000081 ÷ 0.009

=> p ÷ q = 0.009

Therefore The value is 0.009.

Q11. Answer: (b) 18

Given:

Numbers: 4, 6, and x

Formula Used:

LCM (Least Common Multiple) of a set of numbers is the smallest number that is a multiple of each of the numbers.

Calculation:

LCM of 4 and 6:

Prime factorization of 4: 2^2

Prime factorization of 6: 2 × 3

LCM(4, 6) = 2^2 × 3 = 12

For the LCM of 4, 6, and x to be a number, it must be a multiple of 12.

Checking each option:

Option 1: 24

24 is a multiple of 12

Option 2: 18

18 is not a multiple of 12

Option 3: 60

60 is a multiple of 12

Option 4: 36

36 is a multiple of 12

The LCM of 4, 6, and x CANNOT be 18.

Q12. Answer: (b) Rs. 1.5 lakhs

Given:

Monthly interest = Rs. 1,500

Annual interest rate = 12%

Interest is simple interest

Formula Used:

Simple Interest (SI) = (Principal × Rate × Time) / 100

To find Principal (P): Principal (P) = (SI × 100) / (Rate × Time)

Calculation:

Annual interest = Monthly interest × 12

Annual interest = Rs. 1,500 × 12

Annual interest = Rs. 18,000

Let Principal = P

Rate = 12%

Time = 1 year

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Using the formula for simple interest:

SI = (P × 12 × 1) / 100

Rs. 18,000 = (P × 12 × 1) / 100

To find Principal (P):

=> P = (Rs. 18,000 × 100) / 12

=> P = Rs. 1,50,000

The capital required to earn a monthly interest of Rs. 1,500 at 12% per annum simple interest is Rs. 1.5 lakhs.

Q13. Answer: (d) [figure]

The Venn diagram that best depicts the relationship between Children, Adult, and Tall is shown below:

Both children and adults can be tall.

Children are a different category from adults.

Hence, "Option 4' is the correct answer.

Q14. Answer: (a) Amitav Ghosh

The correct answer is Amitav Ghosh

Key Points

• Amitav Ghosh was awarded the Jnanpith Award for 2018, which is the highest literary honor in India.

• The award recognizes his outstanding contribution to literature and his extensive body of work, which includes novels, essays, and other writings.

• Amitav Ghosh is known for his profound and engaging storytelling, often weaving together history, culture, and the environment.

• His notable works include "The Shadow Lines," "The Glass Palace," and "The Ibis Trilogy," among others.

Additional Information

• The Jnanpith Award is presented annually by the Bharatiya Jnanpith to an author for their "outstanding contribution towards literature."

• The award was instituted in 1961 and is considered one of the most prestigious literary honors in India.

• The recipient of the award receives a cash prize, a citation plaque, and a bronze replica of Saraswati, the Hindu goddess of knowledge and wisdom.

• The award is open to works in any of the 22 languages listed in the Eighth Schedule of the Indian Constitution.

• Previous laureates include prominent writers such as G. Sankara Kurup, R.K. Narayan, and M.T. Vasudevan Nair.

Q15. Answer: (a) Rs. 3,600

Given:

Compound Interest (CI) for 3 years = Rs. 3,783

Rate (R) = 5% per annum

Time (T) = 3 years

Formula Used:

CI = P(1 + R/100)^T - P

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

Calculation:

Let the principal amount be P.

From the CI formula:

3,783 = P(1 + 5/100)³ - P

3,783 = P(1.05)³ - P

(1.05)³ = 1.157625

3,783 = P(1.157625 - 1)

3,783 = P(0.157625)

P = 3,783 / 0.157625

P ≈ Rs. 24,000

Now, calculating SI:

SI = (P × R × T) / 100

SI = (24,000 × 5 × 3) / 100

SI = (24,000 × 15) / 100

SI = 360,000 / 100

SI = Rs. 3,600

The simple interest on the same sum of money for the same period and at the same rate is Rs. 3,600.

Q16. Answer: (a) All statements 1, 2 and 3 are correct.

Given:

1. In any triangle, the concurrent point of medians is a centroid.

2. In any triangle, the concurrent point of altitudes is an orthocentre.

3. In any triangle, the concurrent point of internal angular bisectors is an in-centre.

Formula Used:

To determine the correctness of statements about the properties of triangles.

Calculation:

Statement 1: The centroid of a triangle is the point where its three medians intersect. This is a well-known property of triangles.

Statement 2: The orthocentre of a triangle is the point where its three altitudes intersect. This is also a well-known property of triangles.

Statement 3: The in-centre of a triangle is the point where its three internal angle bisectors intersect. This is another well-known property of triangles.

=> All statements 1, 2, and 3 are correct.

The correct answer is option 1.

Q17. Answer: (b) Bengal

The correct answer is Bengal

Key Points

• The first nationalistic revolutionary movement in British India emerged from Bengal.

• During the late 19th and early 20th centuries, Bengal became the epicenter of revolutionary activities aimed at ending British colonial rule.

• Prominent revolutionary groups such as Anushilan Samiti and Jugantar were established in Bengal.

• The movement included various activities such as armed resistance, assassinations of British officials, and bomb attacks.

• Key figures in the Bengal revolutionary movement included Aurobindo Ghosh, Bagha Jatin, and Surya Sen.

Additional Information

• The revolutionary activities in Bengal were part of a larger national struggle for India's independence.

• Despite heavy crackdowns by the British authorities, the revolutionary spirit continued to inspire future generations of freedom fighters.

• The partition of Bengal in 1905 by Lord Curzon further fueled the revolutionary activities, leading to widespread protests and the eventual reversal of the partition in 1911.

• The sacrifices made by these early revolutionaries laid the groundwork for the mass movements led by figures like Mahatma Gandhi and Subhas Chandra Bose.

Q18. Answer: (c) Dutee Chand

The correct answer is Dutee Chand

Key Points

• Dutee Chand is the first Indian woman to win a gold medal in the World Universiade.

• She achieved this milestone in the year 2019.

• The World Universiade, also known as the World University Games, is an international multi-sport event organized for university athletes by the International University Sports Federation (FISU).

• Dutee Chand won the gold medal in the 100 meters sprint event.

• Her victory marked a significant achievement in Indian athletics, highlighting her as one of the country's top sprinters.

Additional Information

• Dutee Chand hails from Odisha, India, and has represented the country in various international competitions.

• She is also known for her advocacy for gender equality and LGBTQ+ rights, being one of the few openly gay athletes in India.

• In addition to her Universiade gold, Dutee has also won multiple medals in the Asian Games and Asian Championships.

• Her achievements have inspired many young athletes in India to pursue careers in sports.

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Q19. Answer: (c) 3/2

Given:

$a + b + c = 3$

$a^2 + b^2 + c^2 = 6$

$(1/a) + (1/b) + (1/c) = 1$

Formula used:

$(1/a) + (1/b) + (1/c) = (ab + bc + ca) \div abc$

Calculation:

$ab + bc + ca = abc$ ...{$(1/a) + (1/b) + (1/c) = 1$}.

Using $a^2 + b^2 + c^2 = (a + b + c)^2 - 2(ab + bc + ca)$

$6 = 9 - 2(ab + bc + ca)$

$\Rightarrow ab + bc + ca = 3 \div 2$

$\Rightarrow abc = 3/2$

Therefore The value of abc is 3/2.

Q20. Answer: (b) Rs. 720

Given:

A alone can finish a job in 12 days.

B alone can finish a job in 15 days.

With the help of C, they can finish the job in 5 days.

Total payment for the job = Rs. 2,880.

Formula Used:

Work done by A in 1 day = 1/12

Work done by B in 1 day = 1/15

Work done by A, B, and C together in 1 day = 1/5

Share of C = Total payment × (Work done by C in 1 day)

Calculation:

Work done by A and B in 1 day = 1/12 + 1/15

$\Rightarrow$ Work done by A and B in 1 day = (5 + 4) / 60

$\Rightarrow$ Work done by A and B in 1 day = 9 / 60

$\Rightarrow$ Work done by A and B in 1 day = 3 / 20

Work done by A, B, and C together in 1 day = 1/5

Work done by C in 1 day = (1/5) - (3/20)

$\Rightarrow$ Work done by C in 1 day = 4/20 - 3/20

$\Rightarrow$ Work done by C in 1 day = 1/20

$\Rightarrow$ Work done by C in 5 days = 5/20

Share of C = Total payment × (Work done by C in 1 day)

$\Rightarrow$ Share of C = Rs. 2,880 × 5/20

$\Rightarrow$ Share of C = Rs. 720

The share of C is Rs. 720.

Q21. Answer: (b) Subhas Chandra Bose

The correct answer is Subhas Chandra Bose

Key Points

• Subhas Chandra Bose founded the Forward Bloc party in 1939.

• The Forward Bloc was established as a faction within the Indian National Congress.

• Bose aimed to consolidate the political left and rally radical elements within the Congress to fight against British colonial rule.

• Subhas Chandra Bose was a prominent freedom fighter and a key figure in the Indian independence movement.

• He believed in complete and immediate independence for India, differing from the more moderate approach of other Congress leaders.

Additional Information

• Subhas Chandra Bose was born on January 23, 1897, in Cuttack, Odisha.

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• He was elected as the President of the Indian National Congress in 1938 and 1939 but resigned due to differences with Mahatma Gandhi and other Congress leaders.

• Bose is also known for his role in leading the Indian National Army (INA) during World War II to fight against British rule.

• He is often referred to by the honorific title Netaji, which means "Respected Leader" in Hindi.

• Subhas Chandra Bose's legacy continues to inspire many in India and around the world.

Q22. Answer: (a) Salivary

The correct answer is Salivary

Key Points

• The Salivary gland is NOT an endocrine gland.

• Endocrine glands secrete hormones directly into the bloodstream, while salivary glands secrete saliva into the mouth.

• Examples of endocrine glands include the Thyroid, Adrenal, and Pineal glands, which release hormones that regulate various body functions.

• Salivary glands are part of the digestive system and play a crucial role in the initial stages of digestion.

Additional Information

• The human body has three pairs of major salivary glands: the parotid glands, submandibular glands, and sublingual glands.

• These glands produce saliva, which contains enzymes that begin the process of breaking down food.

• Endocrine glands, such as the Thyroid and Adrenal glands, play a vital role in regulating metabolism, stress response, and other essential bodily functions.

• The Pineal gland is responsible for producing melatonin, which regulates sleep patterns.

• Understanding the difference between endocrine and exocrine glands is fundamental in the study of human physiology and medicine.

Q23. Answer: (a) -4

Given:

Expression: 36 - 2 (20 + 12 ÷ 4 × 3 - 2 × 2) + 10

Formula Used:

Order of Operations (PEMDAS/BODMAS)

Calculation:

First, solve the expression inside the parentheses:

=> 20 + 12 ÷ 4 × 3 - 2 × 2

Division and multiplication from left to right:

=> 20 + 3 × 3 - 2 × 2

=> 20 + 9 - 4

Then, addition and subtraction from left to right:

=> 20 + 9 - 4

=> 29 - 4

=> 25

Now substitute back into the original expression:

=> 36 - 2 (25) + 10

Next, perform multiplication:

=> 36 - 50 + 10

Finally, perform addition and subtraction from left to right:

=> 36 - 50 + 10

=> -14 + 10

=> -4

The value of the expression is -4.

Q24. Answer: (d) 39 : 29

Given:

a : b = 3 : 2

Formula Used:

To find the ratio (7a + 9b) : (5a + 7b), we need to substitute a = 3k and b = 2k and then simplify.

Calculation:

Given a : b = 3 : 2

Let a = 3k and b = 2k

Substitute these values into the expression:

(7a + 9b) : (5a + 7b)

=> 7(3k) + 9(2k) : 5(3k) + 7(2k)

=> 21k + 18k : 15k + 14k

=> 39k : 29k

=> 39 : 29

The correct answer is 39 : 29.

Q25. Answer: (c) L8

The correct answer is L8

Key Points

• G7 is an economic grouping consisting of seven of the world's largest advanced economies, which includes Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States.

• SAARC (South Asian Association for Regional Cooperation) is an organization of South Asian nations, aimed at promoting economic and regional integration.

• G20 is an international forum for governments and central bank governors from 19 countries and the European Union, working to address issues related to global economic stability.

• L8 is not an established economic grouping and does not exist as a recognized entity in international economic forums.

Additional Information

• Economic groupings are formed to foster economic cooperation, trade, and investment among member nations.

• Such groupings often work on reducing trade barriers, enhancing economic integration, and addressing economic challenges collectively.

• Examples of prominent economic groupings include the European Union (EU), the North American Free Trade Agreement (NAFTA), and the Association of Southeast Asian Nations (ASEAN).

Q26. Answer: (a) [figure]

The logic followed here is:-

From the given two different cubes the adjacent sides are as shown below :

As

is common on both the dice, it is clear that

,

,

, and

are adjacent to it, and the remaining i.e.,

will be opposite to it.

Opposite pairs:

So, the opposite side of "

" will be side "

".

Hence, the correct answer is "Option 1".

Q27. Answer: (b) 2

The correct answer is 2

Key Points

• There are 2 types of Indian river systems.

• The Indian river systems are broadly classified into Himalayan rivers and Peninsular rivers.

• Himalayan rivers are perennial, originating from glaciers and snowfields in the Himalayas.

• Peninsular rivers are largely rain-fed and have seasonal flows.

• The classification is based on the origin, flow pattern, and the type of basin they form.

Additional Information

• The Himalayan river system includes major rivers like the Ganges, Brahmaputra, and Indus, which have extensive drainage

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basins and flow across multiple countries.

• The Peninsular river system includes rivers like the Godavari, Krishna, and Cauvery, which flow within the Indian subcontinent and have relatively smaller drainage basins.

• Rivers in India play a crucial role in agriculture, hydropower generation, and transportation.

• India has a rich tradition of river worship and reverence, with many rivers considered sacred in Hinduism and other religions.

• The management and conservation of river systems are critical for sustaining India's ecosystems and livelihoods.

Q28. Answer: (b) 10^(th) January

The correct answer is 10th January

Key Points

• World Hindi Day is celebrated annually on 10th January.

• The day marks the anniversary of the first World Hindi Conference held in 1975, which was inaugurated by the then Prime Minister of India, Indira Gandhi.

• The aim of the conference was to promote the Hindi language worldwide.

• World Hindi Day is different from National Hindi Day, which is celebrated on 14th September to mark the adoption of Hindi as the official language of India.

Additional Information

• Hindi is the fourth most spoken language in the world, with over 260 million native speakers.

• Efforts are made by the Indian government and various organizations to promote Hindi globally through cultural events, academic programs, and media.

• The World Hindi Secretariat, established in Mauritius, works to promote the Hindi language worldwide.

• Various events, including literary festivals, poetry sessions, and language competitions, are organized on World Hindi Day to celebrate the language.

Q29. Answer: (d) (3)/(5)

Sample question: If $x^3 + y^3 = 36$ and $x + y = 6$, then (1)/(x) + (1)/(y) = ? 1) 1/3 2) 5/6 3) 6 4) 3/5 5) The correct answer is option 4

Given:

If $x^3 + y^3 = 36$ and $x + y = 6$

Formula Used:

Use the identity for sum of cubes: $x^3 + y^3 = (x + y)(x^2 - xy + y^2)$

Calculation:

Given:

$x + y = 6$

$x^3 + y^3 = 36$

Using the identity:

$x^3 + y^3 = (x + y)(x^2 - xy + y^2)$

Substitute the given values:

$36 = 6(x^2 - xy + y^2)$

$\Rightarrow 36 = 6(x^2 - xy + y^2)$

$\Rightarrow 6 = x^2 - xy + y^2$

We know that:

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

$36 = x^2 + 2xy + y^2$

We already have:

$6 = x^2 - xy + y^2$

Subtract the two equations:

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

$\Rightarrow 36 - 6 = 3xy$

$\Rightarrow 30 = 3xy$

$\Rightarrow xy = 10$

We need to find:

$(1/x) + (1/y)$

$\Rightarrow (x + y) / xy$

=> 6 / 10

=> 3/5

The correct answer is option 4.

Q30. Answer: (a) Starfish

The correct answer is Starfish

Key Points

• Starfish is a marine animal that belongs to the class Asteroidea.

• It has no head, bones, eyes, or nose, making it unique among marine creatures.

• Starfish are known for their star-shaped body and their ability to regenerate lost arms.

• They have a water vascular system that helps them in locomotion and feeding.

Additional Information

• Starfish are found in all the world's oceans, from the tropics to frigid polar waters.

• They play a crucial role in marine ecosystems, often serving as keystone species.

• Starfish can have various colors, sizes, and shapes, with some species having more than five arms.

• They primarily feed on mollusks, such as clams and oysters, by prying them open with their tube feet.

• Their unique biological features make them a subject of interest in marine biology and ecological studies.

Q31. Answer: (a) 2√ 2 units

Given:

angle B = 90°, angle C = 45°

AC = 4√2 units

D is the midpoint of AC

Formula used:

$AB^2 = BD^2 + AD^2$

Calculation:

AB = BC = 4 units (from properties of a 45°-45°-90° triangle)

AC = 4√2 units, so AD = AC/2 = 2√2 units

Using $AB^2 = BD^2 + AD^2$:

=> $4^2 = BD^2 + (2\sqrt{2})^2$

=> $16 = BD^2 + 8$

=> $BD^2 = 16 - 8$

=> $BD^2 = 8$

=> $BD = \sqrt{8} = 2\sqrt{2}$ units

Therefore The correct answer is BD = 2√2 units.

Q32. Answer: (a) 78320

Given:

We need to find the sum of the squares of all two-digit numbers which are completely divisible by 4.

Formula Used:

Sum of squares = $\sum_{i=1}^{n} (\text{number})^2$

Calculation:

Two-digit numbers divisible by 4 are: 12, 16, 20, 24, 28, 32, 36, 40, 44, 48, 52, 56, 60, 64, 68, 72, 76, 80, 84, 88, 92, 96

Sum of squares = $12^2 + 16^2 + 20^2 + 24^2 + 28^2 + 32^2 + 36^2 + 40^2 + 44^2 + 48^2 + 52^2 + 56^2 + 60^2 + 64^2 + 68^2 + 72^2 + 76^2 + 80^2 + 84^2 + 88^2 + 92^2 + 96^2$

=> Sum of squares = 144 + 256 + 400 + 576 + 784 + 1024 + 1296 + 1600 + 1936 + 2304 + 2704 + 3136 + 3600 + 4096 + 4624 + 5184 + 5776 + 6400 + 7056 + 7744 + 8464 + 9216

=> Sum of squares = 78320

The sum of the squares of all two-digit numbers completely divisible by 4 is 78320.

Q33. Answer: (b) 0.05

Shortcut Trick

Recognize the algebraic form: $(a^4 - b^4) / (a^2 + b^2) = a^2 - b^2$.

Here, a = 0.3 and b = 0.2.
The expression simplifies to $0.3^2 - 0.2^2$.
Calculation: 0.09 − 0.04 = 0.05.
Therefore The correct answer is 0.05.
Alternate Method
Given:
Expression = (0.3^4 − 0.2^4) / (0.3^2 + 0.2^2)
Formula Used:
Algebraic Identity: $x^2 - y^2 = (x - y)(x + y)$
Calculations:
=> Let a = 0.3 and b = 0.2.
=> The numerator (a^4 − b^4) can be written as $((a^2)^2 - (b^2)^2$).
=> Using the identity: $(a^2)^2 - (b^2)^2 = (a^2 - b^2)(a^2 + b^2)$.
=> Substitute this in the original expression: $[(0.3^2 - 0.2^2)(0.3^2 + 0.2^2)]$ / (0.3^2 + 0.2^2).
=> Cancel the common term (0.3^2 + 0.2^2) from numerator and denominator.
=> Remaining value = $0.3^2 - 0.2^2$
=> 0.09 − 0.04 = 0.05.
Therefore The correct answer is 0.05.
Additional Information
Difference of Squares
The formula $a^2 - b^2 = (a - b)(a + b)$ is a fundamental algebraic identity used to factorize polynomial expressions.
Decimal Squaring Rule
When squaring a decimal with one decimal place (like 0.3), the result will have two decimal places (0.09).
Higher Order Powers
Differences of even powers can often be reduced: $a^{2n} - b^{2n} = (a^n - b^n)(a^n + b^n)$.

Q34. Answer: (d) 330

Given:
HCF of two numbers = 30
LCM of two numbers = 2310
One of the numbers = 210
Formula Used:
HCF × LCM = Product of the two numbers
Calculation:
Let the other number be xxxxxx
.
According to the formula:
30 × 2310 = 210 × xxxxxx
=> xxxxxx
= (30 × 2310) / 210
=> xxxxxx
= 69300 / 210
=> xxxxx
= 330
The other number is 330.

Q35. Answer: (d) 84

Given:
Raju is thrice as good as Vinod.
Raju and Vinod together can finish the work in 21 days.
Formula Used:
Work Rate = Work / Time

Combined Work Rate = Sum of Individual Work Rates

Calculation:

Let the amount of work Vinod can do in one day be V.

Since Raju is thrice as good as Vinod, the amount of work Raju can do in one day is 3V.

Combined work rate of Raju and Vinod = V + 3V = 4V

Given that together they can finish the work in 21 days, so:

4V × 21 = 1 (whole work)

4V × 21 = 1

=> V = 1 / (4 × 21)

=> V = 1 / 84

Time taken by Vinod alone to complete the work:

=> Time = 1 / V

=> Time = 1 / (1 / 84)

=> Time = 84 days

Vinod alone can complete the work in 84 days.

Q36. Answer: (c) Serena Williams

The correct answer is Serena Williams

Key Points

• Serena Williams was fined $10,000 for damaging a Wimbledon court in 2019.

• The incident occurred during a practice session before the start of the tournament.

• Williams is one of the most accomplished tennis players in the world, with numerous Grand Slam titles to her name.

• This fine was one of the highest handed out during that year's tournament.

Additional Information

• Wimbledon is one of the four Grand Slam tennis tournaments, and it is held annually in London, England.

• The tournament is known for its strict dress code, grass courts, and traditions such as the absence of sponsor advertising around the courts.

• Serena Williams has won multiple Wimbledon titles and is widely regarded as one of the greatest tennis players of all time.

• Besides the fine for damaging the court, players can also be fined for other on-court offenses such as racket abuse, unsportsmanlike conduct, and verbal abuse.

Q37. Answer: (a) 8 km/h

Shortcut Trick

Ratio of distances covered: A : B = (60 − 12) : (60 + 12) = 48 : 72 = 2 : 3.

Since time is constant, Speed Ratio = Distance Ratio = 2 : 3.

Difference in speed units = 3 − 2 = 1 unit.

Given speed difference = 4 km/h => 1 unit = 4 km/h.

Speed of A = 2 units = 2 × 4 = 8 km/h.

Therefore The correct answer is 8 km/h.

Alternate Method

Given: Total distance (X to Y) = 60 km. Speed of A is 4 km/h less than B. Meeting point is 12 km from Y.

Distance covered by B = 60 + 12 = 72 km.

Distance covered by A = 60 − 12 = 48 km.

Let the speed of B be v km/h. Then speed of A = (v − 4) km/h.

Since both start at the same time and meet, the time taken is equal.

=> Time = Distance / Speed

=> 48 / (v − 4) = 72 / v

=> 48v = 72(v − 4)

=> 2v = 3(v − 4)

=> 2v = 3v − 12

=> v = 12 km/h (Speed of B)

=> Speed of A = v − 4 = 12 − 4 = 8 km/h.

Therefore The correct answer is 8 km/h.

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Additional Information

Constant Time Property

When time is constant, the ratio of distances covered is directly proportional to the ratio of speeds (D1/D2 = S1/S2).

Relative Speed in Same Direction

If two objects move in the same direction with speeds u and v (v), the relative speed is (u − v).

Average Speed for Entire Journey

If a person travels from X to Y at speed 'a' and returns at speed 'b', Average Speed = 2ab / (a + b).

Q38. Answer: (d) 20%

Given:

Marked price of the cooker = M

Purchase price of the cooker = 9109109109

• It is a non-metal and is typically found as a diatomic gas (H_2) under standard conditions.

Additional Information

• Hydrogen plays a crucial role in the universe's chemistry, being a primary building block of stars through the process of nuclear fusion.

• On Earth, hydrogen is found in water (H_2O) and organic compounds, making it essential for life.

• Hydrogen is also used in various industrial applications, including refining petroleum, producing ammonia for fertilizers, and as a potential clean fuel source.

• In the periodic table, elements are arranged based on their atomic number, electron configurations, and recurring chemical properties.

• The periodic table was first created by Dmitri Mendeleev in 1869, and it has been expanded and refined over time.

Q41. Answer: (c) 4 : 1

Given:

$(3a^2 - 8b^2) : (a^2 + 4b^2) = 2 : 1$

Formula used:

We can express the given ratio as an equation:

$(3a^2 - 8b^2)/(a^2 + 4b^2) = 2/1$

Calculation:

$\Rightarrow 3a^2 - 8b^2 = 2(a^2 + 4b^2)$

$\Rightarrow 3a^2 - 8b^2 = 2a^2 + 8b^2$

$\Rightarrow 3a^2 - 2a^2 = 8b^2 + 8b^2$

$\Rightarrow a^2 = 16b^2$

$\Rightarrow a = 4b$

Therefore a : b = 4 : 1

Q42. Answer: (d) Development of pilgrimage destinations

The correct answer is Development of pilgrimage destinations

Key Points

• Development of pilgrimage destinations is the primary focus of the Prasad Scheme of the Central Government.

• The scheme aims to enhance tourist attractiveness by developing world-class infrastructure in pilgrimage centers.

• It includes various initiatives like improvement of amenities, better connectivity, and overall development of the destinations to boost tourism.

• The full form of PRASAD is Pilgrimage Rejuvenation and Spiritual Augmentation Drive.

• The scheme was launched in the year 2014-15 by the Ministry of Tourism.

Additional Information

• The Prasad Scheme covers various pilgrimage sites across India, including famous temples, mosques, and churches.

• It is part of the larger initiative to promote cultural and heritage tourism in India.

• The scheme is implemented in collaboration with the respective state governments, ensuring local development and community participation.

• Enhancing the infrastructure and overall experience at these sites aims to attract both domestic and international tourists, boosting the local economy.

Q43. Answer: (a) 9 + 6 - 4 = 1

After the sign + is interchanged with - and the number 9 is interchanged with 6:

Option 1) 9 + 6 - 4 = 1 => 6 - 9 + 4 = 1

=> 6 + 4 - 9 = 1

=> 10 - 9 = 1

=> 1 = 1 (LHS = RHS)

Option 2) 4 - 9 + 5 = 1 => 4 - 6 + 5 = 1

=> 4 + 5 - 6 = 1

=> 9 - 6 = 1

=> 3 ≠ 1 (LHS ≠ RHS)

Option 3) 6 - 9 + 4 = 1 => 9 + 6 - 4 = 1

=> 9 + 6 - 4 = 1

=> 15 - 4 = 1

=> 11 ≠ 1 (LHS ≠ RHS)

Option 4) 6 - 9 + 7 = 1 => 9 + 6 - 7 = 1

=> 9 + 6 - 7 = 1

=> 15 - 7 = 1

=> 8 ≠ 1 (LHS ≠ RHS)

Hence, "Option 1" is the correct answer.

Q44. Answer: (b) 8 hours, 10 minutes, 12 seconds

Given:

Total time = 8.17 hours

Formula Used:

1 hour = 60 minutes

1 minute = 60 seconds

Calculation:

Hours part = 8

Decimal part = 0.17 hours

Minutes = 0.17 × 60

=> Minutes = 10.2 minutes

Minutes part = 10

Decimal part of minutes = 0.2

Seconds = 0.2 × 60

=> Seconds = 12 seconds

Therefore, 8.17 hours is 8 hours, 10 minutes, 12 seconds.

Q45. Answer: (d) F

According to the question A and C interchange their places, B and D interchange their places, E and G interchange their places, and so on for rest of the letters in the alphabet:

Thus, according to the final arrangement F is the 5th to the left of O.

Hence, "Option 4" is the correct answer.

Alternate MethodThe logic followed here is:

A and C interchange their places → C(3) - 2 = A(1)

B and D interchange their places → D(4) - 2 = B(2)

E and G interchange their places → G(7) - 2 = E(5)

Similarly,

O(15) - 2 = M(13) (Here, O interchange position with M as per the given logic)

so, O's position will be 13th in the series after arrangement

Now, 5th to the left of O in English alphabetic series:

O(13) - 5 = H(8)

And, according to the logic given H interchanged with:

H(8) - 2 = F(6)

Q46. Answer: (a) Projects

The correct answer is Projects

Key Points

• Projects is not a part of the MS Office Suite.

• MS Office Suite typically includes applications like Word, Excel, and PowerPoint, among others.

• Each application within the suite serves a specific purpose: Word for word processing, Excel for spreadsheets, and PowerPoint for presentations.

• The MS Office Suite is widely used for both personal and professional tasks due to its comprehensive set of features and tools.

Additional Information

• Microsoft Office was first announced by Bill Gates on August 1, 1988.

• The suite has evolved significantly over the years, with numerous versions and updates to improve functionality and user

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experience.

• Other popular applications in the suite include Outlook for email, Access for database management, and OneNote for note-taking.

• Microsoft also offers a cloud-based version of the suite called Office 365, which provides additional features and online storage.

• Office 365 is now known as Microsoft 365 and includes advanced security and compliance capabilities.

Q47. Answer: (b) 360

Given:

A boy read three-eighth of a book on one day and four-fifth of the remainder of the book on the next day. 45 pages still remain unread.

Formula Used:

Let the total number of pages in the book be x.

Pages read on the first day = (3/8) x

Pages remaining after the first day = x - (3/8) x = (5/8) x

Pages read on the second day = (4/5) × (5/8) x = (1/2) x

Pages remaining after the second day = (5/8) x - (1/2) x = (1/8) x

Given that 45 pages still remain unread, so:

(1/8) x = 45

Calculation:

=> (1/8) x = 45

=> x = 45 × 8

=> x = 360

The total number of pages in the book is 360.

Q48. Answer: (d) Manoj Sinha

The correct answer is Manoj Sinha

Key Points

• Manoj Sinha was appointed as the Lieutenant Governor of Jammu and Kashmir on August 7, 2020.

• He succeeded Girish Chandra Murmu, who resigned from the position.

• Prior to his appointment, Manoj Sinha served as the Minister of State for Railways and the Minister of State for Communications in the Government of India.

• As the Lieutenant Governor, he is responsible for the administration of the Union Territory of Jammu and Kashmir, which was reorganized from a state to a Union Territory on October 31, 2019.

Additional Information

• The Lieutenant Governor is the representative of the President of India in the Union Territory.

• Jammu and Kashmir was granted special autonomy under Article 370 of the Indian Constitution, which was abrogated on August 5, 2019.

• The reorganization of Jammu and Kashmir resulted in the creation of two Union Territories: Jammu and Kashmir, and Ladakh.

• The Lieutenant Governor plays a crucial role in maintaining law and order and overseeing the implementation of central government policies in the Union Territory.

Q49. Answer: (b) E Rutherford

The correct answer is E Rutherford

Key Points

• E Rutherford is widely recognized as the 'father of nuclear physics'.

• He was awarded the Nobel Prize in Chemistry in 1908 for his work in the field of radioactivity.

• Rutherford's experiments led to the discovery of the nuclear structure of the atom.

• He proposed the Rutherford model of the atom, which described the atom as having a central nucleus surrounded by electrons.

• His work laid the foundation for the development of modern nuclear physics and atomic theory.

Additional Information

• Ernest Rutherford was born on August 30, 1871, in New Zealand.

• He is also known for his discovery of the concept of radioactive half-life.

• Rutherford's work in nuclear physics paved the way for further research in nuclear reactions and the development of nuclear energy.

• He passed away on October 19, 1937, leaving behind a significant legacy in the scientific community.

Q50. Answer: (a) 1971

The correct answer is 1971

Key Points

• Bangladesh emerged as an independent country in 1971 after a war of independence against Pakistan, known as the Bangladesh Liberation War.

• The war began on 26th March 1971 and concluded on 16th December 1971, when the Pakistani military surrendered to the allied forces of Bangladesh and India.

• Sheikh Mujibur Rahman is considered the founding leader of Bangladesh and served as its first President and later as Prime Minister.

• The independence of Bangladesh was officially recognized by various countries and international organizations soon after the victory in the war.

• The country has since then commemorated its independence on 26th March every year, known as Independence Day.

Additional Information

• The independence of Bangladesh was a result of a long-standing movement for autonomy and political rights within the region of East Pakistan.

• The cultural and linguistic differences between East and West Pakistan played a significant role in the demand for independence.

• Sheikh Mujibur Rahman and his party, the Awami League, led the movement for independence, culminating in the declaration of independence in March 1971.

• Bangladesh has since developed into a nation with a growing economy and has made significant progress in various sectors including education, health, and infrastructure.

• The country is also a member of international organizations such as the United Nations, the Commonwealth of Nations, and the South Asian Association for Regional Cooperation (SAARC).

Q51. Answer: (c) 50

The correct answer is 50

Key Points

• On 25 April 1945, 50 governments met in San Francisco for a conference and started drafting the UN Charter.

• This meeting marked a crucial step in the establishment of the United Nations as an international organization aimed at promoting peace and cooperation.

• The UN Charter was signed on 26 June 1945 and came into force on 24 October 1945.

• The founding members of the United Nations included countries from around the world, representing diverse political, economic, and social systems.

Additional Information

• The United Nations was established to prevent future conflicts and foster international cooperation.

• The main organs of the UN include the General Assembly, the Security Council, the International Court of Justice, the Secretariat, the Economic and Social Council, and the Trusteeship Council.

• The UN has played a significant role in various global issues, including peacekeeping, humanitarian aid, and sustainable development.

• As of today, the United Nations has 193 member states.

Q52. Answer: (d) Insurance Regulatory and Development Authority of India

The correct answer is Insurance Regulatory and Development Authority of India

Key Points

• Insurance Regulatory and Development Authority of India (IRDAI) is the regulatory body in India that oversees the insurance industry.

• IRDAI was constituted by an act of parliament known as the IRDA Act, 1999.

• The primary purpose of IRDAI is to protect the interests of policyholders and ensure the growth of the insurance sector.

• IRDAI also aims to promote and regulate the orderly growth of the insurance industry in India.

• The headquarters of IRDAI is located in Hyderabad, Telangana.

Additional Information

• The Insurance Regulatory and Development Authority Act was passed by the Indian Parliament in 1999, and the authority was established in 2000.

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• The IRDAI is responsible for the regulation, promotion, and ensuring the orderly growth of the insurance and re-insurance business in India.
• It also sets norms and regulations for the conduct of insurance companies and intermediaries.
• IRDAI plays a crucial role in ensuring financial stability and consumer protection within the insurance sector.
• The authority is composed of a chairman and not more than nine members, of whom at least five are full-time members.

Q53. Answer: (b) BGLQ : YTOJ

The logic followed here is:
AFKP : ZUPK
So, checking each option one by one:
Option 1) EJOT : VWXY
Option 2) BGLQ : YTOJ
Option 3) CHMR : WRMH
Option 4) DINS : XSNI
Thus, out of all the options 'BGLQ : YTOJ' follows the same pattern as given.
Hence, "Option 2" is the correct answer.

Q54. Answer: (b) Oxytocin

The correct answer is Oxytocin
Key Points
• Oxytocin is a hormone that plays a crucial role in childbirth and lactation.
• It stimulates uterine contractions during labor, facilitating the process of childbirth.
• Oxytocin also promotes the dilation of the cervix, making it easier for the baby to pass through the birth canal.
• In addition to its role in childbirth, oxytocin is involved in the milk ejection reflex during breastfeeding.
Additional Information
• Oxytocin is produced in the hypothalamus and released by the posterior pituitary gland.
• It is sometimes referred to as the "love hormone" due to its role in social bonding and emotional connections.
• Oxytocin has also been studied for its potential therapeutic uses in conditions such as autism, anxiety, and depression.
• The release of oxytocin can be triggered by physical touch, social interactions, and positive emotional experiences.

Q55. Answer: (c) C

The logic followed here is: The sum of the position values of each row is 10.
1st row:
→ J(10) = 10
2nd row:
→ D(4) + F(6) = 10
3rd row:
→ G(7) + A(1) + B(2) = 10
Similarly,
4th row:
→ D(4) + A(1) + ? + B(2) = 10
→ ? = 10 - (4 + 1 + 2)
→ ? = 10 - 7
→ ? = 3
So, the letter of position value '3' is 'C'
Hence, "Option 3" is the correct answer.

Q56. Answer: (d) Megabit

The correct answer is Megabit
Key Points
• Mb in computer language stands for Megabit.
• A Megabit is a unit of data measurement equal to 1,000,000 bits or 1,024 kilobits.
• It is often used to measure data transfer speeds of internet connections or digital communication systems.

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• Unlike Megabyte (MB), which is a unit of data storage, Megabit (Mb) is typically used to quantify data transfer rates.

• For example, an internet speed of 100 Mbps means 100 Megabits per second.

Additional Information

• Megabyte (MB) is often confused with Megabit (Mb). One Megabyte is equal to 8 Megabits.

• The distinction is important when considering internet speeds and data storage capacities.

• For instance, a file that is 1 Megabyte in size would take 8 seconds to download on a 1 Megabit per second (Mbps) connection.

• Understanding the difference between these units helps in making informed decisions regarding internet plans and data usage.

Q57. Answer: (a) Rani

Given:

There are five siblings: Raj, Rohan, Ram, Ritika, and Rani.

All of the siblings have different heights

1) Raj's height is more than that of only one sibling.

_ > _ > _ > Raj > _

2) Rohan's height is more than that of Raj and Ritika but not more than that of Ram.

3) Ritika's height is more than that of Raj.

4) Ram is not the shortest.

As only Rani is left, thus will be positioned at only position left.

Ram > Rohan > Ritika > Raj > Rani

Thus, according to the final arrangement, Rani is the shortest.

Hence, "Option 1" is the correct answer.

Q58. Answer: (d) 2023

The correct answer is 2023

Key Points

• India will host the G20 Summit in the year 2023.

• The G20 Summit is an international forum for governments and central bank governors from 19 countries and the European Union.

• It addresses global economic issues such as international financial stability, climate change mitigation, and sustainable development.

• India's presidency of the G20 will provide an opportunity to influence the global economic agenda and promote its interests on various international issues.

Additional Information

• The G20 was founded in 1999 in response to the financial crises of the late 1990s.

• The members of the G20 represent about 85% of the global GDP, over 75% of global trade, and two-thirds of the world's population.

• The G20 Summit is held annually, and the host country rotates among its members.

• Key issues discussed at G20 Summits include economic growth, international trade, and the regulation of financial markets.

• In recent years, the G20 has also focused on issues such as climate change, global health, and sustainable development.

Q59. Answer: (b) National Highway Authority of India

The correct answer is National Highway Authority of India

Key Points

• The National Highway Authority of India (NHAI) is responsible for the construction and maintenance of India's highways.

• Established in 1988, NHAI operates under the Ministry of Road Transport and Highways.

• It is tasked with the development, maintenance, and management of the national highways network.

• NHAI ensures the smooth functioning of the national highway system, which is crucial for the country's transportation infrastructure.

Additional Information

• The National Highways Development Project (NHDP) is one of the major projects undertaken by NHAI to upgrade, rehabilitate and widen major highways.

• India has one of the largest road networks in the world, and the efficient management of this network is crucial for economic development.

• The NHAI also focuses on enhancing road safety, reducing travel time, and improving the overall quality of the highways.

• The authority collaborates with various state governments and private sector entities to achieve its objectives.

Q60. Answer: (b) Neither conclusion I nor II follow.

The least possible Venn diagram for the given statements is as shown below :

Conclusions:

I. Some Roots are Trees → Does not follow (As all Trees are Flowers, no Flower is Plant and some Plants are Roots. So it is possible but not definite.)

II. Some Plants are Trees → Does not follow (As all Trees are Flowers and no Flower is Plant. As whole trees comes in flowers which cannot be plants, therefore it is false.)

Therefore Here, Neither conclusion I nor II follow.

Hence, the correct answer is "Option 2"

Q61. Answer: (d) 4.5 cm

Given:

Each side of an equilateral triangle = 3√3 cm

Formula Used:

Altitude of an equilateral triangle = (side × √3) / 2

Calculation:

Side of the equilateral triangle = 3√3 cm

Altitude = (3√3 × √3) / 2

=> Altitude = (3 × 3) / 2

=> Altitude = 9 / 2

=> Altitude = 4.5 cm

The altitude of the equilateral triangle is 4.5 cm.

Q62. Answer: (c) 4

The logic followed here is:

=> 5 + 3 + 7 = 15

And,

=> 6 + 4 + 5 = 15

Similarly,

=> ? + 8 + 3 = 15

=> ? = 15 - 11

=> ? = 4

Hence, "Option 3" is the correct answer.

Q63. Answer: (c) Both statements 1 and 2 are incorrect

Given:

To check if money doubles at simple interest for given rates and time periods.

Formula used:

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

For the money to double, SI = P, so:

=> P = (P × R × T) / 100

=> R × T = 100 (This is the condition for money to double)

Calculation:

1. Statement 1: Rate = 16%, Time = 6 years

=> R × T = 16 × 6 = 96

Since 96 ≠ 100, money does not double in 6 years at 16% interest.

2. Statement 2: Rate = 18%, Time = 5 years

=> R × T = 18 × 5 = 90

Since 90 ≠ 100, money does not double in 5 years at 18% interest.

Therefore Both statements are false.

Q64. Answer: (b) 343 m/sec

The correct answer is 343 m/sec

Key Points

• The speed of sound in air is approximately 343 meters per second (m/sec) at standard temperature and pressure conditions.

• This speed can vary depending on factors such as temperature, humidity, and altitude.

• At higher temperatures, the speed of sound increases because the molecules in the air move faster.

• Similarly, higher humidity levels can slightly increase the speed of sound, as moist air is less dense than dry air.

• In general, the speed of sound in air is a crucial parameter in various fields, including acoustics, aeronautics, and meteorology.

Additional Information

• The speed of sound in other mediums is different; for example, it is much higher in water (approximately 1482 m/sec) and even higher in solids.

• The speed of sound is an essential factor in the design and analysis of various systems, including sonar, ultrasound imaging, and audio equipment.

• Understanding the speed of sound is also crucial for studying phenomena such as sonic booms and the Doppler effect.

Q65. Answer: (a) Anthocyanins

The correct answer is Anthocyanins

Key Points

• Anthocyanins are pigments responsible for the red, purple, and blue colors in many fruits and vegetables.

• These pigments belong to a class of compounds known as flavonoids and are water-soluble.

• Anthocyanins are found in the cell vacuoles of plant tissues and their color can change depending on the pH level.

• They are not only important for the coloration but also have antioxidant properties which can be beneficial for human health.

Additional Information

• Carotenoids are another class of pigments that contribute to the yellow, orange, and red colors in plants.

• Examples of carotenoids include beta-carotene, lycopene, and lutein.

• Chlorophyll is the pigment responsible for the green color in plants and is vital for photosynthesis.

• Different pigments can coexist in the same plant tissue, contributing to a wide range of colors.

• The study of plant pigments is important for understanding plant biology and for applications in food science and nutrition.

Q66. Answer: (c) 7^(th) December

The correct answer is 7th December

Key Points

• Armed Forces Flag Day is observed across India on 7th December every year.

• The day is dedicated to honoring the soldiers, airmen, and sailors of India who serve the nation.

• Funds are collected on this day through the distribution of flags and stickers to the public.

• The funds raised are used for the welfare of the Armed Forces personnel.

• The day was first observed in 1949 and has since become an annual tradition.

Additional Information

• The Armed Forces Flag Day Fund was set up to manage the collection and distribution of funds for the welfare of the armed forces personnel and their families.

• Various welfare programs are funded by these contributions, including rehabilitation of battle casualties, welfare of serving personnel and their families, and resettlement and welfare of ex-servicemen and their families.

• On this day, the general public and volunteers participate in the collection of funds by distributing token flags, badges, and other items.

• The Ministry of Defence plays a significant role in organizing the events and activities associated with Armed Forces Flag Day.

• It is an opportunity for citizens to express their gratitude and appreciation for the sacrifices made by the armed forces personnel.

Q67. Answer: (b) 3/80

Given:

3/2, 9/8, 81/16, 27/10

Formula used:

The HCF of fractions is calculated using the formula:

HCF = (HCF of numerators)/(LCM of denominators)

Calculation:

Step 1: Find the HCF of the numerators: 3, 9, 81, 27

HCF(3, 9, 81, 27) = 3

Step 2: Find the LCM of the denominators: 2, 8, 16, 10

LCM(2, 8, 16, 10) = 80

Step 3: Apply the formula for HCF of fractions:

HCF = 3/80

Therefore The HCF of the given fractions is 3/80.

Q68. Answer: (b) International Monetary Fund

The correct answer is International Monetary Fund

Key Points

• As of October 2020, Kristalina Georgieva is the Managing Director of the International Monetary Fund (IMF).

• She assumed office on October 1, 2019, succeeding Christine Lagarde.

• The IMF is an international organization headquartered in Washington, D.C., working to foster global monetary cooperation and financial stability.

• The IMF provides policy advice, financial assistance, and technical assistance to its member countries.

Additional Information

• Kristalina Georgieva is a Bulgarian economist and has previously served as the CEO of the World Bank.

• The IMF was established in 1944 at the Bretton Woods Conference and has 190 member countries.

• Its primary purpose is to ensure the stability of the international monetary system—the system of exchange rates and international payments that enables countries to transact with each other.

• The IMF's resources are provided by its member countries, primarily through their payment of quotas.

• The organization is governed by and accountable to its member countries through its Board of Governors and Executive Board.

Q69. Answer: (a) R S Sharma

The correct answer is R S Sharma

Key Points

• R S Sharma has been appointed as the chairperson of an empowered committee for the administration of the Covid-19 vaccine by the Union Government.

• R S Sharma is the former chairman of the Telecom Regulatory Authority of India (TRAI).

• His appointment aims to streamline and oversee the effective distribution and administration of the Covid-19 vaccine across the country.

• This committee will play a crucial role in ensuring that the vaccine reaches all eligible beneficiaries in a systematic and organized manner.

Additional Information

• The Covid-19 vaccination drive in India is one of the largest in the world, targeting a population of over 1.3 billion people.

• The Union Government has also launched the Co-WIN platform to manage and monitor the vaccination process.

• India has approved several Covid-19 vaccines for emergency use, including COVAXIN, Covishield, and Sputnik V.

• The vaccination drive is being conducted in phases, prioritizing healthcare workers, frontline workers, and vulnerable populations.

• Public awareness and cooperation are essential for the successful implementation of the vaccination program.

• The government is also working on addressing vaccine hesitancy and ensuring equitable access to vaccines for all citizens.

Q70. Answer: (d) Trachea

The correct answer is Trachea

Key Points

• The Trachea is not a part of the alimentary canal.

• The alimentary canal consists of the mouth, pharynx, esophagus, stomach, small intestine, large intestine, rectum, and anus.

• The Trachea is part of the respiratory system, not the digestive system.

• The Rectum, Oesophagus, and Pharynx are indeed parts of the alimentary canal.

Additional Information

• The alimentary canal, also known as the digestive tract, is responsible for the ingestion, digestion, absorption, and excretion of food.

• The Trachea, commonly known as the windpipe, conducts air to the lungs and is a critical component of the respiratory system.

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• The Pharynx serves as a common passageway for both air and food but is considered part of the alimentary canal when it comes to the digestive system.

Q71. Answer: (b) Mahatma Gandhi

The correct answer is Mahatma Gandhi

Key Points

• Mahatma Gandhi is attributed with the statement "Indian nationalism is an elite phenomenon, a creation of lawyers and doctors and landlords."

• Gandhi was a prominent leader in the Indian independence movement and his views often highlighted the role of the elite in the nationalist struggle.

• He emphasized the importance of involving the broader masses, including peasants and workers, in the movement for independence.

• This perspective was a critical aspect of Gandhi's philosophy and strategy in mobilizing the Indian population against British colonial rule.

Additional Information

• Mahatma Gandhi, also known as the Father of the Nation in India, led various movements such as the Non-Cooperation Movement, the Civil Disobedience Movement, and the Quit India Movement.

• He advocated for non-violence (Ahimsa) and truth (Satyagraha) as fundamental principles in the struggle against oppression and injustice.

• Gandhi's leadership was instrumental in unifying diverse sections of Indian society in the fight for independence from British rule.

• His legacy continues to influence social and political movements around the world advocating for civil rights and freedom.

Q72. Answer: (c) ONGC

The correct answer is ONGC

Key Points

• As of October 2020, Mr. Shashi Shankar is the Chief Managing Director of ONGC.

• ONGC (Oil and Natural Gas Corporation) is a multinational oil and gas company in India.

• It is the largest oil and gas exploration and production company in the country.

• ONGC was founded on 14 August 1956 by the Government of India.

• The company is involved in exploring, developing, and producing crude oil and natural gas.

Additional Information

• ONGC is headquartered in Dehradun, Uttarakhand, India.

• It is a Public Sector Undertaking (PSU) under the administrative control of the Ministry of Petroleum and Natural Gas.

• ONGC's operations contribute significantly to India's domestic oil and gas production.

• The company also has international projects in over 17 countries.

• Mr. Shashi Shankar has been instrumental in leading the company towards technological advancements and strategic growth.

Q73. Answer: (c) Rs. 46

Shortcut Trick

Effective Rate of Interest for 2 years at 10% = 10 + 10 + (10 × 10)/100 = 21%

Effective Rate of Interest for 2 years at 20% = 20 + 20 + (20 × 20)/100 = 44%

Difference in Effective Percentage = 44% − 21% = 23%

Additional Interest = 23% of Principal (Rs. 200) = (23 ÷ 100) × 200 = Rs. 46

Therefore The correct answer is Rs. 46.

Alternate Method

Given:

Principal (P) = Rs. 200

Time (T) = 2 years

Initial Rate (R1) = 10% per annum

New Rate (R2) = 20% per annum

Formula Used:

Compound Interest (CI) = P[(1 + R/100)^T − 1]

Calculations:

=> Interest at 10% (CI1) = 200 × [(1 + 10/100)² − 1]

=> CI1 = 200 × [(1.1)² − 1] = 200 × [1.21 − 1]

=> CI1 = 200 × 0.21 = Rs. 42

=> Interest at 20% (CI2) = 200 × [(1 + 20/100)² − 1]

=> CI2 = 200 × [(1.2)² − 1] = 200 × [1.44 − 1]

=> CI2 = 200 × 0.44 = Rs. 88

=> Difference in Interest = CI2 − CI1

=> Difference = 88 − 42 = Rs. 46

Therefore The correct answer is Rs. 46.

Additional Information

Compound Interest Concept

Compound interest is calculated on the principal amount and also on the accumulated interest of previous periods.

Successive Percentage Formula

For a 2-year period, the effective rate is given by R_(eff) = x + y + (xy/100), where x and y are the rates for each year.

Difference between CI and SI

For 2 years, the difference between CI and SI is P(R/100)².

Q74. Answer: (d) US

The correct answer is US

Key Points

• The US Women's National Soccer Team won the Women's FIFA Football World Cup in 2019.

• This victory marked their fourth title in the history of the Women's World Cup.

• The final match was held on July 7, 2019, in Lyon, France, where the US defeated the Netherlands with a score of 2-0.

• Megan Rapinoe and Rose Lavelle scored the goals for the US team in the final match.

• The US team was coached by Jill Ellis, who also led the team to victory in the 2015 Women's World Cup.

Additional Information

• The Women's FIFA Football World Cup is an international football competition contested by the senior women's national teams of the members of the Fédération Internationale de Football Association (FIFA).

• The first Women's World Cup tournament was held in 1991, and it has been held every four years since then.

• The 2019 tournament was the eighth edition of the Women's World Cup.

• The US Women's National Soccer Team is the most successful team in the history of the Women's World Cup, having won titles in 1991, 1999, 2015, and 2019.

• The US team has also been known for its advocacy for gender equality and equal pay in sports.

Q75. Answer: (a) (p)/(√(1 - p²))

Given:

cos 42° = p

We know the trigonometric identity:

cos θ = sin (90° - θ)

Formula used:

cos 42° = sin 48°

sin 48° = p

Now, using the identity for tan θ :

tan θ = (sin θ)/(cos θ)

Calculation:

tan 48° = (sin 48°)/(cos 48°)

=> tan 48° = p/(√(1 - p²)) (since cos² θ + sin² θ = 1)

Therefore tan 48° = p/(√(1 - p²)).

Q76. Answer: (b) Delhi

The correct answer is Delhi

Key Points

• The India Water Impact Summit 2019 was held in Delhi.

• This summit is a platform to discuss water-related issues and solutions, aiming to bring together stakeholders from across the

globe.

• The summit focuses on various aspects of water management, including conservation, sustainability, and policy frameworks.

• It provides an opportunity for the exchange of knowledge and best practices regarding water resources management.

Additional Information

• The India Water Impact Summit is organized by the National Mission for Clean Ganga (NMCG) and the Centre for Ganga River Basin Management and Studies (cGanga).

• The summit aims to bring together experts, policymakers, and stakeholders to discuss the challenges and opportunities in the sector of water management.

• The summit has seen participation from various international experts and organizations, highlighting the global importance of water issues.

• It plays a crucial role in shaping the policies and strategies for the clean and sustainable management of water resources in India.

Q77. Answer: (b) 7.5º

Given:

$\sin 2A = \cos 75^\circ$

Formula Used:

$\cos \theta = \sin (90^\circ - \theta)$

Calculation:

$\cos 75^\circ = \sin (90^\circ - 75^\circ)$

$\cos 75^\circ = \sin 15^\circ$

Given: $\sin 2A = \sin 15^\circ$

For $\sin x = \sin y$, $x = n\pi + (-1)^n y$

For smallest positive value of A:

Let n = 0

$\Rightarrow 2A = 15^\circ$

$\Rightarrow A = 15^\circ / 2$

$\Rightarrow A = 7.5^\circ$

The smallest positive value of A is 7.5º.

Q78. Answer: (d) 9IH

The logic followed here is:

Option 1) 13MN

Option 2) 3CX

Option 3) 11KP

Option 4) 9IH

Thus, out of all the options '9IH' is the odd one out.

Hence, "Option 4" is the correct answer.

Q79. Answer: (a) Only conclusions I, II and IV follow

Given,

Statement:

"My husband will drive me to the Hudson Shopping Mall because my hand is not in a healthy condition to drive our car", X told Y.

Conclusions:

I. X will not go to Hudson Shopping Mall walking - True (Because X mentioned that her husband will drive her, implying she will not walk).

II. X is married - True (Because X refers to "my husband").

III. Y is married - False (Because the statement does not provide any information about Y's marital status).

IV. X knows how to drive a car - True (Because X mentions that her hand is not in a healthy condition to drive, implying she knows how to drive under normal circumstances).

So, Only conclusions I, II, and IV follow.

Hence, the correct answer is "Option 1".

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Q80. Answer: (a) 15

According to the given Venn diagram:

The shaded region represents the number of people who are both singers and dancers but are not actors.

So, the number of people who are both singers and dancers but are not actors = '15'

Hence, the correct answer is "Option 1".

Q81. Answer: (d) 40%

The correct answer is 0.4

Key Points

• National Highways carry 0.4 of India's total road traffic as per the Ministry of Road Transport & Highways.

• National Highways are crucial for the nation's infrastructure, connecting major cities, ports, and economic centers.

• These highways are designed to support high-speed vehicular traffic and play a significant role in the movement of goods and passengers across the country.

• Despite constituting only about 2% of the total road network, National Highways handle a disproportionate amount of traffic due to their strategic importance.

Additional Information

• The Ministry of Road Transport & Highways is responsible for the development and maintenance of National Highways.

• National Highways are identified by a unique numbering system, which helps in easy navigation and identification.

• Development of National Highways is a key focus area under various government initiatives such as Bharatmala Pariyojana, aimed at improving road connectivity and boosting economic growth.

• National Highways Authority of India (NHAI) is the nodal agency for the development and management of National Highways.

• Regular maintenance and expansion projects are undertaken to ensure the highways remain efficient and safe for travel.

Q82. Answer: (d) Isaac Newton

The correct answer is Isaac Newton

Key Points

• Isaac Newton is credited with formulating the Law of Gravitation.

• Newton's Law of Gravitation states that every particle of matter in the universe attracts every other particle with a force that is directly proportional to the product of their masses and inversely proportional to the square of the distance between their centers.

• This fundamental law was introduced in Newton's work "Philosophiæ Naturalis Principia Mathematica", commonly known as the Principia, published in 1687.

• The law of gravitation was a groundbreaking discovery that laid the foundation for classical mechanics and significantly advanced the field of physics.

Additional Information

• Isaac Newton (1642–1727) was an English mathematician, physicist, astronomer, and author who is widely recognized as one of the greatest mathematicians and most influential scientists of all time.

• Newton's work in mathematics includes the development of calculus, which he worked on independently of Leibniz.

• His book, the Principia, laid the groundwork for classical mechanics and is considered one of the most important works in the history of science.

• In addition to his work on gravitation, Newton also made significant contributions to optics and the study of light and color.

• Newton's discoveries have had a lasting impact on science, influencing the development of modern physics and astronomy.

Q83. Answer: (a) entitlements

The correct answer is entitlements

Key Points

• Entitlements is the new dimension added by Amartya Sen to the concept of food security.

• Amartya Sen's entitlement approach emphasizes that food security is not just about the availability of food but also about individuals' ability to access food.

• This approach considers the various means through which people can acquire food, such as production, trade, labor, and transfers.

• Sen's theory highlights that food insecurity can occur even when there is ample food supply if people lack the means to access it.

• The focus on entitlements shifts the discussion from mere food supply to broader socio-economic factors that influence food access and distribution.

Additional Information

• Amartya Sen is a renowned economist and philosopher who has made significant contributions to welfare economics and social

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justice.

• He was awarded the Nobel Prize in Economic Sciences in 1998 for his work in welfare economics.

• Sen's entitlement approach has been influential in shaping policies and programs aimed at addressing food security and poverty.

• It underscores the importance of ensuring that all individuals have the necessary resources and opportunities to access food.

• Sen's work has had a profound impact on the understanding of food security and has led to more comprehensive strategies to tackle hunger and malnutrition.

Q84. Answer: (d) oxygen

The correct answer is oxygen

Key Points

• Sodium is a highly reactive metal.

• When sodium is exposed to air, it reacts vigorously with oxygen.

• This reaction can lead to an explosion and fire.

• To prevent this, sodium is typically stored under oil to keep it away from air and moisture.

Additional Information

• Sodium is an element in the alkali metal group, found in Group 1 of the periodic table.

• It has a symbol Na and atomic number 11.

• Due to its reactivity, sodium is not found in its free form in nature but is found in compounds such as sodium chloride (table salt).

• The reaction of sodium with oxygen forms sodium oxide (Na2O), which is a white solid.

Q85. Answer: (a) Admiral Sushil Kumar

The correct answer is Admiral Sushil Kumar

Key Points

• Admiral Sushil Kumar is the author of the novel 'A Prime Minister to Remember'.

• The book offers an insight into the life and tenure of Prime Minister Atal Bihari Vajpayee, providing a detailed account of his leadership and decisions.

• Admiral Sushil Kumar served as the Chief of the Naval Staff of the Indian Navy from 1998 to 2001.

• His tenure coincided with significant events in India's naval history, which are reflected in his writings.

Additional Information

• Tavleen Singh is a well-known Indian columnist, political reporter, and writer.

• Arundhati Roy is an acclaimed author, best known for her novel 'The God of Small Things', which won the Man Booker Prize for Fiction in 1997.

• Bipin Chandra Pal was an Indian nationalist, one of the prominent leaders of the Indian independence movement, and part of the Lal Bal Pal trio.

• 'A Prime Minister to Remember' is a significant contribution to Indian political literature, providing personal anecdotes and professional insights.

Q86. Answer: (b) 6%

Given:

Marks obtained by Student P: Physics = 50, Chemistry = 85, Biology = 55, Hindi = 40

Maximum Marks for Student P: Physics = 100, Chemistry = 100, Biology = 100, Hindi = 50

Marks obtained by Student Q: Physics = 65, Chemistry = 90, Biology = 50, Hindi = 45

Maximum Marks for Student Q: Physics = 100, Chemistry = 100, Biology = 100, Hindi = 50

Formula used:

Percentage = (Total Marks Obtained ÷ Total Maximum Marks) × 100

Calculation:

For Student P:

Total Marks Obtained = 50 + 85 + 55 + 40 = 230

Total Maximum Marks = 100 + 100 + 100 + 50 = 350

=> Percentage of P = (230 ÷ 350) × 100 = 65.71%

For Student Q:

Total Marks Obtained = 65 + 90 + 50 + 45 = 250

Total Maximum Marks = 100 + 100 + 100 + 50 = 350

=> Percentage of Q = (250 ÷ 350) × 100 = 71.43%

Difference in Percentage = 71.43% - 65.71% ≈ 6%

Therefore The approximate difference in the aggregate percentages of P and Q is 6%.

Q87. Answer: (a) June and July

Observation from the graph:

Sales in July = 600 units

Sales in February = 300 units

Sales in March = 100 units

Sales in April = 200 units

Calculation:

Combined sales of February, March, and April = 300 + 100 + 200 = 600 units

=> July sales (600 units) = Combined sales of February, March, and April (600 units)

Combined sales of January, March, and April = 200 + 100 + 200 = 500 units

=> June sales (500 units) = Combined sales of February, March, and April (500 units)

Therefore The correct answer is Option (1).

Q88. Answer: (a) 1 : 130.5

Given:

Expenditure on Taxes in 2014 = 2 million $

Total Expenditure on Transport for all years = Transport in 2012 + Transport in 2013 + Transport in 2014 + Transport in 2015

Formula used:

Ratio = Expenditure on Taxes in 2014 ÷ Total Expenditure on Transport for all years

Calculation:

Total Expenditure on Transport = 48 (2012) + 60 (2013) + 71 (2014) + 82 (2015)

=> Total Transport Expenditure = 48 + 60 + 71 + 82 = 261 million $

Ratio = 2 ÷ 261

=> Ratio = 1:130.5

Therefore The ratio between the expenditure on taxes in 2014 to the total expenditure on transport for all the years is approximately 1:130.5.

Q89. Answer: (b) Rs. 60

Given:

Transportation cost percentage = 9%

Transportation cost for 10,000 ceiling fans = Rs. 36,000

Profit = 50%

Formula used:

Total Cost of Manufacturing = Transportation cost ÷ (Percentage of transportation cost ÷ 100)

Selling Price = (Total Cost of Manufacturing × (1 + Profit% ÷ 100)) ÷ Number of fans

Calculation:

Total Cost of Manufacturing = Rs. 36,000 ÷ (9 ÷ 100)

=> Total Cost of Manufacturing = Rs. 36,000 ÷ 0.09

=> Total Cost of Manufacturing = Rs. 4,00,000

Selling Price = (Rs. 4,00,000 × (1 + 50 ÷ 100)) ÷ 10,000

=> Selling Price = (Rs. 4,00,000 × 1.5) ÷ 10,000

=> Selling Price = Rs. 6,00,000 ÷ 10,000

=> Selling Price = Rs. 60

Therefore The selling price of each ceiling fan should be Rs. 60 for the manufacturer to earn a profit of 50%.

Q90. Answer: (a) Mother

Given: I is J's maternal uncle, K's son, M's only sibling, L's father and N's nephew.

Thus, M is the mother of J.

Hence, "Option 1" is the correct answer.

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Q91. Answer: (a) [figure]

The Venn diagram that best depicts the relationship between Tiger, Tiger shark, and Fish is shown below:

Tiger shark is a specific type of fish, therefore is a subset of fish.

Tiger is distinct entity unrelated to fish.

Hence, "Option 1' is the correct answer.

Q92. Answer: (a) CJIJM

The logic followed here is:

'HOTEL' is coded as 'CJOZG'

Similarly,

'HONOR' is coded as

Hence, "Option 1" is the correct answer.

Q93. Answer: (c) 26

The logic followed here is:

=> $(2^2 + 6^2) \div 2 = 20$

=> $(4 + 36) \div 2 = 20$

=> $40 \div 2 = 20$

=> 20 = 20 (LHS = RHS)

And,

=> $(32 + 52) \div 2 = 17$

=> $(9 + 25) \div 2 = 17$

=> $34 \div 2 = 17$

=> 17 = 17 (LHS = RHS)

Similarly,

=> $(42 + 62) \div 2 = ?$

=> $(16 + 36) \div 2 = ?$

=> $52 \div 2 = ?$

=> 26 = ?

Hence, "Option 3" is the correct answer.

Q94. Answer: (a) 64

The logic followed here is:

MEN is coded as 9

Number of letter i.e. M, E and N → 3 => $3^2 = 9$

And,

WOMEN is coded as 25

Number of letter i.e. W, O, M, E and N → 5 => 52 = 25

Similarly,

CHILDREN is coded as

Number of letter i.e. C, H, I, L, D, R, E and N → 8 => 82 = 64

Hence, "Option 1" is the correct answer.

Q95. Answer: (b) 185

The logic followed here is:

4704 : 336

$4704 \div 14 = 336$

336 = 336 (LHS = RHS)

Similarly,

2590 : ?

$2590 \div 14 = ?$

185 = ?

Hence, "Option 2" is the correct answer.

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Q96. Answer: (d) VFIOMY

The logic followed here is:

'SKIRT' is coded as 'MECLN'

Similarly,

'BLOUSE' is coded as

Hence, "Option 4" is the correct answer.

Q97. Answer: (b) C

According to the question the English alphabet is given in reverse order:

Thus, if the English alphabet is given in reverse order, then C is the 12th letter to the right of O.

Hence, "Option 2" is the correct answer.

Alternate MethodAccording to the question the English alphabet is given in reverse order then the 12th letter to the right of O will be:

In the reverse order, all the alphabets will be at the opposite letter's position.

So, O will be at the position of its opposite letter i.e. L, and thus will be at the 12th position from left.

As asked is 12th letter to the right of O = 12 + 12 => 24th position

As the 24th position is of 'X' according to the English alphabetic series, and in reverse order, the opposite letter is positioned which is 'C'.

Thus, 12th letter to the right of O will be C.

Q98. Answer: (c) HGI

The logic followed here is:

Hence, "Option 3" is the correct answer.

Q99. Answer: (b) Army

The logic followed here is:

Legislature	Government Branch
Army	Military
Judiciary	Government Branch
Executive	Government Branch

Legislature, Judiciary, Executive are all branches of government,

Whereas,

Army is part of the military and not a branch of government.

Hence, the correct answer is "Army".

Q100. Answer: (b) Gujarat

The logic followed here is:

Surat	City
Gujarat	State
Rajkot	City
Ahmedabad	City

Surat, Rajkot, Ahmedabad all are Cities,

Whereas,

Gujarat is a State.

Hence, the correct answer is "Gujarat".

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