SSC CHSL Tier-1 2022: Official Paper (Held On: 15 March, 2023 Shift 4) (Previous Year Paper)

SSC Combined Higher Secondary Level (CHSL) • 2022 • 100 questions • 60 minutes • Answer key and solutions

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ENGLISH LANGUAGE

Q1. In the following question, select the odd word pair from the given alternatives.

(a) Scooter - Vehicle
(b) Triangle - Figure
(c) Kidney - Organ
(d) Fruit - Apple

Q2. Select the option in which the numbers shares the same relationship in set as that shared by the numbers in the given set.

(NOTE: Operations should be performed on the whole numbers, without breaking down the numbers into its constituent digits. E.g.13 - Operations on 13 such as adding/subtracting/multiplying etc. to 13 can be performed. Breaking down 13 into 1 and 3 and then performing mathematical operations on 1 and 3 is not allowed)

(12, 172, 74)

(28, 168, 56)

(a) (16, 115, 34)
(b) (28, 128, 36)
(c) (18, 130, 38)
(d) (14, 130, 42)

Q3. Words given on the left side of (::) are related with each other by some Logic/Rule/Relation. Select the missing word/word pair on the right side of (::) from the given alternatives based on the same Logic/Rule/Relation.

Leather : Shoes :: ?

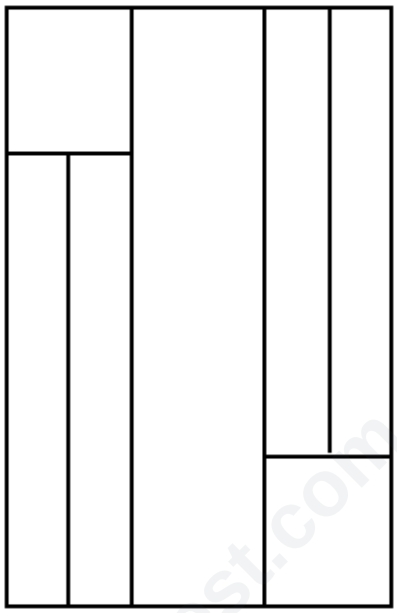
(a) Linen : Flax
(b) Cloth : Fibre
(c) Ore : Metal
(d) Sack : Jute

Q4. In the following question, four number pairs are given. In each pair the number on the left side of (-) is related to the number on the right side of (-) with some Logic/Rule /Relation. Three pairs are similar on basis of same Logic/Rule/Relation. Select the odd one out from the given alternatives.

(NOTE: Operations should be performed on the whole numbers, without breaking down the numbers into its constituent digits. E.g.13 - Operations on 13 such as adding /subtracting /multiplying etc. to 13 can be performed. Breaking down 13 into 1 and 3 and then performing mathematical operations on 1 and 3 is not allowed)

(a) 19-364
(b) 21-444
(c) 17-292
(d) 13-174

Q5. How many quadrilaterals are there in the given figure?



(a) 15
(b) 16
(c) 14
(d) 13

Q6. In the following question, four number pairs are given. In each pair the number on left side of (-) is related to the number of the right side of (-) with some Logic/Rule/Relation. Three pairs are similar on basis of same Logic/Rule/Relation. Select the odd one out from the given alternatives.

(NOTE: Operations should be performed on the whole numbers, without breaking down the numbers into its constituent digits. E.g.13 - Operations on 13 such as adding /subtracting /multiplying etc. to 13 can be performed. Breaking down 13 into 1 and 3 and then performing mathematical operations on 1 and 3 is not allowed)

(a) 729-1656
(b) 843-1181
(c) 681-867
(d) 507-1212

Q7. A series is given with one term missing. Select the correct alternative from the given ones that will complete the series.

MRNG, MVVS, MZDE, MDLQ, ?

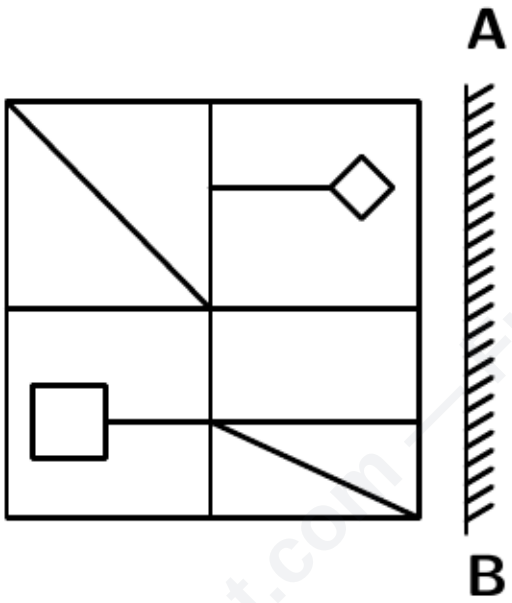
(a) MHTC
(b) MHRT
(c) MGTC
(d) MHTD

Q8. If 13% 27% 3 = 1053 and 4% 8% 13 = 416, then 3% 16% 10 = ?

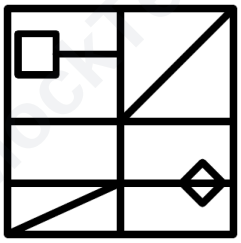
(a) 260
(b) 480
(c) 320
(d) 340

Q9. If a mirror is placed on the line AB, then out of the option figures which figure will be the right image of the question figure?

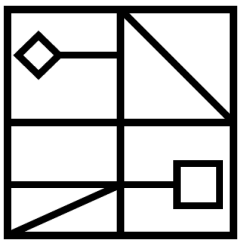
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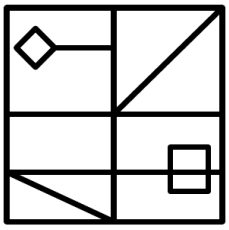
(a)



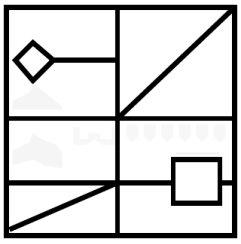
(b)



(c)



(d)



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Q10. In a certain code language, 'FLOORS' is coded as 'QPMNKE'. What is the code for 'GATHER' in that code language?

(a) PCFSZE
(b) PCESZE
(c) PCFSAF
(d) PCFSZF

Q11. In the following question below are given some statements followed by some conclusions based on those statements. Taking the given statements to be true even if they seem to be at variance from commonly known facts. Read all the conclusions and then decide which of the given conclusion logically follows the given statements.

Statements:

I. Some Rice are Salad.

II. All Salad are Table.

Conclusions:

I. Some Rice are Table.

II. No Salad is Rice.

III. Some Table are Salad.

(a) Both conclusions II and III follows
(b) All conclusion follows
(c) Both conclusions I and II follows
(d) Both conclusions I and III follows

Q12. In the following question, select the odd letter/letters from the given alternatives.

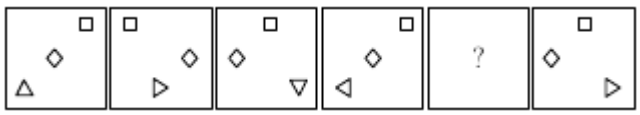
(a) QNJF
(b) EBXS
(c) KHDY
(d) URNI

Q13. Select the option that is related to the first number in the same way as the third number is related to the fourth number and fifth number is related to sixth number.

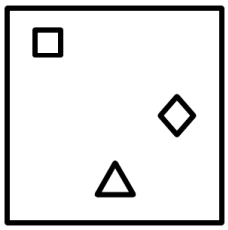
13 : ? :: 8 : 512 :: 11 : 1331

(a) 729
(b) 2197
(c) 1728
(d) 4096

Q14. Select the figure from the given options that can replace the question mark (?) in the following series.

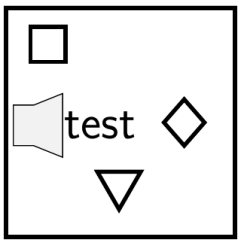


(a)

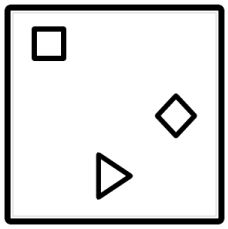


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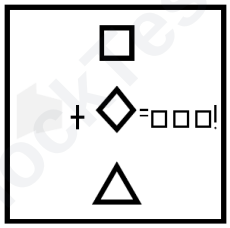
(b)



(c)



(d)

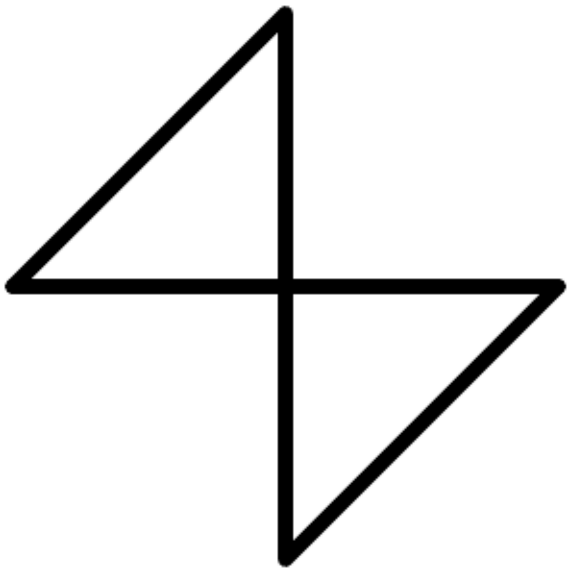


Q15. By interchanging which two numbers (not digits) the given equation will be correct?

16 + 6 ÷ 18 - 5 × 1 = 14

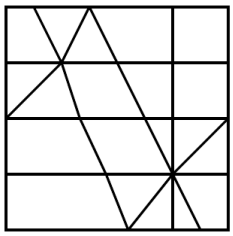
(a) 5 and 16
(b) 14 and 18
(c) 5 and 14
(d) 18 and 6

Q16. Select the option figure in which the given figure is embedded. (rotation is NOT allowed)

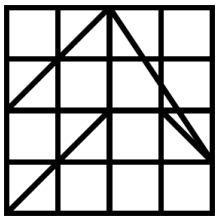


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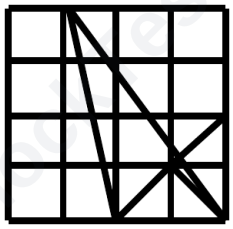
(a)



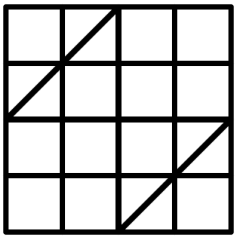
(b)



(c)



(d)



Q17. Arrange the given words in the sequence in which they occur in the dictionary.

1. Mouth
2. Mount
3. Moult
4. Mouse
5. Mound

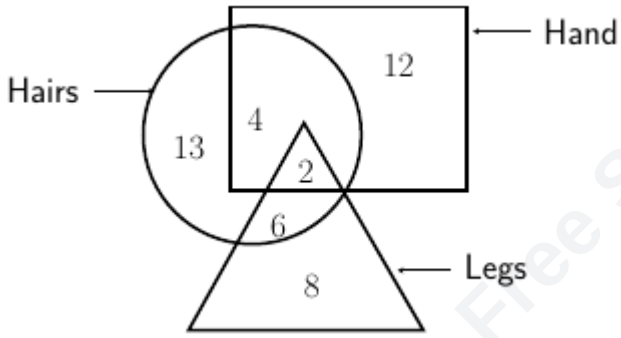
(a) 3, 5, 2, 4, 1
(b) 5, 3, 4, 2, 1
(c) 3, 5, 2, 1, 4
(d) 5, 3, 2, 4, 1

Q18. In a certain code language, 'DAME' is coded as '2976', 'TIME' is coded as ' 9254 ', 'SAPE' is coded as '8369', 'MOST' is coded as '1523'. What is the code for 'ATP' in that code language?

(a) 851
(b) 658
(c) 651
(d) 869

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Q19. How many hands are hairs?

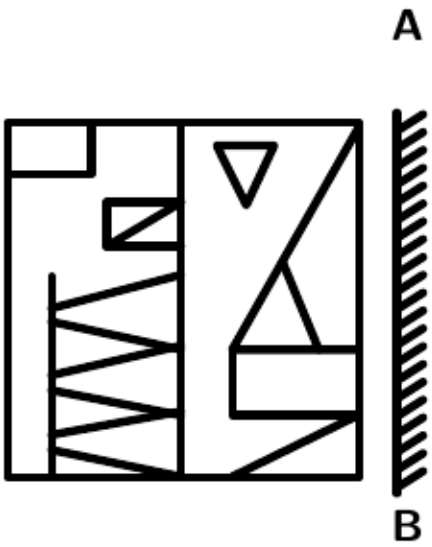


(a) 8
(b) 4
(c) 6
(d) 15

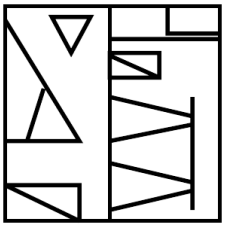
Q20. Pointing towards a photo of a lady, Bhim said, "She is the only sister of my mother's son". How that lady is related to Bhim?

(a) Paternal Grandmother
(b) Niece
(c) Daughter
(d) Sister

Q21. If a mirror is placed on the line AB, then out of the option figures which figure will be the right image of the question figure?

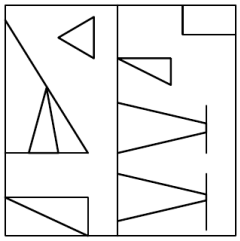


(a)

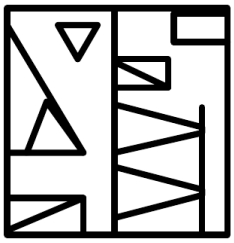


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(b)



(c)



(d)



Q22. Words given on the left side of (::) are related with each other by some Logic/Rule /Relation. Select the missing word/word pair on the right side of (::) from the given alternatives based on the same Logic/Rule/Relation.

Tokyo : Japan :: ?

(a) Havana : Cuba
(b) Thailand : Bangkok
(c) Egypt : Cairo
(d) Italy : Rome

Q23. In the following question, select the related letters from the given alternatives.

OB : TG :: PC : ?

(a) GG
(b) UH
(c) HR
(d) AB

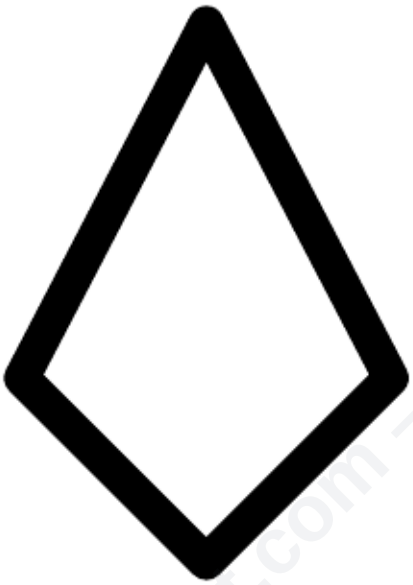
Q24. In the following question, select the missing number from the given series.

4, 6, 6, 10, 8, 14, 10, 18, ?, 22

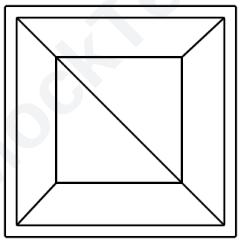
(a) 12
(b) 14
(c) 16
(d) 10

Q25. Select the option figure in which the given figure is embedded. (rotation is NOT allowed)

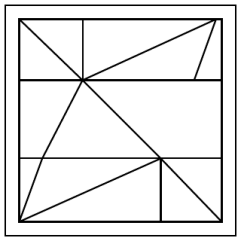
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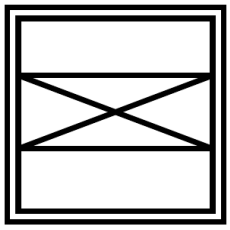
(a)



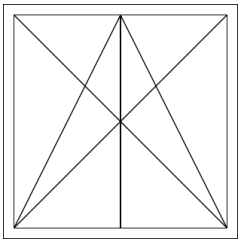
(b)



(c)



(d)



GENERAL INTELLIGENCE

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Q26. Which among the following is the highest peak of Tamil Nadu?

(a) Mahendragiri
(b) Anamudi
(c) Nanda Devi
(d) Doddabetta

Q27. Which among the following is not a type of solar eclipse?

(a) Annular
(b) Partial
(c) Penumbral
(d) Total

Q28. Shri Bismillah khan was a famous player of musical instrument _____.

(a) Tabla
(b) Drum
(c) Shehnai
(d) Veena

Q29. Who was appointed as the new Director General of National Investigation Agency (NIA) in June 2022?

(a) Dinkar Gupta
(b) Anshul Mishra
(c) Yashwant Sonawane
(d) Kiran Bedi

Q30. Which of the following countries is NOT one of the co-hosts of the ICC 2027 ODI World Cup?

(a) Zimbabwe
(b) Kenya
(c) Namibia
(d) South Africa

Q31. Babur, the first Mughal emperor, succeeded to the throne of Ferghana in _____ when he was 12 years old.

(a) 1494
(b) 1526
(c) 1504
(d) 1530

Q32. Which article of the Indian constitution states that "Governor has power to promulgate ordinances during recess of legislature"?

(a) 212
(b) 214
(c) 213
(d) 210

Q33. Which of the following river forms the Dhuandhar falls?

(a) Tapi
(b) Narmada
(c) Godavari
(d) Mahanadi

Q34. Leo Tolstoy is best known for his _____.

(a) dance
(b) acting
(c) direction
(d) novels

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Q35. Which of the following rocks may also contain fossils of plants, animals and other microorganisms that once lived on them?

(a) Sedimentary rocks
(b) Extrusive igneous rocks
(c) Metamorphic rocks
(d) Intrusive igneous rocks

Q36. Which of the following is a common type of Bryophyta?

(a) Cladophora
(b) Marsilea
(c) Marchantia
(d) Monocot

Q37. Who among the following Bollywood actress wrote "Unfinished: A Memoir"?

(a) Priyanka Chopra
(b) Kareena Kapoor
(c) Alia Bhatt
(d) Deepika Padukone

Q38. Which of the following is a second generation system?

(a) IBM notebooks
(b) Sun workstations
(c) Honeywell 400
(d) Apple II

Q39. Which citizen of the Republic of India was awarded the Nobel Peace Prize in the year 2014?

(a) Amartya Sen
(b) C. V. Raman
(c) Kailash Satyarthi
(d) Rabindranath Tagore

Q40. Which of the following is NOT a non-contact force?

(a) Gravitational
(b) Electrostatic
(c) Friction
(d) Magnetic

Q41. Who was appointed as the new chairman of Central Board of Direct Taxes (CBDT) in June 2022?

(a) Atulesh Jindal
(b) Rani Singh Nair
(c) Sudha Sharma
(d) Nitin Gupta

Q42. The One Stop Centre Scheme for women is funded by which of the following?

(a) Cash Suvidha
(b) Saha Fund
(c) Nirbhaya Fund
(d) Rug Beneath My Feet

Q43. Which Indian athlete won first silver medal in weightlifting at Tokyo Olympics 2020 held in 2021?

(a) PV Sindhu
(b) Neeraj Chopra
(c) Ravi Dahiya
(d) Mirabai Chanu

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Q44. In India, the electoral bonds are valid for how many days from the date of issue?

(a) Fifteen days
(b) Thirty days
(c) Seven days
(d) Fourteen days

Q45. In the given expression of GDP according to the expenditure method, which of the following represents the aggregate imports expenditure incurred by the economy?

C + I + G + X - M

(a) C
(b) M
(c) I
(d) X

Q46. Zakir Hussain is associated with which musical Instrument?

(a) Violin
(b) Guitar
(c) Tabla
(d) Shehnai

Q47. _____ administration became the model followed by the great emperor Akbar when he consolidated the Mughal Empire.

(a) Sher Shah Suri's
(b) Alauddin Khalji's
(c) Muhammad Tughluq's
(d) Genghis Khan's

Q48. Which Indian player won the most medals at Commonwealth games 2022?

(a) Pusarla Venkata Sindhu
(b) Amit Panghal
(c) Sharath Kamal
(d) Sathiyan Gnanasekaran

Q49. The world's highest motorable road passes through _____ pass in India, as of 2022.

(a) Khunjerab
(b) Rohtang
(c) Dihang
(d) Umling La

Q50. Which of the following is NOT a valid file format in MS-Word 365?

(a) .dotx
(b) .dcp
(c) .doc
(d) .docx

QUANTITATIVE APTITUDE

Q51. Due to an increase of 20 percent in the price of rice, the consumer decreases his consumption by 5 percent. What is the percentage change in total expenditure?

(a) 10 percent
(b) 15 percent
(c) 12 percent
(d) 14 percent

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Q52. If a + b = 3 and ab = 2, then what is the value of $2a^3 + 2b^3$?

(a) 25
(b) 27
(c) 18
(d) 20

Q53. In a cyclic quadrilateral A B C D, angle A is opposite to angle C. If angle A = 110 degree, then what is the value of angle C?

(a) 60 degree
(b) 50 degree
(c) 70 degree
(d) 55 degree

Q54. If $P+1/P=5$, then what is the value of $P^3+1/(P^3)$?

(a) 110
(b) 95
(c) 125
(d) 120

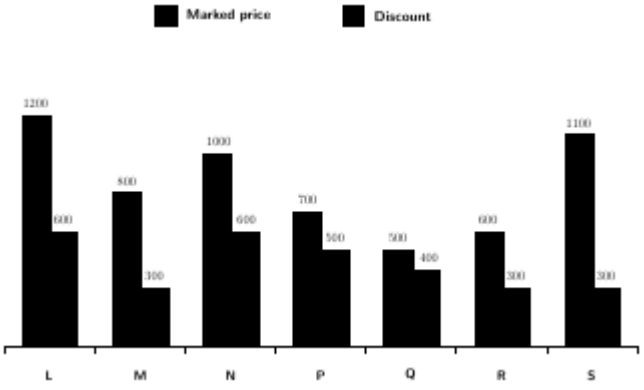
Q55. The table given below shows the income and expenditure of a company in five years.

Years	Income	Expenditure
L	800	400
M	600	300
N	500	400
P	900	300
Q	400	250

What is the difference between total income and total expenditure of the company for these five years?

(a) 1260
(b) 1650
(c) 2040
(d) 1550

Q56. The bar graph given below shows the marked price and value of discount of 7 articles L, M, N, P, Q, R and S.



The total discount on all the articles is what percent of the total marked price of all the articles?

(a) 32.64 percent
(b) 50.84 percent
(c) 60.32 percent
(d) 72.72 percent

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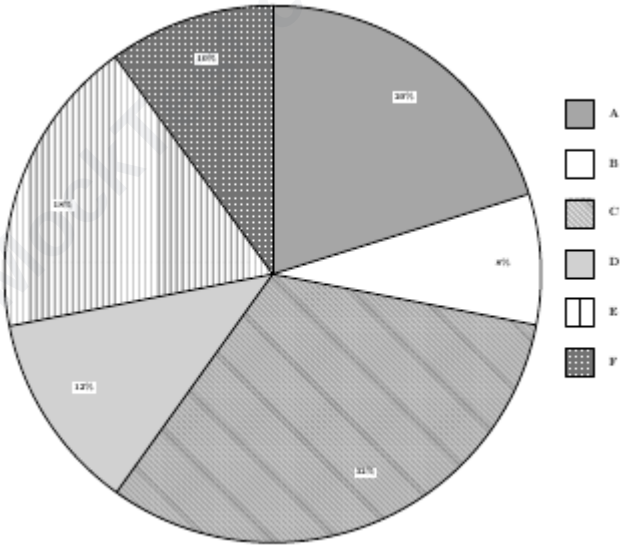
Q57. In ΔXYZ, angle YXZ = 90 degree. P is a point on side YZ such that XP is perpendicular to YZ. If XP = YP = 10 cm, then what will be value of PZ?

(a) 8 cm
(b) 9 cm
(c) 12 cm
(d) 10 cm

Q58. What is the value of (5/3 of 1/4 × 24/5-1/5 of 25/8 × 24/5)/(5/12 of 3/4 × 4/3+3/4 of 12/5 × 5/6) ?

(a) -24/23
(b) -12/23
(c) -25/46
(d) -28/23

Q59. The pie chart given below shows the number of girls in six schools. The total number of girls in all these six schools are 5000. Number of girls in a particular school is shown as a percentage of total number of girls in all these six schools.



What is the ratio of the number of girls in school A to the number of girls in school E?

(a) 5 : 8
(b) 10 : 9
(c) 6 : 7
(d) 9 : 10

Q60. If K+1/K=-3, then what is the value of [2((K^6+1)/(K³))]+((K^4+1)/(K²)) ?

(a) 27
(b) -29
(c) 29
(d) -27

Q61. If sin θ = 3/11, then what is the value of cot θ?

(a) (3 √7)/11
(b) (4 √7)/11
(c) (4 √7)/3
(d) (3 √7)/28

Q62. Selling price of a watch is Rs. 1056 and profit percentage is 10 percent. If selling price is Rs. 800, then what will be the loss percentage?

(a) 16.67 percent
(b) 25 percent
(c) 12.5 percent

(d) 15 percent

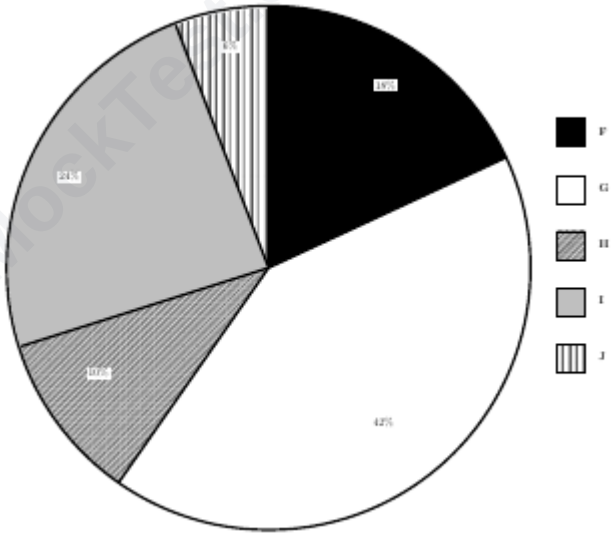
Q63. What is the value of (3 cosec 42°)/(sec 48°)-(5 cos 32°)/(sin 58°)

(a) -1
(b) 5
(c) 0
(d) -2

Q64. Rajeev invested Rs. 3,000 for 2 years at compound interest (compounded annually) in a company which paid him interest of Rs. 1,320. What will be the annual rate of interest at which Rajeev invested his money?

(a) 30 percent
(b) 24 percent
(c) 16 percent
(d) 20 percent

Q65. The pie chart given below show the runs scored by 5 batsmen in a cricket match. Total runs scored by these batsmen are 300. Runs scored by a batsman is shown as a percentage of runs scored by all these five batsmen.



What is the average runs scored in F, I and J?

(a) 48
(b) 36
(c) 42
(d) 58

Q66. The length of a cuboid is thrice of its breadth and the height of cuboid is twice of its breadth. If the breadth of the cuboid is 6 cm. then what is the total surface area of cuboid?

(a) 844 cm²
(b) 708 cm²
(c) 762 cm²
(d) 792 cm²

Q67. Two circles having equal radius intersect each other such that each passes through the centre of the other. Length of the common chord is 24 cm, then what will be the diameter of each circle?

(a) 16√3 cm
(b) 8√3 cm
(c) 12√3 cm
(d) 10√3 cm

Q68. If A = a cosec θ + b cot θ and B = a cot θ + b cosec θ, then what is the value of $A^2 - B^2$?

(a) ab
(b) (a + b)
(c) $(a^2 - b^2)$
(d) (a - b)

Q69. What is the value of 2160 × 3 ÷ 144 + 13 - 2?

(a) 56
(b) 57
(c) 59
(d) 54

Q70. P, Q and R can complete a work alone in 12,15 and 20 days respectively. They started the work together. P left the work 8 days before the work was completed and Q left the work 5 days after P had left. R completed the remaining work alone. How many days will be required to complete the whole work?

(a) 32/3 days
(b) 10 days
(c) 28/3 days
(d) 25/3 days

Q71. A bus starts from a bus stand after every 50 minutes in the same direction. Mohit is walking in opposite direction with a speed of 50 km/hr. If Mohit meets each bus in 10 minutes, then what is the speed of bus?

(a) 14.5 km/hr
(b) 15 km/hr
(c) 12.5 km/hr
(d) 10.5 km/hr

Q72. The marked price of an article is 150 percent of the cost price. If 20 percent discount is given, then what will be the profit percentage?

(a) 20 percent
(b) 12.5 percent
(c) 25 percent
(d) 10 percent

Q73. An amount of Rs.12,029 is divided among P, Q and R such that P's share is 5 times Q's share and R's share is one-third of P's share. What is the share of R?

(a) Rs. 2,718
(b) Rs. 2,312
(c) Rs. 2,615
(d) Rs. 2,518

Q74. Sum of the angles made by a chord at the centre and on the major arc of a circle is 225 degree. What will be the angle made at the major arc of this circle?

(a) 125 degree
(b) 150 degree
(c) 90 degree
(d) 75 degree

Q75. The average runs scored by a batsman in 7 matches is 49 and in other 9 matches the average is 27. What is the average runs scored by the batsman in these 16 matches?

(a) 35.725
(b) 28.475
(c) 40.25
(d) 36.625

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GENERAL AWARENESS

Q76. Fill in the blank with an appropriate option.

Have you ever had a _____ bath using a bath wash?

(a) barbaric
(b) extinguishing
(c) refreshing
(d) killing

Q77. In the following question, out of the given four alternatives, select the alternative which best expresses the meaning of the Idiom/Phrase.

High and dry

(a) Abandoned
(b) Occasionally
(c) Perplexed
(d) Failed

Q78. Improve the underlined part of the sentence. Choose 'No improvement' as an answer if the sentence is grammatically correct.

There are a number of places of historical or religiously importance.

(a) religiosity important
(b) religious importance
(c) No improvement
(d) religious important

Q79. Select the correct indirect form of the given sentence.

I explained, "I don't belong here."

(a) I said that I did not belonged here.
(b) I explained that I did not belong there.
(c) I explained that I do not belong there.
(d) I explained that I did not belong here.

Q80. Choose the word that means the same as the given word.

Caginess

(a) Desiccate
(b) Guilefulness
(c) Dopiness
(d) Ingenuous

Q81. Choose the word that means the same as the given word.

Jape

(a) Quick
(b) Quarrel
(c) Quip
(d) Quit

Q82. Select the most appropriate one-word substitution for the given group of words.

Rhythmic flow of sounds or words.

(a) Credence
(b) Crescents
(c) Cadence
(d) Copious

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Q83. Select the correct passive form of the given sentence.

The villagers have rebuilt the hospital.

(a) The hospital was rebuilt by the villagers.
(b) The hospital has been rebuilt by the villagers.
(c) The hospital had been rebuilt by the villagers.
(d) The hospital has rebuilt by the villagers.

Q84. Choose the sentence with no spelling error.

(a) A well done introduction grabs the reader.
(b) A wel done introduction grabs the reader.
(c) A well done introduction grabbs the reader.
(d) A well done intrudoction grabs the reader.

Q85. Rearrange the parts of the sentence in correct order.

P. useful for the Government to utilize the expertise and
Q. in the present international scenario, it is necessary and
R. and winning over the support of their counterparts in other countries
S. services of Members of Parliament effectively for sensitizing

(a) PRSQ
(b) QPSR
(c) PSQR
(d) SPRQ

Q86. In the following question, out of the given four alternatives, select the alternative which best expresses the meaning of the Idiom/Phrase.

The whole ball of wax

(a) Everything
(b) Sagacious
(c) Meagre
(d) Complete disaster

Q87. Choose the word that is opposite in meaning to the given word.

Credible

(a) Unlikely
(b) Unswerving
(c) Conclusive
(d) Sheltered

Q88. Choose the incorrectly spelt word.

(a) Majestic
(b) String
(c) Tokan
(d) Lovable

Q89. Choose the word that means the same as the given word.

Fortitude

(a) Grit
(b) Vacillation
(c) Plot
(d) Grim

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Q90. Select the word segment that substitutes (replaces) the bracketed word segment correctly and completes the sentence meaningfully. Select the option 'no correction required' if the sentence is correct as given.

"Hello! How (is) you?"

(a) am
(b) are
(c) No correction required
(d) was

Q91. Fill in the blank with an appropriate option.

Habitat loss received little attention from all Twitter _____.

(a) band
(b) users
(c) forces
(d) pools

Q92. Find the part of the given sentence that has an error in it. If there is no error, choose 'No error'.

Give yourself a chance to be distracted of bad news.

(a) chance to be distracted
(b) Give yourself a
(c) No error
(d) of bad news.

Q93. Find the part of the given sentence that has an error in it. If there is no error, choose 'No error'.

The inflow of foreign portfolio funds into Indian equities have pushed up price-earning multiples and valuation.

(a) up price-earning multiples and valuation.
(b) The inflow of foreign portfolio funds
(c) No error
(d) into Indian equities have pushed

Q94. Improve the underlined part of the sentence. Choose 'No improvement' as an answer if the sentence is grammatically correct.

He always checks the weather in the morning before he leaves for working.

(a) leaves for work
(b) leave for work
(c) left for works
(d) No improvement

Q95. Rearrange the parts of the sentence in correct order.

A newly

P. reflected on why he chose to work for his

Q. appointed division manager, trained in accounting,

R. company despite better offers and realized that

S. it was the friendly, collaborative, and ethical culture

(a) QPRS
(b) SPRQ
(c) SQRP
(d) RQPS

Directions

In the following passage some of the words have been deleted. Read the passage carefully and select the correct answer for the given blank out of the four alternatives.

Swollen joints (1)_____ when there is fluid in the tissues around the joints. It can be very (2)_ and can make it difficult to move the affected joints. In some cases, swelling may cause affected joints to increase in size or appear to be an odd (3)___

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Joint pain and swelling can affect more than one (4)___ at a time. The most common joints to be (5)_____ by pain and swelling are elbows, wrists, shoulders, the base of the spine, knuckles, hips, knees or ankles.

Q96. Select the most appropriate option to fill in blank number 1.

(a) happen
(b) prompt
(c) produce
(d) suppress

Q97. Select the most appropriate option to fill in blank number 2.

(a) uncomfortable
(b) snug
(c) pleasant
(d) convenient

Q98. Select the most appropriate option to fill in blank number 3.

(a) shape
(b) audio
(c) colour
(d) odour

Q99. Select the most appropriate option to fill in blank number 4.

(a) muscle
(b) vein
(c) tissue
(d) joint

Q100. Select the most appropriate option to fill in blank number 5.

(a) blended
(b) affected
(c) balmed
(d) reacted

ANSWER KEY

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

SOLUTIONS

Q1. Answer: (d) Fruit - Apple

The logic followed here is

1. Scooter - Vehicle: This pair represents a general category and a specific item within that category. A scooter is a type of vehicle, so this pair is consistent and does not stand out as odd.

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2. Triangle - Figure: This pair represents a specific geometric shape and a general term for any shape or form. A triangle is a type of figure, so this pair is also consistent and not odd.

3. Kidney - Organ: This pair represents a specific organ found in the human body. The word "kidney" and "organ" are related in terms of category and classification, so this pair is consistent and not odd.

4. Fruit - Apple: This pair is the odd one out. While an apple is indeed a type of fruit, it is also a specific example of a fruit. The word "fruit" is a general term that encompasses various types of fruits. The relationship between "fruit" and "apple" is different from the relationships in the other word pairs. The other pairs follow a pattern where one word is a specific example or type within the broader category represented by the other word. However, in the case of "fruit" and "apple," both words represent different levels of specificity within the same category, making it the odd pair.

Hence, the correct answer is 4) Fruit - Apple.

Q2. Answer: (b) (28, 128, 36)

The logic followed here is:

Logic: (1st number + 3rd number) × 2 = 2nd number.

Now,

For (12, 172, 74)

→ (12 + 74) × 2

→ 86 × 2 = 172.

For (28, 168, 56)

→ (28 + 56) × 2

→ 84 × 2 = 168.

Similarly, for (28, 128, 36)

→ (28 + 36) × 2

→ 64 × 2 = 128.

Hence, the correct answer is "Option 2".

Q3. Answer: (c) Ore : Metal

The correct answer is 3) Ore : Metal.

In the given analogy, the relationship between the words "Leather" and "Shoes" is that leather is a raw material or primary component used to make shoes. Leather is processed and transformed into shoes, which are the final product.

Logic: Raw material: Final Product

1. Linen : Flax: Linen is a fabric made from flax fibers. Flax is the raw material used to produce linen. It follows the logic Final Product: Raw material which is reverse of actual logic.

2. Cloth : Fibre: Cloth is a finished product made from fibers. While the relationship is somewhat similar to leather and shoes, the analogy focuses on raw materials being transformed into products. "Fiber" is a more generic term, and it does not specifically represent a primary component used to make cloth. It follows the logic Final Product: Raw material which is reverse of actual logic.

3. Ore : Metal: This pair represents the correct missing word. Ore is a raw material or primary source from which metals are extracted. Just like leather is processed to make shoes, ore is processed to obtain metals. Therefore, this pair follows the same logic as the given analogy.

4. Sack : Jute: This pair does not follow the same logic as leather and shoes. Although jute is a material used to make sacks, It follows the logic Final Product: Raw material which is reverse of actual logic.

Based on the explanation above, the correct answer is 3) Ore : Metal.

Q4. Answer: (d) 13-174

The logic is:

1) 19-364 → $19^2 + 3 = 361 + 3 = 364$

2) 21-444 → $21^2 + 3 = 441 + 3 = 444$

3) 17-292 → $17^2 + 3 = 289 + 3 = 292$

4) 13-174 → $13^2 + 3 = 169 + 3 = 172 \neq 174$

Hence, ‘ 13-174 ’ is the odd one out.

Q5. Answer: (c) 14

The quadrilaterals are:

So, there is '14' quadrilaterals in the given figure.

Hence, the correct answer is "14".

Q6. Answer: (b) 843-1181

The logic followed here is:

Logic: 1st number + Reverse of that number = 2nd number.

Now, checking the options:

Option 1) 729-1656 → 729 + 927 = 1656.

Option 2) 843-1181 → 843 + 348 = 1191 ≠ 1181.

Option 3) 681-867 → 681 + 186 = 867.

Option 4) 507-1212 → 507 + 705 = 1212.

So, '843-1181' odd among the given options.

Hence, the correct answer is "Option 2".

Q7. Answer: (a) MHTC

The logic followed here is:

So, 'MHTC' will replace the question mark in the given series.

Hence, the correct answer is "MHTC".

Q8. Answer: (b) 480

The logic followed here is:

Logic: Consider % as '×'.

Now,

For, 13% 27% 3 = 1053

=> 13 × 27 × 3 = 1053.

For, 4% 8% 13 = 416

=> 4 × 8 × 13 = 416.

Similarly, for 3% 16% 10 = ?

=> 3 × 16 × 10 = 480.

Hence, the correct answer is "480".

Q9. Answer: (d) [figure]

The logic here followed is

Hence, the correct answer is "

"

Q10. Answer: (d) PCFSZF

The logic followed here is:

'FLOORS' is coded as 'QPMNKE',

Similarly, for 'GATHER'

So, 'GATHER' is coded as 'PCFSZF'.

Hence, the correct answer is "Option 4".

Q11. Answer: (d) Both conclusions I and III follows

Given Statements:

I. Some Rice are Salad.

II. All Salad are Table.

The least possible Venn diagram for the given statement is:

Conclusions:

I. Some Rice are Table - True (Because, Those part of Rice that is Salad will be also Table).

II. No Salad is Rice - False (Because, Some Rice is Salad given in the statement).

III. Some Table are Salad - True (Because, All Table are Salad given, so Some Table are Salad will be also true)

So, Both conclusions I and III follows.

Hence, the correct answer is "Option 4".

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Q12. Answer: (a) QNJF

The logic followed here is:

Option 1) QNJF

Option 2) EBXS

Option 3) KHDY

Option 4) URNI

Here, 'QNJF' is odd among the given options.

Hence, the correct answer is "Option 1".

Q13. Answer: (b) 2197

The logic followed here is:

=>First number : (First Number)^3

Let's check,

8 : 512

→ $8^3 = 512$

11 : 1331

→ $11^3 = 1331$

Similarly,

13 :?

→ $13^3 = 2197$

Hence, the correct answer is " 2197 ".

Q14. Answer: (a) [figure]

The logic followed here is:

Step I: The Symbol 'Square' has shifted one place in next images, and getting started again after reaching the last corner.

Step II: The Symbol 'Triangle' are getting rotated in 90 degree in clockwise direction, and shifted one place in next images.

Step III: The Symbol 'Diamond' has shifted one place in next images, and getting started again after reaching the last corner.

So, the complete series will be:

Hence, the correct answer is "Option 1".

Q15. Answer: (d) 18 and 6

Given equation: 16 + 6 ÷ 18 - 5 × 1 = 14.

BODMAS Table:

Let's check each option one by one.

Option 1) 5 and 16

Given: 16 + 6 ÷ 18 - 5 × 1 = 14

After interchanging the numbers we get;

=> 5 + 6 ÷ 18 - 16 × 1 = 14

=> 5 + 0.33 - 16 × 1 = 14

=> 5 + 0.33 - 16 = 14

=> 5.33 - 16 = 14

=> - 10.67 ≠ 14

=> LHS ≠ RHS

Option 2) 14 and 18

Given: 16 + 6 ÷ 18 - 5 × 1 = 14

After interchanging the numbers we get;

=> 16 + 6 ÷ 14 - 5 × 1 = 18

=> 16 + 0.43 - 5 × 1 = 18

=> 16 + 0.43 - 5 = 18

=> 16.43 - 5 = 18

=> 11.43 ≠ 18

=> LHS ≠ RHS

Option 3) 5 and 14

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Given: 16 + 6 ÷ 18 - 5 × 1 = 14

After interchanging the numbers we get;

=> 16 + 6 ÷ 18 - 14 × 1 = 5

=> 16 + 0.33 - 14 × 1 = 5

=> 16 + 0.33 - 14 = 5

=> 16.33 - 14 = 5

=> 2.33 ≠ 5

=> LHS ≠ RHS

Option 4) 18 and 6

Given: 16 + 6 ÷ 18 - 5 × 1 = 14

After interchanging the numbers we get;

=> 16 + 18 ÷ 6 - 5 × 1 = 14

=> 16 + 3 - 5 × 1 = 14

=> 16 + 3 - 5 = 14

=> 19 - 5 = 14

=> 14 = 14

=> LHS = RHS

Hence, the correct answer is "Option 4".

Q16. Answer: (d) [figure]

The image embedded in given figure is as shown below:

Hence, "Option 4" is the correct answer.

Q17. Answer: (a) 3, 5, 2, 4, 1

The correct order according to the English dictionary is:

3. Moult

5. Mound

2. Mount

4. Mouse

1. Mouth

So the correct order is 3, 5, 2, 4, 1.

Hence the correct answer is option 1)

Q18. Answer: (b) 658

Given:

Here,

'A' is the code for '6'.

'T' is the code for '5'.

'P' is the code for '8'.

So, 'ATP' will be coded as '658'.

Hence, the correct answer is "Option 2".

Q19. Answer: (c) 6

According to the given Venn diagram:

The shaded area shows the "total number of hands are hairs".

So, the total number of 'hands are hairs' = 4 + 2 = 6.

Hence, the correct answer is "6".

Additional Information There is no such condition that you should count only hand and hair. There is nothing mention like you should negate legs part.

So, we will also include part of legs with hands and hairs.

Q20. Answer: (d) Sister

Family Chart:

Given: Pointing towards a photo of a lady, Bhim said, "She is the only sister of my mother's son".

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So, the Lady is the Sister of Bhim.

Hence, the correct answer is "Option 4".

Q21. Answer: (a) [figure]

The logic followed here is

Hence, the correct answer is "Option 1".

Q22. Answer: (a) Havana : Cuba

In the given analogy, the relationship between the words "Tokyo" and "Japan" is that Tokyo is the capital city of Japan.

Applying the same logic or rule to the missing word on the right side of (::), we are looking for a word that represents a capital city and the corresponding country it belongs to.

1. Havana : Cuba: Havana is the capital city of Cuba. It follows the same logic as Tokyo and Japan, where the city is a specific example within the broader category of the country.

2. Thailand : Bangkok: This pair does not follow the same logic as the given analogy. While Bangkok is the capital city of Thailand, Thailand itself is not the missing word. The analogy focuses on the relationship between a city and its corresponding country.

3. Egypt : Cairo: This pair does not follow the same logic as the given analogy. While Cairo is the capital city of Egypt, Egypt itself is not the missing word. The analogy focuses on the relationship between a city and its corresponding country.

4. Italy : Rome: This pair does not follow the same logic as the given analogy. While Rome is the capital city of Italy, Italy itself is not the missing word. The analogy focuses on the relationship between a city and its corresponding country.

Hence, the correct answer is 1) Havana : Cuba.

Q23. Answer: (b) UH

The logic followed here is:

OB : TG

O + 5 = T

B + 5 = G

Similarly, for PC : ?

P + 5 = U

C + 5 = H

So, 'PC : UH would be the related letters.

Hence, the correct answer is "Option 2".

Q24. Answer: (a) 12

The logic followed here is:

So, '12' will be the missing number in the given series.

Hence, the correct answer is "Option 1".

Q25. Answer: (d) [figure]

The image embedded in given figure is as shown below:

Hence, "Option 4" is the correct answer.

Q26. Answer: (d) Doddabetta

The correct answer is Doddabetta.

Key Points

• Doddabetta

• Nilgiri Hills are situated in Tamil Nadu.

• Doddabetta is the highest peak of the Nilgiri hills.

• Nilgiri hills are a part of the Western Ghats.

• The hills are located at the tri-junction of the states Karnataka, Kerela, and Tamil Nadu.

• These mountains are named after the Neelakurunji flowers (purplish-blue flowers) found in the Shola forests of Nilgiri hills.

• Nilgiri Hills are known as the Blue Mountains.

Additional Information

• Mahendragiri

• Mahendragiri is a mountain in Odisha, India, located in the Rayagada subdivision of the Gajapati district.

• It is one of the highest peak in the eastern ghats.

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• Now The highest peak in the Eastern Ghats is Jindhagada Peak.

• It is located at an elevation of 1,501 metres in the Eastern Ghats. After Deomali in the Koraput district, this is Odisha's second highest mountain peak.

• Anamudi

• Anamudi is the highest peak of the Anaimalai hills.

• Anaimalai hills are situated in the north of Anamudi.

• Anamudi is located in Kerala.

• Anamudi is also known as the Everest of South India.

• The elevation of Anamudi hill is 2,695 meters.

• The name Anamudi means "elephant's head".

• General Douglas Hamilton made the first recorded ascent of Anamudi.

• Anamudi is the meeting point of Anamalai, Palanimalai, and ealaimalai.

• Nanda Devi Peak

• Nanda Devi is the second-highest mountain in India after Kangchenjunga and the highest located entirely within the country.

• It is the 23rd-highest peak in the world.

• It was considered the highest mountain in the world before computations in 1808 proved Dhaulagiri to be higher.

Q27. Answer: (c) Penumbral

The correct answer is Penumbral.

Key Points

• An eclipse happens when the moon while orbiting the Earth, comes in between the sun and the Earth, due to which the moon blocks the sun’s light from reaching the Earth, causing an eclipse of the sun or a solar eclipse.

• There are three types of eclipses.

• A total solar eclipse happens when the sun, moon and Earth are in a direct line.

• The dark silhouette of the Moon completely covers the intensely bright light of the Sun. Only the much fainter solar corona is visible during a total eclipse which is known as a Totality.

• A partial solar eclipse happens when the shadow of the moon appears on a small part of the sun.

• Annular solar eclipse, which happens when the moon is farthest from the Earth, which is why it seems smaller.

• In this type of eclipse, the moon does not block the sun completely, but looks like a “dark disk on top of a larger sun-coloured disk” forming a “ring of fire”.

Q28. Answer: (c) Shehnai

The correct answer is Shri Bismillah khan was a famous player of musical instrument.

Key Points

• Ustad Bismillah Khan used to play Shehnai.

• Ustad Bismillah Khan (1916 – 2006) (Real name is Qamaruddin Khan), was an Indian musician credited with popularizing the Shehnai.

• Shehnai is a musical instrument that is similar to the oboe (common in India, Pakistan, and Bangladesh.)

• He was felicitated with several awards including:

• Padma Shri in 1961

• Padma Bhushan in 1968

• Padma Vibhushan in 1980

• Bharat Ratna in 2001

• He also played the Shehnai at the 1st Republic Day celebration in 1950.

• On his 102nd birth anniversary, he was honoured by Google with a Google doodle.

Q29. Answer: (a) Dinkar Gupta

The correct answer is Dinkar Gupta.

Key Points

• Dinkar Gupta, a 1987-batch IPS officer and former chief of Punjab Police, has been appointed Director General of National Investigation Agency (NIA).

• The Appointments Committee has approved the appointment of Gupta as the NIA chief till March 31, 2024, the date of his retirement.

Additional Information

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• The National Investigation Agency (NIA) is a federal agency of the Government of India that was established in 2009.

• It is responsible for the investigation and prosecution of offenses that fall under specific laws, primarily related to terrorism, insurgency, and matters affecting the sovereignty, integrity, and security of India.

• The primary mandate of the NIA includes:

• Investigation and prosecution of offenses related to terrorism, terrorist financing, and activities aimed at disrupting the security and sovereignty of India.

• Coordination and sharing of intelligence with state police forces and other agencies involved in counterterrorism efforts.

• Assisting and providing support to states in conducting investigations related to terrorism and certain specified crimes across state borders.

• Conducting special courts for the trial of offenses under its jurisdiction.

Q30. Answer: (b) Kenya

The correct answer is Kenya.

Key Points

• South Africa, along with Namibia and Zimbabwe host the ICC Men's Cricket World Cup in October/November 2027.

• This will be the second time Zimbabwe will host the International Cricket Council (ICC) Cricket World Cup after successfully hosting the 2003 edition of the global tournament with South Africa, and Kenya.

• In October/November 2031, the Men’s Cricket World Cup will be played in India and Bangladesh.

Additional Information

• About ICC Men's ODI Cricket World Cup:

• The Cricket World Cup (officially known as ICC Men's Cricket World Cup) is the international championship of One Day International (ODI) cricket.

• The event is organised by the sport's governing body, the International Cricket Council (ICC), every four years, with preliminary qualification rounds leading up to a finals tournament.

• The first World Cup was organised in England in June 1975, with the first ODI cricket match having been played only four years earlier.

• Facts about List of ICC Men's ODI Cricket World Cup:

• First Edition: 1975.

• First Winner: West Indies.

• Current champion: England (1st title), 2019 World Cup edition, held in England and Wales.

• Most successful Team: Australia (5 titles).

• India & West Indies are the only two countries which have won the world cup 2 times each.

• India won the World Cup in 1983 and 2011, while West Indies won in 1975 and 1979.

Q31. Answer: (a) 1494

The correct answer is Option 1.

Key Points

• Babur, the first Mughal emperor, succeeded to the throne of Ferghana in 1494 when he was 12 years old.

• Babur, whose full name was Zahir-ud-din Muhammad Babur, was the founder of the Mughal Empire in the Indian subcontinent.

• He was born on February 14, 1483, in Andijan, in present-day Uzbekistan.

• Babur belonged to the Timurid dynasty, which traced its ancestry back to the famous conqueror Timur (Tamerlane).At the age of 12, Babur succeeded to the throne of Ferghana, a small kingdom in Central Asia.

• However, he faced numerous challenges and was forced to leave Ferghana due to political instability.

• Over the years, he struggled to regain his kingdom and embarked on a series of military campaigns in Central Asia. In 1526, Babur set his sights on India and launched an invasion of the Delhi Sultanate.

• He faced Ibrahim Lodi, the Sultan of Delhi, in the First Battle of Panipat.

• Despite being outnumbered, Babur's forces achieved a decisive victory, allowing him to establish his rule over northern India.

• Babur's reign marked the beginning of the Mughal Empire, which would become one of the most powerful and culturally significant empires in Indian history.

• He implemented various administrative and military reforms, including the introduction of effective artillery and cavalry tactics.

• Babur also had a keen interest in literature, poetry, and gardening.

• Babur passed away on December 26, 1530, in Agra, India. He was succeeded by his eldest son, Humayun, who continued to expand and consolidate the Mughal Empire.

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Q32. Answer: (c) 213

The correct answer is Option 3.

Key Points

• The power of the Governor to promulgate ordinances during the recess of the legislature in India is mentioned in Article 213 of the Indian Constitution.

• Article 213 empowers the Governor of a state to promulgate ordinances when the legislative assembly or either house of the legislature (in the case of a bicameral legislature) is not in session.

• These ordinances have the same force and effect as an act of the state legislature but are temporary in nature and must be approved by the legislature within a certain period.

Additional Information

• Constitutions typically consist of multiple articles that outline the fundamental principles, structures, and functions of a country's government. While the specific articles and their content can vary from one constitution to another, I can provide you with a general overview of common articles found in many constitutions:

• Preamble: This sets out the purpose, values, and aspirations of the constitution.

• Fundamental Rights and Freedoms: These articles outline the individual rights and freedoms that citizens are entitled to, such as freedom of speech, religion, and assembly, as well as rights related to equality, privacy, and due process.

• Structure of Government: These articles describe the structure of the government, including the separation of powers between the legislative, executive, and judicial branches. They may also define the roles and responsibilities of each branch and the system of checks and balances.

• Head of State and Government: These articles outline the powers, duties, and limitations of the head of state and government, which may include a president, monarch, or prime minister.

• Legislature: These articles establish the composition, powers, and functions of the legislative body, such as the parliament or congress. They may detail the process of lawmaking, representation, and electoral systems.

• Executive: These articles define the powers, responsibilities, and selection process of the executive branch, which may include the president, prime minister, or a council of ministers. They often outline the executive's authority to implement laws and administer the government.

• Judiciary: These articles establish the structure and jurisdiction of the judicial system, including the courts and their powers. They may outline the appointment and tenure of judges, as well as the principles of judicial independence and the right to a fair trial.

• Constitutional Amendments: These articles specify the procedures and requirements for amending the constitution itself, ensuring that any changes are made through a formal and transparent process.

• Territorial Organization: These articles define the territorial boundaries, administrative divisions, and relations between the central government and local or regional authorities.

• Transitional Provisions: In some constitutions, there may be specific articles that address the transition from a previous constitutional order, such as after a regime change or a significant political event.

Q33. Answer: (b) Narmada

The correct answer is Option 2.

Key Points

• The Dhuandhar Falls is formed by the Narmada River.

• The Narmada River is one of the major rivers in central India, and it flows through the states of Madhya Pradesh, Maharashtra, and Gujarat.

• The Dhuadhar Falls is located near Jabalpur in the state of Madhya Pradesh and is a popular tourist attraction known for its powerful cascades and misty appearance, hence the name "Dhuandhar," which means "smoke cascade" in Hindi.

Additional Information

• The Tapi River, also known as the Tapti River, is one of the major rivers in India.

• It is located in the western part of the country and flows through the states of Maharashtra, Madhya Pradesh, and Gujarat. Here are some key details about the Tapi River:

• Origin: The Tapi River originates in the Betul district of Madhya Pradesh, near Multai town, in the Satpura Range of hills.

• Course: The river flows westward through Madhya Pradesh and enters Maharashtra near Bhusawal. It then continues its westward journey through Maharashtra, passing through cities like Jalgaon, Burhanpur, and Surat. Finally, it enters the Gulf of Khambhat in the Arabian Sea in Gujarat.

• Godavari -

• Length and Course: The Godavari River is one of the longest rivers in India, stretching approximately 1,465 kilometers (910 miles).

• Sacred and Cultural Significance: The Godavari holds immense religious importance, especially among Hindus. It is often

referred to as the "Dakshina Ganga" or the Ganges of the South.

• River Basin and Irrigation: The Godavari River has an extensive river basin covering around 312,812 square kilometers (120,777 square miles). This vast basin provides water for irrigation, supporting agriculture and livelihoods for millions of people in the surrounding regions.

• Biodiversity and Ecosystem: The Godavari River and its basin support rich biodiversity and a diverse ecosystem. The river sustains a variety of flora and fauna, including several endangered species.

• Historical and Cultural Heritage: The banks of the Godavari River are adorned with numerous historical and cultural sites. Ancient cities like Nashik, Rajahmundry, and Bhadrachalam are located along its course, showcasing magnificent temples, forts, and architectural marvels.

• Mahanadi -

• Mahanadi River: The Mahanadi is one of the major rivers in India, flowing through the states of Chhattisgarh and Odisha. It originates in the Dhamtari district of Chhattisgarh and empties into the Bay of Bengal.

• Length and Drainage: The Mahanadi River stretches for approximately 858 kilometers, making it the sixth-longest river in India. It has a vast drainage basin covering an area of around 141,600 square kilometers.

• Importance for Agriculture: The Mahanadi River plays a crucial role in irrigation and agriculture in the region. Several dams and reservoirs have been constructed along its course to store water for irrigation purposes, ensuring the availability of water for crops and promoting agricultural development.

• Mahanadi Delta: The river forms a large delta known as the Mahanadi Delta, which is located in the coastal plains of Odisha. The deltaic region is rich in fertile alluvial soil, making it suitable for agriculture and supporting a diverse ecosystem.

• Biodiversity and Wildlife: The Mahanadi River and its surrounding areas are home to a wide variety of flora and fauna. The river supports rich biodiversity, including several species of fish, reptiles, and mammals. It also serves as a habitat for migratory birds, making it a significant area for birdwatching and conservation efforts.

Q34. Answer: (d) novels

The correct answer is Option 4.

Key Points

• Leo Tolstoy is best known for his novels, particularly "War and Peace" and "Anna Karenina."

• These two works are considered literary masterpieces and are among the most celebrated novels in world literature.

• "War and Peace": Published in 1869, "War and Peace" is Tolstoy's epic novel that portrays Russian society during the Napoleonic era.

• It explores the lives of several interconnected characters from different social classes and examines themes such as love, war, power, and the individual's role in historical events.

• The novel is renowned for its rich character development, detailed historical backdrop, and philosophical reflections.

• "Anna Karenina": Published in 1877, "Anna Karenina" is another of Tolstoy's major works.

• It tells the story of Anna Karenina, a married woman who embarks on an affair with Count Vronsky, challenging the societal norms of 19th-century Russia.

• The novel delves into themes of love, morality, family, and the consequences of societal expectations.

• "Anna Karenina" is praised for its psychological insight, complex characters, and exploration of human relationships.

• Tolstoy's writing style is characterized by his attention to detail, vivid descriptions, and his ability to portray the complexities of human nature.

• His works often tackle profound philosophical questions and offer deep insights into the human condition. Tolstoy's contributions to literature have had a lasting impact and continue to be studied and appreciated by readers around the world.

Q35. Answer: (a) Sedimentary rocks

The correct answer is Option 1.

Key Points

• Sedimentary rocks are formed by the accumulation and consolidation of sediment over time.

• They often contain fossils of plants, animals, and other microorganisms that lived in the past.

• Fossils are commonly found in sedimentary rocks because these rocks preserve the remains or traces of ancient life forms.

• Extrusive igneous rocks form from lava cooling on the Earth's surface, and while they can sometimes contain fossils preserved from nearby sedimentary rocks, it is less common.

• Metamorphic rocks are formed through the alteration of existing rocks under high heat and pressure, and they typically do not contain fossils. Intrusive igneous rocks form from magma cooling beneath the Earth's surface and generally do not contain fossils either.

Additional Information

• Extrusive igneous rocks are formed from lava that cools and solidifies on the Earth's surface.

• This lava is typically erupted from volcanoes or fissures and then rapidly cools as it comes into contact with the cooler air or water.

• Examples of extrusive igneous rocks include basalt, andesite, and rhyolite.

• Unlike sedimentary rocks, extrusive igneous rocks are not known for preserving fossils of plants, animals, or microorganisms.

• Fossils are primarily found in sedimentary rocks because the processes of sedimentation and burial help to protect and preserve the remains or traces of ancient life forms.

• However, it's worth noting that in some cases, extrusive igneous rocks can preserve fossils that were captured or trapped within them during an eruption if they were near or in contact with sedimentary rocks containing fossils.

• This is relatively rare, and the vast majority of fossils are found in sedimentary rocks.

• Metamorphic rocks are formed through the process of metamorphism, which involves the transformation of pre-existing rocks under high temperature and pressure conditions.

• Metamorphism occurs deep within the Earth's crust and can be caused by tectonic forces, intense heat from magma intrusion, or burial under thick layers of sediment.

• Metamorphic rocks undergo changes in mineral composition, texture, and structure, but they do not typically contain fossils.

• The intense heat and pressure associated with metamorphism often destroy any organic remains or fossils that may have been present in the original rock.

• The recrystallization and reordering of minerals during metamorphism erase the original structures, including any fossil evidence.

• Intrusive igneous rocks, also known as plutonic rocks, are formed from the cooling and solidification of magma deep beneath the Earth's surface.

• Unlike extrusive igneous rocks, which form from lava that erupts onto the surface, intrusive rocks cool and solidify slowly within the crust.

Q36. Answer: (c) Marchantia

The correct answer is Option 3.

Key Points

• The common type of Bryophyta among the options provided is Marchantia.

• Marchantia is a genus of liverworts, which are a group of bryophytes.

• Bryophyta is a division of non-vascular plants that includes mosses, liverworts, and hornworts.

• Cladophora is a genus of green algae, Marsilea is a genus of ferns, and Monocot is a class of flowering plants that includes grasses, orchids, and lilies, among others.

Q37. Answer: (a) Priyanka Chopra

The correct answer is Option 1.

Key Points

• "Unfinished" is a memoir written by Indian actress Priyanka Chopra and published in 2021.

• The book is a compilation of personal essays, stories, and observations, offering readers a glimpse into significant moments in Chopra's life and her extensive twenty-year-long career.

• Throughout the memoir, she shares her experiences as an actress-producer and her role as a UNICEF Goodwill Ambassador.

• Additionally, Chopra delves into her marriage to American singer and actor Nick Jonas, providing insights into their relationship.

• "Unfinished" presents a candid and introspective narrative, offering readers an opportunity to gain a deeper understanding of Priyanka Chopra's life journey.

Q38. Answer: (c) Honeywell 400

The correct answer is Option 3.

Key Points

• Honeywell 400 is considered a second generation system.

• The Honeywell 400 was a series of mainframe computers introduced by Honeywell in the 1960s, which falls within the second generation of computer systems.

• The other options listed are not second generation systems:

• IBM notebooks: Notebooks, as portable computers, did not exist during the second generation of computers.

• Sun workstations: Sun workstations were introduced in the 1980s, which is considered part of the third generation of computer systems.

• Apple II: The Apple II was released in 1977.

Therefore, the Honeywell 400 is the only option listed that is considered a second generation system.

Q39. Answer: (c) Kailash Satyarthi

The correct answer is Option 3.

Key Points

• In the year 2014, the Nobel Peace Prize was awarded to Kailash Satyarthi, an Indian citizen and children's rights activist.

• He shared the prize with Malala Yousafzai, a Pakistani human rights activist, for their struggle against the suppression of children and young people and for the right of all children to education.

• Kailash Satyarthi has been actively involved in fighting against child labor and advocating for children's rights for several decades.

Additional Information

• The Nobel Peace Prize is one of the prestigious awards established by the will of Alfred Nobel, a Swedish inventor, engineer, and philanthropist. It is awarded annually to individuals, organizations, or movements that have made significant contributions to promoting peace and resolving conflicts.

• Here are some key points about the Nobel Peace Prize:

• Categories: The Nobel Peace Prize is awarded in various categories, including diplomacy, disarmament, human rights, peace negotiations, and humanitarian work.

• Selection Process: The Nobel Peace Prize is awarded by different committees and organizations depending on the category. The Nobel Committee of the Norwegian Nobel Institute is responsible for selecting the Nobel Peace Prize laureate.

• Criteria: The Nobel Peace Prize is awarded to individuals or organizations that have made exceptional efforts to promote peace and alleviate conflicts. The prize aims to recognize achievements in various areas, such as negotiations, diplomacy, humanitarian work, disarmament, and human rights advocacy.

• Nobel Peace Prize Ceremony: The Nobel Peace Prize is traditionally presented on December 10th each year in Oslo, Norway, on the anniversary of Alfred Nobel's death. The ceremony includes the laureate's acceptance speech and the awarding of the Nobel diploma and medal.

• Significance: The Nobel Peace Prize holds great significance worldwide. It highlights the work of the laureates and raises awareness about peace-related issues, inspiring others to contribute to the pursuit of peace and conflict resolution.

Q40. Answer: (c) Friction

The correct answer is Option 3.

Key Points

• Friction is a contact force, not a non-contact force.

• It is the force that opposes the motion or potential motion between two surfaces in contact with each other.

• Examples of contact forces include friction between objects, normal force, tension in a rope, and applied force.

Additional Information

• Gravitational force is a non-contact force.

• It is the force of attraction between two objects with mass.

• It acts at a distance without the need for physical contact between the objects.

• The force of gravity is responsible for the motion of celestial bodies, such as the planets orbiting the sun, and the gravitational attraction between objects on Earth.

• It follows Newton's law of universal gravitation, which states that the force of gravity is proportional to the product of the masses of the objects and inversely proportional to the square of the distance between them.

• Electrostatic force is also a non-contact force.

• It is the force of attraction or repulsion between electrically charged particles.

• Like gravitational force, electrostatic force acts at a distance without the need for physical contact between the charged objects.

• It is responsible for various phenomena, such as the interaction between charged particles, the attraction of hair to a charged comb, and the repulsion between like charges.

• Electrostatic force follows Coulomb's law, which states that the force between two charged objects is directly proportional to the product of their charges and inversely proportional to the square of the distance between them.

• Magnetic force is another example of a non-contact force.

• It is the force of attraction or repulsion between magnetic objects or between a magnetic object and a moving charged particle.

• Magnetic force acts at a distance without the need for physical contact between the objects involved.

• This force is associated with magnetic fields and is responsible for various phenomena, such as the interaction between magnets, the behavior of compass needles, and the deflection of charged particles in magnetic fields.

• The strength and direction of the magnetic force depend on the magnetic properties and relative orientations of the objects or particles involved.

Q41. Answer: (d) Nitin Gupta

The correct answer is Nitin Gupta.

Key Points

• IRS officer Nitin Gupta has been appointed as the new Central Board of Direct Taxes (CBDT) chairman.

• Mr. Gupta is an Indian Revenue Service (IRS) officer of the 1986 batch of the Income Tax cadre and is currently serving as the Member (investigation) in CBDT.

• The post of the CBDT chief was being held in an additional capacity by Board member and 1986-batch IRS officer Sangeeta Singh.

Additional Information

• Important Appointments:

• Retired IAS officer and former Drinking Water and Sanitation Secretary Parameswaran Iyer has been appointed as the new Chief Executive Officer of NITI Aayog.

• The New Development Bank (NDB) of the BRICS countries has appointed Dr. D J Pandian as the Director-General of its India Regional Office in Gujarat International Finance Tec-City (GIFT City).

• Senior Diplomat Ruchira Kamboj has been appointed as the next Ambassador and Permanent Representative of India to the United Nations.

• Somali president Hassan Sheikh Mohamud on 15 June 2022 appointed Hamza Abdi Barre as the country's Prime Minister.

• Justice Bhimanagouda Sanganagouda Patil has been appointed as the new Lokayukta of Karnataka.

• President Ram Nath Kovind has given Justice Pradip Kumar Mohanty the additional charge of the Lokpal chairperson.

• Dinkar Gupta, a 1987-batch IPS officer and former chief of the Punjab Police, has been appointed Director-General of the National Investigation Agency (NIA).

Q42. Answer: (c) Nirbhaya Fund

The correct answer is Nirbhaya Fund.

Key Points

• One-stop Centre is a centrally sponsored scheme is for women empowerment under the Ministry of Women and Child Development.

• It is a scheme for addressing the issue of violence against women.

• It aims to provide assistance and support to the women affected by violence in public and private spheres.

• It is funded through Nirbhaya Fund.

Additional Information

The one-Stop Centre scheme provides the following assistance to women-

• Medical assistance

• Legal assistance

• Shelter

• Counselling

• Rescue services

• Psycho- socio support

Q43. Answer: (d) Mirabai Chanu

The correct answer is Mirabai Chanu.

Key Points

• Saikhom Mirabai Chanu is a weightlifter who hails from Manipur, India.

• She competed in the women’s 49-kilogram division at the Olympic Games in Tokyo in 2020 and earned the silver medal.

• Because of her hard work and dedication to the sport, the government of India honored her with the Padma Shri award in 2018.

• In 2018, the Government of India honored her with Major Dhyan Chand Khel Ratna for her achievements in the athletic world.

• Mirabai Chanu won the first gold for India with a combined lift of 201kg in the Women's 49kg weightlifting final at the Commonwealth Games 2022 in Birmingham on July 30, 2022.

Additional Information

Athlete	Sport	Medal
Mirabai Chanu	Weightlifting	Silver
PV Sindhu	Badminton	Bronze

Lovlina Borgohain	Boxing	Bronze
Ravi Kumar Dahiya	Wrestling (freestyle)	Silver
Bajrang Punia	Wrestling (freestyle)	Bronze
Neeraj Chopra	Athletics (Javelin)	Gold

Q44. Answer: (a) Fifteen days

The correct answer is Fifteen days.

Key Points

• As per provisions of the Scheme, Electoral Bonds may be purchased by a person, who is a citizen of India or incorporated or established in India.

• A person being an individual can buy Electoral Bonds, either singly or jointly with other individuals.

• Only the Political Parties registered under Section 29A of the Representation of the People Act, 1951 (43 of 1951) and which secured not less than one percent of the votes polled in the last General Election to the House of the People or the Legislative Assembly of the State, shall be eligible to receive the Electoral Bonds.

• State Bank of India (SBI), in the XXVI Phase of sale, has been authorized to issue and encash Electoral Bonds through its 29 Authorized Branches (as per list enclosed below).

• The Electoral Bonds shall be valid for fifteen calendar days from the date of issue and no payment shall be made to any payee Political Party if the Electoral Bond is deposited after the expiry of the validity period.

Additional Information

• An electoral bond is like a promissory note that can be bought by any Indian citizen or company incorporated in India from select branches of the State Bank of India.

• The citizen or corporate can then donate the same to any eligible political party of his/her choice.

• The bonds will be issued in multiples of Rs 1,000, Rs 10,000, Rs 100,000 and Rs 1 crore (the range of a bond is between Rs 1,000 to Rs 1 crore).

• The Electoral Bonds shall be encashed by an eligible Political Party only through a Bank account with the Authorized Bank.

Q45. Answer: (b) M

The correct answer is M.

Key Point

Expenditure method of income measurement:

• The expenditure method is a system for calculating gross domestic product (GDP) that combines C + I + G + X - M where consumption (C), investment(I), government spending(G), and net exports(X-M) where M is import and X is export.

• It is the most common way to estimate GDP. It says everything that the private sector, including consumers and private firms, and government spending within the borders of a particular country, must add up to the total value of all finished goods and services produced over a certain period of time. This method produces nominal GDP, which must then be adjusted for inflation to result in the real GDP.

Additional Information

1. Product Method:

• The product or value-added method is a way of computing the national income of a country.

• This system is also known as the output or inventory method. This method calculates national income by adding value to a product at every stage of its production.

2. Income Method:

• In the income method, the national income is measured by adding up the pretax income generated by the individuals and companies in the economy.

• It consists of income from wages, rent of buildings and land, interest on capital, profits, etc.

Q46. Answer: (c) Tabla

The correct answer is Tabla.

Key Points

• Tabla musician, composer, percussionist, music producer and actor Ustad Zakir Hussain hails from India.

• He is Ustad Alla Rakha's oldest son, a tabla player.

• In 1988, he received the Padma Shri, and in 2002, he received the Padma Bhushan.

• In 1990, he also received the Sangeet Natak Akademi Award.

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• He received the National Heritage Fellowship from the National Endowment for the Arts of the United States in 1999.

• The line "Zakir Hussain Tabela Ivaltana" in the Tamil song "Telephone Manipol" in the Indian film directed by S. Shankar is a tribute to him.

Additional Information

• Hindustani classical harmonium player R. K. Bijapure was from India.

• Indian classical musician and santoor player Pandit Shivkumar Sharma played both instruments.

• Sharma received the Padma Shri in 1991, the Padma Bhushan in 2001, and the Sangeet Natak Akademi Award in 1986.

• Indian classical flautist and music director Hariprasad Chaurasia plays the flute.

• In 1984, he was awarded the Sangeet Natak Academy, and in 1992, the Padma Bhushan.

Q47. Answer: (a) Sher Shah Suri's

The correct answer is Sher Shah Suri.

Key Points

• Akbar followed the administration model of Sher Shah Suri.

Additional Information

• Sher Shah Suri was the founder of the Suri Empire in India.

• He introduced the currency of the Rupee.

• Sher Shah of Sur took control of the Mughal Empire in 1540.

• His reorganization of the empire laid the foundations for the later Mughal emperors, notably Akbar, son of Humayun.

• Sher Shah Suri's administration:

• He organized an excellent administrative system.

• The king was aided by four important ministers.

• Diwan –i- Wizarat or Wazir – in charge of Revenue and Finance

• Diwan-i-Ariz – in charge of Army

• Diwan-i-Rasalat – Foreign Minister

• Diwan-i-Insha – Minister for Communications

Important Points

• Akbar (1556- 1605)

• He reigned from 1556 to 1605.

• He defeated Hemu at the second battle of Panipat in 1556.

• He constructed Fatehpur Sikri and made it his capital in 1569.

• He started a new religion Din-i Ilahi in 1582.

• Abul Fazl wrote his biography titled Akbarnama.

• Nine of his courtiers were known as Navratnas.

• They were Todar Mal, Abul Fazal, Faizi, Birbal, Tansen, Abdur Rahim Khana-i-Khana, Mullah-do-Pyaza, Raja Man Singh, and Fakir Aziao-Din.

• He married a Hindu princess Harka Bai who is commonly known as Jodha Bai.

• Akbar captured the historic fortress of Chitor in 1568.

• He abolished the pilgrimage tax by Hindus in 1563.

• He abolished the Jizyah tax in 1564.

• He also introduced the Mansabdari System or the rank-holder system to organize the nobility and army.

Q48. Answer: (c) Sharath Kamal

The correct answer is Sharath Kamal.

Key Points

• Sharath Kamal won the most medals (three gold medals and a silver medal) for India at the Commonwealth Games 2022.

• Achanta Sharath Kamal was born on July 12, 1982, in Chennai, Tamil Nadu, a city known for its table tennis prowess and multiple national champions.

• With four Commonwealth Games golds, two Asian Games medals, three Olympic Games appearances, and two ITTF Pro Tour titles under his belt, Sharath Kamal is arguably the best Indian table tennis player in history.

Additional Information Achievements

• He won his first national title in 2003 and his first international medal at the 2004 Commonwealth Table Tennis Championships.

• He has conferred the Arjuna Award in 2004, won five national titles in a row.

• A historic singles gold medal at the 2006 Commonwealth Games in Melbourne.
• In 2010, Sharath Kamal became the first Indian table tennis player to win an ITTF Pro Tour title.
• In 2020, at the age of 37, Sharath Kamal finally won his second international title at the Oman Open, a decade after his first.

Q49. Answer: (d) Umling La

The correct answer is Umling La.

Key Points

• Umling La:

• In Ladakh, India, close to Demchok, on the ridgeline between Koyul Lungpa and the Indus River, lies a mountain pass known as Umling La.

• Umling Pass was awarded the Guinness World Record in 2021 for being the world's highest motorable road.

Additional Information

Pass	State
Nathu La	Sikkim
Rohtang Pass	Himachal Pradesh
Zoji La	Jammu and Kashmir
Chang La	Jammu and Kashmir
Baralacha La	Himachal Pradesh
Bomdila Pass	Arunachal Pradesh
Thag/Tanglang La	Ladakh
Lipulekh Pass	Uttarakhand
Shipki La	Himachal Pradesh
Mana Pass	Uttarakhand
Jelep La	Sikkim
Banihal Pass	Jammu and Kashmir
Lungalacha La	Jammu and Kashmir/Himachal Pradesh

Q50. Answer: (b) .dcp

The correct answer is .dcp.

Key Points

The file format ".dcp" is not a valid file format in MS Word 365. The dotx, doc, docx are valid file formats:

• .dotx: It is a template file format that allows users to create reusable document templates with preset formatting and styles.

• .doc: However, it is the file format used in older versions of MS Word (prior to MS Word 2007) and is known as the "Word 97-2003 Document" format. Although MS Word 365 primarily uses the .docx format, it can still open and work with .doc files.

• .docx: This is the default file format in MS Word 365 for saving documents. It is an XML-based file format introduced with MS Word 2007 and has since become the standard format for MS Word documents. The .docx format supports advanced features, improved compatibility, and better file size optimization compared to the older .doc format.

Additional Information

Shortcut Key	Function
Ctrl + N	Create a new document
Ctrl + O	Open an existing document
Ctrl + S	Save the current document
Ctrl + P	Print the current document
Ctrl + Z	Undo the last action
Ctrl + Y	Redo the last undone action

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Ctrl + X	Cut the selected text or object
Ctrl + C	Copy the selected text or object
Ctrl + V	Paste the cut or copied text or object
Ctrl + A	Select the entire document
Ctrl + F	Find a specific word or phrase in the document
Ctrl + H	Find and replace a specific word or phrase in the document
Ctrl + B	Bold the selected text
Ctrl + I	Italicize the selected text

Q51. Answer: (d) 14 percent

Shortcut Trick

Apply the net percentage change formula: Net % = a + b + (ab / 100).

Here, a = +20 (increase) and b = −5 (decrease).

Net Change = 20 − 5 + [20 × (−5) / 100]

Net Change = 15 − (100 / 100) = 15 − 1 = 14%.

Since the result is positive, it is a 14% increase in expenditure.

Therefore The correct answer is 14 percent.

Alternate Method

Given:

Price increase = 20%

Consumption decrease = 5%

Formula Used:

Total Expenditure = Price × Consumption

Calculations:

=> Let original Price = 100 and original Consumption = 100

=> Original Expenditure = 100 × 100 = 10000

=> New Price = 100 + 20% of 100 = 120

=> New Consumption = 100 − 5% of 100 = 95

=> New Expenditure = 120 × 95 = 11400

=> Change in Expenditure = 11400 − 10000 = 1400

=> Percentage Change = (1400 / 10000) × 100

=> Percentage Change = 14%

Therefore The correct answer is 14 percent.

Additional Information

Successive Percentage Formula

When a value is changed by a% and then by b%, the net effective change is [a + b + (ab/100)]%.

Price-Consumption-Expenditure Relation

If expenditure is kept constant, price and consumption are inversely proportional (Price prop. to 1 / Consumption).

Ratio Method

Price ratio = 100:120 = 5:6. Consumption ratio = 100:95 = 20:19. Expenditure ratio = (5×20):(6×19) = 100:114.

Q52. Answer: (c) 18

Given

a + b = 3

ab = 2

Concept:

This is the formula to simplify cubic expressions: $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$

Solution:

$2a^3 + 2b^3 = 2(a^3 + b^3)$

$2(a + b)(a^2 - ab + b^2)$ (Substituting from given)

$2(3)(a^2 - 2 + b^2)$ (as $a + b = 3$ and $ab = 2$)

$2(3)(a^2 + b^2 - 2)$ (as $a^2 + b^2 = (a + b)^2 - 2ab = 9 - 4 = 5$)

$2(3)(5 - 2) = 2(3)(3) = 18$

fore, the value of $2a^3 + 2b^3$ is 18.

Q53. Answer: (c) 70 degree

Given

angle A = 110°

Concept:

In a cyclic quadrilateral, opposite angles are supplementary (i.e., they add up to 180°).

Solution:

angle C = 180° - angle A

angle C = 180° - 110° = 70°

Therefore, the value of angle C is 70°.

Q54. Answer: (a) 110

Given

$P + 1/P = 5$

Concept:

Cubic equation formula from quadratic equation: If $P + 1/P = n$, then $P^3 + 1/P^3 = n^3 - 3n$

Solution:

$P^3 + 1/P^3 = 5^3 - 3\times5$

$P^3 + 1/P^3 = 125 - 15 = 110$

The value of $P^3 + 1/P^3$ is 110.

Q55. Answer: (d) 1550

Concept:

Difference = Total Income - Total Expenditure

Solution:

Total Income = 800 + 600 + 500 + 900 + 400 = 3200

Total Expenditure = 400 + 300 + 400 + 300 + 250 = 1650

Difference = Total Income - Total Expenditure = 3200 - 1650 = 1550

Therefore, the difference between total income and total expenditure of the company for these five years is 1550.

Q56. Answer: (b) 50.84 percent

Calculation:

Total discount on all the articles = 600 + 300 + 600 + 500 + 400 + 300 + 300 = 3000

Total marked price of all the articles = 1200 + 800 + 1000 + 700 + 500 + 600 + 1100 = 5900

Percentage of total discount to total marked price = 3000/5900 × 100 = 50.84%

Therefore Option 2 is the correct answer.

Q57. Answer: (d) 10 cm

Given:

angle YXZ = 90 degree

P is a point on side YZ such that XP is perpendicular to YZ.

XP = YP = 10 cm

Concept Used:

Similarity Rule is used.

Calculation:

In ΔXYZ,

angle YXZ = 90 degree

If angle Y = θ, then

=> angle Z = 90 - θ

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In ΔXPY,
=> angle YPX = 90° [Given]
=> angle Y = angle YXP = θ [XP = PY]
In ΔXPZ,
=> angle XPZ = 90° [Given]
=> angle PXZ = 90 - θ
=> angle Z = 90 - θ
Since two angles are equal, ΔXPZ is isosceles triangle.
=> XP = PZ = 10 cm
Therefore Value of PZ = 10 cm

Q58. Answer: (b) -12/23

Calculation:
(5/3 of 1/4 × 24/5-1/5 of 25/8 × 24/5)/(5/12 of 3/4 × 4/3+3/4 of 12/5 × 5/6)
(5/3 × 1/4 × 24/5-1/5 × 25/8 × 24/5)/(5/12× 3/4 × 4/3+3/4× 12/5 × 5/6)
(2-3)/(5/12+3/2)
(-1)/(23/12)
(-12)/23
Therefore Option 2 is the correct answer.

Q59. Answer: (b) 10 : 9

Calculation:
According to the question:
20% : 18%
10 : 9
Therefore Option 2 is the correct answer.

Q60. Answer: (b) -29

Shortcut Trick
If $K + 1/K = a$, then $K^2 + 1/K^2 = a^2 - 2$ and $K^3 + 1/K^3 = a^3 - 3a$.
Given $K + 1/K = -3$, so $a = -3$.
$K^2 + 1/K^2 = (-3)^2 - 2 = 7$.
$K^3 + 1/K^3 = (-3)^3 - 3(-3) = -27 + 9 = -18$.
Required Expression = $2(K^3 + 1/K^3) + (K^2 + 1/K^2) = 2(-18) + 7 = -29$.
Therefore The correct answer is −29.
Alternate Method
Given: $K + 1/K = -3$
Formula Used: $(a + b)^2 = a^2 + b^2 + 2ab$ and $(a + b)^3 = a^3 + b^3 + 3ab(a + b)$
=> Square the given equation: $(K + 1/K)^2 = (-3)^2$
=> $K^2 + 1/K^2 + 2 = 9$
=> $K^2 + 1/K^2 = 7$
=> Cube the given equation: $(K + 1/K)^3 = (-3)^3$
=> $K^3 + 1/K^3 + 3(K)(1/K)(K + 1/K) = -27$
=> $K^3 + 1/K^3 + 3(-3) = -27$
=> $K^3 + 1/K^3 = -18$
=> [2((K^6 + 1) / K³)] + ((K^4 + 1) / K²) = $2(K^3 + 1/K^3) + (K^2 + 1/K^2)$
=> Value = 2(−18) + 7
=> Value = −36 + 7 = −29
Therefore The correct answer is −29.
Additional Information
Algebraic Identity for Power 2
For any variable x, $x^2 + 1/x^2 = (x + 1/x)^2 - 2$.
Algebraic Identity for Power 3

For any variable x, $x^3 + 1/x^3 = (x + 1/x)^3 - 3(x + 1/x)$.

Algebraic Identity for Power 4

x^4 + 1/x^4 = $(x^2 + 1/x^2)^2 - 2$. This can be derived by squaring the power 2 identity.

Q61. Answer: (c) (4 √7)/3

Given

sin θ = 3/11

Concept:

Use the trigonometric identities $\sin^2\theta + \cos^2\theta = 1$ and cot θ = cos θ / sin (4 √7)/3

Solution:

=> First, find the value of cos θ: $\cos^2\theta = 1 - \sin^2\theta = 1 - (3/11)^2 = 1 - 9/121 = 112/121$

n, cos θ = √(112/121) = 4 √7 / 11

cot θ = cos θ / sin θ = (4 √7 / 11) / (3 / 11) = 4 √7 / 3

Hence, the value of cot θ is (4 √7)/3

Q62. Answer: (a) 16.67 percent

Shortcut Trick

The reasoning involves determining the Cost Price using the given Selling Price and Profit Percentage, followed by calculating the Loss Percentage for the new Selling Price.

Initial SP = 110% of CP = 1056.

CP = 1056 ÷ 1.1 = 960.

New SP = 800.

Loss = 960 − 800 = 160.

Loss% = (160 ÷ 960) × 100 = 16.67%.

Therefore The correct answer is 16.67 percent.

Alternate Method

Given → SP1 = 1056, Profit1 = 10%, SP2 = 800.

Formulas: CP = SP × 100 ÷ (100 + P%) | Loss% = (CP − SP) ÷ CP × 100.

=> Cost Price (CP) = 1056 × 100 ÷ 110 = 960.

=> Loss = 960 − 800 = 160.

=> Loss Percentage = (160 ÷ 960) × 100.

=> Loss Percentage = 100 ÷ 6 = 16.666...% ≈ 16.67%.

Therefore The correct answer is 16.67 percent.

Additional Information

Cost Price and Selling Price

The Cost Price is the base for calculating Profit or Loss unless specified otherwise. CP = SP − Profit or CP = SP + Loss.

Loss Percentage

Loss% = (Loss ÷ CP) × 100. It indicates the amount of value lost relative to the original investment.

Q63. Answer: (d) -2

Shortcut Trick

Identify complementary angles: 42° + 48° = 90° and 32° + 58° = 90°.

Using the property: If A + B = 90°, then csc A / sec B = 1 and cos A / sin B = 1.

Expression = 3(1) − 5(1)

Expression = 3 − 5 = −2.

Therefore The correct answer is -2.

Alternate Method

Given: (3 csc 42° / sec 48°) − (5 cos 32° / sin 58°)

Formula Used: csc θ = sec(90° − θ) and cos θ = sin(90° − θ)

=> csc 42° = sec(90° − 42°) = sec 48°

=> cos 32° = sin(90° − 32°) = sin 58°

=> Expression = [3 × sec 48° / sec 48°] − [5 × sin 58° / sin 58°]

=> Expression = 3(1) − 5(1)

=> Expression = 3 − 5 = −2

Therefore The correct answer is -2.

Additional Information

Trigonometric Ratios of Complementary Angles

Two angles are complementary if their sum is 90°. Basic identities include sin(90° − θ) = cos θ and tan(90° − θ) = cot θ.

Secant and Cosecant Relationship

The secant of an angle is equal to the cosecant of its complement: sec θ = csc(90° − θ).

Quotient Property for Complementary Angles

If A + B = 90°, then sin A / cos B = 1, tan A / cot B = 1, and sec A / csc B = 1.

Q64. Answer: (d) 20 percent

Given

Principal (P) = Rs. 3000

Compound Interest (CI) = Rs. 1320

Time (t) = 2 years

Concept:

The compound interest formula is CI = P(1 + r/100)^t - P, where r is the rate of interest.

Solution:

Substitute the given values in the formula: 1320 = 3000(1 + r/100)^2 - 3000

Solve the equation for r: $(1 + r/100)^2 = 4320/3000$

r: $(1 + r/100)^2 = 144/100$

r = 20%

Hence, the annual rate of interest at which Rajeev invested his money is 20%.

Q65. Answer: (a) 48

Given

Percentage of runs for F = 18%, I = 24%, J = 6%; Total runs = 300

Concept:

The average of a quantity is the sum of all quantities divided by the number of quantities.

Solution:

Calculate runs for F, I, and J: F = 18% of 300 = 54, I = 24% of 300 = 72, J = 6% of 300 = 18

Calculate average: (F + I + J)/3 = (54 + 72 + 18)/3 = 48

Hence, the average runs scored in F, I and J is 48

Q66. Answer: (d) 792 cm^2

Shortcut Trick

Ratio of dimensions Length (L) : Breadth (B) : Height (H) = 3 : 1 : 2

Given Breadth (1 unit) = 6 cm => Length = 18 cm and Height = 12 cm.

Total Surface Area = 2 × (LB + BH + LH)

Area = 2 × (18 × 6 + 6 × 12 + 12 × 18) = 2 × (108 + 72 + 216) = 2 × 396 = 792 cm^2.

Therefore The correct answer is 792 cm^2.

Alternate Method

Given:

Breadth (b) of the cuboid = 6 cm

Length (l) = 3 × Breadth = 3 × 6 = 18 cm

Height (h) = 2 × Breadth = 2 × 6 = 12 cm

Formula Used:

Total Surface Area (TSA) of a cuboid = 2(lb + bh + hl)

Calculations:

=> TSA = 2 × (18 × 6 + 6 × 12 + 12 × 18)

=> TSA = 2 × (108 + 72 + 216)

=> TSA = 2 × 396

=> TSA = 792 cm^2

Therefore The correct answer is 792 cm².

Additional Information

Volume of a Cuboid

The space occupied by the cuboid is calculated as Volume = Length × Breadth × Height.

Lateral Surface Area (LSA)

The area of the four vertical faces (excluding top and bottom) is LSA = 2 × Height × (Length + Breadth).

Diagonal of a Cuboid

The longest rod that can be placed inside a cuboid is the diagonal, given by √(l² + b² + h²).

Q67. Answer: (a) 16√3 cm

Shortcut Trick

For two equal circles passing through each other's centers, the common chord length is given by: L = √3 × r.

=> 24 = √3 × r

=> r = 24 / √3 = 8√3 cm

=> Diameter of the circle (d) = 2 × r = 2 × 8√3

=> d = 16√3 cm

Therefore The correct answer is 16√3 cm.

Alternate Method

Given:

Length of the common chord = 24 cm

Calculation:

According to the figure,

=> AD = DB

Let,

=> O1O2 = 2x

Also,

=> O1A = O2A = 2x [Radius of the circles]

=> angle ADO1 = 90°

Therefore,

=> O1D = O2D = 2x ÷ 2 = x

Since AD = 24 ÷ 2 = 12 cm,

Using Pythagoras theorem:

=> 12 = √(4x2 − x2)

=> 122 = 4x2 − x2

=> 144 = 3x2

=> x2 = 48

=> x = 4√3

Therefore,

=> Radius = 2x

=> Radius = 2 × 4√3

=> Radius = 8√3 cm

Now,

=> Diameter = 8√3 × 2

=> Diameter = 16√3 cm

Therefore The diameter of the circle is 16√3 cm.

Additional Information

Common Chord Property

The line joining the centers of two intersecting circles is the perpendicular bisector of their common chord.

Intersecting Equal Circles

When two equal circles pass through each other's centers, they form two equilateral triangles with the intersection points and the centers, all sides being equal to the radius r.

Common Chord Length Formula

If two circles of radii r1 and r2 have centers at distance d, the length of the common chord is $2 \times \sqrt{[r1^2 - ((r1^2 - r2^2 + d^2) \div 2d)^2]}$.

Q68. Answer: (c) $(a^2 - b^2)$

Given

$A = a \operatorname{cosec} \theta + b \cot \theta$

$B = a \cot \theta + b \operatorname{cosec} \theta$

Concept:

A trigonometric identity can be used here: $\operatorname{cosec}^2 \theta - \cot^2 \theta = 1$

Solution:

Substitute the given values into the formula: $A^2 - B^2 = (a^2 - b^2)(\operatorname{cosec}^2 \theta - \cot^2 \theta) = (a^2 - b^2) \times 1 = a^2 - b^2$

Hence, the value of $A^2 - B^2$ is $a^2 - b^2$.

Q69. Answer: (a) 56

Given:

$2160 \times 3 \div 144 + 13 - 2$

Concept used:

Follow the BODMAS rule given below to solve this question

Calculation:

$2160 \times 3 \div 144 + 13 - 2$

$45 + 11$

56

Hence, the value of the expression is 56.

Q70. Answer: (c) 28/3 days

Given:

P can complete the work in 12 days.

Q can complete the work in 15 days.

R can complete the work in 20 days.

P left the work 8 days before it was completed.

Q left the work 5 days after P had left.

R completed the remaining work alone.

Concept:

The total work done by individuals working together is equal to the sum of their individual work done in the same time.

Solution:

Total work = LCM(12, 15, 20) = 60

Efficiency of P = 60/12 = 5

Efficiency of Q = 60/15 = 4

Efficiency of R = 60/20 = 3

Let the total work done in t days.

According to question,

$\Rightarrow 5(t - 8) + 4(t - 3) + 3t = 60$

$\Rightarrow 5t - 40 + 4t - 12 + 3t = 60$

$\Rightarrow 12t = 112$

$\Rightarrow t = 112/12 = 28/3$ days

Therefore 28/3 days will be required to complete the whole work.

Q71. Answer: (c) 12.5 km/hr

Shortcut Trick

The distance covered by the bus in (50 − 10) = 40 minutes is equal to the distance covered by Mohit in 10 minutes.

Since the distance is constant, Speed is inversely proportional to Time.

Ratio of Time (Bus : Mohit) = 40 : 10 = 4 : 1

Ratio of Speed (Bus : Mohit) = 1 : 4

Mohit's speed = 4 units => 50 km/hr, so Bus's speed = 1 unit => $50 \div 4 = 12.5$ km/hr.

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Therefore The correct answer is 12.5 km/hr.

Alternate Method

Given:

Bus frequency time = 50 mins

Mohit's meeting time with each bus = 10 mins

Mohit's speed = 50 km/hr

Formula Used:

Distance = Speed × Time

Relative Speed (Opposite Direction) = S1 + S2

Next Bus Mohit Meet in 10 mins Bus travels for 10 mins Mohit travels for 10 mins Initial Gap = Bus Speed × 50 mins

Calculations:

Let the speed of the bus be V km/hr.

=> Distance between two consecutive buses = V × (50/60) km

=> Relative speed of Bus and Mohit = (V + 50) km/hr

=> Time taken to meet = 10/60 hours

We know, Time = Distance ÷ Relative Speed

=> 10/60 = [V × (50/60)] ÷ (V + 50)

=> 1/6 = (5V/6) ÷ (V + 50)

=> (V + 50) / 6 = 5V / 6

=> V + 50 = 5V

=> 4V = 50

=> V = 12.5

Therefore The correct answer is 12.5 km/hr.

Additional Information

Relative Speed (Opposite Direction)

When two bodies are moving in opposite directions towards each other, their relative speed is the sum of their individual speeds (S1 + S2).

Relative Speed (Same Direction)

When two bodies are moving in the same direction, their relative speed is the difference of their individual speeds (|S1 − S2|).

Distance in Periodic Events

If a bus or train departs periodically after every T interval, the constant distance maintained between any two consecutive vehicles on the route is D = Speed × T.

Q72. Answer: (a) 20 percent

Given

Marked price is 150% of the cost price

Discount given is 20%

Concept:

Profit percentage is calculated as (Selling price - Cost price)/Cost price × 100%

Solution:

Selling price after discount = 150% - 20% of 150% = 150% - 30% = 120%

Profit percentage = (Selling price - Cost price)/Cost price × 100% = (120% - 100%)/100% × 100% = 20%

Therefore, the profit percentage is 20%.

Alternate MethodMP/CP = (100 + profit%)/(100 - loss%)

150/100 = (100 + p)/80 => P = 120 -100 = 20%

Q73. Answer: (c) Rs. 2,615

Given

Total amount = Rs. 12,029

P's share = 5Q

R's share = P/3

Concept:

The total amount is the sum of the shares of P, Q, and R.

Solution:

Express all shares in terms of Q: P = 5Q, R = 5Q/3

Total = P + Q + R = 5Q + Q + 5Q/3 = 12,029

Solving the above equation we get Q = Rs. 1569

Therefore, R's share = 5Q/3 = 5 × 1569/3 = Rs. 2615

Therefore, the share of R is Rs. 2615.

Q74. Answer: (d) 75 degree

Shortcut Trick

The angle subtended by a chord at the centre is always twice the angle subtended by it on the major arc.

Ratio of Angle at Centre : Angle on Major Arc = 2 : 1

Total Ratio Units = 2 + 1 = 3 units

Given: 3 units = 225°

1 unit = 225° ÷ 3 = 75°

Therefore The correct answer is 75 degree.

Alternate Method

Given:

Sum of angle at the centre and angle on the major arc = 225°.

Formula Used:

Angle subtended by an arc at the centre is double the angle subtended by it at any point on the remaining part of the circle.

Calculations:

Let the angle subtended by the chord at the major arc be x.

=> Angle subtended at the centre = 2x

=> x + 2x = 225°

=> 3x = 225°

=> x = 225° ÷ 3

=> x = 75°

Therefore The correct answer is 75 degree.

Additional Information

Inscribed Angle Theorem

The angle subtended by an arc at the center is exactly twice the angle subtended by the same arc at any point on the circle's circumference (major arc).

Angles in the Same Segment

Angles subtended by the same chord or arc at different points on the same segment (major or minor) of the circle are always equal.

Cyclic Quadrilateral Property

The sum of the angle at the major arc and the angle at the minor arc subtended by the same chord is 180°, as they form opposite angles of a cyclic quadrilateral.

Q75. Answer: (d) 36.625

Given

Average runs in 7 matches = 49

Average runs in 9 matches = 27

Concept:

The total average is the sum of all runs divided by the total number of matches.

Solution:

Total runs in 7 matches = 7 × 49 = 343

Total runs in 9 matches = 9 × 27 = 243

Total runs in 16 matches = 343 + 243 = 586

Average runs in 16 matches = 586/16 = 36.625

Therefore, the average runs scored by the batsman in these 16 matches is 36.625.

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Q76. Answer: (c) refreshing

The correct answer is 'Option 3' i.e. 'Refreshing'.

Key Points

• In this context, "refreshing" is the most suitable choice because it describes a common and pleasant experience associated with bathing (particularly when using a bath wash).

• A "refreshing" bath would be one that invigorates and revitalizes you.

Therefore, the correct sentence is: Have you ever had a refreshing bath using a bath wash?

Additional Information

• Here is a brief explanation of the other options:

• Barbaric: This word typically describes something crude, uncivilized, or cruel, making it an unlikely descriptor for a bath.

• Extinguishing: This is usually used in the context of putting out a fire or ending something abruptly, so it doesn't fit well with describing a bath.

• Killing: This generally has negative connotations, and it's hard to imagine a context where a "killing bath" would be a common or enjoyable experience.

Q77. Answer: (a) Abandoned

The solution is in Hindi. Read it online.

Q78. Answer: (b) religious importance

The correct answer is 'Option 2' i.e. 'Religious importance'.

Key Points

• The original sentence contains a grammatical error in the phrase "religiously importance."

• The correct construction should use the adjective "religious" to modify the noun "importance."

• Option 2 provides the correct answer by using the adjective "religious" in its correct form and pairing it with the noun "importance."

• This choice accurately conveys that the places mentioned have historical or religious significance.

Therefore, the correct sentence is: There are a number of places of historical or religious importance.

Q79. Answer: (b) I explained that I did not belong there.

The correct answer is 'Option 2'.

Key Points

• In the original sentence, the speaker is explaining their feeling of not belonging in a particular place ("I don't belong here").

• In indirect speech, we need to use reporting verbs like "explained" to convey the speaker's words.

• In the indirect form, we make changes to the pronouns, verb tense, and word order.

• Here's an explanation of why option 2 is the correct answer:

• The reporting verb "explained" accurately conveys the speaker's action of providing an explanation.

• The pronoun "I" remains the same to maintain the first-person perspective.

• The verb "don't belong" changes to "did not belong" to reflect the past tense and indirect speech.

• The adverb "here" changes to "there" to indicate the change in location in the reported speech.

Therefore, the correct sentence is: "I explained that I did not belong there."

Q80. Answer: (b) Guilefulness

The solution is in Hindi. Read it online.

Q81. Answer: (c) Quip

The solution is in Hindi. Read it online.

Q82. Answer: (c) Cadence

The solution is in Hindi. Read it online.

Q83. Answer: (b) The hospital has been rebuilt by the villagers.

The correct answer is 'Option 2'.

Key Points

• In this sentence, the verb "have" in the active sentence becomes "has been" in the passive form.

• "Has been" is the present perfect passive form, indicating an action that started in the past and is still relevant at the present moment.

• The word "rebuilt" remains the same because it is the past participle form of the verb "rebuild," which is used in the active sentence.

• The subject "the villagers" in the active sentence becomes the agent of the passive sentence, indicated by the preposition "by."

• It shows that the villagers are the ones who performed the action of rebuilding the hospital.

Therefore, the correct answer: 'The hospital has been rebuilt by the villagers'.

Q84. Answer: (a) A well done introduction grabs the reader.

The solution is in Hindi. Read it online.

Q85. Answer: (b) QPSR

The correct answer is 'Option 2'.

Key Points

• The sentence should begin with Q, which sets the context by stating that in the present international scenario, something is necessary and useful.

• Next, we have P, which introduces the idea of the Government utilizing the expertise and services of Members of Parliament effectively.

• S follows, providing the specific purpose for which these services are required, which is sensitizing.

• Finally, R concludes the sentence by explaining the outcome or goal of this utilization, which is winning over the support of counterparts in other countries.

Therefore, the correct answer is: 'QPSR'. i.e. Revised sentence: In the present international scenario, it is necessary and useful for the Government to utilize the expertise and services of Members of Parliament effectively for sensitizing and winning over the support of their counterparts in other countries.

Q86. Answer: (a) Everything

The solution is in Hindi. Read it online.

Q87. Answer: (a) Unlikely

The solution is in Hindi. Read it online.

Q88. Answer: (c) Tokan

The solution is in Hindi. Read it online.

Q89. Answer: (a) Grit

The solution is in Hindi. Read it online.

Q90. Answer: (b) are

The correct answer is 'Option 2' i.e. 'Are'.

Key Points

• The original sentence, "Hello! How is you?" contains a grammatical error.

• The subject pronoun "you" requires the corresponding verb form "are" instead of "is" to maintain subject-verb agreement.

• Option 2 provides the correct answer by using the verb form "are" to match the subject "you."

Therefore, the correct sentence is: "Hello! How are you?"

Q91. Answer: (b) users

The correct answer is 'Option 2' i.e. 'Users'.

Key Points

• In this context, "users" is the most suitable choice because it refers to the people who are using Twitter.

• They are the ones who could give attention to a topic (like habitat loss), so it makes the most sense in this sentence.

Therefore, the correct sentence is: Habitat loss received little attention from all Twitter users.

Additional Information

• Here is a brief explanation of the other options:

• Band: This generally refers to a group of people who share a common identity in some way, but it's not a standard way to refer to people on social media.

• Forces: This usually refers to groups that exert power or influence, such as military forces or forces of nature. It's not a typical way to refer to people on social media.

• Pools: In some contexts, a "pool" can refer to a group of people, but it's more commonly used to describe a group that shares a specific resource, like a talent pool or a carpool. It's not a common way to refer to people on Twitter.

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Q92. Answer: (d) of bad news.

The correct answer is 'Of bad news'.

Key Points

• The part of the sentence that contains a grammatical error is: of bad news.

• In this context, the correct preposition to use after "distracted" is "by", not "of".

• Be distracted by: This means to have one's attention diverted by something.

So, the corrected sentence would be: "Give yourself a chance to be distracted by bad news."

Q93. Answer: (d) into Indian equities have pushed

The correct answer is 'Option 4'.

Key Points

• The part of the sentence that contains a grammatical error is: into Indian equities have pushed.

• The error in this sentence is related to subject-verb agreement.

• The subject of the sentence "The inflow of foreign portfolio funds" is singular.

• Therefore, it should be followed by a singular verb "has" instead of the plural "have".

Therefore, the corrected sentence is: "The inflow of foreign portfolio funds into Indian equities has pushed up price-earning multiples and valuation."

Q94. Answer: (a) leaves for work

The correct answer is 'Option 1' i.e. 'Leaves for work'.

Key Points

• The original sentence, "He always checks the weather in the morning before he leaves for working" contains a grammatical error.

• The phrase "leaves for working" is incorrect because it does not match the correct usage in this context.

• Option 1 provides the correct answer by using the phrase "leaves for work" instead.

• This is the appropriate expression to convey that the person is leaving in order to go to work.

• The word "work" functions as a noun in this context, describing the place or activity.

Therefore, the correct sentence is: He always checks the weather in the morning before he leaves for work.

Q95. Answer: (a) QPRS

The correct answer is 'Option 1'.

Key Points

• The sentence should begin with Q, introducing the subject of the sentence, which is the newly appointed division manager who is trained in accounting.

• P follows, specifying the reflection of the manager on why he chose to work for his company despite better offers.

• R comes next, continuing the reflection of the manager, stating that he realized that it was the friendly, collaborative, and ethical culture that made him choose his company.

• Finally, S concludes the sentence by providing further description and elaboration on the culture that influenced the manager's decision.

Therefore, the correct answer is 1) QPRS. i.e. Revised sentence: A newly appointed division manager, trained in accounting, reflected on why he chose to work for his company despite better offers and realized that it was the friendly, collaborative, and ethical culture.

Q96. Answer: (a) happen

The correct answer is 'Option 1' i.e. 'Happen'.

Key Points

• The term "happen" accurately describes the occurrence of swollen joints.

• Swollen joints are a result of the presence of fluid in the tissues around the joints.

• The word "happen" conveys the idea that swollen joints occur as a natural consequence of fluid accumulation.

Therefore, the correct sentence is: Swollen joints happen when there is fluid in the tissues around the joints.

Additional Information

• Option 2) "prompt" means to cause or bring about something, but it doesn't accurately describe the mechanism behind swollen joints.

• Option 3) "produce" suggests an active process of creating or generating swollen joints, which is not accurate in this context. Swollen joints are a passive result of fluid accumulation.

• Option 4) "suppress" means to prevent or stop something, which is not suitable in this context. It does not describe the

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occurrence of swollen joints.

Q97. Answer: (a) uncomfortable

The correct answer is 'Option 1' i.e. 'Uncomfortable'.

Key Points

• The most appropriate option to fill in blank number 2 is "uncomfortable."

• Swelling in the joints can be very uncomfortable.

• When there is fluid in the tissues around the joints, it can cause pain, stiffness, and limited mobility.

• The discomfort can make it difficult to move the affected joints and can significantly impact daily activities.

Therefore, the correct sentence is: It can be very uncomfortable and can make it difficult to move the affected joints.

Q98. Answer: (a) shape

The correct answer is 'Option 1' i.e. 'Shape'.

Key Points

• The most appropriate option to fill in blank number 3 is "shape."

• Swelling in the joints may cause affected joints to increase in size or appear to be an odd shape.

• When joints become swollen, the accumulation of fluid can lead to visible changes in the joint's size and contour.

• This can result in joints appearing larger or taking on an irregular shape compared to their normal appearance.

Therefore, the correct sentence is: In some cases, swelling may cause affected joints to increase in size or appear to be an odd shape Joint pain and swelling can affect more than one joint at a time.

Q99. Answer: (d) joint

The correct answer is 'Option 4' i.e. 'Joint'.

Key Points

• The most appropriate option to fill in blank number 4 is "joint."

• Joint pain and swelling can affect more than one joint at a time.

• When there is inflammation or swelling in the joints, it can impact multiple joints simultaneously, leading to pain and discomfort throughout the affected areas.

• Out of the given options, "joint" is the most suitable choice because it directly relates to the topic of the sentence and aligns with the context provided.

Therefore, the correct sentence is: In some cases, swelling may cause affected joints to increase in size or appear to be an odd shape Joint pain and swelling can affect more than one joint at a time.

Q100. Answer: (b) affected

The correct answer is 'Option 2' i.e. 'Affected'.

Key Points

• The sentence states that the most common joints to be (5)_____ by pain and swelling are elbows, wrists, shoulders, the base of the spine, knuckles, hips, knees, or ankles.

• The word in the blank should describe the joints that experience pain and swelling.

• Out of the given options, "affected" is the most suitable choice because it accurately conveys that the mentioned joints are the ones experiencing the pain and swelling.

• When joints are swollen, they are considered affected by the swelling and associated symptoms.

Therefore, the correct sentence is: The most common joints to be affected by pain and swelling are elbows, wrists, shoulders, the base of the spine, knuckles, hips, knees or ankles.

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