RRB NTPC Graduate Level CBT-II Official Paper (Held On: 13 Oct, 2025 Shift 2) (Previous Year Paper)

RRB NTPC • 2025 • 120 questions • 90 minutes • Answer key and solutions

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FULL TEST

Q1. What should come in place of the question mark (?) in the given series?

14, 25, 47, 80, 124, ?

(a) 178
(b) 177
(c) 180
(d) 179

Q2. Ramanand spends 48% of his income on food, 25% on house rent, 12% on conveyance and 60% of the remaining on children's education. Find the percentage of his income left with him.

(a) 6%
(b) 9.98%
(c) 9%
(d) 8.25%

Q3. The progressive increase in pesticide concentration at successive trophic levels is termed as:

(a) biotransformation
(b) bioaccumulation
(c) biomagnification
(d) biodegradation

Q4. The ratio of the cost prices of articles X and Y is 2 : 3. A man earns a profit of 43% by selling X and loses 12% by selling Y. What is his gain/loss percentage in the entire transaction?

(a) Gain, 10%
(b) Loss, 10%
(c) Loss, 11.5%
(d) Gain, 9.5%

Q5. In the following series, only one letter-cluster is incorrect. Select the INCORRECT letter - cluster.

WOG ASK EWO IAS MEV QIA

(a) IAS
(b) QIA
(c) EWO
(d) MEV

Q6. If an Age Pyramid has a wide base and is tapering rapidly upwards, what does it indicate?

(a) Regressive population
(b) Stationary population
(c) Progressive population
(d) Non-stationary population

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Q7. Which of the following statements is INCORRECT about the Kumbh Mela?

(a) The Kumbh Mela is held in Haridwar on the banks of the Ganges.
(b) The Kumbh Mela is held in Nasik on the banks of Godavari.
(c) The Kumbh Mela is held in Ujjain on the banks of Narmada.
(d) The Kumbh Mela is held in Prayagraj on the banks of the Ganges.

Q8. A value is increased by 10% and then increased by 20%. What is the net percentage increase?

(a) 31
(b) 33
(c) 32
(d) 30

Q9. During the reign of which emperor was the Hawa Mahal built in Jaipur?

(a) Sawai Pratap Singh
(b) Ashoka
(c) Rana Pratap Singh
(d) Chandra Gupta Maurya

Q10. A 40 kg object is moved horizontally from point A to point B on a table. What is the work done by gravity during this movement?

(a) 10 J
(b) 98 J
(c) 400 J
(d) 0 J

Q11. Container A contains 30 litres of pure milk costing Rs. 40 per litre, and container B contains 50 litres of pure milk costing Rs. 50 per litre. The entire contents are mixed together. By how much is the average cost per litre of the mixture more or less than the average cost per litre of container A's milk?

(a) Rs. 6.50 more
(b) Rs. 6.25 more
(c) Rs. 6.50 less
(d) Rs. 6.25 less

Q12. Which HTTP status code indicates that a requested web page has been permanently moved to a new location?

(a) 500
(b) 302
(c) 404
(d) 301

Q13. Rash Behari Ghosh, a leader inclined towards the Moderate wing of the Indian National Congress, presided over which two Congress sessions?

(a) Surat (1907) and Madras (1908)
(b) Bombay (1885) and Madras (1887)
(c) Calcutta (1906) and Surat (1907)
(d) Lahore (1909) and Calcutta (1911)

Q14. Refer to the following letter, number, symbol series and answer the question. Counting to be done from left to right.

(Left) $ T 1 & 9 Z 7 * A 0 # K @ N Z (Right)

How many such numbers are there which are immediately preceded by a symbol and also immediately followed by a letter?

(a) Four
(b) Two
(c) None
(d) One

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Q15. A question is followed by two statements numbered (I) and (II). You have to decide whether the data provided in the statements are sufficient to answer the question. Read both the statements and decide the appropriate answer.

Five people P, Q, R, S and T are sitting in a row, all facing north. Who is sitting second from the left end?

Statements :

I. P is sitting to the immediate right of T. P is sitting to the immediate left of S.

II. Only T is sitting between P and Q.

(a) Data in statement I alone is sufficient to answer the question while data in statement II is not
(b) Data in statement II alone is sufficient to answer the question while data in statement I is not
(c) Both statements I and II together (and not statement I alone or statement II alone) are sufficient to answer the question
(d) Both statements I and II together are NOT sufficient to answer the question

Q16. Laksh starts from point A and drives 7 km towards east. He then takes a right turn and drives 12 km. He takes a final left turn and drives 6 km and stops at point B. Vinod starts from point P, which is 16 km east of Point A, and drives 4 km towards east. He then takes a right turn and drives 12 km. He takes a final right turn and drives 3 km and stops at Point Q. What is the shortest distance between Point Q and Point B? (All turns are 90 degree turns only.)

(a) 3 km
(b) 4 km
(c) 6 km
(d) 5 km

Q17. Evaluate the following.

5/4+(1/(1+3/7))-4/3

(a) 33/64
(b) 41/70
(c) 37/60
(d) 27/68

Q18. Who among the following laid the foundation of the Kanva dynasty?

(a) Menander
(b) Vasudeva
(c) Pushyamitra
(d) Rudradaman

Q19. 9 is related to 55 following a certain logic. Following the same logic, 12 is related to 73. To which of the given options is 16 related, following the same logic?

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

(a) 99
(b) 96
(c) 97
(d) 98

Q20. In the following series, only one letter-cluster is incorrect. Select the INCORRECT letter - cluster.

SAI XFN CUM HPX MUC RZH

(a) HPQ
(b) RZH
(c) CUM
(d) MUC

Q21. The Intergovernmental Panel on Climate Change (IPCC), founded in 1988 to address global warming, was established by which two organisations?

(a) International Energy Agency (IEA) and World Trade Organization (WTO)
(b) UN Development Programme (UNDP) and UN Framework Convention on Climate Change (UNFCCC)

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(c) World Meteorological Organization (WMO) and United Nations Environment Programme (UNEP)
(d) World Bank and International Monetary Fund (IMF)

Q22. Simplify : 0.5 + 0.2 × 4.8 ÷ (2.4 ÷ 1.2) - 0.90 ÷ 2
(a) 0.52
(b) 0.53
(c) 0.51
(d) 0.50

Q23. The sides of a triangle are 189 cm, 48 cm and 195 cm. What is its area? (in cm^2)
(a) 4501
(b) 4509
(c) 4536
(d) 4532

Q24. Which of the following were prominent leaders of the Extremist phase of the Indian National Movement, who emphasised Swadeshi, self-reliance, and direct action against British rule?
(a) Raja Ram Mohan Roy, Ishwar Chandra Vidyasagar and MG Ranade
(b) Dadabhai Naoroji, Gopal Krishna Gokhale and MG Ranade
(c) Bipan Chandra Pal, Bal Gangadhar Tilak and Ashwini Kumar Dutt
(d) Surendranath Banerjee, Pherozeshah Mehta and Ananda Charlu

Q25. If 'A' stands for '+', 'B' stands for '−', 'C' stands for '×' and 'D' stands for '÷', what will come in place of the question mark (?) in the following equation?
8 C 7 B 24 D 8 A 5 = ?
(a) 58
(b) 57
(c) 59
(d) 56

Q26. What does Article 51A(b) emphasise?
(a) Safeguarding public property
(b) Promoting national integration and unity
(c) Upholding and protecting the sovereignty of India
(d) Cherishing and following the noble ideals that inspired the national struggle for freedom

Q27. Based on the English alphabetical order, three of the following four letter-cluster pairs are alike in a certain way and thus form a group. Which is the letter-cluster pair that DOES NOT belong to that group?
(Note : The odd one out is not based on the number of consonants/vowels or their position in the letter-cluster.)
(a) NQ−NT
(b) IL−JM
(c) JM−KN
(d) LO−MP

Q28. Which Article of the Constitution of India contains the provisions regarding 'Rights of citizenship of certain persons of Indian origin residing outside India'?
(a) Article 13
(b) Article 11
(c) Article 5
(d) Article 8

Q29. Which climate classification system is most widely used in the world?
(a) Trewartha Classification
(b) Strahler Classification
(c) Koppen Classification

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(d) Thornthwaite Classification

Q30. If Rs. 10,000 becomes Rs. 12,100 in 2 years at compound interest compounded annually, what is the annual percentage rate of compounding?

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

Q31. A student adds dilute HCl to Calcium carbonate. Which of the following experimental observations confirms that a gas is evolved?

(a) Formation of white ppt
(b) Solution turns pink
(c) Pungent smell observed
(d) Effervescence is seen

Q32. A concave lens has a focal length of 20 cm. An object is placed in front of the lens such that it forms a virtual image at 10 cm from the lens on the same side as the object. What is the magnification that the lens produces?

(a) Magnification = 0.66
(b) Magnification = 0.33
(c) Magnification = 0.5
(d) Magnification = 0.75

Q33. Which of the following courts deals with civil cases of small pecuniary stake in India?

(a) Chief Judicial Magistrate
(b) Court of Subordinate Judge
(c) Court of Munsiff
(d) Sessions Court

Q34. In a certain code language,

A + B means ‘A is the mother of B’

A – B means ‘A is the brother of B’

A × B means ‘A is the wife of B’

A ÷ B means ‘A is the father of B’

Which of the following means that S is daughter of P?

(a) P × Q ÷ R + S – T
(b) P – Q ÷ R × S + T
(c) P × Q ÷ R – S + T
(d) P × Q + R – S ÷ T

Q35. A shop offers three successive discounts of 10%, 15% and 20% on a product. Find the single equivalent discount percentage that would result in the same final price.

(a) 40.8%
(b) 38.8%
(c) 42.8%
(d) 45%

Q36. Which Governor-General of India introduced the Subsidiary Alliance System, compelling Indian rulers to host a British force and pay for its maintenance?

(a) Lord Cornwallis
(b) Lord Hastings
(c) Lord Dalhousie
(d) Lord Wellesley

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Q37. This question is based on the following words.

GOT HER WAR FIT

In each of the words, each vowel is changed to the letter immediately following it in the English alphabetical order and each consonant is changed to the letter immediately preceding it in the English alphabetical order. In how many letter-clusters thus formed, will no vowel appear?

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

Q38. The mean of three numbers is 15. If 2 is added to each of these numbers, what will be the new mean?

(a) 18
(b) 16
(c) 17
(d) 15

Q39. LMNO is a cyclic quadrilateral such that angle M = 102°. The tangents at L and N meet at a point P. What is the measure of angle LPN?

(a) 20°
(b) 22°
(c) 24°
(d) 26°

Q40. What is the full form of SGSY, a policy aimed at poverty alleviation in India?

(a) Swabhimaan Gram Suraksha Yojana
(b) Swarna Jayanti Gram Samriddhi Yojana
(c) Swachh Gram Swarozgar Yojana
(d) Swarnjayanti Gram Swarozgar Yojana

Q41. A boat travels downstream at a speed of 25 km/hr and upstream at a speed of 15 km/hr. What is the speed of the stream?

(a) 8 km/hr
(b) 6 km/hr
(c) 5 km/hr
(d) 4 km/hr

Q42. An object of mass 8 kg is placed 7 meters above the ground. What is the energy it possesses? (Take g = 10 m/s^2)

(a) 80 J
(b) 56 J
(c) 560 J
(d) 224 J

Q43. In the following series, only one letter-cluster is incorrect. Select the INCORRECT letter cluster.

DVN ASP XPH UME RJB OGY

(a) XPH
(b) RJB
(c) ASP
(d) UME

Q44. A, B, C, D, E and F have different heights. E is taller than exactly 4 people and F is shorter than exactly 4 people. D is shorter than A but taller than C. C is not the shortest. How many people are shorter than C?

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

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Q45. On 16 June 2025, during his visit to Nicosia, Prime Minister Narendra Modi received which distinction from Cyprus, named after its first President?

(a) Grand Cross of the Order of Makarios IV
(b) Grand Collar of the Order of Makarios IV
(c) Grand Collar of the Order of Makarios III
(d) Grand Cross of the Order of Makarios III

Q46. Which of the following ratios is greatest?

(a) 30 : 74
(b) 38 : 51
(c) 22 61
(d) 43 : 76

Q47. Who has been appointed as the first woman Vice Chancellor of the Indira Gandhi National Open University (IGNOU) on July 2025?

(a) Prof. Uma Kanjilal
(b) Dr. Najma Akhtar
(c) Prof. Anu Singh Lather
(d) Prof. Shashikala Wanjari

Q48. A question is followed by two statements numbered I and II. You have to decide whether the data provided in the statements are sufficient to answer the question. Read both the statements and select the most appropriate answer.

Question:

Six friends, B, C, D, E, F and G, are sitting in a straight line, facing north. Who among them is sitting at the extreme right end?

Statements:

(I) There are exactly four people sitting between B and E. G sits to the immediate right of E.

(II) F is an immediate neighbour of C. Exactly two people sit between B and C.

(a) Data in statement II alone is sufficient to answer the question, while data in statement I is not.
(b) Data in statements I and II together are sufficient to answer the question.
(c) Data in statement I alone is sufficient to answer the question, while data in statement II is not.
(d) Data in statements I and II together are not sufficient to answer the question.

Q49. The radius of a right circular cone is 8 cm and its height is 15 cm. The total surface area of the cone is:

(a) 136π cm^2
(b) 184π cm2
(c) 200π cm2
(d) 64π cm2

Q50. India shares its land boundaries with seven countries. Which of the following does NOT share a direct land boundary with India?

(a) Tajikistan
(b) Myanmar
(c) Bhutan
(d) Pakistan

Q51. A shopkeeper lists the price of a fan at 50% above its cost price and offers a 10% discount on its list price. If he earns a profit of Rs. 56, then what is the list price (in Rs.) of the fan?

(a) 240
(b) 260
(c) 324
(d) 493

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Q52. If x is inversely proportional to y, and y = 6 when x = 4, find the value of x, when y = 32.

(a) 19/12
(b) 8/23
(c) 15/13
(d) 3/4

Q53. Global Tiger Day, also known as International Tiger Day, is observed every year on which day?

(a) 15 July
(b) 25 July
(c) 29 July
(d) 30 July

Q54. Which statement is correct about neutrons?

(a) They are heavier than protons.
(b) They have negative charge.
(c) They are neutral.
(d) They have positive charge.

Q55. Read the given statements and conclusions carefully. Assuming that the information given in the statements is true, even if it appears to be at variance with commonly known facts, decide which of the given conclusions logically follow(s) from the statements.

Statements:

All parks are meadows.

All meadows are forests.

Some forests are gardens.

Conclusions:

(I): Some parks are gardens.

(II): Some meadows are gardens.

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

Q56. Each of A, B, C, D, E, F, and G has an exam on a different day of a week starting from Monday and ending on Sunday of the same week. A has an exam on Tuesday. Exactly three people have exams between A and D. F's exam is immediately after G's exam. Only one person has an exam between B and F. C has an exam before both B and E. E does not have an exam on Saturday or Sunday. How many people have exams after C?

(a) 3
(b) 4
(c) 5
(d) 6

Q57. In August 2025, Union Minister Dr Jitendra Singh inaugurated which facility in Hyderabad, marking India's first of its kind?

(a) India's first State-of-the-Art Animal Stem Cell Biobank and Laboratory
(b) India's first Veterinary Vaccine Research Institute
(c) India's first Animal Cloning and Biotechnology Laboratory
(d) India's first Animal Genome Sequencing Center

Q58. In the following number-pairs, the second number is obtained by applying certain mathematical operation(s) to the first number. Select the number-pair in which the numbers are related in the same way as are the numbers of the following pairs.

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

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8, 38

11, 53

(a) 14, 67
(b) 14, 68
(c) 15, 68
(d) 15, 67

Q59. If you have three variables—X, Y and Z—and want to display X vs Y and represent Z through marker size on a chart, which chart type is most appropriate in MS Excel?

(a) Area Chart
(b) Line Chart
(c) Scatter Chart
(d) Bubble Chart

Q60. Find the value of the following expression.

3/2+(1/(1+3/7))-3/5

(a) 18/11
(b) 3/2
(c) 8/5
(d) 6/5

Q61. What will come in the place of the question mark (?) in the following equation, if '+' and '−' are interchanged and '×' and '÷' are interchanged?

60 + 15 ÷ 3 − 10 × 2 = ?

(a) 21
(b) 22
(c) 19
(d) 20

Q62. Which of the following regions did the Shakas (Scythians) migrate from before entering India?

(a) North Africa
(b) Western Europe
(c) Southeast Asia
(d) Central Asia

Q63. Which statutory body, established during the first phase of the Green Revolution, deals with food grains and supply chain management in India?

(a) Food and Agriculture Organization
(b) Agricultural and Processed Food Products Export Development Authority
(c) Food Stack Portal
(d) Food Corporation of India

Q64. What is China's global infrastructure initiative aimed at fostering connectivity worldwide, launched in 2013?

(a) Belt and Road Initiative
(b) Great Wall Initiative
(c) Economic Belt Initiative
(d) Economic Corridor

Q65. The total surface area of a solid hemisphere is 155 cm^2. Its radius (in cm) is _____. (Take π = 22/7)

(a) √(1090/66)
(b) √(1077/132)
(c) √(1085/66)
(d) √(1094/66)

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Q66. What is the average of 6, 8, 10 and 12?

(a) 7
(b) 8
(c) 10
(d) 9

Q67. The value of $4^2 + \sqrt{6^2} - 5\sqrt{9} - 11$ is

(a) 3
(b) -9
(c) -2
(d) -4

Q68. Pure ghee costs Rs. 86/kg. After adulterating it with vegetable oil costing Rs. 43/kg, a dishonest shopkeeper sells the mixture at the rate of Rs. 80/kg, thereby making a profit of 60%. In what ratio does he mix the two?

(a) 6 : 41
(b) 36 : 7
(c) 11 : 34
(d) 3 : 38

Q69. According to the Ministry of Power, which of the following is the primary source of energy in India? (As of May 2023).

(a) Solar
(b) Hydroelectric
(c) Nuclear
(d) Thermal

Q70. The simple interest on a certain sum of money at 8% per annum for 3 years is Rs. 360 more than the simple interest on the same sum at 6% per annum for 3 years. Find the principal.

(a) Rs. 3,600
(b) Rs. 4,800
(c) Rs. 7,200
(d) Rs. 6,000

Q71. Simplify the following.

$(4^3 \times 4\text{^}4 \times 2\text{^}4)/(4^2 \times 8)$

(a) 2055
(b) 2039
(c) 2048
(d) 2043

Q72. Ajit starts from point A and drives 8 km towards east. He then takes a right turn and drives 17 km. He takes a final left turn and drives 10 km and stops at point B. Vishal starts from point P, which is 13 km east of point A, and drives 6 km towards east. He then takes a right turn and drives 17 km. He takes a final left turn and drives 1 km and stops at point Q. What is the shortest distance between point Q and point B? (All turns are 90-degree turns only.)

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

Q73. A person covers certain distance in 13 hours at a speed of 3 km/hr and some more distance in 15 hours at a speed of 6 km/hr. Find his average speed for the entire distance covered.

(a) 817/28 km/hr
(b) 1117/28 km/hr
(c) 417/28 km/hr
(d) 517/28 km/hr

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Q74. In the following triads, each group of letters is related to the subsequent one following a certain logic. Select from the given options, the one which follows the same logic.

CLAY - YLCA - LACY

BOWS - SOBW - OWBS

(a) DENT - EDNT - TEND
(b) GEAR - GAER - RAEG
(c) FROM - MRFO - ROFM
(d) FILE - EIFL - LIFE

Q75. On which of the following dates was the first session of the Rajya Sabha held?

(a) 3 April 1950
(b) 26 November 1951
(c) 26 November 1952
(d) 13 May 1952

Q76. Based on the English alphabetical order, three of the following four letter-clusters are alike in a certain way and thus form a group. Which letter-cluster DOES NOT belong to that group?

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

(a) SAI
(b) LCT
(c) IZQ
(d) OFW

Q77. The amount (in Rs.) payable after 1 year on a principal of Rs. 10,000 at 6% per annum compounded half-yearly is:

(a) 10,605
(b) 10,906
(c) 10,609
(d) 10,600

Q78. In which country is the Inuvik port located, which is the gateway to Western Arctic?

(a) Greenland
(b) Canada
(c) Sweden
(d) Russia

Q79. Based on the English alphabetical order, three of the following four letter-cluster pairs are alike in a certain way and thus form a group. Which is the letter-cluster pair that DOES NOT belong to that group?

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

(a) DH−DK
(b) QU−RV
(c) VZ−WA
(d) NR−OS

Q80. What should come in place of the question mark (?) in the given series?

4 4 12 60 420 ?

(a) 3740
(b) 3720
(c) 3760
(d) 3780

Q81. Which of the following Directive Principles of State Policy is based on the Gandhian principles?

(a) To secure the right to adequate means of livelihood
(b) To promote international peace
(c) To organise village panchayat

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(d) To secure equal pay for equal for men and women

Q82. The LCM of the numbers 5, 155 and 83 is:

(a) 12865
(b) 12245
(c) 12685
(d) 12425

Q83. In this question, a statement is given followed by two courses of action, numbered I and II. You must assume everything in the statement to be true, and on the basis of the information given in the statement, decide which of the given courses of action logically follow(s) for pursuing.

Statement:

Many students in rural schools fail to clear the basic reading and writing tests due to lack of trained teachers and poor infrastructure.

Courses of Action:

I. Immediate recruitment and training of teachers should be carried out in rural areas.

II. All students failing the tests should be expelled from schools to maintain quality.

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

Q84. In a certain code, ‘lion tiger cat’ is coded as ‘dz ph st’, ‘cat dog horse’ is coded as ‘lp jk st’, and ‘dog lion rat’ is coded as ‘ug ph jk’. What is the word 'tiger' coded as in that code? (All the codes are two letter coded only.)

(a) dz
(b) st
(c) jk
(d) ph

Q85. In August 2025, researchers demonstrated that genetically engineered Escherichia coli (E. coli) bacteria can function as which of the following, directly interfacing with electronics?

(a) Wireless energy storage units
(b) Bio-fueled medical implants
(c) Microbial fuel cells for electricity generation
(d) Self-powered chemical sensors

Q86. A dishonest shopkeeper promises to sell his goods at cost price. However he uses a weight that actually weighs 37% less than what is written on it. Find his profit percentage.

(a) 6446/63
(b) 6346/63
(c) 6046/63
(d) 5846/63

Q87. Which among the following states launched a Clean Air Plan, India's first state-level clean air strategy grounded in scientific analysis and an airshed-based approach?

(a) Karnataka
(b) Kerala
(c) Maharashtra
(d) Uttar Pradesh

Q88. There are 80 students in a hostel. Due to new admissions, 30 new students join the mess, and the daily expense of the mess increases by Rs. 260, while the average expenditure per head diminishes by Rs. 10. What was the original daily expenditure (in Rs. , rounded off to the nearest tens) of the mess?

(a) 3,630
(b) 4,220

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(c) 3,720
(d) 4,020

Q89. The ages of P and Q are in the ratio 5 : 9. If P's age is 25 years, then Q is how many years older than P?
(a) 20 years
(b) 25 years
(c) 10 years
(d) 15 years

Q90. India is divided into _____ agroclimatic regions.
(a) 14
(b) 11
(c) 15
(d) 12

Q91. Read the given statements and conclusions carefully. Assuming that the information given in the statements is true, even if it appears to be at variance with commonly known facts, decide which of the given conclusions logically follow(s) from the statements.

Statements:

No nail is a cutter.

All cutters are knives.

No cutter is a scissor.

Conclusions:

(I) No scissor is a knife.

(II) Some nails are knives.

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

Q92. What should come in place of the question mark (?) in the given series?

9, 25, 57, 105, 169, ?

(a) 250
(b) 249
(c) 248
(d) 247

Q93. Each of P, Q, R, S, T, U and V has an exam on a different day of a week starting from Monday and ending on Sunday of the same week. U has an exam on Saturday. Only four people have an exam between T and S, neither of whom has an exam on Monday. V has an exam immediately after P and Q has an exam immediately before P. S has an exam after V. How many people have exams after T?
(a) 2
(b) 3
(c) 4
(d) 5

Q94. Which of the following letter-clusters should replace # and % so that the pattern and relationship followed between the letter-cluster pair on the left side of :: is the same as that on the right side of ::?

: NVS :: JRO : %

(a) = MUS, % = KSP
(b) = MUR, % = KRP
(c) = MUR, % = KSP
(d) = MUR, % = KSO

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Q95. Which of the following options accurately describes how ASCII ensures backward compatibility with Unicode?

(a) Unicode's first 128 code points match the ASCII values exactly.
(b) ASCII uses 8-bit encoding identical to Unicode's full range.
(c) ASCII was revised to include all Unicode symbols beyond U+007F.
(d) Unicode deprecated ASCII control characters entirely.

Q96. The blood pressure recorded when the heart relaxes is called _____.

(a) diastolic
(b) pulse
(c) venous
(d) systolic

Q97. Which of the following electron configurations is NOT possible according to the Bohr Bury rules?

(a) 2, 8, 3
(b) 2, 9, 7
(c) 2, 8, 8, 1
(d) 2, 8, 2

Q98. Select the triad that follows the same pattern as the one followed by the two triads given below. Both triads follow the same pattern.

KH-MI-NP

MJ-OK-PR

(a) OL-QM-RV
(b) PL-QM-RV
(c) OL-QM-RT
(d) PL-QN-RV

Q99. Eight people are sitting in two parallel rows containing 4 people each in such a way that there is equal distance between adjacent persons.

In row 1, A, D, G and F are seated and all of them are facing south.

In row 2, P, R, N and Z are seated and all of them are facing north.

Thus, each person faces another person from the other row.

Z sits third to the left of R. The one facing F is an immediate neighbour of R. A sits at some place to the right of F and is not facing P. D sits third to the right of G. Who amongst the following faces N?

(a) P
(b) Z
(c) G
(d) A

Q100. A, B, C, D, E, F, G and H are sitting around a square table facing the centre of the table. Some of them are sitting at the corners while some are sitting at the exact centre of the sides. E sits third to the left of B. E does not sit at the centre of any side. F sits second to the right of B. G is the immediate neighbour of D and B. H sits to the immediate left of F. C does not sit in a corner. How many people sit between D and A when counted from the left of D?

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

Q101. From a bus depot, buses leave every 8 minutes and travel along a straight road at a speed of 24 km/hr. A traveller moving towards the depot along the same road meets the buses at regular intervals of 6 minutes. Find the speed of the traveller.

(a) 3 km/hr
(b) 5 km/hr
(c) 6 km/hr

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(d) 8 km/hr

Q102. What will come in the place of the question mark (?) in the following equation, if '+' and '−' are interchanged and '×' and '÷' are interchanged?

50 − 8 + 2 ÷ 6 × 4 = ?

(a) 55
(b) 56
(c) 54
(d) 57

Q103. In the context of the Revolt of 1857, what did the General Service Enlistment Act of 1856 require of sepoys?

(a) Compulsory overseas service, violating the religious beliefs of some sepoys
(b) Prohibition on wearing religious symbols such as caste marks or beards
(c) Mandatory conversion of sepoys to Christianity before joining service
(d) Restriction on marrying without the permission of British officers

Q104. J, K, L, M, P and Q each scored different marks. Only two people have scored between P and K. Only one person has scored more than M. Only three people have scored between M and P. Q has scored more than L but less than J. How many people have scored less than L?

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

Q105. In Slide Show, which option ensures that only a specific set of slides is played during an MS PowerPoint 2019 presentation without creating a new file?

(a) Browsed at a kiosk
(b) Use Custom Slide Show
(c) Show slides: From – To range
(d) Loop continuously until Esc

Q106. As per Zoological Survey of India's 'Animal Discoveries - New Species and New Records 2023', which species is recognised as the largest existing bovine in India?

(a) Gaur
(b) Yak
(c) Wild water buffalo
(d) Nilgai

Q107. Which of the following numbers is divisible by 93?

(a) 858226
(b) 856159
(c) 856497
(d) 855786

Q108. What was one of the reasons for including Fundamental Duties in the Constitution according to HR Gokhale?

(a) To create a legal framework for taxes
(b) To address anti-national activities and subversive agitations
(c) To enhance the rights of citizens
(d) To strengthen democracy by balancing rights with duties

Q109. Find the simplified value of 24^(-3) × 15^(-3) × 17^(-3).

(a) $1/(6084^3)$
(b) $1/(6120^3)$
(c) $1/(6108^3)$
(d) $1/(6144^3)$

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Q110. The main advantage of genetic variation in a population is to enhance:

(a) similarity
(b) disease susceptibility
(c) survival
(d) reproductive speed

Q111. The number 699138 is divisible by:

(a) 117
(b) 99
(c) 102
(d) 108

Q112. In which of the following states did the Indian Army conduct a high-altitude technology demonstration exercise named ‘Divya Drishti’ in July 2025?

(a) Sikkim
(b) Kerala
(c) Arunachal Pradesh
(d) Uttarakhand

Q113. As per data of 2011-2012 published in Niti Aayog Annual Report 2014-2015, which of the following states has the highest percentage of people below the poverty line?

(a) Chhattisgarh
(b) Bihar
(c) Arunachal Pradesh
(d) Jharkhand

Q114. In August 2025, which of the following organisations released the Framework for Responsible and Ethical Enablement of Artificial Intelligence (FREE-AI) Committee Report, outlining 7 guiding principles for responsible AI use in the financial sector?

(a) Ministry of Finance
(b) Securities and Exchange Board of India (SEBI)
(c) Reserve Bank of India (RBI)
(d) NITI Aayog

Q115. What is the effect of using Ctrl + J in MS Word, and how is it distinct from Ctrl + Shift + J?

(a) Ctrl + J left-aligns; Ctrl + Shift + J right-aligns
(b) Both shortcuts justify text identically
(c) Ctrl + J justifies text; Ctrl + Shift + J applies distributed justification where last line is also stretched
(d) Ctrl + J centers text; Ctrl + Shift + J varies justification

Q116. Simplify: (4/2) x^2+4 x-2/2+(4/2) x^2-7 x+6/2

(a) $4x^2 + (-3)x + (2)$
(b) $-4x^2$-(-3)x − (2)
(c) $-4x^2$-(-3)x + (2)
(d) 4x2 + (-3)x - (2)

Q117. In a certain code, ‘dogs bark loud’ is coded as ‘xl mn vc’, ‘cats and dogs’ is coded as ‘rs tp xl’, and ‘bark and play’ is coded as ‘mn rs wz’. What is the code for ‘cats’ in that code? (All codes are two-letter codes.)

(a) rs
(b) xl
(c) tp
(d) mn

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Q118. Animals with high energy needs, like birds and mammals, have:

(a) a two-chambered heart
(b) a three-chambered heart
(c) a single-chambered heart
(d) a four-chambered heart

Q119. The Third United Nations Conference on Landlocked Developing Countries (LLDC3) opened on 5 August 2025 in which country?

(a) Kazakhstan
(b) Kyrgyzstan
(c) Turkmenistan
(d) Uzbekistan

Q120. What is the remainder when the smallest positive number that leaves a remainder of 5 upon division by each of 12, 15 and 20 is divided by 4?

(a) 1
(b) 33
(c) 2
(d) 0

ANSWER KEY

1	d	2	a	3	c	4	a	5	d	6	c	7	c	8	c	9	a	10	d
11	b	12	d	13	a	14	d	15	d	16	b	17	c	18	b	19	c	20	c
21	c	22	b	23	c	24	c	25	a	26	d	27	a	28	d	29	c	30	d
31	d	32	c	33	c	34	c	35	b	36	d	37	c	38	c	39	c	40	d
41	c	42	c	43	c	44	c	45	d	46	b	47	a	48	c	49	c	50	a
51	a	52	d	53	c	54	c	55	c	56	d	57	a	58	b	59	d	60	c
61	d	62	d	63	d	64	a	65	c	66	d	67	d	68	b	69	d	70	d
71	c	72	b	73	c	74	c	75	d	76	a	77	c	78	b	79	a	80	d
81	c	82	a	83	b	84	a	85	d	86	d	87	c	88	a	89	a	90	c
91	d	92	b	93	d	94	c	95	a	96	a	97	b	98	c	99	d	100	c
101	d	102	a	103	a	104	c	105	b	106	a	107	d	108	d	109	b	110	c
111	b	112	a	113	a	114	c	115	c	116	a	117	c	118	d	119	c	120	a

SOLUTIONS

Q1. Answer: (d) 179

The logic follows here,

Hence, the correct answer is "Option 4"

Q2. Answer: (a) 6%

Shortcut Trick

Let the total income of Ramanand be 100%.

Total direct expenses on food, rent, and conveyance = 48% + 25% + 12% = 85%.

Remaining income after these expenses = 100% − 85% = 15%.

He spends 60% of the remaining income on education, so he is left with 40% of the remaining income.

Percentage of income left with him = 40% of 15% = (40 ÷ 100) × 15% = 6%.

Therefore The correct answer is 6%.

Alternate Method

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Given:

Expense on food = 48%

Expense on house rent = 25%

Expense on conveyance = 12%

Percentage of remaining income spent on education = 60%

Total Income

100%

Food+Rent+Conv.

85%

Remaining

15%

Education

9%

Left Over

6%

Calculations:

=> Total initial expenses = 48% + 25% + 12% = 85%

=> Remaining income = Total income − Initial expenses

=> Remaining income = 100% − 85% = 15%

=> Expense on education = 60% of the remaining 15%

=> Expense on education = (60 ÷ 100) × 15% = 9%

=> Income left with Ramanand = Remaining income − Expense on education

=> Income left = 15% − 9% = 6%

Therefore The correct answer is 6%.

Additional Information

Total vs Remaining Allocation

When expenses are given as a percentage of total income, they can be directly added together. When expenses are given as a percentage of the remaining income, they must be calculated sequentially on the new reduced base.

Successive Percentage Change

If an initial quantity Q is successively decreased by a% and b%, the final remaining quantity can be directly calculated as Q × (1 − a/100) × (1 − b/100).

Q3. Answer: (c) biomagnification

The correct answer is Biomagnification.

Key Points

• Biomagnification refers to the progressive increase in the concentration of toxic substances, such as pesticides, heavy metals, and pollutants, at successive trophic levels in a food chain.

• It typically occurs because these substances are non-biodegradable, meaning they cannot be broken down by natural processes in the organisms.

• As the toxic substances are consumed by organisms at lower trophic levels, they accumulate in their tissues. When these organisms are eaten by predators at higher trophic levels, the concentration of toxins increases due to the larger consumption required to sustain the predator.

• Examples of substances involved in biomagnification include mercury, DDT, and PCBs (polychlorinated biphenyls).

• This phenomenon can lead to severe health issues in top predators, including humans, such as reproductive issues, neurological damage, and increased risk of diseases.

Additional Information

• Biotransformation:

• Biotransformation refers to the chemical modification of substances within living organisms, often through metabolic processes.

• This process helps to detoxify harmful substances, converting them into less toxic or more easily excretable forms.

• Unlike biomagnification, biotransformation reduces the toxicity of substances rather than accumulating them.

• Bioaccumulation:

• Bioaccumulation is the buildup of toxic substances within an organism over time, typically because the rate of absorption exceeds the rate of excretion.

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• It occurs within a single organism rather than across trophic levels, as seen in biomagnification.
• An example of bioaccumulation is mercury accumulation in fish due to prolonged exposure to polluted water.
• Biodegradation:
• Biodegradation refers to the breakdown of organic substances by microorganisms such as bacteria and fungi.
• It is a natural process that helps reduce environmental pollution by decomposing organic matter into simpler compounds.
• Unlike biomagnification, biodegradation helps in removing harmful substances from the ecosystem.
• Effects of Biomagnification:
• Biomagnification can disrupt ecosystems by harming top predators, which play a crucial role in maintaining ecological balance.
• For humans, consumption of organisms containing high levels of toxins can lead to issues such as cancer, kidney damage, and neurological disorders.
• It highlights the importance of regulating the use of harmful chemicals, such as pesticides and industrial pollutants.
• Examples of Biomagnification:
• DDT accumulation in birds led to thinning of eggshells, causing population decline in species like the bald eagle.
• Mercury pollution in aquatic ecosystems resulted in its accumulation in fish, which affected human health when contaminated fish were consumed.

Important Points

• DDT (Dichlorodiphenyltrichloroethane):
• DDT is a synthetic pesticide used extensively in agriculture during the mid-20th century.
• Its widespread use led to biomagnification in food chains, causing severe ecological damage.
• Many countries, including India, have banned or restricted its use due to its harmful effects.
• Mercury Pollution:
• Mercury is released into the environment through industrial processes such as coal combustion and mining.
• It can enter aquatic ecosystems, where it gets converted into methylmercury, a highly toxic form.
• Methylmercury accumulates in fish and can cause neurological damage when consumed by humans.

Q4. Answer: (a) Gain, 10%

Shortcut Trick

Net Gain/Loss % = (C1 × P1% + C2 × P2%) ÷ (C1 + C2)

=> Net % = (2 × 43 − 3 × 12) ÷ (2 + 3)

=> Net % = (86 − 36) ÷ 5 = 50 ÷ 5 = +10%

Since the value is positive, there is a net gain of 10%.

Therefore The correct answer is Gain, 10%.

Alternate Method

Given:

Ratio of Cost Prices (CP) of articles X and Y = 2 : 3.

Profit on X = 43% and Loss on Y = 12%.

Let the CP of article X be 200 and the CP of article Y be 300.

=> Total CP = 200 + 300 = 500

X: CP = 200

+43% Profit

X: SP = 286

Y: CP = 300

−12% Loss

Y: SP = 264

Total CP

500

+10% Gain

Total SP

550

Calculations:

=> Selling Price (SP) of X = CP + Profit = 200 + (43% of 200)

=> SP of X = 200 + (43 ÷ 100) × 200 = 200 + 86 = 286

=> Selling Price (SP) of Y = CP − Loss = 300 − (12% of 300)

=> SP of Y = 300 − (12 ÷ 100) × 300 = 300 − 36 = 264

=> Total SP = SP of X + SP of Y = 286 + 264 = 550

=> Total Profit = Total SP − Total CP = 550 − 500 = 50

=> Profit % = (Total Profit ÷ Total CP) × 100

=> Profit % = (50 ÷ 500) × 100 = 10%

Therefore The correct answer is Gain, 10%.

Additional Information

Weighted Average Method for Profit/Loss

For multiple items, the overall profit/loss percentage can be calculated directly by taking the weighted average of individual profit/loss percentages with their respective CP ratios: Overall % = (CP1 × P1% + CP2 × P2% + ...) ÷ (CP1 + CP2 + ...).

Basic Profit and Loss Formulas

Profit = SP − CP | Loss = CP − SP

Profit % = (Profit ÷ CP) × 100 | Loss % = (Loss ÷ CP) × 100.

Successive Profit/Loss

If an item undergoes successive percentage changes of a% and b%, the effective percentage change is calculated using the formula: Net % = (a + b + (a × b) ÷ 100)%.

Q5. Answer: (d) MEV

The pattern followed here is:

Hence, the correct answer is "Option 4"

Q6. Answer: (c) Progressive population

The correct answer is Progressive Population.

Key Points

• An age pyramid with a wide base and tapering rapidly upwards indicates a large proportion of young individuals in the population. This is characteristic of a progressive population.

• It reflects a high birth rate, which leads to a significant number of children and younger people in the population.

• Countries with progressive populations typically have developing or underdeveloped economies, where access to education, healthcare, and family planning may be limited, resulting in higher fertility rates.

• Such populations experience rapid growth, as the younger generation will eventually reproduce, leading to further increases in population size.

• This type of pyramid is commonly seen in developing nations such as India and several African countries, where the demographic transition is still in progress.

Additional Information

• Age Pyramid Types:

• Progressive Population: Characterized by a wider base, indicating a high proportion of younger individuals and a high birth rate. Typical of developing countries.

• Stationary Population: Displays a more uniform shape across age groups, suggesting low birth and death rates. Seen in countries with stable demographics like Japan and Germany.

• Regressive Population: Features a narrow base, indicating fewer younger individuals and a declining birth rate. Common in highly developed countries experiencing population decline.

• Demographic Transition Model:

• Describes the shift from high birth and death rates to low birth and death rates as societies progress economically and socially.

• Countries with a progressive population are typically in the first or second stage of the demographic transition model.

• These stages are marked by a growing population due to high fertility and declining mortality rates.

• Factors Contributing to Progressive Population:

• High fertility rates: Due to limited access to family planning and awareness.

• Poor healthcare infrastructure: Leading to higher infant mortality but also higher population growth due to compensatory high birth rates.

• Lack of education: Especially among women, which correlates with higher fertility rates.

• Examples:

• Countries like Niger, Uganda, and Angola exhibit progressive age pyramids due to high fertility rates and significant youth populations.

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• In contrast, developed nations like Germany and Japan show stationary or regressive population structures.

Important Points

• Implications of Progressive Population:

• Rapid population growth can lead to pressure on resources such as food, water, and energy.

• It may strain healthcare and educational systems, requiring significant investment in infrastructure.

• Progressive populations offer a demographic dividend, where a large workforce can drive economic growth if adequately educated and employed.

• However, failure to harness this potential can result in poverty, unemployment, and social instability.

• Global Trends:

• According to World Bank data (2023), countries in Sub-Saharan Africa exhibit the highest fertility rates globally.

• Efforts like Sustainable Development Goals (SDGs) emphasize improving healthcare, education, and gender equality to stabilize population growth.

Q7. Answer: (c) The Kumbh Mela is held in Ujjain on the banks of Narmada.

The correct answer is The Kumbh Mela is held in Ujjain on the banks of Narmada.

Key Points

• The Kumbh Mela is one of the largest religious gatherings in the world and occurs at four major locations: Haridwar, Nasik, Ujjain, and Prayagraj.

• Statement 1: The Kumbh Mela is held in Haridwar on the banks of the Ganges River. This statement is correct.

• Statement 2: The Kumbh Mela is held in Nasik on the banks of the Godavari River. This statement is correct.

• Statement 3: The Kumbh Mela is held in Ujjain on the banks of the Narmada River. This statement is incorrect because the Kumbh Mela in Ujjain is held on the banks of the Shipra River, not the Narmada River.

• Statement 4: The Kumbh Mela is held in Prayagraj on the banks of the Ganges River. This statement is correct.

• Hence, the incorrect statement among the given options is Option 3.

Additional Information

• Kumbh Mela:

• The Kumbh Mela is a Hindu pilgrimage and festival celebrated at four locations: Haridwar, Nasik, Ujjain, and Prayagraj.

• The festival is held every 12 years at each location, with an interval of 3 years between each site.

• The Mela is based on the position of the Jupiter, Sun, and Moon according to Hindu astrology.

• The significance of the Kumbh Mela comes from the belief that bathing in the sacred rivers during this time leads to spiritual purification and liberation (moksha).

• Locations and Rivers:

• Haridwar: Located on the banks of the Ganges River.

• Nasik: Situated on the banks of the Godavari River.

• Ujjain: Held on the banks of the Shipra River.

• Prayagraj: Celebrated at the confluence of the Ganges, Yamuna, and Saraswati Rivers (Triveni Sangam).

• Historical Context:

• The origins of the Kumbh Mela are linked to the story of the Samudra Manthan (Churning of the Ocean) in Hindu mythology.

• It is believed that during the churning, drops of amrit (nectar of immortality) fell at the four locations where the Kumbh Mela is held.

• The first written record of the Kumbh Mela dates back to the 8th century, when Adi Shankaracharya is said to have promoted the event.

• Global Recognition:

• The Kumbh Mela was inscribed as an Intangible Cultural Heritage by UNESCO in 2017.

• It attracts millions of pilgrims from India and across the world, making it one of the largest peaceful gatherings in human history.

Important Points

• Astrological Significance: The Kumbh Mela is held based on the celestial alignment of the Sun, Moon, and Jupiter, which determines the specific time and location for the event.

• Types of Kumbh Mela: There are four types of Kumbh Mela: Ordinary Kumbh, Ardh Kumbh (half Kumbh), Purna Kumbh (full Kumbh), and Mahakumbh (great Kumbh). The Mahakumbh is held every 144 years.

• Pilgrimage Experience: The event includes rituals like holy dips in the rivers, spiritual discourses, mass feeding, and religious processions.

• Management: Due to the massive scale, the event requires extensive planning and coordination involving government agencies, local authorities, and volunteers.

• Environmental Impact: Measures are often taken to minimize pollution and ensure the cleanliness of the sacred rivers during the Kumbh Mela.

Q8. Answer: (c) 32

Shortcut Trick

For successive percentage changes, use the net change formula directly:

Net % Change = x + y + (x × y) ÷ 100

Here, the values are increased by 10% and 20%, so x = 10 and y = 20.

Net Increase = 10 + 20 + (10 × 20) ÷ 100

Net Increase = 30 + 2 = 32%

Therefore The correct answer is 32%.

Alternate Method

Given:

First percentage increase = 10%

Second percentage increase = 20%

Successive Percentage Increase

100

+10%

110

+20%

132

Net Increase = 32%

Calculations:

=> Let the initial value be 100.

=> Value after first increase of 10% = 100 + (10 ÷ 100) × 100 = 110

=> Value after second increase of 20% = 110 + (20 ÷ 100) × 110

=> Final Value = 110 + 22 = 132

=> Net increase = Final Value − Initial Value

=> Net increase = 132 − 100 = 32

=> Net percentage increase = (32 ÷ 100) × 100 = 32%

Therefore The correct answer is 32%.

Additional Information

Successive Percentage Decrease

If a value is successively decreased by x% and y%, the net percentage change is given by −x − y + (x × y) ÷ 100. A negative result indicates an overall decrease.

Compound Interest as Successive Percentage

The effective rate of Compound Interest for 2 years at r% per annum is identical to two successive increases of r%, calculated directly as 2r + (r² ÷ 100)%.

Three Successive Changes

For three successive percentage changes a, b, and c, the net overall change can be found using the expanded formula: a + b + c + (ab + bc + ca) ÷ 100 + (abc) ÷ 10000.

Q9. Answer: (a) Sawai Pratap Singh

The correct answer is Sawai Pratap Singh.

Key Points

• Hawa Mahal, also known as the “Palace of Winds,” was built in Jaipur, Rajasthan.

• It was constructed during the reign of Sawai Pratap Singh, the ruler of Jaipur, in 1799.

• The design of Hawa Mahal was inspired by the crown of Lord Krishna, showcasing its religious and cultural significance.

• The architect of Hawa Mahal was Lal Chand Ustad, who created this magnificent structure using red and pink sandstone, reflecting the distinct Rajput architectural style.

• The palace served as a place for royal women to observe street festivals and daily life while maintaining purdah (privacy), as it had 953 intricately designed windows.

• Hawa Mahal is a five-story building with a unique pyramidal structure and no foundation, showcasing the engineering brilliance of

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its time.

Additional Information

• Sawai Pratap Singh:

• He was the king of Jaipur from 1778 to 1803, and his reign is marked by the construction of several iconic structures in Jaipur.

• Sawai Pratap Singh was known for his patronage of art and architecture, and Hawa Mahal is considered one of his most notable contributions.

• Architectural Features of Hawa Mahal:

• The building is made of red and pink sandstone, blending Rajput and Mughal architectural styles.

• The 953 windows, called jharokhas, are decorated with intricate latticework, allowing cool air to circulate and providing relief during Rajasthan's hot summers.

• The palace does not have stairs to access its upper floors; ramps were built instead to facilitate movement.

• Cultural Significance:

• Hawa Mahal was designed to enable royal women to observe the activities of the city without being seen, adhering to the purdah system.

• The structure is an iconic symbol of Jaipur’s heritage and attracts millions of tourists annually.

• Other Contributions by Sawai Pratap Singh:

• Under his reign, Jaipur flourished as a center of art, culture, and architecture.

• He also contributed to the expansion of city planning and supported several religious and artistic endeavors.

Important Points

• Location: Hawa Mahal is situated in the heart of Jaipur, near the City Palace and Jantar Mantar.

• Historical Context: The construction of Hawa Mahal marked an important period in Jaipur’s urban development under Sawai Pratap Singh.

• Tourism: Today, Hawa Mahal is a major tourist attraction and an architectural gem of India, showcasing the rich cultural heritage of Rajasthan.

• Recognition: Hawa Mahal is often referred to as the “Icon of Jaipur” and is featured prominently in literature and media representing Rajasthan.

Q10. Answer: (d) 0 J

The correct answer is 0 J.

Key Points

• Work Done by Gravity: Gravity performs work on an object when the object moves vertically in the direction of or against the gravitational force. In this case, the object is moved horizontally from point A to point B.

• The work done by a force is calculated using the formula: Work = Force × Displacement × cos(θ), where θ is the angle between the force and displacement.

• Since gravity acts vertically downward and the displacement is in the horizontal direction, the angle (θ) between the force and displacement is 90°.

• The value of cos(90°) is 0. Therefore, when the displacement is horizontal and the force of gravity is vertical, the work done by gravity is: Work = Force × Displacement × cos(90°) = 0.

• The mass of the object (40 kg) and the horizontal distance between points A and B are irrelevant for calculating work done by gravity since there is no vertical displacement.

• From the above analysis, it is clear that the work done by gravity during the horizontal movement of the object from point A to point B is 0 J.

• Hence, the correct answer is 0 J.

Additional Information

• Work:

• Work is defined as the product of the force applied on an object and the displacement of the object in the direction of the force.

• Formula: Work = Force × Displacement × cos(θ), where θ is the angle between the force and displacement.

• Work is measured in Joules (J), and it can be positive, negative, or zero depending on the direction of the force and displacement.

• Gravitational Force:

• The force of gravity acts vertically downward towards the center of the Earth.

• The magnitude of the gravitational force acting on an object is given by F = m × g, where m is the mass of the object and g is the acceleration due to gravity (approximately 9.8 m/s² on Earth).

Important Points

• Horizontal Motion and Gravity:

• When an object moves horizontally, the displacement is perpendicular to the gravitational force, resulting in zero work done by gravity.

• In cases involving vertical motion (e.g., lifting or dropping an object), gravity performs work, which is calculated using the formula Work = m × g × h, where h is the vertical displacement.

• Applications of Work and Energy:

• Engineering: The concept of work is essential in designing machines and understanding energy transformations.

• Physics: The study of work and energy is fundamental to understanding motion, mechanics, and thermodynamics.

• Everyday Life: Understanding work and energy helps in analyzing practical situations like lifting objects, moving cars, or calculating energy consumption.

Q11. Answer: (b) Rs. 6.25 more

Shortcut Trick

By using the weighted average deviation method:

Net change in average = (Quantity of B × Difference in cost) ÷ Total Quantity

Net change = (50 × (50 − 40)) ÷ (30 + 50)

Net change = (50 × 10) ÷ 80 = 500 ÷ 80 = Rs. 6.25

Since B is more expensive, the mixture's average is Rs. 6.25 more than container A.

Therefore The correct answer is Rs. 6.25 more.

Alternate Method

Given:

Quantity of milk in Container A = 30 litres costing Rs. 40 per litre

Quantity of milk in Container B = 50 litres costing Rs. 50 per litre

Formula Used:

Average cost of mixture = (Total cost of A + Total cost of B) ÷ Total quantity

Rs. 40

Rs. 50

Rs. x

50 − x

x − 40

Container A

Container B

Mixture

Ratio = 3

Ratio = 5

Calculation:

=> Total cost of Container A = 30 × 40 = Rs. 1200

=> Total cost of Container B = 50 × 50 = Rs. 2500

=> Total cost of the mixture = 1200 + 2500 = Rs. 3700

=> Total quantity of the mixture = 30 + 50 = 80 litres

=> Average cost per litre of mixture = 3700 ÷ 80 = Rs. 46.25

=> Difference = 46.25 − 40 = Rs. 6.25

=> Therefore, the mixture cost is Rs. 6.25 more than the cost of milk in Container A.

Therefore The correct answer is Rs. 6.25 more.

Additional Information

Alligation Rule

It is applied to find the ratio in which two ingredients at given prices must be mixed to produce a mixture at a given price: (Quantity of cheaper) ÷ (Quantity of dearer) = (Price of dearer − Average price) ÷ (Average price − Price of cheaper).

Weighted Average Method

The average of two or more groups combined together is computed as (n1x1 + n2x2) ÷ (n1 + n2), where n is the number of elements and x is the average of each group.

Deviation Average Rule

When a new value is added, the new average shifts from the old average depending on the difference. Shift in average =

(Deviation × Number of items) ÷ Total items.

Q12. Answer: (d) 301

The correct answer is 301.

Key Points

• HTTP Status Code 301: A 301 Moved Permanently status code indicates that a web page has been permanently moved to a new location. The client (browser) is automatically redirected to the new URL.

• This is part of the HTTP response status codes, which provide information about the result of a client's request to the server.

• The server sends the 301 status code in the HTTP header along with the new URL in the "Location" field, instructing the browser to access the updated page.

• The 301 code is primarily used for implementing permanent URL redirections, which is essential for maintaining SEO rankings, as search engines transfer the ranking power of the old URL to the new one.

• Examples of when to use a 301 status code include moving a website to a new domain, consolidating duplicate URLs, or updating outdated URLs permanently.

Additional Information

• HTTP Status Code Categories:

• 1xx - Informational: The request was received, and the process is continuing.

• 2xx - Success: The request was successfully received, understood, and accepted.

• 3xx - Redirection: The client must take additional action to complete the request, such as being redirected to another URL. Example: 301 Moved Permanently, 302 Found.

• 4xx - Client Errors: The request contains bad syntax or cannot be fulfilled. Example: 404 Not Found.

• 5xx - Server Errors: The server failed to fulfill an apparently valid request. Example: 500 Internal Server Error.

• Difference Between 301 and 302:

• 301 Moved Permanently: Indicates that the resource has been permanently moved to a new location.

• 302 Found: Indicates a temporary redirection, meaning the original URL might be reused in the future.

• SEO Implication: 301 transfers SEO ranking to the new URL, whereas 302 does not.

• SEO Benefits of 301 Redirects:

• Preserves search engine rankings of the old URL and transfers it to the new URL.

• Ensures that users and search engines are directed to the correct page without encountering errors.

• Reduces duplicate content issues by consolidating traffic to a single URL.

• Other Notable HTTP Status Codes:

• 200 OK: Standard response for successful HTTP requests.

• 404 Not Found: Indicates that the requested resource could not be found.

• 500 Internal Server Error: Indicates a general server error.

• 503 Service Unavailable: Indicates the server is temporarily unavailable due to maintenance or overload.

Important Points

• Implementing a 301 Redirect:

return 301 https://www.new-domain.com$request_uri;

• In Apache servers, 301 redirects can be implemented using the .htaccess file with a directive such as:

Redirect 301 /old-url /new-url

• In Nginx, it can be implemented using the "return" directive in the server block:

• Use Cases for 301 Redirects:

• Domain name changes (e.g., migrating from http://example.com to https://example.org).

• Consolidating non-www and www versions of a website (e.g., redirecting http://example.com to http://www.example.com).

• Merging multiple websites into one.

Q13. Answer: (a) Surat (1907) and Madras (1908)

The correct answer is Surat (1907) and Madras (1908).

Key Points

• Rash Behari Ghosh was a prominent leader of the Indian National Congress associated with the Moderate wing during the early 20th century.

• He served as the President of the Indian National Congress for two significant sessions: Surat (1907) and Madras (1908).

• The Surat session of 1907 witnessed a major split between the Moderates and Extremists within the Congress. Rash Behari

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Ghosh, being a Moderate leader, presided over this session.

• The Madras session in 1908 was significant for consolidating the Moderate leadership's position after the split in Surat.

• His leadership symbolized the role of Moderates in the Indian National Congress during the pre-Gandhian era of India's independence movement.

• These sessions highlighted the ideological differences between the Moderate and Extremist factions within the Congress. Rash Behari Ghosh's presidency was aimed at maintaining harmony and pushing for constitutional reforms under British rule.

Additional Information

• Surat Session (1907):

• The Surat session marked the split between Moderates and Extremists due to differences in their methods and goals for achieving India's independence.

• The Extremists, led by leaders like Bal Gangadhar Tilak, advocated for direct action and self-reliance, while Moderates believed in constitutional reforms and dialogues with the British.

• Rash Behari Ghosh, as the President, represented the Moderate faction during this critical session.

• Madras Session (1908):

• This session aimed to stabilize the Indian National Congress after the split in Surat.

• Under Rash Behari Ghosh's leadership, the Moderates focused on addressing key issues through petitions and negotiations with the British government.

• They promoted social reforms, education, and gradual political change within the framework of British rule.

• Moderates vs. Extremists:

• The Moderates, including leaders like Gopal Krishna Gokhale and Rash Behari Ghosh, sought constitutional reforms and believed in peaceful and gradual methods.

• Extremists, including leaders like Lala Lajpat Rai, Bal Gangadhar Tilak, and Bipin Chandra Pal, advocated for Swaraj (self-rule) and were critical of the British government.

• The ideological differences led to the split in the Congress at the Surat session in 1907.

• Role of Rash Behari Ghosh:

• As a prominent Moderate leader, Rash Behari Ghosh played a key role in shaping the Congress's policies during his presidency.

• He focused on constitutional methods to achieve political reforms and independence.

• His leadership highlighted the challenges faced by the Moderates in uniting the Congress amid ideological differences.

Important Points

• Moderates' Approach:

• Moderates believed in constitutional methods, petitions, and discussions to attain political reforms.

• They were primarily supported by the educated middle-class Indians, who trusted the British system of governance.

• Extremists' Approach:

• Extremists emphasized direct action and self-reliance, rejecting reliance on British goodwill.

• They were supported by a broader section of Indian society, including farmers and workers, advocating for complete independence.

• Impact of the Split:

• The split weakened the Congress temporarily but paved the way for greater participation in the freedom movement by diverse groups.

• Later, under leaders like Mahatma Gandhi, both factions were brought together to work towards India's independence.

Q14. Answer: (d) One

Given: (Left) $ T 1 & 9 Z 7 * A 0 # K @ N Z (Right)

Required Conditions: Symbol - Number - Letter

(Left) $ T 1 & 9 Z 7 * A 0 # K @ N Z (Right)

Only one number is there, which are immediately preceded by a symbol and also immediately followed by a letter.

Hence, the correct answer is "Option 4".

Q15. Answer: (d) Both statements I and II together are NOT sufficient to answer the question

Given:

Five people P, Q, R, S and T are sitting in a row, all facing north.

Statements :

• After combining both statement unable to find that who is sitting second from the left end

• Both statements I and II together are NOT sufficient to answer the question.

Hence, the correct answer is "Option 4"

Q16. Answer: (b) 4 km

• Laksh starts from point A and drives 7 km towards east.
• He then takes a right turn and drives 12 km.
• He takes a final left turn and drives 6 km and stops at point B.
• Vinod starts from point P, which is 16 km east of Point A, and drives 4 km towards east.
• He then takes a right turn and drives 12 km.
• He takes a final right turn and drives 3 km and stops at Point Q.

The Final Diagram,

Hence, the correct answer is "Option 2"

Q17. Answer: (c) 37/60

Shortcut Trick

Solve the inner fraction first: 1 + 3/7 = 10/7.

The reciprocal of 10/7 is 7/10.

The expression becomes: 5/4 + 7/10 − 4/3.

Take the LCM of 4, 10, and 3, which is 60.

=> (75 + 42 − 80) / 60 = 37/60.

Therefore The correct answer is 37/60.

Alternate Method

Given:

5/4 + (1 / (1 + 3/7)) − 4/3

Concept Used:

BODMAS Rule − Brackets are solved first, followed by addition and subtraction.

Calculations:

=> 5/4 + (1 / (1 + 3/7)) − 4/3

First, solve the denominator of the bracketed term:

=> 1 + 3/7 = (7 + 3) / 7 = 10/7

Substitute this back into the expression:

=> 5/4 + (1 / (10/7)) − 4/3

Dividing by a fraction is the same as multiplying by its reciprocal:

=> 5/4 + 7/10 − 4/3

Find the LCM of the denominators 4, 10, and 3.

=> LCM of 4, 10, and 3 = 60

Make the denominators equal:

=> (5 × 15) / (4 × 15) = 75/60

=> (7 × 6) / (10 × 6) = 42/60

=> (4 × 20) / (3 × 20) = 80/60

Now, perform the addition and subtraction:

=> (75 + 42 − 80) / 60

=> (117 − 80) / 60

=> 37/60

Therefore The correct answer is 37/60.

Additional Information

BODMAS Rule

It dictates the order of operations: Brackets, Orders (powers/roots), Division & Multiplication (left to right), Addition & Subtraction (left to right).

Reciprocal of a Fraction

The reciprocal of a fraction a/b is b/a. When 1 is divided by a fraction, the result is its reciprocal.

Least Common Multiple (LCM) for Fractions

To add or subtract unlike fractions, find the LCM of their denominators to convert them into like fractions before operating on the numerators.

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Q18. Answer: (b) Vasudeva

The correct answer is Vasudeva.

Key Points

• The Kanva dynasty was established after the fall of the Shunga dynasty.

• Vasudeva, the founder of the Kanva dynasty, overthrew the last Shunga ruler, Devabhuti, and established his rule around 73 BCE.

• The Kanvas were known for their relatively brief rule, lasting for only about 45 years (73 BCE to 28 BCE).

• The Kanva dynasty primarily ruled parts of central India, including Pataliputra, which remained their political center.

• The Kanvas were Brahmins, and their rise marked the end of Shunga dominance in the region. Hence, the correct answer is Vasudeva.

Additional Information

• Menander:

• Menander, also known as Milinda, was a famous Indo-Greek ruler who ruled in the northwestern regions of India.

• He is renowned for his interactions with Buddhist philosopher Nagasena, which are recorded in the Milinda Panha.

• His rule did not influence central India, and he was not related to the Kanva dynasty.

• Pushyamitra:

• Pushyamitra Shunga was the founder of the Shunga dynasty, which preceded the Kanva dynasty.

• He was a Brahmin and ruled from 185 BCE to 149 BCE.

• His dynasty was overthrown by Vasudeva, the founder of the Kanva dynasty.

• Rudradaman:

• Rudradaman I was a ruler of the Western Satraps, a dynasty of Indo-Scythian origin.

• He is known for the Junagadh rock inscription, which mentions his achievements and governance.

• His rule was geographically distinct and unrelated to the Kanva dynasty.

• Kanva Dynasty:

• The Kanva dynasty was established by Vasudeva after the overthrow of the Shunga dynasty.

• It marked the beginning of a new political structure in central India, with Brahmin rulers taking prominence.

• The dynasty lasted for a short span and was eventually succeeded by the Satavahana dynasty.

Important Points

• Historical Context: The Kanva dynasty's rise marked the decline of the Shunga dynasty, which was established by Pushyamitra Shunga after the fall of the Mauryan Empire.

• Religious Influence: The Kanvas were Brahmins, and their rule indicated a shift in political power toward Brahminical dominance in central India during that era.

• Short Rule: Despite their brief rule, the Kanva dynasty played an essential role in transitioning power in the ancient Indian subcontinent.

• Geographical Focus: Their rule was primarily concentrated in central India, with Pataliputra being their political hub.

Q19. Answer: (c) 97

The logic follows here,

Similarly,

Hence, the correct answer is "Option 3"

Q20. Answer: (c) CUM

The pattern followed here is:

Hence, the correct answer is "Option 3"

Q21. Answer: (c) World Meteorological Organization (WMO) and United Nations Environment Programme (UNEP)

The correct answer is World Meteorological Organization (WMO) and United Nations Environment Programme (UNEP).

Key Points

• The Intergovernmental Panel on Climate Change (IPCC) was established in 1988 by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP).

• The IPCC is tasked with providing comprehensive scientific assessments on climate change, its impacts, and potential adaptation and mitigation strategies.

• The decision to establish the IPCC was made to create an international body that consolidates global scientific knowledge on climate change and provides policy-relevant information to governments.

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• Both the WMO and UNEP are key global organizations focused on addressing environmental and climatic issues. Their collaboration led to the creation of the IPCC to tackle the growing concerns of global warming.

• The first assessment report by the IPCC was published in 1990, which played a significant role in the establishment of the United Nations Framework Convention on Climate Change (UNFCCC) in 1992.

Additional Information

• World Meteorological Organization (WMO):

• The WMO is a specialized agency of the United Nations responsible for monitoring and understanding the Earth's atmosphere and its interaction with oceans, the climate, and the environment.

• It was established in 1950 and is headquartered in Geneva, Switzerland.

• The WMO plays a crucial role in promoting international cooperation in weather, climate, water, and related environmental issues.

• It provides valuable data and forecasts to help mitigate the impacts of natural disasters and climate change.

• United Nations Environment Programme (UNEP):

• UNEP is a global authority on environmental sustainability, established in 1972 and headquartered in Nairobi, Kenya.

• It focuses on promoting sustainable development and addressing global environmental challenges like climate change, biodiversity loss, and pollution.

• UNEP works closely with governments, NGOs, and other organizations to develop environmental policies and initiatives.

• Key projects include supporting the implementation of the Paris Agreement and assisting countries in transitioning to green economies.

• Other Options Explained:

• International Energy Agency (IEA) and World Trade Organization (WTO): These organizations focus on energy policies and international trade, respectively, but are not involved in climate change assessments or the creation of the IPCC.

• UN Development Programme (UNDP) and UN Framework Convention on Climate Change (UNFCCC): While these entities are involved in climate-related activities, they were not responsible for establishing the IPCC.

• World Bank and International Monetary Fund (IMF): Both organizations focus on global economic development and financial stability, and neither is directly involved in environmental or climate change assessments.

• Important Milestones:

• The IPCC received the Nobel Peace Prize in 2007, shared with former US Vice President Al Gore, for raising awareness about climate change.

• The IPCC's reports, such as the Sixth Assessment Report (released in parts starting in 2021), provide updated scientific knowledge on climate change and its effects.

• These reports are used globally to formulate policies and strategies to combat climate change.

Q22. Answer: (b) 0.53

Shortcut Trick

Solve brackets first: 2.4 ÷ 1.2 = 2

Perform divisions: 4.8 ÷ 2 = 2.4 and 0.90 ÷ 2 = 0.45

Perform multiplication: 0.2 × 2.4 = 0.48

Add and subtract left to right: 0.5 + 0.48 − 0.45 = 0.53

Therefore The correct answer is 0.53.

Alternate Method

Given:

Expression: 0.5 + 0.2 × 4.8 ÷ (2.4 ÷ 1.2) − 0.90 ÷ 2

Concept Used:

The BODMAS Rule is used to solve the expression by evaluating Brackets, Orders, Division, Multiplication, Addition, and Subtraction in that specific sequence.

Calculation:

=> 0.5 + 0.2 × 4.8 ÷ (2.4 ÷ 1.2) − 0.90 ÷ 2

=> Solving the bracket: (2.4 ÷ 1.2) = 2

=> 0.5 + 0.2 × 4.8 ÷ 2 − 0.90 ÷ 2

=> Performing the division operations left to right: 4.8 ÷ 2 = 2.4 and 0.90 ÷ 2 = 0.45

=> 0.5 + 0.2 × 2.4 − 0.45

=> Performing the multiplication: 0.2 × 2.4 = 0.48

=> 0.5 + 0.48 − 0.45

=> Performing the addition: 0.98 − 0.45

=> 0.53

Therefore The correct answer is 0.53.

Additional Information

BODMAS Rule

It dictates the required order of operations: Brackets, Orders (powers and roots), Division, Multiplication, Addition, and Subtraction. Division and Multiplication share the same priority, so they are solved strictly from left to right.

Decimal Division Tricks

When dividing decimals, shift the decimal point in both the dividend and divisor equally to the right until the divisor becomes a whole number (e.g., 2.4 ÷ 1.2 = 24 ÷ 12 = 2).

Decimal Multiplication Tricks

Multiply the numbers as normal integers first. Then, count the total number of decimal places in all original factors combined and place the decimal point in the final product accordingly (e.g., 0.2 × 2.4 → 2 × 24 = 48 → 0.48).

Q23. Answer: (c) 4536

Shortcut Trick

The sides of the triangle are 48 cm, 189 cm, and 195 cm.

Dividing the sides by 3 to find the base ratio, we get 16 : 63 : 65.

Since $16^2 + 63^2 = 256 + 3969 = 4225 = 65^2$, the sides form a right-angled triangle.

Area of a right-angled triangle = (1 ÷ 2) × Base × Height

Area = (1 ÷ 2) × 189 × 48 = 189 × 24 = 4536 cm^2

Therefore The correct answer is 4536 cm^2.

Alternate Method

Given:

The sides of the triangle are a = 189 cm, b = 48 cm, and c = 195 cm.

189 cm

48 cm

195 cm

Formula Used:

Heron's Formula for the area of a triangle: Area = √(s × (s − a) × (s − b) × (s − c))

Where semi-perimeter, s = (a + b + c) ÷ 2

Calculations:

=> s = (189 + 48 + 195) ÷ 2

=> s = 432 ÷ 2 = 216 cm

=> Area = √(216 × (216 − 189) × (216 − 48) × (216 − 195))

=> Area = √(216 × 27 × 168 × 21)

=> Area = √(216 × 27 × (8 × 21) × 21)

=> Area = √(216 × (27 × 8) × (21 × 21))

=> Area = √(216 × 216 × 21 × 21)

=> Area = 216 × 21 = 4536 cm^2

Therefore The correct answer is 4536 cm^2.

Additional Information

Heron's Formula

Heron's formula is universally applicable to find the exact area of any scalene, isosceles, or equilateral triangle when all three side lengths are known.

Pythagorean Triplets

A set of three positive integers (a, b, c) that perfectly satisfy the Pythagorean theorem $a^2 + b^2 = c^2$. Common examples include (3, 4, 5), (5, 12, 13), and the larger multiple triplet (16, 63, 65).

Equilateral Triangle Area

If all sides of a triangle are equal (side = a), the area simplifies directly to (√3 ÷ 4) × a^2.

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Q24. Answer: (c) Bipan Chandra Pal, Bal Gangadhar Tilak and Ashwini Kumar Dutt

The correct answer is Bipan Chandra Pal, Bal Gangadhar Tilak and Ashwini Kumar Dutt.

Key Points

• The Extremist Phase of the Indian National Movement (1905-1919) was marked by leaders who promoted Swadeshi, self-reliance, and direct action against British rule.

• Bipan Chandra Pal, Bal Gangadhar Tilak, and Ashwini Kumar Dutt were prominent leaders of this phase, advocating for a more radical approach to achieving independence.

• Bal Gangadhar Tilak, often referred to as the "Father of Indian Unrest," emphasized the importance of Swaraj (self-rule) and used festivals like Ganesh Chaturthi and Shivaji Jayanti to mobilize the masses.

• Bipan Chandra Pal was a strong proponent of the Swadeshi movement and emphasized the need for national education and economic self-reliance.

• Ashwini Kumar Dutt was a social reformer and political leader who worked to mobilize rural communities against British rule through his initiatives for national education and rural upliftment.

• The ideology of these leaders contrasted with the Moderates, who believed in constitutional methods and dialogue with the British.

Additional Information

• Features of the Extremist Phase:

• It emerged as a response to the failure of the Moderate leaders to achieve significant results through petitions and resolutions.

• Extremists believed in adopting methods like boycotts, Swadeshi, and mass protests to pressurize the British government.

• The partition of Bengal in 1905 served as a major trigger for the rise of extremism in Indian politics.

• Swadeshi Movement:

• Launched in 1905 during the partition of Bengal, it emphasized the use of Indian-made goods and the boycott of British products.

• It also focused on promoting self-reliance through the establishment of indigenous industries and institutions.

• Contributions of Extremist Leaders:

• Bal Gangadhar Tilak: Advocated for Swaraj and used his newspapers like Kesari and Maratha to inspire the masses.

• Bipan Chandra Pal: Known as the "Father of Revolutionary Thoughts in India," he emphasized the need for complete independence.

• Ashwini Kumar Dutt: Worked for rural development and mobilized youth through initiatives like National Schools.

• Contrast with Moderates:

• Moderates believed in constitutional reforms and discussions with the British, while Extremists believed in mass mobilization and direct action.

• This ideological rift eventually led to a split in the Congress at the Surat Session in 1907.

Important Points

• Partition of Bengal (1905):

• Announced by Lord Curzon, it was seen as a divide-and-rule tactic to create rifts between Hindus and Muslims.

• The opposition to the partition became a rallying point for Extremists, leading to the launch of the Swadeshi and Boycott Movements.

• Surat Split (1907):

• The Indian National Congress split into Moderates and Extremists due to differences in ideology and methods.

• The split weakened the national movement but also highlighted the growing radicalization of Indian politics.

• Role of Newspapers:

• Extremists used newspapers like Kesari, Bande Mataram, and Sandhya to spread their ideas and mobilize public opinion.

• These publications often criticized British policies and called for self-rule.

• Legacy of Extremists:

• Their ideas laid the foundation for the later phase of the Indian freedom struggle, including the Non-Cooperation Movement and Civil Disobedience Movement.

• Their emphasis on self-reliance and Swadeshi continues to inspire modern India.

Q25. Answer: (a) 58

Given: 8 C 7 B 24 D 8 A 5 = ?

'A' stands for '+', 'B' stands for '−', 'C' stands for '×' and 'D' stands for '÷',

BODMAS Table:

8 × 7 − 24 ÷ 8 + 5 = ?

8 × 7 − 3 + 5 = ?

56 +5 − 3 = ?

61 − 3 = ?

58.

Hence, the correct answer is "Option 1"

Q26. Answer: (d) Cherishing and following the noble ideals that inspired the national struggle for freedom

The correct answer is Cherishing and following the noble ideals that inspired the national struggle for freedom.

Key Points

• Article 51A(b) of the Indian Constitution is one of the fundamental duties enshrined in Part IVA, which emphasizes the responsibility of every citizen to cherish and follow the noble ideals that inspired India's national struggle for freedom.

• The provision was added through the 42nd Amendment Act of 1976, which introduced the concept of Fundamental Duties to the Indian Constitution.

• It highlights the importance of remembering the sacrifices and values upheld during India's freedom struggle, such as liberty, equality, fraternity, and justice.

• This duty is aimed at fostering a sense of national pride and awareness among citizens about their heritage and the efforts of freedom fighters.

• Fundamental Duties are non-justiciable, meaning they are not enforceable by law, but they serve as moral obligations for all citizens to promote a sense of discipline and commitment to the nation.

Additional Information

• Fundamental Duties:

• There are 11 Fundamental Duties listed under Article 51A of the Constitution, which were inspired by the Constitution of the former Soviet Union.

• These duties were added to remind citizens of their responsibilities toward the nation and to complement the Fundamental Rights.

• Examples of Fundamental Duties include respecting the National Flag, safeguarding public property, and promoting harmony.

• 42nd Amendment Act, 1976:

• This amendment is often referred to as the "Mini-Constitution" because it made significant changes to the Indian Constitution.

• It added Part IVA, which contains the Fundamental Duties, and also strengthened the Directive Principles of State Policy.

• The amendment was enacted during the Emergency period under the leadership of Prime Minister Indira Gandhi.

• Significance of Article 51A(b):

• It serves as a reminder of the sacrifices made by freedom fighters like Mahatma Gandhi, Bhagat Singh, Subhas Chandra Bose, and others.

• The provision encourages citizens to uphold democratic values and work toward the progress and unity of the nation.

• It also fosters a sense of responsibility and accountability among citizens for preserving the ideals of the freedom struggle.

• Examples of Noble Ideals:

• Non-violence (Ahimsa) and truth as advocated by Mahatma Gandhi.

• Equality and social justice, which were key aspects of the freedom movement.

• Fraternity and unity among all sections of society, as promoted by leaders like Dr. B.R. Ambedkar.

Important Points

• Non-Justiciable Nature: Fundamental Duties are not enforceable in a court of law, but they are considered essential for the moral and ethical development of citizens.

• Role in Education: Many educational institutions incorporate the values of Fundamental Duties into their curriculum to instill national pride and civic responsibility in students.

• Connection to Directive Principles: While Fundamental Duties focus on citizens, the Directive Principles of State Policy aim at guiding the government to establish a welfare state.

• Global Inspiration: The concept of Fundamental Duties draws inspiration from the Constitutions of socialist countries and aims to balance individual rights with collective responsibilities.

Q27. Answer: (a) NQ−NT

The logic followed here is:

Hence, the correct answer is "Option 1"

Q28. Answer: (d) Article 8

The correct answer is Article 8.

Key Points

• Article 8 of the Constitution of India deals with the rights of citizenship for certain persons of Indian origin residing outside India.

• It allows individuals who were born in India or whose parents or grandparents were born in undivided India to claim citizenship if they reside outside India but register themselves at an Indian consulate.

• The provision ensures that individuals of Indian origin living abroad can maintain a legal connection to India, provided they follow the registration process as per the law.

• Citizenship under Article 8 is granted after proper documentation and verification by an Indian diplomatic or consular office.

• This provision is part of the broader framework related to citizenship outlined in Part II of the Indian Constitution, which includes Articles 5 to 11.

Additional Information

• Part II of the Indian Constitution:

• Part II of the Constitution of India deals with citizenship, covering Articles 5 to 11.

• It establishes the legal provisions for determining who is a citizen of India at the time of its commencement and the conditions under which citizenship is granted, terminated, or renounced.

• Other Articles Related to Citizenship:

• Article 5: Provides citizenship to individuals domiciled in India at the commencement of the Constitution.

• Article 6: Deals with the rights of citizenship for persons who migrated to India from Pakistan before July 19, 1948.

• Article 7: Covers citizenship rights for individuals who migrated from India to Pakistan and later returned.

• Article 9: Specifies that individuals who voluntarily acquire the citizenship of another country will cease to be Indian citizens.

• Article 10: Protects the rights of citizenship and ensures that it cannot be arbitrarily taken away except under law.

• Article 11: Empowers Parliament to regulate the acquisition and termination of citizenship through legislation.

• The Citizenship Act, 1955:

• This act provides detailed provisions for acquisition, termination, and supplementation of Indian citizenship.

• It outlines modes of acquiring citizenship, such as birth, descent, registration, naturalization, and incorporation of territory.

• Rights and Privileges:

• Indian citizens enjoy fundamental rights under Part III of the Constitution, such as the right to equality, freedom of speech, and protection against discrimination.

• Citizenship also ensures access to government services, voting rights, and eligibility for public office.

Important Points

• Dual Citizenship:

• India does not allow dual citizenship. However, the concept of Overseas Citizenship of India (OCI) was introduced in 2005 to provide certain privileges to persons of Indian origin living abroad.

• Citizenship Amendment Act (CAA), 2019:

• The CAA facilitates citizenship for persecuted minorities from Pakistan, Bangladesh, and Afghanistan who entered India before December 31, 2014.

• It applies to Hindus, Sikhs, Buddhists, Jains, Parsis, and Christians but excludes Muslims.

• Global Context:

• Many countries offer provisions for citizenship for persons of origin, such as China's Overseas Chinese policies and Israel's Law of Return for Jewish individuals.

Q29. Answer: (c) Koppen Classification

The correct answer is Koppen Classification.

Key Points

• The Koppen Classification is the most widely used climate classification system globally. It was developed by the German climatologist Wladimir Köppen in 1884 and has undergone several revisions since.

• The system categorizes climates into five major groups, based on average temperature and precipitation patterns. These groups are further subdivided into smaller categories.

• The Koppen Classification is valued for its simplicity and ability to effectively correlate vegetation types with climatic conditions, making it extensively used in fields such as geography, ecology, and agricultural studies.

• The five major climate groups in the system are: Tropical (A), Dry (B), Temperate (C), Continental (D), and Polar (E).

• This classification is based on monthly and annual averages of temperature and precipitation, making it a versatile tool for analyzing global climatic patterns.

Additional Information

• Trewartha Classification:

• The Trewartha Classification is a modified version of the Köppen system, introduced by Glenn Trewartha in the 1930s.

• It focuses on better distinguishing between subtropical and temperate climates, addressing criticisms of Köppen's original system.
• Though useful, it is less widely adopted compared to the Köppen system.
• Strahler Classification:
• Developed by Arthur Strahler, this classification is based on the concept of air masses and their movements.
• It integrates physical geography principles to define climate zones.
• While insightful, it is primarily used in academic research rather than practical applications.
• Thornthwaite Classification:
• Introduced by Charles Warren Thornthwaite in 1948, this system emphasizes water balance and potential evapotranspiration.
• It is mainly applied in hydrology and agricultural studies, as it provides a detailed understanding of soil moisture and water availability.
• Despite its utility, it is not as universally applied as the Köppen system.
• Applications of Koppen Classification:
• It is extensively used in environmental studies, agriculture, and urban planning.
• Ecologists use it to study biomes and understand the distribution of vegetation globally.
• It also assists in predicting climate change impacts and analyzing historical climatic trends.

Important Points

• Historical Development:
• The Koppen Classification system was first introduced in 1884 and revised in 1918, 1936, and 1938 to incorporate better understanding of climatic data.
• Its creator, Wladimir Köppen, was a pioneer in integrating climate and vegetation patterns.
• Global Acceptance:
• The system's simplicity and effectiveness have led to its universal adoption, making it the standard for climate classification.
• It is used by organizations such as the World Meteorological Organization (WMO) and United Nations for climate-related studies.
• Scientific Basis:
• The classification is grounded in scientific principles of temperature and precipitation averages, ensuring its reliability across different geographical regions.
• Its subdivisions are particularly useful for detailed regional climate studies.

Q30. Answer: (d) 10

Shortcut Trick

For a 2-year compound interest period, the multiplying factor per year is the square root of the Amount to Principal ratio.

Ratio of A to P = 12100 ÷ 10000 = 121 ÷ 100

1-Year Multiplying factor = √(121 ÷ 100) = 11 ÷ 10

This means an interest of 1 unit is earned over a principal of 10 units in one year.

Rate of Interest (R) = (1 ÷ 10) × 100 = 10%

Therefore The correct answer is 10%.

Alternate Method

Given:

Principal (P) = Rs. 10,000

Amount (A) = Rs. 12,100

Time (T) = 2 years

Formula Used:

A = P(1 + R/100)^T

Rs. 10,000

Principal (P)

Rs. 12,100

Amount (A)

Time (T) = 2 Years

Rate = R% p.a.

Amount ÷ Principal = 12100 ÷ 10000 = 121/100

Calculations:

=> 12100 = 10000 × (1 + R/100)²

=> 12100 ÷ 10000 = (1 + R/100)²

=> 121 / 100 = (1 + R/100)²

=> √(121 / 100) = 1 + R/100

=> 11 / 10 = 1 + R/100

=> R/100 = (11 / 10) − 1

=> R/100 = 1 / 10

=> R = 10%

Therefore The correct answer is 10%.

Additional Information

Effective Rate for 2 Years CI

The effective compound interest rate for 2 years can be calculated as: R_(eff) = 2R + (R² ÷ 100)%. For R = 10%, R_(eff) = 20 + 1 = 21%.

Difference Between CI and SI

For 2 years, the difference between Compound Interest and Simple Interest on a principal P is given by: D = P × (R ÷ 100)².

3-Year Rate Shortcut

If the amount is given after 3 years, the 1-year multiplier is found by taking the cube root: ³√(A ÷ P).

Q31. Answer: (d) Effervescence is seen

The correct answer is Effervescence is seen.

Key Points

• When dilute HCl is added to calcium carbonate, a chemical reaction takes place, producing carbon dioxide gas (CO2). This reaction is represented as:

CaCO3 + 2HCl → CaCl2 + H2O + CO2.

• The release of carbon dioxide gas results in effervescence, which is characterized by the formation of bubbles or fizzing in the liquid. This is a clear indication that gas is being evolved.

• Effervescence is the visible observation confirming the evolution of gas, making it the most reliable experimental evidence in this context.

• The other options, such as the formation of white precipitate, solution turning pink, or pungent smell, are not related to the reaction between dilute HCl and calcium carbonate. Hence, they are incorrect.

• The reaction between calcium carbonate and dilute hydrochloric acid is a typical example of an acid-carbonate reaction, which is widely studied in chemistry.

Additional Information

• Effervescence:

• Effervescence is the formation of bubbles in a liquid due to the release of a gas during a chemical reaction.

• Common examples include the reaction of acids with carbonates or bicarbonates, as seen in this experiment.

• Effervescence often serves as a visual cue indicating that a reaction has taken place.

• Carbon Dioxide (CO2):

• It is a colorless and odorless gas produced during the reaction of acids with carbonates.

• Carbon dioxide is slightly soluble in water and forms carbonic acid upon dissolution.

• In laboratory experiments, its presence can be confirmed by passing the gas through lime water (calcium hydroxide solution), which turns milky due to the formation of calcium carbonate.

• Acid-Carbonate Reaction:

• This type of reaction generally produces a salt, water, and carbon dioxide gas.

• Such reactions are commonly used in industrial processes, such as the manufacturing of cement or plaster.

• In educational settings, these reactions are used to demonstrate the properties of acids and carbonates.

• Incorrect Options:

• Option 1: Formation of white precipitate – This is not observed in the given reaction, as the products are soluble.

• Option 2: Solution turns pink – This does not occur, as no indicator is involved.

• Option 3: Pungent smell observed – Carbon dioxide is odorless, hence no pungent smell is produced.

Important Points

• Applications:

• Effervescence is used in products like antacids and carbonated beverages to release carbon dioxide.

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• In geological studies, effervescence helps identify carbonate minerals when treated with acid.
• Lime Water Test:
• This test is used to confirm the presence of carbon dioxide gas.
• When CO2 is bubbled through lime water, it forms a white precipitate of calcium carbonate, which later dissolves upon excess CO2 exposure.
• Industrial Relevance:
• Acid-carbonate reactions play a significant role in chemical manufacturing processes.
• They are utilized in creating materials like cement and plaster of Paris.

Q32. Answer: (c) Magnification = 0.5

The correct answer is Magnification = 0.5.

Key Points

• The formula for magnification (M) is M = v/u, where v is the image distance and u is the object distance.
• In the case of a concave lens, the image is virtual and appears on the same side as the object. Thus, the image distance (v) is taken as negative.
• Here, the focal length (f) of the lens is given as -20 cm (negative sign for concave lens).
• Image distance (v) is given as -10 cm (negative as the image is virtual).
• Using the lens formula: 1/f = 1/v - 1/u, substitute the values to find u:
• 1/(-20) = 1/(-10) - 1/u
• Solving this gives u = -20 cm.
• Finally, calculate magnification: M = v/u = (-10)/(-20) = 0.5.
• Thus, the magnification produced by the lens is 0.5.

Additional Information

• Concave Lens:
• A concave lens is a diverging lens that causes parallel rays of light to spread out.
• It is used in applications such as correcting myopia (nearsightedness), in optical instruments, and in certain cameras.
• The focal length of a concave lens is always negative, and it forms virtual, upright, and smaller images.
• Lens Formula:
• The lens formula is given as 1/f = 1/v - 1/u, where f is the focal length, v is the image distance, and u is the object distance.
• This formula applies to both concave and convex lenses, with the respective sign conventions.
• Magnification:
• Magnification is the ratio of the image height to the object height or the ratio of the image distance to the object distance (M = v/u).
• If magnification is less than 1, the image is smaller than the object. If it is greater than 1, the image is larger.
• For virtual images formed by a concave lens, magnification is positive.
• Applications of Concave Lenses:
• Eyeglasses: Used to correct nearsightedness by diverging light rays before they reach the eye.
• Optical Devices: Used in telescopes and microscopes to manage the divergence of light rays.
• Safety Equipment: Used in lasers to spread light evenly and reduce intensity.

Important Points

• Sign Convention in Lens Formula:
• Distances measured in the direction of incoming light are taken as positive.
• Distances measured against the direction of incoming light are taken as negative.
• The focal length of a concave lens is always negative, while that of a convex lens is positive.
• Difference Between Concave and Convex Lenses:
• Concave Lens: Diverges light, forms virtual images, and has a negative focal length.
• Convex Lens: Converges light, forms real or virtual images, and has a positive focal length.

Q33. Answer: (c) Court of Munsiff

The correct answer is Court of Munsiff.

Key Points

• The Court of Munsiff in India deals with civil cases involving small pecuniary stakes. It is the lowest civil court in the hierarchy of courts and is specifically designated for handling disputes of lesser monetary value.

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• These courts generally handle cases where the pecuniary jurisdiction is up to a prescribed limit, which varies from state to state. For example, it may be up to Rs. 1 lakh in certain states.

• The jurisdiction of a Munsiff Court is determined by the laws of individual states under the Civil Procedure Code (CPC) of India.

• Munsiff courts are presided over by judicial officers referred to as Munsiffs, who have the authority to adjudicate on civil matters of smaller monetary stakes.

• These courts aim to provide a legal remedy to individuals who may not have the financial resources to approach higher courts for disputes involving smaller amounts.

Additional Information

• Chief Judicial Magistrate:

• Deals primarily with criminal cases rather than civil disputes.

• Has jurisdiction over serious criminal offenses such as theft, assault, and fraud.

• Does not generally handle cases of small pecuniary stakes.

• Court of Subordinate Judge:

• Also known as the Court of Civil Judge (Senior Division), it handles civil cases of higher pecuniary stakes compared to Munsiff Courts.

• It serves as the next level in the judicial hierarchy after the Munsiff Court.

• Sessions Court:

• Mainly deals with criminal cases and does not address civil disputes involving pecuniary stakes.

• It is responsible for trying cases of serious criminal offenses such as murder, rape, and robbery.

• Hierarchy of Civil Courts in India:

• The hierarchy begins with the Munsiff Court at the lowest level, followed by the Court of Subordinate Judge, and then the District Judge.

• Cases involving smaller monetary values are addressed at the Munsiff Court, whereas larger pecuniary disputes are handled by higher courts in the hierarchy.

Important Points

• Structure of Judiciary in India:

• India's judicial structure is divided into three tiers: District Courts, High Courts, and the Supreme Court.

• District courts are further categorized into civil and criminal courts.

• Jurisdiction Variation:

• The pecuniary jurisdiction of civil courts varies across states, depending on local laws and regulations.

• For example, the limit for Munsiff Courts may range from Rs. 50,000 to Rs. 1 lakh, depending on the state.

• Role of Civil Courts:

• Civil courts play an essential role in resolving disputes related to property, contracts, family matters, and other non-criminal issues.

• They provide accessible legal avenues for litigants to seek justice for monetary disputes.

Q34. Answer: (c) P × Q ÷ R – S + T

Preparing the family tree diagram by using the following symbols:

As per the given information:

P × Q ÷ R – S + T

S is the sister of R and P is mother of R. S is daughter of P.

Hence, the correct answer is "Option 3"

Q35. Answer: (b) 38.8%

Shortcut Trick

Convert each discount percentage to its fractional ratio (MP → SP):

10% = 1/10 (10 → 9) | 15% = 3/20 (20 → 17) | 20% = 1/5 (5 → 4)

Net MP = 10 × 20 × 5 = 1000

Net SP = 9 × 17 × 4 = 612

Discount % = (1000 − 612) ÷ 1000 × 100 = 38.8%

Therefore The correct answer is 38.8%.

Alternate Method

Given:

Three successive discounts of 10%, 15%, and 20%.

Method Used (Base 100):

Assume the Initial Marked Price (MP) = 100 and apply the discounts sequentially.

100

MP

−10%

90

−15%

76.5

−20%

61.2

Final SP

Equivalent Discount = 100 − 61.2 = 38.8%

Calculations:

=> Let Marked Price (MP) = 100

=> Price after 1st discount (10%) = 100 × (1 − 10/100) = 100 × 0.90 = 90

=> Price after 2nd discount (15%) = 90 × (1 − 15/100) = 90 × 0.85 = 76.5

=> Price after 3rd discount (20%) = 76.5 × (1 − 20/100) = 76.5 × 0.80 = 61.2

=> Final Selling Price (SP) = 61.2

=> Equivalent Discount = MP − Final SP = 100 − 61.2 = 38.8

=> Equivalent Discount % = (38.8 / 100) × 100 = 38.8%

Therefore The correct answer is 38.8%.

Additional Information

Successive Discount Formula

For two successive discounts of a% and b%, the equivalent single discount is given by: D = a + b − (a × b) / 100. This formula can be chained for multiple discounts.

Single vs Successive Discount

A single flat discount equal to the simple addition of successive discounts is always larger than the successive discounts (e.g., a flat 25% discount is better for the customer than successive discounts of 15% and 10%).

Effective Multiplying Factor

When multiple discounts d1, d2, d3 are applied on a product, Final SP = MP × (1 − d1/100) × (1 − d2/100) × (1 − d3/100).

Q36. Answer: (d) Lord Wellesley

The correct answer is Lord Wellesley.

Key Points

• Subsidiary Alliance System: This system was introduced by Lord Wellesley, the Governor-General of India from 1798 to 1805, as part of his strategy to expand British influence in India.

• The system required Indian rulers to accept the presence of a British force within their territory and to pay for its maintenance.

• Through this alliance, rulers would lose their right to maintain independent diplomatic relations and were forbidden from entering alliances with any other power without British consent.

• The first Indian state to accept the Subsidiary Alliance was Hyderabad in 1798.

• The system ensured British dominance over Indian states while reducing the possibility of foreign intervention in Indian affairs. It also allowed the British to expand their control without direct annexation in some cases.

• Lord Wellesley used this strategy extensively to strengthen the British Empire in India and to secure revenue from Indian states for maintaining British troops.

Additional Information

• Lord Wellesley:

• He served as the Governor-General of India between 1798 and 1805.

• He was known for his aggressive expansionist policies and consolidation of British control over Indian territories.

• Wellesley's key contribution was the introduction of the Subsidiary Alliance System, which became a powerful tool for the British to establish indirect control over princely states.

• Principles of Subsidiary Alliance:

• Indian rulers under the alliance were required to disband their armies and depend on British forces for protection.

• They had to pay for the maintenance of the British troops stationed in their territories.
• Rulers were forbidden from engaging in diplomatic relations or forming alliances with other powers without British approval.
• If the rulers failed to make the required payments, part of their territory would be annexed by the British as compensation.
• Effects of Subsidiary Alliance:
• It led to the loss of sovereignty for Indian rulers as they became dependent on British forces for their protection.
• It helped the British consolidate their power and maintain control over vast territories without direct annexation in some cases.
• The system drained the resources of Indian states, causing resentment among rulers and the populace.
• Other Governor-Generals and Their Contributions:
• Lord Cornwallis: Known for introducing the Permanent Settlement in Bengal in 1793.
• Lord Hastings: Played a role in consolidating British control in India and fought the Third Anglo-Maratha War (1817-1818).
• Lord Dalhousie: Introduced the Doctrine of Lapse and was responsible for several annexations, including the annexation of Awadh in 1856.

Important Points

• The Subsidiary Alliance was instrumental in expanding British control in India and reducing the influence of other European powers like the French.
• It was a significant political tool used by Lord Wellesley to make Indian states dependent on British protection and resources.
• While it ensured the security of Indian rulers, it effectively made them vassals of the British Empire, eroding their autonomy.
• Rulers who resisted the alliance often faced military defeat or annexation of their territories.

Q37. Answer: (c) Three

Given: GOT HER WAR FIT

According to the question, each vowel is changed to the letter immediately following it in the English alphabetical order and each consonant is changed to the letter immediately preceding it in the English alphabetical order.

The letter-clusters without any vowels are "FPS", "GFQ", and "VBQ".

Hence, the correct answer is "Option 3"

Q38. Answer: (c) 17

Shortcut Trick

According to the properties of averages, if a constant value is added to every observation in a dataset, the mean of the dataset increases by the same constant value.

Initial Mean = 15

Value added to each number = 2

New Mean = Initial Mean + 2 = 15 + 2 = 17

Therefore The correct answer is 17.

Alternate Method

Given:

Mean of 3 numbers = 15

Value added to each number = 2

Formula Used:

Mean = Sum of observations ÷ Total number of observations

Mean = 15

• 2 to all items

Mean = 17

New Mean = Initial Mean + 2 = 17

Calculations:

=> Let the three numbers be a, b, and c.

=> (a + b + c) ÷ 3 = 15

=> a + b + c = 15 × 3 = 45

=> The new numbers become (a + 2), (b + 2), and (c + 2).

=> Sum of new numbers = (a + 2) + (b + 2) + (c + 2)

=> Sum of new numbers = (a + b + c) + 2 + 2 + 2

=> Sum of new numbers = 45 + 6 = 51

=> New Mean = Sum of new numbers ÷ Total number of observations

=> New Mean = 51 ÷ 3 = 17

Therefore The correct answer is 17.

Additional Information

Properties of Mean (Addition & Subtraction)

If a constant value 'k' is added to or subtracted from each observation in a dataset, the new mean becomes (Original Mean ± k).

Properties of Mean (Multiplication & Division)

If each observation in a dataset is multiplied or divided by a non-zero constant 'k', the new mean becomes (Original Mean × k) or (Original Mean ÷ k) respectively.

Combined Mean Formula

If Group 1 has n1 items with a mean of A1 and Group 2 has n2 items with a mean of A2, the combined mean of both groups is calculated as (n1A1 + n2A2) ÷ (n1 + n2).

Q39. Answer: (c) 24°

Shortcut Trick

For a cyclic quadrilateral where tangents are drawn from the endpoints of a chord:

angle LPN = 2 × angle LMN − 180°

angle LPN = 2 × 102° − 180°

angle LPN = 204° − 180° = 24°

Therefore The correct answer is 24°.

Alternate Method

Given:

LMNO is a cyclic quadrilateral with angle M = 102°.

Tangents at L and N meet at point P.

Formula Used:

Sum of opposite angles in a cyclic quadrilateral is 180°.

Angle subtended by an arc at the center is twice the angle on the circle.

Angle between tangent and radius is 90°.

L

N

M

O

C

P

156°

102°

78°

24°

Calculations:

=> In cyclic quadrilateral LMNO, angle O + angle M = 180°

=> angle O = 180° − 102° = 78°

=> Angle subtended by minor arc LN at the center C is angle LCN.

=> angle LCN = 2 × angle O = 2 × 78° = 156°

=> Tangents PL and PN are perpendicular to radii CL and CN respectively.

=> angle CLP = 90° and angle CNP = 90°

=> In quadrilateral CLPN, sum of all internal angles is 360°.

=> angle LPN + angle LCN + angle CLP + angle CNP = 360°

=> angle LPN + 156° + 90° + 90° = 360°

=> angle LPN + 336° = 360°

=> angle LPN = 360° − 336° = 24°

Therefore The correct answer is 24°.

Additional Information

Cyclic Quadrilateral

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A quadrilateral is called cyclic if all its four vertices lie on a circle. The sum of opposite angles is always 180°.

Central Angle Theorem

The angle subtended by an arc at the center is double the angle subtended by it at any remaining part of the circle.

Tangent Properties

A tangent to a circle is always perpendicular to the radius at the point of contact. Two tangents drawn from an external point to a circle are equal in length.

Q40. Answer: (d) Swarnjayanti Gram Swarozgar Yojana

The correct answer is Swarnjayanti Gram Swarozgar Yojana.

Key Points

• The Swarnjayanti Gram Swarozgar Yojana (SGSY) was launched by the Government of India in April 1999 as a major poverty alleviation program.

• The objective of SGSY is to bring assisted families above the poverty line by organizing them into Self-Help Groups (SHGs) through a mix of bank credit and government subsidy.

• The scheme is targeted at the rural poor and aims to provide them with sustainable income-generating assets and skills.

• SGSY focuses on self-employment through the development of micro-enterprises in rural areas, including activities such as agriculture, horticulture, animal husbandry, and small-scale industries.

• The program gives special attention to the weaker sections of society, with at least 50% of the benefits reserved for Scheduled Castes (SCs) and Scheduled Tribes (STs), 40% for women, and 3% for disabled persons.

Additional Information

• Implementation of SGSY:

• The scheme is implemented by the District Rural Development Agencies (DRDAs) through Panchayati Raj Institutions, banks, and NGOs.

• SGSY promotes the formation of Self-Help Groups (SHGs), which are then linked with financial institutions for loans and subsidies to start income-generating activities.

• Key Features:

• Focus on capacity building and skill development of rural poor.

• Emphasis on market linkages to ensure that SHG products find buyers and the members earn a consistent income.

• Special attention to infrastructure development, including storage facilities, marketing infrastructure, and technology support.

• Transition to NRLM:

• In 2011, SGSY was restructured into the National Rural Livelihood Mission (NRLM) to address its shortcomings and widen its reach.

• NRLM, now known as Deen Dayal Antyodaya Yojana – National Rural Livelihood Mission (DAY-NRLM), focuses on universal social mobilization, financial inclusion, and sustainable livelihoods.

• Other Similar Poverty Alleviation Programs:

• Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA): Provides guaranteed employment to rural households for 100 days in a financial year.

• National Urban Livelihoods Mission (NULM): Focuses on reducing poverty and vulnerability in urban areas.

• Pradhan Mantri Awas Yojana (PMAY): Aims to provide affordable housing to the urban and rural poor.

Important Points

• Challenges in SGSY Implementation:

• Issues like poor targeting of beneficiaries, lack of proper monitoring, and inadequate training of SHG members hindered its success.

• The scheme faced problems in ensuring sustainable income generation due to market fluctuations and poor infrastructure in rural areas.

• Focus of DAY-NRLM:

• DAY-NRLM addresses the challenges of SGSY by promoting community-driven and participatory approaches.

• It emphasizes the creation of a universal social security net and sustainable livelihood opportunities for the rural poor.

Q41. Answer: (c) 5 km/hr

Shortcut Trick

Speed of the stream = (Downstream Speed − Upstream Speed) ÷ 2

Speed of the stream = (25 − 15) ÷ 2

=> Speed of the stream = 10 ÷ 2 = 5 km/hr

Therefore The correct answer is 5 km/hr.

Alternate Method

Downstream Speed (D) = 25 km/hr

Upstream Speed (U) = 15 km/hr

Speed of Stream = (D − U) ÷ 2

Given:

Downstream speed (D) = 25 km/hr

Upstream speed (U) = 15 km/hr

Formula Used:

Downstream Speed (D) = Boat Speed + Stream Speed

Upstream Speed (U) = Boat Speed − Stream Speed

Calculation:

Let the speed of the boat in still water be u and the speed of the stream be v.

=> u + v = 25.... (Equation 1)

=> u − v = 15.... (Equation 2)

Subtracting Equation 2 from Equation 1:

=> (u + v) − (u − v) = 25 − 15

=> 2v = 10

=> v = 10 ÷ 2

=> v = 5 km/hr

Therefore The correct answer is 5 km/hr.

Additional Information

Speed of Boat in Still Water

It is calculated as the average of the downstream and upstream speeds: Boat Speed = (D + U) ÷ 2.

Downstream Speed (D)

The effective speed when a boat travels in the direction of the stream flow. D = Boat Speed + Stream Speed.

Upstream Speed (U)

The effective speed when a boat travels against the direction of the stream flow. U = Boat Speed − Stream Speed.

Time and Speed Relationship

Since downstream speed is always greater than upstream speed, for covering the same distance, the time taken to travel upstream is always greater than the time taken to travel downstream.

Q42. Answer: (c) 560 J

The correct answer is 560 J.

Key Points

• Gravitational potential energy is the energy possessed by an object due to its position in a gravitational field. It is calculated using the formula: PE = m × g × h.

• Here, m is the mass of the object, g is the acceleration due to gravity, and h is the height of the object above the ground.

• In the given question:

• Mass of the object, m = 8 kg

• Height above the ground, h = 7 m

• Acceleration due to gravity, g = 10 m/s²

• Substituting the given values in the formula:

• PE = 8 × 10 × 7 = 560 J

• Hence, the energy possessed by the object is 560 Joules, which corresponds to the correct answer.

Additional Information

• Gravitational Potential Energy:

• This is a form of potential energy that depends on an object's position relative to the Earth or another massive body.

• The formula PE = m × g × h is applicable only when the object is near the surface of the Earth and the value of g remains constant.

• When the object is moved to a different height, the change in potential energy is calculated as the difference between the initial and final potential energies.

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• Acceleration due to Gravity (g):

• The value of g is approximately 9.8 m/s² near the surface of the Earth, but for simplification in problems, it is often approximated to 10 m/s².

• It decreases as the distance from the Earth's surface increases.

• SI Unit of Energy:

• The SI unit of energy, including potential energy, is the Joule (J).

• 1 Joule is defined as the energy transferred when a force of 1 Newton is applied over a displacement of 1 meter.

• Practical Applications of Potential Energy:

• Hydropower plants utilize the gravitational potential energy of water stored at a height to generate electricity.

• A pendulum stores gravitational potential energy at its highest point, which is converted into kinetic energy as it swings downward.

Important Points

• Conservation of Energy:

• Energy cannot be created or destroyed; it can only be transformed from one form to another.

• In the absence of non-conservative forces like friction, the total mechanical energy (potential + kinetic) of an object remains constant.

• Mass and Height's Role in Potential Energy:

• The gravitational potential energy of an object is directly proportional to its mass and the height at which it is placed.

• Thus, doubling the height or mass of an object will double its potential energy.

• Real-world Examples:

• In roller coasters, at the highest points, the cars possess maximum potential energy, which gets converted into kinetic energy as they descend.

• Water stored in dams possesses potential energy, which is converted to kinetic energy and later to electrical energy in turbines.

Q43. Answer: (c) ASP

The logic followed here is:

All follows the same logic except ASP.

Hence, the correct answer is "Option 3"

Q44. Answer: (c) 2

• A, B, C, D, E and F have different heights.

• E is taller than exactly 4 people and F is shorter than exactly 4 people.

• D is shorter than A but taller than C.

• C is not the shortest.

The final Arrangement is

Hence, the correct answer is "Option 3"

Q45. Answer: (d) Grand Cross of the Order of Makarios III

The correct answer is Grand Cross of the Order of Makarios III.

Key Points

• Prime Minister Narendra Modi was honored with the Grand Cross of the Order of Makarios III during his visit to Nicosia, Cyprus, on 16 June 2025.

• The award is named after Archbishop Makarios III, the first President of Cyprus, who played a crucial role in the country's independence and history.

• The Grand Cross of the Order of Makarios III is one of Cyprus's highest honors and is reserved for distinguished personalities who have significantly contributed to strengthening bilateral ties with Cyprus or to global peace and development.

• This recognition highlights India-Cyprus relations and is a testament to the growing partnership between the two countries in areas like trade, cultural exchange, and diplomatic cooperation.

• Prime Minister Modi's visit to Cyprus also included discussions on enhancing bilateral ties in areas such as energy, technology, and defense cooperation, further cementing the friendship between India and Cyprus.

Additional Information

• Archbishop Makarios III:

• Archbishop Makarios III was the first President of Cyprus and served from 1960 to 1977.

• He is known for his pivotal role in Cyprus's independence movement against British rule and his efforts to unite Cypriots.

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• Makarios III is remembered as a national hero and a symbol of Cypriot sovereignty.

• India-Cyprus Relations:

• India and Cyprus share historical and cultural ties. Diplomatic relations were established between the two nations in 1962.

• Both countries cooperate in areas like trade, investment, education, and technology.

• Cyprus has supported India's stance on various global issues, including the UN Security Council reforms.

• Cyprus is an important partner for India in the European Union.

• Other Honors to PM Modi:

• Prime Minister Narendra Modi has received several international awards, including the Legion of Merit (USA), Order of Abdulaziz Al Saud (Saudi Arabia), and Order of Zayed (UAE).

• These awards reflect India's growing influence and recognition of PM Modi's global leadership.

• Significance of Bilateral Visits:

• Visits like PM Modi's trip to Cyprus strengthen diplomatic ties and foster cooperation in various fields such as economy, defense, and cultural exchange.

• Such interactions promote mutual understanding and open new avenues for partnership and development.

Important Points

• Order of Makarios III:

• The Order of Makarios III is the highest state award of Cyprus, established to honor distinguished personalities for their contributions to the nation.

• It symbolizes the values and legacy of Archbishop Makarios III, including freedom, sovereignty, and peace.

• The Grand Cross is the highest grade of this order and is usually awarded to heads of state or government.

• India's Diplomatic Achievements:

• Under PM Modi's leadership, India has actively participated in global diplomacy, enhancing its role in international organizations like the UN, G20, and BRICS.

• India's initiatives in areas like climate change, digital economy, and global peace have been widely recognized and appreciated.

• Such recognitions reflect India's growing role as a global leader and its commitment to fostering international relations.

Q46. Answer: (b) 38 : 51

Shortcut Trick

Compare the given fractions with 1/2 to easily eliminate smaller options.

30/74 < 1/2 and 22/61 < 1/2.

38/51 > 1/2 and 43/76 > 1/2.

Now cross-multiply the two larger fractions: 38/51 and 43/76.

38 × 76 = 2888 and 51 × 43 = 2193.

Since 2888 > 2193, the ratio 38 : 51 is the greatest.

Therefore The correct answer is 38 : 51.

Alternate Method

Given:

The given ratios are 30 : 74, 38 : 51, 22 : 61, and 43 : 76.

Formula Used:

Percentage = (Numerator ÷ Denominator) × 100

30:74

40.5%

38:51

74.5%

22:61

36.1%

43:76

56.6%

Calculations:

=> 30 : 74 = (30 ÷ 74) × 100 ≈ 40.54%

=> 38 : 51 = (38 ÷ 51) × 100 ≈ 74.50%

=> 22 : 61 = (22 ÷ 61) × 100 ≈ 36.06%

=> 43 : 76 = (43 ÷ 76) × 100 ≈ 56.57%

=> Comparing the percentages: 36.06% < 40.54% < 56.57% < 74.50%

=> The highest percentage is 74.50%, which corresponds to the ratio 38 : 51.

Therefore The correct answer is 38 : 51.

Additional Information

Cross-Multiplication Method

To accurately compare two fractions a/b and c/d without converting them to decimals, you can multiply diagonally. If (a × d) > (b × c), then a/b is greater than c/d.

Ratio as Percentage

Any ratio a : b can be converted into a percentage using the formula (a ÷ b) × 100%. This scales all numbers uniformly out of 100 for swift comparison.

Base Reference Rule

Comparing the numerator to half of the denominator is the fastest way to categorize large and small ratios during competitive exams.

Q47. Answer: (a) Prof. Uma Kanjilal

The correct answer is Prof. Uma Kanjilal.

Key Points

• Prof. Uma Kanjilal has been appointed as the first woman Vice Chancellor of the Indira Gandhi National Open University (IGNOU).

• Her appointment marks a significant milestone in the history of IGNOU, which is one of the largest open universities in the world.

• The decision to appoint her was announced on July 2025, highlighting the increasing representation of women in leadership roles in the education sector.

• Prof. Uma Kanjilal has been associated with IGNOU for many years and has contributed significantly to the university's academic and administrative growth.

• She is known for her work in promoting online education and digital learning platforms, which aligns with IGNOU's mission of providing accessible education.

Additional Information

• Indira Gandhi National Open University (IGNOU):

• Established in 1985, IGNOU is headquartered in New Delhi, India.

• It is named after former Prime Minister Indira Gandhi and is known for promoting distance and open education across India and other countries.

• IGNOU is recognized for its vast network of study centers and its extensive array of courses, catering to millions of students globally.

• The university is committed to providing inclusive education, with a focus on reaching marginalized and underprivileged communities.

• Role of Vice Chancellor:

• The Vice Chancellor is the chief executive officer of a university, responsible for the overall functioning and strategic development of the institution.

• This includes the implementation of academic policies, administrative management, and ensuring the university's mission aligns with national educational goals.

• Significance of Women in Leadership Roles:

• The appointment of women in leadership roles, such as Vice Chancellor, reflects the growing emphasis on gender equality in the education sector.

• It also inspires greater participation of women in academia and higher education management.

• Digital Learning Initiatives:

• IGNOU has been at the forefront of integrating digital education through platforms like SWAYAM (Study Webs of Active-Learning for Young Aspiring Minds).

• As Vice Chancellor, Prof. Uma Kanjilal is expected to further enhance these initiatives, ensuring greater access to quality education through technology.

Important Points

• Other Eminent Women Leaders in Indian Education:

• Dr. Najma Akhtar: She is the first woman Vice Chancellor of Jamia Millia Islamia (appointed in 2019).

• Prof. Anu Singh Lather: She serves as the Vice Chancellor of Ambedkar University, Delhi.

• Prof. Shashikala Wanjari: Former Vice Chancellor of SNDT Women's University, known for her work in women's education.

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• Future of Open and Distance Learning (ODL):
• ODL systems like IGNOU aim to bridge the gap in higher education access, especially in rural and underserved areas.
• The integration of AI and digital platforms is expected to revolutionize the field, making education more interactive and inclusive.

Q48. Answer: (c) Data in statement I alone is sufficient to answer the question, while data in statement II is not.

Given: Six friends, B, C, D, E, F and G, are sitting in a straight line, facing north
Statements:
(II) F is an immediate neighbour of C. Exactly two people sit between B and C.
According to this statement not able to answer who is sitting at the extreme right end.
Data in statement I alone is sufficient to answer the question, while data in statement II is not.
Hence, the correct answer is "Option 3"

Q49. Answer: (c) 200π cm2

Shortcut Trick
The Pythagorean triplet for (8, 15) is 17. So, slant height (l) = 17 cm.
Total Surface Area of a cone = πr(r + l)
=> TSA = π × 8 × (8 + 17)
=> TSA = π × 8 × 25 = 200π cm²
Therefore The correct answer is 200π cm².
Alternate Method
Given:
Radius of the right circular cone (r) = 8 cm
Height of the cone (h) = 15 cm
Formula Used:
Slant height (l) = √(r² + h²)
Total Surface Area (TSA) = Curved Surface Area + Base Area = πrl + πr² = πr(l + r)
h = 15 cm
r = 8 cm
l = 17 cm
Right Circular Cone
Apex
Calculations:
=> First, calculate the slant height (l) of the cone.
=> l = √(8² + 15²)
=> l = √(64 + 225)
=> l = √289
=> l = 17 cm
=> Total Surface Area = πr(l + r)
=> TSA = π × 8 × (17 + 8)
=> TSA = π × 8 × 25
=> TSA = 200π cm²
Therefore The correct answer is 200π cm².
Additional Information
Volume of a Right Circular Cone
The volume represents the total space occupied by the cone inside its boundaries. Formula: V = (1÷3) × π × r² × h.
Curved Surface Area (CSA)
The curved surface area is the area of the lateral surface excluding the flat base. Formula: CSA = π × r × l, where l is the slant height.
Pythagorean Triplets
Common right-angled triangle side ratios like (3, 4, 5), (5, 12, 13), and (8, 15, 17) frequently appear in cone dimension problems to let you calculate the slant height directly without full calculations.

Q50. Answer: (a) Tajikistan

The correct answer is Tajikistan.

Key Points

• India shares its land boundaries with seven countries: These are Pakistan, China, Nepal, Bhutan, Bangladesh, Myanmar, and Afghanistan.

• Tajikistan does not share a direct land boundary with India. However, it is geographically close and separated by the Wakhan Corridor of Afghanistan.

• Myanmar shares a land boundary with India: It is located to the east of India and shares a boundary of approximately 1,643 km. States like Arunachal Pradesh, Nagaland, Manipur, and Mizoram border Myanmar.

• Bhutan shares a boundary with India: Located to the north-east, Bhutan shares a 699 km border with Indian states such as West Bengal, Assam, Arunachal Pradesh, and Sikkim.

• Pakistan shares a boundary with India: The India-Pakistan border is approximately 3,323 km long and runs through Indian states like Jammu & Kashmir, Punjab, Rajasthan, and Gujarat.

Additional Information

• Tajikistan:

• Tajikistan is a Central Asian country and does not share a direct boundary with India. It is separated from India by Afghanistan's Wakhan Corridor.

• Tajikistan's capital is Dushanbe, and it is known for its mountainous terrain and rich historical Silk Road connections.

• Myanmar:

• Myanmar is located to the east of India and shares its boundary with the northeastern Indian states.

• It plays a significant role in India's Act East Policy and is a key partner in regional connectivity projects like the India-Myanmar-Thailand Trilateral Highway.

• Bhutan:

• Bhutan is a landlocked country in South Asia, bordered by India to the south, east, and west, and China to the north.

• India and Bhutan share a close relationship with strong cultural, economic, and political ties. The India-Bhutan Friendship Treaty is a cornerstone of their relations.

• Pakistan:

• Pakistan shares a western border with India, established during the Partition of British India in 1947.

• The border includes highly sensitive areas such as the Line of Control (LoC) in Jammu and Kashmir.

• India's Land Borders:

• India has a total land border length of approximately 15,106.7 km.

• It shares borders with seven countries but has maritime boundaries with nations like Sri Lanka and Maldives.

Important Points

• Wakhan Corridor: This narrow strip of territory in Afghanistan separates Tajikistan from India. It is approximately 210 km long and connects Afghanistan to China.

• India-China Border: Known as the Line of Actual Control (LAC), it spans approximately 3,488 km and is the longest border India shares with any country.

• India-Bangladesh Border: It is the longest border India shares with any country, stretching about 4,096.7 km.

• Strategic Importance: India's borders with its neighboring countries are critical for defense, trade, and cultural exchanges.

Q51. Answer: (a) 240

Shortcut Trick

Let the Cost Price (CP) be 100 units.

List Price (MP) = 100 + 50% of 100 = 150 units.

Selling Price (SP) = 150 − 10% of 150 = 135 units.

Profit = SP − CP = 135 − 100 = 35 units.

Given 35 units = Rs. 56 => 1 unit = 56 ÷ 35 = Rs. 1.6

List Price = 150 units × 1.6 = Rs. 240.

Therefore The correct answer is Rs. 240.

Alternate Method

Given:

Markup percentage = 50%

Discount percentage = 10%

Profit earned = Rs. 56

Formula Used:

Selling Price (SP) = Marked Price (MP) × (100 − Discount%) ÷ 100

Profit = Selling Price (SP) − Cost Price (CP)

+50% Markup

−10% Discount

Profit = 35x

CP = 100x

MP = 150x

SP = 135x

Given Profit = Rs. 56

Calculations:

=> Let the Cost Price (CP) of the fan be 100x.

=> The shopkeeper marks up the price by 50% above the CP.

=> List Price (MP) = 100x + (50 ÷ 100) × 100x = 150x

=> A discount of 10% is offered on the List Price.

=> Selling Price (SP) = 150x × (100 − 10) ÷ 100

=> SP = 150x × 90 ÷ 100 = 135x

=> Profit = SP − CP = 135x − 100x = 35x

=> According to the question, Profit = Rs. 56

=> 35x = 56

=> x = 56 ÷ 35 = 1.6

=> List Price (MP) = 150x = 150 × 1.6 = 240

Therefore The correct answer is Rs. 240.

Additional Information

Effective Profit / Loss Percentage

When an item is marked up by a% and then a discount of b% is given, the overall profit or loss percentage can be directly calculated using the successive change formula: Net % = a − b − (a × b) ÷ 100. A positive result indicates Profit, while a negative result indicates Loss.

Marked Price and Discount Relationship

Discount is always calculated on the Marked Price (or List Price). The formula is: Selling Price = Marked Price × (100 − D%) ÷ 100.

CP and MP Direct Ratio Formula

The ratio between Cost Price and Marked Price can be established directly if Profit% and Discount% are known: CP ÷ MP = (100 − Discount%) ÷ (100 + Profit%).

Q52. Answer: (d) 3/4

Shortcut Trick

For inverse proportion, the product of the variables is constant: x1 × y1 = x2 × y2

=> 4 × 6 = x × 32

=> 24 = 32x

=> x = 24 ÷ 32

=> x = 3/4

Therefore The correct answer is 3/4.

Alternate Method

Given:

x is inversely proportional to y.

Initial values: x = 4 when y = 6

New value: y = 32

Inverse Proportion: x × y = Constant Initial State x1 = 4, y1 = 6 k = 4 × 6 = 24 Final State x2 = ?, y2 = 32 x2 × 32 = 24 k is same Result: x2 = 24 ÷ 32 = 3/4

Formula Used:

x prop. to 1/y => x × y = k (where k is a constant)

Calculations:

=> Substitute the initial values to find k:

=> k = 4 × 6 = 24

=> Now, substitute the new value of y to find x:

=> x × 32 = 24

=> x = 24 ÷ 32

=> x = 3/4

Therefore The correct answer is 3/4.

Additional Information

Direct Proportion

If two quantities are directly proportional, their ratio remains constant. Formula: x ÷ y = k or x1 ÷ y1 = x2 ÷ y2.

Inverse Proportion

If two quantities are inversely proportional, their product remains constant. Formula: x × y = k or x1y1 = x2y2.

Joint Proportion

When a quantity is directly proportional to some variables and inversely proportional to others, their combined relation is a joint variation. Example: x prop. to y/z => x × z ÷ y = k.

Q53. Answer: (c) 29 July

The correct answer is 29 July.

Key Points

• Global Tiger Day, also known as International Tiger Day, is celebrated annually on 29 July.

• This day was established in 2010 during the Saint Petersburg Tiger Summit in Russia to promote the protection and conservation of tigers worldwide.

• The summit highlighted the alarming decline in the population of tigers due to habitat loss, poaching, and human-wildlife conflict.

• The primary objective of Global Tiger Day is to raise awareness about tiger conservation and the need to preserve their natural habitats.

• Various events, campaigns, and initiatives are organized globally to educate people about the significance of tiger preservation and its role in maintaining ecological balance.

Additional Information

• Tiger Population Statistics:

• In the early 1900s, there were approximately 100,000 tigers in the wild; however, this number has drastically declined over time.

• As of the 2022 World Tiger Census, there are around 3,900 tigers left in the wild globally.

• India is home to more than 70% of the global tiger population, making it a crucial player in tiger conservation.

• Conservation Efforts:

• The Global Tiger Initiative (GTI) was launched in 2008 to address the challenges of tiger conservation.

• India's Project Tiger, initiated in 1973, is one of the most successful conservation programs globally, aiming to protect tiger habitats and reduce human-wildlife conflicts.

• The TX2 goal aims to double the number of wild tigers by 2022, the next Year of the Tiger in the Chinese zodiac.

• Role of Tigers in Ecosystem:

• Tigers are apex predators, playing a crucial role in maintaining the ecological balance by controlling prey populations.

• Their presence is an indicator of a healthy ecosystem, as they require large territories and abundant prey to survive.

• Threats to Tiger Survival:

• Habitat loss: Deforestation and urbanization have led to the fragmentation and destruction of tiger habitats.

• Poaching: Tigers are hunted for their skins, bones, and other body parts, which are used in traditional medicines and as luxury items.

• Human-wildlife conflict: Increasing encroachment into tiger habitats has led to conflicts between humans and tigers.

Important Points

• International Collaboration:

• Countries with tiger populations, such as India, Russia, Nepal, and Malaysia, collaborate on tiger conservation initiatives.

• Organizations like the WWF, TRAFFIC, and Global Tiger Forum play significant roles in tiger conservation efforts.

• Success Stories:

• India recorded a 33% increase in its tiger population from 2014 to 2018, according to the All India Tiger Estimation Report.

• Protected areas, such as Ranthambore National Park and Jim Corbett National Park, have contributed significantly to tiger conservation.

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• Global Tiger Day Activities:

• Governments, NGOs, and individuals organize events like awareness campaigns, workshops, and fundraising activities.

• Social media platforms are used to spread awareness about the importance of tiger conservation.

Q54. Answer: (c) They are neutral.

The correct answer is They are neutral..

Key Points

• Neutrons are subatomic particles found in the nucleus of an atom alongside protons.

• They have no electrical charge, which means they are neutral. Hence, the statement "They are neutral" is correct.

• The mass of a neutron is slightly higher than that of a proton but the difference is minimal. The statement "They are heavier than protons" is correct but not as relevant as their neutrality here.

• Neutrons do not carry a positive or negative charge, unlike protons (positive) and electrons (negative). The statements "They have positive charge" and "They have negative charge" are incorrect.

• Neutrons, along with protons, contribute significantly to the atomic mass of an element.

Additional Information

• Protons, Neutrons, and Electrons:

• Atoms are composed of three primary subatomic particles: protons, neutrons, and electrons.

• Protons carry a positive charge, electrons carry a negative charge, and neutrons are neutral.

• The number of protons defines the atomic number, while the sum of protons and neutrons gives the atomic mass.

• Discovery of Neutrons:

• Neutrons were discovered by James Chadwick in 1932.

• His experiments involved bombarding beryllium with alpha particles, resulting in the emission of neutral particles.

• Role of Neutrons:

• Neutrons help to stabilize the nucleus by reducing the electrostatic repulsion between protons.

• They play a crucial role in nuclear reactions, such as fission and fusion.

• Neutrons determine the isotopes of an element. For example, carbon-12 and carbon-14 are isotopes of carbon with different neutron numbers.

• Applications of Neutrons:

• Neutrons are used in neutron scattering experiments to study the structure of materials.

• They are essential in nuclear reactors for initiating and sustaining fission reactions.

• Neutron imaging is used in non-destructive testing for analyzing internal structures of objects.

• Important Facts:

• The mass of a neutron is approximately 1.675 × 10^(-27) kg, slightly more than a proton.

• Neutrons have a mean lifetime of about 14 minutes and 42 seconds outside the nucleus before decaying into a proton, an electron, and an antineutrino.

Important Points

• Atomic Stability:

• Neutrons play an essential role in maintaining the stability of the atomic nucleus.

• Without neutrons, the nucleus would be unstable due to the repulsion between positively charged protons.

• Isotopes and Nuclear Forces:

• Isotopes of an element differ in their number of neutrons, not protons or electrons. For instance, hydrogen has three isotopes: protium, deuterium, and tritium.

• Neutrons mediate the nuclear strong force, which binds protons and neutrons together in the nucleus.

Q55. Answer: (c) Neither conclusion I nor II follows

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

Conclusions:

(I): Some parks are gardens. - False (As their is no direct relation established between parks and gardens may be it is possible but not definite. Hence, it is false)

(II): Some meadows are gardens. - False (As their is no direct relation established between meadows and gardens may be it is possible but not definite. Hence, it is false)

Neither conclusion I nor II follows.

Hence, the correct answer is "Option 3"

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Q56. Answer: (d) 6

Given: Each of A, B, C, D, E, F, and G has an exam on a different day of a week starting from Monday and ending on Sunday of the same week.

• A has an exam on Tuesday.

• Exactly three people have exams between A and D.

• F's exam is immediately after G's exam.

• Only one person has an exam between B and F.

• C has an exam before both B and E.

• E does not have an exam on Saturday or Sunday.

The Final Arrangement is

Mon	C
Tue	A
Wed	E
Thu	G
Fri	F
Sat	D
Sun	B

Hence, the correct answer is "Option 4"

Q57. Answer: (a) India's first State-of-the-Art Animal Stem Cell Biobank and Laboratory

The correct answer is India's first State-of-the-Art Animal Stem Cell Biobank and Laboratory.

Key Points

• Union Minister Dr. Jitendra Singh inaugurated the first-of-its-kind Animal Stem Cell Biobank and Laboratory in Hyderabad in August 2025.

• This facility is a significant milestone in India's biotechnology and veterinary sciences, focusing on stem cell research related to animals.

• The laboratory aims to offer advanced solutions for animal healthcare, including regenerative therapies and treatments for various diseases.

• It is expected to enhance research in the domain of animal genetics, disease resistance, and breeding practices, contributing to the improvement of livestock quality and productivity.

• Hyderabad has emerged as a hub for biotechnology and scientific innovation, making it a suitable location for such a pioneering facility.

Additional Information

• Animal Stem Cell Research:

• Stem cells are cells with the ability to develop into various types of cells, making them crucial for regenerative medicine.

• Animal stem cell research focuses on treating injuries, diseases, and improving genetic traits in livestock and pets.

• It helps in the development of therapies for joint disorders, wound healing, and organ regeneration in animals.

• Hyderabad as a Biotechnology Hub:

• Hyderabad is often referred to as "Genome Valley" due to its prominence in the biotechnology sector.

• The city hosts several national research institutions, including the Centre for Cellular and Molecular Biology (CCMB) and the National Institute of Animal Biotechnology (NIAB).

• Hyderabad's infrastructure and resources make it a preferred location for advanced scientific research and innovation.

• Significance of Biobanks:

• A biobank is a repository that stores biological samples, such as DNA, tissues, and cells, for research purposes.

• Animal stem cell biobanks provide critical resources for studying genetic disorders, disease resistance, and enhancing breeding programs.

• These facilities are pivotal for achieving breakthroughs in veterinary medicine and livestock improvement.

• India's Focus on Veterinary Sciences:

• India's livestock sector is one of the largest in the world, contributing significantly to the agriculture economy.

• Innovations in veterinary sciences, including stem cell research, are crucial for ensuring the health and productivity of cattle, poultry, and other livestock.

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• Such advancements align with the government's initiatives to boost animal husbandry and sustainable agriculture.

Important Points

• Other Options Explained:

• India's first Veterinary Vaccine Research Institute: While vaccine research facilities exist in India, this specific institute is not the one inaugurated in August 2025.

• India's first Animal Cloning and Biotechnology Laboratory: While cloning research in animals is conducted in India, this was not the focus of the August 2025 inauguration.

• India's first Animal Genome Sequencing Center: Genome sequencing centers are integral to genetic research, but this facility was not inaugurated in August 2025.

Q58. Answer: (b) 14, 68

Logic: Second no. = [(First no. × 5) - 2]

Similarly,

Hence, the correct answer is "Option 2"

Q59. Answer: (d) Bubble Chart

The correct answer is Bubble Chart.

Key Points

• A Bubble Chart is an advanced variation of the Scatter Chart in MS Excel. It is the most suitable chart type for representing three variables, where:

• X-axis represents one variable (e.g., X in the question).

• Y-axis represents the second variable (e.g., Y in the question).

• Bubble size (marker size) represents the third variable (e.g., Z in the question).

• The Bubble Chart is useful when you want to visualize relationships between three different variables in a single graphical representation.

• Unlike a Scatter Chart, which only shows two variables (X and Y), the Bubble Chart incorporates a third dimension using the size of the bubble to denote the value of the third variable. Hence, the Bubble Chart is the most appropriate option in this case.

• The Bubble Chart is visually intuitive and aids in quick comparison of data points based on size, X, and Y values.

• Other chart types, such as Area Chart, Line Chart, and Scatter Chart, are not designed to handle three variables simultaneously. Hence, these options are incorrect.

• Therefore, the correct chart type to display X vs. Y and represent Z through marker size is the Bubble Chart.

Additional Information

• Bubble Chart Features:

• A Bubble Chart is a variation of a Scatter Chart where the data points are replaced with bubbles.

• The position of each bubble represents two variables (X and Y), while the size of the bubble represents the third variable (Z).

• The chart is useful in scenarios where data visualization requires understanding of relationships between three data sets.

• Example: It can be used in business to compare sales figures (X), profit margins (Y), and market share (Z).

• Comparison of Chart Types:

• Area Chart: Displays quantitative data over time but is not suitable for three variables. It focuses on visualizing trends. Example: Showing sales data over months.

• Line Chart: Represents data points connected by lines, ideal for illustrating continuous data trends. However, it cannot represent marker sizes. Example: Tracking stock prices over time.

• Scatter Chart: Plots data points for two variables (X and Y) but does not allow for a third variable such as marker size. Example: Comparing height and weight of individuals.

• Bubble Chart: Specifically designed for three variables, making it unique and appropriate for the current use case.

Important Points

• Steps to Create a Bubble Chart in MS Excel:

• Input your data into three columns, where each column represents a variable (e.g., X, Y, Z).

• Select the data range.

• Go to the Insert tab and choose Insert Scatter or Bubble Chart.

• Select Bubble Chart from the dropdown options.

• Customize the chart using formatting options like color, size scale, and legends.

• Applications of Bubble Charts:

• Used in data analysis to find patterns, trends, and relationships among three variables.

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• Commonly used in finance, marketing, and sales to represent market trends, customer segmentation, or financial performance.
• For example, analyzing revenue (X), profit margin (Y), and customer base size (Z) of various companies.

Q60. Answer: (c) 8/5

Shortcut Trick
Solve the inner fraction first: 1 ÷ (1 + 3/7) = 1 ÷ (10/7) = 7/10.
Convert all terms to a common denominator of 10: 3/2 = 15/10 and 3/5 = 6/10.
Evaluate the full expression: 15/10 + 7/10 − 6/10 = 16/10.
Simplify the final fraction to get 8/5.
Therefore The correct answer is 8/5.
Alternate Method
Given:
Expression: 3/2 + 1 / (1 + 3/7) − 3/5
Method Used:
Apply the BODMAS rule and simplify the terms step-by-step.
Calculations:
=> First, simplify the part inside the denominator of the middle term: 1 + 3/7
=> 1 + 3/7 = (7 + 3) / 7 = 10/7
=> Replace this in the original expression:
=> 3/2 + 1 / (10/7) − 3/5
=> The reciprocal of 10/7 is 7/10, so the expression becomes:
=> 3/2 + 7/10 − 3/5
=> Take the Least Common Multiple (LCM) of the denominators 2, 10, and 5, which is 10.
=> Convert each term to have the denominator 10:
=> (3 × 5) / (2 × 5) = 15/10
=> 7/10 remains 7/10
=> (3 × 2) / (5 × 2) = 6/10
=> Now substitute these equivalent fractions back into the expression:
=> 15/10 + 7/10 − 6/10
=> Combine the numerators over the common denominator:
=> (15 + 7 − 6) / 10
=> 16 / 10
=> Simplify by dividing the numerator and denominator by 2:
=> 8 / 5
Therefore The correct answer is 8/5.
Additional Information
BODMAS Rule
It determines the correct sequence of operations to solve mathematical expressions: Brackets, Orders, Division, Multiplication, Addition, and Subtraction. Inner brackets must be resolved first.
Reciprocal of a Fraction
Dividing 1 by any non-zero fraction x/y yields its reciprocal, which simply flips the numerator and denominator to y/x.
Adding and Subtracting Fractions
Fractions can only be directly added or subtracted if they share a common denominator. We compute the LCM of all denominators to make them equal before adding or subtracting the numerators.

Q61. Answer: (d) 20

Given: 60 + 15 ÷ 3 − 10 × 2 = ?
'+' and '−' are interchanged and '×' and '÷' are interchanged
New Equation : 60 − 15 × 3 + 10 ÷ 2 = ?
60 − 15 × 3 + 10 ÷ 2 = ?
60 − 15 × 3 + 5 = ?
60 + 5 − 45 = ?
20.

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Hence, the correct answer is "Option 4"

Q62. Answer: (d) Central Asia

The correct answer is Central Asia.

Key Points

• The Shakas (Scythians) were nomadic tribes who originated from Central Asia, specifically the region around the steppes of Central Asia near modern-day Kazakhstan and Uzbekistan.

• They were known for their warrior culture and were skilled in horseback riding, which made them a formidable force during their migrations and invasions.

• The Shakas migrated towards India after being displaced by the Xiongnu nomadic tribes from Central Asia during the second century BCE.

• These migrations led the Shakas to establish kingdoms in various parts of India, particularly in western and northwestern regions, such as Gujarat, Rajasthan, and the Malwa region.

• The Shakas significantly influenced Indian culture, politics, and art, leaving behind architectural and cultural legacies in regions they ruled.

Additional Information

• Central Asia:

• Central Asia is a vast region encompassing countries like Kazakhstan, Uzbekistan, Turkmenistan, Kyrgyzstan, and Tajikistan.

• Historically, the region has been home to various nomadic tribes such as the Scythians, Huns, and Mongols, known for their migrations and invasions.

• The geographical features, including the Eurasian steppes, played a crucial role in shaping the nomadic lifestyle and warrior culture.

• Impact of Shakas in India:

• The Shakas established their rule in western India and formed dynasties such as the Western Kshatrapas.

• They were instrumental in spreading Greco-Bactrian art and culture, influencing Indian architecture and sculpture.

• Their rule contributed to the fusion of Indian and Central Asian cultures, evident in art and inscriptions.

• Other regions in the options:

• North Africa: While North Africa is historically significant due to civilizations like Egypt and Carthage, it was not the region from which the Shakas originated.

• Western Europe: The Shakas did not migrate from Western Europe, as their origins are firmly rooted in Central Asia.

• Southeast Asia: The Shakas did not originate from Southeast Asia, which was historically influenced by Indian culture rather than vice versa.

Important Points

• Shakas' role in Indian history:

• The Shakas were contemporaries of other Central Asian tribes like the Kushans, who also migrated to India.

• They faced opposition from Indian rulers such as the Satavahanas and Gupta rulers during their reign.

• The Shakas contributed to India's coinage system, introducing coins with inscriptions and designs influenced by Central Asian styles.

• Notable rulers:

• One of the most famous Shaka rulers in India was Rudradaman I, known for his governance and achievements in Sanskrit literature.

• Rudradaman I issued the first known inscription in classical Sanskrit, the Junagadh rock inscription.

Q63. Answer: (d) Food Corporation of India

The correct answer is Food Corporation of India.

Key Points

• Food Corporation of India (FCI) was established under the Food Corporation Act, 1964 by the Government of India.

• The FCI was set up during the first phase of the Green Revolution in 1965 to ensure food security in India.

• The primary role of the FCI is to procure food grains at minimum support prices (MSP) set by the government, ensure adequate storage, and distribute them across the country through the Public Distribution System (PDS).

• It plays a crucial role in managing India's food grain buffer stock and ensuring the availability of food grains during emergencies.

• Headquartered in New Delhi, FCI operates through regional offices and a network of warehouses to manage the supply chain efficiently.

Additional Information

• Food Corporation of India (FCI):

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• It was set up on 14 January 1965, and its first operations started in Thanjavur district, Tamil Nadu.

• FCI procures food grains directly from farmers at the government-declared MSP, reducing exploitation by middlemen.

• It maintains a strategic food grain reserve to meet natural disasters, war emergencies, or other crises.

• The corporation also helps stabilize food grain prices in the market to benefit both producers and consumers.

• Green Revolution:

• The Green Revolution in India began in the 1960s to increase agricultural productivity through modern techniques and high-yielding variety seeds.

• It significantly increased the production of wheat and rice, ensuring food security in the country.

• Institutions like FCI were established to manage surplus production and ensure equitable distribution.

• Public Distribution System (PDS):

• PDS ensures the distribution of essential commodities such as rice, wheat, sugar, and kerosene to the vulnerable sections of society at subsidized rates.

• FCI plays a pivotal role in supplying grains to fair price shops across India.

• Other Relevant Bodies:

• Food and Agriculture Organization (FAO): An international organization under the United Nations, focusing on ending hunger and improving agricultural practices worldwide.

• Agricultural and Processed Food Products Export Development Authority (APEDA): Established in 1985, APEDA promotes the export of agricultural products from India.

• Food Stack Portal: Digital initiatives under government programs for managing food stock and supply chains.

Important Points

• Buffer Stock Policy: FCI ensures adequate buffer stock of grains for emergencies and stabilization of prices.

• Procurement Centers: FCI operates procurement centers in various states, ensuring farmers receive MSP directly.

• Warehousing: The corporation owns warehouses across India, ensuring safe storage of food grains.

• Role in Food Security: FCI ensures equitable distribution of food grains and supports the government's efforts to achieve zero hunger.

Q64. Answer: (a) Belt and Road Initiative

The correct answer is Belt and Road Initiative.

Key Points

• The Belt and Road Initiative (BRI), also known as One Belt One Road (OBOR), is a global infrastructure development strategy introduced by the Chinese government in 2013 under the leadership of President Xi Jinping.

• It aims to enhance global connectivity and cooperation on a transcontinental scale by developing infrastructure and boosting trade across Asia, Europe, and Africa.

• The BRI consists of two main components: the Silk Road Economic Belt, which links China to Europe through Central Asia, and the 21st Century Maritime Silk Road, which connects China to Southeast Asia, South Asia, Africa, and Europe via sea routes.

• The initiative covers a wide range of projects, including railways, highways, ports, energy pipelines, and digital infrastructure. It also focuses on improving trade facilitation and promoting cultural exchanges.

• As of recent updates, more than 140 countries and 30 international organizations have signed agreements to cooperate under the BRI framework, making it one of the most significant global initiatives of the 21st century.

Additional Information

• Silk Road Economic Belt:

• This component focuses on building an overland trade and infrastructure network connecting China, Central Asia, Russia, and Europe.

• It includes projects such as high-speed railways, economic corridors, and free trade zones to boost cross-border connectivity.

• 21st Century Maritime Silk Road:

• This initiative aims to develop maritime trade routes connecting China with Southeast Asia, Africa, and Europe.

• Key projects under this component include the development of ports and shipping lanes, such as the Gwadar Port in Pakistan and the Hambantota Port in Sri Lanka.

• Criticism and Challenges:

• The BRI has faced criticism for creating debt dependency in participating countries, as many projects are financed through Chinese loans.

• Environmental and social concerns have also been raised regarding some of the large-scale infrastructure projects.

• Comparison with Other Initiatives:

• The BRI is often compared with other global infrastructure initiatives, such as the Blue Dot Network led by the United States,

Japan, and Australia, which aims to promote high-quality infrastructure development.

• Unlike the BRI, the Blue Dot Network emphasizes transparency, sustainability, and adherence to international standards.

• Economic Impact:

• The BRI has significantly contributed to global infrastructure development, with an estimated investment of over $1 trillion since its inception.

• It has also enhanced China's influence in participating regions, strengthening its role in global trade and geopolitics.

Q65. Answer: (c) √(1085/66)

Shortcut Trick

The total surface area of a solid hemisphere is given by $3\pi r^2$.

Equating this to the given area directly:

$3 \times (22/7) \times r^2 = 155$

$r^2 = (155 \times 7) \div 66 = 1085/66$

$r = \sqrt{(1085/66)}$ cm

Therefore The correct answer is $\sqrt{(1085/66)}$ cm.

Alternate Method

Given:

Total surface area of solid hemisphere = 155 cm^2

$\pi = 22/7$

Formula Used:

Total Surface Area (TSA) of a solid hemisphere = $3\pi r^2$

r

Flat Area = πr^2

Curved Area = $2\pi r^2$

Total Surface Area = 155 cm^2

Calculations:

=> $3 \times \pi \times r^2 = 155$

=> $3 \times (22/7) \times r^2 = 155$

=> $(66/7) \times r^2 = 155$

=> $r^2 = (155 \times 7) \div 66$

=> $r^2 = 1085/66$

=> $r = \sqrt{(1085/66)}$ cm

Therefore The correct answer is $\sqrt{(1085/66)}$ cm.

Additional Information

Curved Surface Area of a Hemisphere

The curved surface area includes only the bowl-shaped part, excluding the flat base. Formula: CSA = $2\pi r^2$.

Volume of a Hemisphere

The volume of a solid hemisphere is exactly half the volume of a full sphere. Formula: Volume = $(2/3)\pi r^3$.

Total Surface Area of a Sphere

A complete sphere has only a curved surface with no flat edges. Formula: TSA = $4\pi r^2$.

Q66. Answer: (d) 9

Shortcut Trick

The numbers 6, 8, 10, and 12 are in an Arithmetic Progression (A.P.) with a common difference of 2.

For any A.P., the average is simply the average of its first and last terms.

Average = (First term + Last term) ÷ 2

Average = (6 + 12) ÷ 2 = 18 ÷ 2 = 9

Therefore The correct answer is 9.

Alternate Method

Given:

The numbers are 6, 8, 10, and 12.

Formula Used:

Average = Sum of all observations ÷ Total number of observations

6

8

10

12

Avg = 9

Values vs Average

Calculation:

=> Sum of the numbers = 6 + 8 + 10 + 12

=> Sum = 36

=> Total number of observations = 4

=> Average = 36 ÷ 4

=> Average = 9

Therefore The correct answer is 9.

Additional Information

Average of an Arithmetic Progression

If terms are in an A.P., the average is equal to the middle value (or the average of the two middle values), which is identical to the average of the first and last terms: (a + l) ÷ 2.

Average of First 'n' Natural Numbers

The average of the first n consecutive natural numbers is given by the formula (n + 1) ÷ 2.

Average of Consecutive Even Numbers

The average of the first n consecutive even numbers starting from 2 is simply (n + 1).

Q67. Answer: (d) -4

Shortcut Trick

Evaluate powers and roots directly according to BODMAS:

=> 16 + 6 − (5 × 3) − 11

=> 22 − 15 − 11

=> 22 − 26 = −4

Therefore The correct answer is −4.

Alternate Method

Given:

$4^2 + \sqrt{6^2} - 5\sqrt{9} - 11$

Concept Used:

BODMAS Rule (Brackets, Orders, Division, Multiplication, Addition, Subtraction).

Calculations:

=> First, evaluate the exponent and the square roots:

=> $4^2 = 16$

=> $\sqrt{6^2} = 6$

=> $\sqrt{9} = 3$

=> Substitute these simplified values back into the equation:

=> 16 + 6 − 5 × 3 − 11

=> Perform multiplication:

=> 16 + 6 − 15 − 11

=> Group positive and negative terms:

=> (16 + 6) − (15 + 11)

=> 22 − 26

=> −4

Therefore The correct answer is −4.

Additional Information

BODMAS Rule

Always simplify Orders (powers and square roots) before performing multiplication, addition, or subtraction.

Square Roots of Perfect Squares

The square root and square of a number cancel out for positive values, meaning $\sqrt{x^2} = x$.

Addition of Negative Numbers

When subtracting multiple numbers, they can be added together first as negative values (e.g., −15 − 11 = −26).

Q68. Answer: (b) 36 : 7

Shortcut Trick

Cost Price (CP) of mixture = Selling Price ÷ (1 + Profit%) = 80 ÷ 1.6 = Rs. 50/kg

Using the Alligation method to find the ratio of Vegetable Oil to Pure Ghee:

Ratio = (CP of Ghee − CP of Mixture) : (CP of Mixture − CP of Veg Oil)

Ratio = (86 − 50) : (50 − 43) = 36 : 7

Therefore The correct answer is 36 : 7.

Alternate Method

Given:

Cost Price (CP) of Pure Ghee = Rs. 86/kg

Cost Price (CP) of Vegetable Oil = Rs. 43/kg

Selling Price (SP) of the mixture = Rs. 80/kg

Profit on selling the mixture = 60%

Formula Used:

CP = (SP × 100) ÷ (100 + Profit%)

Quantity of Cheaper : Quantity of Dearer = (Dearer CP − Mean Price) : (Mean Price − Cheaper CP)

Veg Oil

Rs. 43

Pure Ghee

Rs. 86

Mixture

Rs. 50

(86 − 50)

36

(50 − 43)

7

Ratio = 36 : 7

Calculations:

=> Mean Cost Price (CP) of the mixture = (80 × 100) ÷ (100 + 60)

=> CP of mixture = 8000 ÷ 160 = Rs. 50/kg

=> Let the ratio in which Vegetable Oil and Pure Ghee are mixed be x : y

=> By applying the Alligation rule, Ratio (x : y) = (86 − 50) : (50 − 43)

=> Ratio = 36 : 7

Therefore The correct answer is 36 : 7.

Additional Information

Rule of Alligation

It is a method used to find the ratio in which two or more ingredients at a given price must be mixed to produce a mixture of a desired price. The formula is (Quantity of cheaper) ÷ (Quantity of dearer) = (Price of dearer − Mean price) ÷ (Mean price − Price of cheaper).

Cost Price from Selling Price

When the profit percentage is given, Cost Price (CP) = [100 ÷ (100 + Profit%)] × SP. The rule of Alligation must only be applied to identically structured units, so always convert the Selling Price into Cost Price before applying the cross difference.

Multiple Mixtures / Replacement

When a process of removing pure liquid and replacing it with another is repeated 'n' times, the remaining quantity = Original Quantity × $[1 − (\text{Replaced Quantity} \div \text{Total Volume})]^n$.

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Q69. Answer: (d) Thermal

The correct answer is Thermal.

Key Points

• In India, the primary source of energy is derived from thermal power plants, which utilize fossil fuels such as coal, natural gas, and oil.

• As of May 2023, thermal power contributes approximately 70% of the total electricity generation in India, making it the dominant energy source.

• Thermal power plants are spread across the country, with major installations in states like Maharashtra, Tamil Nadu, Uttar Pradesh, and Chhattisgarh.

• Coal is the most extensively used fuel in India's thermal power plants, with India being the second-largest producer and consumer of coal globally.

• Despite its environmental challenges, thermal power remains crucial for meeting India's growing energy demand due to its relatively lower operational costs and large-scale infrastructure.

Additional Information

• Solar Power:

• Solar power is a renewable energy source, growing rapidly in India due to initiatives like the National Solar Mission (2010).

• India ranks among the top five countries in terms of solar capacity, with a target of achieving 280 GW by 2030.

• Despite its growth, solar power accounts for around 5-7% of the total energy mix as of 2023.

• Hydroelectric Power:

• India is the fifth-largest producer of hydroelectric power globally, with significant contributions from states like Uttarakhand, Himachal Pradesh, and Arunachal Pradesh.

• Hydropower accounts for approximately 12-15% of the total electricity generation in India.

• It is considered environmentally friendly but is limited by geographical and seasonal factors.

• Nuclear Power:

• Nuclear power contributes around 2-3% of India's total electricity generation.

• India has 22 operational nuclear reactors, with major plants located in Kudankulam (Tamil Nadu), Tarapur (Maharashtra), and Kakrapar (Gujarat).

• While it is a clean energy source, its expansion is constrained by high costs and concerns over safety.

• Important Developments in Energy Policy:

• The Electricity Act, 2003 was a key legislation aimed at liberalizing the energy sector and promoting renewable energy.

• India aims to achieve net-zero carbon emissions by 2070, as announced at the UN Climate Change Conference (COP26).

• The National Energy Policy, formulated by NITI Aayog, focuses on diversifying the energy mix and reducing dependence on fossil fuels.

Important Points

• Environmental Concerns:

• Thermal power plants are a major source of greenhouse gas emissions, contributing to global warming and air pollution.

• Efforts are underway to adopt cleaner technologies, such as supercritical and ultra-supercritical boilers, to reduce emissions.

• Government Initiatives:

• The Perform, Achieve, and Trade (PAT) scheme under the National Mission for Enhanced Energy Efficiency seeks to improve energy efficiency in thermal power plants.

• India is investing in carbon capture and storage (CCS) technologies to mitigate emissions from coal-based plants.

Q70. Answer: (d) Rs. 6,000

Shortcut Trick

Effective rate % for 3 years at 8% = 8 × 3 = 24%

Effective rate % for 3 years at 6% = 6 × 3 = 18%

Difference in effective rate % = 24% − 18% = 6%

According to the given condition, 6% of Principal = Rs. 360

=> Principal (100%) = (360 ÷ 6) × 100 = Rs. 6,000

Therefore The correct answer is Rs. 6,000.

Alternate Method

Given:

Rate 1 (R1) = 8% per annum

Rate 2 (R2) = 6% per annum

Time (T) = 3 years

Difference in Simple Interest = Rs. 360

Formula Used:

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

8% × 3 yrs = 24% of P

6% × 3 yrs = 18% of P

Diff = 6%

(Rs. 360)

6% of P = Rs. 360 → P = Rs. 6000

Calculations:

=> SI1 = (P × 8 × 3) ÷ 100 = 24P ÷ 100

=> SI2 = (P × 6 × 3) ÷ 100 = 18P ÷ 100

=> SI1 − SI2 = 360

=> (24P ÷ 100) − (18P ÷ 100) = 360

=> 6P ÷ 100 = 360

=> P = (360 × 100) ÷ 6

=> P = 60 × 100 = 6000

Therefore The correct answer is Rs. 6,000.

Additional Information

Simple Interest (SI)

It is calculated only on the principal amount for the entire period. Formula: SI = (P × R × T) ÷ 100.

Effective Interest Rate

For simple interest, the effective percentage of principal over T years is simply R × T%. This makes comparisons between different rates directly proportional and much faster to calculate.

Difference Between SI and CI

For the first year (compounded annually), SI and CI are strictly equal. From the second year onwards, CI is always greater than SI because interest is continuously earned on the accumulated interest.

Q71. Answer: (c) 2048

Shortcut Trick

Convert all terms to base 2 using laws of exponents: (a^m)^n = a^(mn).

Numerator = $(2^2)^3$ × (2²)^4 × 2^4 = 2^6 × 2^8 × 2^4 = 2^(18)

Denominator = $(2^2)^2$ × 2^3 = 2^4 × 2^3 = 2^7

Expression = 2^(18) ÷ 2^7 = 2^{11} = 2048

Therefore The correct answer is 2048.

Alternate Method

Given:

Expression: (4^3 × 4^4 × 2^4) ÷ (4^2 × 8)

Formula Used:

a^m × a^n = a^(m+n)

a^m ÷ a^n = a^(m−n)

Calculation:

=> First, combine the base 4 terms in the numerator.

=> Numerator = 4^(3+4) × 2^4 = 4^7 × 2^4

=> Now, divide the base 4 terms: 4^7 ÷ 4^2 = 4^5

=> Expression reduces to: (4^5 × 2^4) ÷ 8

=> Convert remaining terms to base 2: 4 = 2^2 and 8 = 2^3

=> 4^5 = (2²)^5 = 2^(10)

=> Expression = (2^(10) × 2^4) ÷ 2^3

=> 2^(14) ÷ 2^3 = 2^(14−3) = 2^{11}

=> 2^{11} = 2048

Therefore The correct answer is 2048.

Additional Information

Product Rule of Exponents

When multiplying terms with the same base, add their exponents: x^m × x^n = x^(m+n)

Quotient Rule of Exponents

When dividing terms with the same base, subtract the exponent of the denominator from the numerator: x^m ÷ x^n = x^(m−n)

Power of a Power Rule

To raise a power to another power, multiply the exponents: (x^m)^n = x^(mn)

Important Powers of 2

Memorizing powers of 2 up to 2^(10) = 1024 and 2^{11} = 2048 is highly useful for fast calculations in competitive exams.

Q72. Answer: (b) 2 km

• Ajit starts from point A and drives 8 km towards east.
• He then takes a right turn and drives 17 km.
• He takes a final left turn and drives 10 km and stops at point B.
• Vishal starts from point P, which is 13 km east of point A, and drives 6 km towards east.
• He then takes a right turn and drives 17 km.
• He takes a final left turn and drives 1 km and stops at point Q.

The Final Diagram,

Hence, the correct answer is "Option 2"

Q73. Answer: (c) 417/28 km/hr

Shortcut Trick

Average Speed = Total Distance ÷ Total Time

Total Distance = (13 × 3) + (15 × 6) = 39 + 90 = 129 km.

Total Time = 13 + 15 = 28 hours.

Average Speed = 129 ÷ 28 = 4^(17)/28 km/hr.

Therefore The correct answer is 4^(17)/28 km/hr.

Alternate Method

Given:

Speed for first part (S1) = 3 km/hr

Time for first part (T1) = 13 hours

Speed for second part (S2) = 6 km/hr

Time for second part (T2) = 15 hours

Formula Used:

Distance = Speed × Time

Average Speed = Total Distance ÷ Total Time

13 hrs @ 3 km/hr

39 km

15 hrs @ 6 km/hr

90 km

Total Distance = 39 + 90 = 129 km

Average Speed = 129 ÷ 28 = 4 17/28 km/hr

Calculations:

=> Distance for the first part (D1) = 3 × 13 = 39 km

=> Distance for the second part (D2) = 6 × 15 = 90 km

=> Total Distance = 39 + 90 = 129 km

=> Total Time = 13 + 15 = 28 hours

=> Average Speed = 129 ÷ 28

=> 129 ÷ 28 = 4 with a remainder of 17

=> Average Speed = 4^(17)/28 km/hr

Therefore The correct answer is 4^(17)/28 km/hr.

Additional Information

Average Speed for Equal Distances

If a person covers two equal distances at speeds S1 and S2, then Average Speed = (2 × S1 × S2) ÷ (S1 + S2).

Average Speed for Equal Time

If a person travels at speeds S1 and S2 for equal time intervals, then Average Speed = (S1 + S2) ÷ 2.

Relative Speed

When two objects move in opposite directions, their relative speed is S1 + S2. When moving in the same direction, it is S1 − S2.

Q74. Answer: (c) FROM - MRFO - ROFM

The logic follows here,

Similarly,

Hence, the correct answer is "Option 3"

Q75. Answer: (d) 13 May 1952

The correct answer is May 13 1952.

Key Points

• The Rajya Sabha, also known as the Council of States, is the upper house of the Indian Parliament. Its first session was held on May 13, 1952.

• The Rajya Sabha is a permanent body and cannot be dissolved, but one-third of its members retire every two years.

• The first session of the Rajya Sabha commenced after the first general elections conducted in independent India (1951–1952).

• The Rajya Sabha's inaugural proceedings were presided over by Dr. S. Radhakrishnan, who was the first Vice-President of India and also the ex-officio Chairman of the Rajya Sabha.

• The Rajya Sabha represents the states and union territories of India and works alongside the Lok Sabha in legislative matters.

Additional Information

• Structure of Rajya Sabha:

• The Rajya Sabha consists of a maximum of 250 members, of which 12 are nominated by the President of India for their expertise in fields such as literature, science, art, and social services.

• The remaining members are elected by the state legislatures and union territories using a proportional representation system.

• Functions of Rajya Sabha:

• The Rajya Sabha shares legislative powers with the Lok Sabha, except in matters related to money bills, where the Lok Sabha has greater authority.

• It plays a crucial role in reviewing, amending, and passing laws, and represents the interests of states and union territories at the national level.

• Important Facts:

• The Rajya Sabha was established under Article 80 of the Constitution of India, which mandates a bicameral legislature.

• The first elections to the Rajya Sabha were held in April 1952, and members were sworn in during its inaugural session in May 1952.

• Chairman and Vice-Chairman:

• The Vice-President of India serves as the ex-officio Chairman of the Rajya Sabha.

• The Deputy Chairman is elected from among the members of the Rajya Sabha to preside over the proceedings in the absence of the Chairman.

Important Points

• Historical Context:

• The Rajya Sabha's establishment marked the beginning of the bicameral parliamentary system in India, inspired by the parliamentary structure of the United Kingdom.

• The inaugural session in 1952 laid the foundation for India's legislative processes and federal governance.

• Legislative Role:

• The Rajya Sabha has special powers to approve laws related to national emergencies, as per Article 249 of the Constitution.

• It acts as a balancing force between the states and the central government, ensuring equitable representation for all regions of India.

Q76. Answer: (a) SAI

The logic followed here is:

Hence, the correct answer is "Option 1"

Q77. Answer: (c) 10,609

Shortcut Trick

Rate per half-year = 6% ÷ 2 = 3% and Time = 2 half-years.

Effective CI rate for 2 periods = x + y + (x × y)/100

=> Effective Rate = 3 + 3 + (3 × 3)/100 = 6.09%

Amount % = 100% + 6.09% = 106.09%

Total Amount = 106.09% of 10000 = Rs. 10,609

Therefore The correct answer is Rs. 10,609.

Alternate Method

Given:

Principal (P) = Rs. 10,000

Rate (R) = 6% per annum

Time (T) = 1 year

Formula Used:

Amount (A) = $P \times (1 + r/100)^n$

Where r = Rate per compounding period, n = Total number of periods.

Rs. 10,000

Principal

Rs. 10,300

After 6 Months

Rs. 10,609

After 1 Year

• 3%

• 3%

Amount after 1 year compounded half-yearly

Calculations:

=> Rate per half-year (r) = 6% ÷ 2 = 3%

=> Number of half-years (n) = 1 × 2 = 2

=> $A = 10000 \times (1 + 3/100)^2$

=> $A = 10000 \times (103/100) \times (103/100)$

=> A = 10000 × 1.0609

=> A = 10609

Therefore The correct answer is Rs. 10,609.

Additional Information

Half-Yearly Compounding

When interest is compounded half-yearly, the annual rate is halved (R/2) and the time period is doubled (2T).

Quarterly Compounding

When interest is compounded quarterly, the rate is divided by 4 (R/4) and the time period is multiplied by 4 (4T).

Effective Rate of Interest

The equivalent compound interest rate for 2 consecutive periods at R% is given by the formula: $2R + (R^2 \div 100)\%$.

Q78. Answer: (b) Canada

The correct answer is Canada.

Key Points

• Inuvik is located in the Northwest Territories of Canada, serving as a gateway to the Western Arctic.

• The port provides access to the Arctic Ocean and is a vital hub for transportation, trade, and resource exploration in the region.

• Inuvik's port plays a significant role in facilitating logistical operations for industries such as oil and gas exploration and development.

• The region is known for its extreme weather conditions, with the port adapted to handle operations in the challenging Arctic environment.

• Inuvik is strategically located near the Mackenzie River, one of Canada's longest rivers, which serves as a major transportation route.

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Additional Information

• Geography of Inuvik:

• Inuvik is situated at a latitude of approximately 68°N, making it one of the northernmost towns in Canada.

• The town is part of the Mackenzie Delta, a vast area of wetlands and waterways that connects to the Arctic Ocean.

• The region experiences polar nights in winter and midnight sun during summer, characteristic of its Arctic location.

• Role in Arctic Exploration:

• Inuvik is a key location for oil and gas exploration in the Arctic, with significant reserves present in the region.

• The port facilitates the movement of equipment, personnel, and resources required for extraction activities.

• It also supports scientific research in the Arctic, providing a base for studies on climate change, wildlife, and ecosystems.

• Transportation and Accessibility:

• Inuvik is connected to other parts of Canada via the Dempster Highway, which is a vital road network linking the town to southern regions.

• The port supports marine transportation, especially during the ice-free months, facilitating trade and supply chains.

• Aviation is also crucial in the region, with Inuvik's airport providing access to remote Arctic communities.

• Canada's Arctic Strategy:

• The Canadian government prioritizes the development of Arctic infrastructure, including ports, to ensure sustainable economic growth and strengthen sovereignty.

• Investments are being made to enhance the capabilities of ports like Inuvik to support the global shipping industry as Arctic routes become more accessible due to melting sea ice.

Important Points

• Economic Importance: Inuvik's port contributes to the local economy by providing jobs in sectors like logistics, transportation, and resource management.

• Environmental Concerns: Arctic development is accompanied by efforts to minimize the environmental impact, with initiatives focused on sustainable practices.

• Global Trade: As Arctic routes become more navigable, ports like Inuvik are expected to play a crucial role in facilitating international trade.

• Tourism: Inuvik attracts visitors interested in experiencing the unique Arctic environment, boosting the tourism industry.

Q79. Answer: (a) DH−DK

The logic follows here,

Hence, the correct answer is "Option 1"

Q80. Answer: (d) 3780

The logic follows here,

Hence, the correct answer is "Option 4"

Q81. Answer: (c) To organise village panchayat

The correct answer is To organise village panchayat.

Key Points

• Directive Principles of State Policy (DPSP) are enshrined in Part IV of the Indian Constitution (Articles 36 to 51). They aim to create social and economic conditions under which citizens can lead a good life.

• The principle to "organise village panchayats" is mentioned in Article 40 of the Indian Constitution and is inspired by Gandhian principles. Gandhiji strongly advocated for decentralized governance through Panchayati Raj institutions.

• The directive to "organise village panchayats and endow them with powers and authority to function as units of self-government" reflects the idea of Gram Swaraj (self-rule), a concept central to Gandhian philosophy.

• Other Gandhian principles found in the DPSP include the promotion of cottage industries, prohibition of intoxicating drinks, and prevention of slaughter of cows and calves, all of which align with his vision for a self-sufficient rural economy.

• Options like "to secure the right to adequate means of livelihood" and "to secure equal pay for men and women" are based on socio-economic principles rather than Gandhian values. Similarly, "to promote international peace" aligns with the ideals of international cooperation but is not specifically rooted in Gandhian ideology.

Additional Information

• Article 40 and Panchayati Raj:

• Article 40 directs the state to take steps to organise village panchayats and provide them with adequate powers to function as self-governing institutions.

• The 73rd Constitutional Amendment Act of 1992 gave constitutional status to Panchayati Raj institutions, implementing the

Gandhian vision of decentralised governance.

• Panchayati Raj now forms a three-tier system in rural India, consisting of the Gram Panchayat (village level), Panchayat Samiti (block level), and Zila Parishad (district level).

• Gandhian Principles in DPSP:

• Promotion of cottage industries: Article 43 suggests the state should promote cottage industries in rural areas to enhance self-reliance.

• Prohibition of intoxicating substances: Article 47 directs the state to work towards the prohibition of consumption of intoxicating drinks and drugs harmful to health.

• Prevention of slaughter of cows: Article 48 calls for the preservation of cattle wealth, including cows and calves, reflecting Gandhiji's emphasis on protecting livestock.

• Classification of DPSPs:

• Socialistic Principles: These aim to promote social and economic justice, for example, ensuring equal pay for equal work (Article 39).

• Gandhian Principles: Principles inspired by Mahatma Gandhi's philosophy, such as village panchayats and promotion of cottage industries.

• Liberal-Intellectual Principles: These include provisions for protecting the environment, promoting international peace, and ensuring uniform civil codes.

• Important Acts related to Panchayati Raj:

• Balwant Rai Mehta Committee (1957): Recommended the establishment of the Panchayati Raj system.

• 73rd Amendment Act (1992): Provided constitutional status to Panchayati Raj institutions, making them a part of the governance structure.

• Eleventh Schedule: Introduced through the 73rd Amendment, it lists 29 functional items assigned to Panchayats.

Q82. Answer: (a) 12865

Shortcut Trick

Check for direct multiples among the given numbers.

Since 155 is a multiple of 5 (155 = 5 × 31), the LCM of 5 and 155 is directly 155.

Now, we only need to find the LCM of 155 and 83.

Since 83 is a prime number and does not divide 155, their LCM is their direct product.

LCM = 155 × 83 = 12865

Therefore The correct answer is 12865.

Alternate Method

Given:

The numbers are 5, 155 and 83.

Formula Used:

The LCM of a given set of numbers is the product of the highest powers of all prime factors present in their factorizations.

Calculations:

=> Prime factorization of 5 = 5^1

=> Prime factorization of 155 = $5^1 \times 31^1$

=> Prime factorization of 83 = 83^1 (since 83 is prime)

=> LCM = highest powers of all prime factors

=> LCM = $5^1 \times 31^1 \times 83^1$

=> LCM = 155 × 83

=> LCM = 12865

Therefore The correct answer is 12865.

Additional Information

LCM of Co-prime Numbers

If two numbers are co-prime (having no common factor other than 1), their LCM is simply the direct product of the two numbers.

Relation between HCF and LCM

For any two numbers a and b, the product of the numbers is equal to the product of their HCF and LCM (a × b = HCF × LCM).

Prime Factorization Method

To quickly find the LCM of multiple numbers, express each number as a product of prime factors and multiply the highest power of each prime factor observed.

Q83. Answer: (b) Only I follows

Immediate recruitment and training of teachers should be carried out in rural areas.

• The statement clearly identifies “lack of trained teachers” as one of the main causes of poor performance.

• Therefore, recruiting and training teachers directly addresses the problem.

Course of Action I logically follows.

All students failing the tests should be expelled from schools to maintain quality.

• The students are failing not because of lack of effort, but due to poor teaching and infrastructure—factors beyond their control.

• Expelling them would worsen the situation and is not a logical solution to the root cause.

Course of Action II does not follow.

Hence, the correct answer is "Option 2"

Q84. Answer: (a) dz

The logic follows here,

Code for tiger is coded as 'dz'.

Hence, the correct answer is "Option 1"

Q85. Answer: (d) Self-powered chemical sensors

The correct answer is Self-powered chemical sensors.

Key Points

• In August 2025, researchers demonstrated a groundbreaking application of genetically engineered Escherichia coli (E. coli) bacteria as self-powered chemical sensors.

• These sensors are capable of directly interfacing with electronics, marking a significant advancement in the field of biotechnology and bio-electronics.

• E. coli bacteria were genetically modified to produce electrical signals in response to specific chemicals, enabling their use as precise and efficient sensors.

• Such sensors are termed self-powered because they utilize biological processes within the bacteria to generate energy for their operation, eliminating the need for external power sources.

• This innovation is expected to have applications in areas like environmental monitoring, medical diagnostics, and industrial process control.

Additional Information

• Genetically Engineered E. coli:

• E. coli is a widely used organism in biotechnology due to its simple genetic structure and ability to be genetically modified.

• Researchers have engineered E. coli to produce electrical signals by incorporating specific genes that react to chemical stimuli.

• This ability makes E. coli a cost-effective and versatile tool for developing biosensors.

• Bio-electronics Interface:

• Bio-electronics refers to the integration of biological systems with electronic components.

• Self-powered sensors like those developed using E. coli represent a significant step in bio-electronics, as they directly convert biological signals into electronic ones.

• This technology can pave the way for devices capable of real-time monitoring in healthcare and environmental sciences.

• Applications of Self-powered Chemical Sensors:

• These sensors can be used for detecting pollutants and toxins in water and air, contributing to environmental conservation.

• In healthcare, they can monitor specific biomarkers for early diagnosis of diseases.

• Industries can employ these sensors for quality control and process optimization.

• Comparison with Other Options:

• Wireless energy storage units: These are devices designed to store energy wirelessly, typically through electromagnetic induction or other technologies. While innovative, they are unrelated to genetically modified bacteria.

• Bio-fueled medical implants: These utilize biological materials or processes to generate energy for medical devices. However, this concept does not directly relate to self-powered sensing.

• Microbial fuel cells for electricity generation: Microbial fuel cells use bacteria to convert organic materials into electricity. Though similar in utilizing bacteria, their primary function is energy generation, not sensing.

Important Points

• Historical Development: The integration of biological systems with electronics has been a focus of research since the early 2000s, with advancements in genetic engineering playing a key role.

• Environmental Impact: Self-powered sensors can significantly reduce reliance on traditional chemical testing methods, which

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often involve hazardous substances.

• Future Prospects: The development of genetically engineered bacteria for sensing applications opens avenues for creating smart, sustainable, and efficient monitoring systems across various domains.

Q86. Answer: (d) 5846/63

Shortcut Trick

In cases of dishonest dealers promising to sell at cost price but using false weights:

Profit % = (Error ÷ Actual Value Given) × 100

=> Profit % = (37 ÷ 63) × 100

=> Profit % = 3700 ÷ 63 = 58 ^(46)⁄63%

Therefore The correct answer is 58 ^(46)⁄63%.

Alternate Method

Given:

The shopkeeper promises to sell his goods at cost price.

The weight used is 37% less than the marked weight.

Formula Used:

Profit % = (Profit ÷ Cost Price) × 100

Claimed Weight = 100 units (SP = Rs. 100)

Actual Given = 63 units (CP = Rs. 63)

Profit = 37 units

Calculations:

=> Let the cost price of 100 units of goods be Rs. 100.

=> Selling Price (SP) of 100 units = Rs. 100 (since sold at claimed cost price).

=> Weight actually given by the dealer = 100 − 37 = 63 units.

=> Actual Cost Price (CP) incurred for the 63 units given = Rs. 63.

=> The shopkeeper receives Rs. 100 for goods that cost him Rs. 63.

=> Profit earned = SP − CP = 100 − 63 = Rs. 37.

=> Profit % = (Profit ÷ CP) × 100

=> Profit % = (37 ÷ 63) × 100

=> Profit % = 3700 ÷ 63 = 58 ^(46)⁄63%

Therefore The correct answer is 58 ^(46)⁄63%.

Additional Information

Dishonest Dealer Profit Formula

When a dealer claims to sell at Cost Price but uses a false weight, Profit % = [Error ÷ (True Weight − Error)] × 100.

Basic Profit and Loss

Profit is always calculated on the true Cost Price (CP) incurred by the seller. Profit = Selling Price (SP) − Cost Price (CP).

Q87. Answer: (c) Maharashtra

The correct answer is Maharashtra.

Key Points

• Maharashtra became the first Indian state to launch a Clean Air Plan, a state-level strategy aimed at reducing air pollution through a scientific and airshed-based approach.

• This strategy focuses on understanding air pollution patterns and sources to implement targeted measures effectively.

• The plan emphasizes inter-agency collaboration and the use of scientific data to curb pollution and improve air quality across urban and rural regions.

• Maharashtra's Clean Air Plan aligns with India's broader environmental goals and commitments under global frameworks like the Paris Agreement.

• The initiative includes measures such as promoting clean energy, regulating industrial emissions, and enhancing monitoring systems for air quality.

Additional Information

• Airshed-based Approach:

• An airshed refers to a geographic area where air pollutants are likely to mix and interact, affecting regional air quality.

• Maharashtra’s strategy involves identifying airsheds to manage pollution comprehensively, focusing on both urban and rural

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areas.

• This scientific approach enables targeted interventions for sources contributing to pollution within specific areas.

• Air Pollution in India:

• India is one of the most polluted countries globally, with cities like Delhi, Mumbai, and Kolkata often listed among the most polluted cities.

• Sources of air pollution include vehicular emissions, industrial activities, burning of biomass, and construction dust.

• According to the World Health Organization (WHO), air pollution is a leading risk factor for health issues such as respiratory diseases and cardiovascular conditions.

• Government Initiatives:

• Programs such as the National Clean Air Programme (NCAP) aim to reduce air pollution across 122 cities by 20-30% by 2024.

• State-level initiatives like Maharashtra's Clean Air Plan complement national efforts, focusing on local challenges and solutions.

• The Perform, Achieve, and Trade (PAT) scheme aims to improve energy efficiency, indirectly reducing emissions.

• Importance of Clean Air Strategies:

• Improving air quality leads to better public health outcomes, reducing healthcare costs and productivity losses.

• Cleaner air contributes to sustainable development goals such as climate action and sustainable cities.

• Scientific, data-driven approaches enhance the effectiveness of pollution control measures.

Important Points

• National Clean Air Programme (NCAP):

• Launched in January 2019, NCAP is a flagship program of the Ministry of Environment, Forest, and Climate Change (MoEFCC).

• It aims to create a time-bound plan to combat air pollution, with a focus on reducing particulate matter (PM10 and PM2.5) levels.

• Air Quality Index (AQI):

• AQI is a numerical scale used to measure air quality, ranging from 0 (good) to 500 (hazardous).

• It is calculated based on pollutants like PM2.5, PM10, sulfur dioxide, nitrogen dioxide, carbon monoxide, and ozone.

• Role of State Governments:

• State governments play a critical role in implementing pollution control measures tailored to their specific challenges.

• Collaboration between states and central government is essential for achieving nationwide air quality goals.

Q88. Answer: (a) 3,630

Shortcut Trick

Net decrease in total average expense for 110 students = 110 × 10 = Rs. 1100

Expected sum of 30 new students at original average (x) = Actual increase + Net decrease

30 × x = 260 + 1100 = 1360 => x = 136/3

Original total expenditure = 80 × (136/3) = 10880/3 = Rs. 3626.67

Rounding off to the nearest tens gives Rs. 3630.

Therefore The correct answer is Rs. 3630.

Alternate Method

Given:

Original number of students = 80

New students joined = 30 => Total students = 80 + 30 = 110

Increase in total daily expenditure = Rs. 260

Decrease in average expenditure per head = Rs. 10

Formula Used:

Total Expenditure = Number of Students × Average Expenditure

Expenditure Balance

Original Exp (80x)

• Rs. 260

=

New Total Exp = 110 × (x − 10)

Calculation:

=> Let the original average daily expenditure be x.

=> Original total expenditure = 80x

=> New average expenditure = (x − 10)

=> New total expenditure = 110 × (x − 10)

=> According to the condition given:

=> New Total Expenditure = Original Total Expenditure + 260

=> 110(x − 10) = 80x + 260

=> 110x − 1100 = 80x + 260

=> 110x − 80x = 260 + 1100

=> 30x = 1360

=> x = 1360 ÷ 30 = 136/3

=> Original daily expenditure = 80x = 80 × (136/3)

=> Original daily expenditure = 10880 ÷ 3 ≈ 3626.67

=> Rounding off 3626.67 to the nearest tens gives 3630.

Therefore The correct answer is Rs. 3630.

Additional Information

Average Expenditure Formula

Average = Total Value ÷ Total Number of Items. Any change in the overall sum will result in a proportional change in the average across all the participating entities.

Net Deviation Method for Averages

Net Total Change = (New Entity Count × Shift in Average). This deviation logic helps compute the total financial impact of adding items without needing complete algebraic expansion.

Rounding Off Rules

To round a number to the nearest ten, inspect the units digit. If the unit digit is 5 or greater, round up the tens digit. If it is less than 5, retain the tens digit as is.

Q89. Answer: (a) 20 years

Shortcut Trick

5 units of the ratio correspond to P's age = 25 years.

1 unit of the ratio = 25 ÷ 5 = 5 years.

Difference in the ratio between Q and P = 9 − 5 = 4 units.

Difference in their ages = 4 × 5 = 20 years.

Therefore The correct answer is 20 years.

Alternate Method

Given:

The ratio of the ages of P and Q = 5 : 9

P's age = 25 years

5x = 25 years

P

5x = 25 years

4x (Difference)

Q

Value = 20 years

Calculations:

=> Let the age of P be 5x and the age of Q be 9x.

=> We are given that P's age is 25 years.

=> 5x = 25

=> x = 25 ÷ 5 = 5

=> Q's age = 9x = 9 × 5 = 45 years

=> Difference in their ages = Q's age − P's age

=> Difference = 45 − 25 = 20 years

Therefore The correct answer is 20 years.

Additional Information

Constant Age Difference

The difference between the ages of any two people remains exactly the same at any point in time, whether it is in the past,

present, or future.

Ratio Multiplier

When numerical values are given in a ratio a : b, they can be represented as ax and bx, where x is a common multiplier. Any operation on the ratio parts directly corresponds to operations on the actual values.

Direct Difference Method

To find the difference between quantities given in a ratio, you can multiply the difference between their ratio units directly with the multiplier (x) to save calculation steps.

Q90. Answer: (c) 15

The correct answer is 15.

Key Points

• India is divided into 15 agro-climatic regions based on climatic conditions, soil types, and topography. These divisions are essential for effective planning and implementation of agricultural practices in the country.

• The classification of these regions was first introduced in 1989 by the Planning Commission of India, which aimed to enhance agricultural productivity by considering regional variations in natural resources and climatic conditions.

• The classification helps in determining suitable crops, cropping patterns, and agricultural practices for each region based on its agro-climatic conditions.

• The agro-climatic regions in India are:

1) Western Himalayan Region

2) Eastern Himalayan Region

3) Lower Gangetic Plains Region

4) Middle Gangetic Plains Region

5) Upper Gangetic Plains Region

6) Trans-Gangetic Plains Region

7) Eastern Plateau and Hills Region

8) Central Plateau and Hills Region

9) Western Plateau and Hills Region

10) Southern Plateau and Hills Region

11) East Coast Plains and Hills Region

12) West Coast Plains and Hills Region

13) Gujarat Plains and Hills Region

14) Western Dry Region

15) Islands Region

• This division plays a pivotal role in deciding agricultural policies, crop insurance, and irrigation infrastructure development in India.

Additional Information

• Definition of Agro-climatic Region:

• An agro-climatic region is a land unit defined in terms of its climatic and soil characteristics, which are suited for a certain range of crops and cultivars.

• It is an essential geographical classification for better planning and implementation of agricultural practices.

• Factors for Classification:

• The Planning Commission classified India into agro-climatic regions based on rainfall, temperature, soil type, topography, and water resources.

• These factors are critical for determining the suitability of a region for specific crops and agricultural practices.

• Objectives of Agro-climatic Zoning:

• To optimize agricultural production through proper planning of land and water resources.

• To minimize regional disparities by addressing area-specific agricultural challenges.

• To increase productivity and sustainability of the agricultural sector.

• Other Related Data:

• India is an agrarian economy with approximately 54.6% of the workforce engaged in agriculture and allied sectors as per the 2011 Census.

• The agro-climatic regions are key to meeting the food security needs of India’s population, which was approximately 1.4 billion in 2023.

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Q91. Answer: (d) Neither conclusion (I) nor (II) follows.

The least possible Venn diagram for the given statements is as follows

Conclusions:

(I) No scissor is a knife. - False (As their is no direct relation between scissors and knife, maybe it is possible but not definite. Hence it is false.)

(II) Some nails are knives. - False (As their is no direct relation between nails and knives, maybe it is possible but not definite. Hence it is false.)

Neither conclusion (I) nor (II) follows.

Hence, the correct answer is "Option 4"

Q92. Answer: (b) 249

The logic follows here,

Hence, the correct answer is "Option 2"

Q93. Answer: (d) 5

Given: Each of P, Q, R, S, T, U and V has an exam on a different day of a week starting from Monday and ending on Sunday of the same week.

• U has an exam on Saturday.

• Only four people have an exam between T and S, neither of whom has an exam on Monday.

• V has an exam immediately after P, and Q has an exam immediately before P.

• S has an exam after V

The final arrangement is:

Monday	**R**
Tuesday	T
Wednesday	Q
Thursday	P
Friday	V
Saturday	U
Sunday	S

Hence, the correct answer is "Option 4"

Q94. Answer: (c) = MUR, % = KSP

The logic followed here is

: NVS :: JRO : %

Logic : Add 1 to the alphabetical position of each letter. Applying this pattern, 'MUR' becomes 'NVS', and 'JRO' becomes 'KSP.'

Hence, the correct answer is "Option 3"

Q95. Answer: (a) Unicode’s first 128 code points match the ASCII values exactly.

The correct answer is Unicode's first 128 code points match the ASCII values exactly..

Key Points

• ASCII (American Standard Code for Information Interchange) is a character encoding standard that originally used 7 bits to represent characters, allowing for 128 unique values (0–127). Unicode ensures backward compatibility by aligning its first 128 code points with ASCII.

• Unicode uses a broader encoding system to represent characters from various languages and scripts globally. The first 128 Unicode code points (U+0000 to U+007F) are identical to ASCII, ensuring compatibility with older systems.

• This alignment allows software that supports ASCII to be compatible with Unicode encoding without requiring changes for characters within the ASCII range.

• ASCII control characters (values 0–31 and 127) are retained in Unicode, maintaining compatibility for older systems that rely on these codes.

• Unicode extends beyond ASCII to support over one million code points, accommodating diverse character sets, symbols, and emojis used worldwide.

Additional Information

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• ASCII:

• Introduced in 1963, ASCII was designed for telecommunication and computer systems, providing a standardized way to represent text.

• It includes control characters (such as newline and tab) and printable characters (letters, digits, and symbols).

• ASCII is limited to 128 characters, which includes English alphabets, numbers, and specific symbols.

• Unicode:

• Unicode Consortium introduced Unicode in 1991 to provide a universal character encoding system supporting multiple languages.

• It uses encodings like UTF-8, UTF-16, and UTF-32, enabling compatibility with ASCII while supporting global scripts.

• Unicode includes over 143,000 characters from 159 scripts, covering major and minor languages.

• Examples of scripts supported by Unicode include Latin, Cyrillic, Arabic, and Chinese.

• Backward Compatibility:

• Backward compatibility allows systems using ASCII-based text encoding to function seamlessly within Unicode environments for characters in the ASCII range.

• For example, a document encoded in ASCII can be processed by software designed for Unicode without modifications.

• Encoding Methods:

• UTF-8: Popular Unicode encoding that uses 1–4 bytes per character. ASCII characters require only 1 byte.

• UTF-16: Uses 2 bytes for most characters, with compatibility for ASCII through its first 128 code points.

• UTF-32: Allocates 4 bytes per character, supporting all Unicode code points directly.

Important Points

• Option Analysis:

• Option 1: Correct. Unicode ensures backward compatibility with ASCII by matching the first 128 code points exactly.

• Option 2: Incorrect. ASCII is a 7-bit encoding system, while Unicode uses variable-length encoding like UTF-8, UTF-16, and UTF-32.

• Option 3: Incorrect. ASCII has not been revised to include all Unicode symbols; it remains limited to its original 128 characters.

• Option 4: Incorrect. Unicode did not deprecate ASCII control characters; instead, it retained them for compatibility.

• Real-World Applications:

• Unicode is widely used in web development, software localization, and international communication.

• Examples include HTML, XML, and programming languages like Python, which support Unicode.

Q96. Answer: (a) diastolic

The correct answer is diastolic.

Key Points

• The diastolic blood pressure is the pressure in the arteries when the heart relaxes between beats and fills with blood. This is the lower of the two numbers in a blood pressure reading.

• It measures the minimum arterial pressure during relaxation of the ventricles (diastole).

• A normal diastolic blood pressure is typically less than 80 mmHg, as per guidelines by the American Heart Association (AHA).

• Diastolic blood pressure is crucial in determining the overall health of the cardiovascular system and is used in diagnosing conditions like hypertension.

• It complements systolic pressure to provide a full picture of heart health during a blood pressure measurement.

Additional Information

• Systolic Blood Pressure:

• Systolic blood pressure is the pressure in the arteries when the heart contracts and pumps blood into the vessels.

• It is the higher number in a blood pressure reading, typically less than 120 mmHg.

• Elevated systolic pressure can indicate hypertension or increased risks for cardiovascular diseases.

• Pulse Pressure:

• Pulse pressure is the difference between systolic and diastolic pressure.

• A normal pulse pressure range is typically between 30-40 mmHg.

• Abnormal pulse pressure can signal underlying issues like arterial stiffness or heart disease.

• Venous Pressure:

• Venous pressure refers to the pressure within the veins, which is lower compared to arterial pressure.

• It is crucial for understanding conditions like venous insufficiency or varicose veins.

• Measurement of Blood Pressure:

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• Blood pressure is typically measured using a sphygmomanometer or an automated blood pressure monitor.
• The readings are expressed in millimeters of mercury (mmHg), with systolic pressure first, followed by diastolic pressure (e.g., 120/80 mmHg).
• Health Implications:
• Chronic high diastolic pressure can lead to conditions such as heart failure, kidney disease, and stroke.
• Maintaining a healthy lifestyle, including regular exercise and a balanced diet, helps in regulating blood pressure.

Important Points

• Hypertension:
• Hypertension is defined as having a systolic pressure of 130 mmHg or higher or a diastolic pressure of 80 mmHg or higher.
• It is a significant risk factor for cardiovascular diseases globally.
• According to the World Health Organization (WHO), hypertension affects about 1.28 billion people worldwide.
• Blood Pressure Categories:
• Normal: Systolic less than 120 mmHg and diastolic less than 80 mmHg.
• Elevated: Systolic between 120-129 mmHg and diastolic less than 80 mmHg.
• Stage 1 Hypertension: Systolic 130-139 mmHg or diastolic 80-89 mmHg.
• Stage 2 Hypertension: Systolic 140 mmHg or higher or diastolic 90 mmHg or higher.
• Management Guidelines:
• Follow a DASH diet (Dietary Approaches to Stop Hypertension).
• Limit sodium intake to less than 2,300 mg per day.
• Engage in regular physical activity, such as 150 minutes of moderate exercise weekly.
• Avoid smoking and excessive alcohol consumption.

Q97. Answer: (b) 2, 9, 7

The correct answer is 2, 9, 7.

Key Points

• The Bohr-Bury rules dictate how electrons are distributed in different energy levels or shells of an atom.
• The maximum number of electrons that can be accommodated in a shell is calculated using the formula $2n^2$, where n is the principal quantum number (shell number).
• The first shell (K-shell) can accommodate up to 2 electrons, the second shell (L-shell) can accommodate up to 8 electrons, and the third shell (M-shell) can hold up to 18 electrons.
• According to the Bohr-Bury rules, the outermost shell of an atom cannot contain more than 8 electrons, even if the shell has the capacity to hold more. This is known as the "octet rule." This ensures chemical stability.
• The configuration 2, 9, 7 is not possible because the second shell (L-shell) can hold a maximum of 8 electrons. It cannot accommodate 9 electrons.
• In contrast, configurations like 2, 8, 3 and 2, 8, 8, 1 are valid because they adhere to the Bohr-Bury rules regarding electron distribution.

Additional Information

• Electron Distribution:
• The Bohr-Bury rules help explain how electrons occupy atomic orbitals and shells, forming the basis for chemical bonding and periodic trends.
• The energy of shells increases as the distance from the nucleus increases (K-shell < L-shell < M-shell).
• Octet Rule:
• The octet rule states that atoms tend to achieve a stable configuration by having 8 electrons in their outermost shell.
• This rule explains why noble gases like Neon (Ne) and Argon (Ar) are chemically inert—they naturally have 8 valence electrons.
• Exceptions to Bohr-Bury Rules:
• Transition elements and lanthanides/actinides have complex electron configurations due to the involvement of d and f orbitals.
• These exceptions occur due to factors like electron repulsion and energy minimization.
• Applications:
• The Bohr-Bury rules are essential for understanding chemical bonding, reactivity, and the periodic table arrangement.
• They are widely used in predicting the properties of elements and molecules in chemistry.

Important Points

• Bohr Model:
• The Bohr model proposed by Niels Bohr in 1913 describes electrons as moving in fixed circular orbits around the nucleus.

• This model laid the foundation for the quantum mechanical understanding of atomic structure.
• Periodic Table:
• The periodic table arranges elements based on their electron configurations, which are governed by the Bohr-Bury rules.
• Elements in the same group have similar valence electron configurations, explaining their chemical behavior.
• Quantum Numbers:
• Electron configurations are further detailed using quantum numbers, including principal (n), azimuthal (l), magnetic (m), and spin (s) quantum numbers.
• These numbers define the shape, orientation, and energy of atomic orbitals.

Q98. Answer: (c) OL-QM-RT

The logic followed here is:
Similarly,
Hence, the correct answer is "Option 3"

Q99. Answer: (d) A

Eight people are sitting in two parallel rows containing 4 people each in such a way that there is equal distance between adjacent persons.
• In row 1, A, D, G and F are seated and all of them are facing south.
• In row 2, P, R, N and Z are seated and all of them are facing north.
• Thus, each person faces another person from the other row.
• Z sits third to the left of R. The one facing F is an immediate neighbour of R. A sits at some place to the right of F and is not facing P.
The Final Arrangement is :
Hence, the correct answer is "Option 4"

Q100. Answer: (c) Two

A, B, C, D, E, F, G and H are sitting around a square table facing the centre of the table.
Some of them are sitting at the corners while some are sitting at the exact centre of the sides.
• E sits third to the left of B.
• E does not sit at the centre of any side.
• F sits second to the right of B.
• G is the immediate neighbour of D and B.
• H sits to the immediate left of F.
• C does not sit in a corner.
The final arrangement is:
Hence, the correct answer is "Option 3"

Q101. Answer: (d) 8 km/hr

Shortcut Trick
Distance travelled by the bus in (8 − 6) = 2 minutes is exactly equal to the distance travelled by the traveller in 6 minutes.
So, Time taken by bus : Time taken by traveller = 2 : 6 = 1 : 3.
Since speed is inversely proportional to time, Speed of bus : Speed of traveller = 3 : 1.
Given speed of bus = 24 km/hr (which corresponds to 3 units).
Speed of traveller = 1 unit = 24 ÷ 3 = 8 km/hr.
Therefore The correct answer is 8 km/hr.
Alternate Method
Given:
Speed of bus (S_b) = 24 km/hr
Departure interval of buses = 8 minutes
Meeting interval = 6 minutes
Formula Used:
Distance = Speed × Time
Relative Speed (opposite direction) = S1 + S2
Bus 2

Meeting Point

Traveller

Gap = Bus distance in 8 mins

Bus travels 6 mins

Traveller 6 mins

(= Bus 2 mins)

Distance equality: Traveller in 6 mins = Bus in 2 mins

Calculations:

=> Distance between two consecutive buses = Speed × Time gap = 24 × (8 ÷ 60) hr = 3.2 km

=> The traveller meets the buses every 6 minutes = 6 ÷ 60 hr = 0.1 hr

=> Relative speed = Total Distance ÷ Time taken = 3.2 ÷ 0.1 = 32 km/hr

=> S_b + S_t = 32

=> 24 + S_t = 32

=> S_t = 32 − 24 = 8 km/hr

Therefore The correct answer is 8 km/hr.

Additional Information

Relative Speed (Opposite Direction)

When two bodies move towards each other, their relative speed is the sum of their individual speeds (S1 + S2).

Relative Speed (Same Direction)

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

Average Speed

For equal distances covered at speeds x and y, the average speed over the whole journey is (2 × x × y) ÷ (x + y). For unequal distances, use Total Distance ÷ Total Time.

Time & Speed Relationship

Speed is always inversely proportional to time when the distance remains constant (S prop. to 1 ÷ T).

Q102. Answer: (a) 55

Given: 50 − 8 + 2 ÷ 6 × 4 = ?

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

+’ and ‘−’ are interchanged and ‘×’ and ‘÷’ are interchanged

New Equation: 50 + 8 − 2 × 6 ÷ 4 = ?

50 + 8 − 2 × 6 ÷ 4 = ?

50 + 8 − 2 × 1.5 = ?

50 + 8 - 3 = ?

58 - 3 = 55

Hence, the correct answer is "Option 1"

Q103. Answer: (a) Compulsory overseas service, violating the religious beliefs of some sepoys

The correct answer is Compulsory overseas service, violating the religious beliefs of some sepoys.

Key Points

• The General Service Enlistment Act of 1856 was a significant cause of discontent among Indian soldiers (sepoys) during British rule.

• This Act mandated that Indian sepoys serving in the British East India Company’s army could be sent overseas for military service.

• This provision was deeply resented, as traveling overseas violated the religious beliefs of many Hindu sepoys. According to traditional Hindu customs, crossing the sea (referred to as "Kala Pani") was considered a taboo that led to the loss of caste and religious purity.

• The Act also disregarded the cultural and religious sentiments of Indian soldiers, leading to a sense of betrayal and alienation among the sepoys towards their British officers.

• This imposition of overseas service became one of the major grievances that contributed to the outbreak of the Revolt of 1857, also known as the First War of Indian Independence.

Additional Information

• Revolt of 1857:

• The Revolt of 1857 was a significant uprising against British colonial rule in India, starting in Meerut and spreading to other parts of India.

• It was caused by various factors, including political, economic, social, and religious grievances of the Indian people.

• The immediate trigger was the introduction of the Enfield rifle, which required soldiers to bite off cartridges greased with animal fat, offending both Hindu and Muslim religious beliefs.

• Impact of General Service Enlistment Act:

• The Act undermined the trust and loyalty of Indian soldiers towards the British administration.

• It was seen as an intentional move to interfere with the religious practices of Indian sepoys, further fueling discontent.

• Cultural and Religious Sensitivities:

• Hindu soldiers were reluctant to cross the sea because it was believed to result in the loss of their caste and religious purity, a significant concern in the rigid caste-based society of India.

• The British administration failed to respect these cultural and religious customs, exacerbating tensions.

• Other Causes of the Revolt of 1857:

• The annexation of territories under the Doctrine of Lapse, which denied Indian rulers their right to succession, angered many princely states.

• The introduction of British laws and the erosion of traditional Indian practices were perceived as an attack on Indian culture and sovereignty.

• The economic exploitation of Indian resources and industries, coupled with heavy taxation, caused widespread poverty and discontent among the masses.

• Important Events of the Revolt:

• The revolt began on 10 May 1857 in Meerut, where sepoys rebelled against their British officers.

• Prominent leaders of the revolt included Rani Lakshmibai of Jhansi, Bahadur Shah II, Tantia Tope, and Nana Sahib.

• Despite initial successes, the revolt was ultimately crushed by the British in 1858, leading to significant changes in British policies towards India.

Important Points

• The General Service Enlistment Act was one of the many factors that led to the alienation of Indian soldiers and their decision to revolt against British rule.

• While the British intended the Act to enhance military flexibility, it ended up being a key factor in the growing unrest among the sepoys, contributing to the larger rebellion.

• The Revolt of 1857 marked the end of the East India Company's rule and led to the direct control of India by the British Crown under the Government of India Act, 1858.

• The events of 1857 are often regarded as the first significant step towards India's independence from British colonial rule.

Q104. Answer: (c) One

J, K, L, M, P and Q each scored different marks.

• Only two people have scored between P and K.

• Only one person has scored more than M.

• Only three people have scored between M and P.

• Q has scored more than L but less than J.

The Final Arrangement is

Hence, the correct answer is "Option 3"

Q105. Answer: (b) Use Custom Slide Show

The correct answer is Use Custom Slide Show.

Key Points

• Custom Slide Show is a feature in Microsoft PowerPoint that allows users to create a personalized slideshow by selecting a subset of slides from the main presentation.

• This option helps in tailoring presentations to specific audiences without the need to create multiple files or presentations. Hence, it ensures that only the selected slides are displayed during the slideshow.

• To use the feature, navigate to the Slide Show tab, click on Custom Slide Show, and then create a new custom slideshow by selecting the desired slides.

• The feature ensures flexibility and customization, making it ideal for scenarios where the same presentation is used for different purposes or audiences.

• This method does not modify the original presentation, preserving the integrity of the main file while allowing specific slide selections to be showcased.

• Hence, the correct answer is Use Custom Slide Show.

Additional Information

• Browsed at a Kiosk:

• This option sets the presentation to run in kiosk mode, meaning it loops continuously and disables manual slide advancement.

• It is generally used for trade shows or information booths where the presentation runs unattended.

• This mode is not suitable for selecting specific slides to display. Hence, this option is incorrect.

• Show Slides: From-To Range:

• This option allows users to define a specific range of slides (e.g., slides 5 to 10) to display during the slideshow.

• While this provides limited customization, it does not allow for skipping random slides or creating multiple custom presentations. Hence, this option is also not the best choice.

• Loop Continuously Until Esc:

• This option is used to enable the slideshow to run in a continuous loop until the user presses the Escape key.

• It is useful for unattended presentations but does not provide any customization of slide selection. Hence, this is not the correct option.

• Key Features of Custom Slide Show:

• Custom Slide Show allows multiple custom slideshows to be created from the same presentation, catering to diverse requirements.

• It is highly effective in business meetings, educational settings, and conferences where presentations are adapted for different audiences.

• Users can easily switch between the main presentation and custom slideshows as needed.

Important Points

• Microsoft PowerPoint:

• Microsoft PowerPoint is a presentation software developed by Microsoft and is part of the Microsoft Office Suite.

• It is widely used for creating slideshows, which include text, images, audio, and video, to support oral presentations.

• The software supports advanced features like animations, transitions, and custom slide shows, enabling users to create professional and engaging presentations.

• Custom Slide Show Use Cases:

• Used in academic or corporate settings to tailor presentations for different audience groups.

• Allows trainers or educators to focus on specific sections of a presentation for different training sessions.

• Helps in saving time by reusing one master presentation rather than creating multiple new files for varied audiences.

Q106. Answer: (a) Gaur

The correct answer is Gaur.

Key Points

• The Gaur, also known as the Indian Bison, is the largest existing bovine species in India as per the Zoological Survey of India's report "Animal Discoveries - New Species and New Records 2023".

• This species is native to South Asia and Southeast Asia, and it holds a significant place in India's biodiversity due to its massive size and unique characteristics.

• A fully grown male Gaur can weigh between 650 to 1,000 kilograms and can grow up to 6 feet tall at the shoulder.

• They are known for their robust build, blackish-brown coat, and distinct white stocking-like markings on their legs.

• The Gaur is listed as Vulnerable on the International Union for Conservation of Nature (IUCN) Red List, primarily due to habitat loss, poaching, and human-animal conflict.

Additional Information

• Yak:

• The Yak is a long-haired bovine species found primarily in the Himalayan region.

• It is smaller than the Gaur and is known for its ability to survive in high altitudes and cold climates.

• Domesticated Yaks are used for milk, meat, and as pack animals in regions like Ladakh and Sikkim.

• Wild water buffalo:

• Wild water buffalo, also known as Arna, are native to the Indian subcontinent.

• They are slightly smaller than the Gaur, weighing up to 1,200 kilograms, and are known for their long, curved horns.

• This species is listed as Endangered on the IUCN Red List due to habitat destruction and hybridization with domestic buffaloes.

• Nilgai:

• Nilgai, also known as the Blue Bull, is the largest antelope species in India.

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• It is much smaller than the Gaur, with males weighing up to 300 kilograms.

• Nilgai are commonly found in the grasslands and agricultural areas of northern and central India.

• Conservation Efforts for Gaur:

• Protected under Schedule I of the Wildlife Protection Act, 1972, making hunting and poaching illegal in India.

• Efforts like habitat restoration and establishment of wildlife sanctuaries have been initiated to protect their population.

• Some of the key habitats of the Gaur in India include the Western Ghats, parts of the Eastern Ghats, and the forests of Central India.

Important Points

• The Zoological Survey of India (ZSI) is a premier organization established in 1916 under the Ministry of Environment, Forest and Climate Change, Government of India.

• It conducts surveys, research, and documentation of India's biodiversity, focusing on fauna.

• The report "Animal Discoveries - New Species and New Records" is an annual publication that highlights new species discoveries and records in India.

• India is home to a rich diversity of fauna, with over 102,718 species documented as of recent reports.

Q107. Answer: (d) 855786

Shortcut Trick

Since 93 = 3 × 31, a divisible number must be a multiple of both 3 and 31.

Checking divisibility by 3 (sum of digits): 858226 (31, No) and 856159 (34, No).

Only 856497 (sum = 39) and 855786 (sum = 39) are divisible by 3.

Now check divisibility by 31 for 855786: 855786 ÷ 31 = 27606 (perfectly divisible).

Therefore The correct answer is 855786.

Alternate Method

Given:

Four numbers: 858226, 856159, 856497, 855786

Method Used:

A number is exactly divisible by 93 if the division leaves a remainder of 0.

Calculation:

=> Option 1: 858226 ÷ 93 = 9228 with a remainder of 22

=> Option 2: 856159 ÷ 93 = 9206 with a remainder of 1

=> Option 3: 856497 ÷ 93 = 9209 with a remainder of 60

=> Option 4: 855786 ÷ 93 = 9202 with a remainder of 0

=> 855786 is perfectly divisible by 93.

Therefore The correct answer is 855786.

Additional Information

Divisibility Rule of 31

Subtract 3 times the last digit from the remaining number. If the result is a multiple of 31, the original number is also divisible. For example, 837 → 83 − 3×7 = 62, which is divisible by 31.

Co-prime Factors Theorem

If a number is divisible by two co-prime numbers independently, it is also perfectly divisible by their product (e.g., 3 and 31 gives 93).

Divisibility by 3

A number is divisible by 3 if the sum of its digits is a multiple of 3.

Q108. Answer: (d) To strengthen democracy by balancing rights with duties

The correct answer is To strengthen democracy by balancing rights with duties.

Key Points

• Fundamental Duties were added to the Indian Constitution by the 42nd Amendment Act, 1976, during the period of Emergency.

• The inclusion of these duties aimed to remind citizens of their responsibilities towards the nation, thereby creating a balance between individual rights and collective duties.

• HR Gokhale, who played a crucial role in the drafting, emphasized that Fundamental Duties were essential to ensure active participation in the democratic process and to strengthen the democratic framework by promoting accountability among citizens.

• The duties encourage citizens to act responsibly in areas such as environmental conservation, respect for national heritage, and upholding the sovereignty and integrity of India, ensuring the holistic growth of the nation.

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• Fundamental Duties serve as moral obligations rather than legally enforceable rights, fostering a sense of national responsibility and unity among citizens.

Additional Information

• Historical Background:

• The Fundamental Duties were inspired by the Constitution of USSR and were added to the Indian Constitution via the 42nd Amendment Act, 1976.

• The idea was introduced during the Emergency period (1975-77), when the government felt the need for citizens to actively contribute to the nation's development and uphold its values.

• Part IVA of the Constitution:

• Fundamental Duties are enshrined in Part IVA (Article 51A) of the Constitution.

• Initially, there were 10 Fundamental Duties; an additional duty was added through the 86th Amendment Act, 2002, making the total 11 duties.

• Key Features of Fundamental Duties:

• They are non-enforceable by law but act as moral guidelines for citizens to follow.

• They aim to promote national integrity, patriotism, and a sense of responsibility towards the nation.

• Examples include protecting the environment, safeguarding public property, and promoting harmony among diverse cultural backgrounds.

• Important Articles Related to Rights and Duties:

• Article 19-22: Protect fundamental rights such as freedom of speech, assembly, and movement.

• Article 32: Allows citizens to approach the judiciary if their Fundamental Rights are violated.

• Article 51A: Enlists the Fundamental Duties of citizens.

• Comparison with Fundamental Rights:

• While Fundamental Rights (Part III) are enforceable by law and provide protection to individuals, Fundamental Duties (Part IVA) serve as moral obligations for citizens to contribute to the nation.

• The balance between rights and duties is essential for the effective functioning of democracy.

Important Points

• 42nd Amendment Act: Known as the Mini Constitution, it introduced Fundamental Duties, changed the Preamble, and made several other significant changes.

• Fundamental Duties: Include obligations such as respecting national symbols, protecting the environment, and promoting harmony among citizens.

• Democratic Balance: The inclusion of Fundamental Duties ensures that citizens contribute positively to nation-building while enjoying their rights.

• Examples: Duties like protecting public property and preserving heritage sites help maintain societal harmony and cultural pride.

• Global Influence: Other nations, such as Japan and Russia, also incorporate duties in their constitutions to promote civic responsibility.

Q109. Answer: (b) 1/(6120³)

Shortcut Trick

For multiplication of terms with the same negative exponent, we multiply the bases directly.

a^(-n) × b^(-n) × c^(-n) = 1 / (a × b × c)ⁿ

=> 24 × 15 × 17 = 360 × 17 = 6120

=> Result = 1 / 6120³

Therefore The correct answer is 1 / 6120³.

Alternate Method

Given:

24^(-3) × 15^(-3) × 17^(-3)

Formula Used:

a^m × b^m × c^m = (a × b × c)^m

a^(-m) = 1 / a^m

Calculations:

=> 24^(-3) × 15^(-3) × 17^(-3) = (24 × 15 × 17)^(-3)

=> (360 × 17)^(-3)

=> 6120^(-3)

=> 1 / 6120³

Therefore The correct answer is $1 / 6120^3$.

Additional Information

Product Rule of Exponents

When multiplying terms with the same base, add their exponents: a^m × a^n = a^(m+n).

Power of a Power Rule

To raise a power to a power, multiply the exponents: $(a^m)^n$ = a^(m × n).

Zero Exponent Rule

Any non-zero base raised to the power of zero is always equal to one: a^0 = 1.

Q110. Answer: (c) survival

The correct answer is survival.

Key Points

• Genetic variation refers to the differences in DNA sequences among individuals within a population. These variations occur due to mutations, gene flow, and sexual reproduction.

• One of the primary advantages of genetic variation is that it enhances a population's ability to adapt to changing environments. This ensures that individuals with advantageous traits survive better under new conditions.

• Populations with high genetic variation are less susceptible to extinction, as they are more likely to contain individuals capable of surviving diseases, predators, and environmental changes.

• Genetic diversity contributes to the evolutionary process, allowing beneficial traits to be selected over time and improving overall survival rates.

• This variation ensures the long-term survival of species by maintaining a pool of adaptive traits that can be utilized in response to external threats or changes.

Additional Information

• Option 1 (similarity): Genetic similarity within a population reduces the chances of adaptation to environmental changes. Populations with genetic uniformity are more vulnerable to diseases and extinction.

• Option 2 (disease susceptibility): High genetic variation reduces disease susceptibility. It ensures that not all individuals are equally vulnerable to the same pathogen due to varied immune responses.

• Option 4 (reproductive speed): While reproductive speed may contribute to population growth, it is not directly influenced by genetic variation. Genetic variation ensures survival rather than increasing reproduction rates.

• Mechanisms of Genetic Variation:

• Mutations: Random changes in DNA sequences that introduce new traits.

• Gene Flow: The transfer of genetic material between populations, increasing diversity.

• Sexual Reproduction: Combines genes from two parents, creating unique offspring.

• Examples:

• In agriculture, genetic diversity in crops ensures resistance to pests and diseases.

• In wildlife, species with high genetic variation, like cheetahs, can better adapt to environmental changes.

Important Points

• Natural Selection: Genetic variation is the raw material for natural selection, as individuals with favorable traits are more likely to survive and reproduce.

• Human Health: Genetic variation in humans contributes to different responses to drugs and susceptibility to diseases.

• Conservation Efforts: Preserving genetic diversity is a key focus in conservation biology to ensure species' long-term survival.

• Research Insights: Studies on genetic variation provide valuable insights into evolutionary biology and ecosystem functioning.

Q111. Answer: (b) 99

Shortcut Trick

To check divisibility by 99, the number must be divisible by its co-prime factors, 9 and 11.

Sum of digits of 699138 = 6 + 9 + 9 + 1 + 3 + 8 = 36 (Divisible by 9)

Difference of sum of alternating digits = (8 + 1 + 9) − (3 + 9 + 6) = 18 − 18 = 0 (Divisible by 11)

Since the number satisfies both rules, it is exactly divisible by 99.

Therefore The correct answer is 99.

Alternate Method

Given:

The number to test is 699138.

The options are 117, 99, 102, and 108.

Method Used:

We test divisibility rules for the factors of the given options. We analyze Option 2 (99), which requires checking divisibility by 9 and 11.

Calculations:

=> Divisibility by 9: Sum of digits = 6 + 9 + 9 + 1 + 3 + 8 = 36.

=> Since 36 ÷ 9 = 4, the number is divisible by 9.

=> Divisibility by 11: Sum of digits at odd positions (from right to left) = 8 + 1 + 9 = 18.

=> Sum of digits at even positions (from right to left) = 3 + 9 + 6 = 18.

=> Difference = 18 − 18 = 0.

=> Since the difference is 0, the number is perfectly divisible by 11.

=> As 699138 is divisible by both 9 and 11, it is exactly divisible by their product, 99.

Checking other options for confirmation:

=> 108 is a multiple of 4, but the last two digits (38) are not divisible by 4. So, 108 is eliminated.

=> 102 is a multiple of 17. 699138 ÷ 102 leaves a non-zero remainder. So, 102 is eliminated.

Therefore The correct answer is 99.

Additional Information

Divisibility by 9

A number is divisible by 9 if the sum of its digits is exactly a multiple of 9.

Divisibility by 11

A number is divisible by 11 if the difference between the sum of digits at odd places and the sum of digits at even places is 0 or a multiple of 11.

Divisibility by Composite Numbers

To check divisibility for a composite number (like 99), break it down into co-prime factors (like 9 and 11). If the given number is divisible by both factors, it is divisible by the composite number.

Divisibility by 4

A number is divisible by 4 if the number formed by its last two digits is divisible by 4.

Q112. Answer: (a) Sikkim

The correct answer is Sikkim.

Key Points

• The Indian Army conducted a high-altitude technology demonstration exercise named 'Divya Drishti' in the state of Sikkim in July 2025.

• 'Divya Drishti' was carried out to showcase the use of advanced technology in extreme high-altitude areas, focusing on the operational readiness of the Indian Army in such terrains.

• Sikkim, located in the eastern Himalayan region of India, is a strategically significant location due to its proximity to international borders with China, Bhutan, and Nepal.

• The exercise aimed to test the Indian Army's modern surveillance and reconnaissance systems, including drones and other high-tech equipment, in challenging weather and terrain conditions.

• Through this exercise, the Indian Army demonstrated its capability to use advanced technology for intelligence gathering, communication, and tactical operations in mountainous regions.

Additional Information

• Strategic Importance of Sikkim:

• Sikkim is a small northeastern state in India, bounded by China in the north and northeast, Bhutan in the east, Nepal in the west, and the Indian state of West Bengal in the south.

• Its strategic location makes it critical for India's defense and border security, particularly against China. The state shares a border with the Tibet Autonomous Region, making it a sensitive area for military operations.

• The Nathu La Pass in Sikkim is one of the three open trading border posts between India and China.

• High-altitude Exercises:

• High-altitude exercises like 'Divya Drishti' enable the Indian Army to be prepared for potential combat or surveillance operations in challenging terrains where extreme weather and oxygen deficiency can impact operations.

• The exercises also test the efficacy of new technologies such as unmanned aerial vehicles (UAVs), communication systems, and other advanced equipment in high-altitude conditions.

• Importance of Technology in Defence:

• Modern warfare increasingly relies on advanced technology, including AI-based surveillance systems, drones, and satellite

communications.

• Such technologies enhance the army's capability to monitor enemy movements, conduct reconnaissance, and execute precision strikes.

• These exercises are also crucial in testing the integration of technology into traditional military operations, especially in difficult terrains like mountains.

• Indian Army's Presence in Sikkim:

• The Indian Army maintains a strong presence in Sikkim due to its geopolitical importance and the need to secure the country's borders.

• Regular training and operational exercises are conducted in Sikkim to ensure that the armed forces are well-prepared for any potential threats in the region.

Important Points

• Other Indian Army High-Altitude Exercises:

• The Indian Army regularly conducts high-altitude exercises to enhance operational preparedness. For example, the Exercise Him Vijay was conducted in Arunachal Pradesh in 2019.

• These exercises simulate real-time combat conditions in adverse weather and terrain, ensuring operational readiness for the troops deployed in such areas.

• Technological Integration in Indian Army:

• The Indian Army has been adopting state-of-the-art technologies, such as the Integrated Battle Groups (IBGs) concept, to enhance its combat capabilities.

• Some of the technologies tested in such exercises include electronic warfare systems, high-resolution imaging tools, and night-vision equipment.

• Geopolitical Context:

• Sikkim's proximity to the disputed India-China border makes it a key location for defense operations. The Doklam standoff in 2017 between India and China further highlighted the strategic importance of this region.

• Ongoing tensions along the Line of Actual Control (LAC) necessitate constant vigilance and preparedness in regions like Sikkim.

Q113. Answer: (a) Chhattisgarh

The correct answer is Chhattisgarh.

Key Points

• As per the Niti Aayog Annual Report 2014-2015, based on the data from 2011-2012, Chhattisgarh had the highest percentage of people below the poverty line.

• The estimation of poverty in India is conducted using the Tendulkar Committee methodology, which considers expenditure on food, education, and health.

• Chhattisgarh's poverty rate was significantly high due to factors like low industrialization, lack of infrastructure, and a large rural population dependent on agriculture.

• Other states with high poverty rates during the same period included Bihar, Jharkhand, and Arunachal Pradesh, but none surpassed Chhattisgarh.

• The poverty line is determined based on minimum calorie intake and essential expenditure, which varies between rural and urban areas.

Additional Information

• Tendulkar Committee Methodology:

• Introduced by the Tendulkar Committee in 2009, this methodology shifted focus from calorie intake to expenditure on food, health, and education.

• It set the poverty line at Rs. 27.2 per day in rural areas and Rs. 33.3 per day in urban areas (2011-2012 data).

• This approach aimed to provide a more comprehensive understanding of poverty.

• State-wise poverty in India:

• Chhattisgarh recorded the highest poverty rate at 39.93% in 2011-2012.

• Bihar: The poverty rate was approximately 33.74%, reflecting challenges like low literacy and dependence on agriculture.

• Jharkhand: With a poverty rate of 36.96%, the state faced issues like a lack of industrial development and infrastructure.

• Arunachal Pradesh: The poverty rate stood at 34.67%, influenced by geographical isolation and limited economic opportunities.

• Poverty Estimation in India:

• Poverty estimation is conducted by the Planning Commission (now Niti Aayog) using different methodologies like the Lakdawala Committee and Tendulkar Committee.

• It focuses on aspects such as minimum calorie intake, essential consumption expenditure, and other parameters.

• Government Initiatives:

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• MGNREGA: Aims to provide guaranteed employment to rural households.
• National Food Security Act: Ensures subsidized food grains to vulnerable sections.
• Deendayal Antyodaya Yojana: Focuses on skill development and employment generation for the poor.

Important Points

• Poverty Line Calculation:
• In rural areas, the poverty line is based on a calorie intake of 2400 calories/day and essential expenditure.
• In urban areas, it is based on 2100 calories/day and essential expenditure.
• Regional Disparities:
• States in eastern and northeastern India report higher poverty levels compared to western and southern states.
• Factors contributing to poverty include lack of industrialization, poor infrastructure, and geographical isolation.
• Impact of Poverty:
• High poverty rates lead to challenges like malnutrition, illiteracy, and poor health outcomes.
• It also contributes to low economic growth and social inequality.

Q114. Answer: (c) Reserve Bank of India (RBI)

The correct answer is Reserve Bank of India (RBI).

Key Points

• The Reserve Bank of India (RBI) released the Framework for Responsible and Ethical Enablement of Artificial Intelligence (FREE-AI) Committee Report in August 2025.
• The report outlines 7 guiding principles for the responsible use of Artificial Intelligence (AI) in the financial sector, ensuring ethical practices in AI deployment.
• The framework aims to address issues such as data privacy, fairness, transparency, accountability, and security risks in AI usage by financial institutions.
• The RBI has been proactive in adopting technologies and providing frameworks for their ethical utilization to enhance the efficiency and security of the financial ecosystem.
• By releasing this framework, the RBI demonstrates its commitment to integrating innovative technologies while safeguarding public interest and financial stability.

Additional Information

• Reserve Bank of India (RBI):
• The RBI is India's central banking institution, established in 1935 under the Reserve Bank of India Act, headquartered in Mumbai.
• It regulates the country's monetary policy, manages currency issuance, oversees the banking system, and ensures financial stability.
• The RBI frequently adopts technological advancements, such as AI and blockchain, to improve financial inclusion, fraud detection, and operational efficiency.
• Artificial Intelligence in the Financial Sector:
• AI is used in the financial sector for applications like fraud detection, customer service automation, credit scoring, investment management, and risk assessment.
• The integration of AI in banking provides faster decision-making, enhanced customer experiences, and reduced operational costs.
• However, its use also raises concerns about bias, data misuse, and lack of transparency, making ethical frameworks essential.
• Guiding Principles in FREE-AI Framework:
• The FREE-AI Report emphasizes principles like fairness, accountability, transparency, data privacy, security, environmental sustainability, and inclusivity in AI adoption.
• These principles aim to build trust among users and ensure that AI technologies align with ethical and regulatory standards.
• Other Relevant Organizations:
• NITI Aayog: India's policy think-tank that actively promotes AI research and development through initiatives like National AI Strategy.
• SEBI: The securities market regulator in India, which uses AI for market surveillance and fraud detection.
• Ministry of Finance: Oversees financial policies and initiatives but does not directly manage AI frameworks for the financial sector.

Important Points

• Implications of Responsible AI Use:
• Ethical AI frameworks ensure that financial institutions provide services that are unbiased, secure, and transparent to customers.

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• They help mitigate risks associated with AI, such as data breaches, algorithmic bias, and lack of accountability.

• Such frameworks also promote innovation while maintaining public trust in financial systems.

• Global Initiatives on AI Ethics:

• Organizations like the OECD and EU have developed ethical guidelines for AI to ensure fairness, transparency, and security across industries.

• India's FREE-AI framework aligns with global efforts to promote ethical AI practices.

Q115. Answer: (c) Ctrl + J justifies text; Ctrl + Shift + J applies distributed justification where last line is also stretched

The correct answer is Ctrl + J justifies text; Ctrl + Shift + J applies distributed justification where the last line is also stretched.

Key Points

• Ctrl + J: This shortcut is used to justify text in MS Word, aligning text evenly between the left and right margins, creating a clean and professional appearance.

• Ctrl + Shift + J: This shortcut applies distributed justification, ensuring that the text is evenly spaced across the entire width of the page, including the last line, which is stretched.

• Distributed justification (Ctrl + Shift + J) is particularly useful in formatting documents where full block alignment is desired, such as legal or academic documents.

• The distinction lies in the treatment of the last line: Ctrl + J does not stretch the last line, whereas Ctrl + Shift + J does.

• Both shortcuts ensure proper alignment for readability but are applied based on formatting preferences for specific document types.

Additional Information

• Justify Alignment:

• Text is aligned evenly along both left and right margins, creating a clean block of text.

• Used in professional documents, essays, and reports for a polished appearance.

• Does not stretch the last line unless specified.

• Distributed Justification:

• Text is spaced evenly across the width of the page, including the last line.

• Ideal for legal documents, certificates, or specific formatting requirements.

• Can sometimes result in uneven spacing between words.

• Formatting in MS Word:

• MS Word offers multiple alignment options, including left, center, right, justify, and distributed, catering to various document styles.

• Users can also customize margins and spacing to enhance the document's aesthetic and readability.

• Keyboard shortcuts enable quicker formatting without navigating through menus.

• Applications:

• Both justify and distributed justification are used in professional and academic contexts.

• Justify is common in essays, reports, and newspapers.

• Distributed justification is frequently used in legal documentation and certificates.

Important Points

• Keyboard Shortcuts: Keyboard shortcuts like Ctrl + J and Ctrl + Shift + J save time and enhance productivity in text formatting.

• Alignment Importance: Proper alignment improves the readability and professional appeal of documents.

• Spacing Considerations: Distributed justification can sometimes result in uneven spacing, requiring careful review.

• Customization: MS Word provides advanced tools for customizing alignment, spacing, and margins to suit user preferences.

Q116. Answer: (a) $4x^2 + (-3)x + (2)$

Shortcut Trick

Simplify fractions mentally to get: $2x^2 + 4x - 1 + 2x^2 - 7x + 3$

Combine like terms directly: $(2 + 2)x^2 + (4 - 7)x + (-1 + 3)$

The simplified result is $4x^2 - 3x + 2$.

This can be written in the option format as $4x^2 + (-3)x + (2)$.

Therefore The correct answer is $4x^2 + (-3)x + (2)$.

Alternate Method

Given:

$(4/2)x^2 + 4x - 2/2 + (4/2)x^2 - 7x + 6/2$

Calculation:

=> First, simplify the fractional coefficients:

=> $2x^2 + 4x - 1 + 2x^2 - 7x + 3$

=> Group the like terms together:

=> $(2x^2 + 2x^2) + (4x - 7x) + (-1 + 3)$

=> Add the coefficients for each group:

=> $4x^2 - 3x + 2$

=> Rewrite to match the given option format:

=> $4x^2 + (-3)x + (2)$

Therefore The correct answer is $4x^2 + (-3)x + (2)$.

Additional Information

Like Terms

Terms whose variables and their exponents are exactly the same. Only like terms can be added or subtracted together.

Standard Form of a Polynomial

Polynomials are typically written in descending order of their degree. For a quadratic expression, the standard form is $ax^2 + bx + c$.

BODMAS Rule

Before adding or subtracting terms, any division operations (such as simplifying fractions) must be completed first according to the standard order of operations.

Q117. Answer: (c) tp

The logic follows here,

Hence, the correct answer is "Option 3"

Q118. Answer: (d) a four-chambered heart

The correct answer is a four-chambered heart.

Key Points

• Animals with high energy needs, such as birds and mammals, require a highly efficient circulatory system to sustain their metabolic demands.

• A four-chambered heart consists of two atria and two ventricles, ensuring complete separation of oxygen-rich and oxygen-poor blood, which is vital for maintaining high metabolic rates.

• In mammals and birds, the left side of the heart pumps oxygenated blood to the body, while the right side pumps deoxygenated blood to the lungs for oxygenation.

• This complete separation prevents the mixing of oxygenated and deoxygenated blood, thereby delivering maximum oxygen efficiency to tissues and organs.

• Mammals and birds are warm-blooded (endothermic), and their high-energy lifestyles, including activities such as flying and maintaining constant body temperature, depend on the efficiency of a four-chambered heart.

Additional Information

• Two-chambered heart:

• Found in fish, it consists of one atrium and one ventricle.

• Blood flows in a single circuit: from the heart to the gills for oxygenation and then directly to the body.

• Less efficient compared to a four-chambered heart, suitable for aquatic life.

• Three-chambered heart:

• Present in amphibians and most reptiles.

• Consists of two atria and one ventricle, leading to partial mixing of oxygenated and deoxygenated blood.

• Although less efficient than a four-chambered heart, it supports their lower metabolic needs.

• Single-chambered heart:

• Not found in vertebrates but seen in certain invertebrates like mollusks.

• Simple circulatory systems are adequate for their low energy demands.

• Warm-blooded animals:

• Birds and mammals are endothermic, meaning they regulate their body temperature internally.

• This requires high oxygen delivery to maintain metabolic activities, which is made possible by the efficiency of a four-chambered heart.

• Evolutionary significance:

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• The development of a four-chambered heart in mammals and birds is an adaptation to their active lifestyles and high metabolic rates.

• It ensures the separation of oxygenated and deoxygenated blood, enhancing energy production and overall survival.

Important Points

• Blood Circulation in Four-Chambered Heart:

• Oxygenated blood: Pulmonary veins carry oxygen-rich blood from lungs to the left atrium, which is then pumped by the left ventricle to the entire body.

• Deoxygenated blood: Blood from the body returns to the right atrium via veins and is pumped to the lungs by the right ventricle for oxygenation.

• This dual circulation maximizes the efficiency of oxygen delivery and carbon dioxide removal.

• Energy Efficiency:

• The four-chambered heart supports high levels of activity such as sustained flight in birds or long-distance running in mammals.

• It is essential for maintaining a constant body temperature, especially in diverse environmental conditions.

• Examples:

• Mammals: Humans, lions, elephants.

• Birds: Sparrows, eagles, penguins.

Q119. Answer: (c) Turkmenistan

The correct answer is Turkmenistan.

Key Points

• The Third United Nations Conference on Landlocked Developing Countries (LLDC3) opened on 5 August 2025 in Turkmenistan, specifically in the capital city, Ashgabat.

• The conference aimed to address the challenges faced by Landlocked Developing Countries (LLDCs), such as limited access to international markets and high trade costs.

• This conference brought together world leaders, international organizations, and stakeholders to discuss strategies and policies for ensuring sustainable development in LLDCs.

• Turkmenistan, being one of the landlocked countries, played a significant role in hosting this important global conference and showcasing its commitment to advancing international cooperation in addressing LLDC issues.

• Key discussions revolved around enhancing transport infrastructure, promoting regional integration, and achieving the 2030 Agenda for Sustainable Development.

Additional Information

• Landlocked Developing Countries (LLDCs):

• Landlocked developing countries are nations that have no access to the sea and are surrounded entirely by land or have very limited access to sea routes.

• There are 32 LLDCs globally, including countries like Afghanistan, Nepal, Kazakhstan, and Turkmenistan.

• These countries face unique challenges, including high transport costs, limited trade opportunities, and economic vulnerabilities.

• Key objectives of the LLDC conference:

• To review the progress made in implementing the Vienna Programme of Action for LLDCs (2014–2024), which aims to address the challenges faced by LLDCs.

• To focus on fostering regional integration and cooperation to enhance connectivity and trade access for LLDCs.

• To promote sustainable development and improve access to global markets for these nations.

• Challenges faced by LLDCs:

• High transport and transit costs due to geographical constraints.

• Dependence on neighboring countries for access to global markets.

• Limited access to resources and higher exposure to global economic and financial volatility.

• Turkmenistan:

• Turkmenistan is a landlocked country in Central Asia, bordered by Kazakhstan, Uzbekistan, Afghanistan, Iran, and the Caspian Sea.

• The country has been actively involved in regional economic and transport initiatives, which made it a suitable choice for hosting the LLDC3 conference.

Q120. Answer: (a) 1

Shortcut Trick

Smallest number N = LCM(12, 15, 20) + 5 = 60 + 5 = 65.

Since the LCM (60) is perfectly divisible by 4, the remainder depends only on the extra part (5).

Remainder when 5 is divided by 4 => 1.

Therefore The correct answer is 1.

Alternate Method

Given:

Divisors = 12, 15, and 20

Common remainder = 5

New divisor = 4

Formula Used:

Smallest Number = LCM(a, b, c) + k, where k is the common remainder.

Calculations:

=> First, we find the LCM of 12, 15, and 20.

=> $12 = 2^2 \times 3$

=> $15 = 3 \times 5$

=> $20 = 2^2 \times 5$

=> LCM = $2^2 \times 3 \times 5 = 60$

=> Smallest positive number = 60 + 5 = 65

=> Now, divide 65 by 4 to find the remainder.

=> $65 = (16 \times 4) + 1$

=> Hence, the remainder is 1.

Therefore The correct answer is 1.

Additional Information

LCM Rule for Common Remainder

The smallest number dividing a, b, and c and leaving a remainder r in each case is obtained by calculating LCM(a, b, c) + r.

HCF Rule for Common Remainder

The largest number dividing x, y, and z leaving the same remainder r in each case is the HCF of (x − r), (y − r), and (z − r).

Divisibility Rule of 4

A number is divisible by 4 if the number formed by its last two digits is perfectly divisible by 4. Thus, only the last two digits are needed to check the remainder.

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