# RRB Group D Previous Year Paper (Held on: 17 Sept 2022 Shift 2)

RRB Group D • 2022 • 100 questions • 90 minutes • Answer key and solutions

**Take this paper as a timed mock test**

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

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## CBT

**Q1.** In this question, a group of numbers/symbols is coded using letters as per the table given below and the conditions which follow. The correct combination of codes following the conditions is your answer.

| Number / Symbol | 6 | 8 | 4 | • | 5 | # | % | 2 | $ | 1 | ^ | 7 | 9 | • | @ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Code | S | U | T | W | N | P | V | D | A | Z | J | M | O | M | Y |

Conditions:

(i) If the first and last elements are numbers, then the last element will be replaced by the symbol @.

(ii) If the first element is a symbol, then the first element will be coded as ©.

(iii) If both the first and second elements are numbers, then the third element will be coded as *.

What will be the code for the following?

7 8 4 % @

**(a)** VY*UM
**(b)** UM*VY
**(c)** MU*VY
**(d)** UMVY*

**Q2.** Carbon exhibits catenation property due to _____

**(a)** its small size and greater strength of carbon-carbon bond
**(b)** its large size and greater strength of carbon-carbon bond
**(c)** its small size and weaker strength of carbon-carbon bond
**(d)** its large size and weaker strength of carbon-carbon bond

**Q3.** Who among the following sportsmen was in news in June 2021 for being inducted into the ICC Hall of Fame ahead of WTC Final?

**(a)** Dilip Vengsarkar
**(b)** Vinoo Mankad
**(c)** Javagal Srinath
**(d)** Ajay Jadeja

**Q4.** Which of the following falls under the Right to Constitutional Remedies?

**(a)** Equality of opportunity in public employment
**(b)** Freedom of conscience and free profession, practice and propagation of religion
**(c)** The right to move the Supreme Court by appropriate proceedings for the enforcement of the rights conferred by Part III is guaranteed
**(d)** Right to education

**Q5.** _____ is an Indian Technology developed by Research Design and Standards Organisation in collaboration with Indian Railways in March 2022, that can prevent two trains from colliding.

**(a)** Srivatsa
**(b)** jaivardhan
**(c)** Trishool
**(d)** Kavach

**Q6.** The perimeter of an isosceles triangle is 32 cm. If each of the equal sides is 4 cm longer than the base, then the length of the sides of the triangle are _____.

**(a)** 14, 10, 10
**(b)** 14, 14, 4
**(c)** 8, 12, 12
**(d)** 16, 12, 12

**Q7.** The magnification produced by a concave mirror is found to be -2 when an object of height 1 cm is placed at a suitable distance from the pole. Here, image height is equal to:

**(a)** 1 cm
**(b)** 0.2 cm
**(c)** 3 cm
**(d)** 2 cm

**Q8.** The Union Budget also known as Annual Financial Statement (AFS) for a particular financial year is given in which Article of the Indian Constitution?

**(a)** Article 112
**(b)** Article 134
**(c)** Article 31-C
**(d)** Article 38

**Q9.** Which of the following numbers will replace the question mark (?) in the given series?

0, 3, 8, 15, 24, 35, ?

**(a)** 63
**(b)** 48
**(c)** 37
**(d)** 80

**Q10.** The difference between the smallest and the largest fractions among 5/6,7/8,11/12,13/16 is:

**(a)** 5/48
**(b)** 5/43
**(c)** 5/47
**(d)** 5/41

**Q11.** A statement is followed by two conclusions. Find out which conclusion is true based on the given statement.

Statement:

$R < S \leq T \leq U = V > W > X$

Conclusions:

I. $S = V$

II. $V > S$

**(a)** Only conclusion II is true
**(b)** Both conclusions I and II are true
**(c)** Only conclusion I is true
**(d)** Either conclusion I or II is true

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**Q12.** SHG - Bank Linkage Programme (SHG-BLP) is a bank-led microfinance channel in India, which was initiated by _____.

**(a)** EXIM Bank
**(b)** NABARD
**(c)** LIC
**(d)** SIDBI

**Q13.** Ashutosh plotted Voltage against Current for two Ohmic conductors and found that the slopes of these two conductors are 10 and 50, respectively. If the same 20 V battery is connected across these two Ohmic wires separately, what will be the ratio of the current flow in these two wires?

**(a)** 5 : 3
**(b)** 5 : 2
**(c)** 5 : 1
**(d)** 5 : 4

**Q14.** In the given letter-cluster pairs, the first letter-cluster is related to the second letter-cluster following a certain logic. Study the given pairs carefully, and from the given options, select the pair that follows the same logic.

SJC : XOH

FMT : KRY

**(a)** NFK : SKD
**(b)** NFH : MSK
**(c)** HNF : MSK
**(d)** NHF : MWK

**Q15.** Why are contraceptive methods used?

**(a)** To prevent bacterial infection
**(b)** To overcome fatigue
**(c)** To reduce blood pressure
**(d)** To avoid pregnancy

**Q16.** Select the option that is related to the fifth number in the same way as the second number is related to the first number and the fourth number is related to the third number.

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

3 : 16 :: 5 : 36 :: 7 : ?

**(a)** 63
**(b)** 64
**(c)** 62
**(d)** 65

**Q17.** In India, the duration from _____ is the time of the arrival of the normal rainfall, which increases suddenly and continues constantly for several days, known as the ‘burst’ of the monsoon.

**(a)** July to early September
**(b)** Early June to mid-September
**(c)** Early June to August
**(d)** Early July to mid-August

**Q18.** By selling a computer for Rs. 30,875, a shopkeeper suffers a loss of 5%. At what price should he sell it to gain 7%?

**(a)** Rs. 33,985
**(b)** Rs. 36,105
**(c)** Rs. 35,525
**(d)** Rs. 34,775

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**Q19.** Normally, in a healthy adult, the initial filtrate in the kidneys is about 180 L daily. However, the volume actually excreted is only:

**(a)** 1 litre or 2 litres a day
**(b)** 2 litres or 3 litres
**(c)** 3 litres or 3.5 litres a day
**(d)** 2 litres or 3.5 litres a day

**Q20.** Six friends Q, R, S, T, U, and V are sitting in a row facing north. Q is seated 2^(nd) to the right of T and 3^(rd) to the left of S. U is not an immediate neighbour of Q. Who is seated between R and V

**(a)** T
**(b)** S
**(c)** U
**(d)** Q

**Q21.** Three statements are given followed by two conclusions numbered I and II. Assuming the statements to be true, even if they seem to be at variance with commonly known facts, decide which of the conclusions logically follow(s) from the statements.

Statements:

All aliens are people.

All people are mammals.

All mammals are animals.

Conclusions:

I. Some animals are mammals.

II. All people are aliens.

**(a)** Neither conclusion I or II follows
**(b)** Only conclusion II follows
**(c)** Only conclusion I follows
**(d)** Both conclusions I and II follow

**Q22.** Which of following is in-house software of the Indian Railways to tackle the problem of cattle getting run over by the trains?

**(a)** Indian Railway Tracking System
**(b)** Animal Tracking and Vigilant System
**(c)** Smart Event Tracking System
**(d)** Cattle Tracking Collar System

**Q23.** Which of the following numbers will replace the question mark (?) in the given series?

13, 14, 27, 41, 68, ?

**(a)** 109
**(b)** 118
**(c)** 85
**(d)** 98

**Q24.** In the modern periodic table, addition of new shells down the group results in _____.

**(a)** decrease in atomic size and nuclear charge
**(b)** increase in atomic size and decrease in nuclear charge
**(c)** increase in atomic size and nuclear charge
**(d)** decrease in atomic size and increase in nuclear charge

**Q25.** Refer to the following number series and answer the question.

(Left) 1 4 6 2 7 8 3 7 5 6 8 9 1 3 9 5 3 (Right)

Find the sum of all the odd numbers in the above number series.

**(a)** 58
**(b)** 57

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**(c)** 53
**(d)** 55

**Q26.** Each vowel in the word GRADIENT is changed to the letter following it in the English alphabetical order and each consonant is changed to the letter preceding it in the English alphabetical order. Which of the following letters will appear twice in the group of letters thus formed?

**(a)** J
**(b)** F
**(c)** B
**(d)** M

**Q27.** A substance is said to be reduced in a redox reaction if it:

**(a)** gains hydrogen and oxygen both
**(b)** loses hydrogen and oxygen both
**(c)** gains hydrogen or loses oxygen
**(d)** gains oxygen or loses hydrogen

**Q28.** An electric bulb of 40 Ω resistance and a conductor of 10 Ω resistance are connected to a 10 V battery. The total resistance of the circuit is:

**(a)** 50 Ω
**(b)** 40 Ω
**(c)** 60 Ω
**(d)** 30 Ω

**Q29.** When light is passed through a prism, refraction of light occurs:

**(a)** zero times
**(b)** two times
**(c)** three times
**(d)** one time

**Q30.** Two pipes A and B can fill a cistern in 21 minutes and 28 minutes, respectively. Both the pipes are opened together but after 4 minutes, pipe B is turned off. What is the total time taken to fill the tank?

**(a)** 13 minutes
**(b)** 15 minutes
**(c)** 12 minutes
**(d)** 18 minutes

**Q31.** Th which year was the High Court of Delhi established?

**(a)** 1966
**(b)** 1948
**(c)** 1956
**(d)** 1862

**Q32.** The perimeter of a square is 32 m. Its area (in $m^2$) is:

**(a)** 128
**(b)** 64
**(c)** 32
**(d)** 56

**Q33.** Which two numbers should be interchanged to make the following equation correct?

$9 + 7 - (6 \div 3 - 4) \times 8 = 31$

**(a)** 8 and 7
**(b)** 9 and 7
**(c)** 6 and 7
**(d)** 4 and 7

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**Q34.** Different-coloured dustbins are provided by some municipalities in some cities and towns. The blue one is used for collecting _____

**(a)** agricultural wastes
**(b)** kitchen wastes
**(c)** medical wastes
**(d)** reusable wastes

**Q35.** Which of the following fractions is the largest?

5/7, 9/14, 16/21, 29/42

**(a)** 29/42
**(b)** 16/21
**(c)** 9/14
**(d)** 5/7

**Q36.** In which of the following years was the Planning Commission set up with the Prime Minister as its Chairperson, and hence began the era of five-year plans.

**(a)** 1949
**(b)** 1947
**(c)** 1948
**(d)** 1950

**Q37.** Who among the following clocked 20.52 seconds in the men's 200 m final of the Federation Cup 2022 to break Muhammed Anas Yahiya's previous national record of 20.63 created at a meet in the Czech Republic back in 2018?

**(a)** Jinson Johnson
**(b)** Surendra Singh
**(c)** Amlan Borgohain
**(d)** Amiya Kumar Mallick

**Q38.** Ten years ago, Krishna was one-third as old as he will be 20 years from now. Krishna's present age (in years) is _____.

**(a)** 45
**(b)** 27
**(c)** 25
**(d)** 30

**Q39.** Amit starts from Point A and drives 6 km towards the south. He then takes a left turn, drives 4 km, turns right and drives 3 km. He then takes a right turn and drives 7 km. He takes a final right turn, drives 9 km and stops at Point B. How far and towards which direction should he drive in order to reach Point A from Point B? (All turns are 90 degree turns only)

**(a)** 2 km towards the east
**(b)** 3 km towards the north
**(c)** 2 km towards the west
**(d)** 3 km towards the east

**Q40.** Parshavnatha temple is located in which state?

**(a)** Madhya Pradesh
**(b)** Rajasthan
**(c)** Karnataka
**(d)** Kerala

**Q41.** Devprayag is the confluence of _____.

**(a)** Yamuna and Ganga
**(b)** Sutlej and Indus
**(c)** Alaknanda and Bhagirathi
**(d)** Godavari and Narmada

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**Q42.** The traffic signals at three different road crossings change after every 45 seconds, 75 seconds and 90 seconds respectively. If they all change simultaneously at 9:30:00 a.m., then at what time will they next change again simultaneously?

**(a)** 9:38:00 a.m.
**(b)** 9:37:30 a.m.
**(c)** 9:39:10 a.m.
**(d)** 9:39:20 a.m.

**Q43.** Select the option that is related to the seventh number in the same way as the second number is related to the first number, the fourth number is related to the third number and the sixth number is related to the fifth number.

8 : 2 :: 16 : 6 :: 18 : 7 :: 28 : ?

**(a)** 21
**(b)** 12
**(c)** 11
**(d)** 9

**Q44.** Six pen boxes of different brands, P1, Q2, R3, S4, T5 and U6, are kept one above the other but not necessarily in the same order. P1 is third from the top and immediately below U6. Only two boxes are there between P1 and Q2. There are two boxes between R3 and T5. R3 is placed below T5. How many pen boxes are there between T5 and Q2?

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

**Q45.** The Dree Festival, an important agricultural festival, is primarily celebrated by the Apatani tribe in the state of _____.

**(a)** West Bengal
**(b)** Kerala
**(c)** Arunachal Pradesh
**(d)** Madhya Pradesh

**Q46.** Which of the following chemicals can be applied to get relief from pain due to bee-sting?

**(a)** $Na_2CO_3$
**(b)** $CaSO_4$
**(c)** $NaHCO_3$
**(d)** $CaCO_3$

**Q47.** Which of the following Indian languages is NOT categorised as a classical language by the Ministry of Culture, Government of India?

**(a)** Telugu
**(b)** Sanskrit
**(c)** Bengali
**(d)** Tamil

**Q48.** If the cost of two tables and three wooden benches is Rs. 3,500 and the cost of three tables and two wooden benches is Rs. 4,000, then the cost (in Rs.) of one table is _____.

**(a)** 500
**(b)** 1,000
**(c)** 1,400
**(d)** 2,200

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**Q49.** The present total age of A and B is 12 years more than the present total age of B and C. By how many years is C younger than A?

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

**Q50.** Study the following arrangement and answer the question given below. All numbers given below are 2 digit numbers.

33 56 93 % 28 21 @ / 84 94 39 $ 65 19 # 81

Which is the 7^(th) term to the right of the 14^(th) term from the right end in the above arrangement ?

**(a)** 94
**(b)** 21
**(c)** @
**(d)** 84

**Q51.** Arrange the following organic compounds in the increasing order of their boiling point.

CH4, CH3COOH, CHCl3, CH3CH2OH

**(a)** CH3CH2OH < CH3COOH < CHCl3 < CH4
**(b)** CH4 < CHCl3 < CH3COOH < CH3CH2OH
**(c)** CH3COOH < CH3CH2OH < CHCl3 < CH4
**(d)** CH4 < CHCl3 < CH3CH2OH < CH3COOH

**Q52.** The given reaction is an example of _____.

2 Al + Fe2O3 → Al2O3 + 2Fe

**(a)** double displacement reaction
**(b)** oxidation reaction
**(c)** displacement reaction
**(d)** reduction reaction

**Q53.** The element ‘X’ has seven electrons in outermost shell. Select the group of the modern periodic table to which it belongs.

**(a)** 7^(th) group
**(b)** 16^(th) group
**(c)** 17^(th) group
**(d)** 18^(th) group

**Q54.** Read the given statements and conclusions carefully and decide which of the given conclusions logically follow(s) from the statements.

Statements:

1. M ranked higher than B who ranked equal to S.
2. B ranked higher than F.
3. S did not rank higher than Q who ranked lower than M.
4. M ranked higher than F who did not rank lower than T.

Conclusions:

I. Q ranked higher than T.

II. Q ranked equal to T.

III. M ranked higher than F.

**(a)** Conclusions I and II follow
**(b)** Conclusion III follows
**(c)** Conclusions I and III follow
**(d)** Conclusions II and III follow

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**Q55.** The value of the discriminant of the quadratic equation $2x^2 - 4x - 3 = 0$ is:

**(a)** 24
**(b)** 16
**(c)** 36
**(d)** 40

**Q56.** As per the 16^(th) Annual Status of Education Report (ASER) 2021 (Rural), the enrolment rate decreased to _____ in private schools.

**(a)** 18.2%
**(b)** 20.1%
**(c)** 27.2%
**(d)** 24.4%

**Q57.** A dealer sold his goods at a discount of 20% but set the marked price of each article at 30% above the cost price. His gain percentage on each article is _____.

**(a)** 10%
**(b)** 8%
**(c)** 4%
**(d)** 5%

**Q58.** A man receives Rs. 6,500 per month as salary. He saves 20% of his salary every month. His expenditure per month is:

**(a)** Rs. 5,200
**(b)** Rs. 4,900
**(c)** Rs. 5,100
**(d)** Rs. 5,000

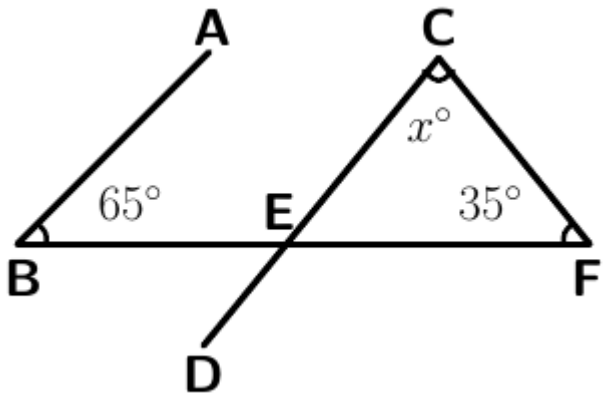
**Q59.** As of March 2022, who is the chief justice of Karnataka high court?

**(a)** B Veerappa
**(b)** Ritu Raj Awasthi
**(c)** S Sujatha
**(d)** Alok Aradhe

**Q60.** Express 0.6464... in the form p/q where p and q are integers and $q \neq 0$.

**(a)** 7/9
**(b)** 67/95
**(c)** 9/11
**(d)** 64/99

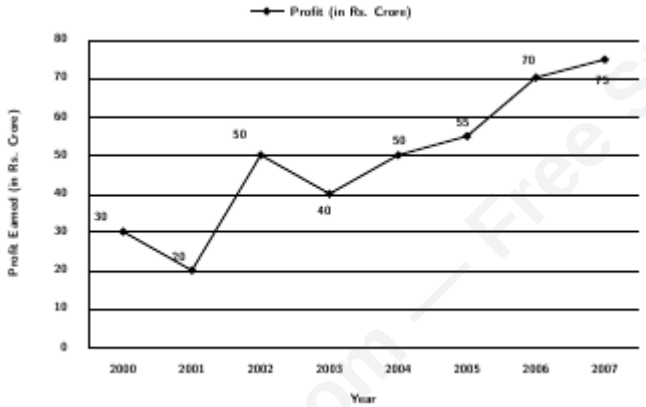
**Q61.** In the given figure, AB is parallel to CD. What is the value of x° ?




**(a)** 30°
**(b)** 80°
**(c)** 110°

**(d)** 100°

**Q62.** The following graph shows the profit earned by a company over the years. Study the graph and answer the question that follows.




Calculate the increase in profit earned by the company in year 2002 as compared to previous year.

**(a)** Rs. 50 crore
**(b)** Rs. 20 crore
**(c)** Rs. 40 crore
**(d)** Rs. 30 crore

**Q63.** Eight girls, A, B, C, D, E, F, G and H, are sitting around a circular table and facing the centre (but not necessarily in the same order). A is sitting second to the left of B. F is sitting to the immediate left of C. D is not an immediate neighbour of either F or E. H is not an immediate neighbour of B. Only three girls are sitting between A and D.

Who among the following girls are the immediate neighbours of D?

**(a)** H and G
**(b)** F and B
**(c)** A and E
**(d)** E and B

**Q64.** What approximate value should come in place of the question mark (?) in the following equation?

$7.05 - 20.92 + 16.20 \times 3.99 = ?$

**(a)** 50
**(b)** 52
**(c)** 62
**(d)** 76

**Q65.** A factory built in the shape of a cuboid except for its roof had its dimensions given as 140 m × 10 m × 10 m. The structure is then closed on the top with a semi-cylindrical structure to exactly cover the open top of the cuboidal structure. The volume (in $m^3$) of the semi-cylindrical structure forming the roof is:

Take $\pi = 22/7$

**(a)** 6500
**(b)** 5500
**(c)** 11000
**(d)** 13000

**Q66.** Who among the following social reformers wrote the book called 'Barno-Porichoy'?

**(a)** Debendranath Tagore
**(b)** Ishwar Chandra Vidyasagar
**(c)** Swami Vivekananda
**(d)** Dwarkanath Ganguly

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**Q67.** The first menstrual flow begins at puberty and is termed as:

**(a)** Menstruation
**(b)** Ovulation
**(c)** Menopause
**(d)** Menarche

**Q68.** A company earns a profit that is distributed among the company's three partners in the ratio of 1 : 3 : 5. If the difference between the smallest and the largest shares is Rs. 80,000, the total profit of the company is:

**(a)** Rs. 1,60,000
**(b)** Rs. 1,80,000
**(c)** Rs. 1,20,000
**(d)** Rs. 1,40,000

**Q69.** What is term used for perks that employers give to their employees above and beyond any financial compensation?

**(a)** Trim benefits
**(b)** Fringe benefits
**(c)** Outlying benefits
**(d)** Marginal benefits

**Q70.** Find the value of [(12×4)×{6÷4×((7-4)/6)}].

**(a)** 36
**(b)** 48
**(c)** 42
**(d)** 24

**Q71.** The rate of electricity in a state is Rs. 5.00 per unit. The cost of running an 100 W fan for 10 hours a day for the whole month of May will be rupees:

**(a)** 300
**(b)** 155
**(c)** 150
**(d)** 200

**Q72.** Refer to the following letter, number and symbol series and answer the question.

(Left) V 2 5 U @ ρ W ¥ # 2 Ω A R Q 1 @ F B 4 6 # H J % Z E (Right)

If all the consonants are dropped from the series, what will be the position of 'Ω' from the left?

**(a)** Eighth
**(b)** Tenth
**(c)** Ninth
**(d)** Seventh

**Q73.** Which acid is produced by the human stomach?

**(a)** CH3COOH
**(b)** H2SO4
**(c)** Lactic acid
**(d)** HCl

**Q74.** Six medical students, J, K, L, M, N and O completed their MBBS graduation from a reputed medical institute between 2014 and 2019. Each of them graduated in a different year. J graduated in the year immediately before the year N graduated. Only one medical student graduated between K and O, where K graduated before O. O graduated in 2019. If M graduated in 2014, then who graduated in 2016?

**(a)** J
**(b)** N
**(c)** L
**(d)** K

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**Q75.** The refractive indices of dense flint glass and water are 1.65 and 1.33, respectively. A ray of light passes from dense flint glass to water. The refractive index of water with respect to dense flint glass is ____ and the ray bends _____ the normal in water.

**(a)** 0.81, away from
**(b)** 1.24 away from
**(c)** 0.81, towards
**(d)** 1.24, towards

**Q76.** If '+' means '-', '-' means '×', × means '÷', and '÷' means '+', what will come in place of the question mark (?) in the following equation?

44 × 11 - 25 ÷ 20 + 80 =?

**(a)** 100
**(b)** 90
**(c)** 40
**(d)** 60

**Q77.** Six Engineering graduates, Jayanth, Komal, Lasya, Midhun, Nayan and Ojaswi, graduated from a reputed engineering institute, each of them in a different year between 2004-2009. Jayanth graduated in the year immediately before the year Nayan graduated. Only one engineering student graduated between Komal and Ojaswi, where Komal was Ojaswi's senior. Ojaswi graduated in 2009.

If Midhun graduated in 2004, then who graduated in 2006?

**(a)** Lasya
**(b)** Komal
**(c)** Jayanth
**(d)** Nayan

**Q78.** Convert 7893/9990 to its recurring decimal form.

**(a)** 0.7900900...
**(b)** 0.799799...
**(c)** 0.7990990...
**(d)** 0.790790...

**Q79.** The elections for Panchayat are conducted by _____.

**(a)** state election commission
**(b)** Election commission of India
**(c)** Revenue Department of the state
**(d)** Urban local government

**Q80.** Consider two coils, A, having larger number of turns than B, kept axially at a distance from each other. The coil A is connected to a battery and a switch and B is connected to a galvanometer. On switching on or off the circuit a DC current flows through the coil A, then deflection in the galvanometer connected to coil B can be increased by winding the core of coil B on _____.

**(a)** an ebonite rod
**(b)** an iron rod
**(c)** a wooden rod
**(d)** a glass rod

**Q81.** The mean of a data is 38 and its median is 46. The mode (using empirical relation) of the data is:

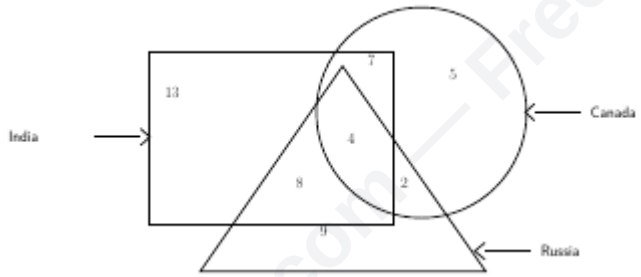
**(a)** 65
**(b)** 64
**(c)** 62
**(d)** 63

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**Q82.** For green plant tissues undergoing photosynthesis, _____ is a waste product.

**(a)** ammonia
**(b)** carbon dioxide
**(c)** oxygen
**(d)** urea

**Q83.** Study the given diagram carefully and answer the question that follows.
The numbers in different sections indicate the number of people who belong to different countries.




What number represents the people who belong to India, Canada as well as Russia?

**(a)** 7
**(b)** 8
**(c)** 4
**(d)** 2

**Q84.** The surface area (in $cm^2$) of a sphere of radius 14 cm is:
Take $\pi = 22/7$

**(a)** 1848
**(b)** 616
**(c)** 1232
**(d)** 2464

**Q85.** _____ pass is a high mountain pass in the state of Himachal Pradesh, that connects Kullu valley with Lahual - Spiti Valley.

**(a)** Shipki La
**(b)** Lipu Lekh
**(c)** Rohtang
**(d)** Zoji La

**Q86.** Janak started from his office and after travelling a distance of 4 km towards north, he turned to the left and travelled a distance of 3 km. He then tuned left and travelled 9 km. He then took a final left, travelled 3 km and stopped. What is the shortest distance between the stopping point and his office? (All tums are 90 degree turns only)

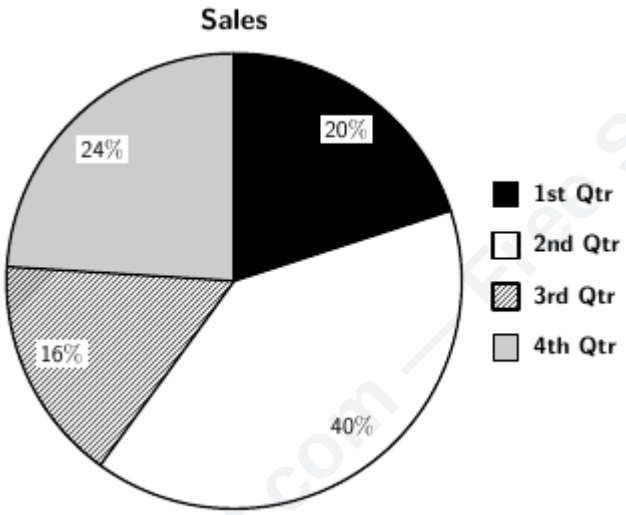
**(a)** 8 km
**(b)** 7 km
**(c)** 6 km
**(d)** 5 km

**Q87.** Which of the following term will replace the question mark (?) in the given series to make it logically complete?
AMB3, DPE5, GSH7, ?, MYN11

**(a)** JVK12
**(b)** JVK9
**(c)** KVL9
**(d)** KYL12

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**Q88.** The given pie chart shows the sales of a store in each quarter as the percentage of total sales. Study the pie chart and answer the question that follows.




Which quarters have the highest and lowest sales, respectively?

**(a)** 1^(st) and 2^(nd)
**(b)** 2^(nd) and 3^(rd)
**(c)** 4^(th) and 3^(rd)
**(d)** 2^(nd) and 4^(th)

**Q89.** Which of the following numbers is exactly divisible by 18?

**(a)** 239076
**(b)** 792462
**(c)** 842104
**(d)** 317468

**Q90.** What is the cause of muscle cramps?

**(a)** Low glucose level in the blood (hypoglycaemia)
**(b)** Excessive excitation of neuromuscular junctions
**(c)** Insufficiency of oxygen supply to muscles
**(d)** Fatigue and weakness of the body

**Q91.** Given that c is the third proportional of 15 and b. If b is the sum of first three odd natural numbers, then the value of c is:

**(a)** 29/5
**(b)** 26/5
**(c)** 27/5
**(d)** 28/5

**Q92.** The principal focus of a convex mirror is located:

**(a)** in front of the mirror
**(b)** below the principal axis
**(c)** behind the mirror
**(d)** above the principal axis

**Q93.** In a certain code language, ‘TOTAL’ is written as ‘RMRYJ’ and ‘PLANT’ is written as ‘NJYLR’. How will ‘PHONE’ be written in that code language?

**(a)** NFMLC
**(b)** FNMLC
**(c)** MLCNF
**(d)** NFLMC

**Q94.** 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 chairs are pens.

Some pens are shoes.

Some shoes are desks.

Conclusions:

(I) Some desks are chairs.

(II) Some shoes are chairs.

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

**Q95.** Which of the following part connects the urinary bladder and the kidney?

**(a)** Urethra
**(b)** Tubules
**(c)** Nephrons
**(d)** Ureters

**Q96.** Suppose a current of 0.05 A is passing through a wire of resistance R when the voltage across the resistor is 10 V. What current will pass through this wire when the voltage across it is 20 V

**(a)** 0.02 A
**(b)** 0.1 A
**(c)** 0.01 A
**(d)** 0.2 A

**Q97.** If α, β be the roots of the quadratic equation $3x^2 - 9x + 8 = 0$, then the value of $(\alpha/\beta+\beta/\alpha)+4(1/\alpha+1/\beta)$ is:

**(a)** 7.225
**(b)** 5.875
**(c)** 6.125
**(d)** 4.825

**Q98.** A statement is given followed by two assumptions numbered I and II. You have to assume everything in the statement to be true and decide which of the assumptions is/are implicit in the statement.

Statement:

Do not throw glass bottles in green dustbins which are meant for other recyclable waste items.

Assumptions:

I. Dustbins for collecting glass bottles are of a different colour than the dustbins used to collect other recyclable items.

II. Glass bottles are to be thrown along with the non-recyclable waste.

**(a)** Neither assumptions I nor II is implicit
**(b)** Both assumptions I and II are implicit
**(c)** Only assumption I is implicit
**(d)** Only assumption II is implicit

**Q99.** A shopkeeper claims to sell his goods at cost price but uses a weight that actually weighs 900 gm though 1 kg is written on it. The gain percentage is:

**(a)** 221/2%
**(b)** 9%
**(c)** 141/3%
**(d)** 111/9%

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**Q100.** In return for help in protection of 1,272 hectares of a badly degraded Sal forest, villagers were given employment in:

**(a)** silviculture
**(b)** agriculture
**(c)** pomo culture
**(d)** Sericulture

## ANSWER KEY

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

## SOLUTIONS

**Q1. Answer: (c) MU*VY**

According to the given information, the numbers and symbols are coded as:

| Number / Symbol | 6 | 8 | 4 | • | 5 | # | % | 2 | $ | 1 | ^ | 7 | 9 | • | @ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Code | S | U | T | W | N | P | V | D | A | Z | J | M | O | M | Y |

Now, let's do the coding for " 7 8 4 % @ ",

As per the given information, " 7 8 4 % @ " can be coded as " M U T V Y ",

Since, it meets the condition (iii) as its first and second elements are numbers, then the third element will be coded as *.

Thus, the final coding of " 7 8 4 % @ " will be " M U * V Y ".

Hence, the correct answer is " MU*VY ".

**Q2. Answer: (a) its small size and greater strength of carbon-carbon bond**

The correct answer is Small size and greater strength of carbon-carbon bond.

Key Points

• Carbon:

• The chemical element carbon has the atomic number six and the symbol C.

• It is nonmetallic and tetravalent, which means that because its valence shell has four electrons, its atoms can form up to four covalent bonds.

• It is a member of periodic table group 14.

• It is a small atom with a small atomic radius, allowing it to form strong carbon- carbon covalent bonds.

• The strength of the carbon-carbon bond allows for the formation of long chains or rings, which is the basis of catenation.

• The strength of the bond also makes carbon compounds more stable and less reactive.

• Different carbon atoms can form different bonds with one another to form different carbon allotropes. Amorphous carbon, diamond, graphite, and fullerenes are a few examples of well-known allotropes.

Additional Information

• Catenation:

• The capacity of certain elements to create bonds with atoms of the same element is known as catenation, and it's a fascinating

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idea in chemistry.

• The great diversity and complexity of organic chemistry arise from this characteristic, which is especially noticeable in carbon compounds.

• Catenation's greatest champion is carbon, which has four valence electrons. It easily forms strong covalent connections with other carbon atoms to form complex structures and lengthy chains.

• Carbon may produce a variety of compounds, such as alkanes, alkenes, alkynes, and aromatic compounds, by making single, double, and even triple bonds with itself.

• The catenation property of carbon is responsible for the amazing diversity of organic chemistry.

• Other elements like silicon and germanium can also exhibit catenation, but their bonds are not as strong as carbon-carbon bonds.

**Q3. Answer: (c) Javagal Srinath**

The correct answer is Javagal Srinath.

Key Points

• The ICC Hall of Fame is a recognition given to the best cricketers in the history of the sport.

• It was established by the International Cricket Council (ICC) in 2009.

• Javagal Srinath:

• He is a former Indian cricketer who played for the Indian national team from 1991 to 2002.

• He was known for his fast bowling and played a key role in India's victory in the 2002 NatWest Series final against England.

• In June 2021, he was inducted into the ICC Hall of Fame along with former Zimbabwean cricketer Andy Flower and former Australian cricketer Monty Noble.

Additional Information

• Dilip Vengsarkar:

• He is a former Indian cricketer who played for the Indian national team from 1976 to 1992.

• He was a part of the Indian cricket squad that took home the World Cup in 1983.

• Additionally, Vengsarkar guided his country's team to victory in the 1988 Asia Cup.

• The greatest accolade bestowed upon a former player by the BCCI, the C. K. Nayudu Lifetime Achievement Award, was given to him in 2014.

• Vinu Mankad:

• Mulvantrai Himmatlal "Vinoo" Mankad, who played 44 Test matches for India between 1946 and 1959, was a former captain of the Indian cricket team.

• He was born on April 12, 1917, and passed away on August 21, 1978.

• His opening partnership of 413 runs with Pankaj Roy in 1956, which set a world record and remained until 2008, is what made him most famous.

• In cricket, Mankading is named after him for running out a batsman who is "backing up" at the non-striker's end.

• He was admitted to the ICC Cricket Hall of Fame in June 2021.

• In 1973, the Indian government bestowed upon him the civilian honor of Padma Bhushan.

• The Vinoo Mankad Trophy, an under-19 domestic event in India organized by the BCCI, bears his name.

• Ajay Jadeja:

• He is a former Indian cricketer who played for India from 1992 to 2000.

• He participated in 196 One Day Internationals and 15 Test matches.

• At the time, he was considered as one of the Indian team's top fielders.

• Jadeja and Mohammed Azharuddin share the record for the greatest one-day partnership, having played against Sri Lanka and Zimbabwe, respectively, at the fourth and fifth wickets.

**Q4. Answer: (c) The right to move the Supreme Court by appropriate proceedings for the enforcement of the rights conferred...**

The correct answer is The right to move the Supreme Court by appropriate proceedings for the enforcement of the rights conferred by Part III is guaranteed.

Key Points

• Right to Constitutional Remedies:

• Enshrined in the Part III: Fundamental Rights of the Indian Constitution under Article 32 which provides for the right to move the Supreme Court by appropriate proceedings for the enforcement of the rights conferred by Part III is guaranteed.

• The SC may issue directives, orders, or writs to enforce any of the fundamental rights in accordance with Article 32.

• Among the writs that may be granted are: Habeas corpus, mandamus, prohibition, certiorari and Quo-warranto.

• The SC has original but not exclusive jurisdiction over the enforcement of fundamental rights. It is concurrent with the jurisdiction of the high court under Article 226.

• The right to move the SC cannot be suspended with the exception of Article 329 which states that in the event of a national emergency, the President may revoke the ability to petition any court to enforce fundamental rights.

• The Supreme Court held in the Chandra Kumar case (1997) that the basic structure of the Constitution includes the writ jurisdiction of both the high court and the Supreme Court.

Additional Information

• Right to Equality:

• These are enshrined in Part III: Fundamental rights of the Indian Constitution under Article 14-18.

• Article 14: No individual within the territory of India may be denied equality before the law or equal protection under the law on the basis of religion, race, caste, sex, or place of birth.

• Article 15: No citizen may be subjected to discrimination by the State based only on their place of birth, race, caste, religion, or any of them.

• Article 16: It ensures equality of opportunity in public work by prohibiting discrimination in public employment on the basis of sex, religion, race, caste, or place of birth.

• Article 17: Abolition of untouchability and all forms of its practice.

• Article 18: All titles are abolished, with the exception of academic and military titles.

• Rights to Freedom of Religion:

• Articles 25 to 28 of the Indian Constitution are part of the Fundamental Rights which gives rights to freedom of religion.

• Article 25 guarantees the freedom of conscience and the right to freely profess, practice, and propagate religion, subject to public order, morality, and health.

• Article 26 grants every religious denomination the right to manage its own affairs in matters of religion, subject to public order, morality, and health.

• Article 27 prohibits the state from compelling any person to pay taxes for the promotion or maintenance of any particular religion or religious denomination.

• Article 28 prohibits the imparting of religious instruction in any educational institution wholly maintained out of state funds.

• Right to Education:

• Article 21A, which reads, "The State shall provide free and compulsory education to all children of 6 to 14 years of age in such manner as the State, may by law determine," was added to the Indian Constitution by the 86th Constitutional Amendment in 2002.

• The original provisions for state-funded, equitable, and accessible education were found in Article 45, Part IV: Directive Principle of State Policy (DPSP) of the Indian Constitution.

• The Ramamurti Committee Report, 1990, was the first formal document establishing the right to an education.

• In the landmark ruling in Unnikrishnan JP versus State of Andhra Pradesh & Others (1993), the Supreme Court ruled that education is a fundamental right derived from Article 21.

• The establishment of the Tapas Majumdar Committee (1999) encompassed the addition of Article 21A.

• The right to education was made a basic right in Part III: Fundamental Rights of the Indian Constitution by the 86th Amendment, 2002.

• 86th Constitutional Amendment Act, 2002 also amended Article 45 of DPSP which now read as, "The state shall endeavour to provide early childhood care and education for all children untill they complete the age of six years."

**Q5. Answer: (d) Kavach**

The correct answer is Kavach.

Key Points

• Kavach:

• It is an advanced technology that can prevent train collisions by detecting the presence of another train on the same track and automatically applying brakes to avoid a collision.

• It is based on a combination of sensors, communication systems, and artificial intelligence algorithms that can analyze and predict the movement of trains in real-time.

• It has been developed by the Research Design and Standards Organisation (RDSO) in collaboration with Indian Railways and was launched in March 2022.

• The technology is expected to significantly improve the safety and efficiency of train operations in India, which has one of the largest railway networks in the world.

Additional Information

• Research Designs & Standards Organisation (RDSO):

• It is the research and development organisation.
• It works under the Ministry of Railways of the Government of India.
• In 1957, it was founded.
• Its headquarters is in Lucknow, Uttar Pradesh.
• Trishool:
• It is a short-range, low-level, quick-reaction surface-to-air missile.
• As a component of the Integrated Guided Missile Development Programme (IGMDP), it is being developed in India by the Defence Research and Development Organisation (DRDO).
• 1983 saw the launch of the Trishul missile project as a component of the Integrated Guided Missile Development Programme.
• It can also be deployed as an anti-sea skimmer from a navy vessel to thwart aeroplanes, assault helicopters, and low-flying missiles.

**Q6. Answer: (c) 8, 12, 12**

The solution is in Hindi. Read it online.

**Q7. Answer: (d) 2 cm**

The correct answer is 2 cm.

Key Points

• Given in the question:
• The magnification produced by the concave mirror (m) = - 2, which means that the image formed is Real and Inverted image.
• The height of the object (h) = 1 cm.
• The height of the image can be calculated using the formula, m = h'/h, where h' is the height of the image.
• From the above equation, we get,
• h' = m x h = -2 x 1 cm = -2 cm.
• Therefore, the height of the image is 2 cm and negative sign indicate that the image is inverted.

Additional Information

• Concave Mirror:
• Mirror which has a depression towards the centre of sphere with polish opposite to the centre of curvature is called Concave mirror.
• This means that the mirror is curved inward, with the outer edges being closer to the viewer than the center.
• A concave mirror is also known as a converging mirror, as it focuses light rays that enter it towards a single point.
• The Centre of Curvature (C) and the Focus (f) are located in front of the mirror i.e. unpolished side.
• Magnification produced by a concave mirror is negative when the image formed is Real and Inverted.
• The height of the object is equal to the height of the image when the object is placed at the focus of the mirror.
• The magnification of a concave mirror can be calculated using the formula m = -v/u, where v is the distance of the image from the mirror and u is the distance of the object from the mirror.

**Q8. Answer: (a) Article 112**

The correct answer is Article 112.

Key Points

• Union Budget:
• Article 112 of the Indian Constitution mandates the presentation of the Union Budget, also known as the Annual Financial Statement (AFS), in the Parliament every year.
• The Union Budget is a statement of the government's revenue and expenditure for the upcoming financial year, which runs from April 1 to March 31.
• The Union Budget comprises three parts:
• The Consolidated Fund of India includes the government's revenue receipts, capital receipts, and expenditure dealt under Article 266.
• The Contingency Fund of India is used to meet unforeseen expenses dealt under Article 267.
• The Public Account of India includes transactions of the government relating to debt, deposits, and other transactions dealt under Article 266.
• The Union Budget is a crucial document that reflects the government's economic policies, priorities, and vision for the country's growth and development.

Additional Information

• Article 134 deals with the appellate jurisdiction of the Supreme Court of India in regard to criminal matters.

• Article 31-C under part III provides for the validation or saving of certain laws that seek to implement the Directive Principles of State Policy, which are non-justiciable in nature.

• Article 38 enshrines the Directive Principle of State Policy that directs the State to promote the welfare of the people by securing a social order in which justice, social, economic, and political, shall inform all the institutions of the national life.

• Aside from the Finance Minister's Budget Speech, the main budget documents that are given to Parliament are the Finance Bill (Article 110), the Annual Financial Statement (Article 112), the Demands for Grants (Article 113), and the Fiscal Policy Statements required by the FRBM Act.

**Q9. Answer: (b) 48**

The pattern followed here is;

Hence, the correct answer is "48".

**Q10. Answer: (a) 5/48**

Shortcut Trick

To compare fractions, convert them to a common denominator using the LCM of (6, 8, 12, 16) = 48.

Fractions become: 5/6 = 40/48, 7/8 = 42/48, 11/12 = 44/48, 13/16 = 39/48.

Smallest = 39/48 (13/16) and Largest = 44/48 (11/12).

Difference = 44/48 − 39/48 = 5/48.

Therefore The correct answer is 5/48.

Alternate Method

Given: Fractions are 5/6, 7/8, 11/12, and 13/16.

=> Convert to decimals: 5/6 ≈ 0.833, 7/8 = 0.875, 11/12 ≈ 0.916, 13/16 = 0.8125.

=> Largest fraction = 11/12

=> Smallest fraction = 13/16

=> Difference = 11/12 − 13/16

=> LCM of 12 and 16 is 48.

=> (11 × 4)/48 − (13 × 3)/48 = 44/48 − 39/48 = 5/48.

Therefore The correct answer is 5/48.

Additional Information

Comparison of Fractions

If the difference between numerator and denominator is the same for all proper fractions, the one with the largest numerator is the largest.

Cross-Multiplication Method

To compare a/b and c/d, check (a × d) and (b × c). If ad > bc, then a c/d.

**Q11. Answer: (d) Either conclusion I or II is true**

Given Statement:- R < S ≤ T ≤ U = V > W > X

Conclusion:-

I. S = V → False (as S ≤ T ≤ U = V i.e S ≤ V No any direct relationship established between S and V)

II. V > S → False (as S ≤ T ≤ U = V i.e S ≤ V No any direct relationship established between V and S)

Combining both Conclusion I & II we get S ≤ V

So, the Conclusion I and II are complementary pair to each other so either or case is followed here.

Hence, the correct answer is "Either conclusion I or II is true".

Additional Information3 Step to find Either or case:

1. Elements are same.2. Combine the Conclusion.3. Check combined conclusion through gate method.

**Q12. Answer: (b) NABARD**

The correct answer is NABARD.

Key Points

• National Bank for Agriculture and Rural Development (NABARD):

• India's top development bank, NABARD, aims to support fair and sustainable rural and agricultural development.

• The Sivaraman Committee, which was constituted on March 30, 1979, recommended the establishment of NABARD.

• As per the National Bank for Agriculture and Rural Development Act, 1981, it is a statutory body that was founded in 1982 by

Parliament.

• Its headquarter is located in Mumbai, India.

• It supervises Regional Rural Banks (RRBs) and Cooperative Banks, assisting them in establishing safe banking procedures and integrating them with the CBS (Core Banking Solution) system.

• Chairman: Shri. Shaji K V

• It was established with the aim of providing credit flow for the development of agriculture, cottage and village industries, handicrafts, and small-scale industries in rural areas.

• Self Help Group - Bank Linkage Programme (SHG-BLP):

• It is the world's largest microfinance initiative initiated by NABARD in 1992 and has since been growing.

• It was started to provide financial assistance to self-help groups (SHGs) through banks with the objective to promote financial inclusion and empower women through microfinance.

• Banks were permitted to open savings accounts for SHGs under this policy.

• Components of SHG-BPL:

• Bank Branch Managers: Education and Sensitization

• Bank Sakhis' orientation and training at rural bank branches

• Community Based Repayment Mechanism (CBRM) should be implemented in rural bank branches.

• SHG Credit Linkage

Additional Information

• Export-Import (EXIM) Bank:

• It is a specialized financial institution in India that was established in 1982.

• The bank's primary function is to finance, facilitate and promote India's international trade.

• It is a statutory body.

• It is owned by the Government of India and its operations are governed by the Export-Import Bank of India Act, 1981.

• Exim Bank provides a wide range of financial services to Indian exporters and importers. These services include export credit, pre-shipment credit, post-shipment credit, and overseas investment finance.

• Headquarter: Mumbai

• Life Insurance Corporation (LIC):

• It is owned by the Indian government, and the Ministry of Finance is in charge of its administration.

• It is a statutory body.

• On September 1, 1956, the Life Insurance of India Act, which nationalised the insurance sector in India, was approved by the Indian Parliament, creating the Life Insurance Corporation of India.

• It is the biggest institutional investment and insurance company in India.

• LIC provides life insurance and pension products to individuals.

• Headquarter: Mumbai

• Small Industries Development Bank of India (SIDBI):

• It is the supreme regulatory agency for general licencing and oversight of micro, small, and medium enterprise finance organisations in India.

• It is governed by the Ministry of Finance of the Government of India, which has offices around the nation.

• It is a statutory body.

• The Government of India founded the SIDBI on April 2, 1990, and it is a fully owned subsidiary of IDBI Bank. With effect from March 27, 2000, it was disconnected from IDBI.

• Headquarter: Lucknow

**Q13. Answer: (c) 5 : 1**

The correct answer is 5 : 1.

Key Points

• The term "ohmic conductor" refers to a conductor that complies with Ohm's law, which states that the voltage across two points and the current flowing through it are directly proportional.

• Given in the question that:

• V = 20 V,

• Slope of the conductors are 10 (= R1) and 50 (= R2) respectively.

• Using Ohm's Law i.e. I = V/R, we get

• I1 = V/R1 = 20/10 = 2 A

• I2 = V/R2 = 20/50 = 0.4 A

• Now, I1: I2 = 2 : 0.4 = 5 : 1

• Thus, ratio of the current flow in two wires is 5 : 1.

Additional Information

• Potential difference:

• The energy differential between two places in a circuit caused by charge carriers is known as the potential difference.

• It is measured in volts (V).

• Electric Current:

• A flow of charged particles across space or an electrical conductor, such as electrons or ions.

• The ampere is the SI unit of electric current.

• Resistance:

• The amount of obstruction to current passage in an electrical circuit is measured as resistance. Ohms, or the Greek letter omega (Ω), are used to measure resistance (R).

• Ohm's Law:

• Ohm's law states that the electric current flowing through a conductor is directly proportional to the potential difference across its ends, provided the physical state of the conductor remains unchanged.

• If I be the current flowing through the conductor and V the potential difference across its ends, then V prop. to I

• Hence, V=IR, where, R is the constant of proportionality termed as Resistance of the conductor.

**Q14. Answer: (c) HNF : MSK**

The pattern followed here is :-

In SJC : XOH →

In FMT : KRY →

Similarly,

In HNF : MSK →

Hence, the correct answer is "HNF : MSK".

**Q15. Answer: (d) To avoid pregnancy**

The correct answer is To avoid pregnancy.

Key Points

• Contraceptive methods:

• These are used by people who want to prevent pregnancy.

• Methods of contraception include oral contraceptive pills, implants, injectables, patches, vaginal rings, intra uterine devices, condoms, male and female sterilization, lactational amenorrhea methods, withdrawal and fertility awareness-based methods.

• These methods have different mechanisms of action and effectiveness in preventing unintended pregnancy.

• Each method has its own benefits and risks, and people should choose a method that suits their individual needs and preferences.

• Contraceptive methods are not 100% effective, but they can greatly reduce the risk of unintended pregnancy.

• People should use a reliable method consistently and correctly to maximize its effectiveness.

Additional Information

• Contraceptive methods do not protect against STIs, except for condoms.

• People who are at risk of STIs should also use condoms or other barrier methods in addition to their chosen contraceptive method.

• Contraceptive methods can have side effects, such as nausea, headaches, mood changes, weight gain, etc.

• People should talk to their healthcare provider about any concerns they have about side effects and how to manage them.

• Human Immunodeficiency Virus (HIV):

• It is a virus that attacks the immune system, which is our body's natural defense against illness.

• It is a lifelong infection because, unlike many other viruses, the human body is unable to fully eradicate it.

• It specifically attacks CD4 cells (T cells), which are a type of white blood cell that plays a crucial role in the immune system.

• Vaccines for HIV prevention are not currently available.

• Prevention Methods:

• Safe Sex: Using condoms consistently and correctly during sexual intercourse can reduce the risk of HIV transmission.

• Needle Exchange Programs: Providing sterile needles to reduce the risk of HIV transmission among injection drug users.

• Safe Blood Transfusions: Ensuring that blood and blood products are screened for HIV.

**Q16. Answer: (b) 64**

The logic followed here is :-

(First Term + 1)² = Second Term

In 3 : 16 → (3 + 1)² = 16

In 5 : 36 → (5 + 1)² = 36

Similarly,

In 7 : 64 → (7 + 1)² = 64

Hence, the correct answer is "64".

**Q17. Answer: (b) Early June to mid-September**

The correct answer is Early June to mid-September.

Key Points

• Monsoons are seasonal winds that reverse their course in response to the onset of a new season.

• The Arabic term for season, "mawsim," is thought to be the source of the word "monsoon."

• It is maintained in the region between 20 °N and 20 °S.

• It lasts for 100–120 days, starting in early June and ending in mid-September.

• At the time of its arrival, the normal rainfall increases suddenly and continues constantly for several days, which is known as the “burst” of the monsoon.

• India receives about 80% of its annual rainfall during the monsoon season.

• In India, 64% of the population makes their living from agriculture, which is reliant on the monsoon season.

• Rainfall during the monsoon season replenishes reservoirs and dams, which is then utilised to produce hydroelectric power.

Additional Information

• Two types of monsoon are as follows:

• The South-west monsoon is the primary rainy season in India, which starts in June and lasts till September.

• This monsoon is caused by the differential heating of land and sea, which results in the formation of low-pressure systems over the Indian Ocean and the Arabian Sea.

• The Retreating Monsoon, also known as the North-East monsoon, brings rainfall to the southern parts of India during October and November.

• This monsoon is caused by the withdrawal of the south-west monsoon winds and the formation of a low-pressure system over the Bay of Bengal.

• The Indian Meteorological Department (IMD) keeps a close eye on the start of the monsoon season to assist farmers in scheduling their farming operations.

**Q18. Answer: (d) Rs. 34,775**

Shortcut Trick

Loss of 5% means selling price is 95% of Cost Price (CP).

Gain of 7% means selling price should be 107% of CP.

Using the unitary method: 95% units → 30,875.

107% units → (30,875 ÷ 95) × 107.

325 × 107 = 34,775.

Therefore The correct answer is Rs. 34,775.

Alternate Method

Given: Selling Price (SP1) = Rs. 30,875, Loss% = 5%, Target Gain% = 7%.

Formulas: CP = [SP × 100] ÷ [100 − Loss%], New SP = [CP × (100 + Gain%)] ÷ 100.

=> Step 1: Find Cost Price: CP = (30,875 × 100) ÷ (100 − 5) = (30,875 × 100) ÷ 95 = 32,500.

=> Step 2: Find New Selling Price for 7% gain: New SP = [32,500 × (100 + 7)] ÷ 100.

=> Step 3: New SP = 32,500 × 1.07 = 34,775.

Therefore The correct answer is Rs. 34,775.

Additional Information

Cost Price and Selling Price Relation

When there is a loss, SP = CP × (100 − Loss%) ÷ 100. When there is a profit, SP = CP × (100 + Profit%) ÷ 100.

Direct SP Ratio

For the same Cost Price, SP1 ÷ (100 ± P/L1) = SP2 ÷ (100 ± P/L2). This helps in finding the new price directly.

**Q19. Answer: (a) 1 litre or 2 litres a day**

The correct answer is 1 litre or 2 litres a day.

Key Points

• In a healthy adult, the initial filtrate in the kidneys is about 180 L daily, but the volume excreted is much lesser.

• The initial filtrate in the kidneys is about 180 L daily, which is equivalent to about 45 gallons.

• The actual amount expelled, which is roughly 1-2 litres per day, is substantially less.

• This means that only about 1% of the initial filtrate is excreted as urine, while the rest is reabsorbed back into the bloodstream.

• Age, gender, body size, and general health are some of the variables that affect how much urine a person excretes.

Additional Information

• Human Excretory system:

• It is a system of the body that is responsible for the elimination of waste products from the body.

• It consists of organs that help the body eliminate nitrogenous waste.

• The human excretory system includes:

• A pair of kidneys.

• A pair of ureters.

• A urinary bladder.

• A urethra.

• Nephrons:

• They are the structural and functional units of the kidneys, which are vital organs responsible for filtering blood, removing waste products, and regulating various physiological processes in the body.

• Each kidney contains approximately one million nephrons, and these microscopic structures play a crucial role in maintaining the body's internal balance by regulating water and electrolyte levels and removing metabolic waste.

• Substances, such as glucose, amino acids, and electrolytes, are reabsorbed from the filtrate back into the bloodstream, primarily in the proximal convoluted tubule.

**Q20. Answer: (d) Q**

Given → Six friends Q, R, S, T, U and V are sitting in a row facing north.

1) Q is seated 2nd to the right of T and 3rd to the left of S.

2) U is not an immediate neighbour of Q.

2 Possibilities of sitting R and V.

Here, Q is sitting between R and V.

Hence, the correct answer is "Q".

**Q21. Answer: (c) Only conclusion I follows**

The correct Venn diagram representation is:

Conclusions:

I) Some animals are mammals. → Follows (The relationship between animals and mammals is all mammals are animals.)

II) All people are aliens. → Does not follows (The relationship between people and aliens is all aliens are people.)

Hence, the correct answer is "Only conclusion I follows".

**Q22. Answer: (c) Smart Event Tracking System**

The correct answer is Smart Event Tracking System.

Key Points

• Smart Event Tracking System (SETS):

• The Ministry of Railways' in-house programme is called Smart Event Tracking System (SETS).

• A new planning and analysis tool based on Google Maps has been implemented to address the issue of cattle being run over by trains.

• The Agra Division has put the programme into use, and other divisions will eventually adopt it.

• Of the 26,000 occurrences of cattle ran over reported in 2020–21, over 6,500 occurred on the North Central Railway, which is situated in Prayagraj.

• Parts of the Delhi-Howrah and Delhi-Mumbai routes are also located in this zone.

Additional Information

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• The Real Time Train Information System (RTIS):

• It was created in partnership with the Indian Space Research Organisation (ISRO), is being installed on trains to automatically acquire their "movement timing at the stations, including that of arrival and departure or run-through."

• It will provides mid-section updates with a periodicity of 30 seconds. Without requiring any manual assistance, the Train Control can keep a closer eye on the whereabouts and velocity of trains equipped with RTIS.

• For the purpose of tracking train movements, the RTIS employs data from GSAT satellites equipped with GAGAN payloads.

• The data is then transmitted to the Centre for Railway Information Systems' Central Location Server (CLS) (CRIS).

**Q23. Answer: (a) 109**

The logic followed here is:

Logic: Addition of the previous two numbers, we get the third number.

13 + 14 = 27

14 + 27 = 41

27 + 41 = 68

41 + 68 = 109

Hence, the correct answer is "109".

**Q24. Answer: (c) increase in atomic size and nuclear charge**

The correct answer is increase in atomic size and nuclear charge

Key Points

• The modern periodic table is arranged in such a way that elements are grouped based on their atomic number, which determines their chemical properties.

• As we move "down a group", a "new electron shell (energy level)" is added to each successive element.

• This results in a "gradual increase in atomic size" because the additional shell increases the distance between the nucleus and the outermost electrons.

• At the same time, the "nuclear charge (number of protons in the nucleus) increases" as we move down the group.

• However, despite the increasing nuclear charge, the "shielding effect" caused by the inner electron shells reduces the effective nuclear attraction on the outermost electrons.

• Therefore, the correct answer is "Increase in atomic size and nuclear charge."

Additional Information

• Option 1 (Decrease in atomic size and nuclear charge) - Incorrect: Atomic size "increases" as we move down the group, and nuclear charge also increases due to the addition of protons.

• Option 2 (Increase in atomic size and decrease in nuclear charge) - Incorrect: While atomic size increases, nuclear charge does "not" decrease. Instead, it increases because more protons are added to the nucleus.

• Option 4 (Decrease in atomic size and increase in nuclear charge) - Incorrect: Atomic size "does not decrease" down the group; it increases due to additional electron shells.

Thus, the correct answer is Option 3: Increase in atomic size and nuclear charge.

**Q25. Answer: (c) 53**

Given a sequence of numbers is

1 4 6 2 7 8 3 7 5 6 8 9 1 3 9 5 3

The above-underlined numbers are odd numbers

The sum of all the odd numbers is

1 + 7 + 3 + 7 + 5 + 9 + 1 + 3 + 9 + 5 + 3 = 53

Hence, the correct answer is "53".

Additional Information

• The numbers that are not divisible by 2 are odd numbers.

**Q26. Answer: (b) F**

1) Replace all the vowels to the following letter of them in the English alphabet. So we increased by +1 in a vowel.

2) Every consonant is also replaced to the preceding letter. So we decreased by -1 in a consonant.

We can see in the new word FQBCJFMS, the F letter will appear twice in the group of letters thus formed.

Hence, the correct answer is "F".

**Q27. Answer: (c) gains hydrogen or loses oxygen**

The correct answer is gains hydrogen or loses oxygen.

Key Points

• Reduction Reaction:

• The chemical reaction which involves addition of hydrogen or removal of oxygen is called reduction.

• The process of reduction is a type of chemical reaction in which the electron density of an atom or molecule is increased.

• Reduction reactions are opposite to oxidation reactions, which involve the loss of electrons or increase in the oxidation state of an atom or molecule.

• Reduction reactions are widely used in industrial processes such as the production of metals and organic chemicals.

• Redox reaction:

• Redox reactions are chemical processes involving oxidation and reduction in which the oxidation states of the reactants change.

• In a chemical reaction, the material that is being reduced is referred to as the oxidizing agent, and the substance that is being oxidized is referred to as the reducing agent.

• Gaining oxygen would lead to an increase in the oxidation state of the substance.

• Losing oxygen would lead to a decrease in the oxidation state of the substance.

• Gaining hydrogen would lead to a decrease in the oxidation state of the substance.

• Losing hydrogen would lead to an increase in the oxidation state of the substance.

Additional Information

• Other Type of Chemical reactions are:

• Bi-displacement reaction is also known as the double displacement reaction.

• It involves two reactants exchanging their ions to form two new products.

• For example, potassium nitrate reacts with aluminium chloride and forms aluminium nitrate and potassium chloride.

• Reaction: $KNO3 + AlCl3 \leftrightarrow Al(NO3)3 + KCl$

• Displacement reaction is also known as the single replacement reaction.

• It involves a more reactive element displacing a less reactive element from its compound.

• The reaction of potassium with magnesium chloride is an example of a single displacement reaction.

• Reaction: $2K + MgCl2 \rightarrow 2KCl + Mg$

• Combination reaction is also known as the synthesis reaction.

• It involves two or more reactants combining to form a single product.

• For example, when we burn magnesium ribbon (or magnesium), it gives a gray-black ash of magnesium oxide.

• Reaction: $Mg + O2 \rightarrow MgO$

**Q28. Answer: (a) 50 Ω**

The correct answer is 50 Ω.

Key Points

• Given in the question:

• Resistance of the bulb (R1) = 40 Ω.

• Resistance of the conductor (R2) = 10 Ω.

• As the bulb and conductor are connected in series combination. The total resistance of a circuit is given by:

• $R_T = R1 + R_(2)= 40 + 10$

• $R_T= 50$ Ω.

• The total resistance of the circuit is 50 Ω.

Additional Information

• Resistance:

• The amount of obstruction to current passage in an electrical circuit is measured as resistance. Ohms, or the Greek letter omega (Ω), are used to measure resistance (R).

• There are mainly two ways of combination of resistance:

• Series Combination:

• When two or more resistances are connected end to end and the same current passes through each one successively, they are said to be connected in series. In this instance, the sum of the individual resistances found in the series combination determines the equivalent or total resistance.

• In terms of mathematics, the equivalent resistance (R) of any number of resistances connected in series (R1, R2, R3,...) is as follows:

• R = R1 + R2 + R3 + …

• Parallel Combination:

• When two or more resistances are connected between two places and have distinct current directions, they are referred to as being in parallel connections. In these circuits, the current splits off and recombines at the point where the branches meet.

• The equivalent resistance (R) of any number of parallel resistances (R1, R2, R3,...) can be found mathematically as follows:

• 1/R = 1/R1 + 1/R2 + 1/R3 + …

**Q29. Answer: (b) two times**

The correct answer is two times.

Key Points

• Refraction of light occurs when light passes through a prism because the prism causes the light to bend or change direction due to the change in speed of light in the prism.

• The refraction of light through a prism causes the different colors of light to separate, resulting in a rainbow-like spectrum.

• The amount of refraction that occurs depends on the angle at which the light enters the prism and the refractive index of the prism material.

• When light is passed through a prism, refraction of light occurs twice.

• This refraction undergoes at two surfaces of the prism, the entry surface and the exit surface.

• Additional Information

• Prism:

• In the field of optics, a it is a transparent substance, such as glass, that has been precisely cut with plane faces and angles.

• It is used to reflect and analyze light.

• A standard triangular prism can divide white light into its component colors, or what is known as a spectrum.

• Refraction:

• It is the bending of light as it moves from one transparent substance into another.

• The refractive index of a medium is a measure of how much the speed of light is reduced when it passes through that medium, compared to the speed of light in a vacuum.

**Q30. Answer: (d) 18 minutes**

Shortcut Trick

Let Total Work be LCM(21, 28) = 84 units.

Efficiency: A = 4 units/min, B = 3 units/min.

Work done by both in 4 minutes = (4 + 3) × 4 = 28 units.

Remaining work = 84 − 28 = 56 units, to be filled by A alone.

Time taken by A for remaining = 56 ÷ 4 = 14 minutes.

Total time = 4 + 14 = 18 minutes.

Therefore The correct answer is 18 min.

Alternate Method

Given: Pipe A fills in 21 min, Pipe B fills in 28 min. Pipe B closed after 4 min.

Formula Used: Total Work = Efficiency × Time

| Person | Days | Total Work | Efficiency |
|---|---|---|---|
| Pipe A | 21 min | 84 units | 4 |
| Pipe B | 28 min | 3 | |

=> Work done by (A + B) in 4 minutes = (4 + 3) × 4 = 28 units

=> Remaining Work = 84 − 28 = 56 units

=> Since Pipe B is turned off, remaining work is completed by Pipe A.

=> Time taken by A = Remaining Work ÷ Efficiency of A = 56 ÷ 4 = 14 min

=> Total Time = Initial 4 min + Remaining 14 min = 18 min

Therefore The correct answer is 18 min.

Additional Information

Total Work Concept

Always assume total capacity as the LCM of individual times to avoid complex fractions.

Negative Work

If an Outlet Pipe (leak) is present, its efficiency is taken as negative in the net efficiency calculation.

Pipes and Cisterns Logic

If pipe B works for its full potential time but is closed early, its contribution is (4 ÷ 28) = 1/7 of the tank.

**Q31. Answer: (a) 1966**

The correct answer is 1966.

Key Points

• The High Court of Delhi:

• By virtue of the Delhi High Court Act, 1966, the Delhi High Court was founded on October 31, 1966.

• Its first four judges were Chief Justice K.S. Hegde, Justice I. D. Dua, Justice H.R. Khanna, and Justice S.K. Kapur.

• The Delhi High Court is the highest court in the NCT of Delhi that exercises state-level judicial functions.

• Subordinate Courts operate for nine judicial districts, including Central, New Delhi, South, North, West, East, and South-West. They are located below it.

• The highest court of a state is the Delhi High Court.

• It derives its authority from Chapter V of Part VI of the Indian Constitution.

Additional Information

List of some High Courts in India:

| Year | High Court | Territorial Jurisdiction |
|---|---|---|
| 1862 | Bombay | Maharashtra Dadra & Nagar Haveli and Daman Diu Goa |
| 1862 | Kolkata | West Bengal<br>Andaman & Nicobar islands |
| 1862 | Madras | Tamil Nadu<br>Pondicherry |
| 1866 | Allahabad | Uttar Pradesh |
| 2019 | Andhra Pradesh | Andhra Pradesh |
| 2019 | Jammu & Kashmir and Ladakh<br>(Note: In 1928, Jammu & Kashmir high court was established. Post-bi-furcation of J&K into two union territories; there is now a common high court.) | Jammu and Kashmir<br>Ladakh |

**Q32. Answer: (b) 64**

Shortcut Trick

Side of the square = Perimeter ÷ 4

Side = 32 ÷ 4 = 8 m

Area = Side² = 8² = 64 m²

Therefore The correct answer is 64 m².

Alternate Method

Given:

Perimeter of the square = 32 m

Formula Used:

Perimeter of square = 4 × Side (a)

Area of square = Side² ($a^2$)

Calculations:

=> 4 × a = 32

=> a = 32 ÷ 4

=> a = 8 m

=> Area = $a^2$ = 8 × 8

=> Area = 64 m²

Therefore The correct answer is 64 m².

Additional Information

Diagonal of a Square

The diagonal of a square with side 'a' is given by the formula $d = a\sqrt{2}$.

Area in terms of Diagonal

If the diagonal 'd' is known, the area of the square can be calculated as Area = $d^2 \div 2$.

Properties of Square

All sides are equal, all angles are 90°, and diagonals bisect each other at right angles.

**Q33. Answer: (a) 8 and 7**

Interchanging the numbers and using the BODMAS rule,

Option 1 → 8 and 7

Given equation: 9 + 7 - (6 ÷ 3 - 4) × 8 = 31

9 + 8 - (6 ÷ 3 - 4) × 7 = 31

17 - (2 - 4) × 7 = 31

17 - (-2) × 7 = 31

17 + 2 × 7 = 31

17 + 14 = 31

31 = 31

Option 2 → 9 and 7

Given equation: 9 + 7 - (6 ÷ 3 - 4) × 8 = 31

7 + 9 - (6 ÷ 3 - 4) × 8 = 31

18 - (2 - 4) × 8 = 31

18 - (-2) × 8 = 31

18 + 2 × 8 = 31

18 + 16 =31

34 ≠ 31

Option 3 → 6 and 7

Given equation: 9 + 7 - (6 ÷ 3 - 4) × 8 = 31

9 + 6 - (7 ÷ 3 - 4) × 8 = 31

15 - (1.33 - 4) × 8 = 31

15 - (- 2.67) × 8 ≠ 31

Option 4 → 4 and 7

Given equation: 9 + 7 - (6 ÷ 3 - 4) × 8 = 31

9 + 4 - (6 ÷ 3 - 7) × 8 = 31

13 - (2 - 7) × 8 = 31

13 - (-5) × 8 = 31

13 + 5 × 8 = 31

13 + 40 = 31

53 ≠ 31

Hence, the correct answer is "8 and 7".

**Q34. Answer: (d) reusable wastes**

The correct answer is reusable wastes.

Key Points

• Reusable wastes:

• It include items such as glass bottles, plastic containers, and metal cans that can be reused or recycled.

• The blue one is used for collecting reusable wastes.

• Proper disposal of reusable wastes can help conserve natural resources and reduce waste in landfills.

• Recycling of reusable wastes can also create jobs and promote a circular economy.

• Reusable wastes that are not disposed of properly can contribute to pollution and environmental degradation.

Additional Information

• Kitchen wastes:

• It includes food scraps, vegetable and fruit peels, eggshells, and other organic waste generated in the kitchen.
• Green coloured dustbin is used.
• These wastes can be composted and used as a fertilizer for plants and gardens.
• It is important to separate kitchen wastes from other types of waste to ensure proper disposal and recycling.
• Kitchen wastes can also attract pests and rodents if not disposed of properly.
• Agricultural wastes:
• It includes crop residues, animal manure, and other organic waste generated in farming activities.
• Green coloured dustbin is used.
• These wastes can be used as a source of energy through anaerobic digestion or as a fertilizer for crops.
• Proper disposal of agricultural wastes can help reduce greenhouse gas emissions and promote sustainable agriculture practices.
• Agricultural wastes can also pose a risk to human health and the environment if not disposed of properly.
• Medical wastes:
• It includes syringes, needles, surgical gloves, and other waste generated in healthcare facilities.
• Yellow coloured dustbin is used.
• These wastes can be hazardous and require special handling and disposal procedures to prevent the spread of infections and diseases.
• Proper disposal of medical wastes is important to protect healthcare workers, patients, and the environment.
• Medical wastes can also pose a risk to public health if not disposed of properly.

**Q35. Answer: (b) 16/21**

Given:

5/7, 9/14, 16/21, 29/42

Concept Used:

Make the denominator equal by taking LCM.

Calculation:

LCM of (7, 14, 21, 42) = 42

Now, make the denominator equal.

=> 5/7 = 30/42

=> 9/14 = 27/42

=> 16/21 = 32/42

New fractions,

=> 30/42, 27/42, 32/42, 29/42

Therefore 32/42 = 16/21 is greater.

Therefore Option 2 is the correct answer.

**Q36. Answer: (d) 1950**

The correct answer is 1950.

Key Points

• The Planning Commission:
• It was set up in 1950 with the Prime Minister as its Chairperson, marking the beginning of the era of five-year plans in India.
• The first five-year plan was launched in 1951 with the objective of achieving rapid industrialization and economic growth.
• The Planning Commission was responsible for formulating and implementing the five-year plans, which were aimed at achieving specific targets for various sectors such as agriculture, industry, and infrastructure.
• The five-year plans continued until 2014, when they were replaced by the NITI Aayog, a policy think tank that serves as the government's premier policy-making body.

Additional Information

• NITI Aayog:
• The Government of India's premier think tank on public policy, NITI Aayog is the nodal agency responsible for promoting cooperative federalism, encouraging economic development, and eschewing bargaining federalism by involving State Governments of India in the formulation of economic policies.
• It emphasis on a bottom-up methodology.
• It took over the role of the Planning Commission when it was founded in 2015.
• Chairperson: Narendra Modi, The Prime Minister (ex-officio)

• Vice Chairperson: Suman Bery

• CEO: B. V. R. Subrahmanyam

• HQ: New Delhi, India

**Q37. Answer: (a) Jinson Johnson**

The correct answer is Jinson Johnson.

Key Points

• Jinson Johnson:

• He clocked 20.52 seconds in the men's 200m final of the Federation Cup 2022 to break Muhammed Anas Yahiya's previous national record of 20.63 created at a meet in the Czech Republic back in 2018.

• He is a middle-distance runner who specializes in the 800m and 1500m races.

• He has won gold medals at the Asian Games and Asian Championships in these events.

• He's achievement of breaking the national record in the 200m race is significant as it is not his usual event and shows his versatility as an athlete.

• Muhammed Anas Yahiya's national record in the 200m race stood for almost four years before Johnson broke it, highlighting the difficulty of achieving such a feat.

Additional Information

• Surendra Singh:

• Born on October 1, 1978, He is an Indian long-distance runner who competed in the 10,000 metres and represented his country in Beijing in the 2008 Summer Olympics.

• In the event, he finished 26th. With speeds of 7:50.31 minutes for the 3000 metres and 28:02.89 minutes for the 10,000 metres, he owns the Indian records in these events.

• Amlan Borgohain:

• Indian track and field athlete Amlan Borgohain was born on April 25, 1998, and he specialises in the 100 and 200 metres.

• For both the 100 and 200 metres, he currently owns the Indian national record. In April 2022, he broke the 200-meter national mark, then in August 2022, he smashed the 100-meter national record to become the fastest Indian ever.

• He won the gold in the 100- and 200-meter events in the 2022 Indian National Games.

• Amiya Kumar Mallick;

• He is an Indian sprinter from Odisha who was born on November 14, 1992.

• His time of 10.26 seconds for the 100 metres is the national record.

• Mallick, who ran a time of 21.33 seconds to win the bronze in the 200 metres at the 2008 Commonwealth Youth Games.

• He won the silver in the 100 metres at the 2006 Junior Asian Meet in Colombo.

**Q38. Answer: (c) 25**

Shortcut Trick

Let the age 10 years ago be 1 unit and age 20 years from now be 3 units.

Difference in units = 3 − 1 = 2 units.

Difference in years = 10 + 20 = 30 years.

2 units = 30 years => 1 unit = 15 years.

Present age = Age 10 years ago + 10 = 15 + 10 = 25 years.

Therefore The correct answer is 25 years.

Alternate Method

Given: Krishna's present age = x

Age 10 years ago = x − 10

Age 20 years from now = x + 20

According to the question:

=> (x − 10) = 1/3 × (x + 20)

=> 3 × (x − 10) = x + 20

=> 3x − 30 = x + 20

=> 3x − x = 20 + 30

=> 2x = 50

=> x = 25

Therefore The correct answer is 25 years.

Additional Information

Ages involving Ratios

If the ratio of ages of two persons is a:b and after 'n' years it becomes c:d, use the concept that the age difference remains constant.

Age Relation after n years

If present age is 'x', then age 'n' years ago was (x − n) and age 'n' years later will be (x + n).

Average Age

Average age = (Sum of ages of all persons) ÷ (Total number of persons).

**Q39. Answer: (d) 3 km towards the east**

As per the given information,

1) Amit starts from Point A and drives 6 km towards the south.

2) He then takes a left turn, drives 4 km, turns right and drives 3 km.

3) He then takes a right turn and drives 7 km.

4) He takes a final right turn, drives 9 km and stops at point B.

Here, we can see that he needs to drive 3 km towards the East to reach point A from point B.

Hence, the correct answer is "3 km towards the East".

**Q40. Answer: (b) Rajasthan**

The correct answer is Rajasthan.

Key Points

• Parshavnatha temple:

• It is a Jain temple dedicated to Parshvanatha, the 23rd Tirthankara in Jainism.

• The temple is located in the city of Nakoda in the Barmer district of Rajasthan.

• The temple is also known as Nakoda Jain temple or Shri Nakoda Parshvanath Jain Tirth.

• The temple is considered to be one of the most important Jain pilgrimage sites in India, attracting thousands of devotees every year.

Additional Information

List of few other Jain temples:

• Ranakpur Jain Temple, Ranakpur (Rajasthan)

• Gomateshwara Temple, Vindhyagiri Hill (Karnataka)

• Dilwara Temple, Mount Abu (Rajasthan)

• Sri Digambar Jain Lal Mandir, Chandni Chowk (Delhi)

• Palitana Temples, Bhavnagar District (Gujarat)

• Sonagiri Temples, Datia (Madhya Pradesh)

**Q41. Answer: (c) Alaknanda and Bhagirathi**

The correct answer is Alaknanda and Bhagirathi.

Key Points

• Devprayag:

• It is also known as Devi prayāga, is a town and nagar panchayat located in the Tehri Garhwal District of Uttarakhand, India.

• It is the last of the five confluences, or Panch Prayags.

• It is the place where Alaknanda River meets the Bhagirathi River, and both rivers continue as the Ganges River, also known as Ganga.

• The Alaknanda rises in Uttarakhand, close to the Tibetan border, at the meeting point and base of the Satopanth

• The Gangotri and Khatling glaciers in the Garhwal Himalaya are the sources of the Bhagirathi's headwaters, which are produced at Gaumukh.

• In Devprayag, these two holy rivers converge to form the Ganges (Ganga).

Additional Information

• Yamuna:

• It is the largest tributary of the Ganges and meets the Ganges at Allahabad in Uttar Pradesh, India.

• The confluence of the Yamuna and Ganges is known as the Triveni Sangam.

• Sutlej:

• It is a river that flows through India and Pakistan.
• It is tributary of Indus. It meets the Indus river in Pakistan.
• Godavari:
• It is a river that flows through the states of Maharashtra, Telangana, Andhra Pradesh, Chhattisgarh, and Odisha in India.
• It is also known as Dakshin Ganga.
• It flows into Bay of Bengal.
• Narmada:
• It is a river that flows through the states of Madhya Pradesh, Maharashtra, and Gujarat in India.
• It flows into Arabian sea.

**Q42. Answer: (b) 9:37:30 a.m.**

Shortcut Trick

Identify the LCM of the given intervals: 45, 75, and 90 seconds.

LCM(45, 75, 90) = 450 seconds.

Convert seconds to minutes: 450 ÷ 60 = 7 minutes 30 seconds.

Next simultaneous change = 9:30:00 a.m. + 7 min 30 sec = 9:37:30 a.m.

Therefore The correct answer is 9:37:30 a.m.

Alternate Method

Given: Intervals are 45 sec, 75 sec, and 90 sec. Initial time is 9:30:00 a.m.

Formula Used: Time for next simultaneous event = LCM of individual intervals.

Calculations:

=> Prime Factorization: $45 = 3^2 \times 5$ | $75 = 3 \times 5^2$ | $90 = 2 \times 3^2 \times 5$

=> LCM = $2^1 \times 3^2 \times 5^2 = 2 \times 9 \times 25 = 450$ seconds

=> Time in minutes = 450 ÷ 60 = 7.5 minutes

=> 0.5 minutes = 0.5 × 60 = 30 seconds

=> Total duration = 7 minutes 30 seconds

=> Next change time = 9:30:00 + 0:07:30 = 9:37:30 a.m.

Therefore The correct answer is 9:37:30 a.m.

Additional Information

LCM (Least Common Multiple)

The smallest number that is a multiple of two or more numbers. Used for periodical events like bells ringing or lights flashing together.

Unit Conversion

Always ensure all intervals are in the same unit (seconds/minutes) before calculating LCM.

Simultaneous Occurrences

To find the n-th occurrence, simply multiply the LCM by 'n' and add it to the starting time.

**Q43. Answer: (b) 12**

The logic here is as follows:

(Second Number × 2) + 4 = First Number.

1) In 8 : 2 → (2 × 2) + 4 = 8

2) In 16 : 6 → (6 × 2) + 4 = 16

3) In 18 : 7 → (7 × 2) + 4 = 18

4) In 28 : ? → (12 × 2) + 4 = 28

Hence, the correct answer is "12".

**Q44. Answer: (a) Four**

The following arrangement is as follows:

There are six pen boxes of different brands, P1, Q2, R3, S4, T5 and U6.

1) P1 is third from the top and immediately below U6.

| **6** | |
|---|---|
| 5 | U6 |

| | |
|---|---|
| 4 | P1 |
| 3 | |
| 2 | |
| 1 | |

2) Only two boxes are there between P1 and Q2.

| | |
|---|---|
| **6** | |
| 5 | U6 |
| 4 | P1 |
| 3 | |
| 2 | |
| 1 | Q2 |

3) There are two boxes between R3 and T5. R3 is placed below T5.

| | |
|---|---|
| **6** | **T5** |
| 5 | U6 |
| 4 | P1 |
| 3 | R3 |
| 2 | |
| 1 | Q2 |

So the final arrangement is as follows.

| | |
|---|---|
| **6** | **T5** |
| 5 | U6 |
| 4 | P1 |
| 3 | R3 |
| 2 | S4 |
| 1 | Q2 |

There are Four boxes between T5 and Q2.

Hence the correct answer is "Four".

**Q45. Answer: (c) Arunachal Pradesh**

The correct answer is Arunachal Pradesh.

Key Points

• Dree Festival:

• The Dree Festival is an occasion to honour agriculture, which provides the majority of Arunachal Pradesh's Ziro population with a living.

• Every year, on July 5th, the Dree festival is observed; festivities go off on July 4th.

• Five Gods are mainly worshipped during the festival: Danyi, Metii, Tamu, Mepin, and Meder. This is done to bless the sacrifices made in dree with a bountiful harvest.

• Following the rites, animals, eggs, and poultry are offered as offerings to the gods. Anyone would be in awe of the fascinating rites performed throughout the celebration after seeing them.

• The local priests make the gods out of bamboos for worship.

• Only a small group of priests, known as the Gaon Burhas, carry out the rites; the other priests merely observe.

• Only at this event do the Apatanis bring this treasured Ranii Akhii out into the open.

• But since it is believed to unleash curses upon those who touch it, the general public is not permitted to touch it.

• Apatani Tribe:

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• Arunachal Pradesh is home to numerous more tribes, including the Apatani.
• But Ziro, in Arunachal Pradesh's lower Subansiri district, is where the Apatani tribe is mainly found.
• The Dree festival, which is celebrated with tremendous fervour and sacrifices, is the primary celebration for the Apatani people.

Additional Information

List of Festivals celebrated in West bengal, Kerla and Madhya Pradesh:

| State | Festivals |
|---|---|
| West Bengal | Durga Puja, Jamai Shashti, Charak Puja and Poush Sankranti |
| Kerala | Onam, Vishu, Thrissur Pooram, Thiruvathira and Theyyam |
| Madhya Pradesh | Navratri, Lokrang, Akhil Bhartiya Kalidas Samaroh, Khajuraho and Bhagoria Haat |

**Q46. Answer: (c) NaHCO3**

The correct answer is NaHCO3.

Key Points

• Sodium Bi-carbonate:
• Its chemical composition is NaHCO3.
• It has alkaline properties that can neutralize the acidic venom of the bee sting and provide relief from pain.
• Bee stings can cause swelling, redness, and pain.
• It is important to remove the stinger immediately and clean the area with soap and water.
• NaHCO3 is commonly found in baking soda and can be mixed with water to create a paste to apply to the sting.

Additional Information

• Sodium Carbonate:
• Its chemical composition is Na2CO3
• The disodium salt of carbonic acid with alkalinizing properties is sodium carbonate.
• Sodium carbonate dissolves in water to produce sodium hydroxide and carbonic acid.
• Sodium hydroxide functions as an antacid because it is a strong base that neutralizes stomach acid.
• Calcium Sulphate:
• Its chemical composition is CaSO4
• The inorganic chemical with the formula CaSO4 and its associated hydrates is calcium sulfate.
• It is utilized as a desiccant when it is in the anhydrous form, or γ-anhydrite.
• Calcium Carbonate:
• Its chemical formula is CaCO3
• As the minerals calcite and aragonite, calcium carbonate is a common material found in rocks.
• It is most commonly found in chalk and limestone, eggshells, gastropod shells, shellfish skeletons, and pearls.

Important Points Some Common Names of Chemical Compounds:

| Common Names | Chemical Compounds |
|---|---|
| Baking Soda | Sodium Bicarbonate or Sodium Hydrogen Carbonate(NaHCO3) |
| Bleaching Powder | Calcium Oxychloride (CaOCl2) |
| Borax | Sodium Tetraborate Decahydrate or Sodium Borate (Na2[B4O5(OH)4].8H2O) |
| Dry Ice | Solid Carbon Dioxide (CO2) |
| Green Vitriol | Ferrous Sulphate Heptahydrate (FeSO4.7H2O) |
| Gypsum | Calcium Sulphate Dihydrate (CaSO4.2H2O) |
| Laughing Gas | Dinitrogen Monoxide or Nitrous Oxide (N2O) |
| Quick Lime or Burnt Lime | Calcium Oxide (CaO) |
| Milk of Magnesia | Magnesium Hydroxide (Mg(OH)2) |

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**Q47. Answer: (c) Bengali**

The correct answer is Bengali.

Key Points

• Bengali is not categorised as a classical language by the Ministry of Culture, Government of India.

• Bengali:

• It also known as Bangla.

• It is an Indo-Aryan language spoken predominantly in the Indian state of West Bengal and the sovereign country of Bangladesh.

• It holds the status of one of the 22 scheduled languages of India.

• Bengali literature has a rich heritage, with contributions from renowned poets, novelists, and playwrights. Notable figures include Rabindranath Tagore, the first non-European Nobel laureate in Literature, and Kazi Nazrul Islam, known as the "Rebel Poet."

Additional Information

• In the Rajya Sabha, the Ministry of Culture specified the requirements for designating a language as "Classical":

• Uniqueness: The literature and languages of the ancient era should be distinguished from their modern equivalents.

• Individuality: The literary heritage ought to be original and shouldn't be taken from another language group.

• Magnificent Legacy: It ought to have a collection of antique books and manuscripts that have been treasured for ages.

• High Antiquity: The language needs to have a 1500–2000 years historical record.

• There are six classical languages in India currently. They are:

• Tamil.

• Sanskrit.

• Kannada.

• Telugu.

• Malayalam.

• Odia.

**Q48. Answer: (b) 1,000**

Shortcut Trick

When coefficients are interchanged (2x + 3y and 3x + 2y), add and subtract the equations.

Sum: 5 Tables + 5 Benches = 7500 => 1 Table + 1 Bench = 1500

Difference: (3T + 2B) − (2T + 3B) = 4000 − 3500 => 1 Table − 1 Bench = 500

Cost of 1 Table = (Sum + Difference) ÷ 2 = (1500 + 500) ÷ 2 = 1000

Therefore The correct answer is Rs. 1,000.

Alternate Method

Given:

Cost of 2 Tables and 3 Benches = Rs. 3,500

Cost of 3 Tables and 2 Benches = Rs. 4,000

Formula Used:

Linear equations in two variables: ax + by = c

Calculations:

Let the cost of one table be T and one bench be B.

=> 2T + 3B = 3500 --- (i)

=> 3T + 2B = 4000 --- (ii)

Multiply equation (i) by 2 and equation (ii) by 3 to eliminate B:

=> 4T + 6B = 7000 --- (iii)

=> 9T + 6B = 12000 --- (iv)

Subtracting equation (iii) from (iv):

=> (9T − 4T) + (6B − 6B) = 12000 − 7000

=> 5T = 5000

=> T = 5000 ÷ 5

=> T = 1000

Therefore The correct answer is Rs. 1,000.

Additional Information

Elimination Method

A process of solving a system of linear equations by adding or subtracting them to eliminate one variable.

Substitution Method

Solving one equation for one variable and then substituting that expression into the other equation.

Interchanged Coefficients Property

For equations ax + by = m and bx + ay = n, the values can be found quickly using (x + y) = (m + n)/(a + b) and (x − y) = (m − n)/(a − b).

**Q49. Answer: (a) 12**

Shortcut Trick

Direct comparison of total ages: (A + B) − (B + C) = 12 years.

Common variable B cancels out on both sides.

Remaining difference: A − C = 12 years.

Therefore The correct answer is 12 years.

Alternate Method

Given Present Total Age of A and B = Present Total Age of B and C + 12

=> (A + B) = (B + C) + 12

=> A + B − B − C = 12

=> A − C = 12

Therefore The correct answer is 12 years.

Additional Information

Age Difference Property

The difference between the ages of two persons remains constant at any point in time.

Sum and Difference of Ages

If sum (S) and difference (D) of ages of two people are known, then Elder age = (S+D)÷2 and Younger age = (S−D)÷2.

Ratio of Ages

When a ratio and a specific year gap are given, use the Unitary method to find the values of 1 unit difference.

**Q50. Answer: (a) 94**

The given series is as follows:

33 56 93 % 28 21 @ / 84 94 39 $ 65 19 # 81

The 7th term to the right of the 14th term from the right end in the above arrangement is:

14^(th)term from the right is 93.

And the 7^(th)term from the right of 14th term from the right is 94.

Hence, the correct answer is "94".

Alternate Solution:

The 7th term to the right of the 14th term from the right end in the above arrangement:

14^(th)term - 7 term = 7^(th)term from the right side.

**Q51. Answer: (d) CH4 < CHCl3 < CH3CH2OH < CH3COOH**

The correct answer is CH4 < CHCl3 < CH3CH2OH < CH3COOH.

Key Points

• The increasing order of boiling point of the given organic compounds is as follows:

• CH4 (methane) < CHCl3 (chloroform) < CH3CH2OH (ethanol). <CH3COOH (acetic acid).

• Methane has the lowest boiling point among the given compounds as it is a non-polar molecule and has weak London dispersion forces.

• Chloroform has a higher boiling point than methane due to the presence of a polar C-Cl bond, which results in dipole-dipole interactions.

• Ethanol can form hydrogen bonds due to the presence of the hydroxyl (-OH) group, which are stronger than the London dispersion and dipole-dipole interactions present in methane and chloroform, respectively. This gives ethanol a higher boiling point.

• Acetic acid can also form hydrogen bonds; however, it can form dimeric structures in the liquid phase due to the ability of each molecule to form two hydrogen bonds (one donated and one accepted) with another molecule. This effectively doubles the size of the molecule, leading to significantly higher boiling points than ethanol, which generally forms linear hydrogen-bonded chains.

Additional Information

• Acetic Acid:
• The chemical compound acetic acid has the formula CH3COOH.
• It is a carboxylic acid with a carboxyl functional group joined to a methyl group.
• The presence of acetic acid is evident in its strong aroma and tart flavour.
• When the temperature drops below 16.6ºC, it produces crystals that resemble ice.
• Vinegar, commonly known as acetic acid or ethanoic acid.
• Ethanol:
• Its chemical formula is (CH3CH2OH).
• It is a volatile, colorless liquid that has a slight odor.
• It burns with a blue flame that is smokeless and sometimes invisible in normal light.
• It is a common alcohol used as a solvent and fuel, and is also found in alcoholic beverages.
• Chloroform:
• Its chemical formula is CHCl3.
• It is a colorless liquid.
• It was historically used as an anaesthetic but is now recognized as a carcinogen.
• Methane:
• Its chemical formula is CH4.
• It is a colorless and odorless gas.
• It is the main component of natural gas and is also produced by certain microorganisms.

Important Points Boiling points of some compounds at atmospheric pressure 1 atm :

| Materials | Boiling point in degree Celcius |
|---|---|
| Ethanol | 78.37 |
| Methanol | 64.7 |
| Acetone | 56 |
| Alcohol | 78.37 |
| Nitrogen | -195.8 |
| Hydrgen | -252.9 |
| liquid Helium | -269 |

**Q52. Answer: (c) displacement reaction**

The correct answer is displacement reaction.

Key Points

• Displacement Reaction:
• It is also known as the Single Replacement Reaction.
• It involves a more reactive element displacing a less reactive element from its compound.
• The reaction of potassium with magnesium chloride is an example of a single displacement reaction.
• Reaction: 2K + MgCl2 → 2KCl + Mg
• In the given reaction, 2 Al atoms replaces the 2 Fe atoms in Fe2O3 to form Al2O3as Aluminium (Al) is more reactive than Iron (Fe).
• This is an example of a displacement reaction as one element is displaced by another element in a compound.

Additional Information

• Double Displacement Reaction:
• It is also known as Bi-displacement reaction.
• It involves two reactants exchanging their ions to form two new products.
• For example, potassium nitrate reacts with aluminium chloride and forms aluminium nitrate and potassium chloride.
• Reaction: KNO3 + AlCl3 ↔ Al(NO3)3 + KCl
• Reduction Reaction:
• The chemical reaction which involves addition of hydrogen or removal of oxygen is called reduction.
• The process of reduction is a type of chemical reaction in which the electron density of an atom or molecule is increased.

• Gaining hydrogen would lead to a decrease in the oxidation state of the substance.
• Losing oxygen would lead to a decrease in the oxidation state of the substance.
• Oxidation Reaction:
• The che mical reaction which involves addition of oxygen or removal of hydrogen is called oxidation.
• It involve the loss of electrons or increase in the oxidation state of an atom or molecule.
• Losing hydrogen would lead to an increase in the oxidation state of the substance.
• Gaining ox ygen would lead to an increase in the oxidation state of the substance.

**Q53. Answer: (c) 17^(th) group**

The correct answer is 17th group.

Key Points

• The element 'X' with seven electrons in outermost shell belongs to the 17th group of the modern periodic table.
• 17th group:
• It also known as the halogen group.
• The halogen group elements have seven electrons in their outermost shell, making them highly reactive and capable of forming compounds with most other elements.
• Some of the common halogens include chlorine, fluorine, bromine, iodine, and astatine.
• These elements are widely used in various applications such as disinfectants, bleaches, and pharmaceuticals.

Additional Information

• 7th group:
• It has bohrium (Bh), rhenium (Re), technetium (Tc), and manganese (Mn).
• Since this group is located on the periodic table's d-block, they are transition metals.
• Because it is a part of the larger grouping of transition metals, this group has not given itself a trivial name.
• It is frequently referred to as the manganese group or manganese family after its lightest member.
• Major group oxidation state (+7) is typical for group 7 elements.
• 16th group:
• It is known as the chalcogens.
• Group 16 is made up of the radioactive elements polonium (Po), livermorium (Lv), oxygen (O), sulphur (S), selenium (Se), and tellurium (Te).
• With six valence electrons, the chalcogens are all two electrons away from having a complete outer shell.
• The most prevalent oxidation states for them are +4, +6, +2, and −2.
• 18th group:
• It is known as the noble gases.
• The naturally occurring elements of group 18 of the periodic table, namely helium (He), neon (Ne), argon (Ar), krypton (Kr), xenon (Xe), and radon (Rn), are referred to as noble gases.
• These chemical elements are colourless, odourless, monatomic gases with cryogenic boiling temperatures and extremely minimal chemical reactivity under normal circumstances.
• Because of their "full" outer shell of valence electrons, which prevents them from participating in chemical reactions, noble gases are inert due to their electron configuration.

**Q54. Answer: (c) Conclusions I and III follow**

The given Statements are as follows:

1. M ranked higher than B who ranked equal to S.

M > B = S

2. B ranked higher than F.

B > F

3. S did not rank higher than Q who ranked lower than M.

S < Q < M

4. M ranked higher than F who did not rank lower than T.

M > F > T

So the final arrangement is as follows

M > Q > B = S > F > T.

Conclusions:

I. Q ranked higher than T.

Q > T

Follows as we can see from the final arrangement.

II. Q ranked equal to T.

Q = T

Doesn't Follow as we can see from the final arrangement.

III. M ranked higher than F.

M > F

Follows as we can see from the final arrangement.

Hence, the correct answer is "Conclusions I and III follow".

**Q55. Answer: (d) 40**

Shortcut Trick

Identify the coefficients of the Quadratic Equation: a = 2, b = −4, and c = −3.

Use the Discriminant formula: $D = b^2 - 4ac$.

$D = (-4)^2 - 4 \times 2 \times (-3) = 16 + 24 = 40$.

Therefore The correct answer is 40.

Alternate Method

Given:

The Quadratic Equation is $2x^2 - 4x - 3 = 0$.

Formula Used:

For a standard Quadratic Equation $ax^2 + bx + c = 0$, the Discriminant (D) is given by:

$D = b^2 - 4ac$

Calculations:

=> Comparing $2x^2 - 4x - 3 = 0$ with $ax^2 + bx + c = 0$:

=> a = 2

=> b = −4

=> c = −3

=> $D = (-4)^2 - 4 \times 2 \times (-3)$

=> D = 16 − (−24)

=> D = 16 + 24

=> D = 40

Since D > 0, the equation has two distinct real roots.

Therefore The correct answer is 40.

Additional Information

Nature of Roots

If D > 0, the roots are real and distinct. If D = 0, the roots are real and equal. If D < 0, the roots are imaginary.

Quadratic Formula

The roots of the equation can be found using $x = (-b \pm \sqrt{D}) \div 2a$, where D is the discriminant.

Perfect Square Discriminant

If a, b, and c are rational and D is a perfect square, then the roots of the Quadratic Equation are rational.

**Q56. Answer: (d) 24.4%**

The correct answer is 24.4%

Key Points

• Annual Status of Education Report (ASER) 2021:

• It was published on November 17, 2021.

• It concentrated on four primary areas: patterns of school enrollment, incidence of tuition patterns, smartphones' accessibility and availability, and resources for at-home learning.

• The following is an overview of the report's findings:

• a switch from private to public education, with children aged 6 to 14 enrolling in private schools falling from 32.5% in 2018 to 24.4% in 2021.

• In 2020, the percentage of kids not in school rose to 4.6% from 1.4%, and in 2021 it stayed the same.

• Children paying tuition increased significantly from 30% in 2018 to nearly 40% in 2021, regardless of gender, grade level, or kind of school.

• Between 2018 and 2021, the percentage of people owning smartphones nearly doubled to 67.6%. A higher percentage of students attending private schools (79%) than those attending government schools (63.7%) own a smartphone at home.

• Children attending government and private schools report receiving less support from their families now that the schools have reopened.

Additional Information

• Annual Status of Education Report (ASER) 2023:

• It was published on January 17, 2024.

• It is based on a survey that was completed by 34,745 children in the 14–18 age range in 28 districts spread over 26 states.

• Four areas were covered in the youth survey: reading and comprehension of written instructions; application of basic skills to daily calculations; basic reading, arithmetic, and English abilities; and financial calculations that are necessary in real life.

• The following is an overview of the report's findings:

• Approximately 42.7% of students between the ages of 14 and 18 are unable to read sentences in English, while 26.5% of rural children find it difficult to read a text at the Class 2 level in their regional language.

• The biggest obstacle is still basic math. More than half of the students (56.7%) who responded to the poll were unable to divide three numbers by one number.

• Basic math proficiency is possessed by 45% of the kids in the surveyed group.

• Male enrollment (36.3%) in the STEM stream is higher than female enrollment (28.1%).

• Surprisingly, 90.5% of young people in this age bracket said they had utilized social media during the reference week, with a slightly larger percentage of men (93.4%) than women (87.8%) reporting this information.

**Q57. Answer: (c) 4%**

Shortcut Trick

Net gain or loss percentage can be calculated using the successive percentage formula: a + b + (a × b) ÷ 100.

Here, the Markup (a) = +30% and the Discount (b) = −20%.

Net Gain% = 30 − 20 + (30 × (−20)) ÷ 100.

Net Gain% = 10 − (600 ÷ 100) = 10 − 6 = 4%.

Therefore The correct answer is 4%.

Alternate Method

Given: Discount = 20%, Markup = 30% above Cost Price (CP).

Formulas: MP = CP × (100 + Markup%) ÷ 100 | SP = MP × (100 − Discount%) ÷ 100 | Profit% = (SP − CP) ÷ CP × 100.

=> Let Cost Price (CP) = 100.

=> Marked Price (MP) = 100 + 30% of 100 = 130.

=> Selling Price (SP) = 130 − 20% of 130 = 130 − 26 = 104.

=> Profit = SP − CP = 104 − 100 = 4.

=> Profit% = (4 ÷ 100) × 100 = 4%.

Therefore The correct answer is 4%.

Additional Information

Relationship between CP and MP

The ratio of CP to MP can be expressed as CP ÷ MP = (100 − Discount%) ÷ (100 + Profit%).

Successive Percentages

When a value is increased by x% and then decreased by y%, the net change is [x − y − (xy ÷ 100)]%.

**Q58. Answer: (a) Rs. 5,200**

Shortcut Trick

Expenditure % = 100% − Savings % = 100% − 20% = 80%.

Monthly Expenditure = 80% of Rs. 6,500.

Calculation = 0.8 × 6,500 = Rs. 5,200.

Therefore The correct answer is Rs. 5,200.

Alternate Method

Given:

Monthly Salary = Rs. 6,500

Savings % = 20%

Formula Used:

Expenditure = Salary − Savings

Calculations:

=> Savings amount = (20/100) × 6,500

=> Savings amount = 0.2 × 6,500 = Rs. 1,300

=> Monthly Expenditure = 6,500 − 1,300

=> Monthly Expenditure = Rs. 5,200

Therefore The correct answer is Rs. 5,200.

Additional Information

Income-Expenditure Relationship

Total Income is always the sum of Expenditure and Savings. Income = Expenditure + Savings.

Percentage Base Change

If savings decrease or income increases, the expenditure percentage can be calculated relative to the new total base of 100%.

**Q59. Answer: (b) Ritu Raj Awasthi**

The correct answer is Ritu Raj Awasthi.

Key Points

• Ritu Raj Awasthi:

• He was born on July 3, 1960.

• He is now the 22nd Law Commission of India's chairperson.

• He served as the Karnataka High Court's Chief Justice from October 11, 2021, to July 2, 2022.

• He was a judge of the Allahabad High Court from April 13, 2009, to October 10, 2021.

Additional Information

• Law Commission of India:

• It is an executive body established by an order of the Government of India.

• It is led by a retired judge and consists of legal experts whose job it is to research and advise the government on legal reform.

• It serves as an advisory body to the Ministry of Law and Justice and is constituted for a set period of time.

• Lord Macaulay led the first Law Commission, which was founded by the East India Company in 1833 under the Charter Act of 1833, when India was still a colony.

• The first Law Commission of independent India had a three-year tenure established in 1955.

**Q60. Answer: (d) 64/99**

Shortcut Trick

For a pure recurring decimal where all digits after the decimal point repeat:

The numerator is the repeating number itself.

The denominator consists of as many 9s as there are digits in the repeating part.

Repeating part 64 has 2 digits => Numerator = 64, Denominator = 99.

Therefore The correct answer is 64/99.

Alternate Method

Given: x = 0.646464... — (Eq. 1)

Step 1: Since 2 digits are repeating, multiply both sides by $10^2 = 100$.

=> 100x = 64.646464... — (Eq. 2)

Step 2: Subtract (Eq. 1) from (Eq. 2):

=> 100x − x = 64.646464... − 0.646464...

=> 99x = 64

=> x = 64/99

Therefore The correct answer is 64/99.

Additional Information

Pure Recurring Decimal

A decimal in which all the figures after the decimal point are repeated. Example: 0.333... = 1/3 or 0.1212... = 12/99.

Mixed Recurring Decimal

A decimal in which some digits are not repeated and some are repeated. Formula: (Total number − Non-repeating part) ÷ (9s for repeating digits followed by 0s for non-repeating digits).

Rational Numbers

Any number that can be expressed in the form p/q where p and q are integers and q ≠ 0. All recurring decimals are rational numbers.

**Q61. Answer: (b) 80°**

Shortcut Trick

In a configuration where two parallel lines form an 'M' shape with two transversals, the interior angle at the middle vertex is equal to the sum of the two alternate interior angles at the parallel lines.

Angle x = 30° + 50° = 80°.

Therefore The correct answer is 80°.

Alternate Method

Given:

Line AB is parallel to line CD (AB || CD).

Angle angle ABE = 30° and Angle angle CDE = 50°.

Formula Used:

Alternate Interior Angles Theorem: When two parallel lines are cut by a transversal, the pairs of alternate interior angles are equal.

Calculations:

=> Draw a construction line EF passing through point E such that EF || AB.

=> Since AB || CD and EF || AB, it follows that EF || CD.

=> angle BEF = angle ABE = 30° (Alternate interior angles are equal).

&r

**Q62. Answer: (d) Rs. 30 crore**

Calculation:

Profit earned by company in 2002 = Rs. 50 crore

Profit earned by company in 2001 = Rs. 20 crore

Increase in profit = 50 - 20 = 30 crore.

Therefore Option 4 is the correct answer.

**Q63. Answer: (a) H and G**

The given arrangement is as follows:

There are Eight girls, A, B, C, D, E, F, G and H, are sitting around a circular table and facing the center.

1) A is sitting second to the left of B

2) Only three girls are sitting between A and D.

3) F is sitting to the immediate left of C.

4) D is not an immediate neighbour of either F or E. H is not an immediate neighbour of B.

So, the final arrangement is as follows

The immediate neighbours of D are H and G.

Hence, the correct answer is " H and G ".

**Q64. Answer: (a) 50**

Given Equation: 7.05 - 20.92 + 16.20 × 3.99 = ?

Using approximation in the equation, we will get:

7 - 21 + 16 × 4 = ?

7 - 21 + 64 = ?

71 - 21 = ?

50 = ?

Hence, the correct answer is "50".

**Q65. Answer: (b) 5500**

Shortcut Trick

Roof dimensions are determined by the top of the cuboid (140 m × 10 m).

The length of the semi-cylinder = 140 m and its diameter = 10 m.

Radius (r) = 10 ÷ 2 = 5 m.

Volume of semi-cylinder = (1/2) × π × $r^2$ × h = (1/2) × (22/7) × $5^2$ × 140 = 5500 $m^3$.

Therefore The correct answer is 5500 $m^3$.

Alternate Method

Given:

Dimensions of cuboid base = 140 m (Length) × 10 m (Breadth) × 10 m (Height).

The semi-cylindrical roof covers the top (140 m × 10 m).

Formula Used:

Volume of cylinder = $\pi r^2 h$

Volume of semi-cylinder = (1/2) × $\pi r^2 h$

Calculations:

=> Length (h) of the roof = 140 m

=> Diameter of the roof = 10 m

=> Radius (r) = 10 ÷ 2 = 5 m

=> Volume = (1/2) × (22/7) × $(5)^2$ × 140

=> Volume = (1/2) × (22/7) × 25 × 140

=> Volume = 11 × 25 × 20

=> Volume = 11 × 500 = 5500 $m^3$

Therefore The correct answer is 5500 $m^3$.

Additional Information

Volume of Cuboid

The volume of a cuboid is calculated as Length × Breadth × Height (L × B × H).

Surface Area of Cylinder

Curved Surface Area (CSA) = 2πrh; Total Surface Area (TSA) = 2πr(r + h).

Units of Volume

Volume is always expressed in cubic units such as $m^3$, $cm^3$, or liters (1 $m^3$ = 1000 liters).

**Q66. Answer: (b) Ishwar Chandra Vidyasagar**

The correct answer is Ishwar Chandra Vidyasagar.

Key Points

• Ishwar Chandra Vidyasagar:

• In the nineteenth century, Ishwar Chandra Vidyasagar, also called Ishwar Chandra Bandyopadhyay, was a well-known person in India.

• Born in West Bengal on September 26, 1820, Vidyasagar was bestowed with the moniker Vidyasagar in 1839 due to his profound understanding of Sanskrit and philosophy.

• Among other things, he studied Vedanta, Smruti, Astronomy, literature, dialectics, and Sanskrit grammar.

• After passing the law exam in 1839, Vidyasagar went on to earn his degree in 1841 from Sanskrit College in Kolkata.

• As Principal of Sanskrit College, Vidyasagar supervised enormous advancements in both administration and education between 1851 and 1858.

• He felt that everyone should have access to education, regardless of gender or caste, and was a fervent advocate for universal education.

• At the age of 21, he was appointed head of Fort William College's Sanskrit department.

• His efforts culminated in the Widow Remarriage Act being passed by the Indian government in 1856.

• Along with fighting against child marriage, he established 35 schools for girls throughout Bengal.

• The first book given to a Bengali child is still Vidyasagar's Borna Porichoy, which is an introduction to the alphabet.

• Two of his books, Upakaramonika and Byakaran Koumudi, translated difficult topics from Sanskrit Grammar into Bengali.

• Among Vidyasagar's social reform writings are "Bahubivah," which condemned polygamy in 1871, "Bidhobabivah," which addresses the rights of widows to remarry in 1855, and "Balyabivah," which addresses the downsides of child marriage.

Additional Information

• Debendranath Tagore:

• Debendranath Tagore (1817-1905) was born in Calcutta.

• He was a social reformer as well as a scholar.

• In 1842, he became a member of the Brahmo Samaj, which Raja Rammohan Roy had established in 1828.

• He founded Tattvabodhini Sabha in 1839, and it began publishing a monthly theological journal called Tattvabodhini Patrika in Bengali.

• Tattvabodhini Sabha was eventually absorbed into the Bahmo Samaj.

• A Tatwabodhini Pathshala, or Theological School, was founded in 1844 by Debendranath with the purpose of teaching Vedanta and preparing young men to teach the Brahmo religion.

• Shortly after Keshab Chandra Sen's admission in samaj in 1858, he elevated Sen to the rank of acharya.

• Keshab Chandra Sen and his followers established the Brahmo Samaj of India in 1866 following his removal as acharya in 1865.

• Debendranath Tagore's Samaj was later referred to as the Adi Brahmo Samaj.

• The Brahma Dharma Grantha is a theistic textbook on religion and morality that he prepared and published.

• Swami Vivekananda:

• He was an Indian Hindu monk, philosopher, writer, and religious instructor.

• He lived from January 12, 1863, to July 4, 1902.

• Originally known as Narendranath Datta.

• He was the foremost pupil of the saint Ramakrishna from India.

• He had a significant role in bringing yoga and Vedanta to the West.

• He is recognised as the founder of contemporary Indian nationalism and for having elevated interfaith understanding and elevated Hinduism to the level of a significant global religion.

• He established the Vedanta Society of San Francisco (now known as the Vedanta Society of Northern California) and the Vedanta Society of New York, which served as the models for other Vedanta Societies in the West.

• In September 1893, he delivered his well-known speech at the "Parliament of Religions" convention in Chicago.

• In 1897, he made his way back to Inida.

• In India, Vivekananda established the Ramakrishna Mission in 1897, which offers social work, education, and charitable services, as well as the Ramakrishna Math, which trains monastics and lay followers in spirituality.

• Dwarkanath Ganguly:

• He was a Brahmo reformer who was born on 20 April 1844 and deid on 27 June 1898.

• He was also known as Dwarkanath Gangopadhyay.

• He made a significant contribution to women's freedom and societal enlightenment.

• He was the spouse of Kadambini Ganguly, the first Indian woman physician.

• He published the periodical Abalabandhab (Friend of Women) in Dhaka in May 1869.

• Sanjivani, a weekly Bengali newspaper that aimed to unite the peasants of lower Bengal, was published by him and Krishna Kumar Mitra.

• Ganguly held multiple terms as the secretary of the Sadharan Brahmo Samaj, which was established by Umeshchandra Datta, Shibchandra Deb, and Ananda Mohan Bose.

**Q67. Answer: (d) Menarche**

The correct answer is Menarche.

Key Points

• Menarche:

• It is the term used to describe the first menstrual flow that a woman experiences during puberty.

• This usually occurs between the ages of 11 and 14, but can happen earlier or later for some women.

• Menarche is an important milestone in a young woman's life, and is often accompanied by physical and emotional changes.

• Because it indicates the potential for reproduction, it is frequently regarded as the main event in female puberty.

• It is important for girls to be educated about menstruation and how to manage it, as well as to have access to sanitary products and medical care if needed.

Additional Information

• Menstruation:

• The regular release of blood and mucous tissue from the inner lining of the uterus into the vagina is called menstruation (or, informally, a period).

• Hormone levels rise and fall throughout the menstrual cycle.

• Falling progesterone levels cause menstruation, which is an indication that pregnancy has not yet begun.

• Menarche, the beginning of the first period, often occurs between the ages of 11 and 14.

• This is a typical vaginal bleed that happens during a woman's monthly cycle.

• In addition to vaginal bleeding, other symptoms includes:
• pain during pelvic or abdominal cramps
• back discomfort in the lower back
• breast pain and bloating
• cravings for food
• erratic emotions and irritation
• Fatigue and headache
• Ovulation:
• An egg (ovum) is released from one of the ovaries during the ovulation phase of the female menstrual cycle.
• It usually happens two weeks or so prior to the onset of the menstrual cycle.
• Gonadotropin-releasing hormone (GnRH) is released by the hypothalamus, a region of the brain, to initiate the ovulation process.
• Follicle-stimulating hormone (FSH) and luteinizing hormone (LH), which are secreted by your pituitary gland (a gland located in your brain), are caused by GnRH.
• It is necessary for pregnancy to occur, as the egg must be fertilized by sperm within 24 hours of being released from the ovary.
• Menopause:
• Menopause, which signifies the end of a woman's reproductive years, is one step in a continuum of life stages.
• A woman cannot conceive after menopause, with the possible exception of rare circumstances in which specialised fertility procedures are employed.
• The menopause occurs naturally in most women between the ages of 45 and 55 as a result of biological ageing.
• Reduced levels of circulating blood oestrogen and loss of ovarian follicular activity are the two main causes of menopause.
• Changes in the menstrual cycle typically precede the menopausal transition, which might happen gradually. The term "perimenopause" describes the time frame beginning when these symptoms appear and ending a year following the last menstrual cycle.

**Q68. Answer: (b) Rs. 1,80,000**

Shortcut Trick

Ratio of shares = 1 : 3 : 5

Difference between largest (5) and smallest (1) units = 5 − 1 = 4 units

Given, 4 units = Rs. 80,000 => 1 unit = Rs. 20,000

Total profit = (1 + 3 + 5) = 9 units = 9 × Rs. 20,000 = Rs. 1,80,000

Therefore The correct answer is Rs. 1,80,000.

Alternate Method

Given: Ratio of profit sharing = 1 : 3 : 5

Let the shares of the three partners be x, 3x, and 5x.

Formula Used: Difference = Largest Share − Smallest Share; Total Profit = Sum of all shares.

=> Smallest share = x, Largest share = 5x

=> Difference = 5x − x = 4x

=> 4x = 80,000

=> x = 80,000 ÷ 4 = 20,000

=> Total Profit = x + 3x + 5x = 9x

=> Total Profit = 9 × 20,000 = 1,80,000

Therefore The correct answer is Rs. 1,80,000.

Additional Information

Partnership Ratio

Profit is distributed based on the ratio of Capital × Time. If time is constant, profit ratio equals the investment ratio.

Unitary Method in Ratios

To find the total value, find the value of 1 unit by dividing the given difference by the difference in ratio parts, then multiply by the total ratio sum.

Types of Partners

Working partners manage the business and may receive extra commission/salary, while sleeping partners only invest capital.

**Q69. Answer: (b) Fringe benefits**

The correct answer is Fringe benefits.

Key Points

• Fringe benefits:

• The extra perks provided to an employee above and beyond their stated pay in exchange for performing a particular function are known as fringe benefits.

• These are the perks that employers give to their employees above and beyond any financial compensation.

• Certain universal perks are provided to all workers in an organisation, while others might only be available to executives.

• While some perks are intended to cover work-related expenses, others are intended to promote overall worker satisfaction.

• These consist of below-market loans, employee discounts, employee stock options, health and life insurance, childcare reimbursement, cafeteria subsidies, tuition help, and personal use of a corporate vehicles.

Additional Information

• Financial compensation:

• Encouraging someone with cash or other valuables in return for their services, labour, or to cover medical expenses related to an injury they have sustained is known as financial compensation.

• Main goal of financial compensation is to keep the ties between people who are trading goods and services intact.

• Wages, overtime pay, salaries, commissions, piece work rates, bonuses, and tips are examples of common financial compensation.

• Marginal Benefits:

• The utmost price a customer is prepared to pay for an extra good or service is known as the marginal benefit.

• When a buyer purchases an additional good or service, they also gain additional enjoyment or usefulness.

• As a good or service is consumed more frequently, the consumer's marginal utility usually declines.

• In the business sector, marginal revenue is a common term used to describe the producers' marginal advantage.

**Q70. Answer: (a) 36**

Calculation:

$[(12\times4)\times\{6\div4\times((7-4)/6)\}]$

$\Rightarrow [(12\times4)\times\{6\div4\times(1/2)\}]$

$\Rightarrow [(12\times4)\times\{3\div 2\times(1/2)\}]$

$\Rightarrow [(12\times4)\times\{(3/4)\}]$

$\Rightarrow 12 \times 3$

$\Rightarrow 36$

Therefore The correct option is 1.

**Q71. Answer: (b) 155**

The correct answer is 155.

Key PointsGiven in the question:

Rate of electricity = Rs. 5.00 per unit,

Power of fan = 100 W,

Time of usage = 10 hours per day,

Total days in May = 31

As we know that, Energy consumed (E) = Power (P) x Time (t)

Thus, Energy consumed by the fan per day = 100 W x 10 hours = 1000 Wh or 1 kWh

Energy consumed by the fan for the whole month = 1 kWh x 31 days = 31 kWh

Cost of running the fan for the whole month = 31 kWh x Rs. 5.00 per unit = Rs. 155.00

Therefore, the correct answer is Rs. 155.

Additional Information

• The rate of flow of charge in a conductor is known as electric current.

• The ampere is the SI unit of electric current.

• Electrons are little particles found in a substance's molecular structure.

• These electrons are held loosely sometimes and securely other times.

• Within the boundaries of the body, electrons can move freely when the nucleus holds them loosely.

**Q72. Answer: (c) Ninth**

Given Series:

(Left) V 2 5 U @ ρ W ¥ # 2 Ω A R Q 1 @ F B 4 6 # H J % Z E (Right)

We know,

Consonants → All alphabets except Vowels (A, E, I, O, U)

After dropping consonants from the given series, the series we get is as follows,

2 5 U @ ρ ¥ # 2 Ω A 1 @ 4 6 # % E

Now, let's check the position of Ω from the left,

2 5 U @ ρ ¥ # 2 Ω A 1 @ 4 6 # % E

Here, we can see that the position of Ω is ninth from the left.

Hence, the correct answer is "Ninth".

**Q73. Answer: (d) HCl**

The correct answer is HCl.

Key Points

• Hydrochloric Acid:

• The human stomach produces HCl as part of the gastric juice.

• It helps break down food, particularly proteins, and creates an acidic environment that is essential for the activation of enzymes involved in digestion.

• The stomach lining has protective mechanisms to prevent the acid from damaging the stomach itself.

• It is produced by specialized cells in the stomach lining called parietal cells.

• It is primarily used to denature proteins, which increases their susceptibility to enzymatic digestion.

Additional Information

• Lactic Acid:

• It is classified as a hydroxy acid and is a carboxylic acid with the chemical formula C3H6O3.

• It exists in two optical isomers: L-lactic acid and D-lactic acid.

• The accumulation of lactic acid in muscles is often associated with muscle fatigue and soreness, particularly during strenuous exercise.

• It serves as an acidulant, flavoring agent, and preservative in various products.

• Acetic Acid:

• The chemical compound acetic acid has the formula CH3COOH.

• It is a carboxylic acid with a carboxyl functional group joined to a methyl group.

• The presence of acetic acid is evident in its strong aroma and tart flavour.

• When the temperature drops below 16.6ºC, it produces crystals that resemble ice.

• Vinegar, commonly known as acetic acid or ethanoic acid, is a common culinary and laboratory reagent.

• The bacteria Acetobacter aceti is the source of it.

• Methanol is carbonylated in an industrial setting to make acetic acid.

• Sulphuric Acid:

• Mineral acids having the chemical formula H2SO4 are sulfuric acid.

• Other names for sulfuric acid include Mattling acid and Oil of Vitriol.

• It is corrosive and has a strong acidic tendency.

• It functions as an oxidising and dehydrating agent at greater doses.

• It is a colourless, syrup-like liquid with no smell.

**Q74. Answer: (b) N**

Let's create the arrangement using the given information:

1) O graduated in 2019.

2) M graduated in 2014.

| 2014 | M |
|---|---|
| 2015 | |
| 2016 | |

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| | |
|---|---|
| 2017 | |
| 2018 | |
| 2019 | O |

3) Only one medical student graduated between K and O, where K graduated before O.

| **2014** | **M** |
|---|---|
| 2015 | |
| 2016 | |
| 2017 | K |
| 2018 | |
| 2019 | O |

4) J graduated in the year immediately before the year N graduated.

| **2014** | **M** |
|---|---|
| 2015 | J |
| 2016 | N |
| 2017 | K |
| 2018 | |
| 2019 | O |

Thus, the final arrangement is as follows,

| **2014** | **M** |
|---|---|
| 2015 | J |
| 2016 | N |
| 2017 | K |
| 2018 | L |
| 2019 | O |

Here, we can see that N graduated in 2016.

Hence, the correct answer is " N ".

**Q75. Answer: (a) 0.81, away from**

The correct answer is 0.81, away from.

Key Points

• Given in the question:

• The refractive index of water = 1.65

• The refractive index of dense flint glass = 1.33

• The refractive index of water with respect to dense flint glass = The refractive index of water / The refractive index of dense flint glass.

• The refractive index of water with respect to dense flint glass = 1.33 / 1.65 = 0.81.

• Thus the refractive index of water with respect to dense flint glass is 0.81.

• This indicates that water is rarer than dense flint glass.

• The ray of light bends away from the normal as it travels from water to dense flint glass.

• Thus, the refractive index of water with respect to dense flint glass is 0.81 and the ray bends away from the normal in water.

Additional Information

• Refractive index of a medium

• It is a measure of how much the speed of light is reduced when it passes through that medium, compared to the speed of light in a vacuum.

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• In mathematical formulae and descriptive texts, the letter n or n' is most frequently used to represent the refractive index variable.

• Refracted light bends more in the direction of the normal line when it moves from a less dense material to a denser one.

• Refracted light bends away from the normal line when it moves from a denser material to rarer medium.

**Q76. Answer: (c) 40**

Given equation: 44 × 11 - 25 ÷ 20 + 80 =?

Decoding the information given,

| **Symbol** | • | × | ÷ | • |
|---|---|---|---|---|
| Meaning | • | × | ÷ | • |

After replacing the signs and using BODMAS rule in the given equation,

44 ÷ 11 × 25 + 20 - 80 =?

4 × 25 + 20 - 80 =?

100 + 20 - 80 =?

120 - 80 =?

40 = ?

Hence, the correct answer is "40".

**Q77. Answer: (d) Nayan**

Let's create the arrangement using the given information,

1) Only one engineering student graduated between Komal and Ojaswi, where Komal was Ojaswi's senior.

2) Ojaswi graduated in 2009.

| **2004** | |
|---|---|
| 2005 | |
| 2006 | |
| 2007 | Komal |
| 2008 | |
| 2009 | Ojaswi |

3) Midhun graduated in 2004.

4) Jayanth graduated in the year immediately before the year Nayan graduated.

| **2004** | **Midhun** |
|---|---|
| 2005 | Jayanth |
| 2006 | Nayan |
| 2007 | Komal |
| 2008 | |
| 2009 | Ojaswi |

Thus, the final arrangement is,

| **2004** | **Midhun** |
|---|---|
| 2005 | Jayanth |
| 2006 | Nayan |
| 2007 | Komal |
| 2008 | Lasya |
| 2009 | Ojaswi |

Here, we can see that Nayan graduated in 2006.

Hence, the correct answer is " Nayan ".

**Q78. Answer: (a) 0.7900900...**

Given:

7893/9990

Concept used;

To convert pure recurring decimal fractions into simple fraction: Firstly, write down the repeated digits only once in numerator and then place as many nines in the denominator as the number of digits repeating.

To convert mixed recurring decimal fractions into simple fractions: In the numerator take the difference between the number formed by all the digits after decimal point and the number formed by non repeating digits in the denominator place as many nines as there are repeating digits and after nine, put as many zeros as the number of non repeating digits.

Calculation:

Let take an example to explain the process. 0.55858...

0.55858...

(558 - 5)/990

553/990

Similarly we can use this process in reverse.

7893/9990

As there is three 9 and one zero so, bar will be on last three digit and on 7 there will be no bar and we have to add 7 in the given fraction.

(7893 +7)/9990

7900/9990

This can be written as 0.7900900...

Therefore The answer is 0.7900900...

**Q79. Answer: (a) state election commission**

The correct answer is State election commission.

Key Points

• State election commission:

• It is a constitutional body.

• The Indian Constitution establishes the State Election Commission to oversee state elections for panchayats and municipalities.

• According to Article 243K(1), a State Election Commission made up of a State Election Commissioner who will be chosen by the Governor will have superintendence, direction, and control over the creation of electoral rolls for all elections to Panchayats (Municipalities under Article 243ZA) as well as their conduct.

• Article 243K(2) specifies that the legislation passed by the state legislature will govern the State Election Commissioner's tenure and condition of the service.

Additional Information

• Election commission of India (ECI):

• It is an independent constitutional body responsible for conducting free and fair elections in the country.

• It was established in 1950.

• It is empowered under Article 324 of the Indian Constitution to oversee, direct, and manage elections for the parliament, state legislatures, the office of the president of India, and the office of the vice president of India.

• The Chief Election Commissioner (CEC) and any additional election commissioners, if any, that the President may from time to time designate, will make up the Election Commission.

• It is currently comprised of two Election Commissioners and the CEC.

• They hold office for a set period of time, which is either six years or until they turn 65.

• They may be removed prior to the end of their term or resign at any moment.

• Parliament must carry out a removal procedure similar to that of a Supreme Court judge in order to remove the CEC from office.

• Revenue Department of the state:

• It is responsible for the assessment, collection, and management of revenue in the state.

• It also deals with land records and settlement.

• Urban local government :

• The 74th Constitutional Amendment Act of 1992 established the constitutional framework for the system of municipalities, sometimes known as urban local governments.

• This amendment's provisions are contained in Part IXA, which went into effect on June 1st, 1993.

• "The Municipalities" is the title of Part IXA, which includes Articles 243-P through 243-ZG.

• The act also amended the Constitution by adding a new Twelfth Schedule. There are eighteen operational municipal items in this schedule.

• It is responsible for the administration of urban areas, including the provision of basic amenities, infrastructure development, and maintenance of law and order.

• Depending on their size and territory, the Act allows for the formation of three different kinds of municipalities in each state.

• Municipal Corporation for a bigger urban area

• Municipal Council for a smaller urban region

• Nagar Panchayat for an area that is transitioning from a rural to an urban environment.

**Q80. Answer: (b) an iron rod**

The correct answer is an iron rod.

Key Points

• Galvanometer:

• An instrument called a galvanometer is used to identify or quantify tiny electric currents.

• The movement of a coil in a magnetic field, which is a crucial component of a galvanometer, or a magnetic needle in a magnetic field typically indicate the current and its intensity.

• The deflection in the galvanometer connected to coil B can be increased by winding the core of coil B on an iron rod.

• This is because iron is a magnetic material and it enhances the magnetic field produced by the current flowing through coil A, thereby increasing the strength of the induced current in coil B.

• Iron is a ferromagnetic material, which means it can be magnetized and has a strong attraction to magnets.

• It is important to note that the distance between the two coils also affects the deflection in the galvanometer.

• The closer the coils are, the stronger the induced current in coil B will be.

Additional Information

• Ebonite:

• It is a type of hard rubber that is often used in electrical insulators and equipment due to its non-conductive properties.

• If an ebonite rod is used, it will not enhance the magnetic field as it is a non-magnetic material.

• Wooden Rod:

• It is a non-magnetic materials and are often used as insulators in electrical equipment.

• It is also non-magnetic materials and will not enhance the magnetic field.

• Glass Rod:

• It is a non-magnetic materials and are often used as insulators in electrical equipment.

• It is also non-magnetic materials and will not enhance the magnetic field.

**Q81. Answer: (c) 62**

Shortcut Trick

Use the Empirical Relation: Mode = 3 × Median − 2 × Mean.

Given Median = 46 and Mean = 38.

Mode = (3 × 46) − (2 × 38)

Mode = 138 − 76 = 62.

Therefore The correct answer is 62.

Alternate Method

Given:

Arithmetic Mean = 38

Median = 46

Formula Used:

The relationship between Mean, Median, and Mode for a moderately skewed distribution is:

Mode = 3 × Median − 2 × Mean

Calculations:

=> Mode = 3 × 46 − 2 × 38

=> Mode = 138 − 76

=> Mode = 62

Therefore The correct answer is 62.

Additional Information

Empirical Relation for Central Tendency

For a moderately skewed distribution, the relation is Mode = 3 × Median − 2 × Mean. This is often used when one of the three measures is missing.

Symmetrical Distribution

In a perfectly symmetrical distribution (like the Normal Distribution), Mean = Median = Mode.

Positively vs Negatively Skewed Data

In positively skewed data, Mean > Median > Mode. In negatively skewed data, Mode > Median > Mean.

**Q82. Answer: (c) oxygen**

The correct answer is oxygen.

Key Points

• Photosynthesis:

• It is the biological process by which plants convert sunlight, carbon dioxide, and water into glucose (a form of sugar) and oxygen.

• This chemical reaction which involves addition of Carbon Dioxide and removal of Oxygen. Oxygen is released as a byproduct or waste of this process.

• This process takes place in specialized structures within plant cells called chloroplasts, which contain a pigment called chlorophyll that gives plants their green color.

• During photosynthesis, chlorophyll absorbs the energy from sunlight.

• This energy is used to power a series of chemical reactions that convert carbon dioxide and water into glucose.

Additional Information

• Ammonia and Urea as waste:

• Ammonotelism is the process by which organisms expel ammonia and ammonium ions as nitrogenous waste products.

• Ammonia is the waste that is created when nitrogen-containing substances, such as proteins and nucleic acids, are broken down.

• While terrestrial animals have evolved various ways to get rid of the harmful ammonia in their bodies, aquatic creatures often excrete ammonia straight into their aquatic environs.

• Urea is the main by-product of ammonia metabolism in vertebrate animals.

• However, uric acid is the main byproduct of ammonia metabolism in birds, terrestrial arthropods, and reptiles.

• Thus, ammonia might be classified as a metabolic waste.

**Q83. Answer: (c) 4**

The number of people who belong to India, Canada as well as Russia is,

The common section of Rectangle, Triangle and Circle representing India, Russia and Canada respectively shows 4.

Hence, the correct answer is "4".

**Q84. Answer: (d) 2464**

Shortcut Trick

Check for divisibility by 11 since the formula involves π (22/7).

Option (1) 1848: (1+4) − (8+8) = −11 (Divisible)

Option (4) 2464: (2+6) − (4+4) = 0 (Divisible)

Calculation: 4 × 22/7 × 14 × 14 = 88 × 2 × 14 = 176 × 14 = 2464 cm².

Therefore The correct answer is 2464 cm².

Alternate Method

Given:

Radius (r) = 14 cm

π = 22/7

Formula Used:

Surface Area of Sphere = $4\pi r^2$

Calculations:

=> Surface Area = $4 \times (22/7) \times (14)^2$

=> Surface Area = $4 \times (22/7) \times 14 \times 14$

=> Surface Area = $4 \times 22 \times 2 \times 14$

=> Surface Area = $88 \times 28$

=> Surface Area = 2464 cm²

Therefore The correct answer is 2464 cm².

Additional Information

Volume of a Sphere

The total space occupied by a sphere is given by V = (4/3)πr³.

Hemisphere Properties

Curved Surface Area = 2πr² and Total Surface Area = 3πr².

Radius vs Diameter

The diameter (d) is twice the radius (r), so d = 2r.

**Q85. Answer: (c) Rohtang**

The correct answer is Rohtang.

Key Points

• Rohtang Pass:

• In the Indian state of Himachal Pradesh, approximately 51 km (32 mi) from Manali, the high mountain pass known as Rohtang Pass has an elevation of 3,980 m (13,058 ft).

• It is located on the eastern extremity of the Pir Panjal Range in the Himalayas.

• It links the Indian state of Himachal Pradesh's Kullu Valley to the Lahaul and Spiti Valleys.

• It is situated on the watershed that separates the Chenab and Beas basins.

• The Chandra River, a source stream of the Chenab River that originates in the eastern Himalayas, runs westward on its northern side, while the Beas River emerges from underground and flows south on the pass's southern side.

Additional Information

• Shipki La:

• On the India-China border, Shipki La is a mountain pass and border checkpoint with dozens of sizable structures.

• Near this crossing, the Sutlej river enters India.

• The pass marks the boundary between the Ngari Prefecture in Tibet, China, and the Kinnaur district in the Indian state of Himachal Pradesh.

• It is mostly used for trade purposes.

• Shipki La is located at an altitude of 5,300 meters above sea level and is closed for civilian traffic.

• Lipu Lekh:

• It is a high altitude mountain pass located in the Western Himalayas that connects China, Nepal, and India.

• With a height of 5,334 metres, or 17,500 feet, it is also known as Lipu-Lekh Pass/Qiangla or Tri-Corner.

• Since ancient times, traders, mendicants, and pilgrims travelling between India and Tibet have utilised Lipulekh Pass, which is located close to the Chinese trading town of Taklakot (Purang) in Tibet.

• This pass, which constitutes the last boundary of Indian territory, connecting the Tibet Autonomous Region of China with the Byans valley in Uttarakhand, India.

• This pass is crossed by the Hindu pilgrimage known as the Kailash Mansarovar Yatra, which leads to Mount Kailash and Lake Manasarovar.

• Currently, cross-border trade is permitted through Lipulekh Pass every year from June to September.

• Zoji La:

• The high mountain pass known as Zoji La is situated in Ladakh's Kargil area.

• The pass serves as a vital conduit between the Union Territories of Ladakh and Kashmir and connects Leh and Srinagar.

• Zoji la is referred to as the "Blizzard Mountain Pass."

• Due to excessive snowfall, Zojila Pass stays blocked during the winter, severing the Ladakh region from Kashmir.

• The Zojila tunnel project began in 2018. The strategically important and longest bi-directional tunnel in Asia will connect Srinagar, Kargil, and Leh under all weather conditions.

• Other important passes of India:

| Pass | Links/Location |
|---|---|
| Baralacha La | Lahaul, Himachal Pradesh with Leh, Ladakh |
| Jelep La | Sikkim with Tibet |
| Nathu La | Sikkim with Tibet |
| Khardung La | Ladakh with Siachen glacier |

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| | |
|---|---|
| Bomdi La | Located in Arunachal Pradesh |

**Q86. Answer: (d) 5 km**

Given:-

1) Janak started from his office and traveled a distance of 4 km towards north.

2) He then turned left and traveled a distance of 3 km.

3) He then turned left and traveled 9 km.

4) He then took a final left, traveled 3 km and stopped.

5) Shortest distance between stopping point and his office.

Hence, the correct answer is "5 km".

**Q87. Answer: (b) JVK9**

The pattern followed here is:-

Hence, the correct answer is "JVK9".

**Q88. Answer: (b) 2^(nd) and 3^(rd)**

Given:

Percentage of total sale in

1^(st) quarter = 20%

2^(nd) quarter = 40%

3^(rd) quarter = 16%

4^(th) quarter = 24%

Calculation:

According to given details,

Quarter 2^(nd)has highest sales i.e = 40%, and

Quarter 3^(rd) has lowest sales i.e = 16%.

Therefore Option 2 is the correct answer.

**Q89. Answer: (a) 239076**

Shortcut Trick

A number is divisible by 18 if it is divisible by both 2 and 9.

Divisibility by 2: Last digit must be even. (842104 and 317468 are even; 239076 and 792462 are even).

Divisibility by 9: Sum of digits must be divisible by 9.

For 239076: 2 + 3 + 9 + 0 + 7 + 6 = 27 (Divisible by 9).

Therefore The correct answer is 239076.

Alternate Method

Given: Numbers 239076, 792462, 842104, 317468.

Condition for divisibility by 18: The number must satisfy the divisibility rules of its co-prime factors, 2 and 9.

Case 1: 239076

=> Last digit = 6 (Even, so divisible by 2).

=> Sum of digits = 2 + 3 + 9 + 0 + 7 + 6 = 27.

=> 27 ÷ 9 = 3 (Remainder 0, so divisible by 9).

Case 2: 792462

=> Sum of digits = 7 + 9 + 2 + 4 + 6 + 2 = 30 (Not divisible by 9).

Case 3: 842104

=> Sum of digits = 8 + 4 + 2 + 1 + 0 + 4 = 19 (Not divisible by 9).

Case 4: 317468

=> Sum of digits = 3 + 1 + 7 + 4 + 6 + 8 = 29 (Not divisible by 9).

Therefore The correct answer is 239076.

Additional Information

Divisibility Rule of 9

A number is divisible by 9 if the sum of its digits is a multiple of 9.

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Divisibility Rule of 6

A number is divisible by 6 if it is even and the sum of its digits is divisible by 3.

Co-prime Numbers

Two numbers are co-prime if their Highest Common Factor (HCF) is 1. For 18, the co-prime factors are 2 and 9.

**Q90. Answer: (c) Insufficiency of oxygen supply to muscles**

The correct answer is Insufficiency of oxygen supply to muscles.

Key Points

• Oxygen is required by muscles to produce energy through aerobic respiration.

• Inadequate oxygen supply can cause muscle cramps due to the switch to anaerobic respiration, which produces lactic acid that can lead to cramping.

• Lactic Acid:

• It is classified as a hydroxy acid and is a carboxylic acid with the chemical formula C3H6O3.

• It exists in two optical isomers: L-lactic acid and D-lactic acid.

• The accumulation of lactic acid in muscles is often associated with muscle fatigue and soreness, particularly during strenuous exercise.

Additional Information

• Hypoglycaemia:

• When the amount of glucose in your blood falls below what is considered healthy for you, you have low blood glucose, also known as hypoglycemia or low blood sugar.

• This translates to blood glucose levels of less than 70 milligrammes per deciliter (mg/dL) for a large number of diabetics.

• Among the symptoms are restless or shaky, hungry, exhausted, lightheaded, dizzy, or agitated.

• Your heart is racing or palpitating, you're experiencing a headache, and you're having trouble speaking or seeing well.

• Neuromuscular junctions:

• A skeletal, smooth, or cardiac muscle and the terminal end of a motor nerve form a synaptic connection known as the neuromuscular junction (NMJ).

• It is the location where the action potential is transferred from the nerve to the muscle.

• It is also the location of many illnesses and the site of action for numerous pharmaceutical products.

**Q91. Answer: (c) 27/5**

Shortcut Trick

b = sum of first three odd numbers = 1 + 3 + 5 = 9.

Third proportional c = $b^2 \div 15$.

c = $9^2 \div 15 = 81 \div 15$.

Divide by 3: c = 27 ÷ 5.

Therefore The correct answer is 27/5.

Alternate Method

Given: First number = 15, Second number = b, Third proportional = c.

Formula Used: If c is the third proportional of a and b, then a : b :: b : c or $c = b^2 / a$.

=> b = Sum of first three odd natural numbers = 1 + 3 + 5

=> b = 9

=> Now, 15 : 9 = 9 : c

=> 15 × c = 9 × 9

=> 15c = 81

=> c = 81 ÷ 15

=> c = 27/5

Therefore The correct answer is 27/5.

Additional Information

Mean Proportional

The mean proportional between two numbers a and b is given by √(ab).

Fourth Proportional

If a : b :: c : d, then d is the fourth proportional, calculated as d = (b × c) / a.

Sum of First 'n' Odd Numbers

The sum of the first n odd natural numbers is always equal to $n^2$.

**Q92. Answer: (c) behind the mirror**

The correct answer is behind the mirror.

Key Points

• Convex Mirror:

• A convex mirror is one with a curved surface that bulges in the direction of the light source. It is not intended to focus light; instead, this bulging surface reflects light outward.

• It is also known as a diverging mirror as it diverges the light rays.

• The principal focus of a convex mirror is a point behind the mirror on the principal axis where the light rays appear to diverge from after reflecting from the mirror.

• The image formed by a convex mirror is always virtual, diminished, and upright.

• The focal length is always positive in case of Convex Mirror.

Additional Information

• Use of convex mirror:

• In corridors of buildings, such as shops, schools, hospitals, hotels, and apartment complexes, convex mirrors are frequently utilised.

• They are used in alleyways, driveways, and other locations where there is poor sight to ensure the safety of all bikers and drivers at bends and turns.

• Additionally, some automated teller machines employ them as a convenient security feature that lets users see what's going on behind them.

• They are used in an automobile's passenger side mirror, where a warning placard reading "objects in mirror are closer than they appear" is placed to alert drivers.

• Image formation by convex mirror:

| Position of the object | Position of the image | Size of the image | Nature of the image |
|---|---|---|---|
| Between Pole and Infinity | Behind the mirror between pole and focus | Diminished | Virtual and Erect |
| At Infinity | Behind the mirror at focus | Highly Diminished | Virtual and Erect |

**Q93. Answer: (a) NFMLC**

The pattern followed here is:-

'TOTAL' is coded as 'RMRYJ'

'PLANT' is coded as 'NJYLR'

Similarly,

'PHONE' is coded as 'NFMLC'

Hence, the correct answer is "NFMLC".

**Q94. Answer: (b) Neither conclusion I nor II follow**

The least possible Venn diagram for the given statements is as follows:-

Conclusions:

I. Some desks are chairs → Does not follow (as all chairs are pens and some shoes are desk but, there is no definite relationship between chairs and desk so some desks are chairs does not follow)

II. Some shoes are chairs → Does not follow (as all chairs are pens and some pens are shoes but, there is no definite relationship between shoes and chairs so some shoes are chairs does not follow)

Hence, the correct answer is "Neither Conclusion I nor II follow".

**Q95. Answer: (d) Ureters**

The correct answer is Ureters.

Key Points

Ureters:

• They are muscular tubes that transport urine from the kidneys to the urinary bladder.

• They extend from the renal pelvis of the kidney to the urinary bladder.

• Each kidney has one ureter, and the urine flows through the ureters by peristaltic contractions of the smooth muscle in the ureter walls.

• They have an average length of about 25–30 centimeters (10–12 inches).

• They have a one-way flow mechanism facilitated by the presence of valves called ureterovesical valves, which prevent the backflow of urine from the bladder into the ureters.

Additional InformationUrethra:

• It is a tubular structure that serves as a duct for the passage of urine from the urinary bladder to the outside of the body.

• In males, the urethra also has a reproductive function, serving as the passage for semen during ejaculation.

• The length and structure of the urethra differ between males and females.

• The female urethra is shorter and primarily serves the purpose of conducting urine from the bladder to the external urethral orifice.

Nephrons:

• They are the structural and functional units of the kidneys, which are vital organs responsible for filtering blood, removing waste products, and regulating various physiological processes in the body.

• Each kidney contains approximately one million nephrons, and these microscopic structures play a crucial role in maintaining the body's internal balance by regulating water and electrolyte levels and removing metabolic waste.

• Substances, such as glucose, amino acids, and electrolytes, are reabsorbed from the filtrate back into the bloodstream, primarily in the proximal convoluted tubule.

**Q96. Answer: (b) 0.1 A**

The correct answer is 0.1 A.

Key Points

• Given in the question:

• Current in the circuit (I) = 0.05 A

• Pottential difference across the circuit (V) = 10 V

• Thus, using Ohm's Law (i.e. R = V/I), the resistance of the wire (R) = V/I = 10/0.05 = 200 Ω.

• Now, the potential difference across the circuit is changed to 20 V (= V_(new))

• Using Ohm's Law (i.e. I = V/R), the current passes through the wire (I_(new)) = V_(new)/ R = 20/200 = 0.1 A.

• Therefore, the current passing through the wire when the voltage across it is 20 V will be 0.1 A.

Additional Information

• Potential difference:

• The energy differential between two places in a circuit caused by charge carriers is known as the potential difference.

• It is measured in volts (V).

• Electric Current:

• A flow of charged particles across space or an electrical conductor, such as electrons or ions.

• The ampere is the SI unit of electric current.

• Resistance:

• The amount of obstruction to current passage in an electrical circuit is measured as resistance. Ohms, or the Greek letter omega (Ω), are used to measure resistance (R).

• Ohm's Law:

• Ohm's law states that the electric current flowing through a conductor is directly proportional to the potential difference across its ends, provided the physical state of the conductor remains unchanged.

• If I be the current flowing through the conductor and V the potential difference across its ends, then V prop. to I

• Hence, V=IR, where, R is the constant of proportionality termed as Resistance of the conductor.

**Q97. Answer: (b) 5.875**

Shortcut Trick

For the equation 3x2 − 9x + 8 = 0, Sum (S) = 3 and Product (P) = 8/3.

The given expression simplifies to: [(α + β)2 − 2αβ + 4(α + β)] ÷ αβ.

Substituting the values: [32 − 2(8/3) + 4(3)] ÷ (8/3) = [9 − 16/3 + 12] ÷ (8/3).

= [21 − 16/3] ÷ (8/3) = (47/3) × (3/8) = 47/8 = 5.875.

Therefore The correct answer is 5.875.

Alternate Method

Given:

The quadratic equation is 3x2 − 9x + 8 = 0, where α and β are the roots.

Comparing with ax2 + bx + c = 0: a = 3, b = −9, c = 8.

Formula Used:

Sum of roots (α + β) = −b/a

Product of roots (αβ) = c/a

Calculations:

=> α + β = −(−9) ÷ 3 = 3

=> αβ = 8/3

=> Expression = (α/β + β/α) + 4(1/α + 1/β)

=> Expression = (α2 + β2) / αβ + 4(α + β) / αβ

=> Since α2 + β2 = (α + β)2 − 2αβ

=> α2 + β2 = (3)2 − 2(8/3) = 9 − 16/3 = 11/3

=> Term 1 = (11/3) ÷ (8/3) = 11/8 = 1.375

=> Term 2 = 4 × [3 ÷ (8/3)] = 4 × (9/8) = 36/8 = 4.5

=> Value = 1.375 + 4.5 = 5.875

Therefore The correct answer is 5.875.

Additional Information

Nature of Roots

The nature is determined by the discriminant D = b2 − 4ac. If D < 0, roots are imaginary; if D > 0, roots are real and distinct.

Relation between Roots and Coefficients

For any polynomial of degree n, the sum of roots taken one at a time is always −an−1/an and the product is (−1)n a0/an.

Symmetric Functions of Roots

Functions like α2+β2 or 1/α+1/β are symmetric because interchanging α and β does not change the value of the expression.

**Q98. Answer: (c) Only assumption I is implicit**

Given:-

Statement:

Do not throw glass bottles in green dustbins which are meant for other recyclable waste items.

Assumptions:

I. Dustbins for collecting glass bottles are of a different colour than the dustbins used to collect other recyclable items → Implicit (As in the statement it is given that green dustbins are meant for other recyclables items only and glass bottles are not to be thrown in it.)

II. Glass bottles are to be thrown along with the non-recyclable waste → Not Implicit (As nothing is mentioned about the non-recyclable waste in the statement.)

Hence, the correct answer is "Only assumption I is implicit".

**Q99. Answer: (d) 111/9%**

Shortcut Trick

In cases of a dishonest shopkeeper selling at cost price, use the direct formula:

Gain % = [Error / (True Weight − Error)] × 100

Error = 1000 gm − 900 gm = 100 gm

Gain % = [100 / 900] × 100 = 100 / 9 = 11(1)/(9)%

Therefore The correct answer is 11(1)/(9)%.

Alternate Method

Given:

True Weight = 1 kg = 1000 gm

Actual Weight used = 900 gm

Selling Price (SP) = Cost Price (CP) of the stated weight.

Let the Cost Price (CP) of 1 gm of goods be Rs. 1.

=> CP of 1000 gm = Rs. 1000

=> The shopkeeper claims to sell 1 kg (1000 gm) at CP.

=> Selling Price (SP) for the customer = Rs. 1000

=> The shopkeeper actually gives only 900 gm to the customer.

=> Actual Cost Price for the shopkeeper = CP of 900 gm = Rs. 900

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=> Profit = SP − Actual CP

=> Profit = 1000 − 900 = Rs. 100

=> Gain Percentage = (Profit / Actual CP) × 100

=> Gain % = (100 / 900) × 100

=> Gain % = 100 / 9 = 11(1)/(9)%

Therefore The correct answer is 11(1)/(9)%.

Additional Information

Dishonest Dealer Concept

When a dealer sells at cost price but uses less weight, the profit is always calculated on the weight actually delivered to the customer.

General Formula for Faulty Weight

Gain % = [(True Weight − False Weight) / False Weight] × 100. This is applicable when the price remains the same.

Combined Gain (Markup + Faulty Weight)

If a dealer marks up the price by x% and uses y% less weight, the total gain percentage is calculated as: Total Gain % = [(x + y) / (100 − y)] × 100.

**Q100. Answer: (a) silviculture**

The correct answer is Silviculture.

Key Points

• The West Bengal Forest Department recognized in 1972 that it had not been successful in restoring the damaged Sal forests in the state's southwest regions.

• The protection of 1,272 hectares of severely degraded sal forest was made possible by the vision of a forest officer, A.K. Banerjee, and the locals.

• Villagers received employment in silviculture and harvesting, 25% of the final harvest, and permission to collect fuelwood and fodder for a small price in exchange for their assistance with protection.

• Silviculture:

• The process of managing a forest's growth, composition, and quality in order to achieve goals and needs—most notably, the production of lumber—is known as silviculture.

• The words silvi- (meaning "forest") and culture (meaning "growing") are Latin roots of the term. Silvology is the study of forests and woods.

Additional Information

• Agriculture:

• It is the science or art of farming, which includes raising animals for food, wool, and other goods and tilling the soil for crop growth.

• It has been the primary source of livelihood for a large percentage of the population for centuries.

• Sericulture:

• It is the practice of silk farming, which involves the cultivation of silkworms and the production of silk.

• The raising of silkworms, the gathering of silk cocoons, and the processing of silk fibres are all parts of sericulture.

• Types of silk:

• Mulberry Silk.

• Tasar Silk.

• Muga Silk.

• Eri Silk.

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