

RRB GROUP D TEST - 4 SOLUTION

MATHS

Q 1. Answer: (c)

Explanation:

Given, Principal = ₹ 10,000

Compound interest for 1-year compounded yearly = 16%

$$\text{Rate of interest for half-yearly} = \frac{16\%}{2} = 8\%$$

$$\text{Compound interest for 1-year} = 8 + 8 + \frac{8 \times 8}{100} = 16.64\%$$

Difference between the compound interest = $16.64\% - 16\% = 0.64\%$

Required Difference = ₹ 10,000 × 0.64% = ₹ 64

Q 2. Answer: (c)

Explanation:

Given, Loss = 22%

Selling price = ₹663

$$\text{So, Cost price of the article} = \frac{\text{₹}663 \times 100}{100 - 22} = \text{₹}850$$

Now, Selling price = ₹833

$$\text{Loss percentage} = \frac{(850 - 833)}{850} \times 100\% = 2\%$$

So, loss is 2%.

Q 3. Answer: (a)

Explanation:

Given,

Ratio of four numbers = 2: 5: 3: 8

Numbers = 2x, 5x, 3x and 8x

Sum of four numbers = 270

$$\Rightarrow 2x + 5x + 3x + 8x = 270$$

$$\Rightarrow 18x = 270$$

$$\Rightarrow x = 15$$

Difference between second and fourth number =

$$(8x - 5x) = 3x$$

$$\Rightarrow 3x = 15 \times 3 = 45$$

Q 4. Answer: (b)

Explanation:

Let the roots be 3a and 4a.

$$\text{Sum of roots} = 3a + 4a = 7a = p/3$$

$$\text{Product of roots} (3a \times 4a) = 36/3$$

$$\Rightarrow 12a^2 = 12$$

$$\Rightarrow a^2 = 1$$

$$\Rightarrow a = \pm 1$$

$$\Rightarrow 7a = p/3$$

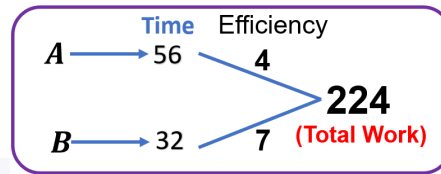
$$\Rightarrow 3 \times 7(\pm 1) = p$$

$$\Rightarrow p = \pm 21$$

Q 5. Answer: (c)

Explanation:

According to the question,



Total work = 224 units

B's work in 12 days = $12 \times 7 = 84$ units

Remaining work = $224 - 84 = 140$ units

A's efficiency = 4 units/day

Time taken by A to complete the remaining work = $140/4 = 35$ days

Q 6. Answer: (a)

Explanation:

According to the question,

Mean = Sum of observations / Number of observations

$$\Rightarrow 10 = (6 + 10 + 12 + P + 9 + 8 + 11 + 15 + 13) / 9$$

$$\Rightarrow 90 = 84 + P$$

$$\Rightarrow P = 6$$

Numbers = 6, 10, 12, 6, 9, 8, 11, 15 and 13

Among the given numbers, 6 has the highest frequency, so,

Q 7. Answer: (b)

Explanation:

According to the question,

8 men = 12 women

Men : Women = 12 : 8 = 3 : 2

Total work = $8 \times 3 \times 24 = 576$

Total efficiency of 6 men and 9 women = $6 \times 3 + 9 \times 2 = 36$

Time required = $576/36 = 16$ days

Q 8. Answer: (b)

Explanation:

According to the question,

$$(\text{Area of } \triangle XYZ) / (\text{Area of } \triangle LMN) = (XY/LM)^2$$

$$\Rightarrow 200/128 = (25/LM)^2$$

$$\Rightarrow 25/16 = (25/LM)^2$$

$$\Rightarrow 5/4 = 25/LM$$

$$\Rightarrow LM = (25 \times 4) / 5$$

$$\Rightarrow LM = 20 \text{ cm}$$

Q 9. Answer: (d)

Explanation:

Given,

HCF of two numbers = 11

Sum of two numbers = 132

Let the numbers be 11a and 11b, where a and b are co-prime.

$$11a + 11b = 132$$



$$11(a + b) = 132$$

$$a + b = 12$$

Possible co-prime pairs (a, b): (1, 11), (5, 7)

Numbers: (11, 121), (55, 77)

Since both the numbers are greater than 42, so the numbers are 55 and 77.

$$\text{Difference between the two numbers} = 77 - 55 = 22$$

Q 10. Answer: (d)

Explanation:

According to the question,

Ratio of speeds of cyclists P and Q = 60 : 75 = 4 : 5

Ratio of time = 5 : 4

Difference of time (1 unit) = 20 min

Time taken by cyclist Q (4 units) = 4 × 20 = 80 min = 4/3 hrs

Speed of cyclist Q = 75 km/h

Distance = 75 × 4/3 = 100 km

Q 11. Answer: (a)

Explanation:

Given,

Radius of coin = 3 cm and Height of coin = 0.1 cm

Volume of cylindrical coin = $\pi r^2 h$

$$= (22/7) \times 3^2 \times 0.1$$

$$= (22/7) \times 9 \times 0.1$$

$$= 2.8285 \text{ cm}^3$$

$$\text{Weight of gold coin} = 2.8285 \times 19.3 = 54.6 \text{ g}$$

Q 12. Answer: (c)

Explanation:

Given,

$$\tan 4A = \cot (A + 15^\circ)$$

$$\tan 4A = \tan (90^\circ - (A + 15^\circ))$$

$$\Rightarrow 4A = 90^\circ - A - 15^\circ$$

$$\Rightarrow 5A = 75^\circ$$

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

$$\Rightarrow 3A = 45^\circ$$

Q 13. Answer: (a)

Explanation:

If the roots are equal, then discriminant (D) = $b^2 - 4ac = 0$

Given equation: $2x^2 - 5x + k = 0$

$$a = 2, b = -5, c = k$$

$$\Rightarrow (-5)^2 - 4(2)(k) = 0$$

$$\Rightarrow 25 - 8k = 0$$

$$\Rightarrow 8k = 25$$

$$\Rightarrow k = 25/8$$

Q 14. Answer: (a)

Explanation:

According to the question,

Two discounts = 30% and 5%

$$\text{Single discount} = 30 + 5 - \frac{30 \times 5}{100} = 33.5\%$$

Profit = 25%

We know,

$$\text{CP: MP} = (100 - D): (100 + P)$$

$$\Rightarrow \text{CP: MP} = (100 - 33.5): (100 + 25)$$

$$\Rightarrow \text{CP: MP} = 66.5: 125$$

$$\Rightarrow \text{CP: MP} = 133: 250$$

$$\text{Markup percentage} = \frac{250 - 133}{133} \times 100\% = 87.97\% \sim 88\%$$

Q 15. Answer: (c)

Explanation:

Ratio of votes = 5:3:12

Votes received by the second candidate (3x) = 720

$$\Rightarrow x = 240$$

Total valid votes = (5x + 3x + 12x) = 20x

$$\Rightarrow 20x = 20 \times 240 = 4800$$

Invalid votes = 20%

$$\text{Total votes} = 4800 \times 100/80 = 6000$$

Q 16. Answer: (c)

Explanation:

Given, $4 \sin^2 \theta = 3$

$$\sin^2 \theta = 3/4$$

$$\sin \theta = \sqrt{3}/2 = \sin 60^\circ$$

$$\theta = 60^\circ$$

Value of $\sec^2 \theta + \tan^2 \theta$,

$$= \sec^2 60^\circ + \tan^2 \theta = 2^2 + (\sqrt{3})^2 = 4 + 3 = 7$$

Q 17. Answer: (b)

Explanation:

According to the question,

$$\text{Remainder} = \frac{(2)^{49}}{7} \Rightarrow \frac{2 \times (2^3)^{16}}{7}$$

$$\Rightarrow \frac{2 \times (8)^{16}}{7} \Rightarrow \frac{2 \times (1)^{16}}{7}$$

$$\Rightarrow \frac{2}{7}$$

$$\text{Remainder} = 2$$

Q 18. Answer: (a)

Explanation:

Given,

$$(4x + 2)(2x - 3) = Ax^2 + Bx + C$$

$$\Rightarrow 8x^2 - 12x + 4x - 6 = Ax^2 + Bx + C$$

$$\Rightarrow 8x^2 - 8x - 6 = Ax^2 + Bx + C$$

On comparison,

$$\Rightarrow A = 8, B = -8, C = -6$$

$$\text{Value of } 2A + B - C = 2 \times 8 + (-8) - (-6)$$

$$\Rightarrow 16 - 8 + 6 = 14$$

Q 19. Answer: (a)

Explanation:

According to the question,

Increase in manufacturing unit in A from year 2021 to

$$2022 = \frac{(175-150)}{150} \times 100\% = 20\%$$

Increase in manufacturing unit in B from year 2021 to

$$2022 = \frac{(269-225)}{225} \times 100\% = 17.25\%$$

Increase in manufacturing unit in C from year 2021 to

$$2022 = \frac{(315-300)}{300} \times 100\% = 5\%$$

Increase in manufacturing unit in E from year 2021 to

$$2022 = \frac{(172-150)}{150} \times 100\% = 14.67\%$$

So, manufacturing unit C has the least increase.

Q 20. Answer: (a)

Explanation:

We know, Area of triangle = $\sqrt{s(s-a)(s-b)(s-c)}$

$$\text{Semi-perimeter (s)} = \frac{(a+b+c)}{2} = \frac{(9+10+17)}{2} = 18$$

$$\text{Area of triangle} = \sqrt{18(18-9)(18-10)(18-17)}$$

$$\Rightarrow \sqrt{18 \times 9 \times 8 \times 1} = 36 \text{ cm}^2$$

Q 21. Answer: (c)

Explanation:

According to the question,

$$[72 + (18 \div 3) \times 2 - 30] \div 6$$

$$\Rightarrow [72 + 6 \times 2 - 30] \div 6$$

$$\Rightarrow [72 + 12 - 30] \div 6$$

$$\Rightarrow 54 \div 6 = 9$$

Q 22. Answer: (a)

Explanation:

Let the number of pages in the first part = N

Number of pages in the second part = N - 55

Number of pages in the third part = (N-55) + 35 = N - 20

Total pages = 390

$$\Rightarrow N + (N - 55) + (N - 20) = 390$$

$$\Rightarrow 3N - 75 = 390$$

$$\Rightarrow 3N = 465$$

$$\Rightarrow N = 155$$

Q 23. Answer: (c)

Explanation:

According to the question,

$$\text{Volume of hollow sphere} = \frac{4}{3}\pi(R^3 - r^3)$$

$$\Rightarrow \frac{4}{3}\pi(10^3 - 8^3) \Rightarrow \frac{4}{3}\pi \times 488$$

Radius of smaller spheres = $4/2 = 2 \text{ cm}$

$$\text{Volume of smaller sphere} = \frac{4}{3}\pi(2^3) \Rightarrow \frac{4}{3}\pi \times 8$$

Let number of spheres = N

Volume of hollow sphere = N × Volume of smaller sphere

$$\Rightarrow \frac{4}{3}\pi \times 488 = N \times \frac{4}{3}\pi \times 8$$

$$\Rightarrow 8N = 488$$

$$\Rightarrow N = 61$$

Q 24. Answer: (b)

Explanation:

According to the question,

Total balls = 4 + 6 + 2 = 12

Blue balls = 6

Probability = Blue balls / Total balls = 6 / 12 = 1/2

Q 25. Answer: (c)

Explanation:

According to the question,

Cost price of 60 items = ₹25 × 60 + ₹300 = ₹1800

Cost price of each item = ₹1800/60 = ₹30

Selling price of each item = ₹35

Profit percentage = $(35 - 30) / 30 \times 100\% = 16.67\%$

REASONING

Q 26. Answer: (a)

Explanation:

19827546

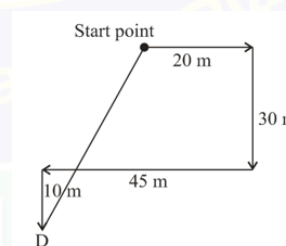
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Thus, the correct answer is option a.

Distance and direction

Q 27. Answer: (a)

Explanation:



Q 28. Answer: (c)

Explanation:



Thus, the correct answer is option c.

Q 29. Answer: (c)

Explanation:

Train have Station $\rightarrow @ \text{ mu } \#$
Station are platform $\rightarrow \text{ Su bc mu}$
I have platform Train $\rightarrow 7 @ \text{ Su } \#$
Common word between 1st and 2nd is Station, and common code is mu $\rightarrow \text{ Station } = \text{ mu}$.
From 2nd and 3rd, common word platform and common code Su $\rightarrow \text{ platform } = \text{ Su}$.
In the 3rd, the order maps I have platform Train $\rightarrow 7 @ \text{ Su } \#$ so:
I = 7
have = @
platform = Su
Train = #
Thus, the correct answer is option c.
Inequality

Q 30. Answer: (b)

Explanation:

$G < H \rightarrow H > G$ -False
 $D > E = F \geq G \rightarrow D > G$ TRUE
Thus, the correct answer is option b.

Q 31. Answer: (a)

Explanation:

1685742419
9876544211
So, the third number to the right of the eighth number from the right end is 4.
Thus, the correct answer is option a.

Q 32. Answer: (b)

Explanation:

"PEGASUS"
PU
Thus, the correct answer is option b

Q 33. Answer: (c)

Explanation:

7 2 ~ U ! 6 I @ L \$ B % 8 * P W Q X 4 5 ^ T \$ 7 O D A
4 is 9th from the right end of the series.
Thus, the correct answer is option c.

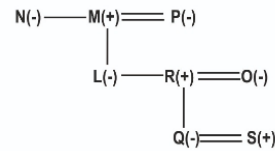
Q 34. Answer: (b)

Explanation:

7 2 U 6 I L B 8 P W Q X 4 5 T 7 O D A
L is 6th from the left end.
Thus, the correct answer is option b.

Q 35. Answer: (c)

Explanation:



Thus, the correct answer is option c

Q 36. Answer: (b)

Explanation:

Conclusion I does not follow — the statements say reading increases factual knowledge but do not guarantee that mere reading (without application) produces wisdom. Conclusion II does follow because Statement II explicitly links applied knowledge to practical wisdom.
Thus the correct answer is option b.

Q 37. Answer: (c)

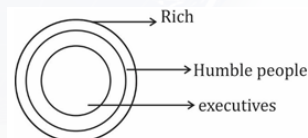
Explanation:



Thus the correct answer is option c.

Q 38. Answer: (a)

Explanation:



Thus the correct answer is option a.

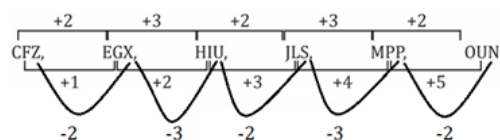
Q 39. Answer: (d)

Explanation:

$D > B$
 $B > C$
 $B > E$
 $D > B > C > E$
Or $D > B > E > C$
Thus the correct answer is option d.

Q 40. Answer: (d)

Explanation:



Thus the correct answer is option d.

Q 41. Answer: (d)

Explanation:

$$J \leq M \geq F > C = T < P$$

I. $J > C$ (False)

II. $F = T$ (False)

Thus, the correct answer is option d.

Q 42. Answer: (c)

Explanation:

A ↓ 1+1=2	B ↓ 2+1=3						
P ↓ 16+1	A ↓ 1+1	R ↓ 18+1	T ↓ 20+1	I ↓ 9+1	C ↓ 3+1	L ↓ 12+1	E ↓ 5+1
17	2	19	21	10	4	13	6

Thus the correct answer is option c.

Q 43. Answer: (b)

Explanation:

$$3 \quad 10 \quad 101 \quad 10202$$

$$3^2+1 \quad 10^2+1 \quad (101)^2+1$$

Thus the correct answer is option b.
Mathematical operation

Q 44. Answer: (b)

Explanation:

$$\frac{1}{4} \times 64 \times 5 + 45 - 120 = 5$$

$$125 - 120 = 5$$

Thus the correct answer is option b.

Q 45. Answer: (b)

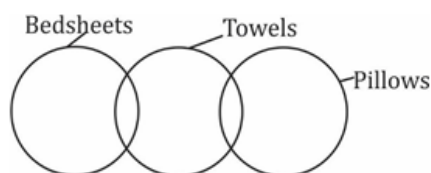
Explanation:

$$\begin{array}{c} +2+3 \\ \text{F H K} \end{array} : \begin{array}{c} +2+3 \\ \text{K M P} \end{array} :: \begin{array}{c} +2+3 \\ \text{P R U} \end{array} : \begin{array}{c} +2+3 \\ \text{U W Z} \end{array}$$

Thus the correct answer is option b.

Q 46. Answer: (d)

Explanation:

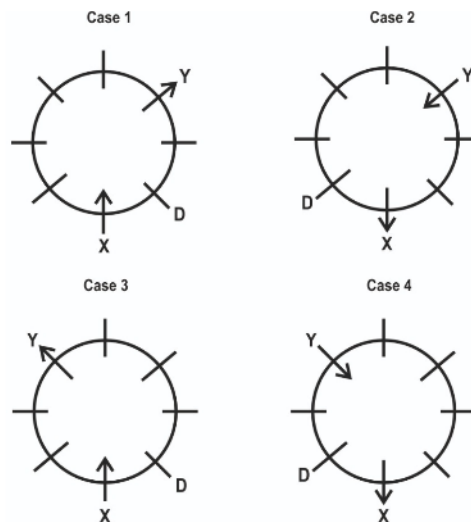


Thus the correct answer is option d

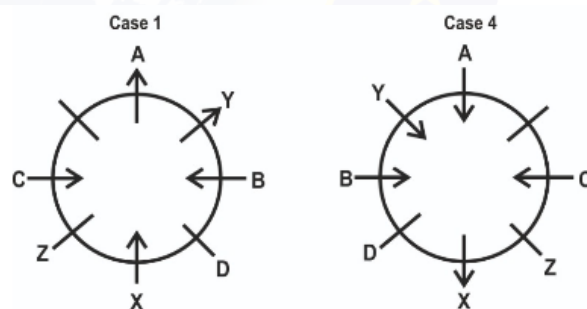
Q 47. Answer: (b)

Explanation:

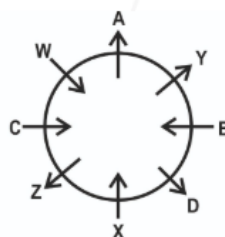
From the given statements, D sits immediately to the right of X. From this condition, we get 2 possibilities i.e. Case 1 and Case 2. There are two persons sit between X and Y and both are facing the opposite direction to each other. Here we get 2 more possibilities i.e. Case 3 and Case 4.



Both C and W are immediate neighbors to each other and facing in the same direction. Both D and Y are not the immediate neighbors of both C and W. From this condition Case 2 and Case 3 are ruled out now. Both C and B are facing to each other. Z sits 3rd to the left of A, who does not sit opposite to Y.



Both C and W are immediate neighbors to each other and facing in the same direction. From this condition Case 4 is ruled out. So, the final arrangement is such as-



Thus, the correct answer is option b.

Q 48. Answer: (a)

Explanation:

$$7 + 2 \times 5 - \frac{16}{4} = 13$$
$$17 - 4 = 13$$

Thus the correct answer is option a.

Q 49. Answer: (a)

Explanation:

$$(13.5 + 1) \times 1 = 14.5$$
$$(14.5 + 1) \times 2 = 31,$$
$$(31 + 1) \times 4 = 128$$
$$(128 + 1) \times 8 = 1032$$

Thus the correct answer is option a.

Q 50. Answer: (a)

Explanation:

F U M E S
↓ ↓ ↓ ↓ ↓
6 21 13 5 19
Place value of letters
so,
C A R L O
↓ ↓ ↓ ↓ ↓
3 1 18 12 15
= 31181215

Thus the correct answer is option a.

Q 51. Answer: (a)

Explanation:

Second = $\text{First}^2 + (\text{First} \times 3)$
Third = $(\text{Second} \div 2) + (\text{First} \times 1.5)$
(5, 40, 27.5)
Second = $5^2 + (5 \times 3) = 25 + 15 = 40$
Third = $(40 \div 2) + (5 \times 1.5) = 20 + 7.5 = 27.5$
(7, 70, 45.5)
Second = $7^2 + (7 \times 3) = 49 + 21 = 70$
Third = $(70 \div 2) + (7 \times 1.5) = 35 + 10.5 = 45.5$
A. (6, 54, 36)
Second = $6^2 + (6 \times 3) = 36 + 18 = 54$
Third = $(54 \div 2) + (6 \times 1.5) = 27 + 9 = 36$
B. (8, 88, 64)
Second = $8^2 + (8 \times 3) = 64 + 24 = 88$
Third = $(88 \div 2) + (8 \times 1.5) = 44 + 12 = 56 \neq 64$
C. (9, 99, 72)
Second = $9^2 + (9 \times 3) = 81 + 27 = 108 \neq 99$
Second = $10^2 + (10 \times 3) = 100 + 30 = 130 \neq 100$
Thus, the correct answer is option a.

Q 52. Answer: (b)

Explanation:

If first and second digit are interchanged, then 434 will be second largest number.
Thus, the correct answer is option b.

Q 53. Answer: (d)

Explanation:

C
A
D
F
E
B

Thus, the correct answer is option d.

Q 54. Answer: (a)

Explanation:

1. Statement 1: Mr. X's rank was 15th from the top in the class. Not sufficient to answer the question.
2. Statement 2: Mr. X's rank was 26th from the bottom in the class. Not sufficient to answer the question.
Adding both statements 1 and 2 gives
Total number of students = $15 + 26 - 1 = 40$
Therefore, both statements 1 and 2 together are sufficient to answer the question.
Thus, the correct answer is option a.

Q 55. Answer: (c)

Explanation:

Floor	Lives
6	A
5	D
4	C
3	F
2	B/E
1	B/E

Thus, the correct answer is option c.

SCIENCE

Q 56. Answer: (c)

Explanation:

- When gypsum (calcium sulfate dihydrate) ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$) is heated to around 150°C , it loses water molecules and gets partially dehydrated, forming Calcium Sulphate Hemihydrate ($\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$), known as Plaster of Paris (POP).
- This white powder is widely used in construction, fireproofing, and making casts/molds.

Q 57. Answer: (a)

Explanation:

- When a thin beam of light passes through a smoke-filled

room, the small particles of smoke act as tiny obstacles in the path of light.

- When light falls on such small particles, it gets deflected in different directions. This phenomenon is called 'scattering of light'.
- Due to scattering, the light from the beam spreads in different directions, making the path of the beam visible to our eyes. Without scattering, the beam would not be visible from the side.

Q 58. Answer: (c)

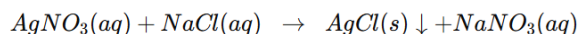
Explanation:

- Respiration occurs in two stages: glycolysis and aerobic respiration. In glycolysis, glucose is broken down into pyruvate without using oxygen.
- If oxygen is absent, pyruvate undergoes fermentation (like forming ethanol or lactic acid). However, when oxygen is present, pyruvate enters the mitochondria and undergoes complete oxidation through the Krebs cycle and electron transport chain, producing carbon dioxide, water, and large amounts of energy (ATP).
- Thus, oxygen is essential during the stage where pyruvate is fully oxidized to CO_2 and H_2O , releasing maximum energy.

Q 59. Answer: (c)

Explanation:

A reaction in which two aqueous salt solutions react to form an insoluble solid is called a precipitation reaction. The insoluble solid formed is known as a precipitate



Here, AgCl is an insoluble solid (precipitate).

Q 60. Answer: (d)

Explanation:

- When a coil or conductor moves at right angles to a magnetic field, an induced current is produced due to electromagnetic induction.
- To determine its direction, Fleming's Right-Hand Rule is applied.
- According to this rule: stretch the thumb, forefinger, and middle finger of the right hand so that they are mutually perpendicular; the thumb indicates the direction of motion of the conductor, the forefinger shows the direction of the magnetic field, and the middle finger gives the direction of the induced current.

Q 61. Answer: (d)

Explanation:

- From lithium ($Z=3$) to fluorine ($Z=9$), the atomic number and nuclear charge both increase. As a result, the effective nuclear attraction on valence electrons becomes stronger.
- Although the number of shells remains the same (all

belong to the second period), the stronger pull reduces the distance between the nucleus and outermost electrons.

- Hence, atomic radii decrease across a period from left to right.

Q 62. Answer: (b)

Explanation:

- In 1866, an English scientist, John Newlands, arranged the elements known at that time in order of increasing atomic mass.
- He started with hydrogen, the element with the lowest atomic mass, and ended with thorium, which was the 56th known element at that time.

Q 63. Answer: (d)

Explanation:

- Infiltration is the process by which water from rainfall or surface sources seeps into the soil through pores and cracks.
- This water then replenishes underground water tables and is vital for plant growth. It differs from percolation, which is the downward movement of water through soil layers.

Q 64. Answer: (d)

Explanation:

- On heating, ferrous sulphate (FeSO_4) decomposes into ferric oxide (Fe_2O_3), sulphur dioxide (SO_2), and sulphur trioxide (SO_3). The balanced reaction is:
 $\checkmark \quad 3\text{FeSO}_4(\text{s}) \rightarrow \text{Fe}_2\text{O}_3(\text{s}) + \text{SO}_2(\text{g}) + \text{SO}_3(\text{g})$
- Here, $p=2$, $q=1$, $r=1$, $s=1$. This reaction is an example of thermal decomposition.

Q 65. Answer: (c)

Explanation:

- A current-carrying solenoid produces a magnetic field similar to that of a bar magnet. One end behaves as a North Pole and the other as a South Pole. Thus, it can magnetise a soft iron core placed inside it, making an electromagnet.
- The statement (iii) is incorrect because concentric circular field lines are produced around a straight conductor, not inside a solenoid.

Q 66. Answer: (c)

Explanation:

- The Smooth Endoplasmic Reticulum (SER) in the liver cells of vertebrates is mainly involved in detoxification.
- It modifies and breaks down harmful metabolic by-products, drugs, and poisons to make them less toxic. While the Rough ER is associated with protein synthesis due to ribosomes, SER functions in lipid synthesis and detoxification.



Q 67. Answer: (b)

Explanation:

- The filament of a bulb is made thin and long to increase its resistance. A higher resistance ensures that the electrical energy is converted efficiently into heat and light without drawing excessive current, which could damage the circuit.
- Materials like tungsten, which have high melting points and suitable resistivity, are used for filaments.
- The design ensures a stable and bright light output while preventing the filament from melting quickly, making it safe and energy-efficient.

Q 68. Answer: (c)

Explanation:

- In photosynthesis, the balanced chemical equation is: $6\text{CO}_2 + 12\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 + 6\text{H}_2\text{O}$ (in presence of sunlight and chlorophyll).
- This shows that six molecules of carbon dioxide and six molecules of water participate directly in the process to form one molecule of glucose, along with oxygen and water as by-products.
- This reaction is essential as it captures solar energy into chemical energy, making it the foundation of life processes on Earth.

Q 69. Answer: (c)

Explanation:

- In the chlor-alkali process, concentrated sodium chloride (brine) solution is electrolyzed. At the cathode, hydrogen gas is released, and at the anode, chlorine gas is liberated. Sodium hydroxide solution remains in the cell.
- Hence, the three products are Hydrogen, Chlorine, and NaOH. This process is industrially very important, as chlorine is used in disinfectants and PVC, hydrogen in fuels and fertilizers, and NaOH in soaps, paper, and textiles. NCERT mentions this reaction under the topic of electrolysis of brine.

Q 70. Answer: (b)

Explanation:

- The split ring in a DC electric motor acts as a commutator. Its main function is to reverse the direction of current in the coil after every half rotation.
- This ensures that the torque acting on the coil always rotates it in the same direction, producing continuous rotation.
- Brushes in contact with the split ring allow current to flow into the coil, while the soft iron core strengthens the magnetic field.

Q 71. Answer: (a)

Explanation:

- AIDS stands for Acquired Immune Deficiency Syndrome.

- It is a disease caused by the Human Immunodeficiency Virus (HIV), which attacks and weakens the immune system, reducing the body's ability to fight infections.
- The term "acquired" indicates that the disease is not inherited but contracted after birth.

Q 72. Answer: (a)

Explanation:

- The principal axis of a spherical mirror is an imaginary straight line passing through the pole and the center of curvature. It is always normal (perpendicular) to the mirror's surface at the pole. The principal focus of the mirror lies on this axis.
- However, the point of incidence of light rays does not necessarily lie on the principal axis; it can strike any point on the mirror's surface.
- The statements (i) and (iii) are correct.

Q 73. Answer: (d)

Explanation:

- In a homologous series, consecutive members differ by a $-\text{CH}_2-$ group. The molecular mass of a $-\text{CH}_2-$ group is $12 (\text{C}) + 2 (\text{H}) = 14 \text{ u}$. Therefore, the difference in molecular mass between two consecutive compounds in a homologous series is 14.
- This principle is important in organic chemistry for identifying series like alkanes, alkenes, and alcohols.
- This pattern also leads to gradual changes in physical properties such as boiling point, melting point, and density.

Q 74. Answer: (c)

Explanation:

- In optics, a real image is an image that is formed when rays converge at a specific point.
- They can be projected onto a screen or a photographic film.
- Real images can be produced by concave mirrors and converging
- lenses, assuming the object is placed further from the mirror or lens than the focal point, and this image is inverted.

Q 75. Answer: (b)

Explanation:

- When dry chlorine gas is passed over dry slaked lime ($\text{Ca}(\text{OH})_2$), the principal product formed is calcium oxychloride (commonly called bleaching powder; nominal formula $\text{Ca}(\text{OCl})_2$ or CaOCl_2), with water as a by-product.
- The reaction yields bleaching powder used widely for disinfection and bleaching.

Q 76. Answer: (c)

Explanation:

- A precipitation reaction occurs when two aqueous

solutions react to form an insoluble solid known as a precipitate. It is a type of double displacement reaction, where positive and negative ions exchange partners, resulting in a product that does not dissolve in water.

- Precipitation reactions are widely used in analytical chemistry to identify ions or to remove specific ions from solutions. This type of reaction is fundamental in laboratory practices, water treatment, and industrial processes to isolate and purify compounds.

Q 77. Answer: (d)

Explanation:

- When a resistance R is cut into two equal parts, the length of each part is halved. Since resistance is directly proportional to the length of a conductor ($R \propto L$), the resistance of each part becomes $R/2$.
- Cutting a resistor into equal halves reduces the resistance of each part by half. This principle is useful in designing circuits where specific resistances are required and demonstrates the fundamental relationship between conductor length and resistance.

Q 78. Answer: (d)

Explanation:

- The electronic configuration of carbon (C) is $1s^2 2s^2 2p^2$, which indicates that carbon has a total of 6 electrons. These electrons are distributed across two shells: the K-shell holds 2 electrons, and the L-shell holds 4 electrons.
- Since electrons occupy the lowest available energy levels first, carbon uses only these two shells to accommodate all its electrons. Therefore, the total number of shells involved in carbon's electronic configuration is two.

Q 79. Answer: (b)

Explanation:

- The distance between the pole (P) and the centre of curvature (C) of a spherical mirror is called the radius of curvature (R). For spherical mirrors, the focal length (f) is half the radius of curvature, i.e., $R = 2f$.
- This means the distance from the pole to the centre of curvature is twice the focal length. This formula applies to both concave and convex mirrors and is fundamental in mirror geometry for locating images and calculating magnification.

Q 80. Answer: (d)

Explanation:

- During adolescence, growth of mammary glands occurs exclusively in girls and signifies sexual maturation. This change is triggered by hormones such as estrogen and progesterone.
- Other changes like oily skin, hair growth, and being conscious of appearance occur in both boys and girls during puberty. Mammary gland development, however, is unique to females and marks the onset

of reproductive maturity. Understanding this helps distinguish general adolescent changes from sex-specific developmental markers.

GENERAL KNOWLEDGE

Q 81. Answer: (c)

Explanation:

- The Indian Constitution empowers the President to declare three types of emergencies: (i) National Emergency under Article 352, (ii) State Emergency or President's Rule under Article 356, and (iii) Financial Emergency under Article 360.
- Article 358 relates to suspension of fundamental rights during a National Emergency, not a public health emergency. No provision exists in the Constitution for declaring a "Public Health Emergency."

Q 82. Answer: (c)

Explanation:

- Latitudes are parallel horizontal lines that never intersect, whereas longitudes are semicircles that converge at the poles. Hence, the statement "longitudes never intersect each other" is incorrect.
- For example, the Prime Meridian (0° longitude) and 180° longitude meet at the poles.

Q 83. Answer: (c)

Explanation:

- The Sangai (*Rucervus eldii eldii*), also called the Manipur brow-antlered deer, is endemic to Manipur, especially the Keibul Lamjao National Park on Loktak Lake.
- It is the state animal of Manipur and a conservation icon; its habitat is the floating marshy phumdis unique to Loktak. Sangai is listed as endangered, and conservation programs (habitat protection, captive breeding, and community involvement) are central to its survival.

Q 84. Answer: (b)

Explanation:

- The Prime Minister Internship Scheme (PMIS) functions under the Ministry of Corporate Affairs. Launched in 2024 (announced in the 2024–25 Budget), it aims to provide internship opportunities to youth across multiple sectors by partnering with leading companies.
- The scheme targets up to one crore internships over five years, enhancing industry-academia linkages and employability by exposing students to real-world work environments.

Q 85. Answer: (b)

Explanation:

- Press Freedom Day (World Press Freedom Day) is observed every year on 3 May. It was established



by UNESCO in 1993 to raise awareness about the importance of freedom of the press and to remind governments of their duty to uphold press freedom and the safety of journalists.

- On this day, countries assess the level of media freedom and advocate for transparency, media rights, and protection of journalists. It is also a day to call attention to violations of press freedom worldwide.

Q 86. Answer: (d)

Explanation:

- The Central Statistics Office (CSO), now merged into the National Statistical Office (NSO), has been responsible since 1956 for compiling and releasing data related to national income, consumption expenditure, savings, and capital formation.
- It plays a crucial role in economic planning and policy-making by providing reliable statistics. According to the Government of India's Ministry of Statistics and Programme Implementation, CSO/NSO ensures transparency and accuracy in national accounts.

Q 87. Answer: (b)

Explanation:

- Sohan Singh Bhakna was the founding president of the Ghadar Party, formed by Indian expatriates on the Pacific coast of North America in 1913 to overthrow British rule in India by armed revolt.
- The organisation (initially the Hindustani Workers/ Pacific Coast Hindustan Association) published the newspaper Hindustan Ghadar and attracted Punjabis and Indian students.
- Lala Har Dayal served as general secretary, while Bhakna was its president.

Q 88. Answer: (c)

Explanation:

- The Planning Commission, established in 1950, launched India's First Five-Year Plan in 1951.
- Jawaharlal Nehru, the first Prime Minister of India, was its Chairman.
- The focus was on agriculture, irrigation, and energy.

Q 89. Answer: (d)

Explanation:

- Chalo Loku is the major three-day harvest festival of the Nocte tribe (Tirap/Khonsa region) in Arunachal Pradesh.
- It is celebrated after the paddy harvest with dances, rituals and feasting.

Q 90. Answer: (c)

Explanation:

- The law of demand states that demand decreases as price rises, creating a downward sloping curve.
- This inverse relationship reflects consumer behaviour.

Q 91. Answer: (b)

Explanation:

- Tropical evergreen forests occur in regions with high rainfall (more than 200 cm), high temperature throughout the year, and no distinct dry season. These conditions are found in the Western Ghats and the northeastern hills and islands.
- Of the options given, Kerala lies along the windward Western Ghats where heavy rainfall and humid tropical climate support dense evergreen forests (thick canopy, multi-storey vegetation, broad-leaf evergreen trees).

Q 92. Answer: (a)

Explanation:

- The Protection of Interest in Aircraft Objects Bill, 2025 aims to align India's aircraft leasing and financing ecosystem with global standards.
- It gives legal force to the Cape Town Convention, 2001 and the Protocol on Matters Specific to Aircraft Equipment (the Aircraft Protocol). India acceded to these in 2008, but lacked full legal enforcement domestically until this Bill.
- The Bill plugs existing gaps in enforcement (e.g. repossession of aircraft when airlines default) which previously made lessors and financiers reluctant to lease aircraft to Indian carriers.

Q 93. Answer: (d)

Explanation:

- Brazil is the world's largest coffee exporter, contributing approximately 30-35% of the global coffee supply.
- Brazil primarily produces two main varieties: Arabica and Robusta beans.
- In 2024, it exported a record 50.4 million 60-kilogram bags of coffee.

Q 94. Answer: (b)

Explanation:

- The 7-member Constitution Drafting Committee, formed on 29th August 1947, was responsible for drafting India's Constitution.
- Dr. B.R. Ambedkar chaired the committee, which included members like Alladi Krishnaswami Ayyar, N. Gopalaswami, K.M. Munshi, Mohammad Saadulla, B.L. Mitter and D.P. Khaitan.
- Later on, N. Madhava Rao replaced B.L. Mitter and T. T. Krishnamachari replaced D.P. Khaitan.

Q 95. Answer: (d)

Explanation:

- The theme for the 76th Republic Day 2025 is officially "Swarnim Bharat – Virasat aur Vikas".
- Prabowo Subianto, President of Indonesia, was invited as Chief Guest for Republic Day 2025.

- There was a 148-member all-women marching contingent of the CRPF, led by Assistant Commandant Aishwarya Joy M.
- There was also an Indonesian contingent: a 190-member military band from Indonesia's Military Academy (Akmil) performed.

Q 96. Answer: (b)

Explanation:

- Haryana secured the top position in the Khelo India Para Games 2025 medal tally with 104 medals, including 34 gold, 39 silver, and 31 bronze.
- Tamil Nadu followed in second place with 74 medals, while Uttar Pradesh stood third with 64 medals.

Q 97. Answer: (d)

Explanation:

- The Dandi March, led by Mahatma Gandhi in 1930, was a famous non-violent protest against the British salt monopoly.
- Gandhi and his followers walked about 240 miles from Sabarmati Ashram to the coastal village of Dandi to produce salt from seawater, defying British law.
- This act of civil disobedience mobilized masses across India and became a pivotal moment in India's freedom struggle.

Q 98. Answer: (b)

Explanation:

- In Jainism, the term 'Jain' comes from 'Jina', meaning 'conqueror'. It refers to a person who has conquered

inner passions such as anger, attachment, greed, and ego, and attained spiritual liberation (moksha).

- Jains follow the teachings of these conquerors, called Tirthankaras, to lead a life of non-violence, truth, and self-discipline.
- The philosophy of Jina emphasizes mastery over human desires and moral conduct as a path to ultimate liberation.

Q 99. Answer: (a)

Explanation:

- In April 2025, Maharashtra introduced a comprehensive electric vehicle (EV) policy aimed at increasing EV adoption. This policy seeks to alleviate range anxiety and enhance charging infrastructure.
- The state government aims to promote the use of electric vehicles to reduce pollution and dependence on fossil fuels. The policy includes incentives for EV manufacturers and consumers, as well as measures to improve the availability of charging stations across the state.

Q 100. Answer: (c)

Explanation:

- In May 2025, Group Captain Ajit Krishnan, selected for India's first human space mission 'Gaganyaan', was recalled to emergency service by the Indian Air Force. This mission is a milestone for India's space capabilities.
- The Gaganyaan mission aims to send Indian astronauts into space, marking a significant achievement in the country's space exploration efforts.