Answer Key

Other (142 Questions)

Q1. (C)	Q2. (A)	Q3. (B)	Q4. (B)	Q5. (A)
Q6. (A)	Q7. (D)	Q8. (B)	Q9. (B)	Q10. (C)
Q11. (A)	Q12. (A)	Q13. (B)	Q14. (A)	Q15. (D)
Q16. (B)	Q17. (D)	Q18. (A)	Q19. (B)	Q20. (A)
Q21. (C)	Q22. (C)	Q23. (C)	Q24. (A)	Q25. (C)
Q26. (A)	Q27. (B)	Q28. (B)	Q29. (A)	Q30. (D)
Q31. (A)	Q32. (B)	Q33. (D)	Q34. (C)	Q35. (D)
Q36. (B)	Q37. (A)	Q38. (C)	Q39. (D)	Q40. (A)
Q41. (D)	Q42. (D)	Q43. (A)	Q44. (D)	Q45. (B)
Q46. (B)	Q47. (D)	Q48. (A)	Q49. (B)	Q50. (D)
Q51. (B)	Q52. (A)	Q53. (A)	Q54. (B)	Q55. (D)
Q56. (C)	Q57. (A)	Q58. (A)	Q59. (A)	Q60. (A)
Q61. (A)	Q62. (D)	Q63. (B)	Q64. (C)	Q65. (B)
Q66. (D)	Q67. (D)	Q68. (A)	Q69. (A)	Q70. (A)
Q71. (B)	Q72. (D)	Q73. (B)	Q74. (A)	Q75. (C)
Q76. (B)	Q77. (D)	Q78. (B)	Q79. (B)	Q80. (C)
Q81. (D)	Q82. (D)	Q83. (C)	Q84. (C)	Q85. (C)
Q86. (C)	Q87. (A)	Q88. (A)	Q89. (C)	Q90. (C)
Q91. (A)	Q92. (C)	Q93. (D)	Q94. (C)	Q95. (A)
Q96. (C)	Q97. (C)	Q98. (B)	Q99. (C)	Q100.(C)
Q101.(B)	Q102.(D)	Q103.(C)	Q104.(D)	Q105.(D)

Q106.(D)	Q107.(A)	Q108.(D)	Q109.(A)	Q110.(C)
Q111.(A)	Q112.(C)	Q113.(C)	Q114.(C)	Q115.(D)
Q116.(B)	Q117.(B)	Q118.(A)	Q119.(B)	Q120.(D)
Q121.(D)	Q122.(B)	Q123.(C)	Q124.(C)	Q125.(D)
Q126.(B)	Q127.(B)	Q128.(C)	Q129.(D)	Q130.(D)
Q131.(C)	Q132.(D)	Q133.(D)	Q134.(A)	Q135.(C)
Q136.(D)	Q137.(B)	Q138.(C)	Q139.(A)	Q140.(B)
Q141.(B)	Q142.(C)			

Solutions

Q1. Solution
Correct Answer: (C)

$$= [Moment\ of\ inertia] \times [Angular\ velocity]$$

$$= ML^2 \times T^{-1}$$

$$= ML^2\,T^{-1}$$

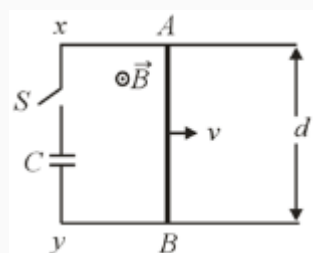## Q2. Solution
Correct Answer: (A)

$h = 500$ m, $\frac{dm}{dt} = 2000$ kg s^{-1}.

Power output $= \frac{80}{100} \times \frac{dm}{dt} gh$

$= \frac{4}{5} \times 2000 \times 10 \times 500$ W
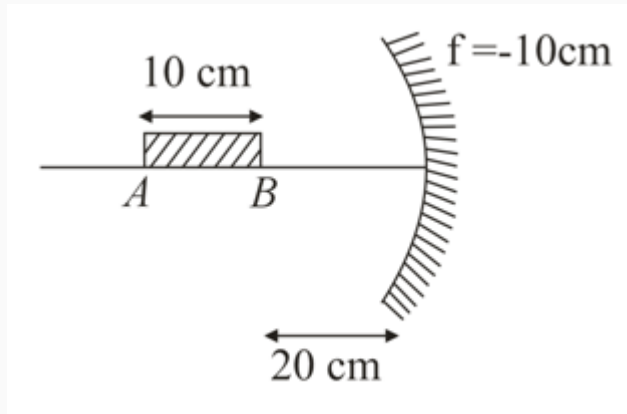
$= 8 \times 10^6$ W $= 8$ MW.

Q3. Solution
Correct Answer: (B)

Here magnetic field $\vec{B}$ is constant and out of paper. When the sliding rod AB moves with a velocity v in the direction shown in the figure, the induced in AB is from A to B As the switch S is closed at time $t = 0$, the capacitor gets charged. If q is the charge on the capacitor, then $I = \frac{dq}{dt} = \frac{Bdv}{r} - \frac{q}{RC}$ or $\frac{q}{RC} + \frac{dq}{dt} = \frac{Bdv}{R}$ Or $q = vBdc + A\,e^{-t/RC}$ (Where A is a constant) ...(i At $t = 0$, $q = 0 \therefore A = -vBdc$ From (i)$q = vBdc\left[1 - e^{-t/RC}\right]$ $I = \frac{dq}{dt} = vBdC \times \frac{1}{RC}e^{-t/RC} = \frac{vBd}{R}e^{-t/RC}$

Q4. Solution

Correct Answer: (B)

from mirror formula $\frac{1}{v} + \frac{1}{u} = \frac{1}{f}$ image distance of A

$\frac{1}{v_A} + \frac{1}{(-30)} = \frac{1}{-10} \Rightarrow v_A = -15$ cm

Also image distance of C, $v_c = -20$ cm The length of image

$= |v_A - v_c| = |-15 - (-20)| = 5$ cm

Q5. Solution

Correct Answer: (A)

The total length of wire is l and mass is m so each side length $= \frac{l}{4}$ and mass $= \frac{m}{4}$.

Work done by gravity is calculated by the displacement of the center of mass in the vertical direction

Work done by gravity$= \frac{mg}{4} \frac{l}{8} + \frac{mg}{4} \frac{l}{8} + \frac{mg}{4} \frac{l}{4}$

Work done by gravity$= \frac{mgl}{8}$

Q6. Solution

Correct Answer: (A)

Width of slit $(W) \propto$ Light intensity (I), $\frac{W_1}{W_2} = \frac{I_1}{I_2} = \frac{4}{9} = \frac{4k}{9k}$ ....(k is a constant)

$I_{max} = 4k + 9k + 2\sqrt{4k9k} = 25k$

$I_{min} = 4k + 9k - 2\sqrt{4k9k} = k$

$\frac{I_{max}}{I_{min}} = 25 : 1$

Q7. Solution

Correct Answer: (D)

The expression of g is,

$g = \frac{GM}{R^2}$, but $\rho = \frac{M}{V} = \frac{M}{\frac{4}{3}\pi R^3}$

$\therefore g = \frac{G \times \rho \times \frac{4}{3}\pi R^3}{R^2}$

$\therefore g = \frac{4}{3}G\pi R\rho$

Q8. Solution

Correct Answer: (B)

The frequencies of micro wave is less than that of visible that is less than X-rays. So $\lambda_m > \lambda_v > \lambda_x$

Q9. Solution

Correct Answer: (B)

Both the springs having spring constant k_1 are in parallel.

Their effective spring constant will be,

$k_{11} = k_1 + k_1 = 2k_1$.

This will be in series connection with k_2. The total spring constant of the system will be,

$\frac{1}{k_{eq}} = \frac{1}{2k_1} + \frac{1}{k_2}$

$k_{eq} = \left[\frac{1}{2k_1} + \frac{1}{k_2}\right]^{-1}$.
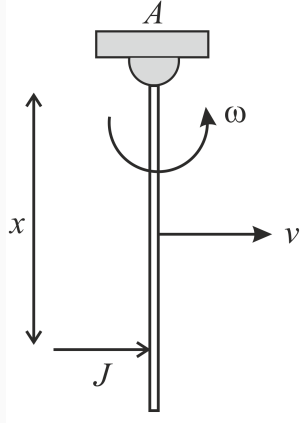
Q10. Solution
Correct Answer: (C)

From impulse-momentum theorem, we can write,

Impulse=change in momentum or, $J = \Delta p$.

Let velocity of the centre of mass is v, then, we can write,

$J = mv - 0 = mv \ldots (i)$

The rod starts rotating. Let the angular speed of rod about point A is ω. Then, from conservation of angular momentum, we have,

$J.x = I\omega = \frac{ml^2}{3}\omega \quad \ldots (ii)$

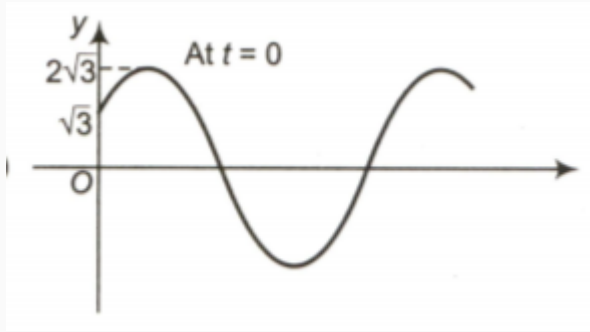And from the relation between linear and angular velocity of the centre of mass, we have,

$v = \frac{l}{2}\omega \quad \ldots (iii)$

Solving these three equations, we get,

$x = \frac{2}{3}l.$

Q11. Solution
Correct Answer: (A)

$$\frac{\Delta p}{p} = \frac{\Delta m}{m} + \frac{\Delta V}{V}$$
$$= \frac{0.05}{5} \times 100 + \frac{0.05}{1} \times 100$$
$$= 6$$
$$\frac{\Delta p}{p} = 6\% \sim$$

Q12. Solution
Correct Answer: (A)

At $x = 0$, $t = 0$, $y = \sqrt{3}$

Further, if x is slightly greater than 0, y is slightly greater than $\sqrt{3}$. Therefore, the current graph is (a).

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Q13. Solution
Correct Answer: (B)

Before contact, charges of each sphere,
$q_1 = \sigma 4\pi R^2$ and $q_2 = \sigma 4\pi (2R)^2 = 4q_1$
When the two sphere are brought in contact, their charges are shared till their potential become equal
$i.e.\ V_1 = V_2$.

$\therefore \quad \dfrac{q_1'}{4\pi\varepsilon_0 R} = \dfrac{q_2'}{4\pi\varepsilon_0(2R)}$

$\therefore \quad q_2' = 2q_1' \qquad \dots (i)$

As there is no loss of charge in the process

$\therefore \quad q_1' + q_2' = q_1 + q_2 = q_1 + 4q_1 = 5q_1 = 5\left(\sigma 4\pi R^2\right)$

Or $q_1' + 2q_1' = 5\sigma 4\pi R^2 \qquad \left(\text{using (i)}\right)$

$q_1' = \dfrac{5}{3}\sigma\, 4\,\pi R^2$ and $q_2' = 2q_1' = \dfrac{10}{3}\left(\sigma 4\pi R^2\right)$

Hence, $\sigma_1 = \dfrac{q_1'}{4\pi R^2} = \dfrac{5}{3}\sigma,\ \sigma_2 = \dfrac{q_1'}{4\pi(2R)^2} = \dfrac{5}{6}\sigma \sim$

Q14. Solution
Correct Answer: (A)

Dimensions of $E = \left[\mathrm{ML^2T^{-2}}\right]$

Dimensions of $G = \left[\mathrm{M^{-1}L^3T^{-2}}\right]$

Dimensions of $I = \left[\mathrm{MLT^{-1}}\right]$

And dimension of $M = \left[\mathrm{M}\right]$

$\therefore$ Dimensions of $\dfrac{GIM^2}{E^2} = \dfrac{\left[\mathrm{M^{-1}L^3T^{-2}}\right]\left[\mathrm{MLT^{-1}}\right]\left[\mathrm{M^2}\right]}{\left[\mathrm{ML^2T^{-2}}\right]^2}$

$$= [\mathrm{T}]$$

$$= \text{Dimensions of time},$$

Q15. Solution
Correct Answer: (D)

Given,

The stress along the length of a rod (with rectangular cross-section) is 1% of the Young's modulus(Y) of its material and

Poisson's ratio,$\gamma = -\frac{\text{lateral strain}}{\text{longitudinal strain}} = 0.3$

$\Rightarrow$ lateral strain $= -\gamma\frac{\Delta l}{l} = -0.3\frac{\Delta l}{l}$.

By Hooke's law,

stress $= Y \times \frac{\Delta l}{l}$

$\Rightarrow 0.01Y = Y\frac{\Delta l}{l}$

$\Rightarrow \frac{\Delta l}{l} = 0.01$.

If length, breadth, and width of the rod are represented by l, b and w respectively then

Volume, $V = lbw$

$\Rightarrow \frac{\Delta V}{V} = \frac{\Delta l}{l} + \frac{\Delta b}{b} + \frac{\Delta w}{w}$

$\Rightarrow \frac{\Delta V}{V} = \frac{\Delta l}{l} - \gamma\frac{\Delta l}{l} - \gamma\frac{\Delta l}{l}$

$\Rightarrow \frac{\Delta V}{V} = \frac{\Delta l}{l} - 2\gamma\frac{\Delta l}{l}$

$\Rightarrow \frac{\Delta V}{V} = 0.01(1 - 2(0.3))$

$\Rightarrow \frac{\Delta V}{V} = 0.004$

$\therefore \frac{\Delta V}{V} \times 100 = 0.4\%$.

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Q16. Solution
Correct Answer: (B)

The expression of the time period for a bar magnet oscillating in the Earth's magnetic field is given as,

$T = 2\pi\sqrt{\frac{I}{MB}}$, here I is the moment of inertia of magnet, M is the magnetic moment and B is the magnetic field intensity.

For a bar magnet, $I = mK^2$, m Being the mass and K is the Radius of gyration about the rotation axis.

Now, $T = 2\pi\sqrt{\frac{mK^2}{MB}}$.

From the above expression, we get $T \propto \sqrt{m}$.

Let m_1 and m_2 be the initial and the final mass of the magnet.

Then, $\frac{T_1}{T_2} = \frac{\sqrt{m_1}}{\sqrt{m_2}} = \frac{\sqrt{m}}{\sqrt{4m}} = \frac{1}{2}$.

Thus, by increasing mass to four times, the time period is gets doubled, $2T$.

∧

Q17. Solution
Correct Answer: (D)

Self-inductance of coil is given as $L = \frac{N^2\mu A}{l}$, where N is number of turns in coil, μ is absolute permeability of core material, A is area of coil and l is length of coil.

Length, area and core material remain same, $\Rightarrow L \propto N^2$

$\Rightarrow \frac{L_1}{L_2} = \frac{N_1^2}{N_2^2}$

$\Rightarrow \frac{L}{L_2} = \frac{N^2}{(4N)^2}$

$\Rightarrow L_2 = 16L$

Hence, new self inductance will be 16 times of initial value.

∧

Q18. Solution
Correct Answer: (A)

$U = \frac{1}{2}CV^2 = \frac{1}{2} \times 4 \times 10^{-6} \times (100^2) = 0.02 \, J$ ∧

Q19. Solution
Correct Answer: (B)

We know that Voltage amplification is given by :
$\frac{V_0}{V_{in}} = \beta \frac{R_L}{R_i}$; $\frac{2}{V_m} = 100 \frac{(2 \times 10^3)}{1 \times 10^3}$!

Q20. Solution
Correct Answer: (A)

When similar poles are on same side time period of oscillation T_1 is given by
$T_1 = 2\pi \sqrt{\frac{I_1 + I_2}{(m_1 + m_2)B_H}}$ [Given]
$m_1 = 2m, \ m_2 = m$
$T_1 = 2\pi \sqrt{\frac{I_1 + I_2}{(3m)B_H}}$ ...(i)
When the polarity of magnet is reversed, time period of oscillation T_2 is given by.
$T_2 = 2\pi \sqrt{\frac{I_1 + I_2}{(m_1 - m_2)B_H}}$
$T_2 = 2\pi \sqrt{\frac{I_1 + I_2}{mB_H}}$
On comparing equations (i) and (ii), we get
$T_2 > T_1$
or $T_1 < T_2$,

Q21. Solution
Correct Answer: (C)

$C_V = \frac{n_1 C_{V_1} + n_2 C_{V_2}}{n_1 + n_2} = \frac{(1)\left(\frac{3}{2}R\right) + (1)\left(\frac{5}{2}R\right)}{1+1} = 2R$

Q22. Solution
Correct Answer: (C)

The capacity of a parallel plate capacitor is
$C = \frac{\varepsilon_0 K A}{d} = \frac{(8.85 \times 10^{-12}) \times 10 \times 1}{10^{-3}}$
$= 8.85 \times 10^{-8} \ F$
The displacement current is
$i = \frac{d}{dt}(CV) = C\frac{dV}{dt} = 8.85 \times 10^{-8} \times 25$
$i = 2.2 \times 10^{-6} \ A.$

Q23. Solution
Correct Answer: (C)

Vertical displacement of the first stone is:

$$= \frac{1}{2}gt^2$$

$$= \frac{1}{2}(10)(3^2)$$

$$= 45 \text{ m.}$$

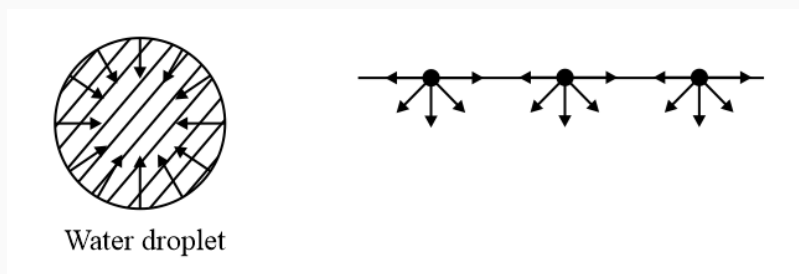Similarly, the vertical displacement of the second stone is $= 45$ m.

If the height of stones is h_1 and h_2 after $t = 3$ s then,
$$h_1 = 100 - \frac{1}{2}gt^2 \quad = 100 - 45 \quad = 55 \text{ m}$$
$$h_2 = 100 - \frac{1}{2}gt^2 = 55\text{m.}$$

Hence the height of the centre of mass is:
$$h_{CM} = \frac{m_1h_1 + m_2h_2}{m_1 + m_2} = 55 \text{ m.}$$

Q24. Solution
Correct Answer: (A)

Water droplet

The molecules of the liquid exert a molecular force on other molecules of the same substance around them which is known as cohesive force.

For a molecule inside the liquid, it is surrounded by the other molecules from every direction thus they experience a net zero resultant force due to the cohesive force.

But for molecule on the top layer experiences force only from the molecule below it, thus it experiences a net inward force from liquid molecules inside the top layer liquid thus there exist a net force on the top layer due to which it always tries to move inwards thus tends to assume the smallest possible area thus this phenomenon exists due to cohesive force.

Q25. Solution

Correct Answer: (C)

The value of acceleration due to gravity changes with height $(ie, \text{ altitude})$. If $g\prime$ is the acceleration due to gravity at a point, at height h above the surface of earth, then

$$g' = \frac{GM}{(R+h)^2}$$

but,

$$g = \frac{GM}{R^2}$$

$$\therefore \quad \frac{g'}{g} = \frac{GM}{(R+h)^2} \times \frac{R^2}{GM} = \frac{R^2}{(R+h)^2}$$

Here, $\quad g' = \frac{GM}{(R+h)^2} = \frac{GM}{(R+3R)^2}$

$$= \frac{GM}{(4R)^2} = \frac{GM}{16R^2} = \frac{g_e}{16}$$

Q26. Solution

Correct Answer: (A)

$\text{w} = -\text{nR}\Delta\text{T} = -2 \times 8.314 \times 100$

$= -1662.8 \text{ J}$

$\Delta\text{U} = \text{n} \int \text{C}_{\text{v, m}} \, d\text{T}$

$= 2 \times \int \left(20 + 10^{-2} \text{ T}\right) d\text{T} = 2 \times 20 \times (\text{T}_2 - \text{T}_1) + 2 \times 10^{-2} \times \frac{(\text{T}_2^2 - \text{T}_1^2)}{2}$

$= 4700 \text{ J}$

$4700 = \text{q} - 1662.8$

$\therefore \text{ q} = 6362.8 \text{ J}$

Q27. Solution

Correct Answer: (B)

$i = qv \; B = \frac{\mu_0 j}{2r} = \frac{\mu_0 qv}{2r} = \frac{4\pi \times 10^{-7} \times 1.6 \times 10^{-19} \times 6.6 \times 10^{15}}{2 \times 0.53 \times 10^{-10}} = \frac{2\pi \times 1.6 \times 6.6}{5.3} = 12.518 \text{ Tesla}$

Q28. Solution

Correct Answer: (B)

$Intensity \propto width \; of \; slit$

$\frac{I_1}{I_2} = \frac{4}{1}.$

$\frac{I_{max}}{I_{min}} = \left(\frac{\sqrt{I_1}+\sqrt{I_2}}{\sqrt{I_1}-\sqrt{I_2}}\right)^2 = \left(\frac{\sqrt{\frac{I_1}{I_2}}+1}{\sqrt{\frac{I_1}{I_2}}-1}\right)^2$

$= \left(\frac{\sqrt{4}+1}{\sqrt{4}-1}\right)^2 = \left(\frac{3}{1}\right)^2 = \frac{9}{1}$

$I_{max} : I_{min} = 9 : 1$

Q29. Solution
Correct Answer: (A)

$\frac{1}{\lambda_1} = R\left[\frac{1}{2^2} - \frac{1}{3^2}\right] = \frac{5}{36}R$

$\frac{1}{\lambda_2} = R\left[\frac{1}{2^2} - \frac{1}{4^2}\right] = R\left[\frac{3}{16}\right]$

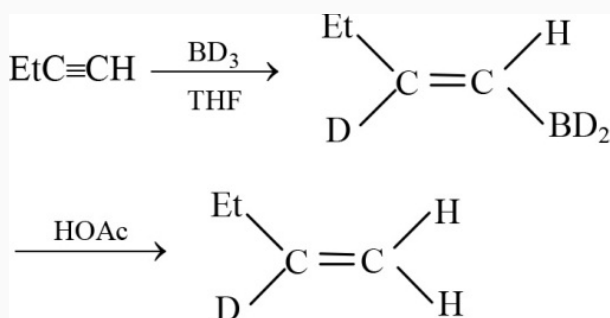$\frac{\lambda_2}{\lambda_1} = \frac{5R/36}{3R/16} = \frac{5}{36} \times \frac{16}{3}$

$\lambda_2 = \frac{5}{36} \times \frac{16}{3} \times 660 = 488.9\,\mathrm{nm}$

Q30. Solution
Correct Answer: (D)

In the case of photoelectric effect when a photon of sufficient energy is incident on a metal surface, then there is a generation of an electron from the metal surface. It means energy is converted into mass but in inverse photoelectric effect, highly energetic electrons are used to make an electromagnetic wave of high frequency and the inverse photoelectric effect is used in the generation of x-ray.

Q31. Solution
Correct Answer: (A)

$Mg^{2+} < Na^+ < F^- < Al$ F^- has bigger size than Mg^{2+} and Na^* due to small nuclear charge.

Q32. Solution
Correct Answer: (B)

It is a hydroboration reaction of alkyne in which tri-alkyl borane is formed, then deuterium alkene is formed by reduction of tri-alkyl borane in the presence of acid.

Q33. Solution
Correct Answer: (D)

n of $O_2 = \frac{16}{32} = \frac{1}{2}$ n of $H_2 = \frac{3}{2}$ Total no. of moles $= \frac{3}{2} + \frac{1}{2} = 2$
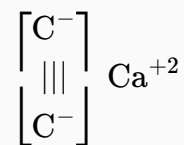
$V = \frac{nRT}{P} = \frac{2 \times .082 \times 273}{1} = 44.8\,\mathrm{lit} = 44800\mathrm{ml} = 44800\mathrm{ml}$

Q34. Solution

Correct Answer: (C)

$\Delta n_g = 1 - \frac{3}{2} = \frac{-1}{2}$, As Δn_g is negative, thus $\Delta H < \Delta E$.

Q35. Solution

Correct Answer: (D)

The structure of CaC_2 is :

$$\begin{bmatrix} C^- \\ \mathrm{III} \\ C^- \end{bmatrix} Ca^{+2}$$

Q36. Solution

Correct Answer: (B)

Reduction potential of hydrogen electrode, $E_H = \frac{-2.303RT}{F} \log \frac{1}{[H^+]}$
$= -0.059pH = -0.059 \times 3 = -0.177$ V
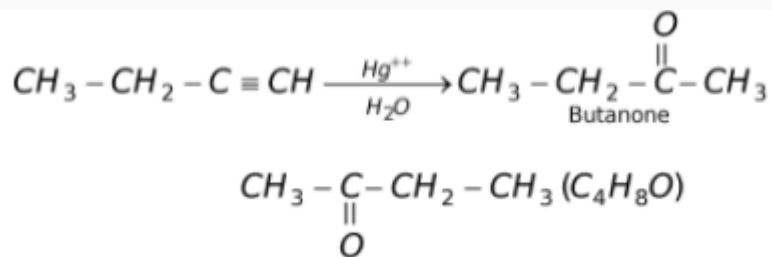
Q37. Solution

Correct Answer: (A)

Densities of two gases are in the ratio 1:2 and their temperature are in the ratio 2:1 Then the ratio of their respective pressure is 1:1. $PV = nRT = \frac{W}{M}RT$ $PM = \frac{W}{V}RT = dRT$ $\frac{P}{dT} = \frac{R}{M} = $ constant $\frac{P}{dT} = \frac{P'}{d'T'}$ $\frac{P}{P'} = \frac{dT}{d'T'}$ $\frac{P}{P'} = \frac{d}{d'} \times \frac{T}{T'}$ Densities of two gases are in the ratio 1:2 $\frac{d}{d'} = \frac{1}{2}$ Their temperature is in the ratio $2 : 1$ $\frac{T}{T'} = \frac{2}{1}$ $\frac{P}{P'} = \frac{d}{d'} \times \frac{T}{T'}$ $\frac{P}{P'} = \frac{1}{2} \times \frac{2}{1}$ $\frac{P}{P'} = \frac{1}{1}$ Therefore, the option is A.

Q38. Solution

Correct Answer: (C)

Equilibrium constants for this reaction is $\frac{[C]}{[A][B]^2}$

Q39. Solution

Correct Answer: (D)

$Cu + 2AgNO_3 \rightarrow Cu(NO_3)_2 + 2Ag^\circ$. This is a redox

Q40. Solution

Correct Answer: (A)

$$CH_3 - CH_2 - C \equiv CH \xrightarrow[H_2O]{Hg^{++}} CH_3 - CH_2 - \overset{\overset{O}{\|}}{C} - CH_3$$
(Butanone)

$$CH_3 - \overset{}{\underset{\overset{\|}{O}}{C}} - CH_2 - CH_3 \ (C_4H_8O)$$

It is hydration of alkynes.

Q41. Solution

Correct Answer: (D)

Butanone is not an isomer of $C_2H_5 - O - C_2H_5 \ (C_4H_{10}O)$

Q42. Solution

Correct Answer: (D)

Pb_3O_4 is also known as Sindhur.

Q43. Solution

Correct Answer: (A)

physical adsorption Is held by weak vander walls forces.

Q44. Solution

Correct Answer: (D)

Correct option is (d) We know that $CH_3CH_2Cl + \underset{(alc.)}{KOH} \rightarrow CH_2 = CH_2 + KCl + H_2O$ Thus in reaction ethene (C_2H_4) is produced.

Q45. Solution

Correct Answer: (B)

The compound 2,3 -Dimethyl-2-butene is an alkene that undergoes reductive ozonolysis and forms acetone. The alkene is symmetrical. $CH_3C\left(CH_3\right) = C\left(CH_3\right)CH_3 + O_3 \overset{ozonolysis}{\rightarrow} \left(CH_3\right)_2C = O$

Q46. Solution

Correct Answer: (B)

Glucose is reducing sugar so reduce Tollen's and Fehling solution.

Q47. Solution
Correct Answer: (D)

The number of unpaired electrons in the Complex ion $[CoF_6]^{3-}$ is 4.

Q48. Solution
Correct Answer: (A)

Upon hydrolysis, the products glucose and fructose form needle shaped crystals. Three molecules of phenylhydrazine are required, the reaction takes place at first two carbon atoms. The difference in these sugars present on the first and second carbon atoms are masked when osazone crystals are formed.

Q49. Solution
Correct Answer: (B)

Aspirin is antipyretic i.e., a drug which is responsible for lowering the temperature of Feverish organism to normal, other antipyretic drugs are paraacetamol, Phenacetin.

Q50. Solution
Correct Answer: (D)

Hydrogen peroxide has a half open book type structure. Hydrogen peroxide has a non-planar structure. H_2O_2 structure in gas phase, dihedral angle is $111.5°$ and H_2O_2 structure in solid phase at 110 K, dihedral angle is $90.2°$.

Q51. Solution
Correct Answer: (B)

$\% \text{ of chlorine} = \frac{35.5}{143.5} \times \frac{\text{Mass of AgCl}}{\text{Mass of substance}} \times 100$

$= \frac{35.5}{143.5} \times \frac{0.287}{0.099} \times 100 = 71.71\%$

Q52. Solution
Correct Answer: (A)

ΔE increases with temperature.

Q53. Solution
Correct Answer: (A)

Any redox reaction would occur spontaneously if the free energy change (ΔG) is negative. $\Delta G° = -nFE°$ Where n is the number of electrons involved, F is the value of Faraday and $E°$ is the cell emf. $\Delta G°$ can be negative if $E°$ is positive.

Q54. Solution
Correct Answer: (B)

Merging (mixing) of dissimilar orbitals of different energies to form new orbitals is known as hybridisation and the new orbital formed are known as hybrid oribitals. They have similar energy.

Q55. Solution
Correct Answer: (D)

CO is called π -acid ligand. In metal carbonyl complexes, there is donation of an electron pair from carbon to the empty orbital of metal and then simultaneously a back π -bonding is formed by sideways overlap of a filled orbital on the metal with empty anti-bonding π_{2py}^{*} orbital of CO.

Q56. Solution
Correct Answer: (C)

$\frac{hc}{\lambda} = \frac{hc}{\lambda_0} + \frac{1}{2}mv^2$

$v = \sqrt{\frac{2hc}{m}\left[\frac{\lambda_0 - \lambda}{\lambda\lambda_0}\right]}$

So, $K = \frac{c}{\lambda\lambda_0}$

Q57. Solution
Correct Answer: (A)

Here oxidation states of nitrogen atom are as follows
$HNO_3 : +5$
$NO : +2$
$N_2 : 0$
$NH_4Cl : -3$

Q58. Solution
Correct Answer: (A)

Ca^{2+} ions form ccp and F^- ions are present in the tetrahedral voids. So, the no. of Ca^{2+} ions is 4 and no. of F^- ions is 8.
So, the formula of the Calcium fluoride Ca_4F_8 or, the simplest formula of calcium fluoride is CaF_2 .

Q59. Solution
Correct Answer: (A)

B.O. $= \frac{1}{2}[N_b - N_a]$ $N_2 = \frac{1}{2}[10-4] = \frac{6}{2} = 3; \quad O_2^{2+} = \frac{1}{2}[10-4] = \frac{6}{2} = 3$

Q60. Solution
Correct Answer: (A)

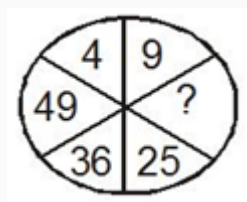The body centred cubic structure has a complete atom at the centre position and 8 atoms at the 8 corners of the cube.

Contribution of atoms at corner $= \frac{1}{8}$

Contribution of atoms at centre $= 1$

Total constituent particles $= \frac{1}{8} \times 8 + 1$

Q61. Solution
Correct Answer: (A)

The given question is

Here, according to the question we have given a square wheel.

Therefore, the pattern follows is as,

$2^2 = 4$
$3^2 = 9$
$4^2 = 16$
$5^2 = 25$
$6^2 = 36$
$7^2 = 49$

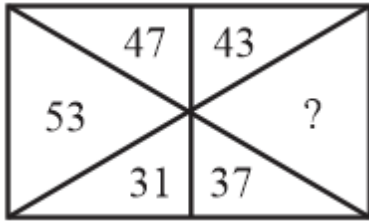Now, we can say that the missing number will be the square of 4 which will be 16.

So, the required answer is 16.

Hence, this is the correct answer.

Q62. Solution
Correct Answer: (D)

Given series:

Let the missing no. be x,

Now, the sum of two diagonal numbers, i.e

$31 + 43 = 74,$

$47 + 37 = 84.$

After observing this process we find that the sum of the diagonals< is increasing by 10.

So, the next diagonal sum will be 94.

Then,

$53 + x = 94$

$x = 94 - 53$

$= 41$

Hence, the correct answer is 41.

Q63. Solution
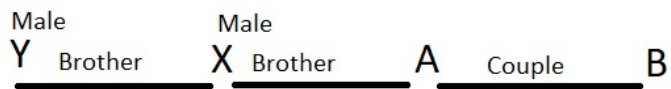**Correct Answer: (B)**

A - B = Couple

X - Y = Brother

X - A = Brother

Y - A = Brother

The following figure can represents the relation

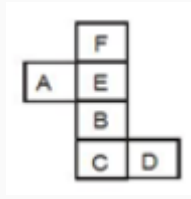Thus, it can be concluded that Y is brother-in-law of B.

Q64. Solution
Correct Answer: (C)

$C@B \rightarrow C$ is the sister of B $B\%F \rightarrow B$ is the son of F Hence, $\rightarrow C$ is the daughter of F $F\%E \rightarrow F$ is the son of E Hence, $\rightarrow$ C is the grand daughter of E.

Q65. Solution
Correct Answer: (B)

The given figure is

As per the given information, we have to find the box that forms a similar sequence as we will get after folding the given sheet of paper.

Here, in the given figure, the adjacent faces are not opposite, and mostly alternate faces are opposite to each other.
We can see that A, F, and B are adjacent to E.

Therefore,
C is opposite to E.
B is opposite to F.
A is opposite to D.

From the given figures:
As per dice 1: F and B cannot be adjacent to each other because B is opposite to F. So, the given dice is not correct.
As per dice 2: E, F, and D are adjacent to each other. So, the given dice is correct.
As per dice 3: E and C cannot be adjacent to each other because E is opposite to C. So, the given dice is not correct.
As per dice 4: D and A cannot be adjacent to each other because D is opposite to A. So, the given dice is not correct.

Therefore, only 2 is the correct dice.

So, option (B) is the correct answer.
Hence, this is the correct answer.

Q66. Solution
Correct Answer: (D)

From 1st and 3rd dice, it can be observed that 1, 2 and 3 are adjacent to 4. So, it means that either 5 or 6 can be opposite to 4.

Now, from 1st and 2nd dice, it can be observed that 3, 4, 6 and 2 are adjacent to 1 that implies 5 is opposite to 1.

Since, 5 is opposite to 1 so, it means that 5 cannot be opposite to 4.

Hence, we get that 6 is opposite to 4.

Q67. Solution
Correct Answer: (D)

A	Punjab	Cycle
B	Maharashtra	Train
C	Karnataka	Truck
D	Uttar Pradesh	Bike
E	Rajasthan	Bus

Q68. Solution
Correct Answer: (A)

According to the question:

As we can clearly conclude from the graph, that School III has the maximum number of students.

And, the total number of students are 120 in this school.

Hence, school III, 120 is the correct answer.

Q69. Solution
Correct Answer: (A)

Venn Diagram Method:

The sketched portion of parrot can never be pigeon.

Analytical Method:
Checking C1:

No green is a pigeon.

From S1 and S2,

All pigeons are white (A) + No white is green (E) = No pigeon is green or No green is a pigeon.

C1 hence follows.

Checking C2: No parrot is green.

Clearly, S1 in which the class 'parrots' exists is an O type statement, we can't derive a definite relationship of it with any other statement.

Clearly, C2 doesn't follow.

Checking C3: Some pigeons are not parrots.

From S1,

A few parrots are not pigeons.

But as conversion of an O type statement is not valid, C3 doesn't follow either.

Evidently, only C1 follows.
Option A is hence the correct answer.

Q70. Solution
Correct Answer: (A)

Venn Diagram Method:

Analytical Method:
All brinjals are vegetables (A) + some vegetables are potatoes (I) = A + I = No conclusion.

But the possibility in I exists.

Hence conclusion I follows.

Again, some vegetables are potatoes (I) + No potato is a tomato (E) = A + E = O = Some vegetables are not tomatoes.

Hence, conclusion II does not follow.

Hence, option A is correct.

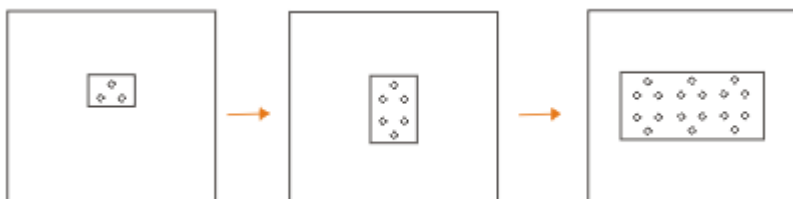**Q71. Solution**
Correct Answer: (B)

11 × 2 + 700 ÷ 70 - 50
⇒ 22 + 10 - 50
⇒ 32 - 50
⇒ - 18.
Hence, the option B is correct.

Q72. Solution
Correct Answer: (D)

Hence, option D is correct.

Q73. Solution

Correct Answer: (B)

$37 - 13 = 24$ $109 - 37 = 72$ $325 - 109 = 216$ The differences between consecutive terms are 24, 72, and 216. Notice that each difference is a multiple of 24: $72 = 24 \times 3$ $216 = 24 \times 9$ The next difference should be $24 \times 27 = 648$ (since $3^2 = 9$ and $3^3 = 27$). Now, add this difference to the last number in the series: $325 + 648 = 973$ $\therefore$ The missing term in the series is 973.

Q74. Solution

Correct Answer: (A)

According to the question,

Given information is, Given a series and we need to find the next term of given series,

Given series is, 6, 11, 24, 49, 90, ?

So, the method used in this series I s, $+1^2 + 2^{2,}$, $+2^2 + 3^2$, $+3^2 + 4^2$, $+4^2 + 5^2 \ldots \ldots$

$11 = 6 + 1^2 + 2^2$ $24 = 11 + 2^2 + 3^2$ $49 = 24 + 3^2 + 4^2$ $90 = 49 + 4^2 + 5^2$ $? = 90 + 5^2 + 6^2 =$
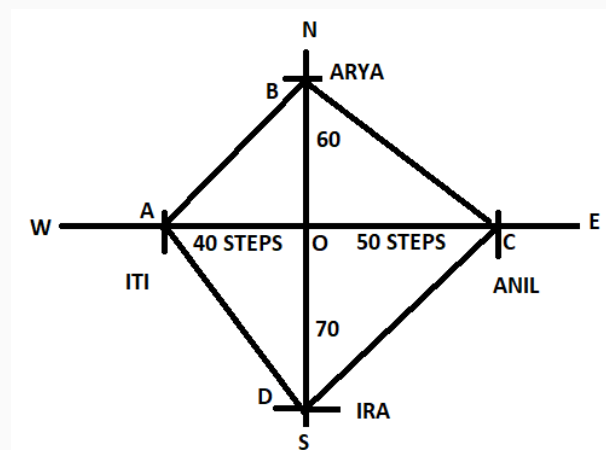
Hence, the answer is 151.

Q75. Solution

Correct Answer: (C)

We have five letters a c b e d which are reversed in the second round as ' $debca'$ and so on we therefore have $a \to 4, c \to 2, e \to 3, d \to 5$ and the remaining $b \to 1$.

Q76. Solution
Correct Answer: (B)

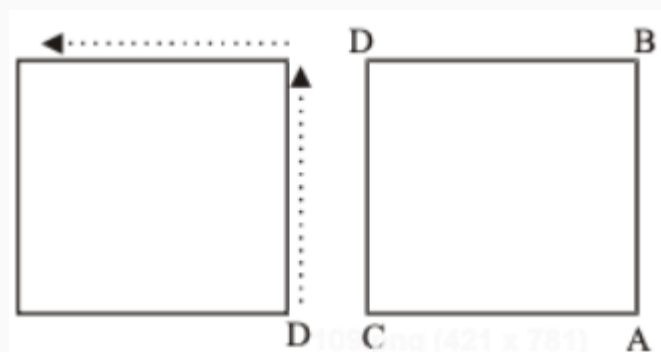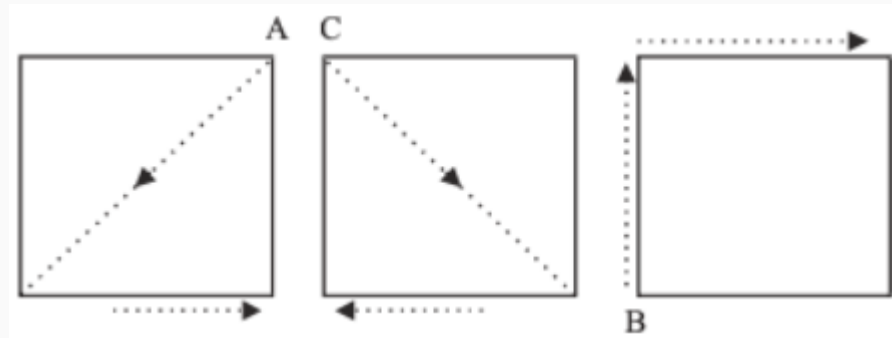Representing the given information diagrammatically:

From the above figure, distance between Arya and Ira is

$BD = BO + OD = 60 + 70 = 130$ steps.

Q77. Solution
Correct Answer: (D)

The movements of A, C, B and D are shown in figures (i), (ii), (iii) and (iv) respectively. The final configuration is shown in (v). Comparing (v). with the given diagram A is in the south- west corner.

Q78. Solution
Correct Answer: (B)

From the following explanation the code for 'life gives joy' is most probably coded as "ba fo st". Though the code of 'gives' is not given but checking the other options we can observe that 'gives' can be coded as 'fo'.
Hence option B is correct.

Word	Code
life	ba
friends	ki
make	po
live	le
trouble	lo
gain	se
joy	st
without	mo/te
impossible	te/mo

Common Explanation:
Reference:
Ram says, "le po ki ba" when he wants to convey that "friends make life live".
Laxman says, "te ki mo ba" when he wants to convey that "without friends life impossible".
Shatrughan says, "st ba po lo" when he wants to convey that "life make trouble joy".
Inference:
From the above hints, the codes for friends life can be obtained as **ki ba** (irrespective of order)
With the help of last hint, code for 'life' can be obtained as **'ba'.**
So, 'friends' will be coded as **'ki'.**
Code for 'make' is **'po'.**
Thus the only left word 'live' is coded as **'le'.**
Reference:
Bharat says, "lo mo se te" when he wants to convey that "without trouble gain impossible".
Shatrughan says, "st ba po lo" when he wants to convey that "life make trouble joy".
Laxman says, "te ki mo ba" when he wants to convey that "without friends life impossible".
Inference:
From the above hints code for 'trouble' is **'lo.'**
The code for **without impossible** is **'mo te'(irrespective of order).**
Thus the code for **gain** is **'se'.**
Reference:
Shatrughan says, "st ba po lo" when he wants to convey that "life make trouble joy".
Laxman says, "te ki mo ba" when he wants to convey that "without friends life impossible".
Inference:
As we have already identified the codes for 'life', 'make' and 'trouble' as 'ba', 'po' and 'lo' respectively.
So, the only left code **'st'** represents **"joy"**.

Q79. Solution
Correct Answer: (B)

Following the common explanation we can say that the code for word 'Wisdom' is '$L19'.
Hence, the correct answer is option **B**.

Common Explanation:

In the code given for each word,

Each of the symbols in the code represents the number of letters in its corresponding word. Such that:

'%' for the word in which the number of letters are odd.
'$' for the word in which the number of letters are even.

For example, number of letters in 'Earth' are 5 which is an odd number. Hence, the symbol is '%'.

Similarly, number of letters in 'Laughs' are 6 which is an even number. Hence, the symbol is '$'.

The second letter in the code denotes the reversed letter of the second letter from right end of its corresponding word.

For example, second letter from right end in 'Earth' is 'T' and the reversed letter of 'T' is 'G'. Hence, the letter is 'G'.

Similarly, second letter from right end in 'Laughs' is 'H' and the reversed letter of 'H' is 'S'. Hence, the letter is 'S'.

The digit of each code denotes the numeric position of third letter from left end in alphabetic series of its corresponding word.
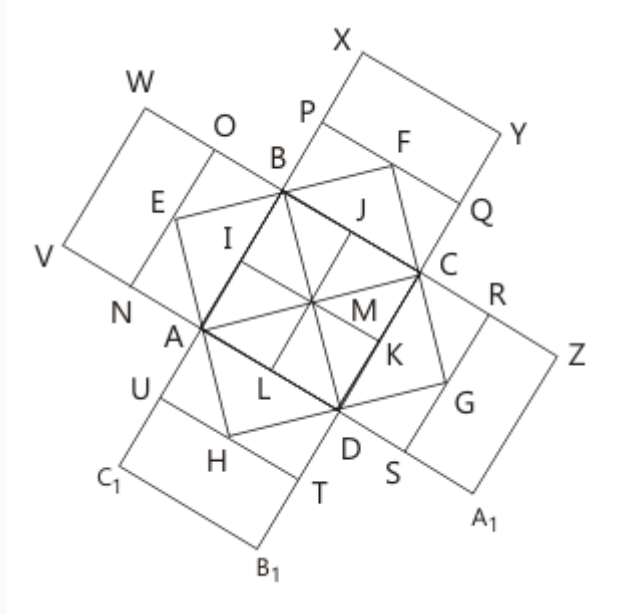
For example, third letter from left end in 'Earth' is 'R' and the numeric position of 'R' is '18'. Hence, the number is '18'.

Similarly, third letter from left end in 'Laughs' is 'U' and the numeric position of 'U' is '21'. Hence, the number is '21'.

Thus, **the code of Earth is '%G18' and the code of Laughs is '$S21'.**

Q80. Solution
Correct Answer: (C)

The figure may be labelled as shown.

The squares composed of two components each are BJMI, CKMJ , DLMK and AIML i.e. 4 in number.

The squares composed of three components each are EBMA, BFCM, MCGD and AMDH i.e. 4 in number.

The squares composed of four components each are VWBA, XYCB, ZA_1DC and B_1C_1AD i.e. 4 in number.

The squares composed of seven components each are NOJL, PQKI, RSLJ and TULK i.e. 4 in number.

There is only one square i.e. ABCD composed of eight components.

There is only one square i.e. EFGH composed of twelve components.

∴ Total number of squares in the figure = 4 + 4 + 4 + 4 + 1 + 1 = 18.

Hence, option C is correct.

Q81. Solution
Correct Answer: (D)

The sentence talks about in which manner. It is a proverb which means the consequences of one's actions to oneself are in proportion to one's good or bad intentions towards others. The option 'so' is used for denoting result or consequences and correctly fits the blank.

'When' is used for time.
'As and like' are used for comparison. So, they are inappropriate.

Thus, the correct sentence will be - As you sow, <u>so </u>shall you reap.

Hence, this is the correct answer.

Q82. Solution
Correct Answer: (D)

The correct sentence will be: A lion is the king of beasts.

When we use the article 'the', we show that we are talking about a specific thing only, which is called the definite article. We use the indefinite article, 'a', and 'an' to refer to a general statement and not about a specific thing. Here, we are generally referring 'lion' to have a specific position of being the king of beasts. Hence this is the correct answer.

Q83. Solution
Correct Answer: (C)

The correct sequence of the sentences is E-C-F-A-B-D and the second sentence clearly is C.

Option C is hence the correct answer.

Common Explanation:

Out of the six sentences, the sentence E is clearly the first one as it introduces 'William G. Perry' (A proper noun) and sets the tone of the passage by mentioning the noun phrase 'Cognitive Development' (Again, a proper noun) in the sentence.

Sentence Cimmediately follows as it describesthe model developed by William G. Perry. Interestingly, the writer has used the phrase 'Intellectual development' in place of 'Cognitive development'. However, both the adjectives 'intellectual' and 'cognitive' are similar in meaning.

Keywords/Phrases that link C to E:

"His" in C links to "William G. Perry" in E.

"Intellectual development" in C links to "Cognitive development" in E.

Sentence F is to follow next as it refers to the first of the nine levels of intellectual development, mentioned in the previous sentence.

Keywords/Phrases that link F to C:

"First level" in F links to "nine levels" in C.

The sequence made so far is: E – C – F.

The sentence A follows next as it takes the description of 'Dualism' further.

Keywords/Phrases that link A to F:

"Dualistic thinking" in A links to "Dualism" in F.

Now, the sentence B describes how the model of 'Dualistic thinking' enables students to develop intellectually. The sentence B clearly, is to follow the sequence next.

Keywords/Phrases that link B to A:

"This model" in B links to "Dualistic thinking" in A.

"Students" in B links to "Students" in A.

Obviously, sentence D must be the last sentence in the sequence and hence the complete made after rearrangement is –ECFABD.

Q84. Solution
Correct Answer: (C)

The correct sequence of sentences is **ECDBA**.
So, D is the third sentence of the paragraph after the rearrangement.
It makes option C the correct choice among the given options.
Common Explanation:
Since the first sentence is given of the paragraph, it is very easy to understand the topic of the passage which is regarding the achievement of India in eradicating polio from the country. This is the premise on which the sentences are based and they have to be rearranged accordingly.
After the given sentence, the next sentence should be based on the reason behind the success of the polio eradication scheme of the government in the country when most of the other schemes do not generally become successful in the country. Among the given options, Statement E explains the reason of such a feat as the contribution of the government as well as the ground level workers of the organization.
Connectors:
First sentence and E:
1. The World Health Organization **has declared India as polio-free** since no new polio case has been reported in the country in the last couple of years.
E. **This** underlines the efforts by the Ministry of Health and Family Welfare along with the staff members at the ground level.
E should be followed by a statement in which there is some inference for the government from the success of the polio eradication program of the government. C should come after that since it explains in detail that the government should think of replicating the same model in case of other diseases also.
Connectors:
E and C:
E: **This underlines the efforts by the Ministry of Health and Family Welfare along with the staff members at the ground level.**
C: India can take heart from **this success** and can replicate the same model for eradication of other diseases also from the country.
Now, C has explained the lesson that should be learnt from this step of the government. This must be followed by something that denotes the main issue behind such problems and the mantra for success behind such programs of the government. D explains that and comes after C.
Connectors:
C: India can take heart from this success and **can replicate the same model** for eradication of other diseases also from the country.
D: **The thrust should be on educating the mass** regarding the harmful effects of insects and the reasons for the growth of such insects.
D should be followed by a statement that denotes the importance of the step explained in this sentence i.e. the participation of general public in the eradication drive of any program. B explains the importance of participation of people and should follow D.
Connectors:
D: **The thrust should be on educating the mass** regarding the harmful effects of insects and the reasons for the growth of such insects.
B: **Without participation from the general public, it would not have been possible** to achieve this tremendous feat with the government schemes only.
A will come at the end of the passage as it underlines the lesson that should be internalized by the government from the model in which polio eradication drive has been launched in the country.

This makes the correct sequence of statements as: **ECDBA**

Q85. Solution
Correct Answer: (C)

The phrase "more vividly than" is contextually and grammatically correct here. According to the structure, it will take the comparative degree as his mind is compared with "anybody else" in the class. Other options are not suitable for the format of comparative degree of adjective.

Q86. Solution
Correct Answer: (C)

Use 'me' in place of 'I'.

The error lies in the third part.

'You and I' is used as a subject, whereas, 'you and me' is used as the object of a preposition.

For example: You and I are visiting Delhi next month.

She invited you and me to the party.

Therefore, in this sentence, the subject is 'I' already, and we are referring to indirect objects thereafter. So, we must replace 'you and I' with 'you and me'.

Hence, the complete sentence is "I have already expressed my desire that there should be no formality between you and me".

Q87. Solution
Correct Answer: (A)

'Quake' means 'shake'. Since 'tremble' means 'to shake slightly, usually because you are cold, frightened or very emotional,' it is the correct synonym.
Meanings of other words are:
Still: not moving or making a sound.
Order: the arrangement or disposition of people or things in relation to each other according to a particular sequence, pattern, or method.
Tranquil: free from disturbance; calm.
Hence, the correct answer is option A.

Q88. Solution
Correct Answer: (A)

The word 'sewage' is the most suitable synonym for 'drainage'. Drainage is the process by which water or liquid waste is drained from an area. Likewise, 'sewage' means used water and waste substances that are produced by homes and factories that are carried away through special pipes (sewers).

Meanings of the other words are given below:
Fortieth: the ordinal form of the number forty.
Emporium: a large shop/store; a shop/store that sells a particular type of goods
Gonorrhoea: a disease of the sexual organs, caught by having sex with an infected person

Q89. Solution
Correct Answer: (C)

The logical and meaningful order of the given words is as follows: LOGIC: The words have been arranged according to the stage of vegetable cook. 3. Buy → Firstly we buy vegetables. 2. Rinse → Then we rinse vegetables. 4. Cut → After the rinse vegetables we cuts the vegetables. 5. Cook → Then after cutting we cook the vegetables. 1. Eat → After cooked vegetable we can eat. Hence, "3, 2, 4, 5, 1" is the correct answer.

Q90. Solution
Correct Answer: (C)

The word 'alternative' means another option. It can be used as a noun or an adjective. The tense in this sentence should be the present perfect continuous because it refers to an action that started at some time in the past and continues till the present time so the right use is 'have been living in Mumbai. 'Have' is used with the pronouns like I, you, we, and they.

Q91. Solution
Correct Answer: (A)

Let

$$I = \int \frac{dx}{(x+1)^{\frac{6}{5}}(x-3)^{\frac{4}{5}}}$$

$$\Rightarrow I = \int \frac{dx}{(x+1)^{\frac{6}{5}+\frac{4}{5}}\left(\frac{x-3}{x+1}\right)^{\frac{4}{5}}}$$

$$\Rightarrow I = \int \frac{dx}{(x+1)^2 \left(\frac{x-3}{x+1}\right)^{\frac{4}{5}}}$$

Put $\frac{x-3}{x+1} = t \Rightarrow dt = \frac{4dx}{(x+1)^2}$

Therefore,

$$I = \frac{1}{4}\int \frac{dt}{t^{\frac{4}{5}}}$$

$$\Rightarrow I = \frac{5}{4}\left(\frac{x-3}{x+1}\right)^{\frac{1}{5}} + C$$

Q92. Solution
Correct Answer: (C)

Now $P^3 = P(I - P) = PI - P^2$

$= PI - (I - P)$

$= P - I + P$

$= 2P - I$

$P^4 = P \cdot P^3 = P(2P - I)$

$\Rightarrow P^4 = 2P^2 - P$

$\Rightarrow P^4 = 2I - 2P - P$

$\Rightarrow P^4 = 2I - 3P$

$P^5 = P(2I - 3P)$

$\Rightarrow P^5 = 2P - 3(I - P)$

$\Rightarrow P^5 = 5P - 3I$

$P^6 = P(5P - 3I) = 5P^2 - 3P$

$= 5(I - P) - 3\ P$

$\Rightarrow P^6 = 5I - 8P$

$\therefore \text{n} = 6$

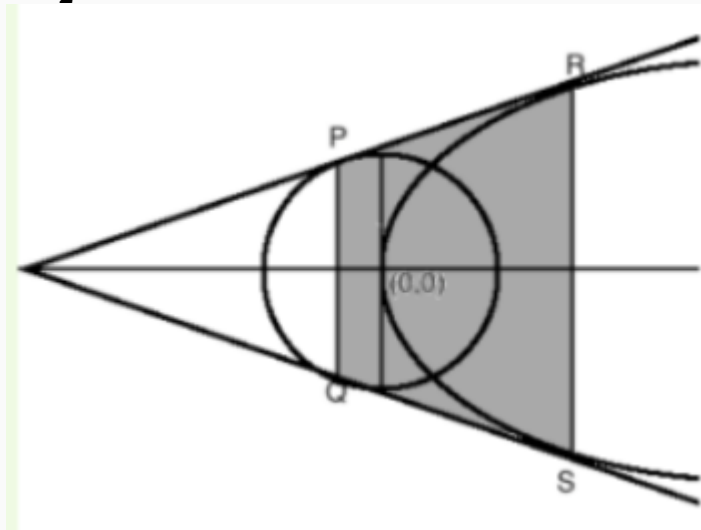**Q93. Solution**

Correct Answer: (D)

Given two conics: $\begin{aligned} &C_1 : x^2 + y^2 = 2 \\ &C_2 : y^2 = 8x \end{aligned}$ Lets assume common tangents touches circle at $P(x_1, y_1)$ and $R(x_2, y_2)$

Then, $\begin{aligned} &C_1(x_1, y_1) : x_1^2 + y_1^2 - 2 = o \\ &C_2(x_2, y_2) : y_2^2 - 8x_2 = o \end{aligned}$ The tangent space to the conics is $\begin{aligned} m_1 &= \frac{dy_1}{dx_1} = -\frac{x_1}{y_1} \cdots \\ m_2 &= \frac{dy_2}{dx_2} = \frac{4}{y_2} \cdots \text{(ii)} \end{aligned}$ The

tangency condition reads: $\begin{cases} y_2 - y_1 = m_1(x_2 - x_1) \\ y_1 - y_2 = m_2(x_1 - x_2) \end{cases} \cdots$ On solving these four eqs, we get

$x_1 = -1, x_2 = 2, y_1 = \pm 1, y_2 = \pm 4$ Therefore, $\begin{aligned} P &= (-1, 1) \\ Q &= (-1, -1) \\ R &= (2, 4) \\ S &= (2, -4) \end{aligned}$ Now the area of the quadrilateral $PQRS$:

$\dfrac{1}{2} \times (PQ + RS) \times (\text{ Distance between } PQ \text{ and RS})$

$= \dfrac{1}{2} \times (2 + 8) \times (1 + 2)$

$= \dfrac{1}{2} \times 10 \times 3 = 15$ sq units.

Q94. Solution

Correct Answer: (C)

$10^n + 3\left(4^{n+2}\right) + 5$ Taking $n = 2; 10^2 + 3 \times 4^4 + 5 = 100 + 768 + 5 = 873$ Therefore, this is divisible by 9 .

Q95. Solution
Correct Answer: (A)

Given expression is

$$= \frac{i^{592}+i^{590}+i^{588}+i^{586}+i^{584}}{i^{582}+i^{580}+i^{578}+i^{576}+i^{574}} - 1$$

$$= \frac{i^{10}\left(i^{582}+i^{580}+i^{578}+i^{576}+i^{574}\right)}{\left(i^{582}+i^{580}+i^{578}+i^{576}+i^{574}\right)} - 1$$

$$= i^{10} - 1$$

$$= \left(i^2\right)^5 - 1$$

$$= (-1)^5 - 1$$

$$= -1 - 1$$

$$= -2.$$

Q96. Solution
Correct Answer: (C)

The second determinant has been obtained by the transformations $R_2 \to 2R_2$ and $C_2 \to 3C_2$ in succession.

Q97. Solution
Correct Answer: (C)

Given, x is parallel to y and z
Therefore, $x \cdot (y \times z) = 0$

$$\Rightarrow \begin{bmatrix} x & y & z \end{bmatrix} = 0 \Rightarrow \begin{vmatrix} 2 & 1 & \alpha \\ \alpha & 0 & 1 \\ 5 & -1 & 0 \end{vmatrix} = 0$$

$$\Rightarrow 2(0+1) - 1(0-5) + \alpha(-\alpha - 0) = 0$$
$$\Rightarrow 2 + 5 - \alpha^2 = 0$$
$$\Rightarrow \alpha^2 = 7$$
$$\Rightarrow \alpha = \pm\sqrt{7}$$

Q98. Solution
Correct Answer: (B)

Let, $I = \int\limits_{-\pi}^{199\pi} \sqrt{\left(\frac{1-\cos 2x}{2}\right)}\, dx$

$= \int\limits_{-\pi}^{199\pi} |\sin x|\, dx$

$= (199 - (-1)) \int\limits_{0}^{\pi} |\sin x|\, dx$

($\because |\sin x|$ is periodic with period π and $\int_{mT}^{nT} f(x)dx = (n-m) \int_{0}^{T} f(x)dx$ if T is the period of the function $f(x)$).

$= 200 \int\limits_{0}^{\pi} \sin x\, dx$

$= 200|-\cos x|_{0}^{\pi}$

$= 200(1 - (-1)) = 400.$

Q99. Solution
Correct Answer: (C)

$$\Delta = \begin{vmatrix} 2 & 6 & 0 \\ 6 & 20 & -6 \\ 0 & 6 & -18 \end{vmatrix} = 0$$

$$\Delta_1 = \begin{vmatrix} -11 & 6 & 0 \\ -3 & 20 & -6 \\ -1 & 6 & -18 \end{vmatrix} \neq 0 : \Delta_2 = \begin{vmatrix} -2 & -11 & 6 \\ 6 & -3 & 20 \\ 0 & -1 & 6 \end{vmatrix} \neq 0$$

and $\Delta_3 = \begin{vmatrix} 2 & 6 & -11 \\ 6 & 20 & -30 \\ 0 & 6 & -1 \end{vmatrix} \neq 0$

Hence, the system is inconsistent.

Q100. Solution
Correct Answer: (C)

Given $y = |\cos x| + |\sin x|$

As we know that from properties of modulus function $|x| = \begin{cases} x, & x > 0 \\ -x, & x < 0 \end{cases}$

Also, $\cos x < 0$ and $\sin x > 0$ in $\left(\frac{\pi}{2}, \pi\right)$

So, $|\cos x| = -\cos x$ and $|\sin x| = \sin x$

Hence, $y = -\cos x + \sin x, \frac{\pi}{2} < x < \pi$

Differentiate above equation with respect to x,

$\frac{dy}{dx} = \frac{d}{dx}(-\cos x + \sin x), \frac{\pi}{2} < x < \pi$

$\frac{dy}{dx} = \sin x + \cos x, \frac{\pi}{2} < x < \pi$

$\Rightarrow \left(\frac{dy}{dx}\right)_{x=\frac{2\pi}{3}} = \sin\left(\frac{2\pi}{3}\right) + \cos\left(\frac{2\pi}{3}\right) = \frac{\sqrt{3}}{2} - \frac{1}{2}$

Q101. Solution
Correct Answer: (B)

$\frac{f(2)-f(0)}{2-0} = f'(x) \Rightarrow \frac{f(2)-0}{2} = f'(x)$

$\Rightarrow \frac{df(x)}{dx} = \frac{f(2)}{2} \Rightarrow f(x) = \frac{f(2)}{2}x + c \qquad$ Given $|f'(x)| \le \frac{1}{2} \Rightarrow \frac{f(2)}{2} \le \frac{1}{2} \dots\dots (ii)$

$\therefore f(0) = 0 \Rightarrow c = 0; \therefore f(x) = \frac{f(2)}{2}x \dots (i)$

$\Rightarrow |f(x)| = \frac{f(2)}{2}x = \frac{f(2)}{2}|x| \le \frac{1}{2}|x|[$ from (ii) $]$ In $[0,2]$, for maximum $x(x = 2)$

$|f(x)| \le \frac{1}{2}.2 \Rightarrow |f(x)| \le 1.$

Q102. Solution
Correct Answer: (D)

$\Delta = 0^2 - 4.\, a.\, 1 = -4a < 0,$ hence the roots of the given equation or are non-real.

Q103. Solution
Correct Answer: (C)

Points $\left(\frac{y_1^2}{4a}, y_1\right), \left(\frac{y_2^2}{4a}, y_2\right), \left(\frac{y_3^2}{4a}, y_3\right)$ Use area formula and get $\Delta = \frac{1}{8a}(y_1 - y_2)(y_2 - y_3)(y_3 - y_1)$

Q104. Solution
Correct Answer: (D)

Let the first terms of A.P. be A and common difference be d, then
$a = A + 6d$
$b = A + 10d$
$c = A + 12d$
Given $a,\ b,\ c$ are in G. P. $\Rightarrow b^2 = ac$
$\Rightarrow (A + 10d)^2 = (A + 6d)(A + 12d)$
$\Rightarrow A^2 + 100d^2 + 20Ad = A^2 + 18Ad + 72d^2$
$\Rightarrow A = -14d$
Now $\frac{a}{c} = \frac{A+6d}{A+12d} = \frac{-14d+6d}{-14d+12d} = \frac{-8d}{-2d} = 4$

Q105. Solution
Correct Answer: (D)

Given, $f(x) = e^x(\sin x - \cos x)$
$\therefore f'(x) = e^x[\cos x + \sin x] + [\sin x - \cos x]e^x$
$\therefore f'(x) = 2e^x \sin x$
To verify Rolle's Theorem.
$f'(c) = 0$
$2e^c \sin c = 0$
$\Rightarrow \sin c = 0$
$\therefore c = \pi$

Q106. Solution
Correct Answer: (D)

Given $\mathrm{r}dx + (x - r^2)dr = 0 \Rightarrow \mathrm{r}dx = -(x - r^2)dr$
$\therefore \mathrm{r}\dfrac{dx}{dr} = r^2 - x \Rightarrow \mathrm{r}\dfrac{dx}{dr} + x = r^2$
$\therefore \dfrac{dx}{dr} + \dfrac{x}{r} = r$
I.F. $= e^{\int \frac{1}{r}dr} = e^{\log r} = r$
Solution is $x \cdot r = \int r \cdot r dr + c$
$xr = \dfrac{r^3}{3} + c$

Q107. Solution
Correct Answer: (A)

Let the point be $P\left(\sqrt{2}\cos\theta, \sin\theta\right)$ on $\frac{x^2}{2} + \frac{y^2}{1} = 1$

$\Rightarrow$ Equation of tangent is

$\frac{x\sqrt{2}}{2}\cos\theta + y\sin\theta = 1$

Whose intercept on coordinate axes are $A\left(\sqrt{2}\sec\theta, 0\right)$ and $B(0, \operatorname{cosec}\theta)$

$\therefore$ Mid point of its intercept between axes is

$\left(\frac{\sqrt{2}}{2}\sec\theta, \frac{1}{2}\operatorname{cosec}\theta\right) = (h, k)$

$\cos\theta = \frac{1}{\sqrt{2h}}$ and $\sin\theta = \frac{1}{2k}$

Thus, locus of mid point M is

$\cos^2\theta + \sin^2\theta = \frac{1}{2h^2} + \frac{1}{4k^2}$

$\Rightarrow \frac{1}{2x^2} + \frac{1}{4y^2} = 1$

Q108. Solution
Correct Answer: (D)

We have $p = \frac{3}{4} \Rightarrow q = \frac{1}{4}$ and $n = 5$ Therefore required probability

$= {}^5C_3\left(\frac{3}{4}\right)^3\left(\frac{1}{4}\right)^2 + {}^5C_4\left(\frac{3}{4}\right)^4\left(\frac{1}{4}\right) + {}^5C_5\left(\frac{3}{4}\right)^5$

$= \frac{10 \cdot 27}{4^5} + \frac{5 \cdot 81}{4^5} + \frac{243}{4^5} = \frac{270+405+243}{1024} = \frac{459}{512}$.

Q109. Solution
Correct Answer: (A)

$1 = \dfrac{1}{z_1} + \dfrac{1}{z_2} + \dfrac{1}{z_3} = \dfrac{z_1\bar{z}_1}{z_1} + \dfrac{z_2\bar{z}_2}{z_2} + \dfrac{z_3\bar{z}_3}{z_3} \left(\because |z_1|^2 = 1 = z_1\bar{z}_1, \text{ etc}\right)$

$= |\bar{z}_1 + \bar{z}_2 + \bar{z}_3| = \overline{z_1 + z_2 + z_3} = |z_1 + z_2 + z_3|$

$\qquad\qquad\qquad\qquad (\because |\bar{z}_1| \neq z_1)$

Q110. Solution
Correct Answer: (C)

$f(0+) = f(0-) = 2$ and $f(0) = 2$

Hence $f(x)$ is continuous at $x = 0$.

Q111. Solution

Correct Answer: (A)

$f(x) = x^2 + \int_0^x e^{-t} f(x-t) dt$

$= x^2 + \int_0^x e^{-(x-t)} f(t) dt = x^2 + e^{-x} \int_0^x e^t f(t) dt$

$\therefore \quad e^x f(x) = x^2 e^x + \int_0^x e^t f(t) dt \quad \dots (1)$

Differentiating both sides w.r.t. x

$e^x f(x) + e^x f'(x) = 2x e^x + x^2 e^x + e^x f(x)$

$\therefore \quad f'(x) = 2x + x^2$

$\therefore \quad f(x) = x^2 + \frac{x^3}{3} + c$
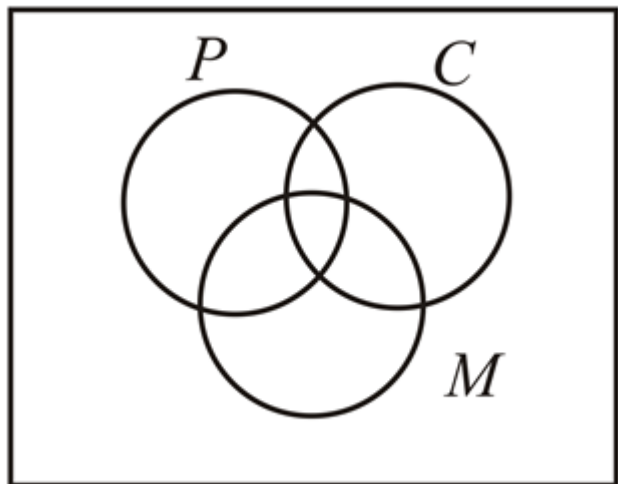
From (1), we have $f(0) = 0$. So $c = 0$

Hence, $f(x) = x^2 + \frac{x^3}{3} \Rightarrow \sum_{k=1}^{9} f(k) = \Sigma\left(k^2 + \frac{k^3}{3}\right) = 960$

Q112. Solution
Correct Answer: (C)

$n(P) \equiv \left[\frac{140}{3}\right] = 46$
$n(C) \equiv \left[\frac{140}{5}\right] = 28$
$n(M) \equiv \left[\frac{140}{2}\right] = 70$

$n\,(P \cup C \cup M) = n(P) + n(C) + n(M) - n(P \cap C) - n(C \cap M) - n(M \cap P) + n(P \cap M \cap C)$
$n\,(P \cup C \cup M) = 46 + 28 + 70 - \left[\frac{140}{15}\right] - \left[\frac{140}{10}\right] - \left[\frac{140}{6}\right] + \left[\frac{140}{30}\right]$
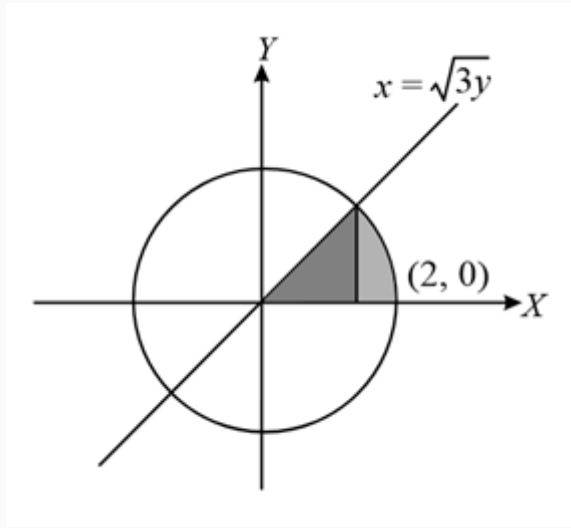$= 144 - 9 - 14 - 23 + 4$
$= 102$

Hence, number of students who did not take any subject& $= 140 - 102 = 38$.

Q113. Solution
Correct Answer: (C)

Required area $\Delta = \int_0^{\sqrt{3}} \frac{x}{\sqrt{3}} dx + \int_{\sqrt{3}}^2 \sqrt{4 - x^2} dx$

$= \frac{1}{\sqrt{3}} \left[\frac{x^2}{2} \right]_0^{\sqrt{3}} + \left[\frac{x}{2} \sqrt{4 - x^2} + \frac{4}{2} \sin^{-1} \frac{x}{2} \right]_{\sqrt{3}}^2$

$= \frac{\sqrt{3}}{2} + \left[\pi - \frac{\sqrt{3}}{2} - \frac{2\pi}{3} \right]$

$= \frac{\pi}{3}$ sq. units.

Trick: Area of sector made by an arc $= \frac{\theta R^2}{2}$ (where, θ is in radian and R is the radius of the circle).
$= \frac{\pi}{6} \cdot \frac{4}{2} = \frac{\pi}{3}$.

Q114. Solution
Correct Answer: (C)

Put $x^3 = \sin\theta, y^3 = \sin\phi$

$\therefore \sqrt{1 - x^6} + \sqrt{1 - y^6} = a^3 \left(x^3 - y^3 \right)$

$\Rightarrow \cos\theta + \cos\phi = a^3 (\sin\theta - \sin\phi)$ 　　 If $\cos\frac{\theta+\phi}{2} = 0$, then $\frac{\theta+\phi}{2} = \frac{\pi}{2}$ 　　 But if we put $x = y$ in

or $2\cos\frac{\theta+\phi}{2}\cos\frac{\theta-\phi}{2} = 2a^3 \sin\frac{\theta-\phi}{2}\cos\frac{\theta+\phi}{2}$ $\therefore \theta = \pi - \phi$ or $\sin\theta = \sin\phi$ or $x = y$

or $\cos\frac{\theta+\phi}{2} \left[\cos\frac{\theta-\phi}{2} - a^3 \sin\frac{\theta-\phi}{2} \right] = 0$

the given equation it is not satisfied and hence we must have

$\cos\frac{\theta-\phi}{2} - a^3 \sin\frac{\theta-\phi}{2} = 0$ or $\cot\frac{\theta-\phi}{2} = a^3$ 　　 Differentiating w.r.t. x, we get

$\therefore \theta - \phi = 2\cot^{-1} a^3$ or $\sin^{-1} x^3 - \sin^{-1} y^3 = 2\cot^{-1} a^3$

$\frac{3x^2}{\sqrt{1-x^6}} - \frac{3y^2}{\sqrt{1-y^6}} \frac{dy}{dx} = 0 \Rightarrow \frac{dy}{dx} = \frac{x^2}{y^2} \sqrt{\frac{1-y^6}{1-x^6}}$

Q115. Solution

Correct Answer: (D)

$\tan^{-1}\left(\frac{2x+3x}{1-2x\times 3x}\right) = \frac{\pi}{4}$

$\Rightarrow \quad \frac{5x}{1-6x^2} = 1$

$\Rightarrow \quad 5x = 1 - 6x^2$

$\Rightarrow \quad 6x^2 + 5x - 1 = 0$

$\Rightarrow \quad x = -1, \ \frac{1}{6}$

But, since $x \geq 0$. Hence $x = \frac{1}{6}$

$\therefore A$ has only one element.

Q116. Solution

Correct Answer: (B)

We have $y = x/\left(ax^2 + b\right), a, b, x > 0$ $\quad \begin{array}{l} \Rightarrow y = 1/ax + b/x \\ \Rightarrow y \leq 1/2\sqrt{ab} \end{array}$ Hence, the max value of y is $1/2\sqrt{ab}$

Q117. Solution

Correct Answer: (B)

Squaring the given relation and putting $\tan\theta = t$

$(m+2)^2 t^2 + 2(m+2)(2m-1)t + (2m-1)^2 = (2m+1)^2\left(1+t^2\right)$

$\Rightarrow 3\left(1-m^2\right)t^2 + \left(4m^2 + 6m - 4\right)t - 8m = 0 \Rightarrow (3t-4)\left[\left(1-m^2\right)t + 2m\right] = 0$, which is true if

$t = \tan\theta = \frac{4}{3}$ or $\tan\theta = \frac{2m}{m^2-1}$.

Q118. Solution
Correct Answer: (A)

We know that

$P\left(\overline{A} \cap B\right) = P(B - A) = P(B) - P(B \cap A)$
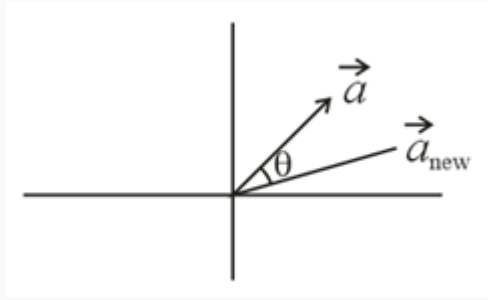
$= P(B) - P(B) - P(A) + P(A \cup B)$

$= P(A \cup B) - P(A)$

$= \frac{3}{4} - \left(1 - \frac{2}{3}\right) = \frac{3}{4} - 1 + \frac{2}{3}$

$= \frac{9 - 12 + 8}{12} = \frac{5}{12}$

Q119. Solution
Correct Answer: (B)

For any two stations in a definite order, we need one ticket. So required number of tickets is $P(20, 2)$.

Q120. Solution
Correct Answer: (D)

$$\vec{a}_{\text{Old}} = 3p\hat{i} + \hat{j}$$

$$\vec{a}_{\text{New}} = \left(p+1\right)\hat{i} + \sqrt{10}\hat{j}$$

$$\Rightarrow \vec{a}_{\text{Old}} = \vec{a}_{\text{New}}$$

$$\Rightarrow ap^2 + 1 = p^2 + 2p + 1 + 10$$

$$8p^2 - 2p - 10 = 0$$

$$4p^2 - p - 5 = 0$$

$$\left(4p - 5\right)\left(p+1\right) = 0 \rightarrow p = \tfrac{5}{4}, -1$$

Q121. Solution
Correct Answer: (D)

$$\begin{array}{ccc} 6i & -3i & 1 \\ 4 & 3i & -1 \\ 40 & 3 & i \end{array} \text{ (given)}$$

$$R_1 \rightarrow R_1 + R_2$$

$$= \begin{array}{ccc} 6i+4 & 0 & 0 \\ 4 & 3i & -1 \\ 40 & 3 & i \end{array}$$

Reduce through R_1

$$= (6i+4)[-3+3]$$

$$\Rightarrow 0 = x + iy$$

$$\therefore x = 0 \ \& \ y = 0$$

Q122. Solution
Correct Answer: (B)

$\frac{1}{1+y^2} \cdot \frac{dy}{dx} + 2x \left(\tan^{-1} y \right) = x^3$

Put $\tan^{-1} y = z$

$\therefore \quad \frac{1}{1+y^2} \cdot \frac{dy}{dx} = \frac{dz}{dx}$

$\frac{dz}{dx} + (2x)z = x^3$

$\Rightarrow z. \ e^{x^2} = \frac{1}{2} \int 2e^{x^2} . x^3 \ dx + C$

$\Rightarrow 2e^{x^2} \left(\tan^{-1} y \right) = x^2 e^{x^2} - \ e^{x^2} + 2C$

$\Rightarrow 2\tan^{-1} y = x^2 - \ 1 + 2Ce^{-x^2}$

Q123. Solution
Correct Answer: (C)

Note that $|z_1 - z_2| \geq ||z_1| - |z_2||$
$\therefore |z - 2 + i| \leq 2$
$\quad \Rightarrow ||z| - |2 - i|| \leq 2$
$\quad \Rightarrow -2 \leq |z| - |2 - i| \leq 2$
$\Rightarrow -2 \leq |z| - \sqrt{4 + 1} \leq 2$
$\Rightarrow -2 \leq |z| - \sqrt{5} \leq 2$
$\Rightarrow \sqrt{5} - 2 \leq |z| \leq 2 + \sqrt{5}$
$\Rightarrow$ Largest value of $|z|$ is $'2 + \sqrt{5}\,'$ and the least value is $'\sqrt{5} - 2\,'$
$\therefore$ Required difference $= 2 + \sqrt{5} - (\sqrt{5} - 2) = 4$

Q124. Solution
Correct Answer: (C)

We have $2p = \ \frac{0+0-1}{\sqrt{\frac{1}{a^2} + \frac{1}{b^2}}} \ \Rightarrow \frac{1}{a^2} + \frac{1}{b^2} = \frac{1}{4p^2} \Rightarrow \frac{1}{a^2} + \frac{1}{b^2} = \frac{2}{8p^2} \Rightarrow \frac{1}{a^2}, \frac{1}{8p^2}, \frac{1}{b^2}$ are in A.P. $\Rightarrow a^2, 8p^2, p^2$ are

in H.P.

Q125. Solution
Correct Answer: (D)

Any point on the line $\frac{x-2}{3} = \frac{y+1}{4} = \frac{z-2}{12} = t$ is $(3t + 2, \ 4t - 1, \ 12t + 2)$
This lies on $x - y + z = 5$
$\therefore 3t + 2 - 4t + 1 + 12t + 2 = 5$ i.e., $11t = 0 \Rightarrow t = 0$
$\therefore$ Point is $(2, \ -1, \ 2)$. Its distance from $(-1, \ -5, \ -10)$ is,
$= \sqrt{(2 + 1)^2 + (-1 + 5)^2 + (2 + 10)^2} = \sqrt{9 + 16 + 144} = 13$.

Q126. Solution

Correct Answer: (B)

Sum of 100 items $= 45 \times 100 = 4500$ Sum of items added $= 19 + 31 = 50$ Sum of items replaced $= 91 + 13 = 104$ New sum $= 4500 - 104 + 50 = 4446$ $\therefore$ New mean $= \frac{4446}{100} = 44.46$

Q127. Solution

Correct Answer: (B)

Letters of the word PARKAR written in alphabetical order are AAKPRR.

Number of words starting with A$= \frac{5!}{2!} = 60$

Number of words starting with K$= \frac{5!}{2!2!} = 30$

Number of words starting with PAA$= \frac{3!}{2!} = 3$

Number of words starting with PAK$= \frac{3!}{2!} = 3$

Number of words starting with PARA$= 2! = 2$

Number of words starting with PARKAR$= 1$

$\therefore$ Rank of word PARKAR is 99.

Q128. Solution

Correct Answer: (C)

Given equation is $ax^2 + 2bx + c = 0$. So $\alpha + \beta = -\frac{2b}{a}$ and $\alpha\beta = \frac{c}{a}$ Now $\sqrt{\left(\frac{\alpha}{\beta}\right)} + \sqrt{\left(\frac{\beta}{\alpha}\right)} = \frac{\alpha + \beta}{\sqrt{\alpha\beta}} = \frac{-2b/a}{\sqrt{c/a}} = -\frac{2b}{\sqrt{ac}}$.

Q129. Solution

Correct Answer: (D)

$\left({}^nC_0\right)^2 + \left({}^nC_1\right)^2 + \left({}^nC_2\right)^2 + \ldots + \left({}^nC_5\right)^2$
$= \left({}^5C_0\right)^2 + \left({}^5C_1\right)^2 + \left({}^5C_2\right)^2 + \left({}^5C_3\right)^2 + \left({}^5C_4\right)^2 + \left({}^5C_5\right)^2$
$= 1 + 25 + 100 + 100 + 25 + 1 = 252$

Q130. Solution

Correct Answer: (D)

$A = \begin{bmatrix} 1 & \boldsymbol{a} \\ 0 & 1 \end{bmatrix}$

$A^2 = A \times A$

$= \begin{pmatrix} \overrightarrow{1} & a \\ 0 & 1 \end{pmatrix} \downarrow \begin{pmatrix} 1 & a \\ 0 & 1 \end{pmatrix}$

$= \begin{pmatrix} 1 & a+a \\ 0 & 1 \end{pmatrix} = \begin{pmatrix} 1 & 2a \\ 0 & 1 \end{pmatrix}$

Now $A^4 = A^2 \times A^2 = \begin{pmatrix} 1 & 2a \\ 0 & 1 \end{pmatrix} \downarrow \begin{pmatrix} 1 & 2a \\ 0 & 1 \end{pmatrix}$

$= \begin{pmatrix} 1 & 4a \\ 0 & 1 \end{pmatrix}$

$A^4 = \begin{pmatrix} 1 & 4a \\ 0 & 1 \end{pmatrix}$

Q131. Solution

Correct Answer: (C)

When all the three, inductor, capacitor and resistor, are connected in parallel. I_L lags I_R by a phase of $\frac{\pi}{2}$, while I_C leads I_R by a phase of $\frac{\pi}{2}$.

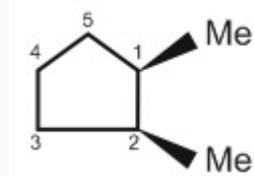
Q132. Solution

Correct Answer: (D)

Work done $=$ change in kinetic energy and initial kinetic energy is zero.

$W = \frac{1}{2}mv^2$

$\therefore W \propto v^2$, graph will be parabolic in nature.

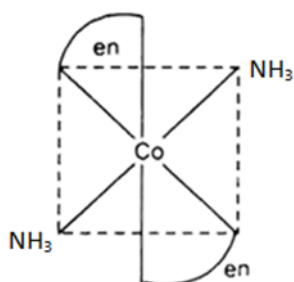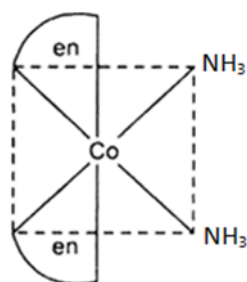---

Q133. Solution

Correct Answer: (D)

Coherent sources can be created from same source. Different sources are always incoherent.
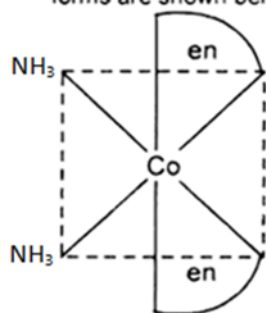
Q134. Solution
Correct Answer: (A)

cis- 1,2-dimethyl cyclopentane

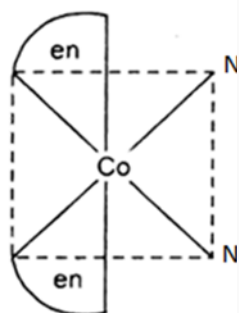## Q135. Solution
Correct Answer: (C)

It is an octahedral complex of the type $[M(AA)_2X_2]$ and capable of showing optical isomerism. As in rest others there is symmetry, so no optical isomerism is possible.

cis form
(Un-symmetrical and show
optical (isomerism d and l
forms are shown below)

trans form
(symmetrical and does not
show optical isomerism)

Q136. Solution
Correct Answer: (D)

$$\left(p + \frac{a}{V_m^2}\right)(V_m - b) = RT$$

at low pressure $b \cong 0$

$$\Rightarrow \left(P + \frac{a}{V_m^2}\right)V_m = RT$$

$$\Rightarrow PV_m + \frac{a}{V_m} = RT$$

$$\Rightarrow Z = 1 - \frac{a}{V_m RT}$$

Q137. Solution
Correct Answer: (B)

Word :	P	A	R	T	N	E	R
Logic :	-1	-1	-1	-1	-1	-1	-1

Similarly the code for SEGMENT is

Code :	O	Z	Q	S	M	D	Q
Word :	S	E	G	M	E	N	T
Logic :	-1	-1	-1	-1	-1	-1	-1
Code :	R	D	F	L	D	M	S

Q138. Solution
Correct Answer: (C)

The logtc followed here is: only option (3) is embedded as shown below,
Hence. option (3) is the correct answer.

Q139. Solution
Correct Answer: (A)

The first term of the question is 2 and the first term of this answer set is $2 \times 2 = 4$.

The second term of the question is 10 and the second term of this answer set is $10 \times 2 = 20$.

The third term of the question is 28 and the third term of this answer set is $28 \times 2 = 56$.

Therefore, clearly, the answer set follows a common rule of second test=(first set$\times 2$).

So, the correct answer is $(4, 20, 56)$.

Q140. Solution
Correct Answer: (B)

$p + q = -p,\ pq = q$
$\Rightarrow q = 0,\ p = 1$

$\Rightarrow p = 0,\ q = -2$

Q141. Solution

Correct Answer: (B)

$1000 \left[\frac{1}{1 \times 2} \times \frac{1}{2 \times 3} + \frac{1}{3 \times 4} + \ldots + \frac{1}{999 \times 1000} \right] = 1000 \left\{ \left(1 - \frac{1}{2} \right) + \left(\frac{1}{2} - \frac{1}{3} \right) + \left(\frac{1}{3} - \frac{1}{4} \right) \right.$
$\left. + \ldots + \left(\frac{1}{999} - \frac{1}{1000} \right) \right] = 1000 \left(1 - \frac{1}{1000} \right) = 1000 \times \frac{999}{1000} = 999$

Q142. Solution

Correct Answer: (C)

Given that $y = 2^x$.

Taking logarithm both sides, we get:

$\log_e y = \log_e 2^x$

$\Rightarrow \log_e y = x \, \log_e 2$ (Since $\log_a b^c = c \times \log_a b$)

Differentiating with respect to x, we get:

$\frac{1}{y} \frac{dy}{dx} = \log_e 2$

$\Rightarrow \frac{dy}{dx} = \log_e 2 \times y$

Hence, $\frac{dy}{dx} = 2^x \, \log_e 2$.

C I P H Ξ R the goat 🙂