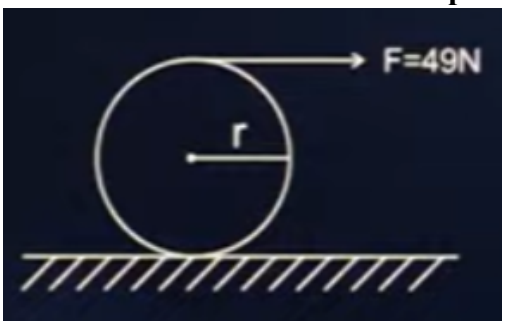
JEE-Main-03-04-2025 (Memory Based)
[MORNING SHIFT]
Physics

Question: An ideal gas with an adiabatic exponent 1.5, initially at 27℃ is compressed adiabatically from 800 cc to 200 cc. The final temperature of the gas is
Options:
(a) 600 K
(b) 300 K
(c) 450 K
(d) 273 K
Answer: (a)

Question: In YDSE, light of intensity of 4I and 9I passes through two slits respectively. Difference of maximum and minimum intensity of interference pattern is
Options:
(a) 5I
(b) 10I
(c) 24I
(d) 26I
Answer: (c)

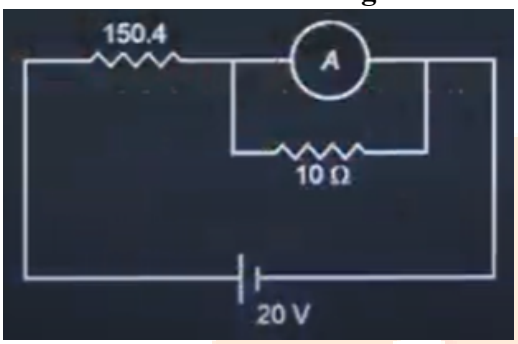
Question: The work function of a metal 3eV. The colour of the visible light that is required to cause emission of photoelectrons is
Options:
(a) Yellow
(b) Blue
(c) Red
(d) Green
Answer (b)

Question: A force of 49 N acts tangentially at the highest point of a sphere (solid of mass 2 kg) kept on a rough horizontal plane. If the sphere rolls without slipping, then the acceleration of the centre of the sphere is



Options:
(a) 0.25 m/s²
(b) 2.5 m/s²
(c) 3.5 m/s²
(d) 0.35 m/s²
Answer: (c)

Question: An ammeter having resistance 240 Ω is connected in the given circuit as shown. Find current through the ammeter.



Options:
(a) 1 mA
(b) 5 mA
(c) 100 mA
(d) 2.5 mA
Answer: (b)

Question: A particle is released from height 's' above the surface of the earth. At certain height it's K.E is 3 times of PE. The height from the surface of the earth and the speed of the particle at the instant are respectively.
Options:
(a) $\frac{s}{4}, \sqrt{\frac{3gs}{2}}$
(b) $\frac{s}{2}, \sqrt{\frac{3gs}{2}}$
(c) $\frac{s}{2}, \frac{3gs}{2}$
(d) $\frac{s}{4}, \frac{3gs}{2}$
Answer: (a)

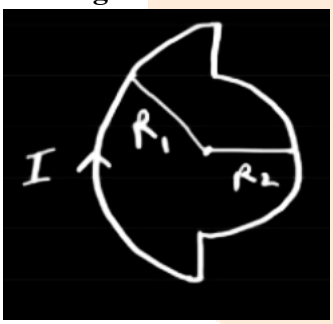
Question: The Electrostatic potential on the surface of uniformly charged spherical shell of radius R = 10 cm is 120 V. The potential at the centre of shell, at a distance 5 cm from centre and a distance 15 cm from the centre of the shells are
Options:
(a) 40 V, 40 V, 80 V
(b) 120 V, 120 V, 80 V
(c) 0 V, 120 V, 40 V
(d) 0 V, 0 V, 80 V

Answer: (b)

Question: Power of point source is 450 watt. Radiation pressure on a perfectly Reflecting surface at a distance of 2 m is …… .
Options:
(a) 1.5×10^{-8}
(b) 3×10^{-8}
(c) 0
(d) 6×10^{-8}
Answer: (d)

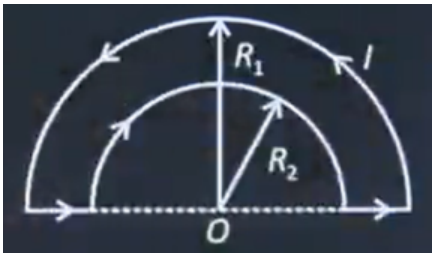
Question: A thin uniform wire of length 25 m and area of cross-section 5 mm² has resistivity 2×10^{-6} Ω-m. If the wire is bent to form a circle, the resistance across diametrically opposite points is
Options:
(a) 5 Ω
(b) 2.5 Ω
(c) 10 Ω
(d) 12.5 Ω
Answer: (b)

Question: There is a setup of conducting wire having current I as shown in figure. Find the magnetic field at the centre.



Options:
(a) $\mu_0 I\left[\frac{1}{R_1}+\frac{1}{R_2}\right]$
(b) $\frac{\mu_0}{4} I\left[\frac{1}{R_1}+\frac{1}{R_2}\right]$
(c) $\frac{\mu_0 I}{4}\left[\frac{1}{R_1}-\frac{1}{R_2}\right]$
(d) $\frac{\mu_0 I}{4\pi}\left[\frac{R_1 R_2}{R_1+R_2}\right]$
Answer: (b)

Question: A current carrying wire is bent as shown in the figure. Find magnetic field at centre O of the semi-circles. (Take $R_1 = 4\pi$ and $R_2 = 6\pi$)



Options:

(a) $8.3l \times 10^{-6}$ T

(b) $8.3l \times 10^{-9}$T

(c) $4\pi l \times 10^{-7}$ T

(d) $6l \times 10^{-8}$ T

Answer: (b)

Question: A biconvex lens is having the radius of curvature of 10 cm and 15 cm. If focal length of the lens is 12 cm find refractive index of material of the lens.

Options:

(a) 3/2

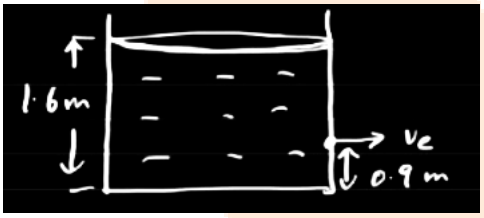
(b) 4/3

(c) 2

(d) √3

Answer: (a)

Question: These is a contains of area of cross section 0.5 m² which is filled upto height 1.6 m with water. It has piston of mass 20 kg placed above water. If there is an orifice at a height 0.9 m above the ground level then. Find the velocity of efflux



Options:

(a) 7 m/s

(b) 3.5 m/s

(c) 2.5 m/s

(d) 3.85 m/s

Answer: (d)

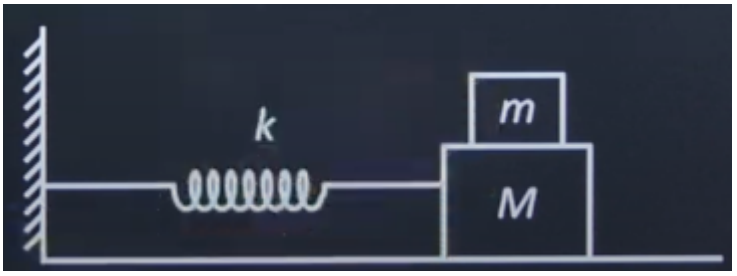
Question: The figure below shows an oscillating system of two blocks and a spring. The horizontal surface is smooth and the contact between the blocks is rough with coefficient of static friction μ.

Considering that the blocks of mass m is always stationary relative to M, choose the correct option regarding the statement below:

(A) Maximum frictional force between blocks is μ mg.

(B) Time period of oscillation is $2\pi\sqrt{\frac{m+M}{k}}$

(C) Friction between the blocks at any instant is μ(m + M)g



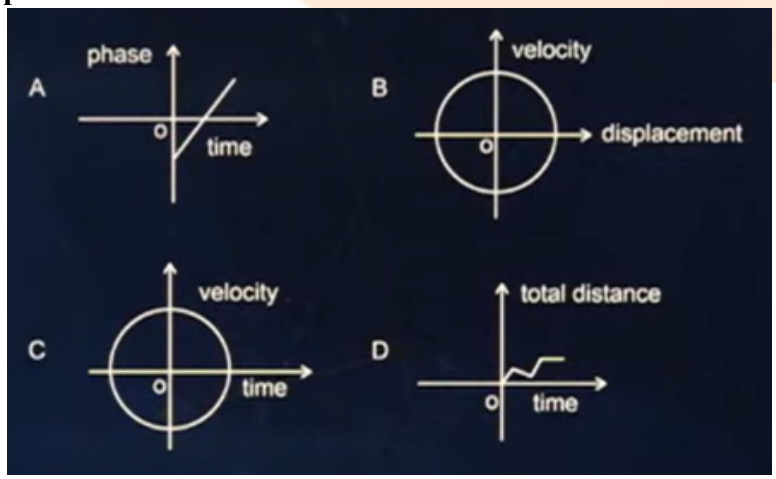
Options:
(a) A correct
(b) B correct
(c) A, B, C correct
(d) C correct
Answer: (b)

Question: Choose the correct option.

a.	**Gravitational potential**	**(i)**	**$M^{-1}L^{3}K^{-2}$**
b.	**Gravitational constant**	**(ii)**	**$ML^{2}T^{-2}$**
c.	**Acceleration due to gravity**	**(iii)**	**$M^{0}L^{2}T^{-2}$**
d.	**Potential energy**	**(iv)**	**$M^{0}LT^{-2}$**

Options:
(a) a(iii), b(ii), c(iv), d(i)
(b) a(iii), b(i), c(iv), d(ii)
(c) a(ii), b(i), c(iv), d(iii)
(d) a(ii), b(iv), c(i), d(iii)
Answer: (b)

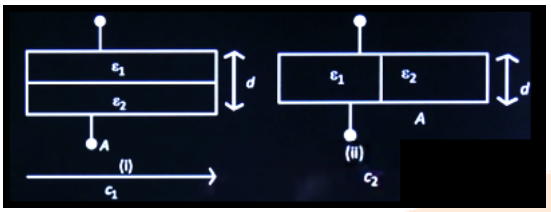
Question: Which of the following curves possibly represent one dimensional motion of a particle?



Options:
(a) A and B

(b) A, B, D
(c) A, B, C
(d) A, C, D
Answer: (b)

Question: Capacitors with dielectric are shown in figure (symmetric situation). Find $\frac{c_1}{c_2}$



Options:

(a) $\frac{4\varepsilon_1\varepsilon_2}{(\varepsilon_1+\varepsilon_2)^2}$

(b) $\frac{4\varepsilon_1\varepsilon_2}{\varepsilon_1+\varepsilon_2}$

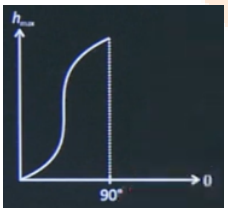
(c) $\frac{2\varepsilon_1\varepsilon_2}{(\varepsilon_1+\varepsilon_2)^2}$

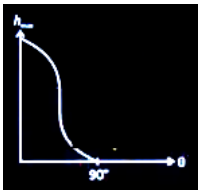
(d) $\frac{(\varepsilon_1\varepsilon_2)^2}{(\varepsilon_1+\varepsilon_2)^2}$

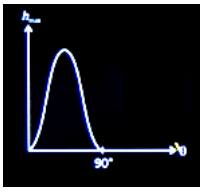
Answer: (a)

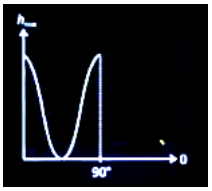
Question: From a horizontal surface a particle is projected with a speed u. Which of the following correctly respect the variation of maximum height above the surface attained by the particle as the angle of projection is varied?

Options:

(a) 

(b) 

(c) 

(d) 

Answer: (a)

Question: Choose the correct option.

	Column I		Column II
a.	**Hydrogen nuclei**	**(i)**	**Fusion with positive Q value**
b.	**Uranium nucleus**	**(ii)**	**Fusion with negative Q value**
c.	**Fusion of hydrogen & helium nucleus**	**(iii)**	**Chemical reaction**
d.	**$2H_2 + O_2 \rightarrow 2H_2O$**	**(iv)**	**Fission**

Options:

(a) a-ii, b-iii, c-i, d-iii
(b) a-i, b-iv, c-i, d-iii
(c) a-ii, b-iv, c-ii, d-iii
(d) a-iii, b-iv, c-ii, d-i

Answer: (b)

JEE-Main-03-04-2025 (Memory Based)
[MORNING SHIFT]
Chemistry

Question: Which of the following ion shows spin only magnetic moment of 4.9 B.M.
Options:
(a) Mn^{2+}
(b) Cr^{2+}
(c) Fe^{3+}
(d) Co^{2+}
Answer: (b)

Question: Which of following has highest atomic number
Options:
(a) Po
(b) Pt
(c) Pr
(d) Pb
Answer: (a)

Question: Match the following List-I with List-II and choose the correct option

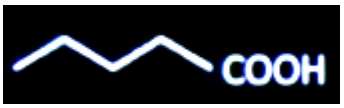
List-I (Compound)	List-II (Shape and Hybridisation
(A) PF_5	(i) Tetrahedral and sp^3
(B) SF_6	(ii) Square planar and dsp^2
(C) $Ni(CO)_4$	(iii) Octahedral and sp^3d^2
(D) $[PtCl_4]^{2-}$	(iv) Trigonal bipyramidal and sp^3d

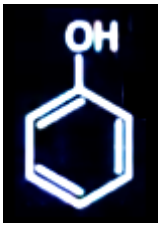
Options:
(a) A-IV, B-III, C-I, D-II
(b) A-III, B-IV, C-I, D-II
(c) A-III, B-IV, C-II, D-I
(d) A-IV, B-III, C-II, D-I
Answer: (a)

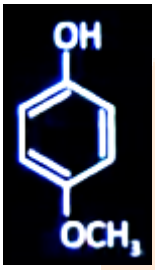
Question: 2 moles each of ethylene glycol and glucose are mixed with 500g of water. Find the boiling point of solution.
Given: $K_b = 0.52$ K kg mol^{-1}
Options:
(a) 377.16 K

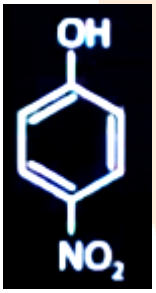
(b) 368.84 K
(c) 376.16 K
(d) 369.84 K
Answer: (a)

Question: Order of limiting molar conductivities of these cations at 298 K is H^+, Ca^{+2}, Na^+, K^+, Mg^{+2}
Options:

(a) 

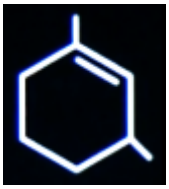
(b) 

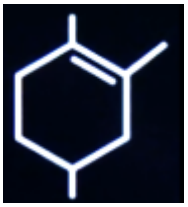
(c) 

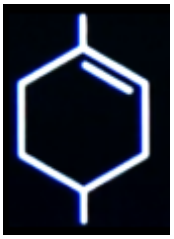
(d) 

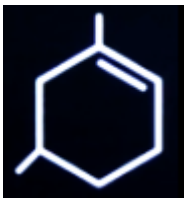
Answer: (a)

Question: Which of the following will give 3-methyl-6-oxoheptanal as the product of reductive ozonolysis?
Options:

(a) 

(b) 

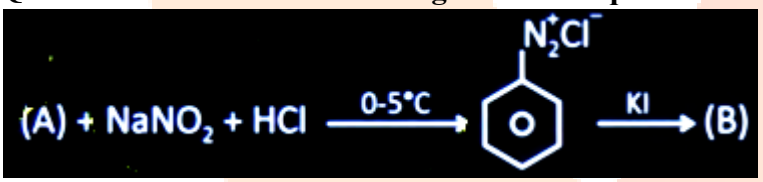
(c) 

(d) 

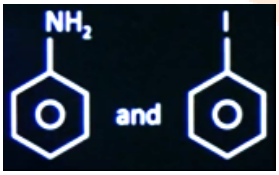
Answer: (c)

Question: The given reaction is at equilibrium starting with only PCl_5
$PCl_5(g) \leftrightharpoons PCl_3(g) + Cl_2(g)$,
When addition of Xe gas takes place at constant pressure, then which following is correct?
Options:
(a) Conc. of PCl_3 will become more than Cl_2
(b) PCl_3 and Cl_2 will have same concentration at new equilibrium
(c) Conc. of Cl_2 will become more than PCl_3
(d) PCl_3 will be 30% and Cl_2 will be 70% at the new equilibrium
Answer: (b)

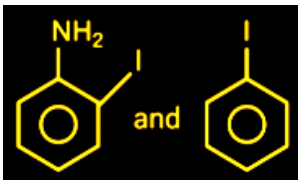
Question: Observe the following reaction sequence.

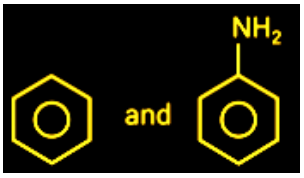


Which of the following options has correct structure (A) and (B) respectively
Options:

(a) 

(b) 

(c) 

(d) 

Answer: (a)

Question: Consider the following statements
Statement-I: N-N has less bond strength than P-P
Statement-II: All group-15 elements in +3 oxidation state undergo disproportionate in the light of above statements, choose the correct option.
Options:
(a) Statement-I and statement-II both are correct
(b) Statement-I and Statement-II both are incorrect
(c) Statement-I is correct statement-II is incorrect
(d) Statement-I is incorrect statement-II is correct
Answer: (c)

Question: Which of the following property shows irregular tend in group 16?
Options:
(a) Electronegativity
(b) Atomic radius
(c) Electron affinity
(d) Ionisation enthalpy
Answer: (c)

Question: Which of the following statement(s) is/are incorrect
I. NO_2 dimerises easily
II. NF_5 does not exist but PF_5 exits
III. The oxides N_2O_5 and P_2O_5 are purely acidic but As_2O_5 and Sn_2O_5 are basic
IV. Nitrogen cannot form dπ-pπ bond as the heavier elements can
Options:
(a) Only I, II and IV
(b) Only III
(c) Only III and IV
(d) Only I and II
Answer: (b)

Question: Consider the following complex ions
(a) $[Co(NH_3)_6]^{3+}$ (b) $[Co(NH_3)_5Cl]^{2+}$
(c) $[Co(NH_3)_5(H_2O)]^{3+}$ (d) $[Co(CN)_6]^{3-}$
Choose the correct order of wavelength absorbed by complex ions
Options:
(a) a < b < c < d
(b) b > c > a > d
(c) b > a > c > d
(d) d > c > b > a
Answer: (b)

Question: Arrange the following metal ions in the decreasing order of their molar conductivity in aqueous solution.

Ca^{2+}, Mg^{2+}, Na^{+}, K^{+}

Options:

(a) $Na^{+} > K^{+} > Ca^{2+} > Mg^{2+}$

(b) $Mg^{2+} > Ca^{2+} > Na^{+} > K^{+}$

(c) $Ca^{2+} > Mg^{2+} > K^{+} > Na^{+}$

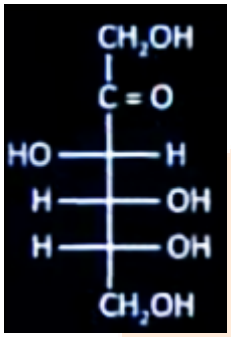
(d) $Mg^{2+} > Ca^{2+} > K^{+} > Na^{+}$

Answer: (c)

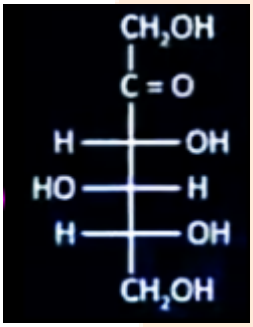
Question: Which of the following represents the L-form of fructose?

Options:

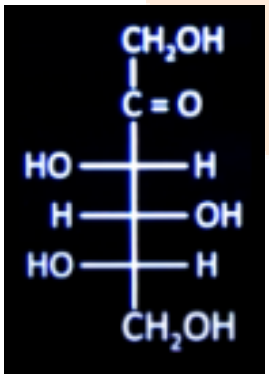
(a)

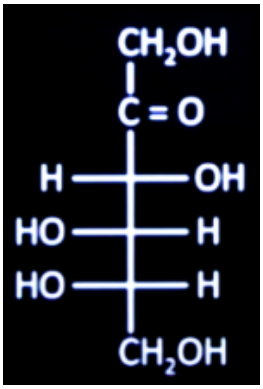


(b)



(c)



(d) 

Answer: (d)

Question: Which of the following is/are correct?
a. $CH_3CH_2CH_2$-$COCH_3$ and CH_3-CH_2-$COCH_2CH_3$ metamers
b. $CH_3CH_2CH_2CH_2OH$ and $CH_3CH_2CH_2$-$CH(OH)$-CH_3 position isomers
c. $CH_3CH_2CH_2CH_2NH_2$ and CH_3-CH_2NH-CH_2CH_3 homologes
d. $CH_3CH_2CH_2CH_2CN$ and $CH_3CH_2CH_2NC$ functional isomers
Options:
(a) (a) and (d)
(b) (a) and (c)
(c) (b) and (c)
(d) (b) and (d)
Answer: (a)

Question: Correct set of four Quantum numbers for last electron of Cr^{3+} ion is:-
Options:
(a) n = 4, l = 1, m = 0, s = + ½
(b) n = 4, l = 2, m = 0, s = + ½
(c) n = 3, l = 2, m = 0, s = + ½
(d) n = 3, l = 2, m = - 1, s = 0
Answer: (c)

Question: Given below are two statements about X-ray spectra of elements:
Statement-II: A plot of √v (v = frequency of X-rays emitted) vs atomic mass is a straight line
Statement-II: A plot of v (v = frequency of X-rays emitted) vs atomic number is a straight line
In the light of the above statements, choose the correct answer from the options given below:
Options:
(a) Statement-I is true but statement-II is false
(b) Statement-I is false but statement-II is true
(c) Both Statement-I and Statement-II are false
(d) Both Statement-I and Statement-II are true
Answer: (c)

Question: How many of the following statements are correct?
a. First ionisation energy of Boron is more than Beryllium.

b. Lithium is strong reducing agent
c. Electronegativity of carbon is 2.5 (approx.) in CCl_4
d. Removal of electron from isolated gaseous atom is endothermic and addition of electron to isolated gaseous atom is generally exothermic

Answer: (3)

Question: 0.5 g of an organic compound gives 1.46 g CO_2 and 0.9 g H_2O. What is the % of carbon in organic sample.
Options:

Answer: (80)

Question: In two first order reactions initial concentration of $[A]_0 = 8[B]_0$. Find the time after which concentration of A and B become equal. Given that $(t_{1/2})_A = 20$ min and $(t_{1/2})_B = 80$ min.
Options:

Answer: (80)

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[MORNING SHIFT]

Maths

Question: Let A be 3 × 3 matrix such that det(A) = 5. If det(3adj(2Aadj(2A))) = $2\alpha.3\beta.5\gamma$, then $(\alpha+\beta+\gamma)$ is equal to

Options:

(a) 25

(b) 26

(c) 27

(d) 28

Answer: (c)

$$|A| = 5,$$

$$|3adj(2Aadj(2A))| = 2^{\alpha} \cdot 3^{\beta} \cdot 5^{\gamma}$$

$$3^3|adj(2A(adj(2A)))| = 2^{\alpha} \cdot 3^{\beta} \cdot 5^{\gamma}$$

$$3^3|2A(adj(2A))| = 2^{\alpha} \cdot 3^{\beta} \cdot 5^{\gamma}$$

$$3^3 \times 2^6|A|^2|adj(2A)|^2 = 2^{\alpha} \cdot 3^{\beta} \cdot 5^{\gamma}$$

$$3^3 \times 2^6 \times 5^2|2A|^4 = 2^{\alpha} \cdot 3^{\beta} \cdot 5^{\gamma}$$

$$3^3 \times 2^6 \times 5^2 \times (2)^{12}|A|^4 = 2^{\alpha} \cdot 3^{\beta} \cdot 5^{\gamma}$$

$$3^3 \times 2^{18} \times 5^2 \times 5^4 = 2^{\alpha}3^{\beta}5^{\gamma}$$

$$2^{18} \times 3^3 \times 5^6 = 2^{\alpha}3^{\beta}5^{\gamma}$$

$$\alpha = 18, \beta = 3, \gamma = 6$$

$$\alpha + \beta + \gamma = 27$$

Question: The sum of all rational number in $\left(2+\sqrt{3}\right)^8$ is

Options:

(a) 18117

(b) 18817

(c) 17280

(d) 1800

Answer: (b)

$\left(2+\sqrt{3}\right)^{8}$

$T_{r+1} = {}^{8}C_{r}2^{8-r}\left(\sqrt{3}^{r}\right)$

$0 \le r \le 8$

For rotational terms $r = 0, 2, 4, 6, 8$

$T_{1} = {}^{8}C_{0}2^{8}\left(\sqrt{3}\right)^{0} = 256$

$T_{3} = {}^{8}C_{2}2^{6}\left(\sqrt{3}^{2}\right) = 5376$

$T_{5} = {}^{8}C_{4}2^{4}\left(\sqrt{3}\right)^{4} = 10080$

$T_{7} = {}^{8}C_{6}2^{2}\left(\sqrt{3}\right)^{6} = 3024$

$T_{9} = {}^{8}C_{8}2^{0}\left(\sqrt{3}\right)^{8} = 81$

$=18817$

Question: If the sum $\sum_{r=1}^{9}\left(\frac{r+3}{2^{r}}\right){}^{9}C_{r} - 9 = \alpha \cdot \left(\frac{3}{2}\right)^{9} - \beta,$ then the value of $(\alpha+\beta)^2$ is equal to

Options:

(a) 9

(b) 81

(c) 27

(d) 36

Answer: (b)

$\sum_{r=1}^{9}\frac{r+3}{2^{r}}.9C_{r}$

$\sum_{r=1}^{9}\frac{r^{9}C_{r}}{2^{r}} + 3\sum_{r=1}^{9}{}^{9}C_{r}\left(\frac{1}{2}\right)^{r}$

$\sum_{r=1}^{9}\frac{9^{8}C_{r-1}}{2^{r}} + 3\left(1+\frac{1}{2}\right)^{9} - {}^{9}C_{0}\left(\frac{1}{2}\right)^{0}$

$\frac{9}{2}\sum_{r=1}^{9}{}^{8}C_{r-1}\left(\frac{1}{2}\right)^{r-1} + 3\left(\frac{3}{2}\right)^{9-3}$

$\frac{9}{2}\left(1+\frac{1}{2}\right)^{8} + 3\left(\frac{3}{2}\right)^{9-3}$

$\frac{9}{2}\left(\frac{3}{2}\right)^{8} + 3\left(\frac{3}{2}\right)^{9-3}$

$\left(\frac{3}{2}\right)^{8}\left[\frac{4}{2} + \frac{3\times3}{2}\right] - 3$

$\left(\frac{3}{2}\right)^{8}\frac{18}{2} - 3$

$(6)\left(\frac{3}{2}\right)^{9} - 3$

$\alpha = 6; \beta = 3$

$(\alpha+\beta)^{2} = (6+3)^{2} = 81$

Question: Let S_n = 1 + 3 + 11 + 25 + 45 + …….. Then sum upto 20th term equals to

Options:

(a) 6200

(b) 7200

(c) 7240

(d) 6240

Answer: (c)

Question: Evaluate $\int x^3\sqrt{1-x^2}dx$

Options:

(a) $-\frac{1}{15}\left(1-x^2\right)^{\frac{3}{2}}\left(3x^2+2\right)+C$

(b) $\frac{1}{3}\left(1+x^2\right)^{\frac{2}{3}}-\sqrt{1-x^2}+C$

(c) $\frac{2}{3}\left(1-x^2\right)^{\frac{3}{2}}\left(3x^2+2\right)+C$

(d) $\frac{1}{3}\left(1-x^2\right)^{\frac{2}{3}}+\sqrt{1-x^2}+C$

Answer: (a)

$\int x^3\sqrt{1-x^2}dx$

$= 1-x^2=t^2$

$= -2x\ dx = 2t\ .\ dt$

$= \int\left(1-t^2\right)t^2dt$

$= \int\left(t^4-t^2\right)dt$

$= \frac{1}{5}t^5-\frac{1}{3}t^3+C = \frac{t^3}{15}\left[3t^2-5\right]$

$= \frac{-1}{15}\left(1-x^2\right)^{\frac{3}{2}}\left(3x^2+2\right)+C$

Question: A relation R = {(x, y) : y ∈ A = {-3, -2, -1, 0, 1, 2, 3} such that $x^2 + 2y \leq 4$}. Then the number of ordered pairs in relation R be and number of ordered pairs required to add in R so that it becomes reflexive relations is m, then r + m is equal to

Options:

(a) 26

(b) 28

(c) 24

(d) 23

Answer: (b)

$A = \{\pm3, \pm2, \pm1, 0\}$

$R = \{(x,y) : x,y \in A \& x^2+2y \leq 4\}$

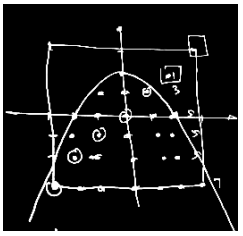
$R = \begin{Bmatrix} (0,2),(0,-2),(0,-3),(0,1),(0,0),(0,-1),(1,1),(1,0), \\ (1,-1),(1,-2),(1,-3)(2,0),(2,-1),(2,-2),(2,-3)), \\ (3,-3),(-1,1),(-1,0),(-1,-1),(-1,-2),(-1,-3) \\ (-2,0)(-2,-1),(-2,-2),(-2,-3),(-3,-3) \end{Bmatrix}$

$r = 26$

same as$\{(2,2)(3,3)\}$

$r = 26, m = 2$

$r + m = 28$



$y = 2 - \frac{1}{2}x^2$

$1 + 3 + 5 + 5 + 5 + 7 = 26$

$r = 26$

$m = 2$

$r + m = 28$

Question: The radius of the smallest circle touching both parabolas $y = x^2 + 2$ and $x = y^2 + 2$ is

Options:

(a) $\frac{7\sqrt{2}}{2}$

(b) $\frac{7\sqrt{2}}{6}$

(c) $\frac{7\sqrt{2}}{8}$

(d) $\frac{7\sqrt{2}}{4}$

Answer: (c)

Question: $3x + 2\tan x = \pi, x \in [-2\pi, 2\pi] = \left[\pm\frac{\pi}{2}, \pm\frac{3\pi}{2}\right]$. **Then number of value of x satisfy is**

Options:

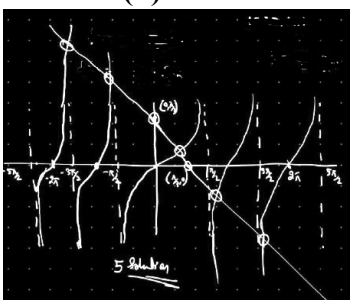
(a) 4

(b) 5

(c) 6

(d) 7

Answer: (b)



$3x + 2\tan = \pi$

$\tan = \frac{\pi - 3x}{2}$ $\quad [-2\pi, 2\pi]$

$\tan = \frac{\pi}{2} - \frac{3x}{2}$ $\quad y = \frac{\pi}{2} - \frac{3}{2}r$

Question: Let $\int_0^x g(t)dt = x - \int_0^x tg(t)dt, x \geq 0$ **and** $\frac{dy}{dx} - y\tan x = 2(x+1)\sec x g(x)$ **satisfying the condition y(0) = 0. Then** $y\left(\frac{\pi}{3}\right)$ **is.**

Options:

(a) $\frac{2\pi}{3}$

(b) $\frac{4\pi}{3}$

(c) π

(d) 2π

Answer: (b)

Question: $f(x) = \begin{vmatrix} \sin x & \cos x & \sin x + \cos x + 1 \\ 27 & 28 & 27 \\ 1 & 1 & 1 \end{vmatrix}$. **Then, the value of f'(x) + f(x) is**

Options:

(a) -1

(b) 28

(c) 27

(d) 1

Answer: (d)

$$\begin{vmatrix} \sin x & \cos x & \sin x + \cos x + 1 \\ 27 & 28 & 27 \\ 1 & 1 & 1 \end{vmatrix}$$

$$f' = \begin{vmatrix} \cos x & -\sin x & \cos x - \sin x \\ 27 & 28 & 27 \\ 1 & 1 & 1 \end{vmatrix}$$

$$f'' = \begin{vmatrix} -\sin x & -\cos x & -\sin x - \cos x \\ 27 & 28 & 27 \\ 1 & 1 & 1 \end{vmatrix}$$

$$f'' + f = \begin{vmatrix} 0 & 0 & 1 \\ 27 & 28 & 27 \\ 1 & 1 & 1 \end{vmatrix}$$

$= 27 - 28$

$= -1$

Question: Let α, β **are the roots of the equation** $x^2 + \sqrt{3}x - 16 = 0$ **and** γ, δ **are the roots of the equation** $x^2 + 3x - 1 = 0$. **If** $Q_n = \alpha^n + \beta^n \ \forall \ n \in N$ **and** $P_n = \gamma^n + \delta^n \ \forall \ n \in N$ **then the value of** $\frac{Q_{25} + \sqrt{3}Q_{24}}{2Q_{23}} + \left(\frac{P_{25} - P_{23}}{P_{24}}\right)$

Options:

(a) 5
(b) 6
(c) 7
(d) 8
Answer: (a)

α, β are roots of the equation $x^2 + \sqrt{3}x - 16 = 0$ and γ, δ are the roots of the equation $x^2 + 3x - 1 = 0$.
If $Q_n = \alpha^n + \beta^n \ \forall \ n \in N$ and $P_n = \gamma^n + \delta^n \ \forall \ n \in N$ then

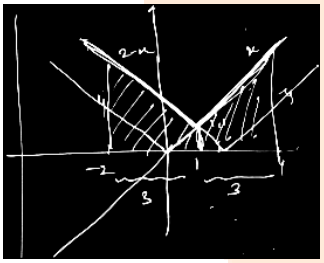
$$\frac{Q_{25}+\sqrt{3}Q_{24}}{2Q_{23}} + \frac{P_{25}-P_{23}}{P_{24}}$$

$$Q_{25} + \sqrt{3}Q_{24} - 16Q_{23} = 0 \qquad P_{25} + 3P_{24} - P_{23} = 0$$

$$\frac{Q_{25}+\sqrt{3}Q_{24}}{2Q_{23}} \qquad \frac{P_{25}-P_{23}}{P_{24}} = \frac{3P_{24}}{P_{24}} = -3$$

$$8 + 3 = 11$$

Question: If y = max{|x|, x, |x - 2|}, then the area under the curve from x = -2 to x = 4 is (in square units)
Options:
(a) 15
(b) 20
(c) 12
(d) 8
Answer: (a)



$$2 - x = x$$

$$x = 1$$

$$2 \cdot \frac{1}{2} \cdot 3 \cdot 5 = 15$$

Question: Let a_1, a_2, a_3 …. Are in GP, where $a_3.a_5 = 729$ and $a_2 + a_4 = \frac{111}{4}$, then $24(a_1 + a_2 + a_3)$
Options:
(a) 131
(b) 130
(c) 129
(d) 128
Answer: (c)

Question: Let $\vec{a} = \hat{i} + \hat{j} + \hat{k}$ and $\vec{b} = 2\hat{i} - \hat{j} + \hat{k}$. Let $\vec{c}$ is a unit vector such that $\vec{a} \times \vec{c} = \vec{b} \times \vec{c}$ If $\vec{c} = \lambda\hat{i} + \mu\hat{j}$ and $\vec{d}$ is a vector perpendicular to $\vec{c}$ and $\vec{a}$, then $\left|\lambda\vec{c} + \mu\vec{d}\right|^2$ is equal to

Options:

(a) $\frac{6}{25}$

(b) $\frac{61}{25}$

(c) $\frac{41}{25}$

(d) $\frac{36}{25}$

Answer: (b)

Question: Let a line passing through (4,1,3) intersects the lines $l_1 : \frac{x-1}{3} = \frac{y-2}{4} = \frac{z-3}{5}$ at (α, β, γ) and l_2 : x - 1 = y = -z + 4 t (a, b, c) then find $\begin{vmatrix} 63 & 21 & -21 \\ \alpha & \beta & \gamma \\ a & b & c \end{vmatrix}$ is equal to

Options:

(a) 102

(b) 204

(c) 63

(d) 21

Answer: (b)