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

Question: The ratio of intensities of two coherent is 1 : 9. The ratio of the maximum to the minimum intensities is
Options:
(a) 9:1
(b) 16:1
(c) 8:1
(d) 4:1
Answer: (d)

Question: Excess pressure inside bubble A is half of that of bubble B. Find ratio of volume of bubble A to bubble B.
Options:
(a) 8
(b) 4
(c) 27
(d) 16
Answer: (a)

Question: In a resonance tube experiment at one end, resonance is obtained at two consecutive length $l_1 = 100$ cm and $l_2 = 14$ cm. If the frequency of the sound is 400 Hz, the velocity of sound is
Options:
(a) 320 m/s
(b) 340 m/s
(c) 380 m/s
(d) 300 m/s
Answer (a)

Question: A magnetic dipole experiences a torque of $80\sqrt{3}$ Nm when placed in uniform magnetic field in such a way that dipole moment makes an angle of 60° with magnetic field. The potential energy of the dipole is
Options:
(a) 90 J
(b) 80 J
(c) 70 J
(d) 75 J
Answer: (b)

Question: Physical quantity S is given as $S = \frac{pq}{r^3\sqrt{t}}$. Find to percentage change in S if percentage change in p, q, r and t are 1, 1, 3 and 2 respectively.

Options:

(a) 7%

(b) 9%

(c) 5%

(d) 12%

Answer: (d)

Question: In a medium of refractive index 2, the frequency of light is 5×10^{14} Hz, the wavelength of the light is

Options:

(a) 200 nm

(b) 300 nm

(c) 500 nm

(d) 600 nm

Answer: (b)

Question: A capacitor $C_1 = 100$ pF is connected to a 60 V cell then disconnected. C_1 is now connected to an uncharged capacitor C_2 such that the final potential across C_1 becomes 20 V. Find C_2.

Options:

(a) 200 pF

(b) 300 nF

(c) 500 nF

(d) 600 nF

Answer: (a)

Question: A block of mass 1 kg, moving along x axis with speed $v_i = 10$ m/s enters a rough region ranging from x = 0.1 m to x = 1.9 m. The retarding force acting on the block in this range is $F_r = -kx$ N, with k = 1 N/m. Then the final speed of the block as it crosses rough region is

Options:

(a) 1 m/s

(b) 2 m/s

(c) 8 m/s

(d) 10 m/s

Answer: (c)

Question: A bulb rated 100 W, 220 V connected to an ac supply of 220 V. Find peak current in the bulb.

Options:

(a) 8 A

(b) 0.64 A

(c) 3.2 A

(d) 2 A

Answer: (b)

Question: Statement-I: O^{2-} and H^{+} are projected in a magnetic field perpendicular to the field with same speed. The radius of curvature of O^{2-} will be less than H^{+}.
Statement-II: e^{-} and p^{+} are projected in a magnetic field perpendicular to the field with same speed. The radius of curvature of e^{-} will be more the proton.
Options:
(a) Statement-I is correct, statement-II is incorrect
(b) Both statement-I and statement-II are correct
(c) Both statement-I and statement-II are incorrect
(d) Statement-I is incorrect, statement-II is correct
Answer: (c)

Question: The pressure of an ideal gas is increased by 0.4% keeping the volume constant. Find the initial temperature of the gas if there is a 1 °C rise in temperature.
Options:
(a) 250 K
(b) 250°C
(c) 2500 K
(d) 2500°C
Answer: (a)

Question: Match the List-I with the List-II.

A.	**Boltzmann constant**	**I.**	**ML^2T^{-1}**
B.	**Coefficient of viscosity**	**II.**	**$MLT^{-3}K^{-1}$**
C.	**Planck's constant**	**III.**	**$ML^2T^{-2}K^{-1}$**
D.	**Thermal conductivity**	**IV.**	**$ML^{-1}T^{-1}$**

Options:
(a) (A - iii, B - iv, C - i, D - ii)
(b) (A - ii, B - iv, C - i, D - iii)
(c) (A - ii, B - i, C - iv, D - iii)
(d) (A - iii, B - i, C - iv, D - iii)
Answer: (a)

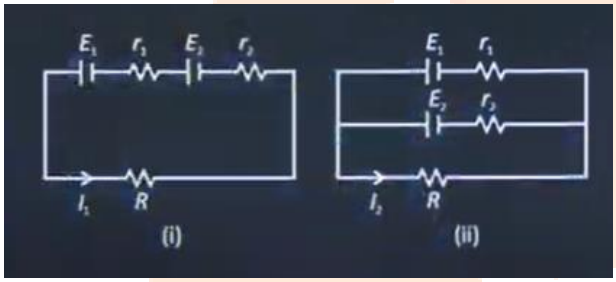
Question: In a H^{+} atom, electron makes transition from 4th excited state to a state with principal quantum number 'n' emitting photon of energy 2.86 eV. Then the value of n is _____
Options:
(a) 3
(b) 5
(c) 2
(d) 1
Answer: (c)

Question: If distance is given by $S = C_0(2 - t)^2 + c(2 - t)$. Final its acceleration.
Options:
(a) $a = 2C_0$

(b) $a = C_0(2 - t)$
(c) $a = -2C_0$
(d) $a = C_0 + C$
Answer: (a)

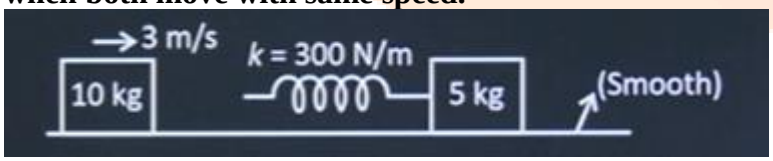
Question: For a projectile, range is 3 times the height. Given $R = \frac{nv^2}{25g}$ where v, speed of projection. Find the value of n.
Options:
(a) 50
(b) 34
(c) 15
(d) 24
Answer: (d)

Question: In two situations given in figures (i) and (ii) current through R is l_1 and l_2 respectively. If $E_1 = 2$ V, $r_1 = 1\Omega$, $E_2 = 1$ V, $r_2 = 2\Omega$, R = 6Ω then find $\frac{I_1}{I_2}$.



Options:
(a) 3/4
(b) 4/3
(c) 9/4
(d) 4/9
Answer: (b)

Question: A block of mass 10 kg is moving with speed 3 m/s collides with a spring connected to another block of mass 5 kg initially at rest. Find the compression in spring when both move with same speed.

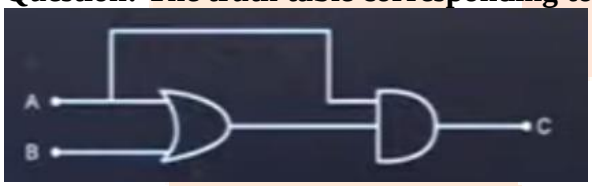


Options:
(a) 0.1 m
(b) 0.2 m
(c) 1 m
(d) 2 m
Answer: (a)

Question: Two cylindrical vessels of equal cross sectional area of $2m^2$ contain water unto heights 1 m and 6 m, respectively. If the vessels are connected at their bottom then the work done by the force of gravity is (Density of water is 10^3 kg/m^3 and g = 10 m/s^2
Options:
(a) 8×10^4 J
(b) 8×10^5 J
(c) 7×10^4 J
(d) 7×10^5 J
Answer: (a)

Question: Statement 1: Two charge particle having charge -2e and +e respectively enter in a region of uniform transverse magnetic field B with same momentum. Both particle move along a circular path with radii R_1 and R_2 respectively where $R_1 < R_2$.
Statement 2: If a proton and an electron enter in a region of uniform transverse magnetic field B with same momentum. Both particle move along a circular path with radii R_1 and R_2 respectively where $R_p < R_e$
Options:
(a) Both Statement I and Statement II are false
(b) Statement I is true but Statement II are false
(c) Both Statement I and Statement II are true
(d) Statement I is false but Statement II is true
Answer: (b)

Question: The truth table corresponding to the circuit given below is:



Options:
(a)

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

(b)

A	B	Y
0	0	1
0	1	1
1	0	0
1	1	0

(c)

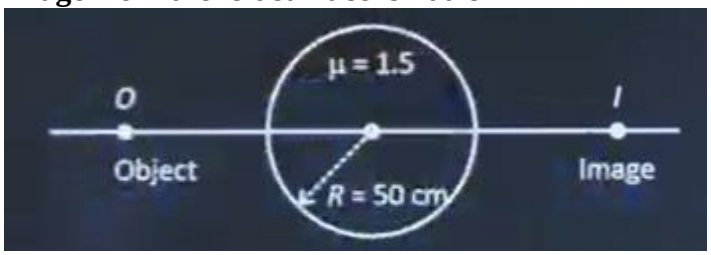
A	B	Y
0	0	0
0	1	0
1	0	1
1	1	1

(d)

A	B	Y
0	0	0
0	1	1
1	0	0
1	1	1

Answer: (c)

Question: Find the distance of the object from the left surface, if the distance of the final image from the left surface is 200 cm



Options:

(a) 100 cm

(b) 50 cm

(c) 200 cm

(d) 75 cm

Answer: (a)

JEE-Main-03-04-2025 (Memory Based)

[EVENING SHIFT]

Chemistry

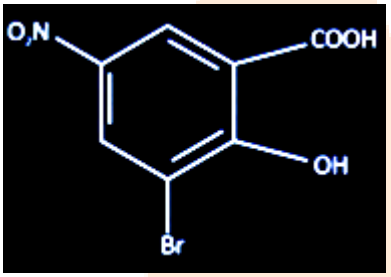
Question: Amount of magnesium (Mg) (in mg) required to liberate 224 mL of H_2 gas at STP, when reacted with HCl.

Options:

(a) 340 mg
(b) 450 mg
(c) 240 mg
(d) 100 mg

Answer: (c)

Question: The correct IUPAC Name of the given compound is:

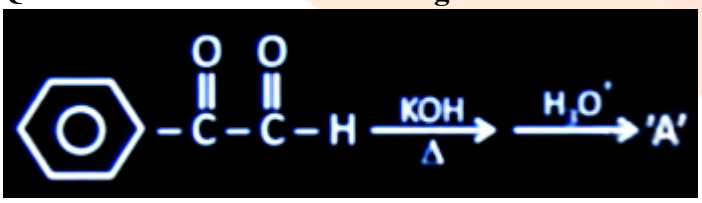


Options:

(a) 2-Hydroxy-3-bromo-5-nitrobenzoic acid
(b) 3-Bromo-2-Hydroxy-5-nitrobenzoic acid
(c) 5-Bromo-6-hydroxy-3-nitrobenzoic acid
(d) 3-Nitro-6-hydroxy-6-bromo-benzoic acid

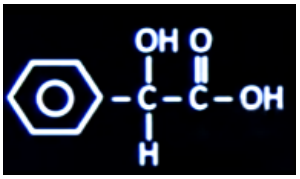
Answer: (b)

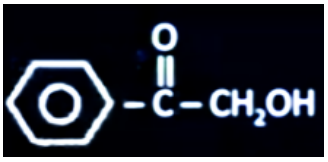
Question: Consider the following reaction.

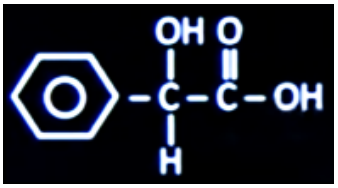


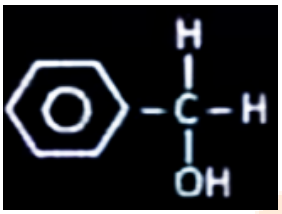
What is the product 'A'?

Options:

(a) 

(b) 

(c) 

(d) 

Answer: (a)

Question: At 715 mm pressure, 300 K, volume of $N_2(g)$ evolved was 80 mL by a 0.4 g sample of organic compound. Find % of N in organic compound Aq. tension at 300 K = 15 mm

Options:

(a) 20.95
(b) 25.85
(c) 30.25
(d) 15.83

Answer: (a)

Question: Statement-I: Wet cotton cloths made up of cellulose based carbohydrate Takes comparatively longer time to get dried than wet nylon based clothes
Statement-2: Intermolecular hydrogen bonding with water molecule is more in nylon based clothes than in cotton clothes.

Options:

(a) Statement-I and Statement-II are correct
(b) Statement-I and Statement-II are incorrect
(c) Statement-I is true and Statement-II is false
(d) Statement-I is true and Statement-II is true

Answer: (c)

Question: Statement-I: Hyper conjugation is not a permanent effect
Statement-II: In general, greater the number of Alkyl groups attached to a positively charged carbon atom greater is the Hyper conjugation interaction and stabilization of the cation.

Options:

(a) Statement-I and Statement-II are correct
(b) Statement-I and Statement-II are incorrect
(c) Statement-I is true and Statement-II is false
(d) Statement-I is true and Statement-II is true

Answer: (d)

Question: Fat soluble vitamin is

Options:

(a) Vitamin B_1

(b) Vitamin C

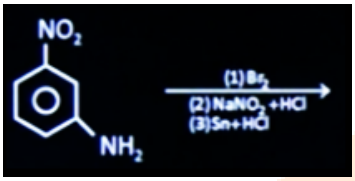
(c) Vitamin B_{12}

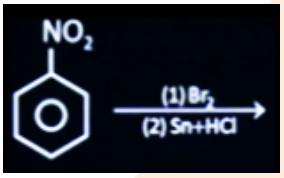
(d) Vitamin K

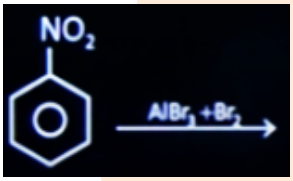
Answer: (d)

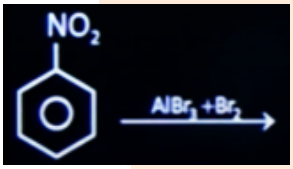
Question: Which of the following reagent is used to prepare tribromoaniline

Options:

(a) 

(b) 

(c) 

(d) 

Answer: (d)

Question: Match the following list-I with list-II

List-I (Groups)	List-II (Elements)
A. Pnictogens	(I) Rn
(B) Chalcogens	(II) At
(C) Halogens	(III) Te
(D) Noble gases	(IV) Bi

Options:

(a) A-I, B-II, C-III, D-IV

(b) A-IV, B-III, C-II, D-I

(c) A-IV, B-II, C-III, D-I

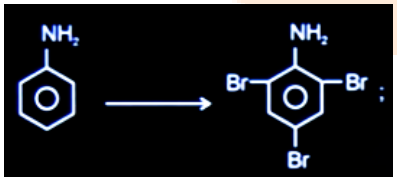
(d) A-I, B-III, C-II, D-IV

Answer: (b)

Question: Find orbital angular momentum for 2s and 2p energy levels
Options:
(a) $0, \frac{h}{(\sqrt{2})\pi}$
(b) $0, \frac{h}{\sqrt{2\pi}}$
(c) $\frac{h}{\pi}, \frac{h}{\pi}$
(d) $0, \frac{h}{2\pi}$
Answer: (a)

Question: Statement-I: Bohr model is applicable for hydrogen and hydrogen like species.
Statement-2: Bohr model does not consider electron-electron repulsion.
Options:
(a) Both Statements are correct
(b) Both Statements are incorrect
(c) Statement-I is incorrect and statement-2 is correct
(d) Statement-I is correct and statement-2 is incorrect
Answer: (a)

Question: Which of the following order is correct?
(A) Electronegativity : B > Tl > In . Ga > Al
(B) Ionisation energy: B > Tl > Ga > Al > ln
(C) Density: Tl > ln > Ga > Al > B
(D) Size: B > Al > Ga > ln > Al
Options:
(a) (A, B, C) only
(b) (B, C, D) only
(c) (A, B, D) only
(d) (A, B, C, D)
Answer: (a)

Question: 

Reagent X in this reaction is
Options:
(a) Br_2/CCl_4
(b) Br_2/H_2O
(c) HBr/H_2SO_4
(d) Br_2/acetone
Answer: (b)

Question: Statement-I: CrO_3 is a strong oxidizing agent

Statement-II: Cr^{+5} is more stable than Mo^{+6} considering the above statements, choose the correct option.

Options:

(a) Both Statement-I and Statement-II are correct

(b) Both Statement-I and Statement-II are incorrect

(c) Both Statement-I is correct but Statement-II is incorrect

(d) Both Statement-I is incorrect but Statement-II is correct

Answer: (c)

Question: Which of the following compound or complex ions is/are diamagnetic in nature

(a) CrO_3 **(b) $[Fe(CN)_6]^{4-}$**

(c) $[Co(H_2O)_3F_3]$ **(d) $[Cr(NH_3)_6]^{3+}$**

Options:

(a) a and b only

(b) a, b and c only

(c) a, b, c and d

(d) c and d only

Answer: (b)

Question: 20 mL 1M NaOH is mixed with 10 mL 2M HCl which is further diluted to 100 mL. Find concentration for the final solution?

Options:

(a) 2×10^{-3} M

(b) 0.2 M

(c) 2×10^{-2} M

(d) 0.1 M

Answer: (b)

Question: Which of the following statements is correct w.r.t Arrhenius equation?

Options:

(a) Dimension of K and A are same

(b) K decreases with increase in temperature generally

(c) A decreases with increase in temperature always

(d) K increases as value of Ea increase

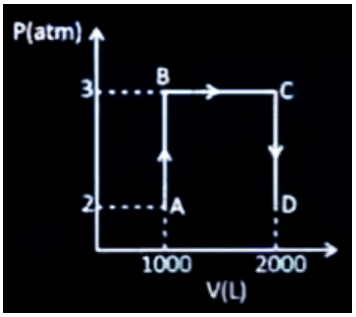
Answer: (a)

Question: Among Sc, Ti, Mn and Co, Calculate the spin only magnetic moment in +2 oxidation state of metal having highest heat of atomisation.

Options:

Answer: (3)

Question: Find out magnitude of work done in the process ABCD (in kJ) (1 atm. Lit = 101.3 J)



Options:

Answer: (304)

Question: Structural isomers of C_9H_{12} (with benzene ring)
Answer: (8)

JEE-Main-03-04-2025 (Memory Based)

[EVENING SHIFT]

Maths

Question: If $\lim_{x\to 0}\left(\frac{\tan x}{x}\right)^{\frac{1}{x^2}}=p,$ then 96 *l*n p is

Answer: (32)

$$p=\lim_{x\to 0}\left(\frac{\tan x}{x}\right)^{\frac{1}{x^2}}$$

$$p=\lim_{x\to 0} e^{\left(\frac{\tan x}{x}-1\right)\cdot\frac{1}{x^2}}$$

$$=\lim_{x\to 0} e^{\frac{\tan x-x}{x^3}}=\lim_{x\to 0} e^{\frac{x+\frac{x^3}{3}+\frac{2}{15}x^5+\lim -x}{x^3}}$$

$$p=e^{\frac{1}{3}}\Rightarrow 96\ln p=32$$

Question: Let A = {-3, -2, -1, 0, 1, 2, 3}. A relation R is defined such that xRy if y = max{x, 1}. Number of elements required to make it reflexive is l, number of elements required to mark it symmetric as m and number of elements in the relation R is n. Then value of l + m + n is equal to

Answer: (15)

$$r=\{(-3,1),(-2,1)(-1,1),(0,1),(1,1)(2,2)(3,3)\}$$

$$\text{for } \ell:(-3,3),(-2,-2),(-1,-1)(0,0)\to 4$$

$$m=(1,3),(1,-2)(1,-1)(1,0)\to 4$$

$$l+m+n=4+4+7=15$$

Question: Let a circle C with radius r passes through four distinct points (0, 0), (k, 3k), (2, 3) and (-1, 5), such that k ≠ 0, then (10k + 2r2) is equal to

Options:

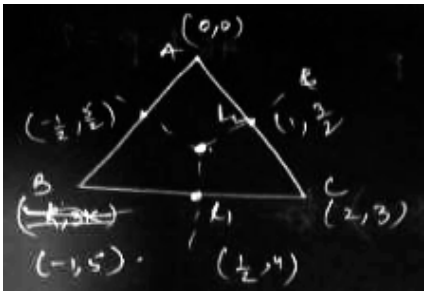
(a) 35

(b) 34

(c) 27

(d) 32

Answer: (c)



$mBc = \frac{3-5}{2+1} = \frac{-2}{3}$ $mAc = \frac{3}{2}$

$ml_1 = \frac{3}{2}$ $\text{ml}_2 = \frac{-2}{3}$

equation $l_1 \Rightarrow y - 4 = \frac{3}{2}\left(x - \frac{1}{2}\right)$ equation $\text{l}_2 \Rightarrow y - \frac{3}{2} = \frac{-2}{3}(x-1)$

$2y - 8 = 3x - \frac{3}{2}$ $3\text{y-}\frac{9}{2} = -2x + 2$

$2y - 3x = \frac{13}{2}$ $3y + 2x = \frac{13}{2}$

$4y - 6x = 13$ $6y + 4x = 13$

$x = -\frac{1}{2}, y = \frac{5}{2}$

for $\text{r}=\left(-\frac{1}{2}, \frac{5}{2}\right)\&(2,3) \Rightarrow r = \sqrt{65}$

$\therefore 2r^2 = 13$

for k; equation if circle

$\left(x + \frac{1}{2}\right)^2 + \left(3k - \frac{5}{2}\right)^2 = \frac{13}{2}$

$(k, 3k)$should satisfy

$\left(k + \frac{1}{2}\right)^2 + \left(3k - \frac{5}{2}\right)^2 = \frac{13}{2}$

$k^2 + \frac{1}{4} + k + 9k^2 + \frac{25}{4} - 15k = \frac{13}{2}$

$10k^2 - 14k + \frac{25}{4} = \frac{13}{2}$

$\therefore 10k = 14$

$10k + 24^2$

$= 14 + 13$

$= 27$

Question: $\ell = \int_0^{\pi} \frac{8x}{4\cos^2 x + \sin^2 x} dx$ **equals to**

Options:

(a) π^2

(b) $4\pi^2$

(c) $2\pi^2$

(d) $\frac{3}{2}\pi^2$

Answer: (c)

$$I = \int_0^{\pi} \frac{8x}{4\cos^2 x + \sin^2 x} dx - - - - - (1)$$

$$I = \int_0^{\pi} \frac{8(\pi - x)}{4\cos^2 x + \sin x} dx - - - - - - (2)$$

$$2I = \int_0^{\pi} \frac{8\pi}{4\cos^2 x + \sin^2 x} dx$$

$$I = 8\pi \int_0^{\frac{\pi}{2}} \frac{\sec^2 x dx}{\tan^2 x + 4} = 8\pi \int_0^{\infty} \frac{dt}{t^2 + 2^2}$$

$$= 8\pi \cdot \frac{1}{2} \left(\tan^{-1} \frac{t}{2}\right)_{0=}^{\infty} = 4\pi\left(\frac{\pi}{2} - 0\right) = 2\pi^2$$

Question: $S = 1 + \frac{1+3}{1!} + \frac{1+3+5}{2!} + ...\infty$ **The value of S is equal to**

Options:

(a) 4e-2

(b) 4e

(c) 5e

(d) 7e

Answer: (c)

$S = 1 + \frac{1+3}{1!} + \frac{1+3+5}{2!} + - - - - -$

$$= \sum_{n=1}^{8} \frac{n^2}{(n-1)!} = \sum_{n=1}^{8} \frac{(n-1)(n+1)+1}{(n-1)!}$$

$$= \sum_{n=1}^{8} \frac{n+1}{(n-2)!} + \sum_{n=1}^{8} \frac{1}{(n-1)!}$$

$$= \sum_{n=1}^{8} \frac{n-2}{(n-2)!} + \sum_{n=1}^{8} \frac{3}{(n-2)!} + e$$

$$= e + 3e + e = 5e$$

Question: Let y= f(x) be the solution of the differential equation $\frac{dy}{dx} + 3y\tan^2 x + 3y = \sec^2 x$ **such that** $f(0) = \frac{e^3}{3} + 1$, then $f\left(\frac{\pi}{4}\right)$

Options:

(a) $(1 + e^{-3})$

(b) $\frac{2}{3}\left(1 + \frac{1}{e^3}\right)$

(c) $\frac{1}{3}\left(1 - \frac{1}{e^3}\right)$

(d) $\frac{1}{3}\left(1 + \frac{1}{e^3}\right)$

Answer: (b)

$\frac{dy}{dx} + 3y\sec^2 x + \sec^2 x$

$If = e^{\int 3\sec^2 x dx} = e^{3\tan x}$

$ye^{3\tan x} = \int e^{3\tan x}\sec^2 x dx$

$ye^{3\tan x} = \frac{3\tan x}{3} + C$

At $x = 0, r = \frac{e^3}{3} + 1 \Rightarrow c = \frac{e^3}{3} + \frac{2}{3}$

At x=$\frac{\pi}{4}, ye^3 = \frac{e^3}{3} + \frac{e^3}{3} + \frac{2}{3} = \frac{2}{3}(e^3 + 1)$

$y = \frac{2}{3}(1 + \frac{1}{e^3})$

Question: Area bounded by $|x - y| \leq y \leq 4\sqrt{x}$ is equal to (in square units)

Options:

(a) $\frac{2048}{3}$

(b) $\frac{1024}{3}$

(c) $\frac{512}{3}$

(d) $\frac{128}{3}$

Answer: (b)

Question: If $(1 + x + x^2)^{10} = 1 + a_1 + a_2x^2 + \ldots..$, then $(a_1 + a_3 + a_5 + \ldots + a_{19}) - 11a_2$ equals to

Answer: (55)

$(1 + x + x^2)^{10} = (1 + a_1x + a_2x^2 + ... + a_{20}x^{20})\text{then}(a_1 + a_3 + ...a_{19})11a_2$

$x = 1, 3^{10} = (1 + a_1 + a_2 + a_3 + ... + a_{20})$

$x = -1, 1 = 1 - a_1 + a_2 - a_3 + ... + a_{20}$

$3^{10} - 1 = 2(a_1 + a_3 + ...a_{19})$

$(a_1 + a_3 + ... + a_{19}) = \left(\frac{3^{10}-1}{2}\right) - 11.....55$

$= \frac{3^{10}-1-1210}{2}$

$= \frac{3^{10}-1211}{2}$

$Also, 10(1 + x + x^2)^9(2x + 1) = a_1 + 2a_2x + ... + 20x^{19}a^{20}$

$10a(1 + x + x^2)^8(2x + 1)^2 + 10(1 + x + x^2)^9(2) = 2a_2$

$90 \cdot 1 + 20 = 2a_2$

$a_2 = 55$

Question: Let $A(z_1)$, $B(z_2)$ and $C(z_3)$ are the vertices of an equilateral triangle. If z0 is the centroid of triangle ABC and $|z_1 - z_2| = 1$, then the value of $\sum_{i=1}^{3} |z_1 - z_0|^2$ is equal to

Options:

(a) 1

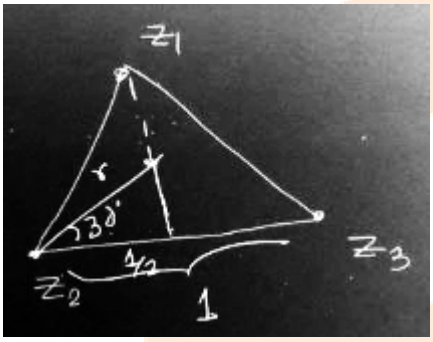
(b) 2
(c) 3
(d) 9
Answer: (a)

$$|z_1 - z_2| = 1$$

$$\sum_{i=1}^{3} |z_i - z_0|^2$$

$$= |z_1 - z_0|^2 + |z_2 - z_0|^2 + |z_3 - z_0|^2$$

$$= \left(\frac{1}{\sqrt{3}}\right)^2 3 = 1$$



$$\cos 30^9 = \frac{1}{2r}$$

$$\frac{\sqrt{3}}{2} = \frac{1}{2r}$$

$$r = \frac{1}{\sqrt{3}}$$

Question: If f(x) = ||x+ 2| - 2|x||, then number of points of local maxima and local minima is
Options:
(a) 5
(b) 3
(c) 2
(d) 7
Answer: (c)

$f(x) = ||x+2| - 2|x||$

$C_1 x < -1$	$C_2 : -2 \leq x < 0$	$C_3 x \geq 0$
$f(x) = -x + 2$	$f(x) = 3x + 2$	$f(x) = x - 2$
$at\ x = -2,$	at $x = 0$	at $x = 2$
$f'(x) = -1$	$f'(x) = 3$	$f'(x) = -1$

$\therefore$ Minima at $x = 2$

maxima at $x = 0$

minima at $x = 2$

Question: x(x - 2) (12 - k) = 2 has both roots same. The distance of $\left(k, \frac{k}{2}\right)$ from the line 3x +4y + 5= 0 is

Options:

(a) 24

(b) 14

(c) 15

(d) 20

Answer: (c)

$x(x-2)(12+k) = 2$ as same roots

D=0

$(x^2 - 2x)(12 - k)$

$(12-k)x^2 - 2(12-k)x - 2 = 0$

$D = 0$

$4(12-k)^2 + 8(12-k) = 0$

$(12-k)^2 + 2(12-k) = 0$

$(12-k)(12-k+12) = 0$

$k = 12, 14$

$k = 12$ rejected

k=14

$\therefore \left(k, \frac{k}{2}\right) = (14, 7)$

$3x + 4y + 5$

$d = \left|\frac{3\times r14+4\times 7+5}{\sqrt{3^2+4^2}}\right| = \left|\frac{42+28+5}{5}\right|$

$= \left|\frac{75}{5}\right| = 15$

Question: The shortest distance between the parabola $y^2 = 8x$ and the circle $x^2 + y^2 + 12y + 35 = 0$ is

Options:

(a) $\left(2\sqrt{2} - 1\right)$ units

(b) $\left(\sqrt{2} - 1\right)$ units

(c) $\left(2\sqrt{2}+1\right)$ units

(d) $\left(\sqrt{2}+1\right)$ units

Answer: (a)

Shortest distance = Normal

$y^2 = 8x$

$4a = 8$

$a = 2$

$x^2 + y^2 + 12y + 35 = 0$

$centre(0, -6)$

$y^2 = 8x$

$2yy' = 8$

$4y' = 4$

$y' = \frac{4}{y}$

stope of normal $= -\frac{y}{4} \rightarrow \frac{4t}{4} = -t$

$\frac{4t+6}{2+2} = -t$

$4t + 6 = -2t^3$

$2t^3 + 4t + 6 = 0$

$t = -1$

$P(2t^2, 4t)$

$P(2, -4)$

Centre $O\,(0, -6)$

radius $= 1$

Shortest distance $=$ OP $-$ radius

$=\sqrt{4+4} - 1$

$= 2\sqrt{2} - 1$

Question 14: The no of solutions of the equation

$$\left(4-\sqrt{3}\right)\sin\,x\,-2\sqrt{3}\cos^2 x\,=\frac{-4}{1+\sqrt{3}},\,x\in\left[-2\pi,\frac{5\pi}{2}\right]$$

Answer: ([-2r,5$\frac{\pi}{2}$])

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

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

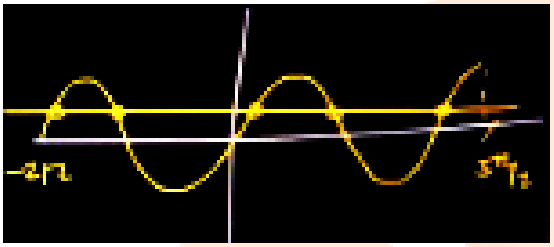
$\left(4-\sqrt{3}\right)s - 2\sqrt{3} + 2\sqrt{3}s^2 = -2\sqrt{3}+2$

$2\sqrt{3}\,s^2 + \left(4-\sqrt{3}\right)s - 2 = 0$

$\sin x = \frac{\sqrt{3}}{2\sqrt{3}}$ & $\frac{-4}{2\sqrt{3}}$

$\therefore\ \sin x = \frac{1}{2}$

from $\left[-2r, 5\frac{\pi}{2}\right]$



Question: The distance of the point (7, 10, 11) from the line $\frac{x-4}{1} = \frac{x-4}{0} = \frac{z-2}{3}$ **along the line** $\frac{x-9}{2} = \frac{y-13}{3} = \frac{z-17}{6}$ **is**

Answer: (PQ = 14 = d)

$\frac{x-4}{1} = \frac{y-4}{0} = \frac{z-2}{3} = \lambda \quad L_1$

$\frac{\lambda+4-9}{2} = \frac{4-1}{3} = \frac{3\lambda+z-17}{6} \quad L_2$

$\frac{\lambda-5}{2} = -3$

$\lambda = -1$

$\therefore Q(3,4,-1)$

$PQ = \sqrt{4^2+6^2+12^2}$

$= \sqrt{16+36+144}$

$PQ = 14 = d$