1. (c)

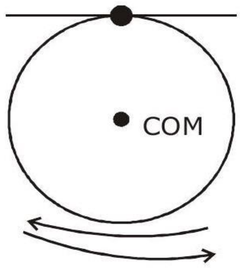
$$T_1 = 2\pi\sqrt{\frac{(mR^2 + mR^2)}{mgR}}$$

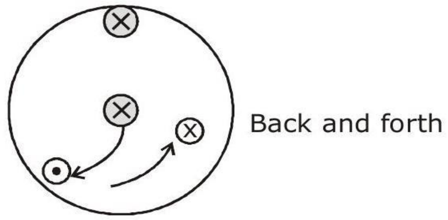
$$T_1 = 2\pi\sqrt{\frac{2R}{g}}$$

$$T_2 = 2\pi\sqrt{\frac{I}{mgL}}$$

$$T_2 = 2\pi\sqrt{\frac{3mR^2/2}{mgR}} = 2\pi\sqrt{\frac{3R}{2\,g}}$$

$$\frac{T_1}{T_2} = \sqrt{\frac{4}{3}} = \frac{2}{\sqrt{3}}$$





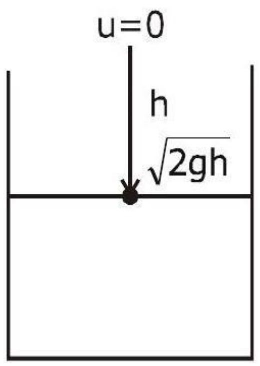
2. (c)

3. (a) $V_T = \sqrt{2gh}$

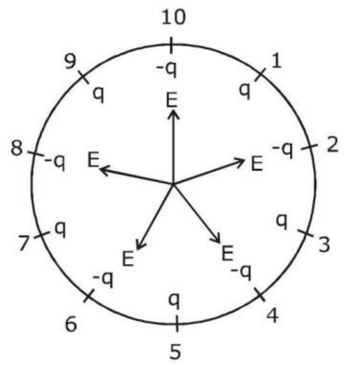
$$\frac{2}{9}r^2\frac{(\rho_b - \rho_l)g}{\eta} = \sqrt{2gh}$$

$$r^2 \propto \sqrt{h} \Rightarrow r^4 \propto h$$

$$h \propto r^4$$



4. (a)



$v_{\text{net}} = 5\left(\frac{kq}{R}\right) + \left(\frac{5k(-q)}{R}\right)$

$v_{\text{net}} = 0[Q_{net} = 0]$

$E_{\text{net}} = 0$ by symmetry

5. (b) $\frac{dM(t)}{dt} = -bv^2$

in free space

no external force

so there in only thrust force on rocket

$f_{in} = \frac{dM}{dt}(V_{rel})$

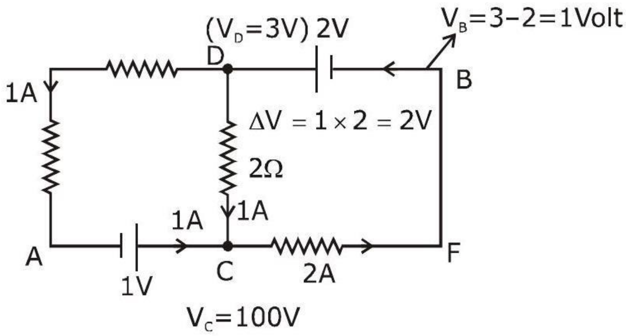
$Ma = \left(\frac{-bv^2}{(t)}\right)v$

$a = \frac{-bv^3}{M(t)}$

6. (a)

$$L_1' = L_1(1 + \alpha_1 \Delta T)$$
$$L_2' = L_2(1 + \alpha_2 \Delta T)$$
$$L' + L_2' = L_1 + L_2 + L_1\alpha_1\Delta T + L_2\alpha_2\Delta T$$
$$= (L_1 + L_2)\left[1 + \left[\frac{L_1\alpha_1 + L_2\alpha_2}{L_1 + L_2}\right]\Delta T\right]$$
$$= (L_1 + L_2)[1 + \alpha_{eq}\Delta T)$$
$$\text{So, } \alpha_{eq} = \frac{L_1\alpha_1 + L_2\alpha_2}{L_1 + L_2}$$

7. (c)

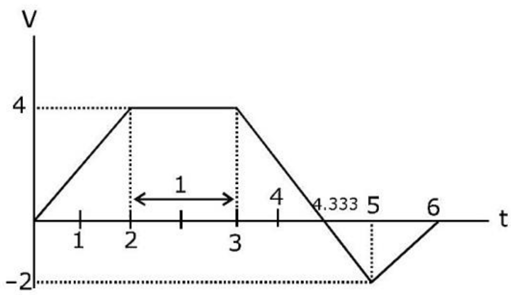


Let $V_A = 0$

$V_B - V_A = 1 - 0$

$= 1$ volt

8. (a)



distance = area under graph

$= \frac{1}{2}(d)\left(\frac{13}{3}+1\right)+\left[\frac{1}{2}\left(6-\frac{13}{3}\right)\times 2\right]$

$= 2 \times \frac{16}{3} + \frac{5}{3}$

$= \frac{32}{3} + \frac{5}{3} = \frac{37}{3}$ m

9. (a)

$B = \left(\frac{\mu_0 I}{2\pi r}\right)$

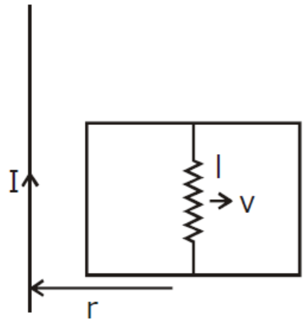
induced emf

$e = Bvl$

$= \frac{\mu_0 I}{2\pi r}$ V.I

$= \frac{\mu_0 I v l}{2\pi r}$

induced current $i = \frac{e}{R} = \frac{\mu_0 I V l}{2\pi r R}$



10. (d)

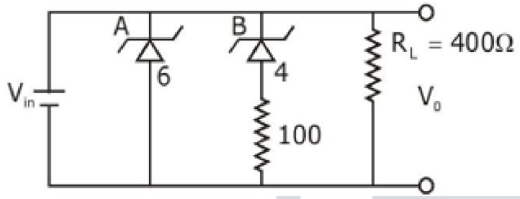
$t = 0$

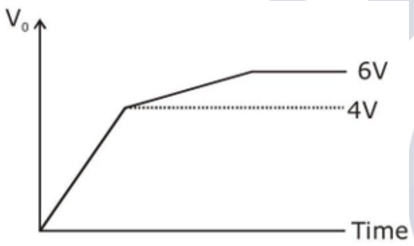
$\mathrm{V_i} = 0$

$V_i \propto t$

Given

∵ Zenerdiode maintain constant breakdown voltage.





11. (d)

PVr = const.

$\mathrm{p}(\rho^{-r}) = \text{const.}$

$\mathrm{P}_1\rho_1{}^{-r} = \mathrm{p}_2\rho_2{}^{-r}$ $r = \frac{7}{5}$ for diatomic

$\mathrm{p}_0\rho_0{}^{-7/5} = (\mathrm{np}_0)(32\rho_0)^{-7/5}$

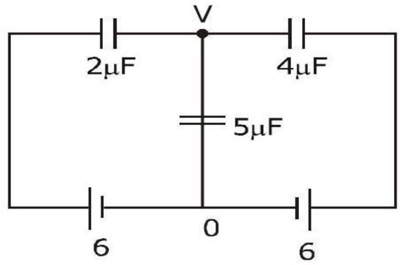
$\rho_0^{-7/5} = \frac{n}{(32)^{7/5}}\left(\rho_0^{-7/5}\right)$

$n = (2^5)^{7/5} = 2^7 = 128$

12. (b) figure of merit $= \frac{I}{\theta} \Rightarrow A/$ div.

$= \frac{6\times10^{-3}}{2} = 3 \times 10^{-3}$ A/div.

13. (b)



$(V-6)\times 2+(V-0)\times 5+(V-6)4=0$

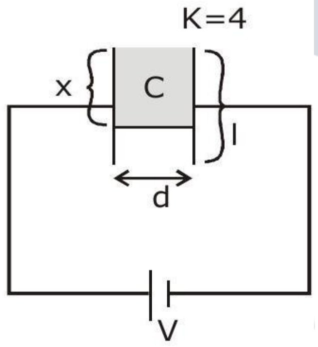
$2V-12+5V+4V-24=0$

$11V=36$

$V=\frac{36}{11}$

$q=CV=5\times\frac{36}{11}\approx 18.00\mu C$

14. (d)

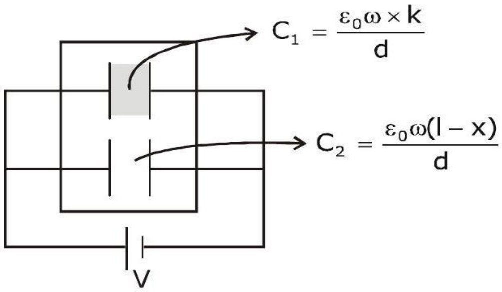


area of plate = IW

$C=\frac{\varepsilon_0 A}{d}=\frac{\varepsilon_0 \mid \omega}{d}$

$U_1=\frac{1}{2}Cv^2=\frac{\frac{1}{2}\varepsilon_0 \mid \omega}{d}v^2$

$C_{eq}=C_1+C_2$



$C_{eq}=\frac{\varepsilon_0\omega x k}{d}+\frac{\varepsilon_0\omega(l-x)}{d}$

$C_{eq} = \frac{\varepsilon_0 \omega}{d}[kx + I - x]$

$U_f = \frac{1}{2} C_{eq} V^2$

$U_f = 2U_i \Rightarrow \frac{1}{2}\frac{\varepsilon_0 \omega}{d}[kx + I - x]v^2 = 2 \times \frac{1}{2}\frac{\varepsilon_0 \mid \omega}{d} v^2$

$kx + | - x = 2|$

$4x - x = 1$

$3x = 1$

$x = \frac{1}{3}$

15. (d) $T_1 = 10\sec \lambda_1 = \frac{\ln 2}{T_1}$

$T_2 = 100\text{ s}, \lambda_2 = \frac{\ln 2}{T_2}, \lambda_{eq} = \frac{\ln 2}{T_{eq}}$

we know

$\lambda_{eq} = \lambda_1 + \lambda_2$

$\frac{\ln 2}{T_{eq}} = \frac{\ln 2}{T_1} + \frac{\ln 2}{T_2}$

$\frac{1}{T_{eq}} = \frac{1}{10} + \frac{1}{100} = \frac{10+1}{100} = \frac{11}{100}$

$T_{eq} = \frac{100}{11} = 9\text{ s}$

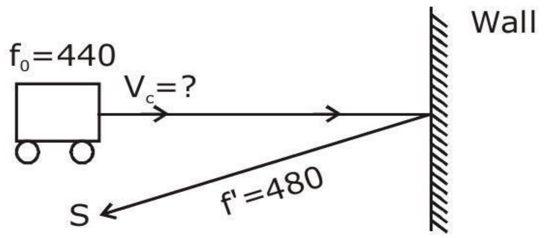
16. (c)

car towards

$f_1 = \left(\frac{v - 0}{v - v_C}\right) f_0$

$480 = \left(\frac{v + v_c}{v - 0}\right) f_i \Rightarrow \left(\frac{v + v_c}{v}\right)\left(\frac{v}{v - v_c}\right) f_0$

$480 = (350 + V_c) \times \left(\frac{440}{350 - V_c}\right)$



$12 = \left(\frac{350 + V_c}{350 - V_c}\right) \times 11$

$12 \times 350 - 12 \times V_c = 350 \times 11 + 11\ V_c$

$23\ V_c = 4200 - 3850 = 350$

$V_c = \frac{350}{23}$ m

$V_c = \frac{350}{23} \times \frac{18}{5}$ km/h

$= \frac{70 \times 18}{23}$

$= 54.78$

$= 54$ km/hr

17. (c) magnetic moment $\vec{M} = \mathrm{NIA}(\mu_r - 1)$

n = 10 turns/cm $= (\mathrm{nl})\mathrm{IA}(\mu_r - 1)$

$= \frac{10}{10^{-2}}$ turn/m $= \mathrm{nI(Al)}(\mu_r - 1)$

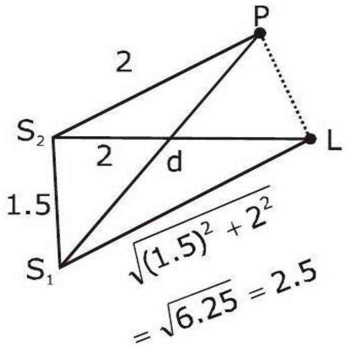
$= 1000$ turn/m $= 1000 \times 0.5 \times 10^{-3}(1000 - 1)$

$V = 10^{-3}\ m^3 = Al\ = 0.5 \times (999) = 499.5$

$I = 0.5\ A, \mu_r\ = 500$

$N = nl\ = 5 \times 10^2$

18. (c)



For min at (L)

$S_1\,L - S_2\,L = \Delta x = \frac{\lambda}{2}(2n+1); (n = 0,12)$

$2.5 - 2 = \frac{1}{2}(2n+1)$

$0.5 \times 2 = (2n+1)$

$2n = 0$

$n = 0$ (first minima)

so at 'p' $\rightarrow$ first maxima

$S_1P - S_2P = \lambda[n = 1]$ for first maxima

$S_1P - 2 = 1$

$S_1P = 1 + 2$

$d = 3$ m

19. (b) $x = \frac{1}{\sqrt{\varepsilon_0 \mu_0}} = (\text{ speed })$

$[x] = L^{-1}\ y = \frac{E}{B} = \text{speed}$

$Z = \frac{I}{CR} = \frac{m}{seC} = m/s\ [y] = LT^{-1}$

$[RC = T]$

$[Z] = LT^{-1}$

So, x, y, z has same dimension

20. (d) weight same at poles and at h(so $g_1 = g_2$)

$g_1 = g - R\omega^2$

$g_2 = g\left(1 - \frac{2h}{R}\right)$

$\because g_1 = g_2$

$g - R\omega^2 = g\left(1 - \frac{2h}{R}\right) \Rightarrow g - \frac{2gh}{R}$

$R\omega^2 = \frac{2gh}{R}$

$h = \frac{R^2\omega^2}{2g}$

21. (41)

$$V_{rms} = \sqrt{\frac{3RT}{m}}$$

$$v_{N_2} = \sqrt{\frac{3R(573)}{28}}$$

$$V_{H_2} = \sqrt{\frac{3RT}{2}}$$

$$V_{H_2} = V_{N_2}$$

$$\sqrt{\frac{3RT}{2}} = \sqrt{\frac{3R(573)}{28}}$$

$$\frac{T}{2} = \frac{573}{28}$$

$$T = 41 \text{ K}$$

22. (2)

$$\frac{\frac{1}{2}mV_1^2}{\frac{1}{2}mV_2^2} = \frac{E_1 - \phi_0}{2.5 - \phi_0} = \frac{4 - \phi_0}{2.5 - \phi_0}$$

$$\left(\frac{V_1}{V_2}\right)^2 = \frac{4 - \phi_0}{2.5 - \phi_0}$$

$$(2)^2 = \frac{4 - \phi_0}{2.5 - \phi_0}$$

$$10 - 4\phi_0 = 4 - \phi_0$$

$$3\phi_0 = 10 - 4 = 6$$

$$\phi_0 = 2\text{eV}$$

23. (5)

$$A = 1^\circ$$

$$\delta = (\mu - 1)\text{A}$$

$$= (1.5 - 1)\text{A}$$

$$= 0.5 \times 1$$

$$= \frac{5}{10} = \frac{\text{N}}{10} \text{ so N} = 5$$

24. (18)

$P = Fv = mav$

$a = \frac{p}{mv}$

$\frac{dv}{dt} = \frac{p}{mv}$

$\int_0^u v dv = \frac{p}{m}\int_0^t dt$

$\frac{u^2}{2} = \frac{p}{m}t$

$u = \sqrt{\frac{2p}{m}}\sqrt{t}$

$\frac{dx}{dt} = \sqrt{\frac{\Phi}{m}}\sqrt{t}$

$\int_0^x dx = \sqrt{\frac{2p}{m}}\int_0^9 \sqrt{t}dt$

$x = \frac{2}{3}\left[(9)^{1/2}\right]^3$

$= \frac{2}{3} \times 27$

$x = 18$

II-method

$Pt = w = \frac{1}{2}mv^2 - 0$

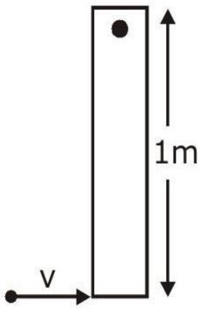
$1 \times t = \frac{1}{2} \times 2 \times u^2$

$u = \sqrt{t}$

$\frac{dx}{dt} = \sqrt{t} = \int_0^1 dx = \int_0^9 \sqrt{t}dt$

$x = \frac{\left[t^{3/2}\right]_0^9}{\frac{3}{2}} = 18 \text{ m}$

25. (b)



$L_i = L_f$

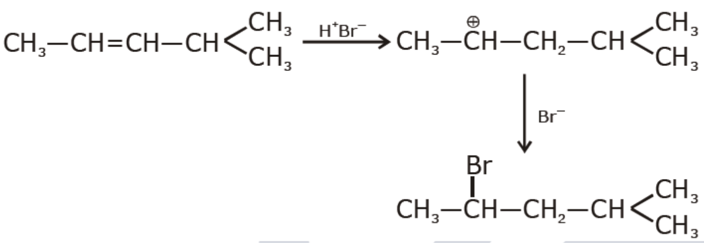
$$0.1 \times 80 \times 1 = \frac{0.9 \times 1^2}{3} \times \omega + (0.1)1^2\omega$$

$$8 = (0.3 + 0.1)\omega$$

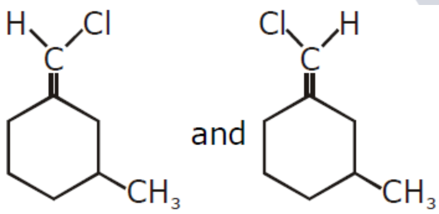
$$8 = (0.4)\omega$$

$$\omega = \frac{80}{4} = 20$$

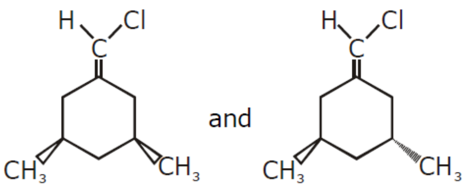
26. (a)



27. (c) H_2O_2 has openbook structure it is non planar
28. (c)
29. (a) Anti-histamine
30. (a, b)



are geometrical isomer



are geometrical isomer

31. (b)
32. (a)
33. (a) $\psi^2_{R/S} > 0$ always

$\psi^2_{R/S}$ can be $=0$; As ' $2s'$ has 1 Radial Node

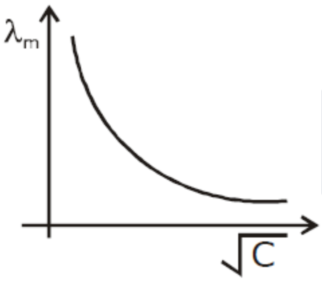
ψ_{R}^2 can never be negative

$\psi_R^2(3P)$ can be $=0$ as $3P$ has Radial Nodes

34. (d)

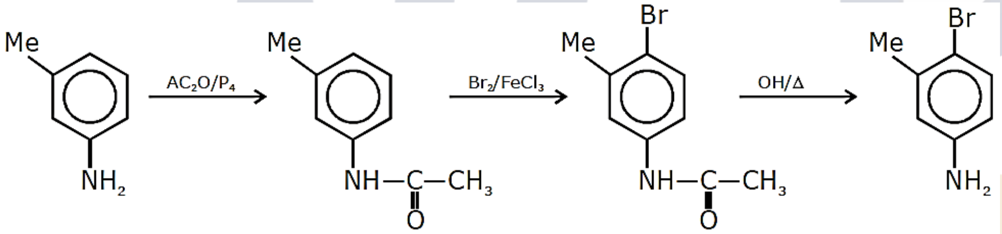
$$\ln(k)=\ln(A)-\frac{Ea}{R}\left(\frac{1}{T}\right)$$
$$\ln(A)=10$$
$$\text{Slope }=\frac{-Ea}{R}\times 10^{-3}=-10/5$$
$$E_a=2000\mathrm{RJ/mol}$$
$$\mathrm{E_a}=2\mathrm{RKJ/mol}$$

35. (b)

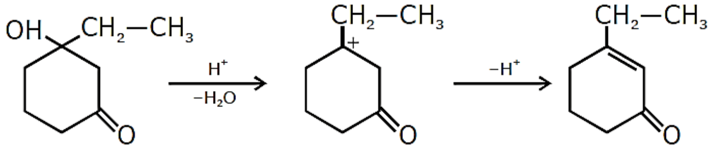


Such type of variation is always for weak electrolyte

36. (c)



37. (c)



38. (c) $\Delta\mathrm{H_{sol}}=\mathrm{L.E.}+\Delta\mathrm{H_{hyd}}$

$4=788+\Delta\mathrm{H_H}$

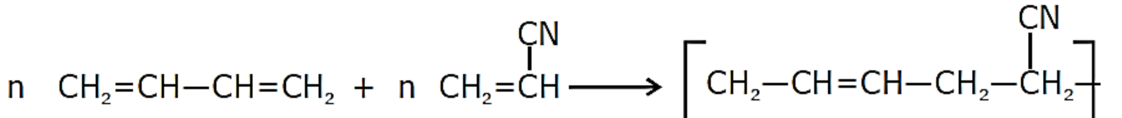
$\Delta\mathrm{H_{Hyd}}=-784\mathrm{KJ/mol}$

39. (c)

(1) $NH_3 + \underset{\text{(excess)}}{3Cl_2}\ NCl_3 + 3HCl$

(2) $8NH_3 + 3Cl_2 \longrightarrow 6NH_4Cl + N_2$ (excess)

40. (b)



1,3-Butadiene Acrylo nitrile Buna - n

41. (d) Due to presence of Pos (A) cannot be optically active, but (B) can be optically active

42. (d) Nearest octahedral voids

One along edge center & other at Body centre

$$\text{Distance} = \sqrt{\left(\frac{a}{2}\right)^2 + \left(\frac{a}{2}\right)^2} = \sqrt{2}\frac{a}{2}$$

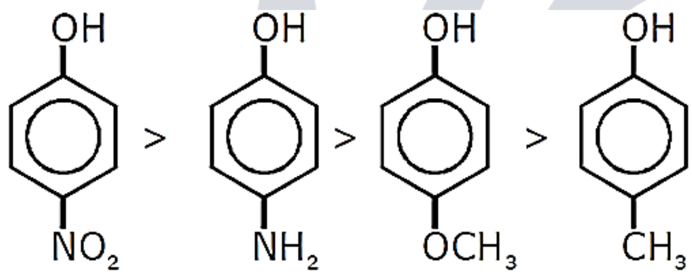
$$= \frac{a}{\sqrt{2}}$$

43. (d) all are Isoelectronic

(1) $\dfrac{N^{3-}O^{2-}F^{-}Na^{+}Mg^{2+}Al^{3+}}{Z\uparrow, Zeff\uparrow, \text{Ionic Radii}\downarrow}$

(2) $Al^{3+} < Mg^{2+} < Na^{+} < F^{-} < O^{2-} < N^{3-}$

44. (c)



(II) (III) (IV) (I)

45. (d)

Clark's method is used for Removal of Temporary hardness

$Ca(HCO_3)_2 + Ca(OH)_2 \rightarrow 2CaCO_3 \downarrow + 2H_2O$

$Mg(HCO_3)_2 + 2Ca(OH)_2 \rightarrow 2CaCP_3 + Mg(OH)_2 \downarrow + 2H_2O$

46. (16)

47. (50 ml)

$K_2Cr_2O_7 + FeC_2O_4 \rightarrow Cr^{3+} + Fe^{3+} + CO_2$

$$\frac{0.02 \times \text{vol} \times 6}{1000} = 3 \times \frac{0.288}{144} \times 100$$

Vol. $= \frac{200}{4} = 50\text{ml}$

48. (0)

$[\text{Ru}(\text{H}_2\text{O})_6]^{2+}$

$\text{Ru}^{2+} = 3\ \text{d}^6(\Delta_0 > \text{P})$

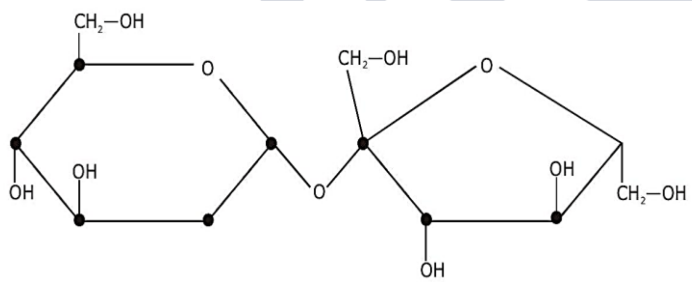
$= \text{t}_2\ \text{g}^6\ \text{eg}\ ^\circ$

$\text{n} = 0, \text{u} = 0$

49. (-13538 j)

$$\begin{aligned}
&2\ \text{A} \longrightarrow \text{A}_2 \\
&\Delta \text{U}^\ominus = -20\ \text{kJ} \\
&\Delta \text{H}^\ominus = -20000 + (-1)\text{R} \times 298 \\
&\Delta \text{G}^\ominus = -20000 - 298\text{R} + 30 \times 298 \\
&\Delta \text{G}^\ominus = -20{,}000 + 298\left(\frac{90-25}{3}\right) \\
&\Delta \text{G}^\ominus = 20{,}000 + \frac{298 \times 65}{3} \\
&\Delta G^\ominus = -13538\ \text{J}
\end{aligned}$$

50. (9)



51. (a) $f(x) = (3x^2 + ax - 2 - a)e^x$

$f'(x) = (3x^2 + ax - 2 - a)e^x + (6x + a)e^x = 0$

$\text{e}^\text{x}[3\text{x}^2 + (\text{a} + 6)\text{x} - 2] = 0$

at $x = 1{,}3 + a + 6 - 2 = 0$

$a = -7$

$f(x) = (3x^2 - 7x + 5)e^x$

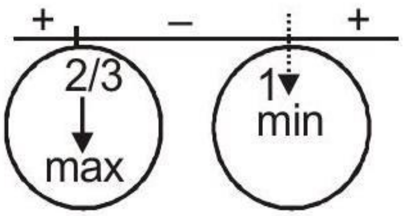
$f'(x) = (6x - 7)e^x + (3x^2 - 7x + 5)e^x$

$= \text{e}^x(3\text{x}^2 - \text{x} - 2) = 0$

$= 3x^2 - 3x + 2x - 2 = 0$

$= (3x + 2)(x - 1) = 0$

$x = 1, -2/3$



52. (b)

53. (d)

p	q → p	p → (q → p)	
T	T	T	
T	T	T	⇒ (Tautology
F	F	T	
F	T	T	

p	$p \vee q$	$p \to (p \vee q)$
T	T	T
T	T	T
F	T	T
F	F	T

54. (a) $\ell = \sin\left(\frac{3\pi}{16}\right)\sin\left(\frac{-\pi}{16}\right)$

$$\ell = \frac{-1}{2}\left[\cos\frac{\pi}{8} - \cos\frac{\pi}{4}\right]$$

$$\ell = \frac{1}{2\sqrt{2}} - \frac{1}{2}\cos\frac{\pi}{8}$$

$$M = \cos\left(\frac{3\pi}{16}\right)\cos\left(\frac{\pi}{16}\right)$$

$$M = \frac{1}{2}\left[\cos\frac{\pi}{4} + \cos\frac{\pi}{8}\right]$$

$$M = \frac{1}{2\sqrt{2}} + \frac{1}{2}\cos\frac{\pi}{8} \ldots$$

55. (b)

$$(2 + 3 + 4 + \cdots + 21)\log_7 x = 460$$
$$\Rightarrow \frac{20 \times (21 + 2)}{2}\log_7 x = 460$$
$$\Rightarrow 230\log_7 x = 460 \Rightarrow \log_7 x = 2 \Rightarrow x = 7^2$$

56. (a)

$$\text{6 case}\begin{cases} \begin{array}{ccc} S-1 & S-2 & S-3 \\ 1,2,3,4,5 & 1,2,3,4,5 & 1,2,3,4,5 \\ 1 & 1 & 3 \\ 1 & 3 & 2 \\ 2 & 2 & 1 \\ 2 & 1 & 2 \\ 3 & 1 & 1 \end{array} \end{cases}$$

$3\left(5_{c_1} \times 5_{c_1} \times 5_{c_3}\right) + 3\left(5_{c_1} \times 5_{c2} \times 5_{c_2}\right) = 3(25 \times 10) + (100 \times 5)3 = 750 + 1500 = 2250$

57. (b) S.D. $= \sqrt{\frac{\sum x_i^2}{n} - (\bar{x})^2}$

$$(2)^2 = \frac{83 + a^2 + b^2}{5} - \left(\frac{15 + a + b}{5}\right)^2$$

$$4 = \frac{83 + a^2 + b^2}{5} - 25$$

$29 \times 5 - 83 = a^2 + b^2 \Rightarrow a^2 + b^2 = 62$

$$\frac{a + b + 15}{5} = 5 \Rightarrow a + b = 10$$

$2ab = 100 - 62 = 38$

$\mathrm{ab} = 19$

58. (d) $x = \tan\theta$

$$\mathrm{u} = \tan^{-1}\left(\frac{\sec\theta - 1}{\tan\theta}\right) = \tan^{-1}(\tan\theta/2) = \frac{\theta}{2} = \frac{\tan^{-1} x}{2}$$

$$v = \tan^{-1}\left(\frac{2\sin\theta\cos\theta}{\cos 2\theta}\right) = 2\theta$$

$= 2\sin^{-1}\mathrm{x}$

$$\frac{du}{dv} = \frac{1}{2(1 + x^2)} \times \frac{\sqrt{1 - x^2}}{2}$$

$$= \frac{\sqrt{3}}{2 \times 2} \times \frac{4}{5 \times 2} = \frac{\sqrt{3}}{10}$$

59. (a)

$$\int \frac{\cos\theta}{5+7\sin\theta-2+2\sin^2\theta}d\theta$$

$$\int \frac{dt}{2t^2+7t+3}$$

$$=\frac{1}{2}\int \frac{dt}{t^2+\frac{7t}{2}+\frac{3}{2}}=\frac{1}{2}\int \frac{dt}{t^2+\frac{7}{2}t+\left(\frac{7}{4}\right)^2-\frac{49}{16}+\frac{24}{16}}$$

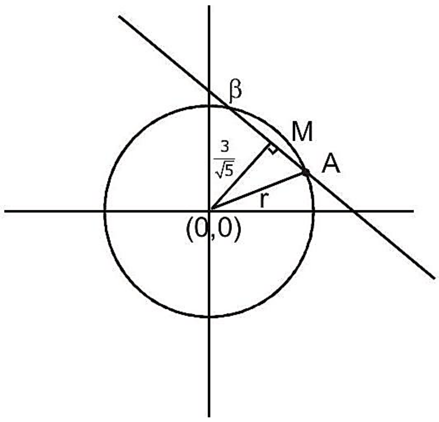
$$=\frac{1}{2}\int \frac{dt}{(t+7/4)^2-(5/4)^2}$$

$$\frac{1}{2}\times\frac{1}{2\cdot\frac{5}{4}}\ln\left|\left[\frac{t+7/4-5/4}{t+7/4+5/4}\right]\right|$$

$$\frac{1}{5}\ln\left|\left(\frac{\sin\theta+1/2}{\sin\theta+3}\right)\right|+C$$

$$\frac{B(\theta)}{A}=5\left(\frac{2\sin\theta+1}{\sin\theta+3}\right)$$

60. (d)



$AB = 2\sqrt{r^2-9/5}=r$

$r^2-9/5=\frac{r^2}{4}$

$3r^2/4=9/5$

$r^2=\frac{12}{5}$

61. (c) $\alpha+\beta=3/7, \alpha\beta=-2/7$

$$\frac{(\alpha+\beta)-\alpha\beta(\alpha+\beta)}{1-(\alpha^2+\beta^2)+(\alpha\beta)^2}$$

$$\frac{\frac{3}{7}+\frac{2}{7}\times\frac{3}{7}}{1-\left\{\frac{9}{49}+\frac{4}{7}\right\}+\frac{4}{49}}$$

$$\frac{\left(\frac{21+6}{49}\right)}{\frac{16}{49}}\Rightarrow\frac{27}{16}$$

62. (d)

$$\frac{ar+ar^2+ar^3}{ar^5+ar^6+ar^7}=\frac{3}{243}$$
$$\frac{1+r+r^2}{r^4(1+r+r^2)}=\frac{1}{81}$$
$$\frac{r=3}{a(3+9+27)}=3$$

$$a=\frac{3}{39}=\frac{1}{13}$$

$$S_{50}=a\left(\frac{r^{50}-1}{r-1}\right)$$

$$=\frac{1}{13}\left\{\frac{3^{50}-1}{2}\right\}$$

63. (a) $c=\pm\sqrt{a^2m^2-b^2}$

$$c=\pm\sqrt{100m^2-64}$$

$$y=mx\pm\sqrt{100m^2-64}$$

$$d|_{(0,0)}=6$$

$$\left|\frac{\sqrt{100m^2-64}}{\sqrt{m^2+1}}\right|=6$$

$$100m^2-64=36m^2+36$$

$$64\ m^2=100$$

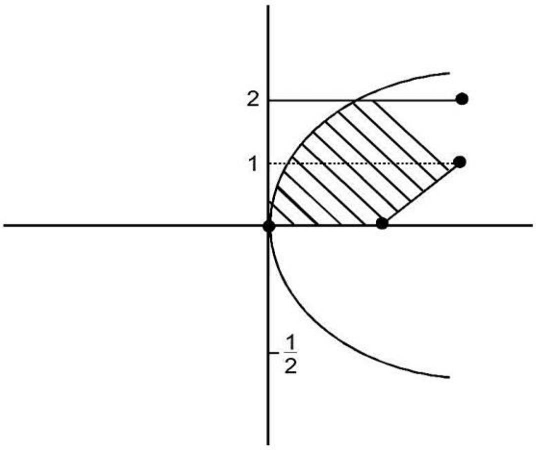
$$m=10/8$$

$$c^2=100\times\frac{100}{64}-64\Rightarrow\frac{(164)(36)}{64}4c^2=369$$

64. (b)

$$y=f(x)=(x-1)[x]=\begin{cases}0 & 0\le x<1\\ x-1 & 1\le x<2\\ 2(x-1) & x=2\end{cases}$$

$$y^2\le 4x$$



$\int_0^1 (2\sqrt{x} - 0) + \int_1^2 (2\sqrt{x} - (x-1))$

$\frac{2}{3} \times 2x^{3/2}\Big|_0^1 + \left(\frac{4}{3}x^{3/2} - \frac{x^2}{2} + x\right)_1^2$

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

$\frac{4}{3} + \frac{8\sqrt{2}}{3} - \frac{4}{3} - \frac{1}{2} = \frac{8\sqrt{2}}{3} - \frac{1}{2}$

65. (a)

66. (a) A $(-1,2,1), B(-2,-1,-1)$

$[\overrightarrow{AB} \quad \overrightarrow{b_1} \quad \overrightarrow{b_2}] = 0$

$\begin{vmatrix} -1 & -3 & -2 \\ 2 & -1 & 1 \\ \alpha & 5-\alpha & 1 \end{vmatrix} = 0$

$-1(-1+\alpha-5) + 3(2-\alpha) - 2(10 - 2\alpha + \alpha) = 0$

$6 - \alpha + 6 - 3\alpha + 2\alpha - 20 = 0$

$-8 - 2\alpha = 0$

$\alpha = -4$

$L_2 : \frac{x+2}{-4} = \frac{y+1}{9} = \frac{z+1}{1}$

any point on L_2 is

$(-4\lambda - 2, 9\lambda - 1, \lambda - 1) = A$

67. (c)

$\left(\frac{-1 + i\sqrt{3}}{1-i}\right)^{30} \Rightarrow \left[\left(\frac{-1+i\sqrt{3}}{2}\right)(1+i)\right]^{30}$

$\omega^{30}(1+i)^{30} = 2^{15}(-i)$

68. (b) $\frac{dy}{dx}+(2\tan x)y=2\sin x$

I.F. $= e^{2\text{In}(\sec x)}=\sec^2 x$

$y(\sec^2 x)=2\int \dfrac{\sin x}{\cos^2 x}dx$

$=2\int \sec x\tan x dx = 2\sec x + c$

$y\left(\frac{\pi}{3}\right)=0$

$0=2\times 2+\text{c}=\text{C}=-4$

$y(\sec^2 x)=2\sec x-4$

$\text{x}=\pi/4$

$2y=2\sqrt{2}-4$

$y=\sqrt{2}-2$

69. (c)

$$\begin{vmatrix}1 & 1 & 3\\ 1 & 3 & k^2\\ 3 & 1 & 3\end{vmatrix}=0$$

$(9-k^2)-(3-3k^2)+3(-8)=0$

$9-k^2-3+3k^2-24=0$

$2k^2-18=0$

$K^2=9$

$K=3,-3$

$x+y+3z=0$

$\underline{x+3y+9z=0}$

$2y+6z=0$

$y=-3z$

$y/z=-3$

$2x=0$

$x=0$

$x+\left(\frac{y}{z}\right)=-3$

70. (c) $4x^3e^y+x^4e^yy'+\frac{2y'}{2\sqrt{y+1}}=0$

at (1,0)

$4+y'+\dfrac{2y'}{2}=0$

$2y'=-4\Rightarrow y'=-2$

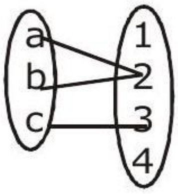
E.O.T. :

$y=-2(x-1)$

$2x + y = 2$

71. (19)

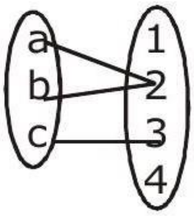
set B only have ' 2 '



$= 1$

case - II

set B have more element with 2



$= {}^3C_1 \dfrac{\lfloor 3}{\lfloor 2 . \lfloor 1} . \lfloor 2 = 18$

total $18 + 1 = 19$

72. (120)
73. (6)

$\dfrac{\vec{b} \cdot \vec{a}}{2} = \dfrac{\vec{c} . \vec{a}}{2} \vec{b} \cdot \vec{a} = \vec{c} \cdot \vec{a}$

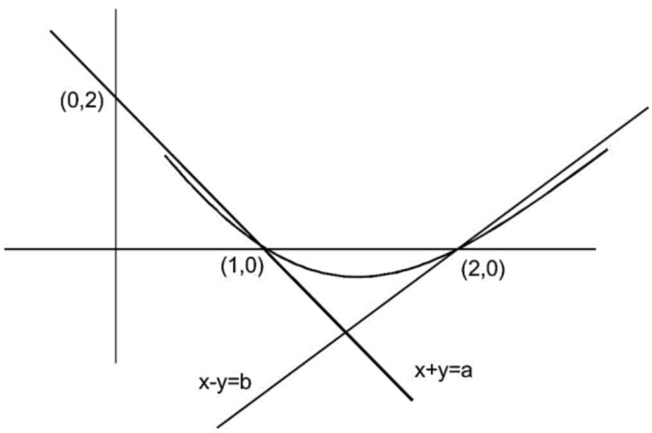
$\vec{b} . \vec{c} = 0$

$|\vec{a} + \vec{b} - \vec{c}| = \sqrt{a^2 + b^2 + c^2 + 2\vec{a} \cdot \vec{b} - 2\vec{b} \cdot \vec{c} - 2\vec{a} \cdot \vec{c}}$

$= \sqrt{4 + 16 + 16}$

$= 6$

74. (0.5)



$y-0=-1(x-1)$

$x+y=1 \Rightarrow a=1$

$y-0=x-2$

$x-y=2=b=2$

$\frac{\mathrm{a}}{\mathrm{b}}=\frac{1}{2}$

75. (11)

Let ' n is total no. of bombs being dropped

at least 2 bombs should hit

$\Rightarrow$ prob ≥ 0.99

$\mathrm{P}(\mathrm{x} \geq 2) \geq 0.99$

$1-p(x<2) \geq 0.99$

$1-(\mathrm{p}(\mathrm{x}=0)+\mathrm{p}(\mathrm{x}=1)) \geq 0.99$

$1-\left[4_{c_0}(p)^0 q^n+{ }^n C_1(p)^1(q)^{n-1}\right] \geq 0.99$

$1-\left[\mathrm{q}^{\mathrm{n}}+\mathrm{pnqq}^{\mathrm{n}}\right] \geq 0.99$

$1-\left[\frac{1}{2^n}+\frac{1}{2} \times \frac{1}{2^{n-1}}\right] \geq 0.99$

$1-\frac{1}{2^n}(n+1) \geq 0.99$

$0.01 \geq \frac{1}{2^n}(\mathrm{n}+1)$

$2^n \geq 100+100 n$

$n \geq 11$