

SOLUTIONS

WEEKLY TEST-8

GZRS-1901

(JEE MAIN PATTERN)

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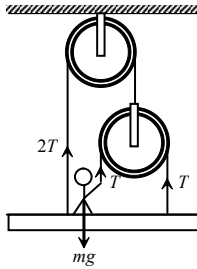
PHYSICS

1. (C)

Reading reduces when the lift starts accelerating downwards and then original value is restored as lift moves with constant velocity.

Apparent weight = $m(g \pm a)$, where a is acceleration of lift.

2. (A)



$$4T = mg$$

$$\therefore T = \frac{60 \times 10}{4} = 150 \text{ N}$$

3. (A)

$$a = \frac{F}{m_{\text{total}}}; N_{2\text{kg}} = F - 3a; N_{1\text{kg}} = 1a$$

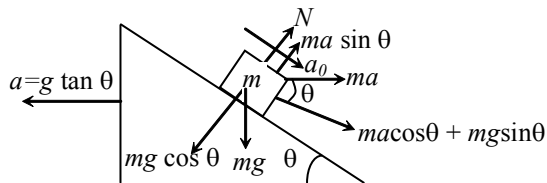
4. (C)

Acceleration in first case $a_1 = g(\sin\theta - \mu \cos\theta)$

In the 2nd case $a_2 = g \sin\theta$ and $t \propto \sqrt{\frac{1}{a}}$

5. (B)

Drawing *FBD* of block m from the frame of wedge,



let a_0 is acceleration of block with respect to wedge,

$$ma_0 = ma \cos \theta + mg \sin \theta$$

$$a_0 = g \tan \theta \cos \theta + g \sin \theta$$

$$a_0 = 2g \sin \theta$$

6. (A)

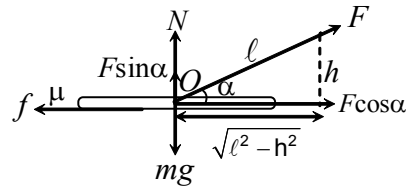
$$N = mg - F \sin \alpha$$

$$F \cos \alpha = f = \mu N$$

$$F \cos \alpha = \mu(mg - F \sin \alpha)$$

$$\mu = \frac{F \cos \alpha}{mg - F \sin \alpha} = \frac{F \times \frac{\sqrt{\ell^2 - h^2}}{\ell}}{mg - F \times \frac{h}{\ell}}$$

$$\mu = \frac{F \sqrt{\ell^2 - h^2}}{mg \ell - F h}$$



7. (B)

From figure (1)

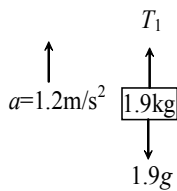


Figure (1)

$$T_1 - 1.9g = 1.9 \times 1.2$$

$$\Rightarrow T_1 = 20.9 \text{ N}$$

From figure (2)

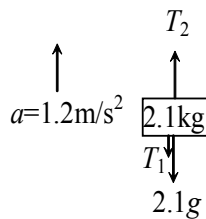


Figure (2)

$$T_2 - T_1 - 2.1g = 2.1 \times 1.2$$

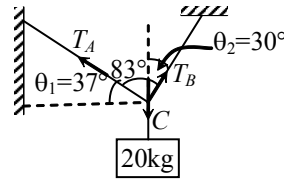
$$T_2 = 44 \text{ N}$$

8. (A)

$$T_A \cos \theta_1 = T_B \sin \theta_2$$

$$T_A \cos 37^\circ = T_B \sin 30^\circ$$

$$T_A \times \frac{4}{5} = T_B \times \frac{1}{2}; \quad \frac{T_A}{T_B} = \frac{5}{8}$$



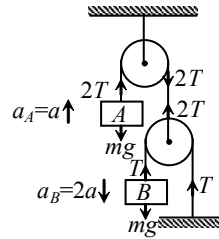
9. (D)

$$2T - mg = ma \quad \dots(i)$$

$$mg - T = 2ma \quad \dots(ii)$$

$$(i) \text{ and } (ii) \Rightarrow a = \frac{g}{5}$$

$$\therefore a_B = \frac{2g}{5}$$



10. (C)

From constraint relation, $a_B = 8a_A$

11. (D)

$$a_1 > 0 \text{ when } \frac{F}{4} > 50, \quad F > 200$$

$$a_2 > 0 \text{ when } \frac{F}{4} > 100, \quad F > 400$$

$$F = 300 \text{ N}$$

$$a_1 = \frac{F/4 - 50}{5} = \frac{300/4 - 50}{5} = 5 \text{ m/s}^2$$

$$a_2 = 0$$

$$\text{If } F = 500 \text{ N}$$

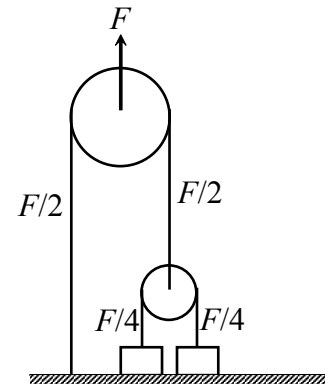
$$a_1 = 15 \text{ m/s}^2, \quad a_2 = 2.5 \text{ m/s}^2$$

12. (A)

$$\text{Given that } \vec{p} = p_x \hat{i} + p_y \hat{j} = 2 \cos t \hat{i} + 2 \sin t \hat{j}$$

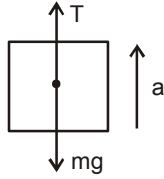
$$\therefore \vec{F} = \frac{d\vec{p}}{dt} = -2 \sin t \hat{i} + 2 \cos t \hat{j}$$

Now, $\vec{F} \cdot \vec{p} = 0$ i.e. angle between \vec{F} and \vec{p} is 90° .



13. (B)

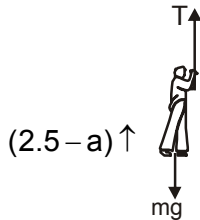
Let us suppose, block goes up with acceleration a ; then from F.B.D. of block ;



$$T - mg = ma \dots\dots\dots(i)$$

As man is going up with 2.5 ms^{-2} acceleration with respect to string. And string goes down with respect to ground. So net acceleration of man w.r.t. ground = $(2.5 - a) \uparrow$

From F.B.D. of man ;



$$T - mg = m(2.5 - a) \dots\dots\dots(ii)$$

from (i) & (ii), we get ;

$$ma = m(2.5 - ma)$$

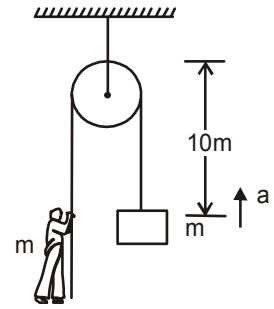
$$ma + ma = 2.5 m$$

$$\Rightarrow 2ma = 2.5m$$

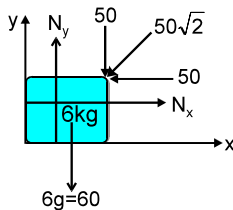
$$\therefore a = \frac{2.5}{2} = 1.25 \text{ m/s}^2$$

\therefore Time taken by block to reach the pulley ;

$$t = \sqrt{\frac{2S}{a}} = \sqrt{\frac{2 \times 10}{1.25}} = \sqrt{16}$$



14. (A)



$$N_y = 110$$

$$N_x = 50$$

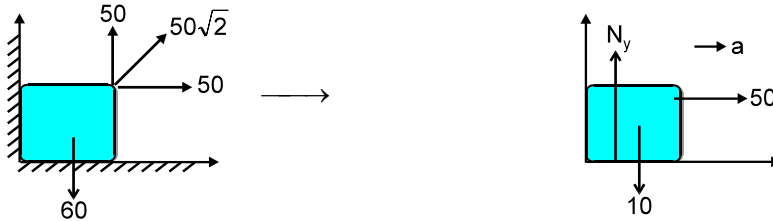
$$\vec{N}_{\text{block}} = 50\hat{i} + 110\hat{j}$$

So A is correct

$$\vec{N}_{\text{wall}} \text{ will be opposite of } N_{\text{block}} = -50\hat{i} - 110\hat{j}$$

So B is incorrect.

If \vec{F} were reversed



it will lose contact with vertical wall and $N_y = 10\hat{j}$

So option C is incorrect.

$$\text{Net force} = 50\hat{i} = 6\vec{a} \Rightarrow \boxed{\vec{a} = \frac{50}{6}\hat{i}}$$

15. (B) 16. (C) 17. (B)
18. (A)

Tension = $m(g + a)$, when lift moving up, putting the values, we get

$$175 = 25(9.8 + a)$$

$$\Rightarrow a = 2.8 \text{ m/s}^2$$

[negative sign shows that lift is moving downward]

19. (B)

Apparent tension,

$$T = 2T_0$$

$$\text{So } T = 2T_0 = T_0 \left(1 + \frac{a_0}{g} \right)$$

$$\text{or } 2 = 1 + \frac{a_0}{g}$$

$$\Rightarrow a_0 = g = 9.8 \text{ m/s}^2$$

20. (A)

As net force on the rod = $F_1 - F_2$ and its mass is M so acceleration of the rod will be

$$a = (F_1 - F_2) / M \quad \dots(i)$$

Now considering the motion of part AB of the rod, which has mass $(M/L)y$,

Acceleration a given by

(i) Assuming that tension at B is T

$$F_1 - T = \frac{M}{L}y \times a \quad \text{(from } F = ma \text{)}$$

$$\Rightarrow F_1 - T = \frac{M}{L}y \frac{F_1 - F_2}{M} \quad \text{(using eqn. (i))}$$

$$\Rightarrow T = F_1 \left(1 - \frac{y}{L}\right) + F_2 \left(\frac{y}{L}\right)$$

21. $T = 0, a = g$

\therefore (D)

22. (A)

23. In condition (i), $20g - T = 20a, \quad N = 20a$

$$T - N = 40a \quad \Rightarrow \quad a = \frac{20g}{80} = \frac{g}{4}$$

$$\text{Net acceleration} = a_1 = a\sqrt{2}, \quad \sqrt{2}a = \frac{\sqrt{2}g}{4} = \frac{g}{2\sqrt{2}}$$

$$\text{In condition (ii) } 20g - T = 20a, \quad T = 40a, \quad a = \frac{g}{3}, \quad a_2 = \frac{g}{3}$$

$$\frac{a_1}{a_2} = \frac{g/2\sqrt{2}}{g/3} = \frac{3}{2\sqrt{2}}$$

\therefore (A)

24. (D)

25. (C)

26. (C)

27. (A)

28. (A)

29. (A)

30. (A)

CHEMISTRY

31. (C)

$\phi = \frac{\pi}{2}$ is yz plane.

32. (C)

$$R\left(1 - \frac{1}{4}\right) = Rz^2\left(\frac{1}{4} - \frac{1}{16}\right)$$

or, $z = 2$

33. (B)

For 4d, $n = 4$, $l = 2$

34. (A)

$$l = 2$$

$$\sqrt{l(l+1)}\hbar = \sqrt{6}\hbar$$

35. (D)

36. (D)

Two electrons in an orbital have opposite spin.

37. (A)

$$l = 0 \text{ to } (n - 1)$$

38. (B)

39. (C)

40. (B)

ψ^2 represents the probability density.

41. (C)

42. (A)

$$mv = \frac{h}{\lambda}, m = \frac{h}{\lambda c} \text{ (} v = c \text{) or } m \propto \frac{1}{\lambda}$$

43. (C)

Limiting line comes from ∞

44. (B)

$$R^4\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right) = R\left(\frac{1}{2^2} - \frac{1}{3^2}\right)$$

equating, $n_1 = 4$, $n_2 = 6$

45. (B)

$$E_{\text{Green}} > E_{\text{Yellow}} > E_{\text{Red}}$$

46. (C)
Photoelectric current depends only on intensity

47. (A)

48. (B)

$$\lambda \propto \frac{1}{\sqrt{K \cdot E}} \text{ and K.E decreases as } n \text{ increases}$$

49. (A)

$$\lambda = v$$

$$mv = \frac{h}{\lambda} = \frac{h}{v}$$

$$\text{or, } v = \sqrt{\frac{h}{m}}$$

50. (B)

51. (D)

$$2\pi r = n\lambda$$

52. (B)

$$P \cdot E = \frac{-2 \times 13.6 \times 1}{4} = -6.8 \text{ e.V}$$

53. (A)

$$\Delta E = h\nu$$

54. (A)

$$54.4 = \frac{E^0 \times 4}{1} \text{ or } E^0 = 13.6 \text{ e.V}$$

$$I.E(H) = 13.6 \text{ e.V}$$

$$I.E(Li^{+2}) = 13.6 \times 9 \text{ e.V} = 122.4 \text{ e.V}$$

55. (C)

For H energy depends only on n

56. (A)

$$K \cdot E = \frac{+13.6z^2}{n^2}$$

57. (B)

$$r = \frac{a_0 n^2}{Z}$$

58. (A)

$$E = \frac{-13.6Z^2}{n^2}$$

59. (C)

$$\frac{n_1}{n_2} = \sqrt{\frac{R}{4R}} = \frac{1}{2}$$

$$T \propto n^3$$

$$\text{So, } \frac{T_1}{T_2} = \frac{1}{8}$$

60. (A)

$$\text{K.E} = \text{P.E} = QV = ex1 = 1\text{e.V.}$$

MATHEMATICS

61. (B)

$$\sqrt{12 - \sqrt{68 + 48\sqrt{2}}}$$

$$= \sqrt{12 - \sqrt{(6 + 4\sqrt{2})^2}} = \sqrt{12 - 6 - 4\sqrt{2}} = \sqrt{6 - 4\sqrt{2}} = \sqrt{(2 - \sqrt{2})^2} = 2 - \sqrt{2}$$

62. (B)

$$x = \sqrt{3 - \sqrt{5}} \quad y = \sqrt{3 + \sqrt{5}}$$

$$xy = 2$$

$$x + y = \sqrt{x^2 + y^2 + 2 \times 2}$$

$$= \sqrt{6 + 4} = \sqrt{10}$$

$$x - y = \sqrt{6 - 4} = \sqrt{2}$$

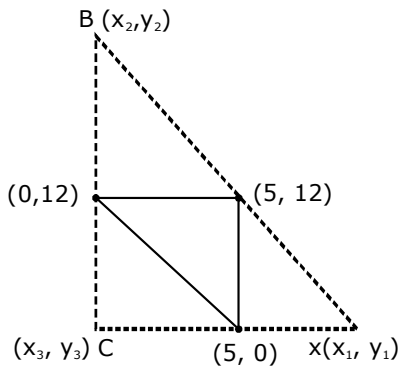
Put the value we get the ans.

$$(x - y) + 2xy(x + y) - xy(x - y)(x^2 + y^2 + xy)$$

$$= \sqrt{450} + \sqrt{160}$$

63. (A)

$$\begin{cases} x_1 + x_3 = 10 & , & y_1 + y_3 = 0 \\ x_2 + x_3 = 0 & , & y_2 + y_3 = 24 \\ x_1 + x_2 = 10 & , & y_2 + y_3 = -24 \end{cases}$$

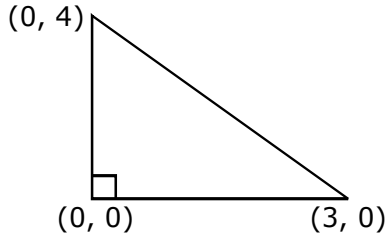


$$\begin{aligned}
 x_1 &= x_2 = 10, y_1 - y_2 = -24 \\
 x_1 &= 10, y_1 = 0 \\
 x_2 &= 0, y_2 = 24 \\
 x_3 &= 0, y_3 = 0
 \end{aligned}$$

$$\left. \begin{aligned}
 x_1 &= 10, y_1 = 0 \\
 x_2 &= 0, y_2 = 24 \\
 x_3 &= 0, y_3 = 0
 \end{aligned} \right\} \begin{aligned}
 &A(10, 0) \text{ on } x\text{-axis} \\
 &\Rightarrow B(0, 24) \text{ on } y\text{-axis} \\
 &C(0, 0) \text{ is origin}
 \end{aligned}$$

ΔABC is right angled \Rightarrow orthocentre is $(0, 0)$

64. (C)
 Δ right angled

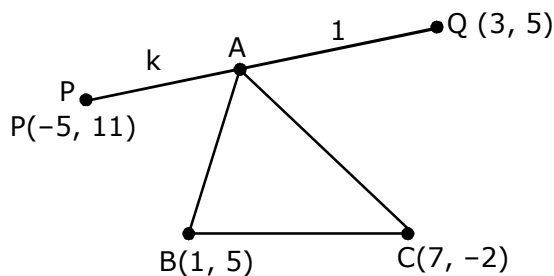


\Rightarrow circum centre

= mid point of hypotaneous = $\left(\frac{3}{2}, 2\right)$

65. (C)

$$\left(\frac{3k-5}{k+1}, \frac{5k+1}{k+1}\right)$$



$$\frac{1}{2} \begin{vmatrix} \frac{3k-5}{k+1} & \frac{5k+1}{k+1} & 1 \\ 1 & 5 & 1 \\ 7 & -2 & 1 \end{vmatrix} = |2|$$

$$\Rightarrow 1.(-2-3) - 1. \left(\frac{-6k+10}{k+1} - \frac{35k+7}{k+1} \right) + \left(\frac{15k-25}{k+1} - \frac{5k+1}{k+1} \right) = \pm 4$$

$$\Rightarrow 6k - 10 + 35k + 7 + 15k - 25 - 5k - 1$$

$$= \pm 4 + 37(k+1)$$

$$\Rightarrow 51k - 29 = 41k + 41 \text{ or } 51k - 29$$

$$= 33k + 33$$

$$\Rightarrow 10k = 70 \text{ or } 18k = 62$$

$$k = 7 \qquad k = \frac{31}{9}$$

66. (A)

$$x = 2^{\log_2 8 \log_{11}^{331}}$$

$$x = 2^9 \qquad y = 2^{\frac{1}{4}}$$

$$\log_B N = \frac{\log 4}{\log 5} \frac{\log 5}{\log 6} \dots \frac{\log 36}{\log 37}$$

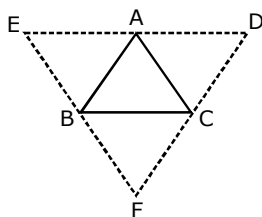
$$= \frac{\log 4}{\log 37} = \log_{37} 4$$

$$Z = \frac{4}{37}$$

$$(xy)^Z = (2^9 \cdot 2^{1/4})^{\frac{4}{37}} = \left(2^{\frac{37}{4}} \right)^{\frac{4}{37}} = 2$$

67. (C)

$A(x_1, y_1), B(x_2, y_2), C(x_3, y_3)$



only three sides can be made parallel to corresponding sides of triangle passing through

vertex of triangle respectively

⇒ So no. of Ilgrams is 3.

68. (A)

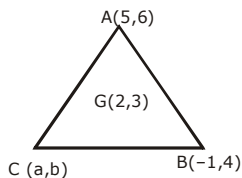
Let A(-a, -b); B (0, 0); C (a, b); D (a², ab)

$$\therefore \text{Area of quadrilateral } \triangle ACD = \frac{1}{2} \begin{vmatrix} -a & -b \\ 0 & 0 \\ a & b \\ a^2 & ab \\ -a & -b \end{vmatrix}$$

$$= \frac{1}{2} [(0 + 0 + a^2 b - a^2 b) + (0 + 0 + a^2 b - a^2 b)]$$

Hence, A, B, C, D are collinear.

69. (B)



$$\frac{5-1+a}{3} = 2 \Rightarrow a = 2$$

$$\& \frac{6+4+b}{3} = 3 \Rightarrow b = (-1)$$

70. (B)

$$\text{Let ratio be } \lambda : 1 \Rightarrow \frac{6\lambda - 3}{\lambda + 1} = 0, \lambda = \frac{1}{2}$$

71. (C)

$$x = \frac{711}{13+11m} = \frac{9 \times 79}{13+11m}$$

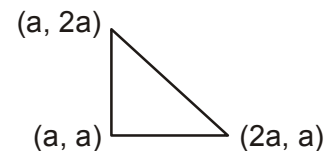
if x is an integer, then m = 6

72. (D)

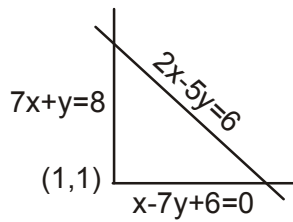
$$\frac{1}{2} a^2 = 72$$

$$a = \pm 12$$

Centroid = (16, 16) or (-16, -16)



73. (C)



74. (A)

$$y = \frac{3}{4}(x-9) + 6$$

75. (C)

$$S_{\infty} = \frac{a}{1-r} = 2$$

$$\Rightarrow \frac{(\alpha/r)}{1-r} = 2 \Rightarrow \frac{\alpha}{2} = r - r^2$$

$$\text{If } -1 < r < 1, \text{ then, } -2 < r - r^2 < \frac{1}{4}$$

$$\therefore -2 < \frac{\alpha}{2} < \frac{1}{4} \Rightarrow \alpha \in \left(-4, \frac{1}{2}\right)$$

76. (C)

$$(A \cap B) \cup C = \{1, 3, 5, 7, 8, 9\}$$

$$A' \cap B' = \{10\}$$

$$(A \cup B)' = \{10\}$$

$$(A \cap B) \cap (A \cap C) = \{8\}$$

77. (C)

We have,

$$(2x - 3y)^2 + (3y - 4z)^2 + (4z - 2x)^2 = 0 \Rightarrow 2x = 3y = 4z$$

$$\Rightarrow \frac{1}{x}, \frac{1}{y}, \frac{1}{z} \text{ are in AP} \Rightarrow x, y, z \text{ are in HP}$$

78. (C)

$$\frac{H_1+2}{H_1-2} + \frac{H_{20}+3}{H_{20}-3} = \frac{\frac{1}{2} + \frac{1}{H_1}}{\frac{1}{2} - \frac{1}{H_1}} + \frac{\frac{1}{3} + \frac{1}{H_{20}}}{\frac{1}{3} - \frac{1}{H_{20}}}$$

$$= \frac{\frac{1}{2} + \frac{1}{2} + d}{\frac{1}{2} - d - \frac{1}{2}} + \frac{\frac{1}{3} + \frac{1}{3} - d}{\frac{1}{3} + d - \frac{1}{3}} = \frac{1+d}{-d} + \frac{\frac{2}{3} - d}{d} = \frac{\frac{2}{3} - 1}{d} - 2 = 2 \times 21 - 2 = 40$$

79. (A)

$$\sin \alpha + \cos \alpha = -\frac{b}{a} \text{ and } \sin \alpha \cos \alpha = \frac{c}{a}$$

$$\Rightarrow 1 + 2 \sin \alpha \cos \alpha = \frac{b^2}{a^2} \Rightarrow 1 + \frac{2c}{a} = \frac{b^2}{a^2} \Rightarrow a^2 + 2ac - b^2 = 0$$

80. (C)

$$\sec 40^\circ, \sec 80^\circ, \sec 160^\circ \text{ are the roots of } \frac{8}{t^3} - \frac{6}{t} + 1 = 0$$

$$\text{or } t^3 - 6t^2 + 8 = 0$$

$$\therefore \text{Sum of roots} = 6.$$

81. (B)

$$\text{We have, } \sin \theta + \cos \theta = m$$

$$\text{and } \sec \theta + \operatorname{cosec} \theta = n$$

$$\Rightarrow \frac{1}{\cos \theta} + \frac{1}{\sin \theta} = n \Rightarrow \frac{\sin \theta + \cos \theta}{\cos \theta \sin \theta} = n$$

$$\Rightarrow \frac{m}{\cos \theta \sin \theta} = n$$

$$\Rightarrow \cos \theta \sin \theta = \frac{m}{n}$$

Squaring (i), we get

$$\sin^2 \theta + \cos^2 \theta + 2 \sin \theta \cos \theta = m^2 \Rightarrow 1 + 2 \cdot \frac{m}{n} = m^2$$

$$\Rightarrow \frac{2m}{n} = m^2 - 1 \Rightarrow 2m = n(m^2 - 1).$$

82. (C)

a_1, a_2, a_3, a_4, a_5 are in H.P.

$$\Rightarrow a_2 = \frac{2a_1 a_3}{a_1 + a_3} \Rightarrow 2a_1 a_3 = a_2 a_1 + a_3 a_2$$

$$a_4 = \frac{2a_3 a_5}{a_3 + a_5} \Rightarrow 2a_3 a_5 = a_3 a_4 + a_5 a_4$$

$$\Rightarrow a_1 a_2 + a_2 a_3 + a_3 a_4 + a_4 a_5 = 2a_1 a_3 + 2a_3 a_5 \quad \dots (i)$$

$$a_3 = \frac{2(a_1 a_5)}{a_1 + a_5} \Rightarrow a_1 a_3 + a_5 a_3 = 2a_1 a_5 \quad \dots (ii)$$

using (i) and (ii)

$$a_1 a_2 + a_2 a_3 + a_3 a_4 + a_4 a_5 = 2(2a_1 a_5) = 4a_1 a_5$$

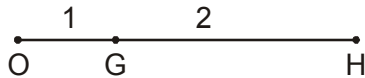
83. (D)

$$\text{Area} = \frac{1}{2} |P^3 - P + 1|$$

Cubic in 'P' so it must vanish

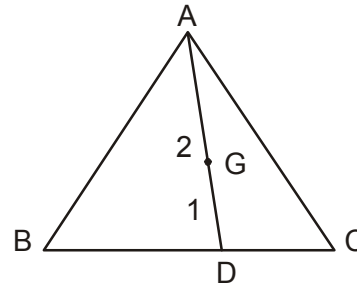
84. (A)

Circum-centre O, ortho-centre H centroid G



$$\therefore G \equiv \left(1, \frac{8}{9}\right)$$

$$AG : GD = 2 : 1$$



85. (A)

P lies on perpendicular bisector of BC and at a distance of $\frac{\sqrt{3}}{2} BC = \sqrt{15}$ units from the mid-point of BC.

\therefore P can be $(\sqrt{3}, 2 - \sqrt{3})$ or $(-\sqrt{3}, 2 + 2\sqrt{3})$ but A and P should lie on the same side of BC.

\therefore P is $(-\sqrt{3}, 2 + 2\sqrt{3})$

86. (A)

$$\frac{1}{2}ab = 11 \Rightarrow ab = 22$$

$$\text{Also } \frac{2}{a} + \frac{3}{b} = 1 \Rightarrow 2b + 3a = ab \qquad \Rightarrow 4b^2 + 9a^2 + 12ab = a^2b^2$$

$$\therefore 4b^2 + 9a^2 = 220$$

87. (D)

$$2^{n+1}(n-1) + 2 = 2^{n+10} + 2.$$

$$\therefore n = 513.$$

Sum of digits = 9.

88. (B)

$$\frac{(a^2 + 3a + 1)(b^2 + 3b + 1)(c^2 + 3c + 1)}{abc}$$

$$= \left(a + \frac{1}{a} + 3\right) \left(b + \frac{1}{b} + 3\right) \left(c + \frac{1}{c} + 3\right)$$

$$\geq (2 + 3)(2 + 3)(2 + 3) = 125$$

89. (C)

$$6 \left\{ (\sin^2 \theta + \cos^2 \theta)^3 - 3 \sin^2 \theta \cdot \cos^2 \theta (\sin^2 \theta + \cos^2 \theta) \right\} - 9 \left\{ (\sin^2 \theta + \cos^2 \theta)^2 - 2 \sin^2 \theta \cdot \cos^2 \theta \right\}$$

$$= 6 \{1 - 3 \sin^2 \theta \cdot \cos^2 \theta\} - 9 \{1 - 2 \sin^2 \theta \cos^2 \theta\} = -3$$

90. (A)

$$a_{2r} = a_{2r-1} + d$$

$$\sum_{r=1}^{10^{99}} a_{2r} = \sum_{r=1}^{10^{99}} (a_{2r-1} + d)$$

$$10^{100} = 10^{99} + 10^{99} d$$

$$d = 9.$$