11. LOCUS

1. Locus of the centroid of a triangle whose vertices are (1, 0), $(a\cos t, a\sin t)$, $(b\sin t, -b\cos t)$ is $9x^2+9y^2-6x=k$. Then the value of k=

[AP EAMCET 17-09-20_Shift-2]

1. a^2+b^2 2. a^2+b^2-1
3. a^2+b^2+1 4. 0

2. If A(2,-3) and B(-2,1) are two vertices of a triangle ABC and if the centroid of ΔABC lies on the line 2x+3y=1, then the locus of vertex C of Δ ABC is equal to

[AP EAMCET 18-09-20_Shift-2]

1. 2x+3y=5 2. 2x+3y=9
3. 3x+2y=5 4. 3x+2y=9

3. The locus of the point whose ratio of distance from the origin to its distance from (-2,-3) is 5:7, is given by____

[AP EAMCET 21-09-20_Shift-1]

1. $24(x^2+y^2)-100x-150y-325=0$
2. $24(x^2+y^2)+100x+150y-325=0$
3. $24(x^2+y^2)-100x+150y+325=0$
4. $2x^2+2y^2=325$

4. The equation of the line through the point $(2,3)$ such that its x-intercept is twice its y-intercept is **[AP EAMCET 21-09-20_Shift-2]**

1. $x+2y-8=0$ 2. $4x+y+2=0$
3. $2x+33y-46=0$ 4. $4x+3y-11=0$

5. A point P(-3,-2) is such that the sum of squares of its distances from the co-ordinate axes is equal to the square of its distance from the line x-y=1. Then the equation of the locus of P is

[AP EAMCET 22-09-20_Shift-1]

1. $x^2+y^2-2xy-2x-2y-1=0$
2. $x^2+y^2+2xy+2x+2y+1=0$
3. $x^2+y^2+2xy+2x-2y-1=0$
4. $x^2+y^2-2xy+2x-2y+1=0$

6. AB is a line segment moving between the axes such that 'A' lies on x-axis and 'B' lies on y-axis. If P is a point on AB such that PA=b and PB=a, then the equation of locus of P is

[AP EAMCET 22-09-20_Shift-2]

1. $\frac{x^2}{b^2}+\frac{y^2}{a^2}=1$ 2. $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$
3. $\frac{x^2}{2a^2}+\frac{y^2}{2b^2}=1$ 4. $\frac{x^2}{2b^2}+\frac{y^2}{a^2}=1$

7. The equation $\sqrt{(x-2)^2+y^2}+\sqrt{(x+2)^2+y^2}=4$, where -2<x<2, represents a

[AP EAMCET 22-09-20_Shift-2]

1. Circle 2. Pair of lines
3. Parabola 4. Line segment

8. If the sum of the distances of a point from two perpendicular lines in a plane is 1,then its locus is **[AP EAMCET 22-09-20_Shift-2]**

1. Two intersecting lines
2. Square
3. A straight line
4. Circle

9. To points A and B with co-ordinates (1,1) and (-2,3) respectively are given. Then the locus of a point P so that the area of ΔPAB is 9 sq. Units is given by ________

[AP EAMCET 23-09-20_Shift-1]

1. 2x+3y+13=0 & 2x+3y-23=0
2. 2x+3y-23=0 & 2x+3y-13=0
3. 2x+3y-13=0 & 2x-3y+23=0
4. 2x-3y+23=0 & 2x+3y+13=0

10. The locus of a point which moves such that the area of the triangle formed by it with the vertices $(1,2)$ *and* $(-2,5)$ is 8 s.q.units is / are

1. $3x+3y+7=0$ & $x+y+3=0$
2. $3x+3y-25=0$ & $x+y+3=0$
3. $3x+3y-2=0$ & $3x+3y-25=0$
4. $3x+3y+7=0$ & $3x+3y-25=0$

11. Let A=(0,4) and $B=(2\cos\theta, 2\sin\theta)$,,for some $0<\theta<\frac{\pi}{2}$. Let P divide the line segment AB in the ratio 2:3 internally. The locus of P is

[TS EAMCET 09-09-20_Shift-1]

1. Circle 2. Ellipse
3. Parabola 4. Hyperbola

12. For a real variable a>1, consider the points $A_k=\left(ka,a^k\right),k=1,2,....n$ in the Cartesian plane. If α and β represent respectively the arithmetic mean of x-coordinates and the geometric mean of y coordinates of A_k, then the locus of the point $P(\alpha,\beta)$ is

[TS EAMCET 09-09-20_Shift-2]

1. $ny=\left(\frac{2x}{n}\right)^{n^2+1}$ 2. $y^2=\left(\frac{2x}{n+1}\right)^{n+1}$
3. $y=\left(\frac{x^2}{n+1}\right)^{n}$ 4. $y=(n+1)(x-(n+1))$

13. If M is the foot of the perpendicular drawn from the origin O on to the variable line L, passing through a fixed point (a, b) then the locus of the mid point of OM is

[TS EAMCET 10-09-20_Shift-1]

1. $x^2+y^2=a^2+b^2$ 2. $2x^2+2y^2-ax-by=0$
3. $ax+by=0$ 4. $2x^2+2y^2-ay-bx=0$

14. Let A(2,1) be a point and equation of the straight line L be x-y=0. Let a and b respectively represent the distances from a variable point P (α,β) to A and to the line L. If C is distance of the point A from origin such that a=bc, then locus of P is **[TS EAMCET 10-09-20_Shift-2]**

1. $3x^2+3y^2+10xy+8x+4y+10=0$
2. $3x^2+3y^2-10xy+8x+4y-10=0$
3. $3x^2+2y^2-10xy+8x+4y+10=0$
4. $2x^2+3y^2-10xy-8x-4y-10=0$

15. Given two fixed points $A(-2,1)$ and $B(3,0)$, find the locus point P which moves such that the angle $\angle APB$ is always a right angle

[AP EAMCET 19-08-2021_Shift-2]

1. $x^2+y^2+x+y+6=0$
2. $x^2+y^2-x-y-6=0$
3. $x+y+6=0$
4. $2x^2+2y^2-2x-2y+1=0$

16. The locus of a point which is at a distance of 4 units from $(3,-2)$ in xy – plane is______

[AP EAMCET 20-08-2021_Shift-1]

1. $x^2+y^2+6x-4y+16=0$
2. $x^2+y^2-6x-4y+3=0$
3. $x^2+y^2-6x+4y-16=0$
4. $x^2+y^2-6x+4y-3=0$

17. A point moves so that the sum of its distances from $(ae,0)\&(-ae,0)$ is 2a, then the equation to its locus where $b^2=a^2\left(1-e^2\right)$ is

[AP EAMCET 20-08-2021_Shift-2]

1. $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ 2. $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$
3. $\frac{x^2}{b^2}+\frac{y^2}{a^2}=1$ 4. $\frac{y^2}{b^2}-\frac{x^2}{a^2}=1$

18. The sum of the squares of the distances of a moving point from 2 fixed points $A(a,0)\&B(-a,0)$ is equal to a constant $2c^2$, then the equation of its locus is

[AP EAMCET 23-08-2021_Shift-1]

1. $x^2+y^2=c^2-a^2$
2. $x^2+y^2=c^2+a^2$
3. $2x^2+2y^2=c^2+a^2$
4. $2x^2-2y^2=c^2+a^2$

19. Given points $A(6,0),B(0,4)$ and O as the origin, find the locus of a point P such that area of triangle *POB* is 2 times the area of triangle *POA*. **[AP EAMCET 23-08-2021_Shift-2]**

1. $x^2-3y^2=0$ 2. $x^2+3y^2=0$
3. $x^2-9y^2=0$ 4. $x^2-4y^2=0$

20. For two points $A(2,1)$ and $B(1,2)$, 'P' is a point such that $PA:PB=2:1$ then locus of P is

[AP EAMCET 24-08-2021_Shift-1]

1. $3x^2+3y^2+4x+14y-15=0$
2. $3x^2+3y^2-4x-14y+15=0$
3. $3x^2+3y^2+2x+7y+13=0$
4. $3x^2+3y^2-2x-7y-13=0$

21. A straight rod of length 4 units slides such that its ends 'A' and 'B' always lie on the x and y axes respectively. Then the locus of the centroid of ΔOAB is ______ **[AP EAMCET 24-08-2021_Shift-2]**
1. $x^2+y^2=4$
2. $x^2+y^2=3$
3. $x^2+y^2=\frac{9}{16}$
4. $x^2+y^2=\frac{16}{9}$

22. The equation of the locus of a point which is equidistant from the points (2, 3) and (4, 5) is **[AP EAMCET 25-08-2021_Shift-1]**
1. $x+y=0$
2. $x+y=4$
3. $x+y=7$
4. $4x+4y=38$

23. A rod of length 2l slides with its ends on two perpendicular lines, then the locus of its mid point is __ **[AP EAMCET 25-08-2021_Shift-2]**
1. $x^2+y^2=l^2$
2. $x^2-y^2=l^2$
3. $2x^2+2y^2=l^2$
4. $2x^2-2y^2=l^2$

24. The locus of a point P which moves such that the sum of its distances from two perpendicular lines is equal to 1 is a **[TS EAMCET 04-08-2021_Shift-2]**
1. Square
2. Circle
3. Straight line
4. Set of four parallel lines

25. A rod of length 6 units slides with its ends on the coordinates axes. The locus of the midpoint of the rod is **[TS EAMCET 04-08-2021_Shift-1]**
1. $x^2+y^2=9$
2. $x+y=3$
3. $x^2+y^2=36$
4. $x+y=6$

26. If a point $P(x,y)$ moves such that the sum of the squares of its coordinates is equal to their product, then the locus of P excluding origin is **[TS EAMCET 05-08-2021_Shift-1]**
1. $\frac{1}{x^2}+\frac{1}{y^2}=1$
2. $\frac{1}{x}+\frac{1}{y}=1$
3. $\frac{x}{y}+\frac{y}{x}=1$
4. $x^2+y^2-xy=1$

27. $A(1,0),B(0,2)$ and $C(1,2)$ are three points on XY-plane. If a point $P(x,y)$ which moves such that the area of triangle PAB is twice the area of the triangle ABC, then the locus of the point P is **[TS EAMCET 05-08-2021_Shift-2]**
1. $4x^2-4xy+y^2-8x+4y=0$
2. $4x^2+4xy+y^2-8x-4y-12=0$
3. $4x^2-4xy+y^2-8x+4y-12=0$
4. $4x^2+4xy+y^2-8x+4y+12=0$

28. If $A(2,3),B(3,-2)$ are two fixed points and $P(x,y)$ is a variable point satisfying the condition $|PA-PB|=2$, then the locus of P is **[TS EAMCET 06-08-2021_Shift-2]**
1. $(x+y+1)^2=4\left[(x-3)^2+(y+2)^2\right]$
2. $(x-5y-2)^2=4\left[(x-2)^2+(y-3)^2\right]$
3. $(x-5y-2)^2=4\left[(x-3)^2+(y+2)^2\right]$
4. $(x+y+1)^2=4\left[(x-2)^2+(y-3)^2\right]$

29. Let S be the set of points on X-axis lying at a distance of d units from $(3,4)$. Which of the following is true? **[TS EAMCET 06-08-2021_Shift-1]**
1. S is an empty set if $d<4$
2. S contains infinitely many points if $d<4$
3. S contains atleast two points if $d=4$
4. S contains exactly three points for any $d>4$

30. A stick of length r units slides with its ends on coordinate axes. Then the locus of the midpoint of the stick is a curve whose length is **[AP EAMCET 04-07-2022_Shift-1]**
1. $2\pi r$
2. πr^2
3. $1/2\pi r$
4. πr

31. Suppose P and Q are the midpoints of the sides

AB and BC of a triangle where A(1,3),B(3,7) and C(7,15) are vertices.Then the locus of R satisfying $AC^2+QR^2=PR^2$ is

[AP EAMCET 04-07-2022_Shift-2]

1. 6x+12y=297
2. 6x+12y+297=0
3. 12x+6y=297
4. 12x+6y+297=0

32. The locus of midpoints of points of intersection of x cosθ+ y sinθ=1 with the coordinate axes is

[AP EAMCET 05-07-2022_Shift-1]

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

33. Suppose a point P moves so that $BP^2-AP^2=121$, where A and B are (2, 5) and (5,11) respectively. Then the locus of P is a straight line, whose slope is **[AP EAMCET 05-07-2022_Shift-2]**

1. 1/2
2. −2
3. −1/2
4. 2

34. A point $P(x,y)$ is such that its distance from $(-1,0)$ and $(0,2)$ are in a ratio of $\sqrt{2}:1$. Then the locus of P is

[AP EAMCET 06-07-2022_Shift-1]

1. $(x-1)^2+(y-4)^2=10$
2. $(x+2)^2+(y+2)^2=10$
3. $(x-1)^2+(y-4)^2=100$
4. $(x+2)^2+(y+2)^2=100$

35. On the locus of the point P(x,y) equidistant from (3,0) and (0,4) , if A and B are two points that satisfy 4x=3y and x=y respectively, then the distance between A and B is

[AP EAMCET 07-07-2022_Shift-1]

1. $\frac{5}{2}$
2. 5
3. $\frac{25}{4}$
4. 25

36. A point P(x,y) is such that the sum of squares of its distances from (a,0) and (-a,0) is $2b^2$. The equation representing the locus of P is

[AP EAMCET 07-07-2022_Shift-2]

1. $x^2+y^2=b^2+a^2$
2. $x^2+y^2=b^2-a^2$
3. $x^2+y^2=b^2-2a^2$
4. $x^2+y^2=b^2+2a^2$

37. In ΔABC, if A is (1, 2), B and C lie on $y=x+\alpha$ (where α is variable), then the locus of the orthocentre of the triangle is

[AP EAMCET 08-07-2022_Shift-1]

1. $x+y-3=0$
2. $x+y+3=0$
3. $y=x+1$
4. $y=x-1$

38. If a line AB of length r moves so that A and B always lie respectively on x-axis and y=6x, then the locus of midpoint of AB is

[AP EAMCET 08-07-2022_Shift-2]

1. y=12x
2. $\left(x-\frac{y}{3}\right)^2+y^2=\frac{r^2}{2}$
3. $\left(x-\frac{y}{3}\right)^2+y^2=\frac{r^2}{4}$
4. $y=6x$

39. Let A(5, -3), B(3, -2), C(-1,5) be three points. If P is a point satisfying the condition $PA^2+2PB^2=3PC^2$, then a point that lies on the locus of P is

[TS EAMCET 18-07-2022_Shift-1]

1. $\left(-\frac{1}{7},\frac{1}{2}\right)$
2. $\left(-\frac{5}{2},-2\right)$
3. $\left(-\frac{2}{21},\frac{31}{66}\right)$
4. $\left(2,\frac{37}{22}\right)$

40. If the perimeter of a triangle is 20 and two of its vertices are (- 5, 0) and (6, 0), then the locus of the third vertex is

[TS EAMCET 18-07-2022_Shift-2]

1. $40x^2-81y^2-40x-800=0$
2. $40x^2+9y^2-25x+00=0$
3. $40x^2-9y^2=800$
4. $5x^2-3y^2+3x-4y+25=0$

41. If the distance from a variable point P to a

fixed point $A(a,0)$ is equal to the perpendicular distance from P to the line $x+y=0$ then the equation of the locus of P is

[TS EAMCET 19-07-2022_Shift-I]

1. $x^2+y^2-2xy-4ax=0$
2. $x^2+y^2-2xy-4ax+2a^2=0$
3. $x^2-4ay+y^2=0$
4. $(x-a)^2+y^2=4axy$

42. If A(1,1), B(–1,1) and C(–1,–1) are three points and a point P moves such that $PA^2=PB^2+PC^2$, then the equation of the locus of P is

[TS EAMCET 19-07-2022_Shift-2]

1. $x^2+y^2-6x-2y+2=0$
2. $x^2+y^2+6x+2y+2=0$
3. $x^2+y^2+6x-2y+2=0$
4. $x^2+y^2+6x+2y-2=0$

43. The locus of the image of a variable point $(\alpha,2\alpha-1)$ with respect to the line $3x-2y+4=0$ is

[TS EAMCET 20-07-2022_Shift-1]

1. $22(13x+36)=19(13y-11)$
2. $30(13x+36)=19(13y+37)$
3. $22(13x+36)=7(13y+11)$
4. $22(13x-36)=30(13y-11)$

44. The locus of a point which is at a distance of 2 units from the line $2x-3y+4=0$ and at a distance of $\sqrt{13}$ units from a point (5.0), is.

[15th May 2023 Shift 1]

1. $8x^2+12xy+56x-24y+84=0$
2. $12xy-5y^2-56x+24y+84=0$
3. $8x^2+12xy+y^2-56x+24y+84=0$
4. $8x^2+12xy-7y^2-56x+24y+84=0$

45. The combined equation of the lines passing through the point (3,4) and each making an angle 45o with the line $x+y+1=0$ is

[15th May 2023 Shift 1]

1. $xy-4x-3y+12=0$
2. $(3x-2y-1)(x-2y+2)=0$
3. $(3x+2y-17)(x+2y-11)=0$
4. $xy-4x+3y+12=0$

46. If A(4,0) and B(-4,0) are two points, then the locus of a point P such that PA-PB=4 is

[15th May 2023 Shift 2]

1. $3x^2-y^2=12$
2. $x^2-3y^2=12$
3. $4(x^2-3y^2)=1$
4. $3x^2-y^2=1$

47. If a line is moving between the coordinate axes such that the sum of the intercepts made by it on the coordinate axes is always 12, then the equation of that line which forms a triangle of maximum area with the coordinate axes is

[15th May 2023 Shift 2]

1. $3x+y=9$
2. $5x+7y=35$
3. $x+y=6$
4. $5x+y=10$

48. If A = (2,3) and B= (– 4,5) are two fixed points, then the locus of a point P such that the area of ΔPAB is 12 square units is

[16th May 2023 Shift 1]

1. $x^2+6xy+9y^2+22x+66y+23=0$
2. $x^2-6xy+9y^2+22x+66y+23=0$
3. $x^2+6xy+9y^2-22x-66y-23=0$
4. $x^2-6xy+9y^2-22x-66y-23=0$

49. If the equations $x=t^2+t+1,\ y=t^2-t+1$ represents a curve C with parameter t, then the Cartesian equation of C is

[16th May 2023 Shift 2]

1. $x^2-2xy+y^2-2x-2y+4=0$
2. $x^2+2xy+y^2-2x-2y+4=0$
3. $x^2-2xy+y^2+2x-2y+4=0$
4. $x^2-2xy-y^2+2x+2y+4=0$

50. The locus of the point which is

equidistant from the point (1,1) and the line x+y+1=0 is

[17th May 2023 Shift 1]

1. $x^2-y^2+6x+4y-3=0$
2. $(x-y)^2-6(x+y)+3=0$
3. $(x+y)^2+6(x-y)+3=0$
4. $x^2+y^2-2x-2y+4=0$

51. If $t \in R-\{-1\}$, then the locus of the point $\left(\frac{3at}{1+t^3},\frac{3at^2}{1+t^3}\right)$ is **[17th May 2023 Shift 2]**

1. $x^3+y^3=3ax^2y^2$ 2. $x^3-3ax^2y-3axy^2+y^3=0$
3. $x^3+y^3=3axy$ 4. $x^3-y^3=3axy$

52. If A(2,3) and B(2,-3) are two points, then the equation of the locus of a point P such that PA+PB=8 is **[18th May2023 shift -1]**

1. $16x^2+7y^2-64x-48=0$ 2. $16x^2+7y^2-64x+48=0$
3. $16x^2-7y^2+64x-48=0$ 4. $16x^2-7y^2+64x+48=0$

53. The Cartesian form of the curve given by $x=\frac{a}{2}\left(t+\frac{1}{t}\right), y=\frac{a}{2}\left(t-\frac{1}{t}\right)$, t is a parameter, is

[18th May 2023 Shift 2]

1. $x^2+y^2=a^2$ 2. $x^2-y^2=a^2$
3. $2x^2-y^2=a^2$ 4. $x^2-2y^2=a^2$

54. If the end of the hypotenuse of a right angled triangle are (0, a) and (a,0), then the locus of the third vertex is **[19th May 2023 Shift 1]**

1. $x^2+y^2-ax-ay=0$ 2. $x^2+y^2-ax+ay=0$
3. $x^2-y^2-ax-ay=0$ 4. $x^2-y^2+ax-ay=0$

55. If t is a parameter, $A=(a\sec t, b\tan t)$, $B=(-a\tan t, b\sec t)$ and $O=(0,0)$ then the locus of the centroid of ΔOAB is

[12TH MAY 2023 SHIFT-1]

1. $9xy=ab$ 2. $xy=9ab$
3. $x^2-9y^2=a^2-b^2$ 4. $x^2-y^2=\frac{1}{9}\left(a^2-b^2\right)$

56. The locus of the mid points of the intercepted portion of the tangents by the coordinate axes, which are drawn to the ellipse $x^2+2y^2=2$ is

[12TH MAY 2023 SHIFT -2]

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

57. Let A= (2, 0) and B=(0, -2) let P be any point such that the sum of the distance of P from A and B is 4. Then the equation of the locus of the point P is **[13TH MAY 2023 SHIFT-1]**

1. $3x^2-2xy+3y^2-4x+12y+16=0$
2. $3x^2-2xy+3y^2-8x+8y=0$
3. $3x^2+2xy+3y^2+8x-8y=0$
4. $3x^2+2xy+3y^2+4x-12y+16=0$

58. If a point P moves so that the distance from (0,2) to P is $\frac{1}{\sqrt{2}}$ times the distance of P from (-1,0), then the locus of the point P is

[EAPCET 14-05-23 SHIFT-1]

1. A circle with centre (1,4)and radius 10 units
2. A circle with centre (-1,-4)and radius $\sqrt{10}$ units
3. A circle with centre (1,4)and radius $\sqrt{10}$ units
4. A parabola with focus at (1,4)and length of latus rectum 10units

59. Let A= (1,2), B=(2,1),C=(-1,-1) be three points. If P is a point such that the area of the quadrilateral PABC is twice the area of the triangle PAB, then the equation of the locus of P is **[EAPCET 13-05-23 SHIFT-2]**

1. $8x^2-14xy+3y^2-18x+22y+7=0$
2. $9x^2-12xy+4y^2-24x+16y+16=0$
3. $x^2+2xy+y^2-6x-6y+9=0$
4. $x^2-4xy+8y-4=0$

KEY

1)	2	2)	2	3)	1	4)	1	5)	3
6)	2	7)	4	8)	2	9)	1	10)	4
11)	1	12)	2	13)	2	14)	2	15)	2

16)	4	17)	2	18)	1	19)	3	20)	2
21)	4	22)	3	23)	1	24)	1	25)	1
26)	3	27)	2	28)	3	29)	1	30)	4
31)	1	32)	1	33)	3	34)	1	35)	1
36)	2	37)	1	38)	3	39)	4	40)	1
41)	2	42)	2	43)	1	44)	2	45)	1
46)	1	47)	3	48)	3	49)	1	50)	2
51)	3	52)	1	53)	2	54)	1	55)	1
56)	1	57)	2	58)	3	59)	4		

SOLUTIONS

1. Let centroid (x,y)

$$(x,y)=\left(\frac{1+a\cos t+b\sin t}{3},\frac{a\sin t-b\cos t}{3}\right)$$

$3x=1+a\cos t+b\sin t; 3y=a\sin t-b\cos t$

$\Rightarrow(3x-1)^2+(3y)^2=a^2+b^2$

$\Rightarrow 9x^2+9y^2-6x=a^2+b^2-1$

$\therefore K=a^2+b^2-1$

2. $G=\left(\frac{h}{3},\frac{-2+k}{3}\right)$

It lies on $2x+3y=1$

$\Rightarrow 2h+3k=9$

$\therefore$ locus is $2x+3y=9$

3. Given A(0, 0),B(-2, -3)

Let P(x, y) be a locus point

$\frac{PA}{PB}=\frac{5}{7}$

$49(x^2+y^2)=25((x+2)^2+(y+3)^2)$

$24(x^2+y^2)-100x-150y-325=0$

4. By verification taking given line

$x+2y-8=0\rightarrow(1)$ passing through P(2,3),we

get 8-8=0and intercept form $\frac{x}{8}+\frac{y}{4}=1$

Where x-intercept=a=8

y-intercept=b=4

5. Let locus be P(h,k)

$$h^2+k^2=\left|\frac{h-k-1}{\sqrt{1+1}}\right|^2$$

$2(h^2+k^2)=h^2+k^2+1-2hk+2k-2h$

$h^2+k^2+2hk-2k+2h-1=0$

$\Rightarrow x^2+y^2+2xy+2x-2y-1=0$

6. $P(h,k)$ locus of a point.

Let

$A(x_0,0),B(0,y_0)$

$\left(\frac{ax_0}{a+b},\frac{bx_0}{a+b}\right)=(h,k)$

$x_0=(a+b)\frac{h}{a},y_0=(a+b)\frac{k}{b}$

$\Delta OAB\quad OA^2+OB^2=AB^2$

$$(a+b)^2\left(\frac{h^2}{a^2}+\frac{k^2}{b^2}\right)=(a^2+b^2)$$

locus of P is $\frac{h^2}{a^2}+\frac{k^2}{b^2}=1.$

7. $\sqrt{(x-2)^2+y^2}+\sqrt{(x+2)^2+y^2}=4....(1)$

let $A(2,0)\;\; B(-2,0)\Rightarrow AB=4$

$PA+PB=AB$

P,A,B *are collinear...*

So given eqn is a line segment.

8. $P(x,y)$ *be the locus*

given condition $|x|+|y|=1$

$\pm x\pm y=1$

req.locus is square.

9. Area of PAB=9

$$\begin{vmatrix} x & 1 & -2 & x \\ y & 1 & 3 & y \end{vmatrix}=18$$

$|x-y+3+2-2y-3x|=18$

$2x+3y-23=0$ and $2x+3y+13=0$

10. Let $P(x_1,y_1)$ be a locus of point

Area of $\Delta PAB=8$

$$\frac{1}{2}\begin{vmatrix} x_1 & 1 & -2 & x_1 \\ y_1 & 2 & 5 & y_1 \end{vmatrix}=8$$

$\Rightarrow -3x-3y_1+9=\pm 16$

$\therefore$ locus of P is $3x+3y+7=0,\ 3x+3y-25=0$

11. $A(0,4), B(2\cos\theta, 2\sin\theta), P(x,y)$

m : n =2:3

$(x,y)=\left(\frac{4\cos\theta}{5}, \frac{4\sin\theta+12}{5}\right)$

$\cos\theta=\frac{5x}{4} \quad \sin\theta=\frac{5y-12}{4}$

$5x^2+(5y-12)^2=16$

It represents a circle

12. $\alpha=\frac{a+2a+3a+.......+na}{n}=\frac{a(n+1)}{2}$

$\beta=\left(a.a^2.a^3.a^4.....a^n\right)^{\frac{1}{n}}=a^{\frac{n+1}{2}}$

$\beta^2=a^{n+1}=\left(\frac{2\alpha}{n+1}\right)^{n+1}$

locus of (α,β) *is* $y^2=\left(\frac{2x}{n+1}\right)^{n+1}$

13. Let the line be $px+qy-1=0$

$\frac{h}{p}+\frac{k}{q}=\frac{-(-1)}{p^2+q^2}$

$h=\frac{p}{p^2+q^2}, k=\frac{q}{p^2+q^2}$

$\therefore M=\left(\frac{p}{p^2+q^2}, \frac{q}{p^2+q^2}\right)$

$x=\frac{p}{2(p^2+q^2)}, y=\frac{q}{2(p^2+q^2)}$

$2x=\frac{p}{p^2+q^2}, 2y=\frac{q}{p^2+q^2}$

$4(x^2+y^2)=\frac{1}{p^2+q^2}$

$p=\frac{2x}{4(x^2+y^2)}, q=\frac{2y}{4(x^2+y^2)}$

$P(a,b)$ *lies on* $px+qy-1=0$

$ap+bq=1 \Rightarrow ax+by=2(x^2+y^2)$

14. $a=\sqrt{(\alpha-2)^2+(\beta-1)^2}$

$b=\frac{\alpha-\beta}{\sqrt{2}}$

$c=\sqrt{4+1}=\sqrt{5}$

Given , $(\alpha-2)^2-(\beta-1)^2=\left(\frac{\alpha-\beta}{\sqrt{2}}\right)^2(5)$

$3\alpha^2+3\beta^2-10\alpha\beta+8\alpha+4\beta-10=0$

15. $AB^2=PA^2+PB^2$, then simplify.

16. $PA=4$, then simplify .

17. $PA+PB=2a$, then simplify.

18. $PA^2+PB^2=2c^2$, then simplify.

19. Area of $\Delta POB=2$. Area of ΔPOA, then simplify.

20. $PA=2PB$,then simplify

21. Let $A(a,0), B(0,b)$

Given that $AB=4 \Rightarrow a^2+b^2=16$

Centroid of ΔOAB

$(x,y)=\left(\frac{a}{3},\frac{b}{3}\right) \Rightarrow a=3x, b=3y$

$\therefore x^2+y^2=\frac{16}{9}$

22. $PA=PB$, then simplify.

23. Let $A(a,0), B(0,b)$

Given that $AB=2l \Rightarrow a^2+b^2=4l^2$

Midpoint of AB

$(x,y)=\left(\frac{a}{2},\frac{b}{2}\right) \Rightarrow a=2x, b=2y$

$\therefore x^2+y^2=l^2$

24. Conceptual

25. $\frac{\alpha}{2}=x_1, \frac{\beta}{2}=y_1$

$\alpha=2x_1, \beta=2y_1$

$(2x_1)^2+(2y_1)^2=36$

$\Rightarrow x_1^{\ 2}+y_1^{\ 2}=9$

26. Let $P(x,y)$ be any point on the locus.

Given $x^2+y^2=xy$

$\frac{x^2}{xy}+\frac{x^2}{xy}=1$

$$\frac{x}{y}+\frac{y}{x}=1$$

27. Let $P(x,y)$ be a locus point

$A(1,0), B(0,2), C(1,2)$

Given condition $Ar(\Delta PAB)=2[Ar(\Delta ABC)]$

$$\Rightarrow \frac{1}{2}\begin{vmatrix}1 & 0 & x & 1\\ 0 & 2 & y & 0\end{vmatrix}=2.\frac{1}{2}\begin{vmatrix}1-0 & 1-1\\ 0-0 & 0-2\end{vmatrix}$$

$$\Rightarrow \frac{1}{2}|2-2x-y|=2$$

$$2-2x-y=\pm 4$$

Required locus $=(2x+y+2)(2x+y-6)=0$

$$4x^2+4xy+y^2-8x-4y-12=0$$

28. $PA-PB=\pm 2$

$$PA=PB\pm 2$$

$$PA^2=PB^2+4\pm 4PB$$

$$2x-10y-4=\pm 4PB$$

$$(x-5y-2)^2=4PB^2$$

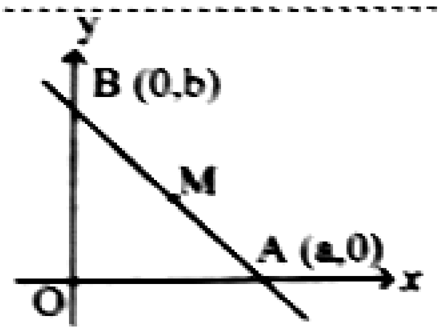
$$(x-5y-2)^2=4\left[(x-3)^2+(y+2)^2\right]$$

29. The nearest point from $(3,4)$ to the X-axis is

$(3,0)$

If $d<4$ then no point lies on X-axis.

30.



$$AB=r$$

$$a^2+b^2=r^2$$

$$M=(x_1,y_1)=(a/2,b/2)$$

$$\Rightarrow 4x_1^2+4y_1^2=r^2$$

$$\Rightarrow x_1^2+y_1^2=\frac{r^2}{4}$$

Circle with radius $=R=\frac{r}{2}$

Length $=2\pi R=\pi r$

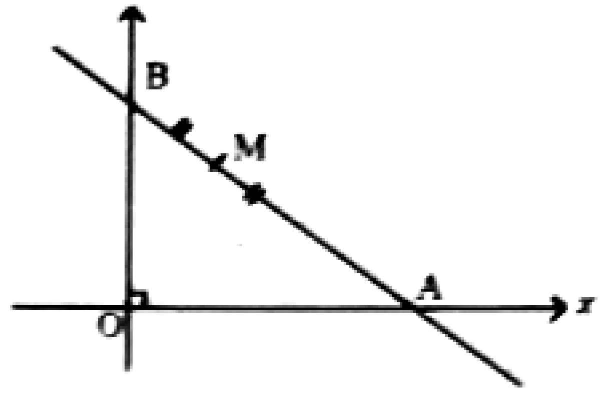
31. $P=(2,5), Q(5,11)$

$$R=(x,y)$$

$$AC^2+QR^2=PR^2$$

$$6x+12y-297=0$$

32.



$$\frac{x}{\sec\theta}+\frac{y}{\cos ec\theta}=1$$

$$M(x,y)=\left(\frac{\sec\theta}{2},\frac{\cos ec\theta}{2}\right)$$

$$\cos\theta=\frac{1}{2x}$$

$$\sin\theta=\frac{1}{2y}$$

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

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

33. $A(2,5), B(5,11), P(x,y)$

$$Bp^2-AP^2=121$$

$$3x+6y+2=0$$

$$slope=\frac{-a}{b}=\frac{-1}{2}$$

34. $A(-1,0), B(0,2), P(x,y)$

$$\frac{PA}{PB}=\sqrt{2}$$

$$PA^2=2PB^2$$

$$x^2+y^2-2x-8y+7=0$$

$$(x-1)^2+(y-4)^2=10$$

35. $A'(3,0), B'(0,4), P(x,y)$

$PA' = PB'$

$\sqrt{(x-3)^2+y^2} = \sqrt{x^2+(y-4)^2}$

$6x-8y+7=0 \qquad \to (1)$

$4x = 3y \qquad \to (2)$

$x = y \qquad \to (3)$

solve 1 & 2 $A = (3/2,\ 2)$

solve 1 & 3 $B = (7/2,\ 7/2)$

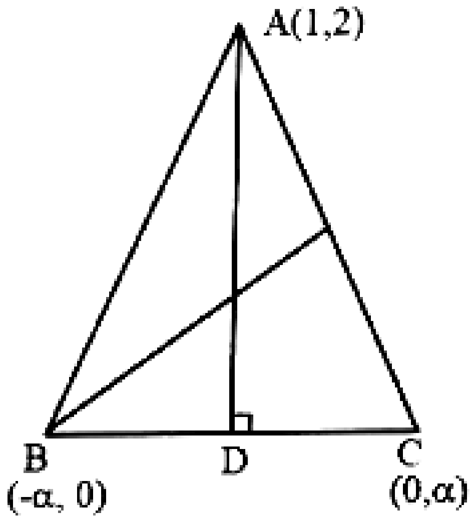
$AB = \frac{5}{2}$

36. $A(a,0), B(-a,0), P(x,y)$

$PA^2 + PB^2 = 2b^2$

$\Rightarrow x^2+y^2 = b^2 - a^2$

37.



$\overline{AD}: y+x-3=0$ which is the locus of orthocentre of triangle ABC

38. $A(\alpha,0), B(t,6t)$

$M = \frac{A+B}{2} = (x,y)$

$t = y/3, \qquad \alpha = 2x - y/3$

$AB = r$

$(x-y/3)^2 + y^2 = \frac{r^2}{4}$

39. $A(5,-3), B(3,-2)$

$C(-1,5), P(x,y)$

$PA^2 + 2PB^2 = 3PC^2$

$14x-22y+9=0$

verify point (2,37/22)

40. $A(-5,0), B(6,0), C(x,y)$

$AB+BC+CA=20$

$BC+CA=9$

The locus of C is

$40x^2-81y^2-40x-800=0$

41. $A(a,0), P(x,y)$

$PA = \frac{|x+y|}{\sqrt{2}}$

$\sqrt{(x-a)^2+y^2} = \frac{|x+y|}{\sqrt{2}}$

The locus of p is

$x^2+y^2-2xy-4ax+2a^2=0$

42. $A(1,1),\ B(-1,1),\ C(-1,-1)$

$P(x,y)$

$PA^2 = PB^2 + PC^2$

$\Rightarrow x^2+y^2+6x+2y+2=0$

43. $A(\alpha, 2\alpha-1)$

$3x-2y+1=0$

$Image = B(h,k)$

$\frac{h-\alpha}{3} = \frac{k-2\alpha+1}{-2} = \frac{-2(6-\alpha)}{13}$

The locus of B is

$22(13h+36) = 19(13k-11)$

$22(13x+36) = 19(13y-11)$

44.

Let P(x1,y1) is locus of a point

$S=(5,0)$

$PM = \perp^{rd}$ distance from $2x-3y+4=0$ to 'P'

$\frac{SP}{PM} = \frac{\sqrt{13}}{2}$

$\Rightarrow 4SP^2 = 13PM^2$

$\Rightarrow 4\left[(x_1-5)^2+(y_1-0)^2\right] = \frac{\cancel{13}(2x_1-3y_1+4)^2}{\cancel{13}}$

$\Rightarrow \cancel{4x^2}+4y^2-40x+100 = \cancel{4x^2}+9y^2+16-12xy-24y+16x$

$\Rightarrow 12xy-5y^2-56x+24y+86=0$

45.

Let 'm' be the slope required line

Given angle between lines slope -1 is 45o

$\text{Tan}\,45 = \left|\frac{m+1}{1-m}\right|$

$\Rightarrow \pm 1 = \frac{m+1}{1-m}$

$\Rightarrow 1-m = m+1 \quad (or) -1+m = m+1$ *does not exist*

$\Rightarrow \quad m = 0$

Combined equation of lines are x=3 & y=4

$\Rightarrow (x-3)(y-4)=0$

$\Rightarrow xy-4x-3y+12=0$

46. $A(4,0), B(-4,0), PA-PB=4$

$ae=4,\ 2a=4 \Rightarrow a=2$

$\frac{x^2}{a^2}-\frac{y^2}{(ae)^2-a^2}=1$

$\frac{x^2}{4}-\frac{y^2}{16-4}=1$

$\frac{x^2}{4}-\frac{y^2}{12}=1$

$3x^2-y^2=12$

47. Let the line is

$\frac{x}{a}+\frac{y}{b}=1$

Given that $a+b=12 \Rightarrow b=12-a$

$Area\ of\ AOB\quad A=\frac{1}{2}ab$

$=\frac{a}{2}(12-a)$

$=6a-\frac{a^2}{2}$

$\frac{dA}{da}=6-a\ and\ \frac{d^2A}{da^2}=-1$

For max of A, $\frac{dA}{da}=0 \Rightarrow a=6 \therefore b=6$

$\therefore$Req line equation is x+y=6

48. $Given\ \ A(2,3), B(-4,5)$

$Area=12$

$\frac{1}{2}\begin{vmatrix} x_1-x_2 & x_1-x_3 \\ y_1-y_2 & y_1-y_3 \end{vmatrix}=12$

$\frac{1}{2}\begin{vmatrix} x-2 & x+4 \\ y-3 & y-5 \end{vmatrix}=12$

49. $x=t^2+t+1, y=t^2-t+1$

$x-1=t^2+t$ - (1)

$y-1=t^2=t$ - (2)

(1) + (2)

$x+y-2=2t^2$

$t^2=\frac{x+y-2}{2}, t=\sqrt{\frac{x+y-2}{2}}$

$\therefore x=t^2+t+1$

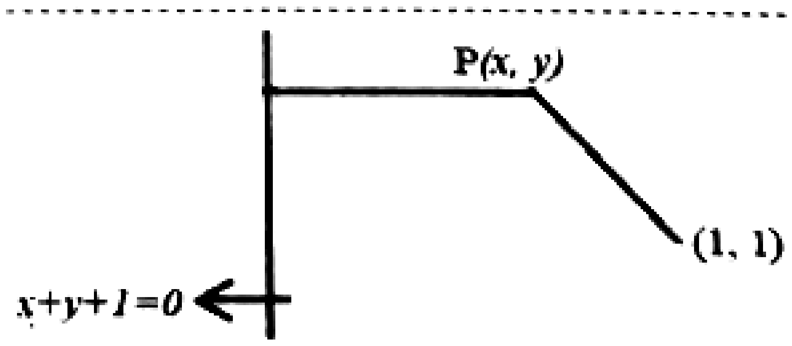
$x-\frac{x+y-2}{2}-1=\sqrt{\frac{x+y-2}{2}}$

$\frac{x-y}{\sqrt{2}}=\frac{\sqrt{x+y-2}}{1}$

Squaring on both sides

$x^2+y^2-2xy-2x-2y+4=0$

50.



$$\sqrt{(x-1)^2+(y-1)^2} = \frac{(x+y+1)}{\sqrt{1+1}}$$

Given $(x-1)^2+(y-1)^2 = \frac{(x+y+1)^2}{2}$

$2x^2+2-4x+2y^2+2-4y = x^2+y^2+1+2xy+2y+2x$

$x^2+y^2-6x-6y-2xy+3=0$

Locus of P is $(x-y)^2-6(x+y)+3=0$

51. $x=\frac{3at}{1+t^3}$, $y=\frac{3at^2}{1+t^3}$

$$x^3+y^3=\frac{27a^3t^3(1+t^3)}{(1+t^3)^3}$$

$$=3a\left(\frac{3at}{1+t^3}\right)\left(\frac{3at^2}{1+t^3}\right)$$

$$\Rightarrow x^3+y^3=3axy$$

52. Required equation is $\frac{4(x-a)^2}{k^2-4b^2}+\frac{4y^2}{k^2}=1$

Here $a=2, b=3, k=8$

53. $\frac{2x}{a}=t+\frac{1}{t}$.......(1) | $\frac{2y}{a}=t-\frac{1}{t}$ ....(2)

(1) + (2) $\Rightarrow \frac{2}{a}(x+y)=2t \Rightarrow x+y=at$......(3)

(1) – (2)

$\Rightarrow \frac{2}{a}(x-y)=\frac{2}{t} \Rightarrow x-y=\frac{a}{t}$.....(4)

(3) × (4) ⇒ (x + y) (x – y) = a2

⇒ x2 – y2 = a2

54. Let A = (a,0) B =(0,a) be end pts of hypotenuse

Let P(x, y) be the 3rd vertex

Slope of AP x slope of BP = -1

$$\frac{y}{x-a}\times\frac{y-a}{x}=-1$$

$y^2-ay=-x^2+ax$

$x^2+y^2-ax-ay=0$

55. Let p(x,y) be any point in the locus.

(x,y) =centroid of ΔOAB

$$=\left(\frac{a\sec-a\tan t+0}{3},\frac{b\tan t+b\sec t+0}{3}\right)$$

$x=a\frac{(\sec t-\tan t)}{3}$, $y=b\frac{(\sec t+\tan t)}{3}$

$3x=a(\sec t-\tan t)\to(1)$, $3y=b(\sec t+\tan t)\to(2)$

$(1)\times(2)\Rightarrow 9xy=ab(\sec^2 t-\tan^2 t)$

Locus is 9xy = ab

56. Given equation of the ellipse

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

$a^2=2,\ b^2=1$

Equation of the tangent at p (θ) to the ellipse

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

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

$A\left(\frac{\sqrt{2}}{\cos\theta},0\right)B\left(0,\frac{1}{\sin\theta}\right)$

Locus is the mid point of AB

$x_1=\frac{1}{\sqrt{2}\cos\theta}\ y_1=\frac{1}{2\sin\theta}$

$\cos\theta=\frac{1}{\sqrt{2}x_1}\quad \sin\theta=\frac{1}{2y_1}$

$\cos^2\theta+\sin^2\theta=1$

$\Rightarrow\frac{1}{2x_1^2}+\frac{1}{4y_1^2}=1$

Hence locus of midpoint of AB is

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

57. Given *Given* $A=(2,0)$ and $B=(0,-2)$

Let $p(x,y)$ be any point on locus

And Given PA+PB=4

PA=4-PB

$PA^2-PB^2-16=-8PB$

$(x-2)^2+(y-0)^2-\left[x^2+(y+2)^2\right]-16=-8PB$

$x+y+4=2PB$

$3x^2+3y^2-2xy-8x+8y=0$

58. Let A (0,2) , B(-1, 0) , $P(x,y)$

$PA=\frac{1}{\sqrt{2}}$ PB

$2PA^2=PB^2$

$2\left[x^2+(y-2)^2\right]=(x+1)^2+y^2$

$x^2+y^2-2x-8y+7=0$

Locus is a circle with centre (1,4)

And r = 10cm

59. $\Delta PAB=\frac{1}{2}\begin{vmatrix}x-1 & y-2\\ -1 & 1\end{vmatrix}=\frac{1}{2}|x-1+y-2|$

$=\frac{1}{2}|x+y-3|$

$\Delta PABC=\frac{1}{2}\begin{vmatrix}x-2 & y-2\\ 2 & 3\end{vmatrix}$

$=\frac{1}{2}|3x-6-2y++2|=\frac{1}{2}|3x-2y-4|$

$\Delta PABC=2\Delta PAB$

$\frac{1}{2}|3x-2y-4|=2\frac{1}{2}|x+y-3|$

squaring on both sides

$x^2-4xy+8y-4=0$