2. LOCUS

Synopsis:

1. Locus is a set of points satisfying the given geometric property.
2. Locus of a point which is at a constant distance from a fixed point is a **circle**.
3. If A, B are two given points, then the locus of P such that the area of ΔPAB is a "pair of lines".
4. If A(a, 0) and B(–a, 0) be two points, then the equation of locus of P such that PA + PB = C or PA – PB = c or |PA + PB| = c is $\frac{4x^2}{c^2}+\frac{4y^2}{c^2-4a^2}=1$.
5. If A(0, b) and B(0, –b) be two points, then the equation of locus of P such that PA + PB = C or PA – PB = c or |PA + PB| = c is $\frac{4y^2}{c^2}+\frac{4x^2}{c^2-4b^2}=1$.
6. If a line segment $\overline{AB}$ subtends a right angle at P, then the locus of P is a "circle", the equation of the locus is $(x - x_1)(x - x_2) + (y - y_1)(y - y_2) = 0$.
7. If A and B are two fixed points and a point P moves such that PA : PB = m : n ($m \neq n$), then the locus of P is a "circle".
8. A and B are two fixed points $PA \pm PB = k$ (constant), then $k > AB \Rightarrow$ Locus of P is an ellipse having A, B as foci. $k = AB \Rightarrow$ Locus of P is union of two rays (i.e., the line segment $\overrightarrow{AB}$)
   $k < AB \Rightarrow$ Locus of P is hyperbola.
9. The locus of the point whose distances from two parallel lines $ax + by + c_1 = 0$, $ax + by + c_2 = 0$ are in the ratio m : n is $ax + by + \left(\frac{mc_2+nc_1}{m+n}\right) = 0$.
10. A variable line passes through a fixed point (x_0, y_0) the locus of point which divides the portion between axis in the ratio m : n is $\frac{nx_0}{x}+\frac{my_0}{y} = m + n$.
11. The distance from origin to a variable line is a constant P then the locus of the point which divides the portion between the axis in the ratio m : n is $\frac{m^2}{x^2}+\frac{n^2}{y^2}=\frac{(m+n)^2}{p^2}$.