

1. $b^2x^2 - a^2y^2 = 0$ $(bx - ay)(bx + ay) = 0$ $bx - ay = 0$ or $bx + ay = 0$
(degenerate hyperbola ; the graph is two intersecting lines which are the asymptotes of the hyperbolas $\pm b^2x^2 - a^2y^2 = a^2b^2$)
2. No real point < 0 imaginary parabola
 Two coincident lines when a (or b) $= 0$ degenerate parabola
 Two parallel lines > 0
 The discussion is also valid when x and y are replaced by $x - h$ and $y - k$.

EXERCISES (4,1)

1. Find the projections on the coordinate axes and the length of the line segment joining the following points:
 a) $(-4, 4)$ and $(1, 3)$ b) $(-\sqrt{2}, \sqrt{3})$ and $(\sqrt{3}, \sqrt{2})$
2. Find the midpoint of the line segment with the following and points:
 a) $(a - b, d - c)$ and $(a + b, c + d)$ b) $(-4, 6)$ and $(2, 4)$
3. Find the coordinates of the point which divides internally the line segment joining $(-1, 4)$ and $(-5, -8)$ in the ratio $1/3$.
4. Find the locus of the points equidistant from $A(3, -4)$ and $B(-1, 6)$.
5. One end of a line segment whose length is 13 is the point $(-4, 8)$, the ordinate of the other end is -3. What is its abscissa?
6. Show that the diagonals of a rectangle are equal.