

Line

General equation

$$Ax+By+C=0$$

Point slope equation

$$y-y_1=m(x-x_1)$$

Slope of a straight line (m)

$$m=-A/B$$

$$m=(y_2-y_1)/(x_2-x_1)$$

$$m=\tan(\alpha)$$

Positions relative to two lines

Equations

$$Ax+By+C=0$$

$$A'x+B'y+C'=0$$

Secant lines

$$A/A' \neq B/B'$$

Parallel lines

$$A/A' = B/B' \neq C/C'$$

Coincident lines

$$A/A' = B/B' = C/C'$$

Parallel lines

Slope

$$m_1=m_2$$

$$-A/B = -A'/B'$$

Perpendicular lines

Slope

$$m_1.m_2=-1$$

$$-A/B = B'/A'$$

Points

Coordinates

$$P(x_1,y_1)$$

$$Q(x_2,y_2)$$

$$M(x_3,y_3)$$

Distance between two points (P and Q)

$$d=\sqrt{[(x_2-x_1)^2+(y_2-y_1)^2]}$$

Midpoint (M)

$$x_3=(x_1+x_2)/2$$

$$y_3=(y_1+y_2)/2$$

Distance from a point (P) to a line

$$d=|(A.x_1+B.y_1+C)/\sqrt{(a^2+b^2)}|$$

Circumference

Ordinary equation

$$(x-a)^2+(y-b)^2=r^2$$

Elements

$$\text{Center: } C(a,b)$$

$$\text{Point: } P(x,y)$$

$$\text{Radius: } r$$

General equation

$$x^2+y^2+Ax+By+C=0$$

If:

$$(A/2)^2+(B/2)^2-C>0$$

x and y don't multiply

x^2 and y^2 have 1 as coefficient

Elements

$$A=-2a$$

$$B=-2b$$

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

Ellipse

Equation

$$[(x-x_0)^2]/(a^2)+[(y-y_0)^2]/(b^2)=1$$

$$\text{Center: } C(x_0,y_0)$$

$$\text{Horizontal radius: } a$$

$$\text{Vertical radius: } b$$

Parabola

General equation

$$Ax^2+Bxy+Cy^2+Dx+Ey+F=0$$

If:

$$A \neq 0 \vee B \neq 0$$

$$B^2-4AC=0$$

Vertical Parabola Ordinary Equation

$$(x-x_0)^2=2p(y-y_0)$$

$$\text{Vertex: } V(x_0,y_0)$$

$$\text{Parameter: } p$$

Horizontal Parabola Ordinary Equation

$$(y-y_0)^2=2p(x-x_0)$$

$$\text{Vertex: } V(x_0,y_0)$$

$$\text{Parameter: } p$$

Hyperbola

General equation

$$Ax^2+Bxy+Cy^2+Dx+Ey+F=0$$

If:

$$A \neq 0 \wedge B \neq 0$$

$$A.B < 0$$

Ordinary Equation (horizontal focal axis)

$$[(x-x_0)^2]/(a^2)-[(y-y_0)^2]/(b^2)=1$$

Ordinary Equation (vertical focal axis)

$$[(y-y_0)^2]/(b^2)-[(x-x_0)^2]/(a^2)=1$$

Equilateral Hyperbola Equation

$$a=b$$

Asymptotes

$$y=x$$

$$y=-x$$

Elements

$$\text{Center: } O(x_0,y_0)$$

Length of the semimajor axis of the hyperbola: a

Length of the semi-minor axis of the hyperbola: b