Parabola formula

The standard formula of a parabola

1.
$$y^2 = 2px$$

Parametric equations o fthe parabola:

2.
$$x = 2pt^2$$

$$y = 2pt$$

Tangent line in a point D(X_0,Y_0) of a parabola

$$y^2 = 2px$$

is:

3.
$$y_0 y = p(x + x_0)$$

Tangent line with a given slope m:

4.
$$y = mx + \frac{2}{2m}$$

Tangent lines from a given point

Take a fixed point P(x_0,y_0) the equations of the tangent lines are

$$y - y_0 = m_1(x - x_0)$$
$$y - y_0 = m_2(x - x_0)$$
$$m_1 = \frac{y_0 + \sqrt{y_0^2 - 2px_0}}{2x_0}$$
$$m_2 = \frac{y_0 - \sqrt{y_0^2 - 2px_0}}{2x_0}$$

The Ellipse formulas

the set of all points in the plane,the sum of whose distances from two fixed points,called the foci ,is a constant.
the standard formula of a ellipse:
6.
$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$
Parametric equations of the ellipse::
7.
$$x = acost$$
$$y = bsint$$

Tangent line in a point D(x_0,y_0) of a ellipse:
8.
$$\frac{x_0x}{a^2} + \frac{y_0y}{b^2} = 1$$

Eccentricity of the ellipse:

9.

$$e = \frac{\sqrt{a^2 - b^2}}{a}$$

Foci of the ellipse:
10.
if

$$a \geq b \Rightarrow F_1(-\sqrt{a^2 - b^2}, 0)F_2(\sqrt{a^2 - b^2}, 0)$$

if

$$a < b \Rightarrow F_1(0, -\sqrt{b^2 - a^2})F_2(0, \sqrt{b^2 - a^2})$$

Area of the ellipse

11.

$$A = \pi \cdot a \cdot b$$

The Hyperbola Formulas

The set of all points in the plane,the difference of whose distances from two fixedpoints,called the focci,remains constant.
The standard formula of a Hyperbola:
12.

$$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$$

Parametric equations of the Hyperbola:
13.

$$x = \frac{a}{\sin t}$$

$$y = \frac{b \sin t}{\cos t}$$

Tangent line in a point D(x_0,y_0) of a Hyperbola
14.

$$\frac{x_0 x}{a^2} - \frac{y_0 y}{b^2} = 1$$

Foci:

15.

if

$$a \geq b \Rightarrow F_1(-\sqrt{a^2+b^2},0)F_2(\sqrt{a^2+b^2},0)$$

if

$$a < b \Rightarrow F_1(0,-\sqrt{a^2+b^2})F_2(0,\sqrt{a^2+b^2})$$

Asymptotes:

16.if

$$a \geq b \Rightarrow y = \frac{b}{a}x$$

and

$$y = -\frac{b}{a}x$$

if

$$a < b \Rightarrow y = \frac{a}{b}x$$

and

$$y = -\frac{a}{b}x$$