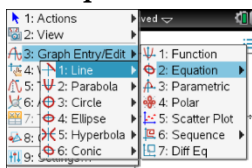


8.1, 8.2 & 8.3 Parabolas, Ellipses & Hyperbolas

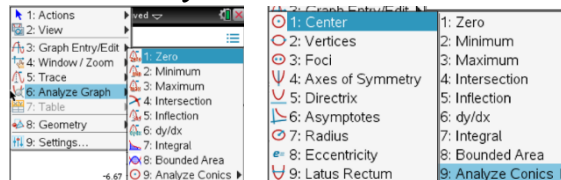
Target 4A/4C/4E: Investigate the geometric properties of parabolas/ellipses/hyperbolas

Graphing Conic Sections on the TI-Nspire

Graph Conics



Analyze conics



Type of Conic	Equation	Key Features
Circle	$(x - 1)^2 + (y + 3)^2 = 8$ $(x - 1)^2 + (y + 3)^2 = (\sqrt{8})^2$	Center $(1, -3)$ Radius $2.828$ (or $\sqrt{8}$ )
Parabola	$(y + 3)^2 = 8(x - 1)$ $\frac{1}{8}(y + 3)^2 = x - 1$ $\frac{1}{8}(y + 3)^2 + 1 = x$	Vertex $(1, -3)$ Focus $(3, -3)$ Directrix $x = -1$ Axis of Symmetry $y = -3$ Focal Width (Latus Rectum) $8$ Eccentricity $e = 1$
Ellipse	$\frac{(x + 2)^2}{25} + \frac{(y - 1)^2}{36} = 1$ $\frac{(x - (-2))^2}{5^2} + \frac{(y - 1)^2}{6^2} = 1$	Center $(-2, 1)$ Vertices $(-2, 7)$ and $(-2, -5)$ Foci $(-2, 4.317)$ and $(-2, -2.317)$ Axes of Symmetry $x = -2$ and $y = 1$ Eccentricity $e = .553$
Hyperbola	$\frac{y^2}{9} - \frac{x^2}{16} = 1$ $\frac{y^2}{3^2} - \frac{x^2}{4^2} = 1$ "south-north" ...	Center $(0, 0)$ Vertices $(0, 3)$ and $(0, -3)$ Foci $(0, 5)$ and $(0, -5)$ Axes of Symmetry $y = 0$ and $x = 0$ Asymptotes $y = \frac{3}{4}x$ , $y = -\frac{3}{4}x$ or $y = \pm \frac{3}{4}x$ Eccentricity $e = \frac{5}{3}$

Type of Conic	Equation	Key Features
Ellipse	$\frac{x^2}{9} + \frac{y^2}{16} = 1$ $\frac{x^2}{3^2} + \frac{y^2}{4^2} = 1$	<p>Center: <math>(0,0)</math></p> <p>Vertices: <math>(0,4)</math> and <math>(0,-4)</math></p> <p>Foci: <math>(0, 2.646)</math> and <math>(0, -2.646)</math></p> <p>Axes of Symmetry: <math>x=0</math> and <math>y=0</math></p> <p>Eccentricity: <math>e = 0.661</math></p>
Hyperbola	$\frac{(x-1)^2}{25} - \frac{(y-4)^2}{36} = 1$ $\frac{(x-1)^2}{5^2} - \frac{(y-4)^2}{6^2} = 1$ <p>"east-west" ... 😊</p>	<p>Center: <math>(1,4)</math></p> <p>Vertices: <math>(-4,4)</math> and <math>(6,4)</math></p> <p>Foci: <math>(-6.810, 4)</math> and <math>(8.810, 4)</math></p> <p>Axes of Symmetry: <math>x=1</math> and <math>y=4</math></p> <p>Asymptotes: <math>y = \frac{6}{5}x + \frac{14}{5}</math>, <math>y = -\frac{6}{5}x + \frac{26}{5}</math></p> <p>Eccentricity: <math>e = 1.562</math></p>
Parabola	$(x-2)^2 = 6(y-1)$ $\frac{1}{6}(x-2)^2 = y-1$ $\frac{1}{6}(x-2)^2 + 1 = y$	<p>Vertex: <math>(2,1)</math></p> <p>Focus: <math>(2, \frac{5}{2})</math></p> <p>Directrix: <math>y = -\frac{1}{2}</math></p> <p>Axis of Symmetry: <math>x=2</math></p> <p>Focal width: <math>6</math></p> <p>Eccentricity: <math>e = 1</math></p>
Ellipse	$\frac{(x+2)^2}{36} + \frac{(y-1)^2}{25} = 1$ $\frac{(x+2)^2}{6^2} + \frac{(y-1)^2}{5^2} = 1$	<p>Center: <math>(-2,1)</math></p> <p>Vertices: <math>(-8,1)</math> and <math>(4,1)</math></p> <p>Foci: <math>(-5.317, 1)</math> and <math>(1.317, 1)</math></p> <p>Axes of Symmetry: <math>x=-2</math> and <math>y=1</math></p> <p>Eccentricity: <math>e = .553</math></p>

**More Practice**

**Conics on the TI-Nspire**

<https://www.youtube.com/watch?v=4z63CeoJD1Q>

**Homework Assignment**

p.640 #39,43,45, p.652 #17,19,20, p.663 #17,21,22