

Conics Section	Center/vertex at (0,0)	Center/Vertex at (h, k)	Foci
Circle (10.3)	Center (0,0) $x^2 + y^2 = r^2$	Center (h, k) $(x - h)^2 + (y - k)^2 = r^2$	NA
Ellipse (10.4) $a^2 - b^2 = c^2$	Center (0,0) $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ $\frac{x^2}{b^2} + \frac{y^2}{a^2} = 1$	Center $\frac{(x - h)^2}{a^2} + \frac{(y - k)^2}{b^2} = 1$ $\frac{(x - h)^2}{b^2} + \frac{(y - k)^2}{a^2} = 1$	$(h \pm c, k)$ $(h, k \pm c)$
Hyperbola (10.5) $a^2 + b^2 = c^2$	Center (0,0) $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ $\frac{y^2}{a^2} - \frac{x^2}{b^2} = 1$	Center (h, k) $\frac{(x - h)^2}{a^2} - \frac{(y - k)^2}{b^2} = 1$ $\frac{(y - k)^2}{a^2} - \frac{(x - h)^2}{b^2} = 1$	$(h \pm c, k)$ $(h, k \pm c)$
Parabola (10.2) $ a = \frac{1}{4c}$	Vertex (0,0) $y = ax^2$ $x = ay^2$	Vertex (h, k) $y = a(x - h)^2 + k$ $x = a(y - k)^2 + h$	$(h, k \pm c)$ $(h \pm c, k)$

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Ellipse (10.4) $a^2 - b^2 = c^2$	Center (0,0) $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ $\frac{x^2}{b^2} + \frac{y^2}{a^2} = 1$	Center (h, k) $\frac{(x - h)^2}{a^2} + \frac{(y - k)^2}{b^2} = 1$ $\frac{(x - h)^2}{b^2} + \frac{(y - k)^2}{a^2} = 1$	$(h \pm c, k)$ $(h, k \pm c)$
Hyperbola (10.5) $a^2 + b^2 = c^2$	Center (0,0) $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ $\frac{y^2}{a^2} - \frac{x^2}{b^2} = 1$	Center (h, k) $\frac{(x - h)^2}{a^2} - \frac{(y - k)^2}{b^2} = 1$ $\frac{(y - k)^2}{a^2} - \frac{(x - h)^2}{b^2} = 1$	$(h \pm c, k)$ $(h, k \pm c)$
Parabola (10.2) $ a = \frac{1}{4c}$	Vertex (0,0) $y = ax^2$ $x = ay^2$	Vertex (h, k) $y = a(x - h)^2 + k$ $x = a(y - k)^2 + h$	$(h, k \pm c)$ $(h \pm c, k)$