| Conics Section | Center/vertex <br> at $(0,0)$ | Center/Vertex <br> at $(h, k)$ | Foci |
| :---: | :---: | :---: | :---: |
| $\begin{aligned} & \text { Circle } \\ & \text { (10.3) } \end{aligned}$ | $\begin{gathered} \text { Center }(0,0) \\ x^{2}+y^{2}=r^{2} \\ \hline \end{gathered}$ | $\begin{gathered} \text { Center }(h, k) \\ (x-h)^{2}+(y-k)^{2}=r^{2} \end{gathered}$ | NA |
| Ellipse <br> (10.4) $a^{2}-b^{2}=c^{2}$ | $\begin{aligned} & \text { Center }(0,0) \\ & \frac{x^{2}}{a^{2}}+\frac{y^{2}}{b^{2}}=1 \\ & \frac{x^{2}}{b^{2}}+\frac{y^{2}}{a^{2}}=1 \end{aligned}$ | Center $\begin{aligned} & \frac{(x-h)^{2}}{a^{2}}+\frac{(y-k)^{2}}{b^{2}}=1 \\ & \frac{(x-h)^{2}}{b^{2}}+\frac{(y-k)^{2}}{a^{2}}=1 \end{aligned}$ | $\begin{aligned} & (h \pm c, k) \\ & (h, k \pm c) \end{aligned}$ |
| Hyperbola <br> (10.5) $a^{2}+b^{2}=c^{2}$ | $\begin{aligned} & \text { Center }(0,0) \\ & \frac{x^{2}}{a^{2}}-\frac{y^{2}}{b^{2}}=1 \\ & \frac{y^{2}}{a^{2}}-\frac{x^{2}}{b^{2}}=1 \end{aligned}$ | $\begin{gathered} \text { Center }(h, k) \\ \frac{(x-h)^{2}}{a^{2}}-\frac{(y-k)^{2}}{b^{2}}=1 \\ \frac{(y-k)^{2}}{a^{2}}-\frac{(x-h)^{2}}{b^{2}}=1 \end{gathered}$ | $\begin{aligned} & (h \pm c, k) \\ & (h, k \pm c) \end{aligned}$ |
| Parabola $\begin{gathered} (10.2) \\ \|a\|=\frac{1}{4 c} \end{gathered}$ | $\begin{gathered} \text { Vertex }(0,0) \\ \begin{array}{c} y=a x^{2} \\ x=a y^{2} \end{array} \end{gathered}$ | $\begin{gathered} \text { Vertex }(h, k) \\ y=a(x-h)^{2}+k \\ x=a(y-k)^{2}+h \end{gathered}$ | $\begin{aligned} & (h, k \pm c) \\ & (h \pm c, k) \end{aligned}$ |


| Conics Section | Center/vertex $\text { at }(0,0)$ | Center/Vertex <br> at $(h, k)$ | Foci |
| :---: | :---: | :---: | :---: |
| $\begin{aligned} & \text { Circle } \\ & (10.3) \\ & \hline \end{aligned}$ | $\begin{gathered} \text { Center }(0,0) \\ x^{2}+y^{2}=r^{2} \end{gathered}$ | $\begin{gathered} \text { Center }(h, k) \\ (x-h)^{2}+(y-k)^{2}=r^{2} \end{gathered}$ | NA |
| Ellipse <br> (10.4) $a^{2}-b^{2}=c^{2}$ | $\begin{aligned} & \text { Center }(0,0) \\ & \frac{x^{2}}{a^{2}}+\frac{y^{2}}{b^{2}}=1 \\ & \frac{x^{2}}{b^{2}}+\frac{y^{2}}{a^{2}}=1 \end{aligned}$ | $\begin{gathered} \text { Center }(h, k) \\ \frac{(x-h)^{2}}{a^{2}}+\frac{(y-k)^{2}}{b^{2}}=1 \\ \frac{(x-h)^{2}}{b^{2}}+\frac{(y-k)^{2}}{a^{2}}=1 \end{gathered}$ | $\begin{aligned} & (h \pm c, k) \\ & (h, k \pm c) \end{aligned}$ |
| Hyperbola <br> (10.5) $a^{2}+b^{2}=c^{2}$ | $\begin{aligned} & \text { Center }(0,0) \\ & \frac{x^{2}}{a^{2}}-\frac{y^{2}}{b^{2}}=1 \\ & \frac{y^{2}}{a^{2}}-\frac{x^{2}}{b^{2}}=1 \end{aligned}$ | $\begin{gathered} \text { Center (h,k) } \\ \frac{(x-h)^{2}}{a^{2}}-\frac{(y-k)^{2}}{b^{2}}=1 \\ \frac{(y-k)^{2}}{a^{2}}-\frac{(x-h)^{2}}{b^{2}}=1 \end{gathered}$ | $\begin{aligned} & (h \pm c, k) \\ & (h, k \pm c) \end{aligned}$ |
| $\begin{gathered} \text { Parabola } \\ \text { (10.2) } \\ \|a\|=\frac{1}{4 c} \end{gathered}$ | $\begin{gathered} \text { Vertex }(0,0) \\ \begin{array}{c} y=a x^{2} \\ x=a y^{2} \end{array} \end{gathered}$ | $\begin{gathered} \text { Vertex }(h, k) \\ y=a(x-h)^{2}+k \\ x=a(y-k)^{2}+h \end{gathered}$ | $\begin{aligned} & (h, k \pm c) \\ & (h \pm c, k) \end{aligned}$ |

