

Name: _____

Writing Conics Using the Foci

You know the standard form of the conic equation and how to determine the distance to the focus (c) using a and b :

Ellipse: $a^2 - b^2 = c^2$ **Hyperbola:** $a^2 - (-b^2) = c^2$

Now, we're going to turn this process around and use c to determine a and b .

Determine the value of the un-identified variable and write the equation of the conic.

<p>EXAMPLE On the ellipse, x wins. $(h, k) = (3, 2)$ $a = 4$ $b = \underline{\hspace{1cm}}$ $c = 2$</p> <p style="text-align: center; margin-top: 100px;">The equation of the conic is:</p>	<p>1. On the hyperbola, y wins. $(h, k) = (-2, 4)$ $a = \underline{\hspace{1cm}}$ $b = 7$ $c = 5$</p> <p style="text-align: center; margin-top: 100px;">The equation of the conic is:</p>	<p>2. On the ellipse, y wins. $(h, k) = (-5, 0)$ $a = \underline{\hspace{1cm}}$ $b = 6$ $c = 7$</p> <p style="text-align: center; margin-top: 100px;">The equation of the conic is:</p>
<p>3. On the hyperbola, x wins. $(h, k) = (-6, 8)$ $a = \underline{\hspace{1cm}}$ $b = 4$ $c = 4$</p> <p style="text-align: center; margin-top: 100px;">The equation of the conic is:</p>	<p>4. On the ellipse, x wins. $(h, k) = (3, -3)$ $a = 6$ $b = \underline{\hspace{1cm}}$ $c = 3$</p> <p style="text-align: center; margin-top: 100px;">The equation of the conic is:</p>	<p>5. On the hyperbola, y wins. $(h, k) = (1, 1)$ $a = 9$ $b = \underline{\hspace{1cm}}$ $c = 11$</p> <p style="text-align: center; margin-top: 100px;">The equation of the conic is:</p>
<p>6. On the ellipse, y wins. $(h, k) = (0, 0)$ $a = \underline{\hspace{1cm}}$ $b = 8$ $c = 8$</p> <p style="text-align: center; margin-top: 100px;">The equation of the conic is:</p>	<p>7. On the hyperbola, x wins. $(h, k) = (0, -2)$ $a = 3$ $b = \underline{\hspace{1cm}}$ $c = 5$</p> <p style="text-align: center; margin-top: 100px;">The equation of the conic is:</p>	<p>8. On the ellipse, x wins. $(h, k) = (4, 3)$ $a = 10$ $b = \underline{\hspace{1cm}}$ $c = 7$</p> <p style="text-align: center; margin-top: 100px;">The equation of the conic is:</p>

Use the given points to **determine a, b, and c**. Remember:

a is the distance (change in x **or** y) between the center point and the winning corner (vertex)

b is the distance (change in x **or** y) between the center point and the losing corner (co-vertex)

c is the distance (change in x **or** y) between the center point and the focus ($a^2 - b^2 = c^2$).

<p>EXAMPLE Ellipse: Center = (3, 5) Vertex = (3, 7) Co-Vertex = (4, 5)</p> <p><i>a</i> is from the center to the winner (center→vertex) (3, 5) → (3, 7) The change is 7 - 5 = 2...<i>a</i> = 2</p> <p><i>b</i> is from the center to the loser (center→co-vertex) (3, 5) → (4, 5) The change is 4 - 3 = 1...<i>b</i> = 1</p> <p><i>c</i> is from the center to the focus, which we don't know, so we'll use the formula.</p> $a^2 - b^2 = c^2$ $2^2 - 1^2 = c^2$ $4 - 1 = c^2$ $3 = c^2$ $\sqrt{3} = c$ $1.7 \approx c$ <p><i>a</i> = <input type="text" value="2"/> <i>b</i> = <input type="text" value="1"/> <i>c</i> = <input type="text" value="1.7"/></p>	<p>EXAMPLE Ellipse: Center = (0, 2) Vertex = (5, 2) Focus = (4, 2)</p> <p><i>a</i> is from the center to the winner (center→vertex) (0, 2) → (5, 2) The change is 5 - 0 = 5...<i>a</i> = 5</p> <p><i>b</i> is from the center to the loser (center→co-vertex), but we don't have it, so we'll solve after we have <i>c</i>.</p> <p><i>c</i> is from the center to the focus (0, 2) → (4, 2) The change is 4 - 0 = 4...<i>c</i> = 4</p> <p>Plug it in to find <i>b</i>.</p> $a^2 - b^2 = c^2$ $5^2 - b^2 = 4^2$ $25 - b^2 = 16$ $-b^2 = -9$ $b^2 = 9$ $b = \sqrt{9} = 3$ <p><i>a</i> = <input type="text" value="5"/> <i>b</i> = <input type="text" value="3"/> <i>c</i> = <input type="text" value="4"/></p>	<p>EXAMPLE Hyperbola: Center = (2, -1) Focus = (-4, -1) Co-Vertex = (2, 3)</p> <p><i>a</i> is from the center to the winner (center→vertex) but we don't have it, so we'll solve after we have <i>c</i>.</p> <p><i>b</i> is from the center to the loser (center→co-vertex), (2, -1) → (2, 3) The change is 3 - -1 = 3 + 1 = 4...<i>b</i> = 4</p> <p><i>c</i> is from the center to the focus (2, -1) → (-4, -1) The change is 2 - -4 = 2 + 4 = 6...<i>c</i> = 6</p> <p>Plug it in to find <i>a</i>.</p> $a^2 - (-b^2) = c^2$ $a^2 + 4^2 = 6^2$ $a^2 + 16 = 36$ $a^2 = 20$ $a = \sqrt{20} \approx 4.5$ <p><i>a</i> = <input type="text" value="4.5"/> <i>b</i> = <input type="text" value="4"/> <i>c</i> = <input type="text" value="6"/></p>
<p>1. Hyperbola: Center = (-3, 2) Focus = (-3, 5) Co-Vertex = (-5, 2)</p> <p><i>a</i> = _____ <i>b</i> = _____ <i>c</i> = _____</p>	<p>2. Ellipse: Center = (4, 4) Vertex = (4, 8) Focus = (4, 6)</p> <p><i>a</i> = _____ <i>b</i> = _____ <i>c</i> = _____</p>	<p>3. Hyperbola: Center = (3, -4) Vertex = (6, -4) Co-Vertex = (3, -7)</p> <p><i>a</i> = _____ <i>b</i> = _____ <i>c</i> = _____</p>
<p>4. Hyperbola: Center = (5, 9) Vertex = (5, 5) Focus = (5, 3)</p> <p><i>a</i> = _____ <i>b</i> = _____ <i>c</i> = _____</p>	<p>5. Hyperbola: Center = (2, -4) Vertex = (6, -4) Co-Vertex = (2, 2)</p> <p><i>a</i> = _____ <i>b</i> = _____ <i>c</i> = _____</p>	<p>6. Ellipse: Center = (6, 5) Focus = (4, 5) Co-Vertex = (6, 4)</p> <p><i>a</i> = _____ <i>b</i> = _____ <i>c</i> = _____</p>
<p>7. Ellipse: Center = (-4, 8) Vertex = (-4, 5) Co-Vertex = (-2, 8)</p> <p><i>a</i> = _____ <i>b</i> = _____ <i>c</i> = _____</p>	<p>8. Hyperbola: Center = (8, -8) Vertex = (1, -8) Focus = (-2, -8)</p> <p><i>a</i> = _____ <i>b</i> = _____ <i>c</i> = _____</p>	<p>9. Ellipse: Center = (0, 4) Focus = (0, 8) Co-Vertex = (-2, 4)</p> <p><i>a</i> = _____ <i>b</i> = _____ <i>c</i> = _____</p>