

Writing Equations of Hyperbolas: Use the information provided to write the standard form equation of each hyperbola.

- 7) Vertices: $(-1, 5), (-1, -3)$
 Foci: $(-1, 6), (-1, -4)$

Step 1: transverse axis: y

* Step 2: Center: $(\frac{-1+1}{2}, \frac{5+(-3)}{2}) = (-1, 1)$

* Step 3: a = $(-1, 1)$ to $(-1, 5)$
 $a = 4$ $a^2 = 16$

Step 4: c = $(-1, 1)$ to $(-1, 6)$
 $c = 5$ $c^2 = 25$

* Step 5: $b^2 = 25 - 16$
 $b^2 = 9$

Step 6: Equation:

$$\frac{(y-1)^2}{16} - \frac{(x+1)^2}{9} = 1$$

- 9) Vertices: $(-10, -5), (-10, -13)$
 Foci: $(-10, -4), (-10, -14)$

Step 1: transverse axis: y

* Step 2: Center: $(\frac{-10+(-10)}{2}, \frac{-5+(-13)}{2}) = (-10, -9)$

* Step 3: a = $(-10, -9)$ to $(-10, -13)$
 $a = -4$ $a^2 = 16$

Step 4: c = $(-10, -9)$ to $(-10, -14)$
 $c = -5$ $c^2 = 25$

* Step 5: $b^2 = 25 - 16$
 $b^2 = 9$

Step 6: Equation:

$$\frac{(y+9)^2}{16} - \frac{(x+10)^2}{9} = 1$$

- 8) Vertices: $(-1, -7), (-11, -7)$
 Foci: $(7, -7), (-19, -7)$

Step 1: transverse axis: x

* Step 2: Center: $(-6, -7)$

* Step 3: a = $(-6, -7)$ to $(-11, -7)$
 $a = 5$ $a^2 = 25$

Step 4: c = $(-6, -7)$ to $(-19, -7)$
 $c = 13$ $c^2 = 169$

* Step 5: $b^2 = 169 - 25 = 144$

Step 6: Equation:

$$\frac{(x+6)^2}{25} - \frac{(y+7)^2}{144} = 1$$

- 10) Vertices: $(1, -8), (-5, -8)$
 Foci: $(3, -8), (-7, -8)$

Step 1: transverse axis: x

* Step 2: Center: $(\frac{1+(-5)}{2}, \frac{-8+(-8)}{2}) = (-2, -8)$

* Step 3: a = $(-2, -8)$ to $(-5, -8)$
 $a = -3$ $a^2 = 9$

Step 4: c = $(-2, -8)$ to $(-7, -8)$
 $c = 5$ $c^2 = 25$

* Step 5: $b^2 = 25 - 9$
 $b^2 = 16$

Step 6: Equation:

$$\frac{(x+2)^2}{9} - \frac{(y+8)^2}{16} = 1$$