MORE PRACTICE: Hyperbolas

For the following hyperbolas, find the following:

1. $\frac{(y+2)^2}{64} - \frac{x^2}{81} = 1$

h = 0, k = -2, a = 8, b = 9

Vertices (0, 6) (0, -10)

Foci $(0, \sqrt{145}-2)$ $(0, -\sqrt{145}-2)$

EQ of Asymptotes $y = \pm \frac{8}{9}x - 2$

$c^2 = 64 + 81 = 145$

$c = \sqrt{145}$

2. $\frac{(x-3)^2}{169} - \frac{(x-1)^2}{9} = 1$

h = 3, k = 1, a = 13, b = 3

Vertices (16, 1) (-10, 1)

Foci $(\sqrt{178}+3, 1)$ $(-\sqrt{178}+3, 1)$

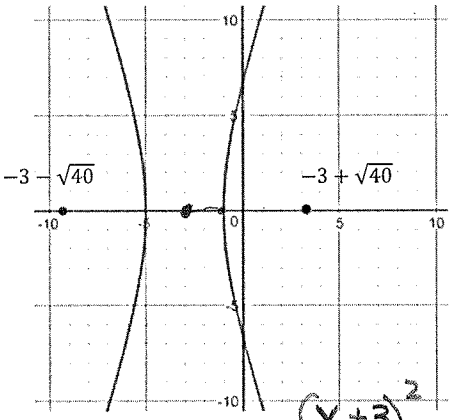
EQ of Asymptotes $y = \pm \frac{3}{13}(x-3) + 1$

$c^2 = 169 + 9 = 178$

$c = \sqrt{178}$

Write the equation of the hyperbola:

3.



$(h,k) = (-3, 0)$

$a = 2$

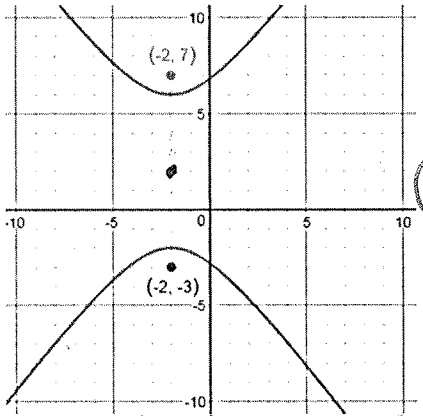
$c + h = -3 + \sqrt{40} \rightarrow c = \sqrt{40}$

$\frac{(x+3)^2}{4} - \frac{y^2}{36} = 1$

$40 = 4 + b^2$

$b^2 = 36$

4.



$(h,k) = (-2, 2)$

$a = 4$

$c + k = 7$

$c + 2 = 7$

$c = 5$

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

$25 = 16 + b^2$

$b^2 = 9$

Given the following properties, graph and write an equation for the hyperbolas.

6. The vertices are (–1, 3) and (1, 3), and the slopes of the asymptotes are ±3.

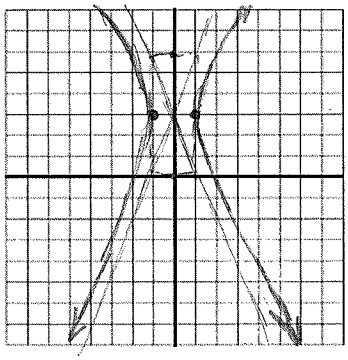
$(h,k) = (0, 3)$

$\pm\frac{b}{a} = \pm\frac{3}{1}$

$b = 3$

$a = 1$

$\frac{x^2}{1} - \frac{(y-3)^2}{9} = 1$



7. The vertices are (2, 3) and (2, 5). The foci are (2, 0) and (2, 8).

$(h,k) = (2, 4)$

$a = 1$

$c = 4$

$16 = 1 + b^2$

$15 = b^2$

$\frac{(y-4)^2}{1} - \frac{(x-2)^2}{15} = 1$