Pre-Calc
Worksheet #2 – Hyperbolas

Name Solutions

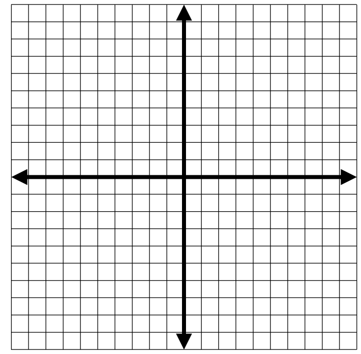
Write an equation in standard form for each hyperbola.

a) Foci at $(\pm 5, 0)$; endpoints of transverse axis $(\pm 3, 0)$

$c = 5$ $a = 3$ $b = 4$ $c(0,0)$

opens L-R

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

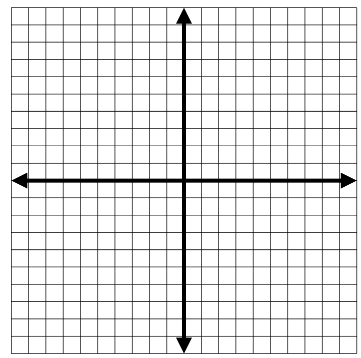


b) Foci at $(0, \pm 7)$; endpoints of transverse axis $(0, \pm 4)$

$c = 7$ $a = 4$ $b = \sqrt{33}$

opens U-D $c(0,0)$

$$\frac{y^2}{16} - \frac{x^2}{33} = 1$$

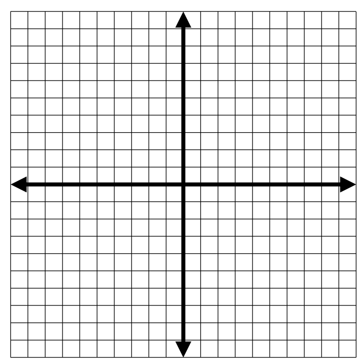


c) Foci at $(0, \pm 6)$; transverse axis length = 6

$c = 6$ $2a = 6$ $a = 3$

$b = \sqrt{27}$ $c(0,0)$ opens U-D

$$\frac{y^2}{9} - \frac{x^2}{27} = 1$$

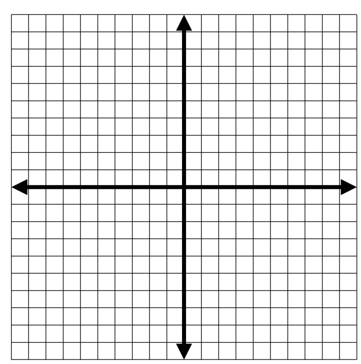


d) Endpoints of transverse axis at $(\pm 4, 0)$; Endpoints of conjugate axis at $(0, \pm 3)$

$a = 4$ $b = 3$ $c = 5$

opens L-R $c(0,0)$

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



e) The endpoints of the transverse axis are $(-2,-3)\,and\,(-2,7)$ and of the conjugate axis are $(-4,2)\,and\,(0,2)$

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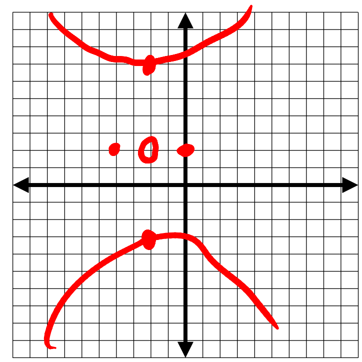
4

$a = 5 \quad b = 2$

$c = 29$

opens u-d

$$\frac{(y-2)^2}{25} - \frac{(x+2)^2}{4} = 1$$

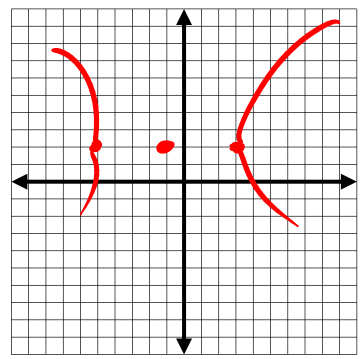


f) The transverse axis endpoints are $(-5,2)\,and\,(3,2)$; the conjugate axis is length 6,

$2a = 8 \quad a = 4 \quad b = 3$

$c(-1,2)$ opens L-R

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



g) State the location of the center, the length of the semi-transverse and semi-conjugate axis, and write in parametric form: $\frac{x^2}{36} - \frac{y^2}{25} = 1$ $c(0,0)$ $2a = 12$ $2b = 10$

$x = 6\sec t$

$y = 5\tan t$

h) State the location of the center, the length of the semi-transverse and semi-conjugate axis, and write in parametric form: $\frac{(x-2)^2}{16} - \frac{(y+1)^2}{12} = 1.$ $c(2,-1)$ $2a = 8$, $2b = 2\sqrt{12}$

$x = 2 + 4\sec t$

$y = -1 + \sqrt{12}\tan t$

i) Put the equation. $3x^2 - 5y^2 - 12x + 30y + 42 = 0$ in to standard form.

$$3(x^2 - 4x + \underline{4}) - 5(y^2 - 6y + \underline{9}) = -42 + 12 - 45$$

$$3(x-2)^2 - 5(y-3)^2 = -75$$

$$\frac{3(x-2)^2}{-75} - \frac{5(y-3)^2}{-75} = \frac{-75}{-75}$$

$$\frac{(y-3)^2}{15} - \frac{(x-2)^2}{25} = 1$$

j) Put the equation. $4x^2 - y^2 - 32x + 16y - 128 = 0$ in to standard form.

$$4(x^2 - 8x + \underline{\quad}) - (y^2 - 16y + \underline{64}) = 128$$

$$4(x^2 - 8x + 16) - (y^2 - 8)^2 = 128 + 64 - 64$$

$$4(x-4)^2 - (y-8)^2 = 128$$

$$\frac{(x-4)^2}{32} - \frac{(y-8)^2}{128} = 1$$