

Hyperbola Writing Equations WS

Name Fuston

Write the equation of the Hyperbola in standard form.

1. $9x^2 - y^2 - 36x - 6y + 18 = 0$

$9x^2 - 36x - y^2 - 6y = -18$

$9(x^2 - 4x + 4) - (y^2 + 6y + 9) = -18 + 36 - 9$

$9(x-2)^2 - (y+3)^2 = 9$

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

2. $16y^2 - x^2 + 2x + 64y + 47 = 0$

$16y^2 + 64y - x^2 + 2x = -47$

$16(y^2 + 4y + 4) - (x^2 - 2x + 1) = -47 + 64 - 1$

$16(y+2)^2 - (x-1)^2 = 16$

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

3. $6x^2 - 4y^2 - 12x - 8y - 46 = 0$

$6x^2 - 12x - 4y^2 - 8y = 46$

$6(x^2 - 2x + 1) - 4(y^2 + 2y + 1) = 46 + 6 - 4$

$6(x-1)^2 - 4(y+1)^2 = 48$

$\frac{(x-1)^2}{8} - \frac{(y+1)^2}{12} = 1$

4. $9y^2 - x^2 + 2x + 54y + 62 = 0$

$9y^2 + 54y - x^2 + 2x = -62$

$9(y^2 + 6y + 9) - (x^2 - 2x + 1) = -62 + 81 - 1$

$9(y+3)^2 - (x-1)^2 = 18$

$\frac{(y+3)^2}{2} - \frac{(x-1)^2}{18} = 1$

Identify if the following Hyperbola will be horizontal or vertical. DO NOT GRAPH.

<p>5. $(y-3)^2 - (x-2)^2 = 1$ \uparrow Vertical</p>	<p>6. $-\frac{(y+3)^2}{9} + \frac{(x+2)^2}{4} = 1$ \curvearrowright horizontal</p>	<p>7. $\frac{(y+2)^2}{16} - \frac{(x-1)^2}{49} = 1$ Vertical</p>
<p>8. $\frac{x^2}{1} - \frac{y^2}{4} = 1$ horizontal</p>	<p>9. $\frac{(y+1)^2}{4} - \frac{(x+1)^2}{4} = 1$ Vertical</p>	<p>10. $\frac{(x+2)^2}{25} - \frac{(y-1)^2}{9} = 1$ horizontal</p>

Write the standard form of the equation of the specified Hyperbola.

11. Vertices $(0, \pm 2)$; foci $(0, \pm 4)$

$C: (0, 0)$
 $c = 4$
 $a = 2$
 $16 = 4 + b^2$

$$\frac{y^2}{4} - \frac{x^2}{12} = 1$$

12. Vertices $(\pm 1, 0)$; Asymptotes $y = \pm 5x$

$C: (0, 0)$
 $m = \frac{5}{1} = b$
 $1 = a$

$$\frac{x^2}{1} - \frac{y^2}{25} = 1$$

13. Vertices $(2, 0)$ and $(6, 0)$; Foci $(0, 0)$ and $(8, 0)$

$C = (4, 0)$
 $16 = 4 + b^2$

$$\frac{(x-4)^2}{4} - \frac{y^2}{12} = 1$$

14. Vertices $(4, 1)$ and $(4, 9)$; Foci $(4, 0)$ and $(4, 10)$

$C = (4, 5)$
 $25 = 16 + b^2$

$$\frac{(y-5)^2}{16} - \frac{(x-4)^2}{9} = 1$$

15. Vertices $(-2, 1)$ and $(2, 1)$; Foci $(-3, 1)$ and $(3, 1)$

$C(0, 1)$
 $9 = 4 + b^2$

$$\frac{x^2}{4} - \frac{(y-1)^2}{5} = 1$$

16. Vertices $(4, 1)$ and $(4, 5)$; Asymptote $y - 3 = \pm \frac{2}{3}(x - 4)$

$C(4, 3)$
 $m = \frac{2}{3} = a$
 $3 = b$

$$\frac{(y-3)^2}{4} - \frac{(x-4)^2}{9} = 1$$

17. Center at $(3, -1)$ with transverse axis of length 8 and Foci at $(3, 4)$ and $(3, -6)$

$a = 4$
 $c = 5$
 $25 = 16 + b^2$

$$\frac{(y+1)^2}{16} - \frac{(x-3)^2}{9} = 1$$

18. An Asymptote $y - 2 = \pm \frac{1}{3}(x + 4)$ and a vertical transverse axis (aka opens up and down)

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

$$\frac{(y-2)^2}{1} - \frac{(x+4)^2}{9} = 1$$