Hyperbola Writing Equations WS Name_____

Write the equation of the Hyperbola in standard form.

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

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

$9(x^2 - 4x + 4) - 1(y^2 + 6y + 9) = -18 + 36 - 9$

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

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

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

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

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

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

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

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

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

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

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

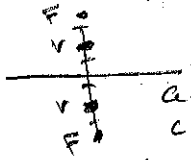
$\frac{(y+3)^2}{2} - \frac{(x-1)^2}{18} = 1$

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

5. $(y-3)^2 - (x-2)^2 = 1$ Vertical	6. $-\frac{(y+3)^2}{9} + \frac{(x+2)^2}{4} = 1$ Horizontal	7. $\frac{(y+2)^2}{16} - \frac{(x-1)^2}{49} = 1$ Vertical
8. $\frac{x^2}{1} - \frac{y^2}{4} = 1$ Horizontal	9. $\frac{(y+1)^2}{4} - \frac{(x+1)^2}{4} = 1$ Vertical	10. $\frac{(x+2)^2}{25} - \frac{(y-1)^2}{9} = 1$ Horizontal

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

11. Vertices $(0,\pm2)$: foci $(0,\pm4)$ Vertical



$a=2$, $c=4$

$c^2=a^2+b^2$

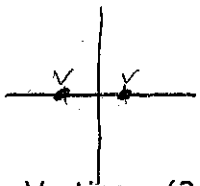
$16=4+b^2$

$12=b^2$

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

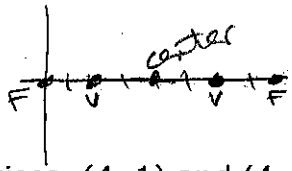
12. Vertices $(\pm1, 0)$; Asymptotes $y=\pm5x$

Horizontal $y=\pm\frac{b}{a}x$ $b=5$ $a=1$



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

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



Horizontal

$a=2$

$c=4$

Center $(4,0)$

$c^2=a^2+b^2$

$16=4+b^2$

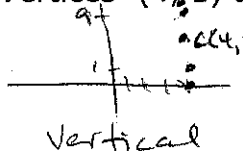
$12=b^2$

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

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

$a=4$

$c=5$



Vertical

midpoint of $(4,1)+(4,9)=(4,5)$ Center

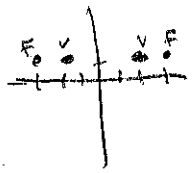
$c^2=a^2+b^2$

$25=16+b^2$

$9=b^2$

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

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



$a=2$

$c=3$

Center $(0,1)$

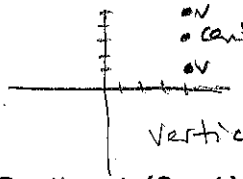
$c^2=a^2+b^2$

$9=4+b^2$

$5=b^2$

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

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



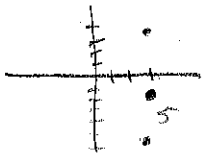
Vertical

$a=2$

slope $=\frac{2}{3}=\frac{a}{b}$

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

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



$a=4$

$c=5$

$c^2=a^2+b^2$

$25=16+b^2$

$9=b^2$

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

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

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

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