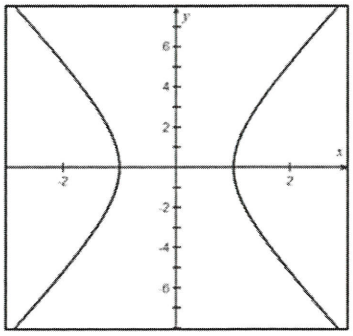
Name: Key Date: Period:

Hyperbolas Homework

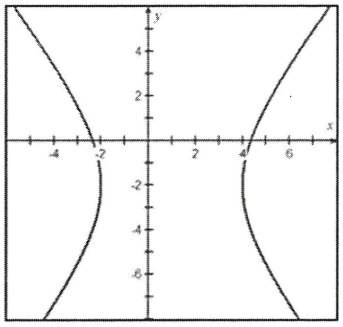
Problems 1–6, the graph of a hyperbola is given. Match each graph to its equation.

A. $\frac{x^2}{9} - y^2 = 1$ 6	B. $x^2 - \frac{y^2}{9} = 1$ 1	C. $\frac{y^2}{4} - \frac{x^2}{9} = 1$ 5
D. $\frac{(x-1)^2}{9} - \frac{(y+2)^2}{16} = 1$ 2	E. $\frac{(x-2)^2}{9} - \frac{(y-1)^2}{4} = 1$ 3	F. $\frac{(y-2)^2}{16} - \frac{(x+2)^2}{9} = 1$ 4

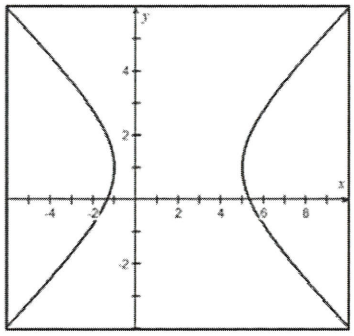
1. B



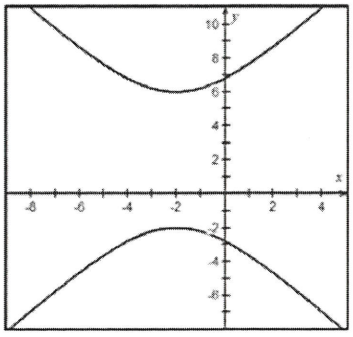
2. D



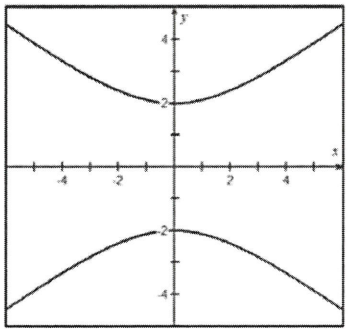
3. E



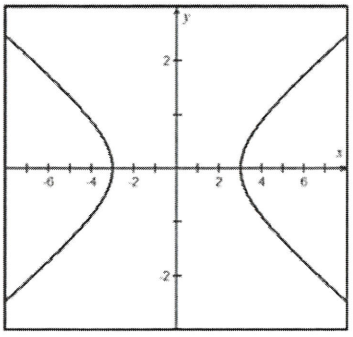
4. F



5. C



6. A



Problems 7–12, find the center, transverse axis, vertices, foci, and asymptotes of each hyperbola, and write the equation if it is not already given. Graph each equation, clearly showing the center, the foci, the transverse axis, and both branches of the hyperbola.

7. $\frac{x^2}{25} - \frac{y^2}{16} = 1$

horizontal

$a=5, b=4$

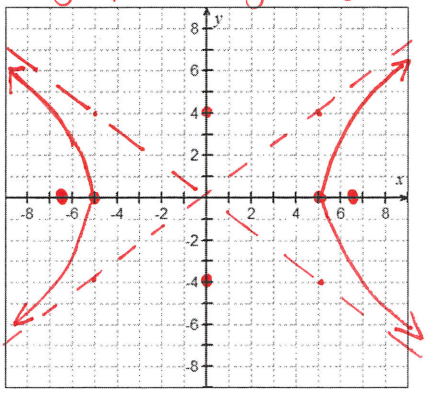
$c=\sqrt{41} \approx 6.4$

center: $(0,0)$

vertices: $(\pm 5, 0)$

foci: $(\pm\sqrt{41}, 0)$

asymptotes: $y = \pm\frac{4}{5}x$



8. $\frac{y^2}{4} - \frac{x^2}{25} = 1$

vertical

$a=2, b=5$

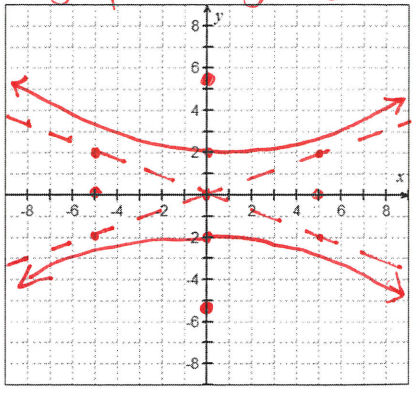
$c=\sqrt{29} \approx 5.4$

center: $(0,0)$

vertices: $(0, \pm 2)$

foci: $(0, \pm\sqrt{29})$

asymptotes: $y = \pm\frac{2}{5}x$



9. $4x^2 - 9y^2 = 36$

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

horizontal

$a=3,\ b=2$

$c=\sqrt{13}\approx 3.6$

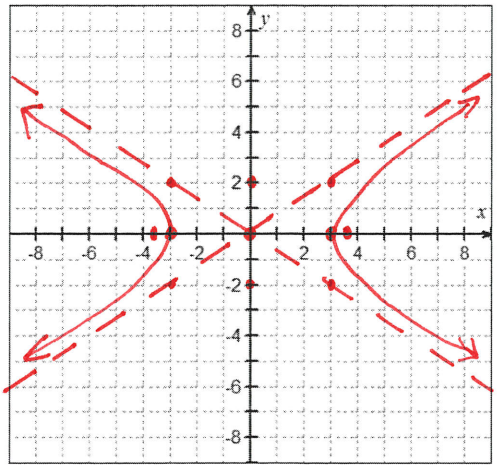
center: $(0,0)$

vertices: $(\pm 3,0)$

foci: $(\pm\sqrt{13},0)$

asymptotes:

$y=\pm\frac{2}{3}x$



10. Foci at $(\pm 5, 0)$; vertex at $(3, 0)$

$a=3,\ c=5$

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

$b^2=25-9$

$b=4$

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

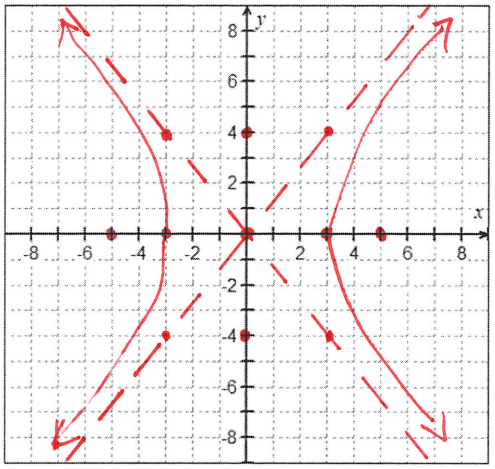
center: $(0,0)$

vertices: $(\pm 3,0)$

foci: $(\pm 5,0)$

asymptotes:

$y=\pm\frac{4}{3}x$



11. Focus at $(0, 6)$; vertices at $(0, \pm 2)$

$a=2,\ c=6$

$b^2=36-4$

$b=\sqrt{32}=4\sqrt{2}$

≈ 5.66

$\frac{y^2}{4} - \frac{x^2}{32} = 1$

center: $(0,0)$

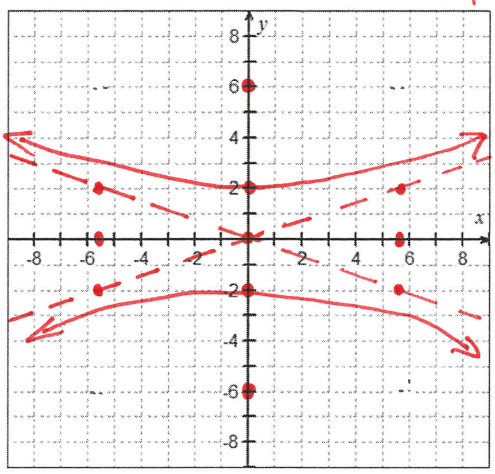
vertices: $(0,\pm 2)$

foci: $(0,\pm 6)$

asymptotes:

$y=\pm\frac{2}{4\sqrt{2}}x$

$=\pm\frac{\sqrt{2}}{4}x$



12. Vertices at $(\pm 3, 0)$; asymptotes are $y = \pm\frac{2}{3}x$

$a=3$, horizontal

$y=\pm\frac{b}{a}x$

$c=\sqrt{a^2+b^2}$

$=\sqrt{13}\approx 3.6$

$\therefore b=2$

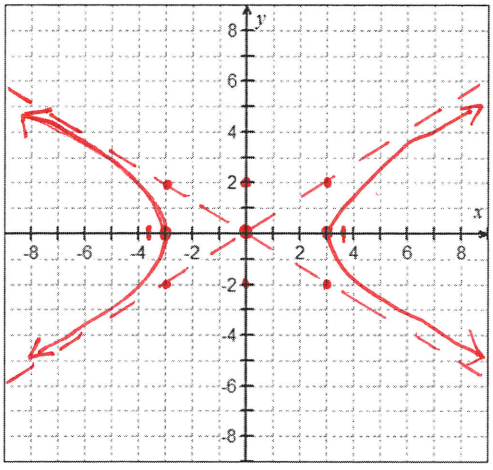
$\frac{x^2}{9} - \frac{y^2}{4} = 1$

center: $(0,0)$

vertices: $(\pm 3,0)$

foci: $(\pm\sqrt{13},0)$

asymp: $y=\pm\frac{2}{3}x$



Problems 13 – 16, find the center, transverse axis, vertices, foci, and asymptotes of each hyperbola. Graph each equation, clearly showing the center, the foci, the transverse axis, and both branches of the hyperbola.

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

horizontal

$a=3, b=4$

$c=5$

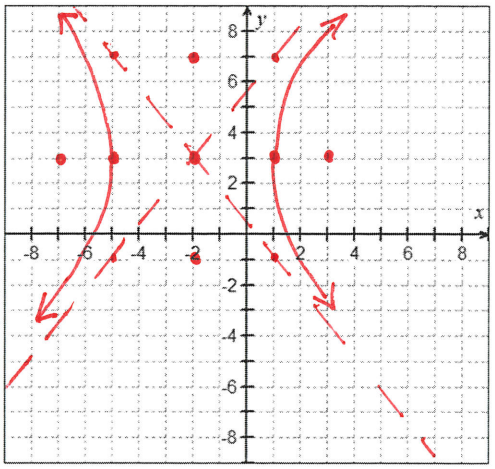
center: $(-2,3)$

vertices: $(-5,3)$ $(1,3)$

foci: $(-7,3)$ $(3,3)$

asymptotes:

$y = 3 \pm \frac{4}{3}(x+2)$



14. $\frac{(y-3)^2}{25} - \frac{(x+2)^2}{16} = 1$

vertical

$a=5, b=4$

$c=\sqrt{41} \approx 6.4$

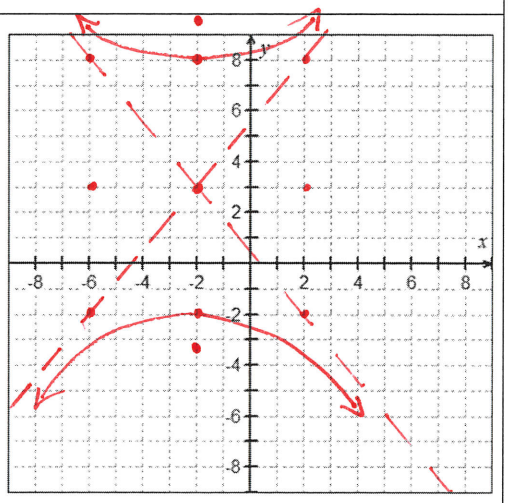
center: $(-2,3)$

vertices: $(-2,8)(-2,-2)$

foci: $(-2, 3 \pm \sqrt{41})$

asymptotes:

$y = 3 \pm \frac{5}{4}(x+2)$



15. $4(x-3)^2 - 5(y+4)^2 = 100$

$\frac{(x-3)^2}{25} - \frac{(y+4)^2}{20} = 1$

horizontal

$a=5, b=2\sqrt{5} \approx 4.5$

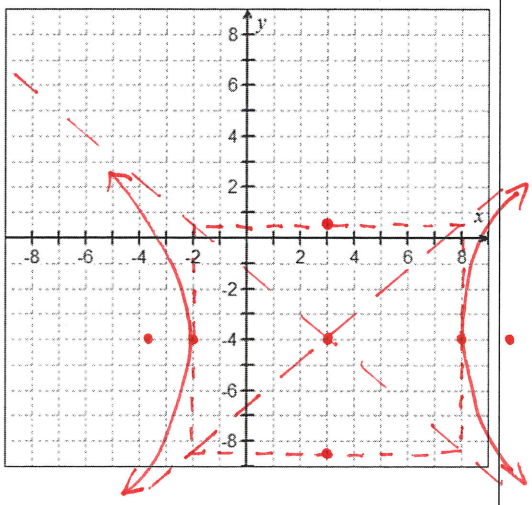
$c=\sqrt{45} = 3\sqrt{5} \approx 6.7$

center: $(3,-4)$

vertices: $(-2,-4)$ $(8,-4)$

foci: $(3 \pm 3\sqrt{5}, -4)$

asymptotes: $y = -4 \pm \frac{2\sqrt{5}}{5}(x-3)$



16. $x^2 - y^2 - 4x + 4y - 1 = 0$

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

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

horizontal

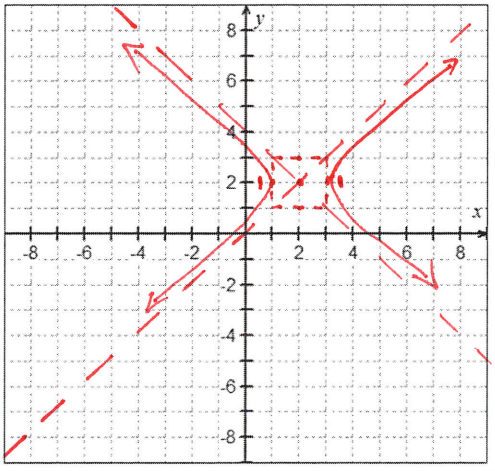
$a=1,\ b=1,\ c=\sqrt{2} \approx 1.4$

center: $(2,2)$

vertices: $(1,2)\ (3,2)$

foci: $(2 \pm \sqrt{2}, 2)$

asymptotes: $y = 2 \pm (x-2)$



17. $4y^2 - x^2 - 24y - 4x + 16 = 0$

$4(y^2-6y+9) - (x^2+4x+4) = -16+36-4$

$4(y-3)^2 - (x+2)^2 = 16$

$\frac{(y-3)^2}{4} - \frac{(x+2)^2}{16} = 1$

vertical

$a=2,\ b=4,\ c=\sqrt{20} = 2\sqrt{5} \approx 4.5$

center: $(-2,3)$

vertices: $(-2,1)(-2,5)$

foci: $(-2, 3 \pm 2\sqrt{5})$

asymptotes: $y = 3 \pm \frac{1}{2}(x+2)$