

Hyperbolas

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Identify the vertices, foci, and asymptotes of each.

$$1) \frac{(x+9)^2}{25} - \frac{(y+5)^2}{36} = 1$$

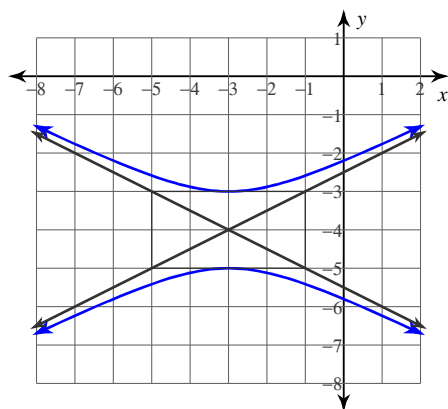
$$2) \frac{(x+1)^2}{121} - \frac{(y+10)^2}{25} = 1$$

$$3) x^2 - y^2 - 12x - 2y - 86 = 0$$

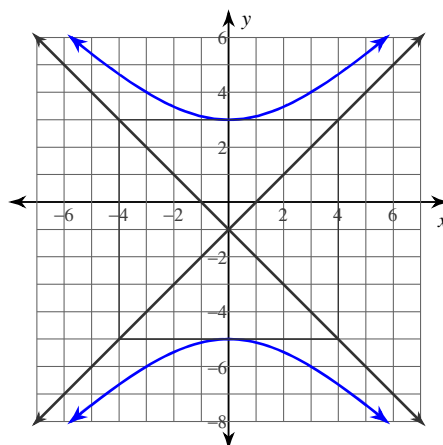
$$4) -9x^2 + 16y^2 - 90x + 64y - 737 = 0$$

Use the information provided to write the standard form equation of each hyperbola.

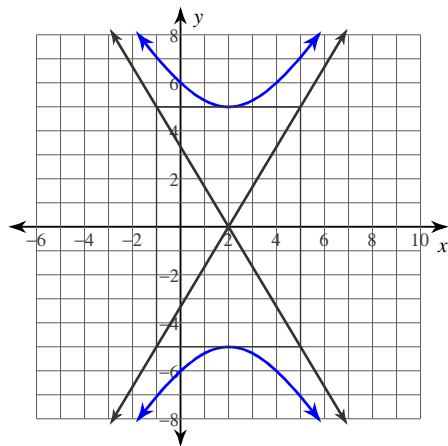
5)



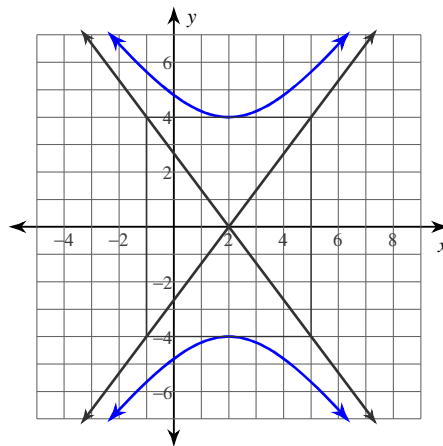
6)



7)



8)



9) Vertices: $(0, -1), (0, -19)$
Foci: $(0, -10 + 3\sqrt{13}), (0, -10 - 3\sqrt{13})$

10) Vertices: $(-5, 19), (-5, -3)$
Foci: $(-5, 8 + \sqrt{202}), (-5, 8 - \sqrt{202})$

11) Vertices: $(8, 8), (8, 4)$
Foci: $(8, 6 + 5\sqrt{5}), (8, 6 - 5\sqrt{5})$

12) Vertices: $(4, 3), (4, 1)$
Foci: $(4, 2 + \sqrt{145}), (4, 2 - \sqrt{145})$

13) Vertices: $(-8, 18), (-8, 0)$
Endpoints of Conjugate Axis: $(5, 9)$
 $(-21, 9)$

14) Vertices: $(4, 3), (4, -17)$
Endpoints of Conjugate Axis: $(9, -7)$
 $(-1, -7)$

15) Vertices: $(-4, -2), (-4, -16)$
Endpoints of Conjugate Axis: $(-1, -9)$
 $(-7, -9)$

16) Vertices: $(-4, 10), (-4, -18)$
Endpoints of Conjugate Axis: $(4, -4)$
 $(-12, -4)$

17) Center at $(-9, -4)$
Focus at $(-9 + \sqrt{215}, -4)$
Eccentricity = $\frac{\sqrt{1333}}{31}$

18) Center at $(0, 0)$
Focus at $(0, -5\sqrt{10})$
Eccentricity = $\frac{5\sqrt{10}}{13}$

19) Center at $(5, 3)$
Focus at $(5 + \sqrt{317}, 3)$
Eccentricity = $\frac{\sqrt{317}}{11}$

20) Center at $(8, -6)$
Focus at $(8, -6 + 2\sqrt{10})$
Eccentricity = $\frac{\sqrt{10}}{3}$

Answers to Hyperbolas (ID: 1)

- 1) Vertices: $(-4, -5), (-14, -5)$
 Foci: $(-9 + \sqrt{61}, -5), (-9 - \sqrt{61}, -5)$
 Asym.: $y = \frac{6}{5}x + \frac{29}{5}$
 $y = -\frac{6}{5}x - \frac{79}{5}$
- 2) Vertices: $(10, -10), (-12, -10)$
 Foci: $(-1 + \sqrt{146}, -10), (-1 - \sqrt{146}, -10)$
 Asym.: $y = \frac{5}{11}x - \frac{105}{11}$
 $y = -\frac{5}{11}x - \frac{115}{11}$
- 3) Vertices: $(17, -1), (-5, -1)$
 Foci: $(6 + 11\sqrt{2}, -1), (6 - 11\sqrt{2}, -1)$
 Asym.: $y = x - 7$
 $y = -x + 5$
- 4) Vertices: $(-5, 4), (-5, -8)$
 Foci: $(-5, 8), (-5, -12)$
 Asym.: $y = \frac{3}{4}x + \frac{7}{4}$
 $y = -\frac{3}{4}x - \frac{23}{4}$
- 5) $(y+4)^2 - \frac{(x+3)^2}{4} = 1$
- 6) $\frac{(y+1)^2}{16} - \frac{x^2}{16} = 1$
- 7) $\frac{y^2}{25} - \frac{(x-2)^2}{9} = 1$
- 8) $\frac{y^2}{16} - \frac{(x-2)^2}{9} = 1$
- 9) $\frac{(y+10)^2}{81} - \frac{x^2}{36} = 1$
- 10) $\frac{(y-8)^2}{121} - \frac{(x+5)^2}{81} = 1$
- 11) $\frac{(y-6)^2}{4} - \frac{(x-8)^2}{121} = 1$
- 12) $(y-2)^2 - \frac{(x-4)^2}{144} = 1$
- 13) $\frac{(y-9)^2}{81} - \frac{(x+8)^2}{169} = 1$
- 14) $\frac{(y+7)^2}{100} - \frac{(x-4)^2}{25} = 1$
- 15) $\frac{(y+9)^2}{49} - \frac{(x+4)^2}{9} = 1$
- 16) $\frac{(y+4)^2}{196} - \frac{(x+4)^2}{64} = 1$
- 17) $\frac{(x+9)^2}{155} - \frac{(y+4)^2}{60} = 1$
- 18) $\frac{y^2}{169} - \frac{x^2}{81} = 1$
- 19) $\frac{(x-5)^2}{121} - \frac{(y-3)^2}{196} = 1$
- 20) $\frac{(y+6)^2}{36} - \frac{(x-8)^2}{4} = 1$