Hyperbola

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

1) $-2x^2 + 3y^2 + 4x - 60y + 268 = 0$

2) $-x^2 + y^2 - 18x - 14y - 132 = 0$

3) $-16x^2 + 9y^2 + 32x + 144y - 16 = 0$

4) $9x^2 - 4y^2 - 90x + 32y - 163 = 0$

5) Vertices: (8, 14), (8, –10), Conjugate Axis is 6 units long

6) Vertices: (7, 4), (7, –24), Distance from Center to Focus = $7\sqrt{5}$

7) Vertices: (–5, 22), (–5, –4), Distance from Center to Focus = $\sqrt{218}$

8) Vertices: (0, –1), (–20, –1), Asymptotes: $y = x + 9$, $y = -x - 11$

9) Foci: $(-9, -5 + 9\sqrt{2})$, $(-9, -5 - 9\sqrt{2})$, Conjugate Axis is 18 units long

10) Foci: $(8, -5 + \sqrt{53})$, $(8, -5 - \sqrt{53})$,

Endpoints of Conjugate Axis: (15, –5), (1, –5)

Identify the vertices, foci, and direction of opening of each.

11) $\frac{y^2}{25} - \frac{x^2}{16} = 1$

12) $\frac{x^2}{121} - \frac{y^2}{36} = 1$

13) $\frac{x^2}{121} - \frac{y^2}{81} = 1$

14) $\frac{x^2}{81} - \frac{y^2}{4} = 1$

15) $\frac{(x+2)^2}{169} - \frac{(y+8)^2}{4} = 1$

16) $\frac{(y+8)^2}{36} - \frac{(y+2)^2}{25} = 1$

Answers

Hyperbola

1) $\frac{(y-10)^2}{10} - \frac{(x-1)^2}{15} = 1$

2) $\frac{(y-7)^2}{100} - \frac{(x+9)^2}{100} = 1$

3) $\frac{(y+8)^2}{64} - \frac{(x-1)^2}{36} = 1$

4) $\frac{(x-5)^2}{36} - \frac{(y-4)^2}{81} = 1$

5) $\frac{(y-2)^2}{144} - \frac{(x-8)^2}{9} = 1$

6) $\frac{(y+10)^2}{196} - \frac{(x-7)^2}{49} = 1$

7) $\frac{(y-9)^2}{196} - \frac{(x+5)^2}{49} = 1$

8) $\frac{(x+10)^2}{100} - \frac{(y+1)^2}{100} = 1$

9) $\frac{(y+5)^2}{81} - \frac{(x+9)^2}{81} = 1$

10) $\frac{(y+5)^2}{4} - \frac{(x-8)^2}{49} = 1$

11) Vertices: (0, 5), (0, –5)

Foci: $(0, \sqrt{41}), (0, -\sqrt{41})$

Opens up/down

12) Vertices: (11, 0), (–11, 0)

Foci: $(\sqrt{157}, 0), (-\sqrt{157}, 0)$

Opens left/right

13) Vertices: (11, 0), (–11, 0)

Foci: $(\sqrt{202}, 0), (-\sqrt{202}, 0)$

Opens left/right

14) Vertices: (9, 0), (–9, 0)

Foci: $(\sqrt{85}, 0), (-\sqrt{85}, 0)$

Opens left/right

15) Vertices: (11, –8), (–15, –8)

Foci: $(-2 + \sqrt{173}, -8), (-2 - \sqrt{173}, -8)$

Opens left/right

16) Vertices: (–2, –2), (–2, –14)

Foci: $(-2, -8 + \sqrt{61}), (-2, -8 - \sqrt{61})$

Opens up/down