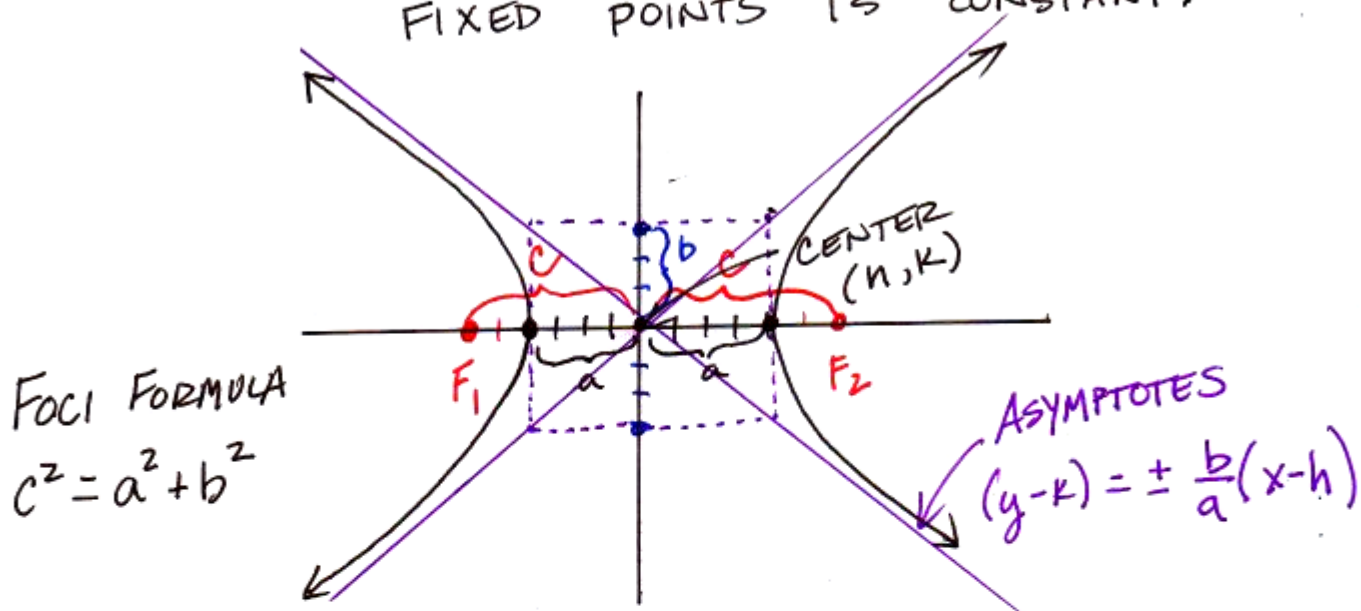


SEC 8.3 HYPERBOLAS

1. HYPERBOLA: THE SET OF POINTS IN A PLANE WHERE THE DIFFERENCE FROM TWO FIXED POINTS IS CONSTANT.



2. STANDARD EQUATION OF A HYPERBOLA

VERTICAL

$$\frac{(y-k)^2}{a^2} - \frac{(x-h)^2}{b^2} = 1$$

CENTER: (h, k)

VERTICES: $(h, k \pm a)$

FOCI: $(h, k \pm c)$

TRANSVERSE AXIS: $2a$

CONJUGATE AXIS: $2b$

ECC: $\frac{c}{a}$

ASYMPTOTES: $(y-k) = \pm \frac{a}{b}(x-h)$

HORIZONTAL

$$\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$$

CENTER: (h, k)

VERTICES: $(h \pm a, k)$

FOCI: $(h \pm c, k)$

LENGTH OF THE TRANSVERSE AXIS IS: $2a$

LENGTH OF THE CONJUGATE AXIS IS: $2b$

ECC: $\frac{c}{a}$

ASYMPTOTES: $(y-k) = \pm \frac{b}{a}(x-h)$

$$\#7. \frac{\cancel{50}(y+3)^2}{10} - \frac{\cancel{50}(x-7)^2}{25} = 1 \cdot \cancel{50} \quad \text{LCD: } 50$$

$$5(y^2+6y+9) - 2(x^2-14x+49) = 50$$

$$5y^2+30y+45 - 2x^2+28x-98 = 50 = 0$$

$$\boxed{-2x^2+5y^2+28x+3y-103=0}$$

$$\#15. \quad x^2-25y^2-2x-100y-124=0$$

$$x^2-2x-25y^2-100y=124$$

$$1(x^2-2x+1) - 25(y^2+4y+\underline{4}) = 124 + 1 + \underline{-100}$$

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

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

DIRECTION: HORIZONTAL

CENTER: $(1, -2)$

VERTICES: $(6, -2)$ $(-4, -2)$

FOCI: $(1 \pm \sqrt{26}, -2)$

ASYMPTOTES: $y+2 = \pm \frac{1}{5}(x-1)$

TRANSVERSE AXIS: 10 ECC: $\frac{\sqrt{26}}{5} \approx 1.0198$

CONJUGATE AXIS: 2

