

Important Formulas of Hyperbola PDF



Formulas
Examples
with Units

List of 21
Important Formulas of Hyperbola

1) Axis of Hyperbola Formulas

1.1) Conjugate Axis of Hyperbola Formula

Formula

$$2b = 2 \cdot b$$

Example with Units

$$24\text{m} = 2 \cdot 12\text{m}$$

Evaluate Formula

1.2) Semi Conjugate Axis of Hyperbola given Eccentricity Formula

Formula

$$b = a \cdot \sqrt{e^2 - 1}$$

Example with Units

$$14.1421\text{m} = 5\text{m} \cdot \sqrt{3\text{m}^2 - 1}$$

Evaluate Formula

1.3) Semi Conjugate Axis of Hyperbola given Latus Rectum Formula

Formula

$$b = \sqrt{\frac{L \cdot a}{2}}$$

Example with Units

$$12.2474\text{m} = \sqrt{\frac{60\text{m} \cdot 5\text{m}}{2}}$$

Evaluate Formula

1.4) Semi Transverse Axis of Hyperbola given Focal Parameter Formula

Formula

$$a = \frac{b}{p} \cdot \sqrt{b^2 - p^2}$$

Example with Units

$$5.2318\text{m} = \frac{12\text{m}}{11\text{m}} \cdot \sqrt{12\text{m}^2 - 11\text{m}^2}$$

Evaluate Formula

1.5) Semi Transverse Axis of Hyperbola given Linear Eccentricity Formula

Formula

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

Example with Units

$$5\text{m} = \sqrt{13\text{m}^2 - 12\text{m}^2}$$

Evaluate Formula

1.6) Transverse Axis of Hyperbola Formula

Formula

$$2a = 2 \cdot a$$

Example with Units

$$10\text{m} = 2 \cdot 5\text{m}$$

Evaluate Formula



2) Eccentricity of Hyperbola Formulas

2.1) Eccentricity of Hyperbola Formula

Formula

$$e = \sqrt{1 + \frac{b^2}{a^2}}$$

Example with Units

$$2.6m = \sqrt{1 + \frac{12m^2}{5m^2}}$$

Evaluate Formula 

2.2) Eccentricity of Hyperbola given Focal Parameter Formula

Formula

$$e = \frac{b^2}{a \cdot p}$$

Example with Units

$$2.6182m = \frac{12m^2}{5m \cdot 11m}$$

Evaluate Formula 

2.3) Eccentricity of Hyperbola given Latus Rectum and Semi Conjugate Axis Formula

Formula

$$e = \sqrt{1 + \frac{(L)^2}{(2 \cdot b)^2}}$$

Example with Units

$$2.6926m = \sqrt{1 + \frac{(60m)^2}{(2 \cdot 12m)^2}}$$

Evaluate Formula 

2.4) Eccentricity of Hyperbola given Linear Eccentricity and Semi Transverse Axis Formula

Formula

$$e = \frac{c}{a}$$

Example with Units

$$2.6m = \frac{13m}{5m}$$

Evaluate Formula 

3) Focal Parameter of Hyperbola Formulas

3.1) Focal Parameter of Hyperbola Formula

Formula

$$p = \frac{b^2}{\sqrt{a^2 + b^2}}$$

Example with Units

$$11.0769m = \frac{12m^2}{\sqrt{5m^2 + 12m^2}}$$

Evaluate Formula 

3.2) Focal Parameter of Hyperbola given Eccentricity and Semi Transverse Axis Formula

Formula

$$p = \frac{a}{e} \cdot (e^2 - 1)$$

Example with Units

$$13.3333m = \frac{5m}{3m} \cdot (3m^2 - 1)$$

Evaluate Formula 



3.3) Focal Parameter of Hyperbola given Latus Rectum and Semi Conjugate Axis Formula

Formula

$$p = \frac{b^2}{\sqrt{\left(\frac{2 \cdot b^2}{L}\right)^2 + b^2}}$$

Example with Units

$$11.1417\text{m} = \frac{12\text{m}^2}{\sqrt{\left(\frac{2 \cdot 12\text{m}^2}{60\text{m}}\right)^2 + 12\text{m}^2}}$$

Evaluate Formula 

3.4) Focal Parameter of Hyperbola given Linear Eccentricity and Semi Conjugate Axis Formula

Formula

$$p = \frac{b^2}{c}$$

Example with Units

$$11.0769\text{m} = \frac{12\text{m}^2}{13\text{m}}$$

Evaluate Formula 

4) Latus Rectum of Hyperbola Formulas

4.1) Latus Rectum of Hyperbola Formula

Formula

$$L = 2 \cdot \frac{b^2}{a}$$

Example with Units

$$57.6\text{m} = 2 \cdot \frac{12\text{m}^2}{5\text{m}}$$

Evaluate Formula 

4.2) Latus Rectum of Hyperbola given Eccentricity and Semi Transverse Axis Formula

Formula

$$L = 2 \cdot a \cdot (e^2 - 1)$$

Example with Units

$$80\text{m} = 2 \cdot 5\text{m} \cdot (3\text{m}^2 - 1)$$

Evaluate Formula 

4.3) Latus Rectum of Hyperbola given Linear Eccentricity and Semi Conjugate Axis Formula

Formula

$$L = \frac{\sqrt{\left(2 \cdot b^2\right)^2}}{c^2 - b^2}$$

Example with Units

$$57.6\text{m} = \frac{\sqrt{\left(2 \cdot 12\text{m}^2\right)^2}}{13\text{m}^2 - 12\text{m}^2}$$

Evaluate Formula 

4.4) Semi Latus Rectum of Hyperbola Formula

Formula

$$L_{\text{Semi}} = \frac{b^2}{a}$$

Example with Units

$$28.8\text{m} = \frac{12\text{m}^2}{5\text{m}}$$

Evaluate Formula 



5) Linear Eccentricity of Hyperbola Formulas

5.1) Linear Eccentricity of Hyperbola Formula

Formula

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

Example with Units

$$13\text{m} = \sqrt{5\text{m}^2 + 12\text{m}^2}$$

Evaluate Formula 

5.2) Linear Eccentricity of Hyperbola given Eccentricity and Semi Conjugate Axis Formula

Formula

$$c = \sqrt{\frac{b^2}{1 - \frac{1}{e^2}}}$$

Example with Units

$$12.7279\text{m} = \sqrt{\frac{12\text{m}^2}{1 - \frac{1}{3\text{m}^2}}}$$

Evaluate Formula 

5.3) Linear Eccentricity of Hyperbola given Latus Rectum and Semi Transverse Axis Formula

Formula

$$c = \sqrt{1 + \frac{L}{2 \cdot a} \cdot a}$$

Example with Units

$$13.2288\text{m} = \sqrt{1 + \frac{60\text{m}}{2 \cdot 5\text{m}} \cdot 5\text{m}}$$


Evaluate Formula 






























Variables used in list of Important Formulas of Hyperbola above

- **2a** Transverse Axis of Hyperbola (Meter)
- **2b** Conjugate Axis of Hyperbola (Meter)
- **a** Semi Transverse Axis of Hyperbola (Meter)
- **b** Semi Conjugate Axis of Hyperbola (Meter)
- **c** Linear Eccentricity of Hyperbola (Meter)
- **e** Eccentricity of Hyperbola (Meter)
- **L** Latus Rectum of Hyperbola (Meter)
- **L_{Semi}** Semi Latus Rectum of Hyperbola (Meter)
- **p** Focal Parameter of Hyperbola (Meter)

Constants, Functions, Measurements used in list of Important Formulas of Hyperbola above

- **Functions:** **sqrt**, **sqrt(Number)**
A square root function is a function that takes a non-negative number as an input and returns the square root of the given input number.
- **Measurement:** **Length** in Meter (m)
Length Unit Conversion 



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