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Curvilinear Motion Formulas

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List of 11 Curvilinear Motion Formulas

Curvilinear Motion

1) Angular Acceleration given Linear Acceleration

Open Calculator

fx $$\alpha_{cm} = \frac{a_{cm}}{r}$$

ex $$8.101449\text{rad/s}^2 = \frac{5.59\text{m/s}^2}{0.69\text{m}}$$

2) Angular Displacement given Angular Acceleration

Open Calculator

fx $$\theta_{cm} = \omega_{in} \cdot t_{cm} + \frac{1}{2} \cdot \alpha_{cm} \cdot t_{cm}^2$$

ex $$6187.944^\circ = 24\text{rad/s} \cdot 3\text{s} + \frac{1}{2} \cdot 8\text{rad/s}^2 \cdot (3\text{s})^2$$

3) Angular Velocity given Linear Velocity

Open Calculator

fx $$\omega = \frac{v_{cm}}{r}$$

ex $$36.23188\text{rad/s} = \frac{25\text{m/s}}{0.69\text{m}}$$

4) Angular Velocity of Body Moving in Circle

Open Calculator

fx $$\omega = \frac{\theta_{cm}}{t_{cm}}$$

ex $$35.99451\text{rad/s} = \frac{6187^\circ}{3\text{s}}$$

5) Average Angular Velocity

Open Calculator

fx $$\omega = \frac{\omega_{in} + \omega_{fi}}{2}$$

ex $$36\text{rad/s} = \frac{24\text{rad/s} + 48\text{rad/s}}{2}$$

6) Final Angular Velocity

Open Calculator

fx $$\omega_{fi} = \omega_{in} + \alpha_{cm} \cdot t_{cm}$$

ex $$48\text{rad/s} = 24\text{rad/s} + 8\text{rad/s}^2 \cdot 3\text{s}$$

7) Initial Angular Velocity

Open Calculator

fx $$\omega_{in} = \omega_{fi} - \alpha_{cm} \cdot t_{cm}$$

ex $$24\text{rad/s} = 48\text{rad/s} - 8\text{rad/s}^2 \cdot 3\text{s}$$

8) Linear Acceleration in Curvilinear Motion

Open Calculator

fx $a_{cm} = \alpha_{cm} \cdot r$

ex $5.52\text{m/s}^2 = 8\text{rad/s}^2 \cdot 0.69\text{m}$

9) Radius of Curvilinear Motion given Angular velocity

Open Calculator

fx $r = \frac{v_{cm}}{\omega}$

ex $0.694444\text{m} = \frac{25\text{m/s}}{36\text{rad/s}}$

10) Radius of Curvilinear Motion given Linear Acceleration

Open Calculator

fx $r = \frac{a_{cm}}{\alpha_{cm}}$

ex $0.69875\text{m} = \frac{5.59\text{m/s}^2}{8\text{rad/s}^2}$

11) Velocity in Curvilinear Motion given Angular Velocity

Open Calculator

fx $v_{cm} = \omega \cdot r$

ex $24.84\text{m/s} = 36\text{rad/s} \cdot 0.69\text{m}$

Variables Used

- a_{cm} Acceleration For Curvilinear Motion *(Meter per Square Second)*
- **r** Radius *(Meter)*
- t_{cm} Time Period *(Second)*
- v_{cm} Velocity of Curvilinear Motion *(Meter per Second)*
- α_{cm} Angular Acceleration *(Radian per Square Second)*
- θ_{cm} Angular Displacement *(Degree)*
- ω Angular Velocity *(Radian per Second)*
- ω_{fi} Final Angular Velocity of Object *(Radian per Second)*
- ω_{in} Initial Angular Velocity of Object *(Radian per Second)*

Constants, Functions, Measurements used

- Measurement: **Length** in Meter (m)
  Length Unit Conversion
- Measurement: **Time** in Second (s)
  Time Unit Conversion
- Measurement: **Speed** in Meter per Second (m/s)
  Speed Unit Conversion
- Measurement: **Acceleration** in Meter per Square Second (m/s²)
  Acceleration Unit Conversion
- Measurement: **Angle** in Degree (°)
  Angle Unit Conversion
- Measurement: **Angular Velocity** in Radian per Second (rad/s)
  Angular Velocity Unit Conversion
- Measurement: **Angular Acceleration** in Radian per Square Second (rad/s²)
  Angular Acceleration Unit Conversion

Check other formula lists

- **Curvilinear Motion Formulas**
- **Motion in Bodies Connected by Strings Formulas**
- **Motion in Bodies Hanging by String Formulas**
- **Projectile Motion Formulas**

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