question 2 views

Daily Challenge 23.6

(**Due: Wednesday 3/6 at 12:00 noon Eastern**)

In session 54, we defined the *moment of inertia* of an object as

$$I = \int r^2 \, dm,$$

where $m = m(x)$ is the mass density function and r is the distance from some chosen origin. For a one-dimensional object which has linear mass density λ (in units of kilograms per meter), the formula becomes

$$I = \int x^2 \lambda(x) \, dx$$

Consider a rod of length L, total mass m, and constant mass density $\lambda = \frac{m}{L}$. The moment of inertia explicitly depends upon our choice of origin. To see this, compute the rod's moment of inertia about two points:

1. About an origin at the center of the rod. That is, let the origin be $x = 0$ and suppose the rod sits on the interval $[-\frac{L}{2}, \frac{L}{2}]$.
2. About an origin at one end of the rod. Let the origin be $x = 0$ and let the rod run from $[0, L]$.

You should find $I_{\text{center}} = \frac{1}{12} mL^2$ and $I_{\text{end}} = \frac{1}{3} mL^2$.

daily_challenge

Updated 1 month ago by Christian Ferko

the students' answer, *where students collectively construct a single answer*

let's see if i can start tomorrows now

Updated 1 month ago by Logan Pachulski

the instructors' answer, *where instructors collectively construct a single answer*

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