

question

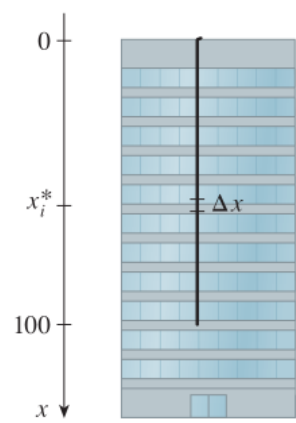
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Daily Challenge 23.4

(Due: Monday 3/4 at 12:00 noon Eastern)

A 200 kg cable is 100 meters long and hangs vertically from the top of a tall building. How much work (in units of Joules) is needed to lift the cable to the top of the building?

Hint: The mass density of the cable is two kilograms per meter. Break the chain into small chunks Δx located at a distance x_i^* from the top. For each chunk, the work needed to move the chunk to the top is $\int_0^{x_i^*} F(x) \, dx$, where the force is the gravitational force $F = mg = \left(2 \frac{\text{kilograms}}{\text{meter}}\right) \cdot (\Delta x) \cdot \left(9.8 \frac{\text{meters}}{\text{second}^2}\right)$. Integrate the contributions from the chunks Δx to get the total work. Check that your result is roughly 100, 000 Joules.



daily_challenge

Updated 1 month ago by Christian Ferko

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

Vegetarians don't eat green ham, Sam I am.

Updated 1 month ago by Logan Pachulski

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

Click to start off the wiki answer

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