

Dimensional Analysis

Every F=ma exam has one or two dimensional analysis problems — and they're pretty easy.

The trick is recognizing them!

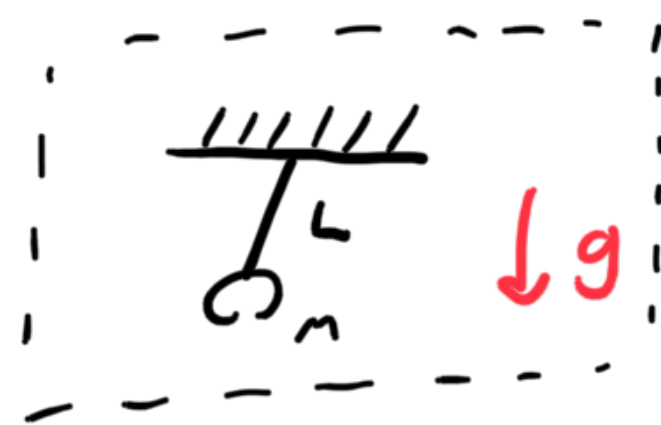
On the diagnostic this wasn't so difficult, but we'll still discuss strategies for spotting and solving this class of problems.

Spotting them

Do the answer choices have different dimensions?

For example, this proto-question:

What's the period of this pendulum?



A. $\sqrt{g/L}$ B. $\sqrt{L/g}$ C. $\sqrt{mg/L}$

D. $\sqrt{L/mg}$ E. \sqrt{gL}

A-ha! All the answers have different dimensions!

Well, we want a period, given in seconds.

So, \sqrt{n} shouldn't be there at all. \rightarrow A B ~~C~~ ~~D~~ E

We need the lengths in g and L to cancel each other out. \rightarrow A B ~~E~~

We can check the units of the remaining choices:

$$[\sqrt{g/L}] = \left(\frac{m}{s^2} \frac{1}{m}\right)^{1/2} = s^{-1} \quad \times \quad \text{A B}$$

$$[\sqrt{L/g}] = \left(m \frac{s^2}{m}\right)^{1/2} = s^{+1} \quad \checkmark \quad \text{B!}$$

Now, can someone walk us through #6?