



- The diffusion constant D , describes how molecules jiggling around in a fluid drift. It has dimensions

$$[D] = L^2/T$$

- We have good reason to believe (we'll see it in a reading later) that D depends on the average distance a molecules travels, λ , and it's average speed v .
- If $[\lambda] = L$ and $[v] = L/T$ guess an equation that expresses D in terms of λ and v .

As part of an exam a few years ago, a student wrote the following derivation of a final result. Without knowing the problem, but knowing the dimensions of each quantity shown along the bottom can you determine:



Is equation D correct?

1. Yes
2. No
3. Can't tell

$$A. \quad Mgh = \frac{1}{2}Mv^2 + \frac{1}{2}I\omega^2$$

$$B. \quad Mgh = \frac{1}{2}Mv^2 + \frac{1}{2}(MR^2)\omega^2$$

$$C. \quad Mgh = \frac{1}{2}Mv^2 + \frac{1}{2}(MR^2)\left(\frac{v^2}{R}\right)^2$$

$$D. \quad gh = \frac{1}{2}v^2 + \frac{1}{2}v^4$$

Given that equation D is NOT correct, can you tell which is the first line that has an error?

$[M]=M$	$[g]=L/T^2$	$[h]=L$	$[\omega]=/T$	$[v]=L/T$	$[R]=L$	$[I]=ML^2$
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Estimate the thickness
of a page in a textbook.
(Quickly! No talking!)



1. 10^0 m

6. 10^{-5} m

2. 10^{-1} m

7. 10^{-6} m

3. 10^{-2} m

8. 10^{-7} m

4. 10^{-3} m

9. 10^{-8} m

5. 10^{-4} m

Estimate the thickness
of a page in a textbook.
Discuss with your neighbor
before answering.



1. 10^0 m

2. 10^{-1} m

3. 10^{-2} m

4. 10^{-3} m

5. 10^{-4} m

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