

Taking Notes on Math Problems

Unit: Study Skills

NGSS Standards/MA Curriculum Frameworks (2016): SP5

AP® Physics 1 Learning Objectives/Essential Knowledge (2024): SP2.A, SP2.B, SP2.C, SP2.D

Mastery Objective(s): (Students will be able to...)

- Take notes on math problems that both show and explain the steps.

Success Criteria:

- Notes show the order of the steps, from start to finish.
- A reason or explanation is indicated for each step.

Language Objectives:

- Be able to describe and explain the process of taking notes on a math problem.

Tier 2 Vocabulary: N/A

Notes:

If you were to copy down a math problem and look at it a few days or weeks later, chances are you'll recognize the problem, but you won't remember how you solved it.

Solving a math problem is a process. For notes to be useful, ***your notes need to capture the process as it happens, not just the final result.***

If you want to take good notes on how to solve a problem, you need your notes to show what you did at each step

Use this space for summary and/or additional notes:

For example, consider the following physics problem:

A 25 kg cart is accelerated from rest to a velocity of $3.5 \frac{m}{s}$ over an interval of 1.5 s. Find the net force applied to the cart.

The solved problem looks like this:

A $\overset{m}{25 \text{ kg}}$ cart is accelerated from rest to a velocity of $\overset{v}{3.5 \frac{m}{s}}$ over an interval of $\overset{t}{1.5 \text{ s}}$. Find the net force applied to the cart.

$$\begin{array}{ll}
 \boxed{F_{net}} & \\
 F_{net} = ma & v - v_o = at \\
 F_{net} = 25a & 3.5 - 0 = (a)(1.5) \\
 F_{net} = (25)(5.5) & 3.5 = 1.5a \\
 F_{net} = 138.8 \text{ N} & a = 5.5 \frac{m}{s^2}
 \end{array}$$

This looks nice, and it's the right answer. But if you look at it now (or look back at it in a month), you won't know what you did.

The quickest and easiest way to fix this is to number the steps and add a couple of words of description for each step:

$\overset{m}{25 \text{ kg}}$ cart is accelerated from rest to a velocity of $\overset{v}{3.5 \frac{m}{s}}$ over an interval of $\overset{t}{1.5 \text{ s}}$. Find the net force applied to the cart.

① **Label quantities (Given & Unknown)**

② **Find Equation that has desired quantity**

③ **Need another equation to find a**

④ **Solve for a**

⑤ **Substitute a into 1st equation**

⑥ **Remember the unit!**

$$\begin{array}{ll}
 F_{net} = ma & \\
 F_{net} = 25a & \\
 v - v_o = at & \\
 3.5 - 0 = (a)(1.5) & \\
 a = 5.5 \frac{m}{s^2} & \\
 F_{net} = (25)(5.5) & \\
 F_{net} = 138.8 \text{ N} &
 \end{array}$$

The math is exactly the same as above, but notice that the annotated problem includes two features:

- Steps are numbered, so you can see what order the steps were in.
- Each step has a short description so you know exactly what was done and why.

Annotating problems this way allows you to **study the process**, not just the answer!

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