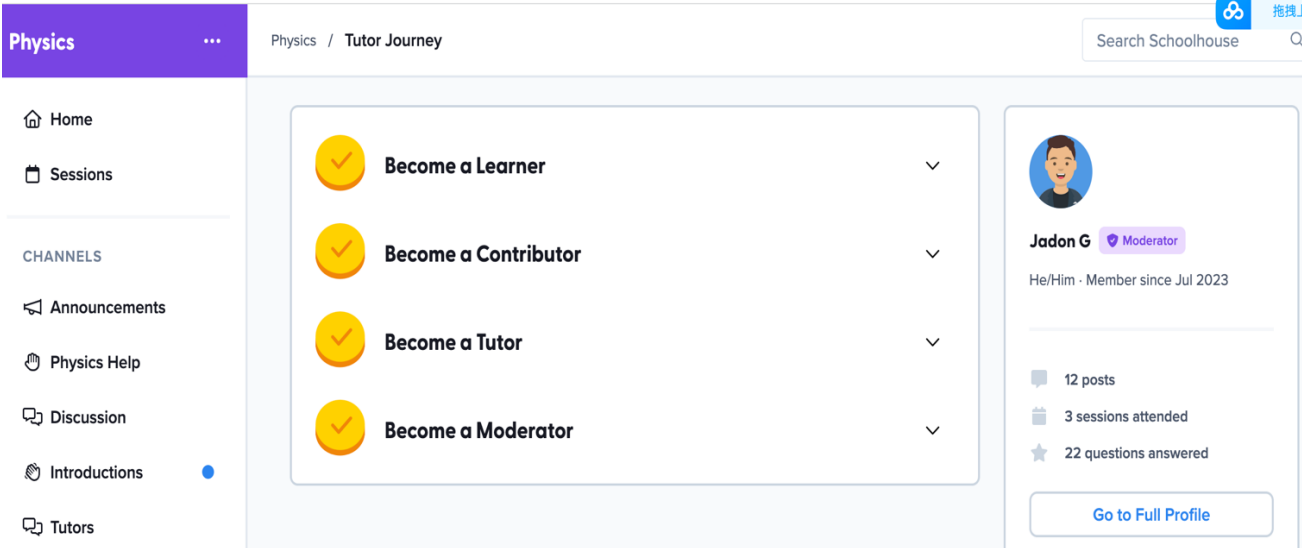


Moderator-Mingjun Gao

Physics Sub-world of Schoolhouse.world

Initiated “Weekly Challenge Problems” Project. These puzzles are designed to be interesting problems that are unclear at first sight. But they will be neat and fun to think about.



Schoolhouse Physics Subworld Help Sheet

Written at the Front:

We know physics can sometimes be puzzling! This sheet will provide you with a curated set of resources you can turn to for self-study or to clear up your confusion. It will be an excellent complement if you aren't paired up with a tutor on time and need to review certain materials. That being said, you should still ask in the help section whenever you like!

Table of contents:

We're separating the resource sheet into three parts: learning resources, review resources, and fun resources.

Examples of *learning* resources: Textbooks, Khan Academy.

Examples of review resources: review books such as 5 Steps to a 5 or Barron's AP.

Examples of *fun* resources: Feynman's Lectures, Particle Fever, Crash Course, Veritasium, etc.

Physics advice sheets:

Kevin Zhou's (coach of the US Physics Team) [Advice on Learning Introductory Physics](#)

Contains excellent comments on how to self-study physics and will clear up a lot of misconceptions about the subject as a whole. It is especially useful if you wish to take a step further and participate in physics competitions.

I will quote one he said which is very relevant to this sheet:

"...When I was a kid, I had a naive view of physics based on talent. I thought every "level" of physics required some minimum bar of talent, and that people just kept climbing until they hit a wall, a level of abstraction they were simply unable to grasp. After all, that's how adults talked about it. They'd say things like, 'math stopped making sense for me at trigonometry', or 'I couldn't make it past differential equations.' So when things got hard, such as when I started quantum field theory, I had a sinking feeling that I was 'hitting the wall.'

But in reality, the cognitive load of learning stays relatively constant. **With modern resources, the difficulty of learning quantum mechanics is about the same as learning introductory physics, provided you have equal mastery of the prerequisites. The reason people hit walls is largely not because the material gets inherently harder but because they finally fall through the massive holes in their foundations.** For example, algorithmically, differentiating functions is not more complex than doing long division: the number of things to keep track of, and new rules to apply, is comparable. But people get stuck at the former because it tends to expose all the misunderstandings they've ever had about basic things, like simplifying fractions. That's the problem; it can't be the raw complexity of manipulating the symbols because all of us can follow a much larger set of rules for manipulating a much larger set of symbols whenever we assemble letters into words and sentences."

Hence, it's very important to have the needed prerequisites, **mainly algebra** (resources on these will also be provided) for learning high school physics.

Never tell yourself you "just can't understand something." Try finding what you don't understand, whether it's something very fundamental such as simplifying fractions or Newton's Laws. Then you can go to the corresponding sections in this resource sheet to solve that confusion! (Of course, you should always ask in the "help channel" first, pairing up with a tutor will make all of this diagnostic and learning process much easier!)

Finally, give yourself some time to think after you've consumed some information on physics. LEARN ACTIVELY!

Please Add Here!

Learning Resources:

For studying physics bottom up. Resource types can be of all sorts: textbooks, videos of a certain topic, lectures, simulations, articles, etc.

Common Traps to Avoid: Don't use resources that haven't been tested by physics learners and time. This includes websites such as Wikipedia, Brilliant, or random YouTube videos or homework help websites that pop up whenever you search for a topic. These resources tend to be incohesive. Use them freely, but turn to your reliable sources whenever puzzled about something written on these websites. Chances are that you'll open 20 tabs and go down the rabbit hole, understanding nothing in the end.

But cohesive resources such as a **Great Textbook** like HRK can help you avoid this! Therefore, for each subject, just choose **one** resource listed below and rely mainly on that!

You should still ask somebody whenever you're truly confused about something.

Physics Textbooks (This borrows from Kevin's advice sheet):

Note: There's not much difference between editions, so whichever edition would suffice. Also, it's recommended to get a printed version. If not, you can find pdfs of these very easily online.

Algebra-based Physics, this includes AP Physics 1&2 (get whichever one you want):

- Hewitt, *Conceptual Physics*.
- Serway and Faughn, *Holt Physics*.
- Serway and Vuille, *College Physics*.
- Cutnell, Johnson, Young, and Stadler, *Physics*.
- Knight, Jones, and Field, *College Physics: A Strategic Approach*.
- Giancoli, *Physics: Principles with Applications*.

Calculus:

- Stewart, *Calculus: Early Transcendentals*

Calculus-based Physics, includes AP Physics C (these are equally good according to Kevin, so get whichever one you want):

- Serway and Jewett, *Physics for Scientists and Engineers with Modern Physics*
- Halliday, Resnick, and Walker, *Fundamentals of Physics*
- Young and Freedman, *University Physics*
- Tipler and Mosca, *Physics for Scientists and Engineers*
- Giancoli, *Physics for Scientists & Engineers*
- Knight, *Physics for Scientists and Engineers: A Strategic Approach with Modern Physics*

Advanced Physics:

- Just choose the HRK book -> *Physics* by Halliday, Resnick, and Krane. **It should also be your primary source to rely on if you're self-studying competitions.**

Physics Beyond: Explore Kevin's website -> <https://knzhou.github.io/>

Videos:

- **[Flipping Physics](#): A great website to utilize for AP Physics. I highly recommend relying completely on it.**

If you're confused about a unit, find that corresponding unit here!

- **[KhanAcademy](#), Algebra, AP Physics 1 & Calculus; Just Magnificent Explanations.**
- **[Introductory Calculus](#)**

If the video lectures on calculus at Khan Academy and OCW seem a bit too lengthy, rely on Stewart's book to get to the point.

- **[Excellent Calculus-based physics lectures](#)**
- **[TheOrganicChemistryTutor](#), Explains basic and advanced physics concepts thoroughly for you to grasp.**

Fun:

Anything fun related.

[FUN TO IMAGINE](#) - A true master of the subject talks about why physics is fun.

[Feynman's Lectures](#) - Read and you'll see why. It's different.

Review Resources:

Resources one wouldn't recommend relying on to learn physics but would be nice for cramming before exams.

- **[400+ page PDF with practice problems for AP Physics 1 or equivalent.](#)**
- **[300+ page PDF with practice problems for AP Physics 2 or equivalent.](#)**
- **[EuPhO European Physics Olympiad](#)**
- **[IPho International Physics Olympiad](#)**
- **[Basic knowledge test of physics concepts](#)**
- **<https://sites.google.com/site/twuphysicslessons/>**

Review Books:

- **[200 Puzzling Physics Problems: With Hints and Solutions](#)**
- **[Problems In General Physics](#)**
- **[Pathfinder for Olympiad and JEE \(Advanced\) Physics, 1e](#)**
- **[Aptitude Test Problem in Physics](#)**