Skinny Physics for QS&BB

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2025-09-12

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Preface

This is a Quarto book.

To learn more about Quarto books visit https://quarto.org/docs/books.

1 Introduction to Skinny Physics

I'm guessing that you might come from various backgrounds and since posts in **QS&BB** may rely on a small bit of background, I've created this Skinny Physics collection to help you whether you're an English major with little physics in your life to an engineer with more.

1.1 Chapter structure

Each chapter has the same structure in support of your particular level of preparation:

1. **Just the facts.** The equations for those of you who might have had some physics in your background and need a refereshser
2. **Different way.** There are some places where I introduce ways of approaching thingss in QSBB that you wouldn't have seen elsewhere. So follow those links for sure.
3. **Gentle explanations of..**. This is textbook-like, but textbook-lite. From the beginning but not overpowering. Some videos of explanation.
4. **Pointers** to topics so you can quickly go to a topic where you need more than just the equations. That's #4 just above

The Parts are:

1. Mechanics
    1. Motion
    2. Momentum and Force
    3. Collisions

    4. Energy

2. Gravitation

    1. Copernicus' heliocentric proposal
    2. Galileo's Astronomy
    3. Kepler's Astrophysics
    4. Newton's Gravitation

3. Electricity and Magnetism

    1. Electric Charge and Magnetism
    2. Faraday's Experiments and Conclusions
    3. Maxwell's Theory
    4. Forces on electrical charges

4. Einstein's Theory of Special Relativity

Part I

Part I: Mechanics

This Part introduces mechanics — the core of classical physics and a source of important concepts for **QS&BB**, not to mention a lot of vocabulary of physics…momentum, force, energy, and so on.

Here you can see the main themes as a review or for the first time, key equations, or learning goals before readers dive into each chapter.

Each chapter has four levels of detail: 1. Just the facts. The equations for those of you who might have had some physics in your background and need a referesher 2. Different way. There are some places where I introduce ways of approaching thingss in QSBB that you wouldn't have seen elsewhere. So follow those links for sure. 4. Gentle explanations of… This is textbook-like, but textbook-lite. From the beginning but not overpowering. Some videos of explanation. 3. Pointers to topics so you can quickly go to a topic where you need more than just the equations. That's #4 just above

2 Skinny Motion, Speed, and Acceleration

This is the first of three outlines of some basic physics ideas so that I can refer to them in other posts. If you'd like more, including history and examples, then visit full textbook for a textbook-level presentation. If you only need the basic simple equations, they're here. If you'd like some explanation, that's next!

Units. Sorry. In QS&BB we won't care about English versus metric units but for this motion review we'll sometimes have to convert. I'll do it for you but you can check me at places like unitjuggler...or often just Google.

2.1 Just the facts:

changes in something

I'll use:

- x_0 to be where we start in distance
- x to be where we end up (sometimes, I'll be explicit and say "x_f" for "final.")
- We'll use the Greek symbol Delta, Δ to mean "change of"...this will come up a lot.
- change in position is $\Delta x = x_{\text{ended up}} - x_{\text{where we started}} = x - x_0$
- same goes for time, from $\Delta t = t_{\text{ended up}} - t_{\text{when we started}} = t - t_0$
- symbol for average: $< A >$