

Seven Brief Lessons On Physics Summary

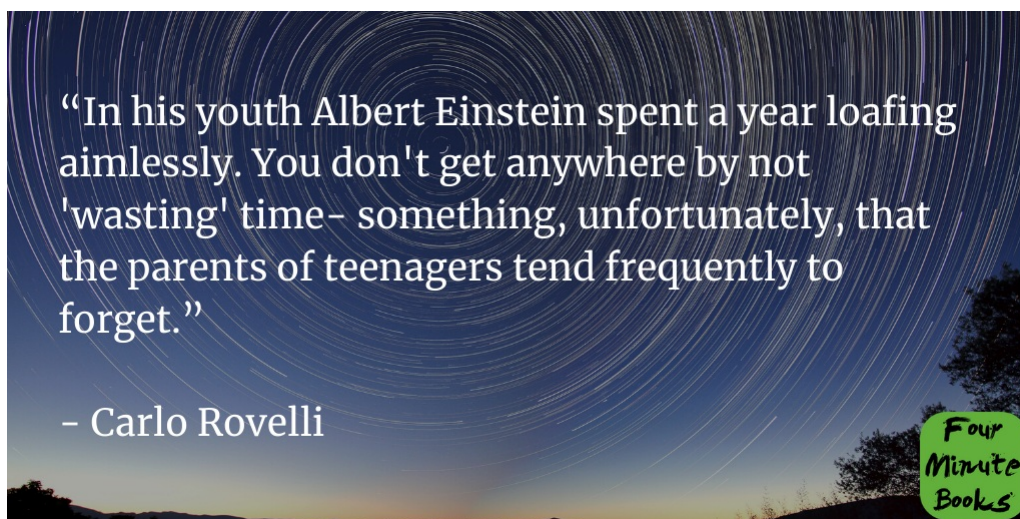


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1-Sentence-Summary: *Seven Brief Lessons On Physics* is your guide to getting up to speed with current theories on how the universe works by explaining general relativity and quantum mechanics, the two pillars of modern physics.

Read in: 4 minutes

Favorite quote from the author:



Science is a fascinating and important subject in our world. For a long time though, humanity was relatively clueless about how everything works. Thankfully that's changed now and we have a pretty good understanding of our world on a small and large scale.

It's crazy to think that we once didn't know about atoms or galaxies. The more you think of it the more you begin to see the similarities between the micro and macro worlds. These laws of physics and our curiosity about them are ever-changing and growing.

But what are the main tenets of physics that explain the way the universe runs? And what is the current state of this subject today? These are some of the questions we get answers to in Carlo Rovelli's *Seven Brief Lessons on Physics*. You'll also discover what this subject is missing right now that it's trying to solve.

Here are the 3 most interesting lessons I got out of this book:

1. Quantum mechanics and general relativity are in conflict with each other, but this has given us the opportunity to develop new theories.
2. Thermodynamics, or the science of heat, is an interesting study that also might explain the characteristics of time.

3. We aren't just observers to our world but participants in the physics behind the grand cosmos we live in.

Who's ready for a lesson on some crazy interesting science? I am and I hope you are too! Let's dive right in!

Lesson 1: **New theories arise from the conflict between general relativity and quantum mechanics.**

The two pillars of modern physics are general relativity and quantum mechanics. Relativity is Einstein's theory of how time and space relate to one another. Quantum theory, on the other hand, zooms right down to the atomic level to explain things. The problem is, although these two are widely accepted as plausible, they contradict each other.

The rules of relativity declare that space is continuous and curves. In contrast, quantum mechanics paints a picture of it being flat, using quanta, or finite packets, to describe how energy works. But this is what gives physicists the opportunity to develop theories that work better.

A leading contender is loop quantum gravity (LQG) that says that microscopic loops make up space. Think of these as the "atoms of space" that are the makeup of space itself. This means that space and time aren't continuous. Space is comprised of tiny grains and time has a differing rhythm for every system in nature.

The other crazy part about this theory is what it says about the big bang, which many believe to be the beginning of our universe. LQG sets up the start of everything as more of a "big bounce" instead. This idea comes from the thought that a universe before ours now collapsed then exploded in what we think of as the big bang.

Lesson 2: **We can understand the nature of time better by looking into the systems that make up heat.**

Thermodynamics sounds like a big word, but breaking it down it's just simply the science of heat. The whole study of it comes from a simple question: what is heat? In the nineteenth century, it was thought to be under the roof of fluids, or calorics.

We now know that heat isn't a fluid but simply friction causing the atoms of an object to move faster. Atoms are always bouncing around all over the place and vibrating. And it's simple to see that quicker vibrations make for hotter objects. It's easy to see why heat happens, but how it moves around is a little more difficult.

Take a hot cup of coffee for example. Putting a cold spoon into the cup will heat the spoon up, right? But what about the spoon adding some extra heat to the coffee? Shouldn't it also become hotter from whatever heat the spoon has? In the eyes of Ludwig Boltzmann, this is because heat transfer happens just by pure chance.

The way we see time is another thing that heat affects. Thinking of a pendulum, it slows because of the air it contacts as it swings. **This friction causes heat, which makes the pendulum lose energy with each swing.**

You can think of the movement as the past and the resting state is the future. But if no friction occurred, no heat would be present. Which makes the concepts of past, present, and future obsolete.

Lesson 3: We are part of the universe and it is part of us and these physics lessons apply to us as much as to our world.

A few years ago my family and I went to see an IMAX movie about the universe. It was a little cheesy and we laughed when it said "you are in the universe and the universe is in you."

Although we still laugh about that today, I think it's pretty cool to think about how our bodies contain the same atoms as stars. Trees are the same way. Sometimes we see ourselves as outside observers, but the truth is that we're part of it all.

Our curiosity about the way the universe works began long ago and it continues today. We've come a long way, but we still have a lot to understand. Physics is even working to understand our capability to have free will.

We might think of physics and human nature as separate, but they have more in common than we think. **Physics is all about understanding the laws of nature, and isn't human action part of that too?** Our brains and bodies work in a similarly natural way as our universe does.

Even death shows how true this is. Everything, from people, to flowers, and even stars lives and dies. Although one thing is true regardless of what happens about our discoveries. We will always remain curious to discover more about the workings of the small and big things in our world.

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Seven Brief Lessons On Physics Review

Seven Brief Lessons On Physics is certainly an interesting read. Some of these principles are a little tough to grasp, which makes me think we're just beginning to understand how our universe works. Either way, it's great to learn these important lessons that govern so much of our everyday lives!

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Who would I recommend the Seven Brief Lessons On Physics summary to?

The 20-year-old college freshman who is trying to figure out if they want to major in physics, the 39-year-old scientist that loves to learn more about their field, and anyone with a curious personality who wants to know how things work.