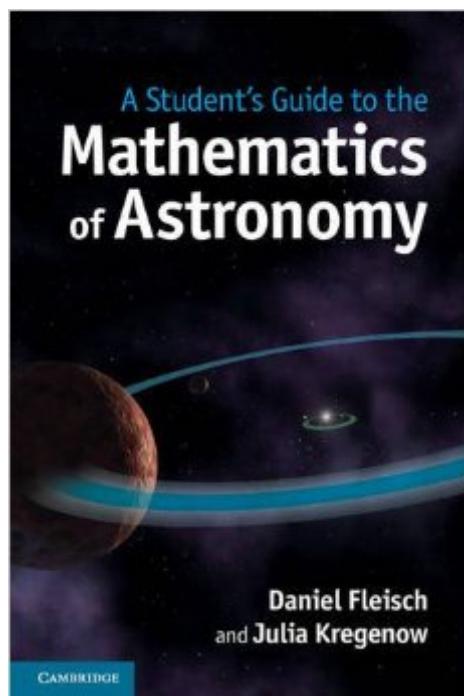


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# A Student's Guide To The Mathematics Of Astronomy



## Synopsis

The study of astronomy offers an unlimited opportunity for us to gain a deeper understanding of our planet, the Solar System, the Milky Way Galaxy and the known Universe. Using the plain-language approach that has proven highly popular in Fleisch's other Student's Guides, this book is ideal for non-science majors taking introductory astronomy courses. The authors address topics that students find most troublesome, on subjects ranging from stars and light to gravity and black holes. Dozens of fully worked examples and over 150 exercises and homework problems help readers get to grips with the concepts in each chapter. An accompanying website features a host of supporting materials, including interactive solutions for every exercise and problem in the text and a series of video podcasts in which the authors explain the important concepts of every section of the book.

## Book Information

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## Customer Reviews

In chapter 1, the authors describe the mathematical basics that are needed for so many physics problems: how to form ratios, how to use scientific notation, and how to perform dimensional analysis (so answers come out in the proper units). Then, they lead you through the concepts and standard formulas for Gravity (Newton, Kepler, and a terrific overview of the property of ellipses), Light (Wavelength, Frequency, Energy, Doppler Shifts), Parallax (Angular size and resolution), Characteristics of Stars, Black Holes and Cosmology. In each case, they step through the concepts so you gain an intuitive understanding, and also walk you through each of the applicable equations, showing how each term is used. There is no calculus in the book. The book is all about the fundamental formulas, what they mean, and how to use them. The content is up to date as far as I

can tell. For example, the chapter on Light explains how astronomers use radial velocity to find the wobble of stars, and then use that wobble to predict the existence of extrasolar planets. The authors have a website hosted by Wittenburg University where they have answers to the problems, as well as video podcasts of the material. The videos themselves make up an Astronomy in a Nutshell series. I love the options they provide for getting answers to the book's problems. You can either print a PDF of all the answers for a chapter, or you can display 1, 2, 3 or 4 hints while trying to work through the problem. The physical condition of the paperback edition is excellent. The publisher uses a heavy glossy cover, well-built spine, and thick pages. No skimping on production quality. It's the same high quality used for the author's paperback edition of A Student's Guide to Maxwell's Equations. All in all - beautifully done. The authors of this book obviously have a true desire to impart knowledge, and to do so with class and quality. I'm very grateful.

I will start this review by saying I wish that this book had been in existence during my undergraduate career. This is one of the best problem solving books in the sciences I've seen recently and I highly recommend it! The authors clearly layout the fundamentals of using math to solve problems and then apply it to astronomy. While astronomy is the focus, I will recommend the book to my geoscience students just because of its clarity and style. The book is very modular and can easily be referenced by the student, but should be read cover-to-cover. It will only take about 4-5 hours of study time. Audience: Advanced high school physics/astronomy student, early undergraduate science student, or arm-chair astronomer. Contents: Fundamentals - Units and unit conversion - Absolute and ratio methods - Rate problems - Scientific notation - Chapter problems 1) Gravity - Newton's Law of Gravity - Newton's Laws of Motion - Kepler's Laws - Chapter Problems 2) Light - Light and spectrum fundamentals - Radiation laws - Doppler shift - Radial-velocity plots - Chapter Problems 3) Parallax, angular size, and angular resolution - Parallax - Angular size - Angular resolution - Chapter Problems 4) Stars - Stellar parallax - Luminosity and apparent brightness - Magnitudes - H-R diagram - Chapter Problems 5) Black holes and cosmology - Density - Escape speed - Black holes - The expansion of the Universe - The history and fate of the Universe - Chapter Problems

A Student's Guide to the Mathematics of Astronomy is an excellent supplemental text for somebody that is struggling with the math side of astronomy or physics. This is not an astronomy text, although the authors do talk about the principals. This is one of the most concise and clear texts I have ever read about the math side of astronomy. The book is a supplement to the basic early astronomy

classes - the math is straightforward and does not include any calculus. This is a rich well written book. The authors have clearly taught physics or astronomy for many years and are very good at it. I really like the talking to me tone of the book. It reads exactly like a very smart helpful professor is sitting there coaching you through the problems. In the preface the authors talk about why you might need this book. Ultimately, if you understand the concepts but are having difficulty with the math, this is the book for you. The book is arranged in standalone chapters. In other words, if you are struggling with light calculations, skip forward to that chapter. The only critical chapter everybody has to understand is the first one on fundamentals - mostly about units and unit conversions. Each chapter is constructed in a similar manner - introduction to the topic, critical math formulas, and then how to solve those problems. There are problems scattered throughout the chapter with detailed solution steps. There is a set of problems at the end of each chapter. The solutions are all fully explained on the website for the book. Each problem is listed and the option to show hints for the solution. The hints start by referring to a section of the book, and then get more explicit with actual equations, and then finally there is a choice to show the full solution. If you are a visual learner, or prefer to have somebody tell and show you how to solve problems, the support website for the book is incredibly rich. The authors have organized an incredible series of YouTube videos where they take on a single topic, tell and show how to solve problems for that topic. The videos are around 15 minutes each, and are outstanding. The authors are very comfortable with the subject matter and their years of teaching shine. For the student that needs some extra help with the math side of Astronomy, this is a fantastic book and website. The authors have a great writing style and approach the subject with authority in an approachable manner. I clearly remember my first physics class, my teacher had a similar approach to problems, and I was very successful with physics.

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