Relativity Visualized

Subject area
General Physics.

Description
An introductory text for Special and General Relativity presented via a series of diagrams hand drawn by the author.

Authors
Lewis Carroll Epstein.

Publishers/Suppliers
Insight Press, San Francisco (http://www.appliedthought.com/InsightPress/index.html).

Date/Edition
1997.

ISBN
0-93-521805-X.

Level
A-level, access, undergraduate.

Price
$17.95 (+ $2.95 shipping).

This is a delightful book running to 206 pages with several diagrams on most pages. The theory of Special Relativity, Big Bang, Gravity and Curved Space are all introduced via a series of illustrations drawn by the author. The presentation given in the text regarding the cause of Gravity and 'Space Warped' serve as a plausible introduction to General Relativity.

Summary Review

range: * very poor to ***** excellent

Academic content	****
Usefulness to student	*****
Usefulness to teacher	****
Meets objectives	*****
Accuracy	*****

Formulae and algebra are kept to a minimum and the only small section using simple calculus appears in a box labelled 'teachers only'.
Any A-level student following an option involving Special Relativity would be well advised to read this book as a way of extending their study without any fear of being troubled by the mathematics one usually associates with Relativity. Indeed I would argue that their teachers/tutors should be directing them to this text prior to moving onto something like Adams (1997) .

For undergraduate students new to Relativity this really should be the starting point since it will both make them think about the fundamental concepts and question their understanding. Too often, I feel, students hide behind their ability to solve problems in relativity, for example length contraction and time dilation, by using the mathematics rather than by understanding the concepts that lie behind the mathematics. This unique book takes the reader on a very gentle journey towards just such an understanding dealing with the concepts and introducing the philosophy required to think through each situation. For example, when introducing the limiting value of 'c' no mention of Maxwell's equations here, but rather a simple 'story':

"Why can't you travel faster than light? the reason you can't go faster than the speed of light is that you can't go slower. There is only one speed. Everything, including you, is always moving at the speed of light ...."

This is then used to develop the notion of space-time and the slow running of moving clocks. The development taking place via a series of diagrams which really do make things clear.

The questions at the end of sections follow a similar style to that in the text with the emphasis of thinking through the logical reasoning for the answer rather than the mechanical processing of data. For example:

Suppose that one day you come across a thing moving backwards in time. Could you recognise that it was moving backwards?

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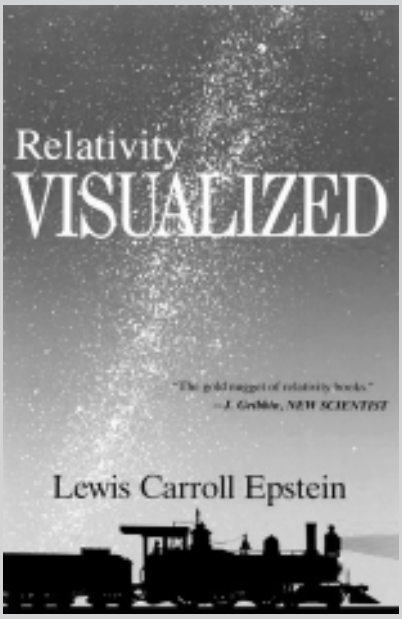

From the publisher...

Relativity Visualized

Lewis Carroll Epstein

Why can't you travel faster than light? The reason you can't go faster than the speed of light is that you can't go slower. Everything, including you, is always moving at the speed of light. How can you be moving if you are at rest in a chair? You are moving through time. Why are clocks moving through space perceived to run slower and slower as they travel faster and faster? Because a clock properly runs through time, not through space. If you compel it to run through space, it is able to do so only by diverting some of the speed it should use for traveling through time. As it travels through space faster and faster, it diverts more and more speed. How much speed can it possibly divert? The clock can divert ALL its speed. Then it is going through space as fast as it possibly can, but there is nothing left for traveling through time. The clock stops ticking. It stops aging.

0-935218-05-X 206pp 1981 $17.95

This obviously needs the reader (student) to think through the situation and offer an explanation which can be used to elicit understanding. Having built the foundations for understanding teachers/lecturers and students should all be better placed to share the more traditional mathematical description of Special and General Relativity.

Due to the sparing use of even simple mathematics no student should feel the need for any pre-requisite study before starting out on a study of Relativity.

Whilst the book appears fresh and new it is interesting to note that it first appeared in 1981 and the eight reprints speak highly of its impact. However, unless used as suggested above I am unsure how it would fit into a typical UK Higher Education programme where the mathematical demand remains so much higher.