



Trigonometry (Gelfand Mathematical Seminar)

By I.M. Gelfand, Mark Saul



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In a sense, trigonometry sits at the center of high school mathematics. It originates in the study of geometry when we investigate the ratios of sides in similar right triangles, or when we look at the relationship between a chord of a circle and its arc. It leads to a much deeper study of periodic functions, and of the so-called transcendental functions, which cannot be described using finite algebraic processes. It also has many applications to physics, astronomy, and other branches of science. It is a very old subject. Many of the geometric results that we now state in trigonometric terms were given a purely geometric exposition by Euclid. Ptolemy, an early astronomer, began to go beyond Euclid, using the geometry of the time to construct what we now call tables of values of trigonometric functions. Trigonometry is an important introduction to calculus, where one studies what mathematicians call analytic properties of functions. One of the goals of this book is to prepare you for a course in calculus by directing your attention away from particular values of a function to a study of the function as an object in itself. This way of thinking is useful not just in calculus, but in many mathematical situations. So trigonometry is a part of pre-calculus, and is related to other pre-calculus topics, such as exponential and logarithmic functions, and complex numbers.

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Trigonometry (Gelfand Mathematical Seminar) By I.M. Gelfand, Mark Saul Bibliography

- Sales Rank: #1200990 in eBooks
- Published on: 2012-12-06
- Released on: 2012-12-06
- Format: Kindle eBook

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Editorial Review

Review

"Cover[s] all of the basic topics that a high school or beginning university student should be expected to know.... There are...some nice touches; for example, a nice informal discussion showing that the sine of an angle in a right triangle does not depend on whether the sides are measured in inches or centimeters..."

?Choice

"Covers all the basics of the subject through beautiful illustrations and examples.... Throughout, the treatment stimulates the reader to think of mathematics as a unified subject."

? L'enseignement Mathématique

"As a teacher I enjoyed this book enormously and I will doubtless borrow many of the plums to spice up my lessons.... [For] that ideal student who is to be prepared to be challenged to think what the subject is really about, and has the patience to excavate the basic ideas for all they are worth before jumping on to the next chapter, it should prove to be a godsend."

?The Mathematical Gazette

"The authors tried to explain the results of trigonometry as simply as possible.... The exercises include a few problems of each routine type. Most of the problems exhibit a new aspect of the technique or object under discussion. One of the goals of this book is to prepare students for a course in calculus. We recommend it for teachers and students."

?Publicationes Mathematicae

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