1. Record Nr.   UNINA9910790363403321

   Autore   Schiffer Menahem

   Titolo   The role of mathematics in science / / by M.M. Schiffer and Leon
                        Bowden [[electronic resource]]

   Pubbl/distr/stampa   Washington : , : Mathematical Association of America, , 1984

   ISBN   0-88385-945-9

   Descrizione fisica   1 online resource (xi, 207 pages) : digital, PDF file(s)

   Collana   Anneli Lax New Mathematical Library ; ; 30

   Disciplina   501.51

   Soggetti   Mathematical physics
                        Mathematics
                        Science

   Lingua di pubblicazione   Inglese

   Formato   Materiale a stampa

   Livello bibliografico   Monografia

   Note generali   Title from publisher's bibliographic system (viewed on 02 Oct 2015).

   Nota di contenuto   The beginnings of mechanics: Archimedes' law of the lever ; First
                        application: the centroid of a triangle ; Second application: the area
                        under a parabola ; Third application: the law of the crooked lever ;
                        Galileo: the law of the inclined plane ; Stevin: the law of the inclined
                        plane ; Insight and outlook -- Growth functions: The exponential law of
                        growth ; Maxwell's derivation of the law of errors ; Differential and / or
                        functional equations ; The problem of predicting population growth ;
                        Cusanus' recursive formula for [pi] ; Arithmetic and geometric means
                        -- The role of mathematics in optics: Euclid's optics ; Heron: the
                        shortest path principle ; Archimedes' symmetry proof ; Ptolemy and
                        refraction ; Kepler and refraction ; Fermat: the quickest path principle ;
                        Newton's mechanistic theory of light ; Fermat versus Newton:
                        experimentum crucis ; To recapitulate ; The role of science in
                        mathematics ; Some practical applications of conics ; Conical ingenuity:
                        the reflecting telescope.
                        Mathematics with matrices-transformations: Why use matrices? ; Plane
                        analytic geometry and vector addition ; The dot product ; To relate
                        coordinate geometry and vector algebra ; The law of cosines revisited ;
                        Linear transformations of the plane ; Rotations ; Composite
                        transformations and inverses ; Composition and matrix multiplication ;
                        Rotations and the addition formulas of trigonometry ; Reflections ;
                        Rigid motions (isometries) ; Orthogonal matrices ; Coordinate

transformations ; A matter of notation -- What is time? Einstein's transformation problem: The Michelson-Morley experiment ; What time is it? ; Einstein's space-time transformation problem ; Einstein's solution ; Rods contract and clocks slow down -- Relativistic addition of velocities: Einstein's law of relativistic addition ; Rescaling velocities ; Experimental verification of Einstein's law ; Rescaled velocities revisited -- Energy: The two body impact problem in classical mechanics ; The two body impact problem in the theory of relativity ; Admissible energy functions ; More about admissible energy functions ; Proof that V is admissible ; Energy and momentum ; The dependence of mass on velocity ; Energy and matter ; The Lorentz transformation and the momentum-energy vector ; Relativity in more than one space dimension ; Relativity and electrodynamics.

Sommario/riassunto	The Role of Mathematics in Science aims to illustrate the many ways in which mathematical methods have helped discovery in science. It is aimed at a group of readers who are interested in mathematics beyond the level of high school. The authors occasionally use some calculus and more intricate arguments. The book should appeal to college students and general readers with some background in mathematics. The authors state that, 'If we succeed in giving an impression of the beauty and power of mathematical reasoning in science, the purpose of our work will have been achieved.' This book includes the laws of levers and inclined planes, the laws of exponential versus limited population growth, ray optics, and relativity.