

Euclidean And Transformational Geometry A Deductive Inquiry

Now with a full-color design, the new Fourth Edition of Zill's Advanced Engineering Mathematics provides an in-depth overview of the many mathematical topics necessary for students planning a career in engineering or the sciences. A key strength of this text is Zill's emphasis on differential equations as mathematical models, discussing the constructs and pitfalls of each. The Fourth Edition is comprehensive, yet flexible, to meet the unique needs of various course offerings ranging from ordinary differential equations to vector calculus. Numerous new projects contributed by esteemed mathematicians have been added. New modern applications and engaging projects makes Zill's classic text a must-have text and resource for Engineering Math students!

Features the classical themes of geometry with plentiful applications in mathematics, education, engineering, and science Accessible and reader-friendly, Classical Geometry: Euclidean, Transformational, Inversive, and Projective introduces readers to a valuable discipline that is crucial to understanding both spatial relationships and logical reasoning. Focusing on the development of geometric intuition while avoiding the axiomatic

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method, a problem solving approach is encouraged throughout. The book is strategically divided into three sections: Part One focuses on Euclidean geometry, which provides the foundation for the rest of the material covered throughout; Part Two discusses Euclidean transformations of the plane, as well as groups and their use in studying transformations; and Part Three covers inversive and projective geometry as natural extensions of Euclidean geometry. In addition to featuring real-world applications throughout, Classical Geometry: Euclidean, Transformational, Inversive, and Projective includes: Multiple entertaining and elegant geometry problems at the end of each section for every level of study Fully worked examples with exercises to facilitate comprehension and retention Unique topical coverage, such as the theorems of Ceva and Menelaus and their applications An approach that prepares readers for the art of logical reasoning, modeling, and proofs The book is an excellent textbook for courses in introductory geometry, elementary geometry, modern geometry, and history of mathematics at the undergraduate level for mathematics majors, as well as for engineering and secondary education majors. The book is also ideal for anyone who would like to learn the various applications of elementary geometry. Geometric Transformations, Volume 1: Euclidean and Affine Transformations focuses on the study of

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coordinates, trigonometry, transformations, and linear equations. The publication first takes a look at orthogonal transformations, including orthogonal transformations of the first and second kinds; representations of orthogonal transformations as the products of fundamental orthogonal transformations; and representation of an orthogonal transformation of space as a product of fundamental orthogonal transformations. The text then examines similarity and affine transformations. Topics include properties of affine mappings, Darboux's lemma and its consequences, affine transformations in coordinates, homothetic transformations, similarity transformations of the plane in coordinates, and similarity mapping. The book takes a look at the representation of a similarity transformation as the product of a homothetic transformation and an orthogonal transformation; application of affine transformations to the investigation of properties of the ellipse; and representation of any affine transformation as a product of affine transformations of the simplest types. The manuscript is a valuable reference for high school teachers and readers interested in the Euclidean and affine transformations.

Solutions Manual to accompany Classical Geometry: Euclidean, Transformational, Inversive, and Projective Written by well-known mathematical problem solvers, Classical Geometry: Euclidean,

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Transformational, Inversive, and Projective features up-to-date and applicable coverage of the wide spectrum of geometry and aids readers in learning the art of logical reasoning, modeling, and proof. With its reader-friendly approach, this undergraduate text features self-contained topical coverage and provides a large selection of solved exercises to aid in reader comprehension. Material in this text can be tailored for a one-, two-, or three-semester sequence.

In this monograph, the authors present a modern development of Euclidean geometry from independent axioms, using up-to-date language and providing detailed proofs. The axioms for incidence, betweenness, and plane separation are close to those of Hilbert. This is the only axiomatic treatment of Euclidean geometry that uses axioms not involving metric notions and that explores congruence and isometries by means of reflection mappings. The authors present thirteen axioms in sequence, proving as many theorems as possible at each stage and, in the process, building up subgeometries, most notably the Pasch and neutral geometries. Standard topics such as the congruence theorems for triangles, embedding the real numbers in a line, and coordinatization of the plane are included, as well as theorems of Pythagoras, Desargues, Pappas, Menelaus, and Ceva. The final chapter covers consistency and independence of

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axioms, as well as independence of definition properties. There are over 300 exercises; solutions to many of these, including all that are needed for this development, are available online at the homepage for the book at www.springer.com. Supplementary material is available online covering construction of complex numbers, arc length, the circular functions, angle measure, and the polygonal form of the Jordan Curve theorem. Euclidean Geometry and Its Subgeometries is intended for advanced students and mature mathematicians, but the proofs are thoroughly worked out to make it accessible to undergraduate students as well. It can be regarded as a completion, updating, and expansion of Hilbert's work, filling a gap in the existing literature.

"Written by well-known mathematical problem solvers, Modern Geometry features up-to-date and applicable coverage of the wide spectrum of modern geometry and aids readers in learning the art of logical reasoning, modeling, and proof. With its reader-friendly approach, this undergraduate text features: self-contained coverage of modern geometry, provides a large selection of solved exercises to aid in reader comprehension, contains material that can be tailored for a one-, two-, or three-semester sequence, and provides a wide range of fully worked exercises throughout"--

Designed for economics, business, or social or

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behavioral science majors in a one- or two-term course, *Brief Calculus for the Business, Social, and Life Sciences* presents mathematics in a clear and accessible language. Engaging, real-world examples and real data applications make calculus relevant, and the easy-to-read conversational style of the text evokes the one-on-one communication of a personalized tutorial session without sacrificing depth of coverage or intellectual rigor. The revised and updated Third Edition of this popular text includes a new, four-step problem-solving method that allows students to independently find solutions to a broad spectrum of problem sets. Rich in pedagogical features, this text includes comprehensive exercise sets, chapter openers that outline key concepts for each chapter, and Flashback features that revisit and reinforce content from previous chapters. The Third Edition contains all-new exercises, updated real-world data for modeling applications, and Section Objectives that provide students with a clear understanding of learning goals for each section. The text is packaged with a full ancillary suite of instructor resources, including a test bank, lecture outlines in PowerPoint format, WebAssign, and a Complete Solutions Manual; additional student resources include a Student Solutions Manual and access to the student companion website. *Brief Calculus for the Business, Social, and Life Sciences* is a comprehensive,

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student-friendly text that will gently push students to new levels of independent problem-solving. Key features of the new Third Edition include: Optional highlighted Technology Option sections that point out how solutions can be found using a graphing calculator From Your Toolbox feature that reinforces previously introduced material Real data applications, fully revised and updated for the Third Edition, that keep problems relevant and interesting Comprehensive exercise sets, including Concept and Writing Exercises, Vocabulary Exercises, and Application Exercises Clearly defined four-step problem-solving method new to the Third Edition User-friendly, conversational approach that mimics the style of an individualized tutorial session Chapter Openers and Section Objectives that clearly outline key concepts for each chapter and section Section Projects that encourage further study, reflection, and independent research A full suite of ancillary student and instructor resources"

Geometric algebra is a powerful mathematical language with applications across a range of subjects in physics and engineering.

Designed for the one-term course in trigonometry, the Third Edition incorporates all of the many teaching and learning tools that have made Zill's texts a resounding success. A rich pedagogy and an extensive supplements package make this text a must-have resource for students and instructors alike. Zill takes care to include a

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full set of engaging and motivating features for students, including a wide range of word problems and specific applications, historical accounts of mathematicians, and a strong variety of relevant exercises. These extensive exercises give students the opportunity to test their comprehension, challenge their understanding, and apply their knowledge to real-world situations.

This introduction to Euclidean geometry emphasizes transformations, particularly isometries and similarities. Suitable for undergraduate courses, it includes numerous examples, many with detailed answers. 1972 edition.

Transformation Geometry: An Introduction to Symmetry offers a modern approach to Euclidean Geometry. This study of the automorphism groups of the plane and space gives the classical concrete examples that serve as a meaningful preparation for the standard undergraduate course in abstract algebra. The detailed development of the isometries of the plane is based on only the most elementary geometry and is appropriate for graduate courses for secondary teachers.

This unique textbook combines traditional geometry presents a contemporary approach that is grounded in real-world applications. It balances the deductive approach with discovery learning, introduces axiomatic, Euclidean and non-Euclidean, and transformational geometry. The text integrates applications and examples throughout. The Third Edition offers many updates, including expanding on historical notes, Geometry and Its Applications is a significant text for any college or university that focuses on geometry's usefulness in other

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disciplines. It is especially appropriate for engineering and science majors, as well as future mathematics teachers. The Third Edition streamlines the treatment from the previous two editions Treatment of axiomatic geometry has been expanded Nearly 300 applications from all fields are included An emphasis on computer science-related applications appeals to student interest Many new excercises keep the presentation fresh Ideal for mathematics majors and prospective secondary school teachers, Euclidean and Transformational Geometry provides a complete and solid presentation of Euclidean geometry with an emphasis on solving challenging problems. The author examines various strategies and heuristics for approaching proofs and discusses the process students should follow to determine how to proceed from one step to the next through numerous problem solving techniques. A large collection of problems, varying in level of difficulty, are integrated throughout the text and suggested hints for the more challenging problems appear in the instructor's solutions manual and can be used at the instructor's discretion.

Demonstrates relationships between different types of geometry. Provides excellent overview of the foundations and historical evolution of geometrical concepts.

Exercises (no solutions). Includes 98 illustrations.

Appropriate for the traditional 3-term college calculus course, *Calculus: Early Transcendentals, Fourth Edition* provides the student-friendly presentation and robust examples and problem sets for which Dennis Zill is known. This outstanding revision incorporates all of the

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exceptional learning tools that have made Zill's texts a resounding success. He carefully blends the theory and application of important concepts while offering modern applications and problem-solving skills.

This richly illustrated and clearly written undergraduate textbook captures the excitement and beauty of geometry. The approach is that of Klein in his Erlangen programme: a geometry is a space together with a set of transformations of the space. The authors explore various geometries: affine, projective, inversive, hyperbolic and elliptic. In each case they carefully explain the key results and discuss the relationships between the geometries. New features in this second edition include concise end-of-chapter summaries to aid student revision, a list of further reading and a list of special symbols. The authors have also revised many of the end-of-chapter exercises to make them more challenging and to include some interesting new results. Full solutions to the 200 problems are included in the text, while complete solutions to all of the end-of-chapter exercises are available in a new Instructors' Manual, which can be downloaded from www.cambridge.org/9781107647831.

Appropriate for the third semester in the college calculus sequence, the Fourth Edition of Multivariable Calculus maintains student-friendly writing style and robust exercises and problem sets that Dennis Zill is famous for. Ideal as a follow-up companion to Zill first volume, or as a stand-alone text, this exceptional revision presents the topics typically covered in the traditional third course, including Vector-valued Functions, Differential Calculus

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of Functions of Several Variables, Integral Calculus of Functions of Several Variables, Vector Integral Calculus, and an Introduction to Differential Equations.

Beyond Pseudo-Rotations in Pseudo-Euclidean Spaces presents for the first time a unified study of the Lorentz transformation group $SO(m, n)$ of signature (m, n) , $m, n \in \mathbb{N}$, which is fully analogous to the Lorentz group $SO(1, 3)$ of Einstein's special theory of relativity. It is based on a novel parametric realization of pseudo-rotations by a vector-like parameter with two orientation parameters. The book is of interest to specialized researchers in the areas of algebra, geometry and mathematical physics, containing new results that suggest further exploration in these areas. Introduces the study of generalized gyrogroups and gyrovector spaces Develops new algebraic structures, bi-gyrogroups and bi-gyrovector spaces Helps readers to surmount boundaries between algebra, geometry and physics Assists readers to parametrize and describe the full set of generalized Lorentz transformations in a geometric way Generalizes approaches from gyrogroups and gyrovector spaces to bi-gyrogroups and bi-gyrovector spaces with geometric entanglement

With an emphasis on problem-solving and packed with engaging, student-friendly exercise sets and examples, the Third Edition of Zill and Dewar's College Algebra is the perfect text for the traditional college algebra course. Zill's renowned pedagogy and accessible, straightforward writing style urges students to delve into the content and experience the mathematics first hand through numerous problem sets. These problem sets

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give students the opportunity to test their comprehension, challenge their understanding, and apply their knowledge to real-world situations. A robust collection of student and instructor ancillaries include: WebAssign access, PowerPoint Lecture Slides, Test Bank, Student Resource Manual and more.

Thinking Geometrically: A Survey of Geometries is a well written and comprehensive survey of college geometry that would serve a wide variety of courses for both mathematics majors and mathematics education majors. Great care and attention is spent on developing visual insights and geometric intuition while stressing the logical structure, historical development, and deep interconnectedness of the ideas. Students with less mathematical preparation than upper-division mathematics majors can successfully study the topics needed for the preparation of high school teachers. There is a multitude of exercises and projects in those chapters developing all aspects of geometric thinking for these students as well as for more advanced students. These chapters include Euclidean Geometry, Axiomatic Systems and Models, Analytic Geometry, Transformational Geometry, and Symmetry. Topics in the other chapters, including Non-Euclidean Geometry, Projective Geometry, Finite Geometry, Differential Geometry, and Discrete Geometry, provide a broader view of geometry. The different chapters are as independent as possible, while the text still manages to highlight the many connections between topics. The text is self-contained, including appendices with the material in Euclid's first book and a high school axiomatic system

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as well as Hilbert's axioms. Appendices give brief summaries of the parts of linear algebra and multivariable calculus needed for certain chapters. While some chapters use the language of groups, no prior experience with abstract algebra is presumed. The text will support an approach emphasizing dynamical geometry software without being tied to any particular software.

Never HIGHLIGHT a Book Again! Virtually all of the testable terms, concepts, persons, places, and events from the textbook are included. Cram101 Just the FACTS101 studyguides give all of the outlines, highlights, notes, and quizzes for your textbook with optional online comprehensive practice tests. Only Cram101 is Textbook Specific. Accompanys: 9780763743666 .

Ideal for the one-semester undergraduate course, Basic Real Analysis is intended for students who have recently completed a traditional calculus course and proves the basic theorems of Single Variable Calculus in a simple and accessible manner. It gradually builds upon key material as to not overwhelm students beginning the course and becomes more rigorous as they progresses. Optional appendices on sets and functions, countable and uncountable sets, and point set topology are included for those instructors who wish include these topics in their course. The author includes hints throughout the text to help students solve challenging problems. An online instructor's

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solutions manual is also available.

Many paths lead into Euclidean plane geometry.

Geometry Transformed offers an expeditious yet rigorous route using axioms based on rigid motions and dilations. Since transformations are available at the outset, interesting theorems can be proved sooner; and proofs can be connected to visual and tactile intuition about symmetry and motion. The reader thus gains valuable experience thinking with transformations, a skill that may be useful in other math courses or applications. For students interested in teaching mathematics at the secondary school level, this approach is particularly useful since geometry in the Common Core State Standards is based on rigid motions. The only prerequisite for this book is a basic understanding of functions. Some previous experience with proofs may be helpful, but students can also learn about proofs by experiencing them in this book—in a context where they can draw and experiment. The eleven chapters are organized in a flexible way to suit a variety of curriculum goals. In addition to a geometrical core that includes finite symmetry groups, there are additional topics on circles and on crystallographic and frieze groups, and a final chapter on affine and Cartesian coordinates. The exercises are a mixture of routine problems, experiments, and proofs.

This volume presents an accessible, self-contained survey of topics in Euclidean and non-Euclidean

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geometry. It includes plentiful illustrations and exercises in support of the thoroughly worked-out proofs. The author's emphasis on the connections between Euclidean and non-Euclidean geometry unifies the range of topics covered. The text opens with a brief review of elementary geometry before proceeding to advanced material. Topics covered include advanced Euclidean and non-Euclidean geometry, division ratios and triangles, transformation geometry, projective geometry, conic sections, and hyperbolic and absolute geometry. Topics in Geometry includes over 800 illustrations and extensive exercises of varying difficulty.

MathematicsMechanization

consistsoftheory,softwareandapplicationofc-puterized mathematical activities such as computing, reasoning and discovering. Itsuniquefeaturecanbesu-ccinctlydescribedasAAA(Algebraization,Algori-mization, Application). The name "Mathematics Mechanization" has its origin in the work of Hao Wang (1960s), one of the pioneers in using computers to do research in mathematics, particularly in automated theorem proving. Since the 1970s, this research direction has been actively pursued and extensively dev- oped by Prof. Wen-tsun Wu and his followers. It di?ers from the closely related disciplines like Computer Mathematics, Symbolic Computation and Automated Reasoning in that its goal is to make algorithmic studies and

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applications of mathematics the major trend of mathematics development in the information age. The International Workshop on Mathematics Mechanization (IWMM) was initiated by Prof. Wu in 1992, and has ever since been held by the Key Laboratory of Mathematics Mechanization (KLMM) of the Chinese Academy of Sciences. There have been seven workshops of the series up to now. At each workshop, several experts are invited to deliver plenary lectures on cutting-edge methods and algorithms of the selected theme. The workshop is also a forum for people working on related subjects to meet, collaborate and exchange ideas.

Ward Cheney and David Kincaid have developed *Linear Algebra: Theory and Applications, Second Edition*, a multi-faceted introductory textbook, which was motivated by their desire for a single text that meets the various requirements for differing courses within linear algebra. For theoretically-oriented students, the text guides them as they devise proofs and deal with abstractions by focusing on a comprehensive blend between theory and applications. For application-oriented science and engineering students, it contains numerous exercises that help them focus on understanding and learning not only vector spaces, matrices, and linear transformations, but uses of software tools available for use in applied linear algebra. Using a flexible design, it is an ideal textbook for instructors who

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wish to make their own choice regarding what material to emphasize, and to accentuate those choices with homework assignments from a large variety of exercises, both in the text and online. This textbook is a self-contained presentation of Euclidean Geometry, a subject that has been a core part of school curriculum for centuries. The discussion is rigorous, axiom-based, written in a traditional manner, true to the Euclidean spirit. Transformations in the Euclidean plane are included as part of the axiomatics and as a tool for solving construction problems. The textbook can be used for teaching a high school or an introductory level college course. It can be especially recommended for schools with enriched mathematical programs and for homeschoolers looking for a rigorous traditional discussion of geometry. The text is supplied with over 1200 questions and problems, ranging from simple to challenging. The solutions sections of the book contain about 200 answers and hints to solutions and over 100 detailed solutions involving proofs and constructions. More solutions and some supplements for teachers are available in the Instructor's Manual, which is issued as a separate book. From the Reviews... ?In terms of presentation, this text is more rigorous than any existing high school textbook that I know of. It is based on a system of axioms that describe incidence, postulate a notion of congruence of line

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segments, and assume the existence of enough rigid motions ("free mobility")? My gut reaction to the book is, wouldn't it be wonderful if American high school students could be exposed to this serious mathematical treatment of elementary geometry, instead of all the junk that is presented to them in existing textbooks. This book makes no concession to the TV-generation of students who want (or is it the publishers who want it for them?) pretty pictures, side bars, puzzles, games, historical references, cartoons, and all those colored images that clutter the pages of a typical modern textbook, while the mathematical content is diluted more and more with each successive edition.?

Professor Robin Hartshorne, University of California at Berkeley.

?The textbook ?Euclidean Geometry? by Mark Solomonovich fills a big gap in the plethora of mathematical textbooks ? it provides an exposition of classical geometry with emphasis on logic and rigorous proofs? I would be delighted to see this textbook used in Canadian schools in the framework of an improved geometry curriculum. Until this day comes, I highly recommend ?Euclidean Geometry? by Mark Solomonovich to be used in Mathematics Enrichment Programs across Canada and the USA.?

Professor Yuly Billig, Carlton University.

A practical, accessible introduction to advanced geometry

Exceptionally well-written and filled with historical and bibliographic notes, Methods of

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Geometry presents a practical and proof-oriented approach. The author develops a wide range of subject areas at an intermediate level and explains how theories that underlie many fields of advanced mathematics ultimately lead to applications in science and engineering. Foundations, basic Euclidean geometry, and transformations are discussed in detail and applied to study advanced plane geometry, polyhedra, isometries, similarities, and symmetry. An excellent introduction to advanced concepts as well as a reference to techniques for use in independent study and research, *Methods of Geometry* also features: Ample exercises designed to promote effective problem-solving strategies Insight into novel uses of Euclidean geometry More than 300 figures accompanying definitions and proofs A comprehensive and annotated bibliography Appendices reviewing vector and matrix algebra, least upper bound principle, and equivalence relations An Instructor's Manual presenting detailed solutions to all the problems in the book is available upon request from the Wiley editorial department. Geometry has been an essential element in the study of mathematics since antiquity. Traditionally, we have also learned formal reasoning by studying Euclidean geometry. In this book, David Clark develops a modern axiomatic approach to this ancient subject, both in content and presentation. Mathematically, Clark has chosen a new set of axioms that draw on a modern understanding of set theory and logic, the real number continuum and measure theory,

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none of which were available in Euclid's time. The result is a development of the standard content of Euclidean geometry with the mathematical precision of Hilbert's foundations of geometry. In particular, the book covers all the topics listed in the Common Core State Standards for high school synthetic geometry. The presentation uses a guided inquiry, active learning pedagogy. Students benefit from the axiomatic development because they themselves solve the problems and prove the theorems with the instructor serving as a guide and mentor. Students are thereby empowered with the knowledge that they can solve problems on their own without reference to authority. This book, written for an undergraduate axiomatic geometry course, is particularly well suited for future secondary school teachers. In the interest of fostering a greater awareness and appreciation of mathematics and its connections to other disciplines and everyday life, MSRI and the AMS are publishing books in the Mathematical Circles Library series as a service to young people, their parents and teachers, and the mathematics profession.

Illuminating, widely praised book on analytic geometry of circles, the Moebius transformation, and 2-dimensional non-Euclidean geometries.

This book gives a rigorous treatment of the fundamentals of plane geometry: Euclidean, spherical, elliptical and hyperbolic.

Meyer's *Geometry and Its Applications*, Second Edition, combines traditional geometry with current ideas to present a modern approach that is grounded in real-world applications. It balances the deductive approach with discovery learning, and introduces axiomatic, Euclidean geometry, non-Euclidean geometry, and transformational geometry. The text integrates applications and examples throughout and includes historical notes in many chapters. The Second Edition of *Geometry and*

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Its Applications is a significant text for any college or university that focuses on geometry's usefulness in other disciplines. It is especially appropriate for engineering and science majors, as well as future mathematics teachers. Realistic applications integrated throughout the text, including (but not limited to): Symmetries of artistic patterns Physics Robotics Computer vision Computer graphics Stability of architectural structures Molecular biology Medicine Pattern recognition Historical notes included in many chapters

Designed for a one-semester course at the junior undergraduate level, Transformational Plane Geometry takes a hands-on, interactive approach to teaching plane geometry. The book is self-contained, defining basic concepts from linear and abstract algebra gradually as needed. The text adheres to the National Council of Teachers of Mathematics Principles and Standards for School Mathematics and the Common Core State Standards Initiative Standards for Mathematical Practice. Future teachers will acquire the skills needed to effectively apply these standards in their classrooms. Following Felix Klein's Erlangen Program, the book provides students in pure mathematics and students in teacher training programs with a concrete visual alternative to Euclid's purely axiomatic approach to plane geometry. It enables geometrical visualization in three ways: Key concepts are motivated with exploratory activities using software specifically designed for performing geometrical constructions, such as Geometer's Sketchpad. Each concept is introduced synthetically (without coordinates) and analytically (with coordinates). Exercises include numerous geometric constructions that use a reflecting instrument, such as a MIRA. After reviewing the essential principles of classical Euclidean geometry, the book covers general transformations of the plane with particular attention to translations, rotations, reflections, stretches, and their compositions. The authors

