



Modern Geometries

By James R. Smart

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This comprehensive, best-selling text focuses on the study of many different geometries -- rather than a single geometry -- and is thoroughly modern in its approach. Each chapter is essentially a short course on one aspect of modern geometry, including finite geometries, the geometry of transformations, convexity, advanced Euclidian geometry, inversion, projective geometry, geometric aspects of topology, and non-Euclidean geometries. This edition reflects the recommendations of the COMAP proceedings on Geometry's Future, the NCTM standards, and the Professional Standards for Teaching Mathematics. References to a new companion text, Active Geometry by David A. Thomas encourage students to explore the geometry of motion through the use of computer software. Using Active Geometry at the beginning of various sections allows professors to give students a somewhat more intuitive introduction using current technology before moving on to more abstract concepts and theorems.

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Editorial Review

Review

1. SETS OF AXIOMS AND FINITE GEOMETRIES Introduction to Geometry / Development of Modern Geometries / Introduction to Finite Geometries / Four-Line and Four-Point Geometries / Finite Geometries of Fano and Young / Finite Geometries of Pappus and Desargues / Other Finite Geometries 2. GEOMETRIC TRANSFORMATIONS Introduction to Transformations / Groups of Transformations / Euclidean Motions of the Plane / Sets of Equations for Motions of the Plane / Applications of Transformations in Computer Graphics / Properties of the Group of Euclidean Motions / Motions and Graphics of Three-Space / Similarity Transformations / Introduction to the Geometry of Fractals and Fractal Dimension / Examples and Applications of Fractals 3. CONVEXITY Basic Concepts / Convex Sets and Supporting Lines / Convex Bodies in Two-Space / Convex Bodies in Three-Space / Convex Hulls / Width of a Set / Helly's Theorem and Applications 4. MODERN EUCLIDEAN GEOMETRY, THEORY, AND APPLICATIONS Fundamental Concepts and Theorems / Some Theorems Leading to Modern Synthetic Geometry / The Nine-Point Circle and Early Nineteenth-Century Synthetic Geometry / Isogonal Conjugates / Recent Synthetic Geometry of the Triangle / Golden Ratio, Tessellations, Packing Problems and Pick's Theorem / Extremum Problems, Geometric Probability, Fuzzy Sets, and Bezier Curves 5. CONSTRUCTIONS The Philosophy of Constructions / Constructible Numbers / Constructions in Advanced Euclidean Geometry / Constructions and Impossibility Proofs / Constructions by Paper Folding and by Use of Computer Software / Constructions with Only One Instrument 6. THE TRANSFORMATION OF INVERSION Basic Concepts / Additional Properties and Invariants under Inversion / The Analytic Geometry of Inversion / Some Applications of Inversion 7. PROJECTIVE GEOMETRY Fundamental Concepts / Postulational Basis for Projective Geometry / Duality and Some Consequences / Harmonic Sets / Projective Transformations / Homogenous Coordinates / Equations for Projective Transformations / Special Projectivities / Conics / Constructions of Conics 8. GEOMETRIC INTRODUCTION TO TOPOLOGICAL TRANSFORMATIONS Topological Transformations / Simple Closed Curves / Invariant Points and Networks / Introduction to the Topology of Surfaces / Euler's Formula and the Map-Coloring Problem 9. NON-EUCLIDEAN GEOMETRIES Foundations of Euclidean and Non-Euclidean Geometries / Introduction to Hyperbolic Geometry / Ideal Points and Omega Triangles / Quadrilaterals and Triangles / Pairs of Lines and Area of Triangular Regions / Curves / Elliptic Geometry / Consistency; Other Modern Geometries / APPENDIX 1: SELECTED IDEAS FROM LOGIC / APPENDIX 2: REVIEW OF EUCLIDEAN GEOMETRY / APPENDIX 3: FIRST TWENTY-EIGHT PROPOSITIONS OF EUCLID / APPENDIX 4: HILBERT'S AXIOMS / APPENDIX 5: BIRKHOFF'S POSTULATES / APPENDIX 6: ILLUSTRATIONS OF BASIC EUCLIDEAN CONSTRUCTIONS / BIBLIOGRAPHY / ANSWERS TO SELECTED EXERCISES / INDEX

Users Review

From reader reviews:

Gary Cornejo:

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