Chapter 6 Geometry Conjectures

This book provides a comprehensive description of topological polymers, an emerging research area in polymer science and polymer materials engineering. The precision polymer topology designing is critical to realizing the unique polymer properties and functions leading to their eventual applications. The prominent contributors are led by Principal Editor Yasuyuki Tezuka and Co-Editor Tetsuo Deguchi. Important ongoing achievements and anticipated breakthroughs in topological polymers are presented with an emphasis on the spectacular diversification of polymer constructions. The book serves readers collectively to acquire comprehensive insights over exciting innovations ongoing in topological polymer chemistry, encompassing topological geometry analysis, classification, physical characterization by simulation and the eventual chemical syntheses, with the supplementary focus on the polymer folding, invoked with the ongoing breakthrough of the precision AI prediction of protein folding. The current revolutionary developments in synthetic approaches specifically for single cyclic (ring) polymers and the topology-directed properties/functions uncovered thereby are outlined as a showcase example. This book is especially beneficial to academic personnel in universities and to researchers working in relevant institutions and companies. Although the level of the book is advanced, it can serve as a good reference book for graduate students and postdocs as a source of valuable knowledge of cutting-edge topics and progress in polymer chemistry.

Over the past 20 years, the theory of groups in particular simplegroups, finite and algebraic has influenced a number of diverseareas of mathematics. Such areas include topics where groups have beentraditionally applied, such as algebraic combinatorics, finitegeometries, Galois theory and permutation groups, as well as severalmore recent developments.

This volume contains papers which are based primarily on talks given at an inter national conference on Algorithmic Problems in Groups and Semigroups held at the University of Nebraska-Lincoln from May ll-May 16, 1998. The conference coincided with the Centennial Celebration of the Department of Mathematics and Statistics at the University of Nebraska-Lincoln on the occasion of the one hun dredth anniversary of the granting of the first Ph.D. by the department. Funding was provided by the US National Science Foundation, the Department of Math ematics and Statistics, and the College of Arts and Sciences at the University of Nebraska-Lincoln, through the College's focus program in Discrete, Experimental and Applied Mathematics. The purpose of the conference was to bring together researchers with interests in algorithmic problems in group theory, semigroup theory and computer science. A particularly useful feature of this conference was that it provided a framework for exchange of ideas between the research communities in semigroup theory and group theory, and several of the papers collected here reflect this interac tion of ideas. The papers collected in this volume represent a cross section of some of the results and ideas that were discussed in the conference. They reflect a synthesis of overlapping ideas and techniques stimulated

by problems concerning finite monoids, finitely presented mono ids, finitely presented groups and free groups. Mathematicians wanting to get into the field ... will find a very well written and encyclopaedic account of the mathematics which was needed in, and was developed from, what now might be termed classical mirror symmetry. --Bulletin of the LMS The book is highly recommended for everyone who wants to learn about the fascinating recent interplay between physics and mathematics. --Mathematical Reviews Mirror symmetry began when theoretical physicists made some astonishing predictions about rational curves on quintic hypersurfaces in four-dimensional projective space. Understanding the mathematics behind these predictions has been a substantial challenge. This book is a completely comprehensive monograph on mirror symmetry, covering the original observations by the physicists through the most recent progress made to date. Subjects discussed include toric varieties, Hodge theory, Kahler geometry, moduli of stable maps, Calabi-Yau manifolds, quantum cohomology, Gromov-Witten invariants, and the mirror theorem.

Introduction to Algebraic Independence Theory

An Investigative Approach. Teaching and worksheet masters

Fundamental Problems, Ideas and Theories

Conjectures in Arithmetic Algebraic Geometry

Koszul Cohomology and Algebraic Geometry

This monograph is the result of the cooperation of a mathematician working in universal algebra and geometry, and

a computer scientist working in automated deduction, who succeeded in employing the theorem prover Otter for proving first order theorems from mathematics and then intensified their joint effort. Mathematicians will find many new results from equational logic, universal algebra, and algebraic geometry and benefit from the state-of-the-art outline of the capabilities of automated deduction techniques. Computer scientists will find a large and varied source of theorems and problems that will be useful in designing and evaluation automated theorem proving systems and strategies.

This volume presents the proceedings of the I Iberoamerican Congress on Geometry: Cruz del Sur held in Olmue, Chile. The main topic was 'The Geometry of Groups: Curves, Abelian Varieties, Theoretical and Computational Aspects'. Participants came from all over the world. The volume gathers the expanded contributions from most of the participants in the Congress. Articles reflect the topic in its diversity and unity, and in particular, the work done on the subject by Iberoamerican mathematicians. Original results and surveys are included on the following areas: curves and Riemann surfaces, abelian varieties, and complex dynamics. The approaches are varied, including Kleinian groups, quasiconformal mappings and Teichmuller spaces, function theory, moduli spaces, automorphism groups, algebraic geometry, and more.

Plastics, films, and synthetic fibers are among typical examples of polymer materials fabricated industrially in massive quantities as the basis of modern social life. By comparison, polymers from biological resources, including proteins, DNAs, and cotton fibers, are essential in various processes in living systems. Such polymers are molecular

substances, constituted by the linking of hundreds to tens of thousands of small chemical unit (monomer) components. Thus, the form of polymer molecules is frequently expressed by line geometries, and their linear and non-linear forms are believed to constitute the fundamental basis for their properties and functions. In the field of polymer chemistry and polymer materials science, the choice of macromolecules has continuously been extended from linear or randomly branched forms toward a variety of precisely controlled topologies by the introduction of intriguing synthetic techniques. Moreover, during the first decade of this century, a number of impressive breakthroughs have been achieved to produce an important class of polymers having a variety of cyclic and multicyclic topologies. These developments now offer unique opportunities in polymer materials design to create unique properties and functions based on the form, i.e., topology, of polymer molecules. The introduction and application of topological geometry (soft geometry) to polymer molecules is a crucial requirement to account for the basic geometrical properties of polymer chains uniquely flexible in nature, in contrast to small chemical compounds conceived upon Euclidian geometry (hard geometry) principles. Topological geometry and graph theory are introduced for the systematic classification and notation of the non-linear constructions of polymer molecules, including not only branched but also single cyclic and multicyclic polymer topologies. On that basis, the geometrical–topological relationship between different polymers having distinctive constructions is discussed. A unique conception of topological isomerism is thus formed, which contrasts with that of conventional constitutional and stereoisomerism occurring in small

chemical compounds. Through the close collaboration of topology experts Shimokawa and Ishihara and the polymer chemist Tezuka, this monograph covers the fundamentals and selected current topics of topology applied in polymers and topological polymer chemistry. In particular, the aim is to provide novel insights jointly revealed through a unique interaction between mathematics (topology) and polymer materials science.

This research monograph develops an arithmetic analogue of the theory of ordinary differential equations: functions are replaced here by integer numbers, the derivative operator is replaced by a ``Fermat quotient operator'', and differential equations (viewed as functions on jet spaces) are replaced by ``arithmetic differential equations''. The main application of this theory concerns the construction and study of quotients of algebraic curves by correspondences with infinite orbits. Any such quotient reduces to a point in usual algebraic geometry. But many quotients as above cease to be trivial (and become quite interesting) if one enlarges algebraic geometry by using arithmetic differential equations in place of algebraic equations. The book partly follows a series of papers written by the author; however, a substantial part of the material presented here has never been published before. For most of the book the only prerequisites are the basic facts of algebraic geometry and number theory.

Topological Polymer Chemistry

The Geometry and Topology of Coxeter Groups

Constructions With a Straightedge and Compass (Grades 4-6)

Geometry and Topology

A Step-by-Step Guide With Activities, Games, and Lesson Planning Tools

Complex Geometry of Groups

Tensors are used throughout the sciences, especially in solid state physics and quantum information theory. This book brings a geometric perspective to the use of tensors in these areas. It begins with an introduction to the geometry of tensors and provides geometric expositions of the basics of quantum information theory, Strassen's laser method for matrix multiplication, and moment maps in algebraic geometry. It also details several exciting recent developments regarding tensors in general. In particular, it discusses and explains the following material previously only available in the original research papers: (1) Shitov's 2017 refutation of longstanding conjectures of Strassen on rank additivity and Common on symmetric rank; (2) The 2017 Christandl-Vrana-Zuiddam quantum spectral points that bring together quantum information theory, the asymptotic geometry of tensors, matrix multiplication complexity, and moment polytopes in geometric invariant theory; (3) the use of representation theory in quantum information theory, including the solution of the quantum marginal problem; (4) the use of tensor network states in solid state physics, and (5) recent geometric paths towards upper bounds for the complexity of matrix multiplication. Numerous open problems appropriate for graduate students and post-docs are included throughout.

From two authors who embrace technology in the classroom and value the role of collaborative learning comes College Geometry Using GeoGebra, a book that is ideal for geometry courses for both mathematics and math education majors. The book's discovery-based approach guides students to explore geometric worlds through computer-based activities, enabling students to make observations, develop conjectures, and write mathematical proofs. This unique textbook helps students understand the underlying concepts of geometry while learning to use GeoGebra software—constructing various geometric figures and

investigating their properties, relationships, and interactions. The text allows students to gradually build upon their knowledge as they move from fundamental concepts of circle and triangle geometry to more advanced topics such as isometries and matrices, symmetry in the plane, and hyperbolic and projective geometry. Emphasizing active collaborative learning, the text contains numerous fully-integrated computer lab activities that visualize difficult geometric concepts and facilitate both small-group and whole-class discussions. Each chapter begins with engaging activities that draw students into the subject matter, followed by detailed discussions that solidify the student conjectures made in the activities and exercises that test comprehension of the material. Written to support students and instructors in active-learning classrooms that incorporate computer technology, College Geometry with GeoGebra is an ideal resource for geometry courses for both mathematics and math education majors.

Mathematics research papers provide a forum for all mathematics enthusiasts to exercise their mathematical experience, expertise and excitement. The research paper process epitomizes the differentiation of instruction, as each student chooses their own topic and extends it as far as their motivation and desire takes them. The features and benefits of the research paper process offer a natural alignment with all eight Common Core State Standards for Mathematical Practice. Writing Math Research Papers serves both as a text for students and as a resource for instructors and administrators. The Writing Math Research Papers program started at North Shore High School in 1991, and it received the 1997 Chevron Best Practices in Education Award as the premier high school math course in the United States. Author Robert Gerver's articles on high school mathematics research programs were featured in the National Council of Teachers of Mathematics publication Developing Mathematically Promising Students, the NCTM's 1999 Yearbook, Developing Mathematical Reasoning in Grades K – 12, and in the September 2017 issue of

the Mathematics Teacher.

"A magisterial acount of matters as diverse as the Talmud, Justinian's Digest, torture, witch hunts, Tudor treason trials, ancient and medieval astronomy and physics, humanist historiography, scholastic philosophy, speculations in public debt, and 17th century mathematics." -- International Journal of Evidence and Proof

L2-Invariants: Theory and Applications to Geometry and K-Theory

A Guide through the Proofs of the Tarski Conjectures

Tensors: Asymptotic Geometry and Developments 2016–2018

Algorithmic Problems in Groups and Semigroups

Writing Math Research Papers - 5th Ed.

Relations with Algebraic Geometry, Group Cohomology, and Algebraic K-theory : an International Conference on Algebraic Topology, March 24-28, 2002, Northwestern University

Conjectures in Arithmetic Algebraic GeometryA SurveySpringerArithmetic Algebraic GeometryAmerican Mathematical Soc.Mirror Symmetry and Algebraic GeometryAmerican Mathematical Soc.

In algebraic topology some classical invariants – such as Betti numbers and Reidemeister torsion – are defined for compact spaces and finite group actions. They can be generalized using von Neumann algebras and their traces, and applied also to non-compact spaces and infinite groups. These new L2-invariants contain very interesting and novel information and can be applied to problems arising in topology, K-Theory, differential geometry, non-commutative geometry and spectral

theory. The book, written in an accessible manner, presents a comprehensive introduction to this area of research, as well as its most recent results and developments.

In the past century, different branches of mathematics have become more widely separated. Yet, there is an essential unity to mathematics which still springs up in fascinating ways to solve interdisciplinary problems. This text provides a bridge between the subjects of algebraic topology, including differential topology, and geometry. It is a survey book dedicated to a large audience of researchers and graduate students in these areas. Containing a generalintroduction to the algebraic theory of rational homotopy and giving concrete applications of algebraic models to the study of geometrical problems, mathematicians in many areas will find subjects that are of interest to them in the book.

This monograph is a bridge between the classical theory and modern approach via arithmetic geometry.

An Investigative Approach

Some Novel Types of Fractal Geometry

Arithmetic Algebraic Geometry

Discovering Geometry

Homotopy Theory: Relations with Algebraic

Geometry, Group Cohomology, and Algebraic K-Theory

"Cruz Del Sur" I Iberoamerican Congress on Geometry, January 5-11, 1998, Olmué, Chile

In the last five years there has been very significant progress in the development of transcendence theory. A new approach to the arithmetic properties of values of modular forms and theta-functions was found. The solution of the Mahler-Manin problem on values of modular function j(tau) and algebraic independence of numbers pi and e^(pi) are most impressive results of this breakthrough. The book presents these and other results on algebraic independence of numbers and further, a detailed exposition of methods created in last the 25 years, during which commutative algebra and algebraic geometry exerted strong catalytic influence on the development of the subject.

This book contains expository papers that give an up-to-date account of recent developments and open problems in the geometry and topology of manifolds, along with several research articles that present new results

appearing in published form for the first time. The unifying theme is the problem of understanding manifolds in low dimensions, notably in dimensions three and four, and the techniques include algebraic topology, surgery theory, Donaldson and Seiberg-Witten gauge theory, Heegaard Floer homology, contact and symplectic geometry, and Gromov-Witten invariants. The articles collected for this volume were contributed by participants of the Conference "Geometry and Topology of Manifolds" held at McMaster University on May 14-18, 2004 and are representative of the many excellent talks delivered at the conference.
Volume of geometric objects plays an important role in applied and theoretical mathematics. This is particularly true in the relatively new branch of discrete geometry, where volume is often used to find new topics for research. Volumetric Discrete Geometry demonstrates the recent aspects of volume, introduces problems related to it, and presents methods to apply it to other geometric problems. Part I of the text consists of survey

chapters of selected topics on volume and is suitable for advanced undergraduate students. Part II has chapters of selected proofs of theorems stated in Part I and is oriented for graduate level students wishing to learn about the latest research on the topic. Chapters can be studied independently from each other. Provides a list of 30 open problems to promote research Features more than 60 research exercises Ideally suited for researchers and students of combinatorics, geometry and discrete mathematics

Put compasses into your students' hands and behold the results! Hands-On Geometry teaches students to draw accurate constructions of equilateral triangles, squares, and regular hexagons, octagons, and dodecagons; to construct kites and use their diagonals to construct altitudes, angle bisectors, perpendicular bisectors, and the inscribed and circumscribed circles of any triangle; to construct perpendicular lines and rectangles, parallel lines, and parallelograms; and to construct a regular pentagon and a

golden rectangle. Students will enjoy fulfilling high standards of precision with these hands-on activities. Hands-On Geometry provides the background students need to become exceptionally well prepared for a formal geometry class. The book provides an easy way to differentiate instruction: Because the lessons are self-explanatory, students can proceed at their own pace, and the finished constructions can be assessed at a glance. Grades 4-6

Concepts and Practices

Mirror Symmetry and Algebraic Geometry

Groups Combinatorics & Geometry

Novikov Conjectures, Index Theorems and Rigidity

Perspectives in Mathematical Sciences II

Geometry with Applications and Proofs

This edition has been called ‘startlingly up-to-date’, and in this corrected second printing you can be sure that it’s even more contemporaneous. It surveys from a unified point of view both the modern state and the trends of continuing development in various branches of number theory. Illuminated by elementary problems, the central ideas of modern theories are laid bare. Some topics covered include non-Abelian generalizations of class field theory, recursive computability and Diophantine equations, zeta- and L-

functions. This substantially revised and expanded new edition contains several new sections, such as Wiles' proof of Fermat's Last Theorem, and relevant techniques coming from a synthesis of various theories.

The present book deals with fractal geometries which have features similar to ones of ordinary Euclidean spaces, while at the same time being quite different from Euclidean spaces in other ways. A basic type of feature being considered is the presence of Sobolev or Poincare inequalities,concerning the relationship between the average behaviour of a function and the average behaviour of its small-scale oscillations. Remarkable results in the last few years of Bourdon-Pajot and Laakso have shown that there is much more in the way of geometries like this than has been realized.Examples related to nilpotent Lie groups and Carnot metrics were known previously. On the other hand, 'typical' fractals that might be seen in pictures do not have these same kinds of features. 'Some Novel Types of Fractal Geometry' will be of interest to graduate students and researchers inmathematics, working in various aspects of geometry and analysis.

The Geometry and Topology of Coxeter Groups is a comprehensive and authoritative treatment of Coxeter groups from the viewpoint of geometric group theory. Groups generated by reflections are ubiquitous in mathematics, and there are classical examples of reflection groups in spherical, Euclidean, and hyperbolic geometry. Any Coxeter group can be realized as a group generated by reflection on a certain contractible cell complex, and this complex is the principal subject of this book. The book explains a theorem of Moussong that demonstrates that a

polyhedral metric on this cell complex is nonpositively curved, meaning that Coxeter groups are "CAT(0) groups." The book describes the reflection group trick, one of the most potent sources of examples of aspherical manifolds. And the book discusses many important topics in geometric group theory and topology, including Hopf's theory of ends; contractible manifolds and homology spheres; the Poincaré Conjecture; and Gromov's theory of CAT(0) spaces and groups. Finally, the book examines connections between Coxeter groups and some of topology's most famous open problems concerning aspherical manifolds, such as the Euler Characteristic Conjecture and the Borel and Singer conjectures.

The Novikov conjecture is the single most important unsolved problem in the topology of high-dimensional non-simply connected manifolds. These two volumes give a snapshot of the status of work on the Novikov conjecture and related topics from many points of view: geometric topology, homotopy theory, algebra, geometry, and analysis. Volume 1 contains a detailed historical survey and bibliography of the Novikov conjecture and of related subsequent developments, including an annotated reprint (both in the original Russian and in English translation) of Novikov's original 1970 statement of his conjecture; an annotated problem list; the texts of several important unpublished classic papers by Milnor, Browder, and Kasparov; and research/survey papers on the Novikov conjecture by Ferry/Weinberger, Gromov, Mishchenko, Quinn, Ranicki, and Rosenberg. Volume 2 contains fundamental long research papers by G. Carlsson on "Bounded K-theory and the assembly map in algebraic K-theory" and by S. Ferry and E.

Pedersen on "Epsilon surgery theory"; and shorter research and survey papers on various topics related to the Novikov conjecture, by Bekka, Cherix, Valette, Eichhorn, and others. These volumes will appeal to researchers interested in learning more about this intriguing area.

Oberwolfach 1993

Arithmetic Differential Equations

A Survey

Algebraic Models in Geometry

Mathematical Argumentation in Middle School-The What, Why, and How

Comparison Theorems in Riemannian Geometry

Conference proceedings based on the 1996 LMS Durham Symposium 'Galois representations in arithmetic algebraic geometry'.

Discovering Geometry is designed so that you can be actively engaged as you learn geometry. In this book you learn by doing. You will learn to use the tools of geometry and to perform geometry investigations with them. Many of the investigations are carried out in small cooperative groups in which you jointly plan and find solutions with other students. Your investigations will lead you to the discovery of geometry properties. In addition, you will gradually learn about proof, a form of reasoning that will help you explain why your discoveries are true, through developing proof group activities and exercises. - p. xiv.

Presents the theory of local Chern characters used in commutative algebra in an algebraic setting.

This book consists of 16 surveys on Thurston's

work and its later development. The authors are mathematicians who were strongly influenced by Thurston's publications and ideas. The subjects discussed include, among others, knot theory, the topology of 3-manifolds, circle packings, complex projective structures, hyperbolic geometry, Kleinian groups, foliations, mapping class groups, Teichmüller theory, anti-de Sitter geometry, and co-Minkowski geometry. The book is addressed to researchers and students who want to learn about Thurston's wide-ranging mathematical ideas and their impact. At the same time, it is a tribute to Thurston, one of the greatest geometers of all time, whose work extended over many fields in mathematics and who had a unique way of perceiving forms and patterns, and of communicating and writing mathematics.

Multiplicities and Chern Classes in Local Algebra

Topology of Polymers

Lectures on Algebraic Geometry II

A Classical Introduction to Modern Number Theory

A Guide for High School Students and Instructors

The Science of Conjecture

As part of its series of ""Emphasis Years in Mathematics"", Northwestern University hosted an International Conference on Algebraic Topology. The purpose of the conference was to develop new connections between homotopy theory and other areas of mathematics. This

proceedings volume grew out of that event. Topics discussed include algebraic geometry, cohomology of groups, algebraic K-theory, and $\mathbb{A}^1$ homotopy theory. Among the contributors to the volume were Alejandro Adem, Ralph L. Cohen, Jean-Louis Loday, and many others. The book is suitable for graduate students and research mathematicians interested in homotopy theory and its relationship to other areas of mathematics.

This book gives an up-to-date account of progress on Pansu's celebrated problem on the sub-Riemannian isoperimetric profile of the Heisenberg group. It also serves as an introduction to the general field of sub-Riemannian geometric analysis. It develops the methods and tools of sub-Riemannian differential geometry, nonsmooth analysis, and geometric measure theory suitable for attacks on Pansu's problem.

The systematic use of Koszul cohomology computations in algebraic geometry can be traced back to the foundational work of Mark Green in the 1980s. Green connected classical results concerning the ideal of a projective variety with vanishing theorems for Koszul cohomology. Green and Lazarsfeld also stated two conjectures that relate the Koszul cohomology of algebraic curves with the existence of special divisors on the curve. These conjectures became an important guideline for future research. In the intervening years, there has been a growing interaction between Koszul cohomology and algebraic geometry. Green and

Voisin applied Koszul cohomology to a number of Hodge-theoretic problems, with remarkable success. More recently, Voisin achieved a breakthrough by proving Green's conjecture for general curves; soon afterwards, the Green-Lazarsfeld conjecture for general curves was proved as well. This book is primarily concerned with applications of Koszul cohomology to algebraic geometry, with an emphasis on syzygies of complex projective curves. The authors' main goal is to present Voisin's proof of the generic Green conjecture, and subsequent refinements. They discuss the geometric aspects of the theory and a number of concrete applications of Koszul cohomology to problems in algebraic geometry, including applications to Hodge theory and to the geometry of the moduli space of curves.

After being an open question for sixty years the Tarski conjecture was answered in the affirmative by Olga Kharlampovich and Alexei Myasnikov and independently by Zlil Sela. Both proofs involve long and complicated applications of algebraic geometry over free groups as well as an extension of methods to solve equations in free groups originally developed by Razborov. This book is an examination of the material on the general elementary theory of groups that is necessary to begin to understand the proofs. This material includes a complete exposition of the theory of fully residually free groups or limit groups as well a complete description of the algebraic geometry of free groups. Also included are

introductory material on combinatorial and geometric group theory and first-order logic. There is then a short outline of the proof of the Tarski conjectures in the manner of Kharlampovich and Myasnikov.

In the Tradition of Thurston

Advanced Geometry for Senior High School,Student Text and Background Information

Galois Representations in Arithmetic Algebraic Geometry

Introduction to Modern Number Theory

Hands-On Geometry

Durham 2001

This second volume introduces the concept of shemes, reviews some commutative algebra and introduces projective schemes. The finiteness theorem for coherent sheaves is proved, here again the techniques of homological algebra and sheaf cohomology are needed. In the last two chapters, projective curves over an arbitrary ground field are discussed, the theory of Jacobians is developed, and the existence of the Picard scheme is proved. Finally, the author gives some outlook into further developments- for instance é tale cohomology- and states some fundamental theorems.

This book shows how geometry can be learned by starting with real world problems which are solved by intuition, common sense reasoning and experiments. Gradually the more formal demands of mathematical proofs get their proper place and make it possible to explore new applications. This process helps students to feel the need for precise definitions and procedures, to contribute to the construction of an axiomatic system, and to experience the power of systematic reasoning. The course is

designed for students in a Nature & Technology strand which prepares for studying the sciences or technology at university level. Its goal was basically to reintroduce ‘proof’ in a meaningful way in the late 1990s Dutch secondary education curriculum. Following the educational view of the Freudenthal Institute this is not done by stating Euclid’s axioms on page one, but rather a starting point is chosen in students’ intuitions and tentative solutions of problems that are experienced as real and relevant. The photograph on the cover shows students exploring one of the problems from the midpart of the course in the computerlab.

This well-developed, accessible text details the historical development of the subject throughout. It also provides wide-ranging coverage of significant results with comparatively elementary proofs, some of them new. This second edition contains two new chapters that provide a complete proof of the Mordel-Weil theorem for elliptic curves over the rational numbers and an overview of recent progress on the arithmetic of elliptic curves.

Comparison Theorems in Riemannian Geometry

Automated Deduction in Equational Logic and Cubic Curves

Heights in Diophantine Geometry

Basic Concepts, Coherent Cohomology, Curves and their Jacobians

The Elementary Theory of Groups

An Introduction to the Heisenberg Group and the Sub-Riemannian Isoperimetric Problem

Geometry and Topology of Manifolds

Get them talking: Your formula for bringing math concepts to life! Want your middle schoolers to intelligently

engage with mathematical ideas? Look no further. This research-based gem brings tough Standards for Mathematical Practice 3 standards for mathematical argumentation and critical reasoning alive—all within a thoroughly explained four-part model that covers generating cases, conjecturing, justifying, and concluding. Immediately engage students in fun, classroom-ready argumentation activities Help students explore—and take ownership of—mathematical ideas and concepts Promote precise use of mathematical language Includes games, vignettes, a rich companion website, sample tasks, and links to online tools. Bring well-planned, well-constructed mathematical discourse to life in your classroom today!
Volumetric Discrete Geometry
College Geometry with GeoGebra
Evidence and Probability Before Pascal