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early middle school is a great time for children to start their mathematical circle education this time is a period of curiosity and openness to learning the thinking habits and study skills acquired by children at this age stay with them for a lifetime mathematical circles with their question driven approach and emphasis on creative problem solving have been rapidly gaining popularity in the

united states the circles expose children to the type of mathematics that stimulates development of logical thinking creativity analytical abilities and mathematical reasoning these skills while scarcely touched upon at school are in high demand in the modern world this book contains everything that is needed to run a successful mathematical circle for a full year the materials distributed among 29 weekly lessons include detailed lectures and discussions sets of problems with solutions and contests and games in addition the book shares some of the know how of running a mathematical circle the curriculum which is based on the rich and long standing russian math circle tradition has been modified and adapted for teaching in the united states for the past decade the author has been actively involved in teaching a number of mathematical circles in the seattle area this book is based on her experience and on the compilation of materials from these circles the material is intended for students in grades 5 to 7 it can be used by teachers and parents with various levels of expertise who are interested in teaching mathematics with the emphasis on critical thinking also this book will be of interest to mathematically motivated children 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

this book is based on selected topics that the authors taught in math circles for elementary school students at the university of california berkeley stanford university dominican university marin county ca and the university of oregon eugene it is intended for people who are already running a math circle or who are thinking about organizing one it can be used by parents to help their motivated math loving kids or by elementary school teachers we also hope that bright fourth or fifth graders will be able to read this book on their own the main features of this book are the logical sequence of the problems the description of class reactions and the hints given to kids when they get stuck this book tries to keep the balance between two goals inspire readers to invent their own original approaches while being detailed enough to work as a fallback in case the teacher needs to prepare a lesson on short notice it introduces kids to combinatorics fibonacci numbers pascal s triangle and the notion of area among other things the authors chose topics with deep mathematical context these topics are just as engaging and entertaining to children as typical recreational math problems but they can be developed deeper and to more advanced levels 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

math circles provide a setting in which mathematicians work with secondary school students who are interested in mathematics this form of outreach which has existed for decades in russia bulgaria and other countries is now rapidly spreading across the united states as well the first part of this book offers helpful advice on all aspects of math circle operations culled from

conversations with over a dozen directors of successful math circles topics include creative means for getting the word out to students sound principles for selecting effective speakers guidelines for securing financial support and tips for designing an exciting math circle session the purpose of this discussion is to enable math circle coordinators to establish a thriving group in which students can experience the delight of mathematical investigation the second part of the book outlines ten independent math circle sessions covering a variety of topics and difficulty levels each chapter contains detailed presentation notes along with a useful collection of problems and solutions this book will be an indispensable resource for any individual involved with a math circle or anyone who would like to see one begin in his or her community sam vandervelde teaches at st lawrence university he launched the stanford math circle and also writes and coordinates the mandelbrot competition a math contest for high schools 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 titles in this series are co published with the mathematical sciences research institute msri

many mathematicians have been drawn to mathematics through their experience with math circles the berkeley math circle bmc started in 1998 as one of the very first math circles in the u s over the last decade and a half 100 instructors university professors business tycoons high school teachers and more have shared their passion for mathematics by delivering over 800 bmc sessions on the uc berkeley campus every week during the school year this second volume of the book series is based on a dozen of these sessions encompassing a variety of enticing and stimulating mathematical topics some new and some continuing from volume i from dismantling rubik s cube and randomly putting it back together to solving it with the power of group theory from raising knot eating machines and letting alexander the great cut the gordian knot to breaking through knot theory via the jones polynomial from entering a seemingly hopeless infinite raffle to becoming friendly with multiplicative functions in the land of dirichlet möbius and euler from leading an army of jumping fleas in an old problem from the international mathematical olympiads to improving our own essay writing strategies from searching for optimal paths on a hot summer day to questioning whether archimedes was on his way to discovering trigonometry 2000 years ago do some of these scenarios sound bizarre having never before been associated with mathematics mathematicians love having fun while doing serious mathematics and that love is what this book intends to share with the reader whether at a beginner an intermediate or an advanced level anyone can find a place here to be provoked to think deeply and to be inspired to create 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 titles in this series are co published with the mathematical sciences research institute msri

moscow has a rich tradition of successful math circles to the extent that many other circles are modeled on them this book presents materials used during the course of one year in a math circle organized by mathematics faculty at moscow state university and also used at the mathematics magnet school known as moscow school number 57 each problem set has a similar structure it combines review material with a new topic offering problems in a range of difficulty levels this time tested pattern has proved its effectiveness in engaging all students and helping them master new material while building on earlier knowledge the introduction describes in detail how the math circles at moscow state university are run dorichenko describes how the early sessions differ from later sessions how to choose problems and what sorts of difficulties may arise when running a circle the book also includes a selection of problems used in the competition known as the mathematical maze a mathematical story based on actual lessons with students and an addendum on the san jose mathematical circle which is run in the russian style 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

the main part of this book describes the first semester of the existence of a successful and now highly popular program for elementary school students at the berkeley math circle the topics discussed in the book introduce the participants to the basics of many important areas of modern mathematics including logic symmetry probability theory knot theory cryptography fractals and number theory each chapter in the first part of this book consists of two parts it starts with generously illustrated sets of problems and hands on activities this part is addressed to young readers who can try to solve problems on their own or to discuss them with adults the second part of each chapter is addressed to teachers and parents it includes comments on the topics of the lesson relates those topics to discussions in other chapters and describes the actual reaction of math circle participants to the proposed activities the supplementary problems that were discussed at workshops of math circle at kansas state university are given in the second part of the book the book is richly illustrated which makes it attractive to its young audience 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 titles in this series are co published with the mathematical sciences research institute msri

service to young people their parents and teachers and the mathematics profession

this book is a captivating account of a professional mathematician s experiences conducting a math circle for preschoolers in his apartment in moscow in the 1980s as anyone who has taught or raised young children knows mathematical education for little kids is a real mystery what are they capable of what should they learn first how hard should they work should they even work at all

should we push them or just let them be there are no correct answers to these questions and the author deals with them in classic math circle style he doesn t ask and then answer a question but shows us a problem be it mathematical or pedagogical and describes to us what happened his book is a narrative about what he did what he tried what worked what failed but most important what the kids experienced this book does not purport to show you how to create precocious high achievers it is just one person s story about things he tried with a half dozen young children mathematicians psychologists educators parents and everybody interested in the intellectual development in young children will find this book to be an invaluable inspiring resource 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 titles in this series are co published with the mathematical sciences research institute msri

mathematics rhyme and reason is an exploration of the aesthetic value of mathematics and the culture of the mathematics community this book introduces budding mathematicians of all ages to mathematical ways of thinking through a series of chapters that mix episodes from the author s life with explanations of intriguing mathematical concepts and the stories of the mathematicians who discovered them the chapters can be read independently and most require only a background in basic high school algebra or geometry to appreciate the topics covered part personal memoir part appreciation of the poetry and humanity inherent in mathematics this entertaining collection of stories theorems and reflections will be of interest to anyone curious about mathematics and the human beings who practice it 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

classical euclidean geometry with all its triangles circles and inscribed angles remains an excellent playground for high school mathematics students even if it looks outdated from the professional mathematician s viewpoint it provides an excellent choice of elegant and natural problems that can be used in a course based on problem solving the book contains more than 750 mostly easy but nontrivial problems in all areas of plane geometry and solutions for most of them as well as additional problems for self study some with hints each chapter also provides concise reminders of basic notions used in the chapter so the book is almost self contained although a good textbook and competent teacher are always recommended more than 450 figures illustrate the problems and their solutions the book can be used by motivated high school students as well as their teachers and parents after solving the problems in the book the student will have mastered the main notions and methods of plane geometry and hopefully will have had fun in the process 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 what a joy shen s geometry in problems is a gift to the school teaching world beautifully organized by content topic shen has collated a vast collection of fresh innovative and highly classroom relevant questions problems and challenges sure to enliven the minds and clever thinking of all those studying euclidean geometry for the first time this book is a spectacular resource for educators and students alike users will not only sharpen their mathematical understanding of specific topics but will also sharpen their problem solving wits and come to truly own the mathematics explored also math circle leaders can draw much inspiration for session ideas from the material presented in this book james tanton mathematician at large mathematical association of america we learn mathematics best by doing mathematics the author of this book recognizes this principle he invites the reader to participate in learning plane geometry through carefully chosen problems with brief explanations leading to much activity the problems in the book are sometimes deep and subtle almost everyone can do some of them and almost no one can do all the reader comes away with a view of geometry refreshed by experience mark saul director of competitions mathematical association of america

this book is a translation from russian of part ii of the book mathematics through problems from olympiads and math circles to profession part i algebra was recently published in the same series part iii combinatorics will be published soon the main goal of this book is to develop important parts of mathematics through problems the authors tried to put together sequences of problems that allow high school students and some undergraduates with strong interest in mathematics to discover and recreate much of elementary mathematics and start edging into more sophisticated topics such as projective and affine geometry solid geometry and so on thus building a bridge between standard high school exercises and more intricate notions in geometry definitions and or references for material that is not standard in the school curriculum are included to help students that might be unfamiliar with new material problems are carefully arranged to provide gradual introduction into each subject problems are often accompanied by hints and or complete solutions the book is based on classes taught by the authors at different times at the independent university of moscow at a number of moscow schools and math circles and at various summer schools it can be used by high school students and undergraduates their teachers and organizers of summer camps and math circles 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

this geometry book is written foremost for future and current middle school teachers but is also designed for elementary and high school teachers the book consists of ten seminars covering in a rigourous way the fundamental topics in school geometry including all of the significant topics in high school geometry the seminars are crafted to clarify and enhance understanding of the subject concepts in plane and solid geometry are carefully explained and activities that teachers can use in their classrooms are

emphasised the book draws on the pictorial nature of geometry since that is what attracts students at every level to the subject the book should give teachers a firm foundation on which to base their instruction in the elementary and middle grades in addition it should help teachers give their students a solid basis for the geometry that they will study in high school the book is also intended to be a source for problems in geometry for enrichment programmes such as math circles and young scholars

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