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P R O J E C T

mEg s s s

WE PUT THE M IN STEM

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# Project MEGSSS, Inc. Student and Parent Handbook

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## Introduction

### Welcome to Project MEGSSS

We are pleased to welcome you to Project MEGSSS. **Project MEGSSS has a mission to discover, inspire, and develop the talents of middle school students with extraordinary gifts in mathematics. Our vision is to be a mathematics resource for the St. Louis region, working cooperatively with other organizations to provide more mathematics opportunities for high-talent and high-potential students.** Through this mission, we hope to teach students to read and think mathematics, foster social relationships among students, and help students reach a level of independence when it comes to their learning (study skills, perseverance).

### Statement of Inclusion

Project MEGSSS provides programming to all qualified students regardless of race, color, gender, creed, or national origin.

### How We Approach Educating High-Talent Math Students

The Elements of Mathematics program is designed to challenge the students by introducing them to mathematical theory and concepts and teaching them logic and problem-solving skills. The program covers some highly advanced mathematics, but at a level that challenges these high-talent students. Many students who qualify for the Elements program have never experienced the challenge of grappling with difficult mathematics concepts and building the persistence to master such concepts. Student surveys indicate an improvement in students' intellectual abilities as a result of participation, including:

- Development of self-discipline & study habits.
- Better time management and organizational skills.
- Transfer of logical problem-solving techniques to other academic areas.
- A more positive approach to school.
- Confidence in their ability to participate in higher-level mathematics coursework during high school & college.

We hope that by challenging students, we are nurturing effective levels of self-discipline, motivation, and confidence, which will help develop their potential to its fullest.

### Teacher Qualifications

Our Elements teachers are highly qualified and dedicated teachers. All teachers have experience instructing middle-school aged students and working with high-ability learners. Many either have a degree in mathematics or engineering and a Missouri State Teaching Certificate in Secondary Mathematics or a Masters/Ph.D. with substantial mathematics experience. Students will have the opportunity to interact with different instructors throughout their time in the program. Your child should have their name and their teacher's name on the front of each textbook. If that is not so, you can check the list of teachers on our Moodle site for the course or email our program manager to ask which teacher(s) your child has. Please encourage your student to ask for the teacher's name if your student does not already know it.

### History of Organization

The Comprehensive School Mathematics Program (CMSP) project was established in 1966, under the direction of Burt Kaufman. It was originally affiliated with Southern Illinois University in Carbondale, Illinois. After a year of planning, CSMP was incorporated into the Central Midwest Regional Educational Laboratory (CEMREL) located in Saint Louis – one of a nationwide network of twenty educational research and development centers set up under President Johnson's Administration.

Two major curricula were developed under CSMP project – a K-6 mathematics program for regular classroom instruction, and the Elements of Mathematics (EM) program, a Grade 7-12 mathematics program for gifted students. EM treats traditional topics rigorously and in depth and was the only curriculum that strictly adheres to the Goals for School Mathematics: The Report of the Cambridge Conference on School Mathematics (1963). As a result, the curriculum used in its entirety includes much of the content generally required for an undergraduate mathematics major.

While teaching the EM materials in the University City schools, Burt began to feel that an audience of much broader geographical scope could be reached if only an organization existed to make it possible for the many small school districts and private schools in the metropolitan St. Louis area to work together. So, in 1978, with CEMREL's help, he set up the first Project MEGSSS (Mathematics Education for Gifted Secondary School Students) as an after-school mathematics program in the Saint Louis area. The program was originally offered at no cost to the school systems, where students from most of the western suburbs of the city were transported by parents to the CSMP offices, where they studied the EM materials. As their part of the arrangement, the schools and school districts participating in this project allowed the MEGSSS students to take a study hall instead of their regular mathematics class. The project proved so popular with both students and parents that the decision was made to expand its scope, starting the 1979 – 80 school year in separate premises at Kirkwood North Middle School in a southwestern suburb of St. Louis.

CEMREL had helped Project MEGSSS obtain sufficient federal funding to enable it to function through November 1981, but no longer. With the prospect of the eventual closing down of the project as a stimulus, the parents of MEGSSS students incorporated the project during 1980 and set up a tuition fee structure which meant that, when the federal money dried up, the project was able to support itself. Its operations continue to this day.

In 1984, the original CSMP project moved to Mid-Continental Research for Learning (McREL) Institute's Comprehensive School Reform program, who supported the program until 2003. Burt — together with his son, Terry, and his colleagues, Martin and Ferguson — established the Institute for Mathematics and Computer Science (IMACS) in July 1993 for the purpose of making the CSMP and EM curricula in mathematics and computer science available within the private sector. IMACS continues to operate to this day for this purpose.

*More information on the history of CSMP and the EM program can be found on the IMACS website:*  
<https://www.imacs.org>

## **Governance**

Project MEGSSS, Inc. is incorporated as a 501 (c)3 non-for-profit organization and managed by a Board of Directors. The board is governed by the organization's articles of incorporation and by-laws. The board is comprised of up to nine (9) members, at least four (4) of whom must be parent representatives (parents of current or past students), who are elected by families of enrolled students. Opportunities exist for an additional nine (9) at large (non-voting) members of the board. All board members serve two-year terms.

The Board appoints an Executive Director to manage the operations and development of the organization.

If you would like to serve on the Board or nominate someone to serve, please contact the Executive Director or any current board member and the nomination will be forwarded to the nominating committee.

## **2020/21 Board of Directors**

Arthur Graves, President

Vacant, Vice-President

Doug Hunt, Secretary

Katy Jochum, Treasurer

Lee Douangkeomany

Mohit Maheswari

Murali Rangarajan

### *At-Large Directors*

Christine Nobbe

Naresh Bansal

## **Key Organization Employees**

Heather Gutting, Executive Director

[exec@megsss.org](mailto:exec@megsss.org)

Heather Sweeney, Director of Recruitment

[nomination@megsss.org](mailto:nomination@megsss.org)

Austin Wilmot, Technical Director

[tech@megsss.org](mailto:tech@megsss.org)

Kelli Brown, Program Manager

[clark@megsss.org](mailto:clark@megsss.org)

Teresa Corley, Summer Programs Director

[summerdirector@megsss.org](mailto:summerdirector@megsss.org)

## **Academic Schedule (2020/21)**

The MEGSSS academic schedule can be found here: <https://megsss.org/schedule>

*Note: Some courses may end before the final week of class depending upon how quickly the students complete the material.*

MEGSSS students attend classes one day per week on Wednesdays.

All classes will be held online for the 2020/21 academic year.

All classes begin at 4:00 pm. First-year classes end at 6:20 pm. Second and third-year classes end at 6:50 pm.

Tutoring is available to first-year students for a half hour after classes end.

Second and third-year students should arrange any necessary tutoring with their teachers.

## **Program Information**

### **The Elements of Mathematics Program**

Elements coursework offers studies in advanced mathematics, based on the Elements of Mathematics series, to highly-talented middle school students. Courses include formal logic, along with a broadened and accelerated course of math that is very different than mathematics curriculum used in schools. One student who had been advanced in math in his regular school characterized the difference between his geometry

course in school vs. MEGSSS like this: "In school, they teach me how to do something [a certain math problem]; in MEGSSS, they teach me why [we do it that way]." Students will explore different ways to approach problems and will discover that there is not always only one right answer.

The Elements program is a closed program—5<sup>th</sup> and 6<sup>th</sup> grade students must be nominated by an educator or parent—and are qualified for admission by means of an above-level test. The program is rigorous and open only to students who already excel in math and whose abilities fall outside the range of the usual classroom curricula, usually scoring in the top 5% of their peers in math and reading. A student does not need to be identified in a gifted program in their home school.

There are three steps to qualification:

- 1) Students are nominated.
- 2) Families may attend an informational meeting.
- 3) Nominated students are screened through an "above level" admissions test.

For more information, see the section on Admissions and Admissions Testing.

Students who qualify are offered the opportunity to participate in our pre-requisite summer Elements or Logic Bootcamp program. Successful completion of summer programming permits the student to register for the after-school program, which is a three-year series of after-school courses. This program ideally begins the summer after 5<sup>th</sup> grade and spans the three middle school years. However, many students enter after 6<sup>th</sup> grade and some choose to complete the third year after they begin high school. Some students complete only a portion of the after-school program, depending on time constraints and individual motivation. In addition, students who are not able to complete the after-school year Elements courses have several options for subsequent summers (see MathJam, in the following section).

Academic success is usually directly correlated with a student's effort. Most qualified students have the ability to be successful with EM coursework, but every student reacts to the challenge uniquely. For some, this may be the first time they experience a true challenge in a school setting. See the section on "Being Successful in Our Program" for specifics about how to help.

### **MathJam Summer Program**

As compared to Elements, MathJam is an open, summer program designed for rising 5<sup>th</sup> through 8<sup>th</sup> grade students and includes courses that are open to all interested students. Students may register for many of these courses without being nominated or tested. While these courses are not as rigorous as the Elements program, they are intended for the top 10% of middle school math students. MathJam is generally the best option for high-talent 4<sup>th</sup> grade students and is a great introduction to Project MEGSSS for students who are considering testing for Elements in their 5<sup>th</sup> grade year.

All MathJam courses are available for students who have been admitted to the Elements Program. Some MathJam courses have prerequisites, so students should choose carefully based on course descriptions in the summer registration materials.

### **Admissions**

Students are generally admitted to the Elements program based their test scores. The guideline for participation in testing includes being a student whose 11<sup>th</sup> birthday falls on or before 08/01 of the year in which they test and regularly scores in the 95<sup>th</sup> percentile in math and 95<sup>th</sup> percentile in reading on standardized testing; however, we recognize exceptions to this guideline and allow parents leeway to decide what is in the best interest of

their child. We recommend that parents attend an informational meeting and consider the child's interest level prior to testing and enrolling the child.

In our experience, younger students may have the academic ability but are not yet developmentally ready to invest the effort required to do well in our curriculum. We recommend that parents consider enrollment in the MathJam summer program in lieu of advancing a younger student.

Assuming successful completion of the summer Elements program, the student may register for the first year after-school Elements program. Regardless of whether your child enrolls for the after-school year courses, there are many courses available in subsequent summers for which they may be interested in returning. Some are open to students who have not qualified for Elements and others have Elements courses as prerequisites.

### **Admissions Testing**

Nominees wishing to be considered for admission to the Elements program take an online test on logical reasoning. Our testing process is based on years of experience, and we require that a student takes the test. On occasion, this is not feasible due to extremely late nominations or other circumstances. Decisions about admission in these cases are made on an individual basis, based on a review of any prior testing (MAP Scores, Gifted Testing, etc.) and/or recommendation from the student's math teacher, again in consultation with parents and teachers. We do require that all students pay the testing fee (and late fee, if applicable) or qualify for a fee waiver.

Depending on their score, students may be admitted without provisions to the program or provisionally, based upon satisfactory completion of a summer course. Course grades are not the only determining factor; consideration is always given to the student's desire to continue as evaluated by the Program Manager. Regardless of the student's decision to continue in the after-school program, the student is welcome to return for any succeeding summer programming as enrichment, if they meet the qualifications for the given course.

Students who were not admitted are typically recommended to retest in a future year. If there are extenuating circumstances (test conditions not ideal for the student, the student was feeling ill, etc.), a decision will be made for provisional enrollment by the Program Manager in consultation with the student's teacher or parents. As regards the decision, it is our policy for the introductory summer course to be as inclusive as possible, while maintaining a student population that has demonstrated math talent at a very high level.

### **Tuition**

*Tuition for the summer program is payable upon registration and, like most summer programs, is not refundable.*

After-school tuition must be paid in advance of the semester for which it is due (payable by August 15<sup>th</sup> for fall and December 15<sup>th</sup> for spring) unless a written agreement is executed and returned to the office specifying payment due dates. If tuition is not received on a timely basis, no future registrations will be accepted until payment is made in full. In addition, no grades will be provided to the student for completed coursework.

If a student withdraws prior to the start of the after-school semester, refund of all semester tuition will be made less any discounts taken for payment of tuition upfront. After the start of the semester, no refunds for the semester will be made.

### **Financial Aid**

The Board of Directors supports providing financial aid to qualified students for its programs to the degree there is funding available to support such assistance. Project MEGSSS will implement this policy in such a way as to

include as many qualified students as possible and to strive to make the program attainable for any motivated student with financial need.

The program will provide financial assistance in the form of tuition waivers to students based on the amount of funding contributed by concerned individuals, corporations, and foundations. In addition, it is the general intent, although not an obligation, that Project MEGSSS will budget for potential support in the range of 10% of program revenues, assuming that grantor funding targeted to financial aid remains at approximately 80% of total aid awarded.

An Assessment Committee will be appointed by the Board of Directors to review requests and make final decisions on awards, in coordination with the Executive Director. Aid requests will be made online where possible, and priority will be given to families with a complete application, filed by the financial aid deadlines. Decisions will be based on the funding available for each type of application, and the Committee's judgment of need. The amount of any award may vary from year to year depending upon the size of the revenue pool and the number of requests. Prior awards are not indicative of future awards. IRS regulations require that students re-apply for financial aid each year. The decision of the Assessment Committee will be final.

Project MEGSSS has two different financial aid programs: a traditional program requiring a formal application with verification of family income, and an educator-directed program allowing for a simplified application, designed to target students whose family incomes make them eligible for federal lunch programs within their schools. Financial assistance is also available by request through monthly payment plans.

The board directs that priority be given to educator-directed financial aid as well as currently enrolled students, but a wide degree of discretion is given to the Assessment Committee in allocating awards between the various requests. Generally, substantial funding of tuition is awarded only to students who qualify within the income levels covered by the educator-directed guidelines, and this can apply to students applying for either assistance program. Lower priority is assigned to students enrolled in any courses that fall outside the Elements of Mathematics curriculum unless specifically funded by donations or grants. Aid may be awarded for any program fees, to include testing fees, tuition, and special program fees, but may not be applied to late fees. If accepting an award, sibling discounts may not be applied to further reduce tuition. Other costs may be covered (supplies, transportation reimbursements) at the Assessment Committee's discretion if funded by the Board, grant, or other donation.

Any student receiving financial assistance for the Elements program will be eligible for free or reduced fees for any special programs offered by Project MEGSSS, such as AMC8 Prep Courses. As a commitment by the parents and student, the student will be required to pay the testing fee of the respective test and provide test score information to Project MEGSSS for data collection purposes.

### **Retention**

At times, it is in the best interest of the child and the program to recommend that a student withdraw. This is a very rare occurrence. Such a request will not be made for trivial reasons, and a parent should consider this when contacted to discuss retention. Inappropriate behavior in the classroom, damage to school property, and an ongoing lack of interest in the program as evidenced by a student's participation level and grades are examples of reasons retention may be addressed.

Our Executive Director will make retention decisions, based on input from the staff and parents.

## Withdrawal

If a family decides that their student needs to withdraw from the program because of the difficulty of the coursework, they should first discuss this with the Program Manager to determine the best course of action. Because of the wide variety of material covered, especially in the first year, a low grade in one topic is not necessarily indicative of difficulties in all topics.

Project MEGSSS makes a year-long commitment to its teaching staff each year, and as a result, withdrawals put stress on the finances of the organization. Because of this, we ask that families who commit to the after-school program consider their commitment to be a full year. However, we have a general policy of allowing withdrawals at the semester break without financial penalty. This means that a family commits to paying the full semester tuition whether their student is enrolled for the full semester or not.

A request for withdrawal form should be submitted online, along with any remaining tuition due at the time of the request. The student will be considered enrolled until all tuition and fees are paid.

## Grade Reporting

Grades are one way to gauge understanding of the materials presented in the standard MEGSSS curriculum. Grades reflect whether a student is participating in homework assignments, asking questions to further their understanding of the material (particularly about homework assignments), and appropriately preparing for major tests.

For summer and first-year after-school students, generally, there are one to two major tests for a given book within the curriculum (ex., Book 0-1, 0-5, etc.). These tests comprise about 90% of the student's final grade for that topic. For Book 0 courses, we report final grades upon the completion of each book. For Book 1 (logic), we report progress grades at the semester breaks. The report card also makes a comparison to the semester class average for each course in which the student is enrolled.

For second and third year MEGSSS students, MEGSSS courses last for the full school year. Progress grades are reported at the end of each semester. A class average is provided for comparison purposes.

Grades are reported to schools and non-custodial parents upon written request, which must be withdrawn in writing by mail or e-mail. MEGSSS staff is not responsible for contacting a parent prior to mailing a report that has previously been requested. In addition, upon written request (letter or e-mail), we will provide e-mailed copies of a student's grades to a school to which the student has applied for admission.

The MEGSSS Grading Scale is as follows:

10: A++	7: B	4.5: D+
9.5: A+	6.5: B-	4: D
9.0: A	6: C+	3.5: D-
8.5: A	5.5: C	3.0 or below: F
8: A-	5: C-	
7.5: B+		

## Moodle Site

Project MEGSSS maintains a course website where instructional videos, homework assignments, homework solutions, and other information can be found. The site can be accessed by utilizing a web browser and going to <http://online.megsss.org>

For your first login, the username is your first initial and full last name all in lower case, with no space or punctuation between them (ex. John Doe is *jdoe*). If you have a family member with the same first initial, use the first and last initial of your first name and the full last name (ex. John Doe would be *jndoe*). Your initial password is "changeme" (no quotation marks), and you will be prompted to change it the first time you login. Please choose a password that is easy for you to remember.

Mozilla Firefox and Google Chrome are the two most preferred browsers. Internet Explorer works fairly well, but Safari has several annoying issues and is not recommended.

Online quizzes are required for first summer Elements and should be completed only after the homework for that topic has been checked and corrected.

If you have login issues or your courses are not appearing correctly, please email [tech@megsss.org](mailto:tech@megsss.org) directly or notify your instructor. Please do not wait as there is no time in class to address technical issues during class.

## **Classroom Emergencies**

In the event of an emergency during class time, we will make every effort to contact parents by phone and/or email. Be sure that you fill out our emergency contact form when you register, and update that information whenever there is a change so that we will have accurate information when we need it.

## **Weather or Emergency Closures**

When in-person, if our host school is closed, after-school Elements classes will automatically be canceled that day. We will send an email to families and post a notice on our [Facebook](#) page and [Twitter](#) feed. Please be sure we have a current email for your family and follow us on social media so you will not miss these messages.

## **Buzzbook**

Project MEGSSS will compile a PDF with contact information for current students and parents each fall. Parents who would prefer not to share information may opt out when registering.

## **Student Absences**

Project MEGSSS needs to be a priority in your child's life if they are to be successful in our program. Absences are not expected. First-year students may make up missed work at homework help time each week during the last half-hour of the class day. All students should check the forums on the Moodle site for each course in which they are enrolled each week, even if they are not absent. In the case of our online courses, students may also access the links to the class video files. The video files are not a substitute for attendance. Teachers will post a message each week outlining what was covered, what homework was assigned, what resources are available, what needs to be brought to class the next week, etc. Using the Moodle site appropriately may mean that you won't need to contact the teachers by email, but do not hesitate to contact us if you need more information or need to schedule a test make-up.

## **Mathematical Excellence Award**

The Mathematical Excellence Award is currently on hold. When it is reinstated, all students who were eligible during a year in which it was suspended will be permitted to apply along with that year's high school seniors. Each graduate of the full three-year Elements program is eligible to receive an award during their senior year of high school to be used for college-related expenses. The award amount is currently set at \$200. An application is available on the Project MEGSSS website and the application must be received by April 30<sup>th</sup> of the graduate's senior year of high school. Applicants must show proof of college acceptance and write a brief essay to receive funding.

## **Who to Contact**

Your child's teachers are the first person to contact with any questions that arise about your child or classroom policies/procedures. All MEGSSS teachers can be contacted directly by emailing them using the last name of the teacher and @megsss.org.

Mr. Warren Clark	<a href="mailto:clark@megsss.org">clark@megsss.org</a>
Ms. Adrienne Hunt	<a href="mailto:ahunt@megsss.org">ahunt@megsss.org</a>
Dr. Doug Hunt	<a href="mailto:hunt@megsss.org">hunt@megsss.org</a>
Ms. Jeanne Ra	<a href="mailto:ra@megsss.org">ra@megsss.org</a>

If you have a general question or a teacher issue, you may contact our Program Manager, Warren Clark, at [clark@megsss.org](mailto:clark@megsss.org).

If your question pertains to registration, payment, or other issues, you may contact our Executive Director, Heather Gutting, at [exec@megsss.org](mailto:exec@megsss.org).

Technical issues pertaining to our website or the virtual learning environment (VLE) should be directed to our Technical Director, Kelli Brown, at [tech@megsss.org](mailto:tech@megsss.org).

Questions about nominations, testing, and admissions should be directed to our Director of Recruitment, Heather Sweeney, at [nominations@megsss.org](mailto:nominations@megsss.org).

Questions about the summer program may be directed to our Summer Director, Teresa Corley, at [summerdirector@megsss.org](mailto:summerdirector@megsss.org).

## **Student Code of Conduct**

The Student Code of Conduct is designed to foster student responsibility, respect for others, and to provide for the orderly operation of the organization's programs. No code can be expected to list each and every offense that may result in disciplinary action. However, it is the purpose of this code to list certain offenses which, if committed by a student, will result in the imposition of a certain disciplinary action.

The Executive Director or their designee ultimately has the authority to impose consequences under this code. This code includes, but is not necessarily limited to, acts of students on while on premises where organization activities take place, including virtual learning environments and classes, playgrounds, parking lots, and transportation, or at a MEGSSS activity.

## **Reporting to Law Enforcement**

It is Project MEGSSS's policy to report all crimes occurring during programs/activities organized by our organization that we are required to report in accordance with law.

The Executive Director or their designee shall also notify the Board of Directors if a student is discovered to possess a controlled substance or weapon in violation of the organization's policy.

## **Prohibited Conduct**

The following are examples of prohibited conduct that may subject to discipline up to and including immediate dismissal from the organization's programs without refund of any fees paid. In addition, the organization will notify law enforcement as appropriate and consistent with the above policy.

- Arson
- Assault
- Bullying
- Dishonesty (including lying or cheating)
- Disrespectful or Disruptive Conduct or Speech that substantially disrupts classroom work, activities, or functions. Students will not be disciplined for speech in situations where it is protected by law.
- Extortion
- Fighting
- Possession of Drugs/Alcohol
- Possession or Use of Tobacco Products
- Possession or Use of Weapons (including pocketknives, switchblades, brass knuckles, and weapon-lookalikes)
- Public Display of Affection
- Setting off any alarms without good reason
- Sexual Harassment

- Technology Misconduct – Attempting, regardless of success, to gain unauthorized access to a technology system or information; or to use Project MEGSSS technology to connect to other systems in evasion of the physical limitations of the remote system; sharing or attempting to share class videos, notes, or any proprietary and/or personally identifying information of another student or staff member outside of the designated systems.
- Theft
- Threats or Verbal Assault
- Vandalism

### **Academic Misconduct**

Project MEGSSS does not tolerate academic misconduct, which could include plagiarism, cheating, dishonesty, and other activities deemed unethical. If a student is suspected of academic misconduct, they may be dismissed from an activity such as class, testing, workshops, etc., by a staff member at that staff member's discretion. The staff member will provide a written incident summary to the Executive Director and Program Manager, who will determine whether the student may continue with the program.

Any decision made as the result of academic misconduct is binding for the rest of the academic year, however, with permission from the Executive Director and Program Manager, a student may reapply the following year.

### **Student Dress**

We expect our students to be dressed for an academic atmosphere of purposeful learning and responsible citizenship. Students should be respectful and appropriate to the environment and to others in their attire. Please dress as you would for school. For safety, shoes and socks must be worn to all in-person events. Masks may be required at any in-person events depending upon the guidance of health officials and the host institution.

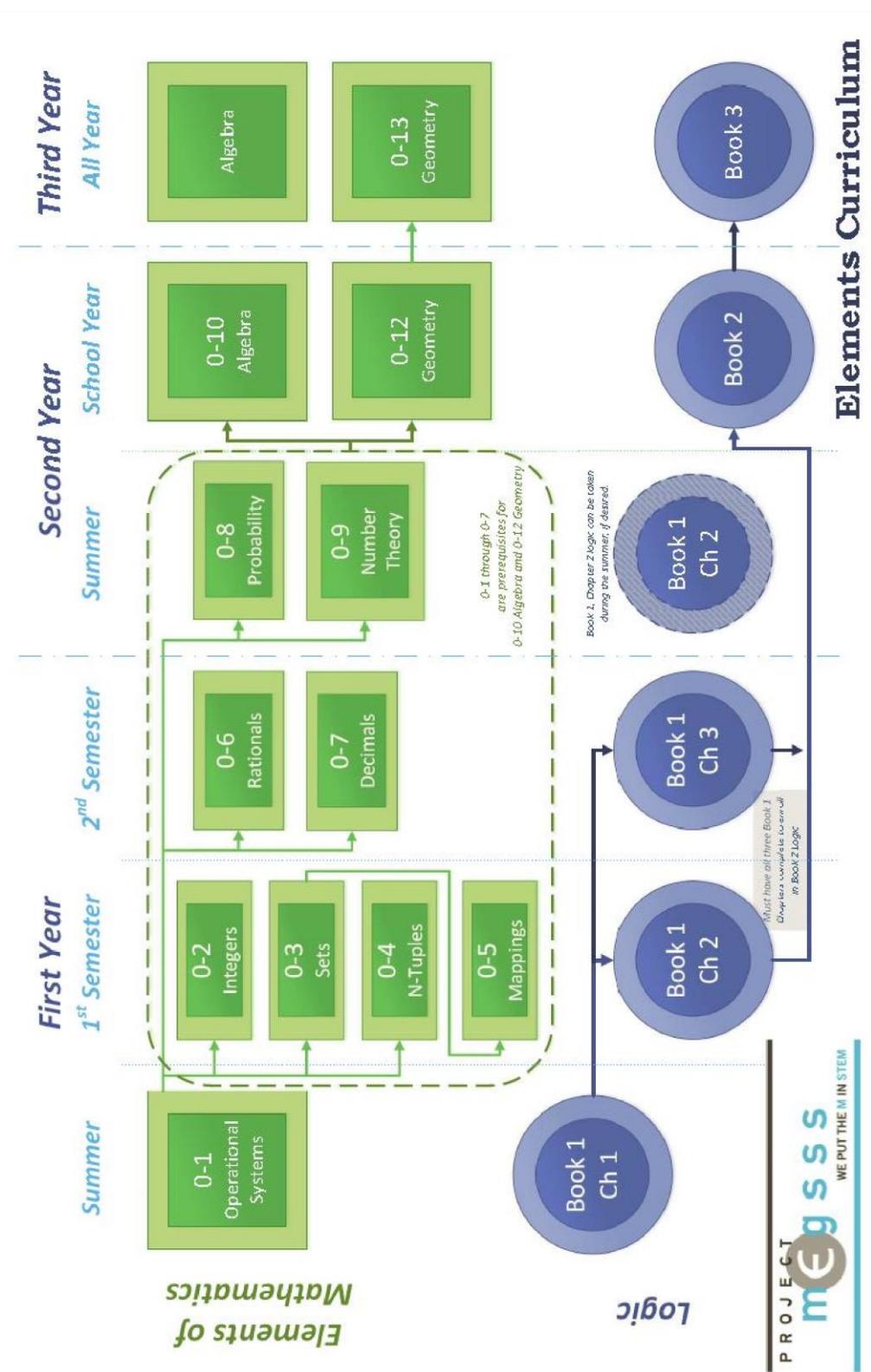
### **Program Locations**

All programming will be online unless otherwise indicated for the 2020/21 academic year. Please make sure your child has a dedicated space in which the background adheres to our code of conduct and contains no personally identifying information.

### **Course Information**

#### ***Elements of Mathematics Curriculum***

*Elements coursework offers studies in advanced mathematics, based on the Elements of Mathematics series, to highly-talented middle school students. Courses include formal logic, along with a broadened and accelerated course of math that is very different from mathematics curriculum used in schools. Please see the chart and course outlines on the following pages for specifics.*



**Elements Curriculum**

**Book 0, Chapter 1, Operational Systems****1<sup>st</sup> Year Summer**

This book covers operational systems and their properties. It starts with finite modular number systems in traditional arithmetic operations and expands to natural and whole numbers. It also includes some nonnumerical systems involving permutations and geometry mappings. Each system is analyzed carefully for the properties: commutative, associative, neutral element (identity element) and invertibility. Equations are solved in every system.

**Book 0, Chapter 2, Integers****1<sup>st</sup> Year**

The number systems introduced in Chapter 1 are expanded to include the negative whole numbers, and we study the Integers. The system is analyzed for the same properties studied in Chapter 1. Much attention is given to the solution of equations, equations which may not be solved in this system, and inequalities are introduced and solved using the integer number line.

**Book 0, Chapter 3, Sets****1<sup>st</sup> Year**

The formal idea of a set is introduced in this chapter. Venn Diagrams are used to solve problems. The operations union, intersection, set difference, and symmetric set difference are studied. The ideas of ground set and complement are introduced. Equations are solved.

**Book 0, Chapter 4 Ordered N-Tuples****1<sup>st</sup> Year**

This book introduces the idea of ordered pairs and triples, leading to the solution of equations in more than one variable. Several operations on ordered n-tuples and sets of numbers are included.

**Book 0, Chapter 5, Mappings****1<sup>st</sup> Year**

This chapter introduces the notion of mapping or function (central to all mathematics) and the properties of functions (onto, one-to-one, permutation). The first functions introduced are applied to sets involving measures of length, weight, time, volume, etc. The composition of functions leads to the introduction of rational numbers. The idea of the exponent is introduced here also.

**Book 0, Chapter 6, The Rationals****1<sup>st</sup> Year**

In this chapter, we expand our number system to include the rational numbers. We continue the study of functions and use them to solve extremely complicated equations involving fractions. This chapter also introduces the concept of denseness in sets of numbers.

**Book 0, Chapter 7, Decimals****1<sup>st</sup> Year**

This chapter introduces the set of decimal numbers as a subset of the rationals. It includes extensive work on applying what we've learned to real world situations involving money.

**Book 0, Chapter 8, Introduction to Probability****2<sup>nd</sup> Year Summer**

Students are introduced to the study of probability. Students learn to identify the set of outcomes for a given trial with multiple steps and calculate the probabilities for each outcome and for each subset of outcomes, using trees and the product rule.

**Book 0, Chapter 9, Introduction to Number Theory****2<sup>nd</sup> Year Summer**

This chapter introduces several topics in number theory including primes and composites.

**Book 0, Chapter 10****2<sup>nd</sup> Year**

This book covers the development of traditional algebra topics based on group, ring, and field theory.

**Book 0, Chapter 12****2<sup>nd</sup> Year**

Students are introduced to formal geometry concepts including the basic concepts of point, line, space, sets of points; plane and three-dimensional figures; closed and open figures; interior, exterior, and boundary points; basic topology; geometric mappings including reflection, translation, rotation, and magnification; properties of triangles and quadrilaterals; notions of area and volume; etc.

**Book 0, Chapter 13****3<sup>rd</sup> Year**

The formal study of geometry is continued in this chapter. It includes work with ratio and proportion resulting from magnification mappings, similarity, and the Pythagorean Theorem. A thorough introduction to trigonometry is made (including basic functions, graphing, and identities).

**Book 1, Chapter 1, Introductory Logic****1<sup>st</sup> Year Summer**

The propositional calculus is introduced. The language includes propositional variables representing sentences with discernible truth values and connectives representing "not," "and," "or" (inclusive), "implies," and the biconditional. The truth values of formulas built using variables and connectives are discerned through the use of truth tables. Students are introduced to the idea of contradiction, tautology, and substitution. They also learn to recognize complex instances of simple tautologies as tautologies, without the use of truth tables.

**Book 1, Chapters 2-3, Introductory Logic****1<sup>st</sup> Year**

Students learn direct proofs based on Modus Ponens and subroutines derived from Modus Ponens. Students then learn to do proofs based on the Deduction Theorem and Indirect Inference. The final chapter introduces the use of universal and existential quantifiers for use with sentences not covered by the use of simple propositional variables. Much time is spent on exploring the negations of sentences involving quantification.

**Book 1, Chapter 2, Introductory Logic****2<sup>nd</sup> Year Summer**

Students learn direct proofs based on Modus Ponens and subroutines derived from Modus Ponens. Students then learn to do proofs based on the Deduction Theorem and Indirect Inference. This class contains material already covered in the 1<sup>st</sup> year (see the previous description); this separate course is offered in summer to allow students who do not plan to attend the after-school program to complete the pre-requisite material needed to participate in the summer Applied Digital Logic course.

**Book 2****2<sup>nd</sup> Year**

This book covers the study of the predicate calculus as applied to set theory.

**Book 3****3<sup>rd</sup> Year**

Students develop the concept of field in a formal way and learn to prove that many of the basic concepts learned informally in algebra apply in any field. Extensive work is done with iteration of operations (multiples and powers), proof by mathematical induction is introduced, extensive work with equation solving including systems of equations and Cramer's Rule.

**Accelerated Algebra****3<sup>rd</sup> Year**

All algebra concepts are reviewed and strengthened using traditional notation to ease the transition to high school mathematics. Extensive work is done in the solution of word problems. Graphing calculators are used extensively.

## **MathJam Courses**

*MathJam is a summer challenge experience for incoming 5th through 8th graders, designed to nurture mathematics interest in younger students, introduce middle school students to advanced topics not covered in a school setting, and provide hands-on, activity-based experiences that allow students to make connections between mathematics, science, art, and literature.*

**Math Explorers I.** (Grade 5). Introduction to Problem Solving. This course will focus on a problem-solving that introduces students to the Papy's minicomputer, the string game, and other interactive experiences designed to develop logic abilities and critical thinking skills.

**Math Explorers II.** (Grade 5). The Shape of Space. This course asks students to think about two- and three-dimensional space and the shape of our universe. Students will explore topics from topology and geometry in order to understand how the shape and dimension of a universe affects its inhabitants. We will ask what the shape of our own universe is and see what that knowledge tells us.

**Symmetry and Numerology in Sir Gawain & The Green Knight.** (Grade 6). Students will read Sir Gawain and the Green Knight and investigate the concepts of symmetry and numerology as they relate to mathematics and literature.

**Puzzles and Programming.** This is a two class block. (Grade 6). Logic puzzles, virtual robotics programming, and more. This course is designed to keep kids working on logic skills, while dipping a toe into the world of real programming, using the language, Logo.

**STEM Sampler.** (Grade 6). Using household materials, students will complete a series of STEM challenges such as a mousetrap vehicle, water bottle rocket or catapult. While hints, help, and collaboration will be online, expect to create and test away from the computer, while meeting virtually with your classmates to collaborate and talk about ideas and solutions to problems. Supplies for all projects will be provided.

**The Logic of Binary Choices: The Lady or the Tiger.** (Grade 7/ 8). This course applies computer logic to literature analysis as students grapple with the logical implications of the Lady or the Tiger.

**Math Contest Prep.** (Grade 7/ 8). This class will develop and sharpen students' problem-solving skills to the degree needed to be competitive in top math competitions such as MATHCOUNTS and the AMC 8. We will cover interesting topics - number theory, algebra, sequences and series, probability, geometry, or word problems - with an emphasis on the fundamental principles necessary for efficient problem solving.

**STEM Sampler.** (Grade 7/ 8). Using household materials, students will complete a series of STEM challenges such as a mousetrap vehicle, water bottle rocket or catapult. While hints, help, and collaboration will be online, expect to create and test away from the computer, while meeting virtually with your classmates to collaborate and talk about ideas and solutions to problems. Supplies for all projects will be provided.

**Geometry: Reflecting on Symmetry.** (Grade 7/8). We will examine symmetry through a series of hands-on activities and explore transformations including reflections, rotations, and translations. We will also study symmetry in art, architecture, and biology.

## Being Successful in Our Program

Phenomena that commonly hinder a student from achieving success in our programs include:

- Insufficient development of good study skills in their regular school because they are too intelligent to be stretched by the actual expectations and requirements operating there;
- Deleterious effects of past experiences where simply “trying hard” received lots of points under the misguided philosophy that all answers have some validity;
- Difficulties in pacing oneself, and leaving assignments or studying to the last moment;
- Letting other commitments, extra-curricular activities, or social life interfere with commitment to the program.

We do not expect that our students will be able to get help at home (it is a rare and lucky Elements student who can get help at home). We do have many resources available for students who have trouble completing their homework.

First, we have an optional homework help time during the last half hour of class for first-year students from 6:20 to 6:50 p.m. on class meeting dates. This is a great opportunity to get a good start on the homework and to get help from classmates and/or the classroom teacher.

Students who are at home and run into difficulty should first look at the book and then refer to the class recording. Additionally, the Moodle site will contain notes on the topic, sometimes a video of the classroom presentation, homework help tips, and homework answers. All these resources should be used to help understand and check homework.

Doing and checking homework is the responsibility of each student. Not doing the homework is a common problem for students who are being asked (some for the first time) to do their work independently. If the student attended class, they should attempt the homework first without any aids. Once the homework (or a section) is complete, check the answers with those online. If there is a discrepancy, students should make a serious effort to figure out how to do the problem correctly, not just correct the answer. If a student is unable to complete an assignment, they should come to class ready to ask questions about how to complete a particular problem type. Remember that the book explains how a problem is to be done, and the Virtual Learning Environment has other resources to help.

In addition, students can also post questions on the forum on the Moodle site during the school year as replies to their teacher’s posting for the week and then watch for replies from other students as well as the teachers. If you are unable to understand how to reach the correct answer on any homework problem, please highlight that problem on your paper so that you will remember to ask about it in class.

Every class begins with an invitation for questions on homework, and students should take advantage of that invitation. Don't worry about what other students or the teacher will think. The best Elements students often ask the most questions!

### Practice tests

Before each major test, students will receive a practice test that mirrors the actual test to a large degree. If a student has done the assigned homework, asked questions on the homework such that they now understand the problem, and then works the practice test, in the same manner, the actual test should not be a surprise to the student. If the student struggles with any of these things, please visit with the teacher before class and/or stay after class for our no cost homework help sessions.

## How You (Parents and Guardians) Can Help

### Parent Engagement and Student Success

Your job is to monitor a student's commitments to allow for time to work on homework between classes. Typically, we suggest that a student spends about one hour a week for each hour in class—so three hours a week working on homework, checking answers, preparing for tests, etc. Please encourage your students to do their very best on the homework and to ask questions whenever they are unsure. This life skill is very important! With online classes, please provide a space in your home where your child can attend the Wednesday classes without interruption. Please ensure anything that shows in the background of this space adheres to our Code of Conduct and has no personally identifying information.

### Set an Example

Your conduct regarding Project MEGSSS will set the tone for how your child reacts to challenges, teachers, and peers. All rules for student conduct also apply to parents, guardians, siblings, etc. Please contact us with any questions or concerns when/if they first arise.

### Spread the Word About Project MEGSSS

In your conversations with friends, family and educator, share information about Project MEGSSS. Our greatest asset over the years has been word of mouth. One easy way to share Project MEGSSS information is to follow and interact with us on social media. Project MEGSSS has active profiles on [Facebook](#) and [Twitter](#). Sharing Project MEGSSS can be as easy as clicking a button!

### Connect Us with Educators at Your School

#### Volunteer

Staff an Information Table at Special Events  
Serve on a Committee  
Join our Board of Directors  
Offer your talents in other ways to support our mission and organization

#### Donate

Project MEGSSS brings alive the excitement and power of mathematics to high-talent students in grades 5-8 by bridging the gap between elementary and high school mathematics with challenging programming. A significant number of our alumni pursue post-secondary degrees and employment in STEM fields. Providing financial assistance to families of modest means is a high priority for us. We partner with individuals, organizations, and businesses to offer financial assistance and to work to expand our programs to communities with limited access to math enrichment. Support Project MEGSSS today by [donating here](#), and you will help to put the "M" in STEM!

#### Other Ways to Support Project MEGSSS

If you shop on Amazon.com, add a "smile" to the hyperlink, choose Project MEGSSS as your nonprofit for donations, and support us every time you buy an item. Visit AmazonSmile at <https://smile.amazon.com/> for more information.

Use this Goodshop and Goodsearch link to help support Project MEGSSS just by searching the internet and doing your regular online shopping! <https://www.goodshop.com/nonprofit/project-megsss-incorporated-st-louis>

You can now shop at over 1,000 of your favorite online merchants via the eScrip Online Mall, and we earn up to 16% of the purchase amount. Please think of us before you shop online - it's free to you and valuable for us. Visit <https://shopping.escrip.com/> for more information.