



Pre-Algebra
Art of Problem Solving Curriculum
Offering a Distinctively
“Classical” Approach to Pre-Algebra
Yearlong 2017/18



ELIGIBLE STUDENTS

Interested students should download and complete the corresponding pre-test (sourced from the *Art of Problem Solving* site). This pre-test should be completed independently, with no help from any outside sources (including notes, texts, parents, or tutors). The completed pre-test and any pages demonstrating the solution process should be scanned and emailed to Mrs. Hodge at the email address noted below. Mrs. Hodge will evaluate the pre-tests and determine if the student is prepared to enroll in this Pre-Algebra course.

Pre-tests should be received by Mrs. Hodge no later than Monday, August 21, 2017.

***Note:** Please do not photograph the pre-test—scan and send the document.

Please note: This course is designed for a responsible, mature student able to take responsibility for engaging with this course material. Please read the “AoPS Pre-Algebra Course Description,” “Student Expectations: Executive Function Skills,” and “Course Map” sections carefully to determine if the instructional approach, course materials, pace, and student responsibilities will best suit your student.

Class Times: Monday, Wednesday, Friday: 12:15–1:30pm (EST)

Class Dates: Beginning Wednesday, September 6, 2017; running through Friday, May 18, 2018.

Instructor: Joelle Hodge

E-mail: logicinstruction@gmail.com

REQUIRED COURSE TEXTS

We will be using the *Art of Problem Solving: Pre-Algebra* text by Rusczyk, Patrick, and Boppana. The text can be accessed [here](#). Families may wish to purchase the Solution Manual text; however, students should not have access to the solution text on a regular basis. Part of our class pedagogy will be a deductive, problem-solving approach to assigned mathematical problems.

***Note:** “The text is written to challenge students at a much deeper level than a traditional middle school pre-algebra course.”

DISTINCTIVELY CLASSICAL PEDAGOGICAL APPROACH TO PRE-ALGEBRA

It should be stated clearly and chiefly that this course should not be considered a traditional mathematics course, differing by being distinctively *Socratic* in the instructor’s pedagogical approach. Please read carefully the “AoPS Pre-Algebra Course Description” section below.

SCHEDULE FOR AOPS PRE-ALGEBRA

CLASS SESSIONS DATES

Classes will take place on **Mondays, Wednesdays & Fridays: 12:15–1:30pm** (EST), for 32 weeks and 95 classes on the following dates*

September (11): 6, 8, 11, 13, 15, 18, 20, 22, 25, 27, 29

October (13): 2, 4, 6, 9, 11, 13, 16, 18, 20, 23, 25, 27, 30

November (10): 1, 3, 6, 8, 10, 13, 15, 17, **[Thanksgiving Break]** 27, 29

December (7): 1, 4, 6, 8, 11, 13, 15, **[Christmas Break]**

January (11): **[Christmas Break]**, 8, 10, 12, 15, 17, 19 **[End 1st Semester]**, 22, 24, 26, 29, 31

February (12): 2, 5, 7, 9, 12, 14, 16, 19, 21, 23, 26, 28

March (10): 2, 5, 7, 9, 12, 14, 16, 19, 21, 23, **[Holy Week]**

April (13): 2, 4, 6, 9, 11, 13, 16, 18, 20, 23, 25, 27, 30

May (8): 2, 4, 7, 9, 11, 14, 16, 18 **[End 2nd Semester]**

*Please note the above dates and times are the anticipated class sessions for this course. However, all dates are subject to change as the instructor's circumstances might dictate (e.g. illness, family emergency). Any classes canceled by the instructor will be made up at an alternate time designated by the instructor.

PREREQUISITES FOR AOPS PRE-ALGEBRA

Interested students should download and complete the pre-test sourced from the Art of Problem Solving site. This pre-test should be completed independently, with no help from any outside sources, including notes, texts, parents, or tutors. The completed pre-test (and any pages demonstrating the solution process) should be scanned and e-mailed to Mrs. Hodge at: logicinstruction@gmail.com. Mrs. Hodge will evaluate the pre-tests and determine if the student is prepared to enroll in this Pre-Algebra course. **Pre-tests should be received by Mrs. Hodge no later than Monday, August 21, 2017.**

***Note:** Please do not photograph the pre-test—scan and send the document.

Please note: This course is designed for a responsible, mature student, able to take responsibility for engaging with this course material. Please read the “AoPS Pre-Algebra Course Description,” “Student Expectations: Executive Function Skills,” and the “Course Map” sections carefully to determine if the instructional approach, course materials, pace, and student responsibilities will best suit your student.

AOPS PRE-ALGEBRA COURSE DESCRIPTION

The *Art of Problem Solving: Pre-Algebra* curriculum is focused on teaching students mathematical concepts and deductive problem-solving skills. Students hoping to not only continue their mathematical studies but also prepare to take a course such as Mrs. Hodge's *Discovery of Deduction* formal logic class would be well-suited to take this class (successfully completing Pre-Algebra is a requirement to enroll in the *Discovery of Deduction* course).

Students taking this course will be required to have a current *AoPS: Pre-Algebra* textbook, and will also be required to enroll in the online AoPS Alcumus educational system, which will incorporate review questions from our studies, with increasing difficulty as the student proceeds through the system. Students will be assessed at various points once they have completed certain Alcumus levels, and will also be allowed to use the online system for personal review and extra practice. **Mrs. Hodge will help students set up their Alcumus accounts during the required orientation session during the week of August 28 (time and date TBD; further information will be e-mailed to enrolled students).**

Students will also be required to set up a Schoology account to access assignments, assessments, other projects, and class communications. Upon enrollment in the Pre-Algebra course, students will be emailed a Schoology access code, providing them entrance into their Pre-Algebra Schoology “classroom.”

As noted earlier, this course will be presented with a distinctively “classical” pedagogical approach. Students will be required to not only arrive at the correct answers but also, more importantly, to arrive at the correct answer by evidencing the correct process studied. It will be the student’s process that is most heavily considered, not merely the final answer. To that end, students and parents should be aware that grades will be earned and determined by assessing both of these components comprising student work, and grades will not be solely determined by reviewing the final answers.

Students should be prepared to complete **daily** math assignments. They will scan (no photographs of work will be accepted) and upload their completed work to the corresponding Schoology assignment folder before the start of each class.

As part of their homework, and after their daily assignment has been submitted, students will be given access to an answer key demonstrating the correct solution process. Students will then be required to measure this key against their completed homework. After reflecting and contemplating their work in comparison to the solutions provided, students should then be prepared to bring those questions and/or concerns to class. Our in-class time will be spent addressing the questions students raise from measuring their work against the correct solution processes.

Mrs. Hodge will provide guidance and training the first few weeks of classes to aid students toward working more independently and taking full advantage of this *dialectic* approach to self-evaluation. She will also engage students in *Socratic* discourse during the sessions to help them discover the answers to their questions, with the

hope that they will sharpen their deductive reasoning skills. Mrs. Hodge will also review the submitted homework to be sure the students are accurately diagnosing their own process and potential problems.

Class time will be spent addressing questions and concerns regarding the homework submissions, and then proceed to the introduction of new material. Active, consistent, and verbal participation will be an ongoing requirement to successfully completing this course.

From the AoPS website:

Pre-Algebra prepares students for the rigors of algebra and also teaches students problem-solving techniques. . . .

Topics covered in the book include the properties of arithmetic, exponents, primes and divisors, fractions, equations and inequalities, decimals, ratios and proportions, unit conversions and rates, percents, square roots, basic geometry (angles, perimeter, area, triangles, and quadrilaterals), statistics, counting and probability, and more!

The text is structured to inspire the reader to explore and develop new ideas. Each section starts with problems, giving the student a chance to solve them without help before proceeding. The text then includes solutions to these problems, through which algebraic techniques are taught. Important facts and powerful problem solving approaches are highlighted throughout the text. In addition to the instructional material, the book contains well over 1000 problems.

STUDENT EXPECTATIONS: EXECUTIVE FUNCTION SKILLS IN GENERAL

Students enrolling in the Pre-Algebra course are expected to demonstrate high-level Executive Function Skills. Executive Function Skills speak to a set of qualities and skill sets students can develop and hone to better approach the courses, lectures, readings, and teachers they will face in their future academic coursework.

Each teacher will invariably have his own set of requirements and skills he requires students to bring to their studies. *Generally* speaking, I believe there are five such qualities that are necessary for my students in various subjects; and I believe they would be accepted as “good” by many other teachers as well.

1. An Engaged Student: One who is willing to step into the arena of class discussion, ask questions, supply answers, and generate the internal dialogue necessary to determine if what's being discussed is important and necessary to himself.

2. Note Taking: A student who, both during and after being engaged with the class, has been trained to note important and relevant content in an organized fashion (Cornell Notes would be a great option). His notes would then be consulted, independently, for

application in assignments and assessments.

3. Attention to Detail & Preparedness: A student who consistently adheres to deadlines, submission requirements, and style guides and codes; confirms technology is working prior to the start of class; and is responsible to determine how to proceed after an absence, consulting the course syllabus and adjusting as the class proceeds, etc.

4. Employ Critiques: One who receives feedback on a submission and then is sure to apply that feedback to future assignments rather than repeating mistakes. Such a student also glean information from the live class critiques of fellow students and notes mistakes to avoid by learning from others.

5. Initiative/Maturity: This student would hear the teacher's comments and be able to assess whether or not the teacher was describing his work, and then take the initiative to schedule office hours with his teacher if necessary.

STUDENT EXPECTATIONS: EXECUTIVE FUNCTION SKILLS IN ACTION

During class discussions, students will review answers, pose questions, and explain and justify their answers and solutions.

In this class, students will be expected to listen attentively and participate actively in class discussions and practices. Students are expected to arrive to class on time and with all assigned material completed prior to the start of class. The instructor will facilitate learning for the student, but the responsibility for staying up-to-date with classwork and assignments ultimately falls to the student.

Students who have not submitted their homework to the appropriate Schoology assignment folder and have not reviewed the corresponding answer sheet against their work prior to the start of class will not be permitted to join the live class session. Those students will be invited into a separate Zoom breakout room to work privately until they have completed the day's assignment. After they have completed both steps to homework submission, they will be permitted to rejoin the class in session. A day spent in a breakout room will constitute an absence from class.

All assignments will be due into the appropriate Schoology Assignment folder prior to the start of class each day. Students turning in late work will earn a 10% penalty for each day the assignment is late. Students will submit their work by scanning their homework pages and uploading it into the Schoology assignment window. Photographs of completed assignments will not be accepted as they are incredibly difficult to read.

A high-tech option to consider, though not required: *Students may also consider purchasing something like a Wacom Bamboo Folio Smart Pad. This paper-based tablet allows students to write directly onto a paper tablet, sync to any Bluetooth device, transfer the written page into a digital file, and then upload it as a PDF or JPEG. For students who like the idea of writing on paper but would prefer to avoid the hassle of scanning and uploading, the*

Wacom Bamboo Folio Smart Pad may be a solution. Mrs. Hodge has one of her own and can provide some assistance to families considering this solution for assignment completion and submissions. The Wacom tablet referenced can be purchased on Amazon or from other retailers.

COURSE MAP

Semester 1: (Ch. 1–7)

1. Week 1: Arithmetic Rules
2. Week 2: Arithmetic Rules
3. Week 3: Squares and Exponent Laws
4. Week 4: Zero as Exponent, Negative Exponents
5. Week 5: Multiples & Divisibility Tests
6. Week 6: Primes & Prime Factorization
7. Week 7: Least Common Multiple, Greatest Common Divisor
8. Week 8: Fractions Part 1
9. Week 9: Fractions Part 2
10. Week 10: Linear Equations
11. Week 11: Advanced Linear Equations & Word Problems
12. Week 12: Inequalities
13. Week 13: Arithmetic & Decimals
14. Week 14: Decimals & Fractions
15. Week 15: Ratios & Proportions
16. Week 16: Conversions, Speed, Rates

Semester 2: (Ch. 8–15)

17. Week 17: Percents
18. Week 18: Percent Increase & Decrease
19. Week 19: Squares & Square Roots
20. Week 20: Arithmetic with Square Roots
21. Week 21: Angles & Parallel Lines
22. Week 22: Angles in Polygons
23. Week 23: Perimeter & Area
24. Week 24: More Triangles & Circles
25. Week 25: Pythagorean Theorem
26. Week 26: Special Triangles
27. Week 27: Quadrilaterals
28. Week 28: Basic Statistics
29. Week 29: Statistics, Graphs & Charts
30. Week 30: Counting as Arithmetic
31. Week 31: More Counting & Probability
32. Week 32: Problem-Solving Strategies

OFFICE HOURS

In addition to scheduled class times, Mrs. Hodge offers an optional, individual or collective weekly session as needed. During “office hours” students may raise questions, seek assistance, or review class material.

STUDENT EVALUATION: GRADING

While engaging in this Pre-Algebra class through Scholé Academy will be “restful,” it will also be rigorous in some places. We recognize the need to provide grades for students who will be using this course as part of their prepared college transcript. It’s a delicate balance to achieve both restful learning and excellent academic performance. Earning a specific grade should not overshadow achievement goals for mastery of this discipline. Pre-Algebra, like the studies of Grammar and Logic, is a “core” discipline in mathematical education, and learning to own the concepts introduced in this class will be a necessary and significant component of future success in any mathematics course. In that sense then, attaining a mastery of Pre-Algebra is its own reward. As the teacher, Mrs. Hodge *may* assign the following grades to your student’s level of achievement: *magna cum laude* (with great praise), *cum laude* (with praise), *satis* (sufficient, satisfactory), and *non satis* (not sufficient).

Ideally, every average student working diligently should do praiseworthy work (*cum laude*). Those who excel beyond this expectation will be the *magna cum laude* students. Students who do adequate but not praiseworthy work will be designated *satis*. *Non satis* means lacking sufficiency or adequacy.

Inasmuch as you might be fully on board with this grading method in theory, there will undoubtedly be the need to complete a college transcript with either a numeric or traditional letter grade. Traditional percentage grades will be provided and will be readily accessed on the Pre-Algebra Schoology page. Additionally, Mrs. Hodge will provide a transcript of that grade to the requesting parent at the end of each semester.

STUDENT EVALUATION: ASSIGNMENTS, TYPES & WEIGHTS

Mrs. Hodge will communicate with students regarding assignment feedback and grading through the free online grading system Schoology. The teacher will provide students with more detailed information and access to the Pre-Algebra course page after enrollment has been secured.

Student’s grades will be comprised of:

1. Daily Homework Submission: 30% of the grade
2. Class Participation: 20% of the grade
3. Alcumus Leveling and Assessments: 15% of the grade.
4. Tests, Quizzes & Other Assessments: 35% of the grade

STUDENT EVALUATION: ACADEMIC DISHONESTY

Students will often take assessment tests and/or quizzes privately at home. Students are on their honor to abide by [Scholé Academy’s Learning Philosophy](#) which assumes the personal cultivation of Student Virtues described in the Student-Parent Handbook.

THE VIRTUAL CLASSROOM

We will be using the free online “virtual classroom” software provided by Zoom, one of the leading companies that offers such software. The virtual classroom will provide students with interactive audio, text chat, and an interactive whiteboard in which texts, diagrams, video, and other media can be displayed and analyzed. We will e-mail students a link that will enable them to join the virtual classroom.

Specific information regarding the technology used by Scholé Academy (including required technology) can be found by visiting the [Technology in the Classroom](#) section of the Student-Parent Handbook.

Students will submit documents by scanning and uploading them to their personal computer, then attaching those files as .pdfs to an email. They will submit their work to the Pre-Algebra Schoology assignment page (access granted after enrollment is secured).

ABOUT THE INSTRUCTOR

Joelle Hodge was one of the original founding members of Classical Academic Press, is an author and a consultant/speaker, and teaches logic and rhetoric at Scholé Academy online. She is the co-author of two top-selling logic books, *The Art of Argument* and *The Discovery of Deduction*, both published by Classical Academic Press.

She holds a BA in history/political science from Messiah College in Grantham, Pennsylvania. She began her career as a staffer to U.S. Senator Arlen Specter (R-Pa) before finding her professional home in the world of classical education in 1999. She has more than eighteen years of logic-teaching experience—many of which were spent at a classical school in Harrisburg, Pennsylvania. There she also developed much of their logic and rhetoric curricula.

Currently, Classical Academic Press hosts Joelle’s consultant offerings, where she engages with educators across the country, tailoring workshops for classical schools and co-ops that seek to train their teachers in the fundamentals of dialectic- and rhetoric-stage pedagogy.

She serves as Senior Teacher for Scholé Academy, where she not only continues to offer courses but also assists other SA teachers in developing their most productive and inspiring classrooms.

Concurrently, Joelle provides year-round, private, multidiscipline tutoring services to a classically educated family living abroad. Mrs. Hodge teaches the summer course *How to Be a Student* as well as the following yearlong classes: Informal Logic: *The Art of Argument*, Formal Logic: *The Discovery of Deduction*, Rhetoric 1, and Rhetoric 2, and Pre-Algebra.