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Well-Trained Mind Academy
AoPS Math for the Logic Stage

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Course website: wtma.blackboard.com

Required Texts:
Batterson, Jason and Owen, Erich. *Beast Academy Guides* 5A - 5D, Art of Problem Solving, 2017
Batterson, Jason, Guillet, Kyle and Rogers, Shannon. *Beast Academy Math Practice* 5A - 5D, Art of Problem Solving, 2017

Course Description: A honors-level math class which leads to readiness to engage in Pre-Algebra.

This math class will focus on problem-solving and engagement with challenging math to foster in-depth understanding and enjoyment so that students are ready to engage in Pre-Algebra. Topics include but are not limited to: arithmetic, exponents, number theory, fractions, equations and inequalities, decimals, ratios and rates, percents, square roots, angles, area and perimeter, right triangles and equilateral triangles, statistics, counting, and problem solving strategies. Students will be expected to come to class prepared to discuss problems and to work individually and in groups to solve assigned problems.

[Beast 5 Readiness Test](#)

Course Assignments: Assignments will consist of problems from the text to be completed at home and submitted via Blackboard as well as online problems. Selected problems will involve a proof-type response where a written solution must be given. Students will participate in discussion challenges and hands-on projects. Review and drill type work will be given as needed to aid learning. Regular tests will be given which will consist of no more than 15 problems which will be similar to those found in the texts. Active participation during the weekly class times is expected.

Grading and Correcting: Students will review some homework problems in class. Solutions to online problems will be provided. Students will be expected to rework problems they have missed. Students are responsible to seek help when needed and the instructor is available to meet with students for extra help by appointment.

Written/Video Assignments:
- *Discussion Questions*: Discussion questions will be drawn from challenging puzzles and current events. Each student must write a meaningful reply to the question by midnight, EST, Monday, and meaningfully respond to two other students' responses by midnight, EST, on Wednesday. See the assignment policies for more information about meaningful participation. 10% of final grade, total.
- *Math Projects:* Students will complete four hands-on math projects, one per quarter. Projects will vary and will be documented with video or photos. 10% of total grade, total.

Quizzes and Tests:

- *Tests:* Students will complete problems drawn from the text as well as non-AoPS material. 30% of final grade, total. Tests are open book and notes and may be corrected to improve mastery.

Other Assignments/Requirements:
- *Homework Problems*: Students will complete problems chosen from each chapter section. 30% of final grade, total.

Grading breakdown:

Course Work	Percentage
Homework Problems	50
Tests	30
Discussion Questions	10
Math Projects	10
Total	100

Assignments:
- *Math Formatting:* The object of the course is mathematics, not technology. A math editor is built into Blackboard for student use. All assignments must be uploaded to Blackboard in digital format. Therefore, emailed or texted assignments will not be accepted.
- *Partial Credit/Showing Your Work:* Requirements vary by problem type. Students are not required to show their work for short answer problems, however, if they do not show their work, and get the problem wrong, they cannot get partial credit. Partial credit is only given for problems when all work is shown. Test problems drawn from the book require that students show work in order to receive any credit.
- *Meaningful Participation:* A good rule of thumb is if you don't spend at least several minutes thinking about or developing your position and explaining it in a concise and clear manner, then it probably will not be meaningful. Criticizing without offering support is not considered worthwhile participation, and you will not receive credit. Examples of meaningful participation include:
  - Sharing a related experience
  - Commenting on others' experiences
  - Asking classmates questions about their ideas and/or experiences
  - Offering a different perspective about an idea that is being discussed
  - Describing an interesting idea from the week's reading
  - Asking the group a question about something in the course
  - Disagreeing (respectfully)
  - Describing a problem and asking for help
  - Describing how you've used something you've learned in the course
  - Sharing a relevant resource
  - Describing relevant research and sharing information on how to find it
  - Noting, briefly, the content and/or purpose of a useful website and providing a link (it is a violation of copyright law to copy the actual page)

Schedule: Available on the class site

AoPS Pre-Algebra

Course website: wtma.blackboard.com

Required Texts:
Rusczyk, Richard; Patrick, David; Boppana, Ravi, *Prealgebra*. Alpine, CA: Art of Problem Solving Incorporated, 2012. ISBN 9781934124215

Recommended text:
Rusczyk, Richard; Patrick, David; Boppana, Ravi, *Prealgebra Solutions Manual*. Alpine, CA: Art of Problem Solving Incorporated, 2012. ISBN 9781934124222

Course Description: Prepares the student for challenging upper level math courses such as Algebra 1, Number Theory, and other exciting classes. Prealgebra focuses on problem-solving and engagement with upper-level math to foster in-depth understanding and enjoyment. The class will strengthen the student's ability to wrestle with tough problems. Topics include: arithmetic, exponents, number theory, fractions, equations and inequalities, decimals, ratios and rates, percents, square roots, angles, area and perimeter, right triangles and equilateral triangles, statistics, counting, and problem solving strategies. Students are expected to come to class prepared to discuss problems and to work individually and in groups to solve assigned problems.

Note: Students must be able to save and upload documents to Blackboard in PDF format.

Is my child ready for pre-algebra?
Students should complete the following readiness test to determine whether they are ready for the class. http://data.artofproblemsolving.com//products/diagnostics/prealgebra-pretest.pdf In addition, students should expect to work roughly 5-7 hours per week on assignments in addition to the online class. Students should be comfortable using a keyboard to write and input work.

Course Assignments: Assignments consist of problems from the text to be completed at home and submitted via Blackboard as well as online problems. At least two problems each week involve a proof-type response where a written solution must be given which shows and explains the steps taken to solve the problem. In addition, students will participate in regular discussion challenges. Extra practice will be given as needed to aid learning. Regular tests consist of no more than 15 problems, similar to those found in the texts. Active participation during the weekly class times is expected. Sample problems are found here:
http://aops-cdn.artofproblemsolving.com/products/prealgebra/exc2.pdf

Grading, Correcting and Accommodations: Solutions to online problems will be provided. Students will be expected to rework problems they have missed and resubmit. This may be done twice before the assignment due date with no penalty. Assignments will be available for a minimum of 10 days. Late work is not accepted, except under extreme circumstances. Students are responsible to seek help when needed and the instructor is available to meet with students for extra help by appointment. If a student has a disability that may have some impact on work in

this class and for which he or she may require accommodations, please contact the instructor prior to the first week of class.

Attendance: According to Well-Trained Mind Academy Policy, students may not miss more than 25% of the total classes each semester. Excused absences are not counted in this total. If a student will be absent during a planned lecture, please notify the instructor as soon as possible so that a plan may be made to keep the student on track.

Attendance is recorded at the beginning of class. Students who are late to class without prior arrangement are marked absent. It is the student's responsibility to submit notes in order to change their status to present.

Delayed students who watch the recordings of the classes must submit class notes weekly to receive attendance and participation points.

Archiving work: Students are responsible for keeping an archive of all work completed for this course, including work posted to Blackboard.

Grades will be based on:

Homework 50%: Regular Problems - 30%, Proof Problems - 20%
Discussion response questions - 10%
Class Engagement and Participation - 10%
Regular Tests - 30%

Example Schedule

Week	Text Sections/Topics (subject to change)
1	1.1 - 1.3 **Properties of Arithmetic:** Arithmetic, Addition, Multiplication
2	1.4 - 1.7 **Properties of Arithmetic:** Negation, Subtraction, Reciprocals, Division
3	1.8 - 2.1 **Properties of Arithmetic:** Summary, **Exponents:** Squares
4	2.2 - 2.4 **Exponents:** Higher Exponents, Zero as an Exponent, Negative Exponents
5	2.5 - 3.2 **Exponents:** Summary, **Number Theory:** Multiples, Divisibility Tests
6	3.3 - 3.5 **Number Theory:** Prime Numbers, Prime Factorizations, LCM
7	3.6 - 3.7 **Number Theory:** Divisors, Greatest Common Divisor
8	3.8 - 4.2 **Number Theory:** Summary, **Fractions:** What is a Fraction?, Multiplying Fractions
9	4.3 - 4.4 **Fractions:** Dividing by a Fraction, Raising Fractions to Powers

10	4.5 - 4.6 **Fractions:** Simplest Form of a Fraction, Comparing Fractions
11	4.7 - 4.8 **Fractions:** Adding and Subtracting Fractions, Mixed Numbers
	No classes - Thanksgiving Break
12	4.9 - 5.1 **Fractions:** Summary, **Equations and Inequalities:** Expressions
13	5.2 - 5.3 **Equations and Inequalities:** Solving Linear Equations I and II
14	5.4 - 5.5 **Equations and Inequalities:** Word Problems, Inequalities
	No Classes - Winter Break
15	5.5 - 6.1 **Equations and Inequalities:** Summary, **Decimals:** Arithmetic with Decimals
16	6.2 - 6.3 **Decimals:** Rounding, Decimals and Fractions
	No Classes - Exam Week
17	6.4 - 7.1 **Decimals:** Repeating Decimals, Summary, **Ratios, Conversions and Rates:** What is a Ratio?
18	7.2 - 7.3 **Ratios, Conversions and Rates:** Multi-way Ratios, Proportions
19	7.4 - 7.5 **Ratios, Conversions and Rates:** Conversions, Speed
20	7.6 - 8.1 **Ratios, Conversions and Rates:** Other Rates, Summary, **Percents:** What is a Percent?
21	8.2 - 8.4 **Percents:** Word Problems, Percent Increase and Decrease, Summary
22	9.1 - 9.2 **Square Roots:** From Squares to Square Roots, Square Roots of Non-Squares
23	9.3 - 9.4 **Square Roots:** Arithmetic with Square Roots, Summary
24	10.1 - 10.4 **Angles:** Measuring, Parallel Lines, Angles in Polygons, Summary
	No Classes - Spring Break
25	11.1 - 11.2 **Perimeter and Area:** Measuring Segments, Area
26	11.3 - 11.4 **Perimeter and Area:** Circles, Summary
27	12.1 - 12.4 **Right Triangles and Quadrilaterals:** Pythagorean Theorem, Some Special Triangles, Types of Quadrilaterals, Summary

28	13.1 - 13.4 **Data and Statistics:** Basic Statistics, Limits of Basic Statistics, Tables, Graphs and Charts, Summary
29	14.1 - 14.4 **Counting:** Counting with Addition and Subtraction, Multiplication Principle, Case Work, Counting Pairs
30	14.5 - 15.2 **Counting:** Probability, Summary, **Problem Solving Strategies:** Find a Pattern, Make a List
31	15.3 - 15.5 **Problem Solving Strategies:** Draw a Picture, Work Backwards, Summary
32	Review
	No Classes - Exam Week

Well-Trained Mind Academy
Bridge to AoPS Algebra I

Course website: wtma.blackboard.com

Required Texts:
Rusczyk, Richard; *Introduction to Algebra*. Alpine, CA: Art of Problem Solving Incorporated, 2010
*Text covers both Algebra I and Algebra II topics. (ISBN: 978-1-934124-14-7) This is the same text as is used in the AoPS Algebra I and Algebra II classes. All other materials will be provided by the instructor.

Prerequisites:
Completion of a Pre-Algebra course with a desire to enroll in the AoPS Algebra I course. Students should be comfortable using a keyboard to input work. Students may not use a calculator in this class (or in the AoPS Algebra I and II classes) .
Note: Students must be able to save and upload documents to Blackboard in PDF format.

Course Description:
This class is ideal for students who are new to the AoPS curriculum or who wish to enroll in AoPS Algebra I but feel less confident with their algebraic skills. The class provides a thorough review of key skills in order to have a smooth transition to Algebra 1. Topics reviewed include: working with variables, dealing with fractions, decimals, solving one-variable equations, exponent laws, ratios and rates, and square roots. Students will also review how to complete a written solution/proof.

Students are expected to come to class prepared to discuss problems and to work individually and in groups to solve assigned problems. Students should expect to spend several hours each week working on assignments for this class.

Course Assignments:
Assignments consist of problems provided on Blackboard to be completed at home and submitted via Blackboard. Students will participate in some discussion board assignments. Extra practice may be given as needed to aid learning using Alcumus, a free review game provided through the Art of Problem Solving site. Active participation during the weekly class times is expected.

Sample problems are found here: [Introduction to Algebra Sample Problems](#)

Grading, Correcting and Accommodations:
Solutions to online problems will be provided. Students will be expected to rework problems they have missed may re-submit work to improve a grade *prior to the due date*. Assignments will be available for a minimum of 7 days. Late work will receive a letter grade reduction (10 points) for every day that the work is late, up to seven days. (For example, work due on a Friday which is submitted on a Monday will receive a grade of no more than 70%, if the grade would have been an 80%, the late grade is 50%.) After 7 days, late work will not be accepted. Students are responsible to seek help when needed and the instructor is available to meet with students for extra help by appointment. If a student has a disability that may have some impact on work in this class and for which he or she may require accommodations, please contact the instructor prior to the first week of class.

Example Schedule:

Week	Topic	Assignments
Week 1	Moving things around in math… advanced techniques for making expressions look nice.	Working with variables practice
Week 2	Fractions are the best things ever! (and why Mrs. Q is less fond of decimals and percents)	Fraction review assignment
Week 3	How exactly do we "find x?"	Solving single-variable linear equations
Week 4	What is the airspeed velocity of a sparrow carrying two coconuts?	Ratios and rates assignments
Week 5	Follow the (exponent) law!	Exponents practice
Week 6	What kind of root? (This lesson is radical!)	Dealing with square roots
Week 7	Solution writing! (saved the best for last!)	"Putting it all together" assignment!
Week 8	In-class grand review with awards!	

Well-Trained Mind Academy
AoPS Algebra 1 - Thinking Algebraically

Required Texts:

Rusczyk, Richard; *Introduction to Algebra*. Alpine, CA: Art of Problem Solving Incorporated, 2010
*Text covers both Algebra I and Algebra II topics. This course will cover chapters 1-13. (ISBN: 978-1-934124-14-7)

Prerequisites:
Completion of AoPS *Prealgebra* or a similar rigorous pre-algebra course. Students should complete the following readiness test to determine whether they should take the class. Students should complete the readiness test without a calculator and without help. If a student is unable to complete at least 80% of the Fundamentals section or fewer than half of the Problem Solving section correctly, please consider a Pre-Algebra class.

Art of Problem Solving Introduction to Algebra Pretest

In addition, students should be comfortable using a keyboard to input work.

Note:
Students must be able to save and upload documents to Blackboard in PDF format.

Course Description: Prepares the student for challenging upper level courses such as Algebra 2, Number Theory, Geometry and other exciting classes. Algebra 1 focuses on problem-solving, logic, and engagement with upper-level math to foster in-depth understanding and enjoyment. The class will strengthen the student's ability to wrestle with tough problems and explain answers in words. Topics include but are not limited to: evaluation of multi-variable expressions, distribution and factoring, single and multivariable linear equations, ratios and percents, direct, inverse, and joint proportion, graphing lines using slope formula, intercepts, inequalities, and quadratic equations.

Students are expected to come to class prepared to discuss problems and to work individually and in groups to solve assigned problems. Students should expect to spend 6-8 hours each week working on assignments for this class.

Course Assignments:
Assignments consist of problems from the text to be completed at home and submitted via Blackboard as well as online problems. Several problems each week involve a proof-type response where a written solution, showing and explaining steps to arrive at the correct answer, must be given. In addition, students will participate in regular discussion board assignments. Extra practice will be given as needed to aid learning using Alcumus, a free review game provided through the Art of Problem Solving site. Regular tests consist of no more than 15 problems, similar to those found in the texts. Active participation during the weekly class times is expected and will be counted for a percentage of a student's overall grade.

Sample problems are found here: Introduction to Algebra Sample Problems

Grading, Correcting and Accommodations: Solutions to online problems will be provided. Students will be expected to rework problems they have missed may re-submit work to improve a grade *prior to the due date*. Assignments will be available for a minimum of 10 days. Late work will receive a letter grade reduction (10 points) for every day that the work is late, up to seven days. (For example, work due on a Friday which is submitted on a Monday will receive a grade of no more than 70%, if the grade would have been 80%, the late grade is 50%.) After 7 days, late work will not be accepted. Students are responsible to seek help when needed and the instructor is available to meet with students for extra help by appointment. If a student has a disability that may have some impact on work in this class and for which he or she may require accommodations, please contact the instructor prior to the first week of class.

Grades will be based on:

- Homework - 50% (Weekly Homework Problems - 30%, Proof Problems - 20%)
- Discussion response questions - 15%
- Class Engagement and Participation - 10%
- Regular Tests/Exams - 25%

Example Schedule:

Week	Text Sections/Topics (subject to change)
Orientation Week	Introduction to Instructor, Class policies, Navigating the online classroom.
1	1.1 Numbers 1.2 Order of Operations 1.3 When Does Order Matter? 1.4 Distribution and Factoring
2	1.5 Equations 1.6 Exponents 1.7 Fractional Exponents
3	1.8 Radicals 1.9 Summary of Follow the Rules 2.1 Expressions
4	2.2 Arithmetic with Expressions 2.3 Distribution, Subtraction, and Factoring 2.4 Fractions

5	2.5 Summary of *X* Marks the Spot 3.1 Solving Linear Equations I 3.2 Solving Linear Equations II
6	3.3 Word Problems 3.4 Linear Equations in Disguise 3.5 Summary
7	Fall Break - No classes on Monday 4.1 Evaluating Multivariable Equations 4.2 Still more Arithmetic Test on Chapters 2 & 3
8	4.3 Distribution and Factoring 4.4 Fractions
9	4.5 Equations 4.6 Summary End of first quarter
10	5.1 Introduction to Two-Variable Linear Equations 5.2 Substitution
11	5.3 Elimination 5.4 Word Problems 5.5 More Linear Equations in Disguise
12	5.6 More Variables 5.7 Summary 6.1 Basic Ratio Problems
13	6.2 More Challenging Ratio Problems 6.3 Conversion Factors
14	6.4 Percent 6.5 Percentage Problems 6.6 Summary
15	Thanksgiving Break
16	7.1 Direct Proportion 7.2 Inverse Proportion 7.3 Joint Proportion

17	7.4 Rate Problems Review and challenge
18	Exam Week - No classes End of Second Quarter
	No Classes - Winter Break
19	Semester 1 review 8.1 The Number Line and the Cartesian Plane
20	8.2 Introduction to Graphing Linear Equations 8.3 Using Slope in Problems
21	8.4 Find the Equation 8.5 Slope and Intercept
22	8.6 Comparing Lines 8.7 Summary
23	9.1 The Basics 9.2 Which is Greater?
24	9.3 Linear Inequalities 9.4 Graphing Inequalities
25	9.5 Optimization 9.6 Summary
26	10.1 Getting Started with Quadratics 10.2 Factoring Quadratics I
	No Class - Spring Break End of Third Quarter
27	10.3 Factoring Quadratics II 10.4 Sums and Products of Roots of a Quadratic
28	10.5 Extensions and Applications 10.6 Summary
29	11.1 Squares of Binomials 11.2 Difference of Squares

30	11.3 Sum and Difference of Squares
31	11.4 Rationalizing Denominators 11.5 Simon's Favorite Factoring Tricks
32	12.1 Complex Numbers 12.2 Imaginary Numbers 12.3 Complex Numbers
33	12.4 Summary 13.1 Squares of Binomials Revisited
34	13.2 Completing the Square 13.3 The Quadratic Formula
35	Exam Week - No Classes Courses end

Well-Trained Mind Academy
Bridge to AoPS Algebra II

Course website: wtma.blackboard.com

Required Texts:
Rusczyk, Richard; *Introduction to Algebra*. Alpine, CA: Art of Problem Solving Incorporated, 2010
*Text covers both Algebra I and Algebra II topics. (ISBN: 978-1-934124-14-7) This is the same text as is used in the AoPS Algebra I and Algebra II classes. All other materials will be provided by the instructor.

Prerequisites:
Completion of an Algebra I course with a desire to enroll in the AoPS Algebra II course. Students should be comfortable using a keyboard to input work. Students may not use a calculator in this class (or in the AoPS Algebra II class).

Course Description:
This class is ideal for students who are new to the AoPS curriculum or who have completed AoPS Algebra I and wish to review and strengthen their algebraic skills. The class provides a thorough review of key skills in order to have a smooth transition to Algebra II. Topics include: working with exponents (regular, fractional, and negative), distribution and factoring, single and multivariable linear equations, graphing lines, using slope formula, quadratics, and completing the square.

Students are expected to come to class prepared to discuss problems and to work individually and in groups to solve assigned problems. Students should expect to spend several hours each week working on assignments for this class.

Course Assignments:
Assignments consist of problems from the text to be completed at home and submitted via Blackboard as well as online problems. In addition, students will participate in some discussion board assignments. Extra practice may be given as needed to aid learning using Alcumus, a free review game provided through the Art of Problem Solving site. Active participation during the weekly class times is expected. *Sample problems are found here:* Introduction to Algebra Sample Problems

Grading, Correcting and Accommodations:
Solutions to online problems will be provided. Students will be expected to rework problems they have missed may re-submit work to improve a grade *prior to the due date*. Assignments will be available for a minimum of 7 days. Late work will receive a letter grade reduction (10 points) for every day that the work is late, up to seven days. (For example, work due on a Friday which is submitted on a Monday will receive a grade of no more than 70%, if the grade would have been an 80%, the late grade is 50%.) After 7 days, late work will not be accepted. Students are responsible to seek help when needed and the instructor is available to meet with students for extra help by appointment. If a student has a disability that may have some impact on work in this class and for which he or she may require accommodations, please contact the instructor prior to the first week of class.

Example Schedule:

Week	Topic	Assignments
Week 1	A review of truly exponential proportions!	Exponent review assignment
Week 2	How to deal out some shared multiplying and how to make those numbers give back!	Distribution and factoring assignment
Week 3	X and Y and how to find them	Single and multivariable linear equations assignment
Week 4	Now that we know X and Y, Where should we put them? What if we only have an equation? There must be an easier way!	Slope formula, point/slope, slope/intercept assignment
Week 5	What happens if there is an exponent?	Quadratics assignment
Week 6	Imagine that! An answer to the question "What is the square root of -1?"	Imaginary numbers review assignment
Week 7	Completing the square (saved the best for last!)	Completing the square practice
Week 8	In class grand review with prizes!	

Well-Trained Mind Academy
Algebra II - Thinking Algebraically

Course website: wtma.blackboard.com

Required Texts:
• Rusczyk, Richard; *Introduction to Algebra*. Alpine, CA: Art of Problem Solving Incorporated, 2010 (ISBN: 978-1-934124-14-7)
    Text covers both Algebra I and Algebra II topics. This course will cover chapters 13-22.

• Rusczyk, Richard and Crawford, Matthew; *Intermediate Algebra*. Alpine, CA: Art of Problem Solving Incorporated, 2013 (ISBN: 978-1-934124-04-8)

Prerequisite: Completion of WTMA AoPS Algebra 1, AoPS Algebra A, or a similar rigorous or honors level Algebra 1 course. If you have previously completed a different Algebra I course, please take the readiness test: https://data.artofproblemsolving.com/course-docs/diagnostics/algebra-b-pretest.pdf

Course Description: Prepares the student for challenging upper level courses such as Number Theory, Geometry, Intermediate Algebra, Pre-Calculus, and other exciting classes. Algebra 2 focuses on problem-solving, logic, and engagement with upper-level math to foster in-depth understanding and enjoyment. The class will strengthen the student's ability to wrestle with tough problems and explain answers in words. Topics include but are not limited to: complex numbers, graphing quadratics, quadratic optimization, graphing functions, inverse functions, operations with polynomials, logarithms, exponential functions, special manipulations.

Students are expected to come to class prepared to discuss problems and to work individually and in groups to solve assigned problems. To that end, the lesson addressed during a class should have been reviewed by the student *prior* to class. Students should expect to spend 6-8 hours each week completing assignments for this class in addition to scheduled class times.

Note: Students must be able to save and upload documents to Blackboard in PDF format.

Course Assignments: Assignments consist of problems from the text to be completed at home and submitted via Blackboard as well as online problems. Several problems each week involve a proof-type response where a written solution, showing and explaining steps taken to arrive at a final answer, must be given. In addition, students will participate in regular discussion challenges. Extra practice will be given as needed to aid learning using Alcumus, a free review game provided through the Art of Problem Solving site. Regular tests consist of no more than 20 problems, similar to those found in the texts. Active participation during the weekly class times is expected and will be counted for a percentage of a student's overall grade.
Sample problems are found here:

Introduction to Algebra - Sample questions

Intermediate Algebra - Sample questions

Grading, Correcting and Accommodations: Solutions to online problems will be provided. Students will be expected to rework problems they have missed may re-submit work to improve a grade *prior to the due date*. Assignments will be available for a minimum of 10 days. Late work will receive a letter grade reduction (10 points) for every day that the work is late, up to seven days. (For example, work due on a Friday which is submitted on a Monday will receive a grade of no more than 70%, if the grade would have been 80%, the late grade is 50%.) After seven days, late work will not be accepted. Students are responsible to seek help when needed and the instructor is available to meet with students for extra help by appointment. If a student has a disability that may have some impact on work in this class and for which he or she may require accommodations, please contact the instructor prior to the first week of class.

Grades will be based on:

Homework - 50% (30% - regular homework questions, 20% - proof problems)
Discussion response questions - 15%
Class Engagement and Participation - 10%
Regular Tests/Exams - 25%

Example Schedule

Week	Class Date	Text Sections/Topics (subject to change)
Orientation Week		Introduction to Instructor, Class policies, Navigating the online classroom.
1		Algebra 1 Review - Factoring, Solving Quadratics, Special patterns
2		**Intermediate Algebra: Complex numbers in the complex plane (a review of chapter 12 with some new information) *it is not critical that you have the Intermediate Algebra book for this first section.** 3.1 Arithmetic of Complex numbers 3.2 The Complex Plane 3.3 Real and Imaginary Parts 3.4 Graphing in the complex plane
3		**Quadratic Equations** 13.1 Squares of Binomials Revisited 13.2 Completing the Square
4		13.3 The Quadratic Formula 13.4 Applications and Extensions
5		**Graphing Quadratics**

		14.1 Parabolas 14.2 Circles
6		15.3 Graphing practice 15.1 Quadratic Inequalities
7		<u>Fall Break</u> 15.2 Beyond Quadratics
8		15.3 The Trivial Inequality 15.4 Quadratic Optimization
9		**Functions** 16.1 The Machine 16.2 Combining Functions
10		16.3 Composition 16.4 Inverse Functions
11		16.5 Problem Solving with Functions 16.6 Operations
12		**Graphing Functions** 17.1 Basics 17.2 Transformations
13		17.3 Inverse Functions Revisited **Polynomials** 18.1 Addition and Subtraction 18.2 Multiplication
14		**Exponents and Logarithms** 19.1 Exponential Functions 19.2 Show Me the Money!
15		19.3 Interest-ing Problems **Thanksgiving Break**
16		19.4 What is a Logarithm? 19.5 Logarithm Bonus
17		Semester 1 Review
18		Exam Week
		No Classes - Winter Break

19		**Special Functions** 20.1 Radicals 20.2 Absolute Values
20		20.3 Floor and Ceiling 20.4 Rational Functions
21		20. 5 Piecewise Defined Functions 20.6 Chapter 20 Summary and Additional Topics
22		**Sequences and Series** 21.1 Arithmetic Sequences 21.2 Arithmetic Series
23		21.3 Geometric Sequences 21.4 Geometric Series 21.5 and 17.2 Telescoping
24		**Special Manipulations** 22.1 Raising Equations to Powers 22.2 Self-Similarity 22.3 Symmetry
25		Intermediate Algebra 5.3 The Maxima and Minima of Quadratics 5.4 Circles
26		5.5 Ellipses 5.6 Hyperbola
		No Class - Spring Break End of Third Quarter: March 13
27		Polynomial roots 7.1 The Factor Theorem 7.2 Integer Roots
28		7.3 Rational Roots 7.4 Bounds
29		7.5 Graphing and the Fundamental Theorem of Algebra 7.6 Algebraic Applications of the Fundamental Theorem

30		8.2 Non Real RootsPolynomial Roots, Part II 8. 1 Irrational Roots
31		8.3 Vieta's Formulas 8.4 Using Roots to make Equations
32		13.1 Exponential Function Basics 13.2 Intro to Logarithms 13.3 Logarithmic Identities
33		13.4 Using Logarithmic Identities 13.5 Switching Between Logs and Exponents 13.6 Natural Logarithms and Exponential Decay
34		10.5 Sequence, Summation, and Product Notation 17.1 Algebra of recursive sequences
35		Exam Week

AoPS Introduction to Geometry

Course Blackboard site: http://wtma.blackboard.com

Required Text(s):
- Rusczyk, Richard. *Introduction to Geometry, 2nd Edition (The Art of Problem Solving).* AoPS, 2007. ISBN 9781934124086
- JARLINK Math & Geometry Compass with Lock, Metal and Durable Compass for Solid and Plane Precision Tool. Purchase through Amazon: https://www.amazon.com/dp/B07F6QJLGB/ref=sspa_dk_detail_4?psc=1
- Sparco Plastic Protractor. Purchase through Amazon: https://preview.tinyurl.com/yagbdeor

Course Description:
A challenging survey of introductory geometry, from points, lines, and planes, through triangles, perimeter and area, quadrilaterals, polygons, circles, three-dimensional geometry, curved surfaces, transformations, and analytical geometry, to an introduction to trigonometry. Highlights include Heron's Formula, the nine-point circle of the triangle, sketching geometric problems, and problem-solving strategies for geometry.

Prerequisite Skills:
Solving linear equations; simplifying fractions containing algebraic expressions; addition and subtraction of quotients with different algebraic denominators; multiplication of polynomials and binomials; solving polynomial equations; solving inequalities .

Written Assignments:
- Weekly Discussion Questions: Discussion questions will be drawn from the text. Each student must write a meaningful reply to the question by midnight, EST, Monday, and meaningfully respond to two other students' responses by midnight, EST, on Wednesday. See the Assignment policies for more information about meaningful participation. 6% of final grade, total.

Quizzes and Tests:
- Comprehensive Exams: There will be two comprehensive exams. Problems will be selected from the text. 18.5% of final grade each.

Other Assignments/Requirements:
- Weekly Section Problems: Students will complete problems chosen from each chapter section. 31% of final grade, total.
- Weekly Review Problems: Students will complete a given number of problems from each chapter's review problem section. 13.5% of final grade, total.
- Weekly Challenge Problems: Students will complete a given number of problems from each chapter's review problem section. 13.% of final grade, total.

Grading breakdown:

Course Work	Percentage
Section Problems	31
Review Problems	13.5
Challenge Problems	13.5
Discussion Questions	6
Comprehensive Final Exams—2	18.5 each (total 35%)
Total	100

Policies and Procedures:

Assignments:
- *Assignment Submission and Late Work Policy*: Assignments are due by 12 am Eastern Standard Time (-5:00 UTC) on the date listed in the syllabus. Late work will receive a letter grade reduction for every day that it is late, up to five days. After five days, late work will not be accepted. Essay assignments are to be submitted via BlackBoard in either .pdf, .doc, .docx, or .rtf format.
- *Math Formatting*: The object of the course is mathematics, not technology. Therefore, while the use of LaTeX, MathType, Geogebra, and other software tools is encouraged, it is not required. A LaTeX editor is built into Blackboard for student use. At certain points, students may be expected to demonstrate use of a straightedge and compass, unless a student's documented exceptionality prevents such assignments. If students choose to hand-sketch and handwrite assignments that do not require handwork (i.e., can be done with LaTeX, etc), easily legible handwriting is required. In addition, all assignments, whether created with software or drawn by hand, must be uploaded to Blackboard in digital format. Therefore, emailed or texted assignments will not be accepted.
- *Partial Credit/Showing Your Work*: Requirements vary by problem type. Students are not required to show their work for Homework and Weekly Quiz problems—however, if they do not show their work, and get the problem wrong, they cannot get partial credit. Partial credit is only given for Homework and Weekly Quiz problems when all work is shown. Test problems drawn from the book require that students show work in order to receive any credit.
- *Style for Written Assignments*: Formatting is to be 12-point Times New Roman, double-spaced, with 1" margins. Use a single space between sentences, always use the Oxford comma, avoid the use of passive voice, and do not use the first person or address the audience directly. Students are to refer to the APA Style Manual. If students wish to purchase a hard copy, use ISBN-13: 978-1433805615 or ISBN-10: 1433805618.
- *Written Assignment Prior Review*: Students may submit an outline for feedback one week in advance of the deadline. Papers will be returned with written feedback at least 24 hours prior to the submission deadline. This option is not available for the final exam.
- *Written Assignment Revision*: Within one week after receiving graded papers, students may revise papers for an improved grade, not to exceed one letter grade above the original grade. This option is not available for the final exam.
- *Meaningful Participation*: A good rule of thumb is if you don't spend at least several minutes thinking about or developing your position and explaining it in a concise and clear manner, then it probably will not be meaningful. Criticizing without offering support is not considered worthwhile participation, and you will not receive credit. Examples of meaningful participation include:

- Sharing a related experience
- Commenting on others' experiences
- Asking others questions about their ideas and/or experiences
- Offering a different perspective about an idea that is being discussed
- Describing an interesting idea from the week's reading and explaining what you learned
- Asking the group a question about something in the course
- Disagreeing (respectfully)
- Describing a problem and asking for help
- Describing how you've used something you've learned in the course
- Sharing a relevant resource
- Describing relevant research and sharing information on how to find it
- Noting, briefly, the content and/or purpose of a useful website and providing a link (it is a violation of copyright law to copy the actual page)

Example Schedule:

Week	Sections	Assignment	Topic
0	--	Introduction	Orientation
1	1.1, 1.2, 1.3	DQs/Problems	Points, Lines, Planes
2	1.4, 1.5, 2.1	DQs/Problems	Points, Lines, Planes; Angles
3	2.2, 2.3, 2.4	DQs/Problems	Angles, Parallel Lines
4	2.5, 2.6, 2.7	DQs/Problems Journal	Angles, Parallel Lines
5	3.1, 3.2, 3.3	DQs/Problems	Congruent Triangles
6	3.4, 3.5, 3.6	DQs/Problems	Congruent Triangles
7	3.7, 4.1, 4.2	DQs/Problems	Congruent Triangles, Perimeter and Area
8	4.3, 5.1, 5.2	DQs/Problems Journal	Perimeter and Area, Similar Triangles
9	5.3, 5.4, 5.5	DQs/Problems	Similar Triangles
10	5.6, 6.1, 6.2	DQs/Problems	Similar Triangles, Right Triangles
11	6.3, 6.4, 6.5	DQs/Problems	Right Triangles
Holiday Break			
12	6.5, 6.6, 7.1	DQs/Problems Journal	Right Triangles, Special Parts of a Triangle
13	7.2, 7.3, 7.4	DQs/Problems	Special Parts of a Triangle
14	7.5, 7.6	DQs/Problems	Special Parts of a Triangle
Holiday Break			
	7.7, 8.1, 8.2	DQs/Problems	Special Parts of a Triangle, Quadrilaterals
16	8.3, 8.4, 8.5	DQs/Problems	Quadrilaterals
17	Finals Week	Comprehensive Final	No lecture
18	8.6, 8.7, 8.8	DQs/Problems	Quadrilaterals

19	8.8, 9.1, 9.2	DQs/Problems	Quadrilaterals, Polygons
20	9.3, 9.4, 9.5	DQs/Problems Journal	Polygons
21	10.1, 10.2, 10.3	DQs/Problems	Geometric Inequalities
22	11.1, 11.2, 11.3	DQs/Problems	Arc Measure, Arc Length, and Circumference
23	12.1, 12.2, 12.3	DQs/Problems	Circles and Angles
24	12.4, 12.5, 13.1	DQs/Problems Journal	Circles and Angles, Power of a Point
25	13.2, 14.1, 14.2	DQs/Problems	Power of a Point, Three-Dimensional Geometry
	Holiday Break		
26	14.3, 14.4, 15.1	DQs/Problems	Three-Dimensional Geometry, Curved Surfaces
27	15.2, 15.3, 15.4	DQs/Problems	Curved Surfaces
28	16.1, 16.2, 16.3	DQs/Problems Journal	Changes
29	16.4, 16.5,16.6	DQs/Problems	Changes
30	17.1, 17.2, 17.3	DQs/Problems	Analytic Geometry
31	17.4, 17.5, 17.6	DQs/Problems Journal	Analytic Geometry
32	18.1, 18.2, 18.3	DQs/Problems	Trigonometry
33	19.1, 19.2, 19.3	DQs/Problems	Problem Solving Strategies
34	Finals Week	Comprehensive Final	No lecture

The Well-Trained Mind Academy
Pre-Calculus (AoPS)

Course Blackboard site: wtma.blackboard.com

Required Text:
Rusczyk, Richard. *Pre-Calculus (the Art of Problem Solving), 2nd Edition.* AoPS Incorporated, San Diego, CA, 2009, 2016. https://www.artofproblemsolving.com/store/item/precalculus ISBN 9781934124260

Course Description:
AoPS Pre-Calculus fully integrates topics from algebra, geometry, trigonometry, discrete mathematics, and mathematical analysis. Word problems are developed throughout the problem sets and become progressively more elaborate. With this practice, high-school level students will be able to solve challenging problems such as rate problems and work problems involving abstract quantities. Conceptually oriented problems that help prepare students for college entrance exams (such as the ACT and SAT) are included in the problem sets. This course, similar to other AoPS courses, emphasizes learning how to solve difficult problems. Students are allowed, and encouraged, to attempt problems multiple times until they master the concept.

Prerequisite:
Completion of WTMA AoPS Algebra 2 or a similar rigorous or honors level Algebra 2 course. It is recommended that the student take this pre-test in order to ensure s/he is ready for the course.
http://data.artofproblemsolving.com/course-docs/diagnostics/precalc-pretest.pdf

Written Assignments:
There are no written assignments for this course, but students will be required to answer discussion questions from time to time, and respond to other students' answers.

Quizzes and Tests:
Tests are due after each chapter. There are also 2 Semester Final Exams.

Grading Breakdown:
Homework - 50% (30% - regular homework questions, 20% - proof problems)
Discussion response questions - 10%
Class Engagement and Participation - 10%
Regular Tests/Exams - 30%

Policies:

Late Work
Solutions to online problems will be provided. Students will be expected to rework problems they have missed and resubmit. This may be done twice within the assignment availability date with no penalty. Assignments will be available for a minimum of 10 days. Students should

complete assignments by the deadline. Late work is not accepted. Students are responsible to seek help when needed, and the instructor is available to meet with students for extra help by appointment. If a student has a disability that may have some impact on work in this class and for which he or she may require accommodations, please contact the instructor prior to the first week of class.

Example Schedule:

Week 1	1.1-1.2	Function Basics, Graphing Functions
Week 2	1.3-1.5	Composition, Inverse Functions
Week 3	2.1-2.2	The Unit Circle, Radians
Test: ch 1		
Week 4	2.3-2.4	Graphs & Transformations of Trig Functions
Week 5	2.5-2.6	Inverse Trig Functions
Week 6	3.1-3.2	Intro to Trig Identities, Sums and Diff. of Angles
Test: ch 2		
Week 7	3.3-3.4	Double and Half Angles, Sum-to-product
Week 8	3.5-4.1	Problem Solving with Ident., Right Triangle Trig
Week 9	4.2-4.3	Law of Cosines, Law of Sines
Test: ch 3		
Week 10	4.4-4.5	More Triangle Relationships
Week 11	5.1-5.2	Parameterization, Polar Coordinates
Test: ch 4		
Week 12	5.3-6.1	Coordinates in 3 Dim., Complex Number Arithmetic
Week 13	6.2-6.3	The Complex Plane, Real and Imaginary Parts
Test: ch 5		
Week 14	6.4-6.5	Nonreal Roots of Polynomials
Week 15	7.1-7.2	Polar & Exponential Forms of Complex Numbers
Test: ch 6		
Week 16	7.3-7.5	Roots of Unity, Problems Involving Roots of Unity
Fall Final Exam (ch 1-6)		
Week 17	8.1-8.2	Trans. of the Com. Plane, Parallel and Perp. Lines
Test: ch 7		
Week 18	8.3-8.4	Distance, Regular Polygons
Week 19	8.5-8.6	Classic Theorems
Week 20	9.1-9.2	What is a Vector?, The Dot Product
Test: ch 8		
Week 21	9.3-9.5	Lines and Linear Dependence, Projections
Week 22	10.1-10.2	What is a Matrix?, Multiplying Matrices
Test: ch 9		
Week 23	10.3-10.4	Matrices as Transformations, The Determinant
Week 24	10.5-10.7	Geo. Interp. of the Determinant, Inverting a Matrix
Week 25	11.1-11.2	Vectors in Three Dimensions, 3 X 3 Matrices
Test: ch 10		
Week 26	11.3-11.5	Deter. of 3 X 3 Matrices, More Than 2 X 2 and 3 X 3

Week 27	12.1-12.2	Lines and Planes in 3 Dim., More Planes in 3 Dim.
Test: ch 11		
Week 28	12.3-12.4	The Cross Product, Geo. Interp. of the Determinant
Week 29	12.5-12.6	Inverse of a 3 X 3 Matrix
Week 30	13.1-13.2	Intro to Vector Geometry, Vectors in the Triangle
Test: ch 12		
Week 31	13.3-13.4	Vectors, Complex Num., and Challenging Prob.
Week 32		Review, Review, Review!
Spring Final Exam		

The Well-Trained Mind Academy
Advanced Calculus AB

Course Blackboard site: wtma.blackboard.com

Required Texts:
- David Patrick, *Calculus (Art of Problem Solving), 2nd Edition,* 2013.
  *Students should purchase the textbook ONLY.
- *Cracking the AP Calculus AB Exam 2020, Premium Edition: 6 Practice Tests + Complete Content Review (College Test Preparation),* 2019.

Course Description:
This course will prepare students to take the College Board's Advanced Placement Calculus AB Exam. Topics include limits, continuity, differentiation, integration, power series, plane curves, and elementary differential equations. Students will balance weekly short-answer questions with longer proof assignments to ensure a deep understanding of the concepts of calculus; the mix of assignments will give students time to practice applying the concepts learned when solving problems.

Over the course of the year, students will complete previous AP® Calculus AB exams in order to practice and feel confident about the test-taking strategies that will help them during the official exam.

Note: The AP® Calculus AB exam is administered by The College Board, which is distinct from The Well-Trained Mind Academy.
See: https://apcentral.collegeboard.org/courses/ap-calculus-ab/course?course=ap-calculus-ab

Prerequisite:
Completion of WTMA AoPS Pre-Calculus or a similar rigorous or honors level Pre-Calculus course. If student has not taken AoPS Pre-Calculus, it is recommended that the student take this pre-test in order to ensure they are ready for the course:
https://data.artofproblemsolving.com/course-docs/diagnostics/calculus-pretest.pdf

Coursework:

Short-Answer Questions & Proof Problems
Daily work will consist of multiple short-answer questions and longer proof problems.

Discussion Response Questions
Students will be required to answer discussion questions from time to time and respond to other students' answers. Discussion questions provide students with an opportunity to solidify their learning through by explaining in words mathematical concepts to their peers.

Unit Tests & Semester Exams

Unit tests will be completed after 2-3 chapters. Students will also take a cumulative exam at the end of each semester.

Grading Breakdown:
- 30% Short-Answer Questions
- 20% Proof Problems
- 5% Discussion Responses
- 10% Class Engagement and Participation
- 15% Unit Tests
- 5% Practice Exams
- 15% Semester Exams (Fall & Spring)

Example schedule:

Week 1	1.1-1.2	Sets, Numbers & Intervals
Week 2	1.2-1.4	Numbers & Intervals, Graphs of Functions
Week 3	1.4-1.5	Graphs of Functions, Trigonometric Functions
Week 4	1.6-1.7	Basic Trig Identities, Exponentials & Logarithms
Week 5	Rev., 2.1	1.A- Relationship Trig./Exp., Review, Limits
Week 6	2.1	Limits, Continuity
Fall Break		
Week 7	2.2-3.1	Intuitive Introduction, Definition of Derivative
Practice Exam #1 and #2 (portions), and pp. 66-81		
Week 8	3.2-3.3	Basic Derivative Computation, Chain Rule
Week 9	3.4-3.5	Rolle's & Mean Value Theorems, Implicit Diff.
Week 10	Rev, 4.1	Review, Graphical Interpretation of Derivative
Test: Ch 1-3		
Week 11	4.2	Extrema and Optimization
Week 12	4.3-4.4	Velocity, Tangent Line Approximation
Week 13	4.5-4.6	Newton's Method, Related Rates
Week 14	5.1	Area Under a Curve
Practice Exam #2 and #3 (portions)		
Week 15	5.2	Fundamental Theorem of Calculus
Thanksgiving Break		
Week 16	5.2-5.3.2	Integration Methods: Basic, Common Antideriv.
Week 17	Review	Review
Week 18- Fall Semester Exams (no classes)		
Week 19	5.3.3	Review, Integration: Chain Rule
Week 20	5.3.4, Rev	Integration By Parts, Substitution Methods
Week 21	5.3.5-5.4.1	Partial Fractions, Review, Areas in Plane
Week 22	5.4.2-5.4.3	Volumes, Length of a Curve
Week 23	5.4.4-5.5	Average Value of a Function, Approx., Review
Practice Exam #3 and #4 (portions)		
Week 24	5.A-6.2	Log & Exp, Simpson's, Limits towards Infinity

Test: Ch 4-5

Week 25	6.3-6.4	L'Hopital's Rule, Exponential Indeter. Forms
Week 26	6.5-7.1	Improper Integrals, Infinite Sequences

Spring Break

Week 27	7.2-7.3	Infinite Series, Series Convergence Tests
Week 28	7.4-7.5	Alternating Series, Taylor Polynomials

Practice Exam #5 (portions)

Week 29	7.6, Rev	Taylor Series, Review

Test: Ch 6-7

Week 30	8.1	Parametric Curves
Week 31	8.2-8.3	Polar Coordinates, Areas in Polar Coordinates
Week 32	Rev, 9.1	Rev, Diff. Equations: Definitions & Examples
Week 33	9.1-9.2	2nd Order Linear Differential Equations
Week 34	Review	Review, Review, Practice Exam #6!
Week 35- Take Your AP Exam!!!		Also, Review for our Final Exam!!!

Extra Credit Due

Spring Final Exam due