

## Precalculus with Proofs

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Times you may meet the teacher outside class: Before and after school, lunch,  
my free blocks (A, D, F)

**Supply List:** Pencils, a few colored pens & hi-liters, **two** 3-ring binders to hold printouts of the daily lesson. Consider buying a large binder that you may keep at home with all the work and a smaller one with recent lessons to bring to class everyday.

**Course Description:** Precalculus with Proofs is the study of trigonometric functions and the foundations of differential calculus. Students review the definitions of sine and cosine functions using right triangles and then use the unit circle to extend the domain of those functions to all real numbers. Students use transformations of the plane to prove several trigonometric identities involving sine and cosine functions. Applications include proving de Moivre's formula and finding  $n$ th roots of unity. Students also prove and apply the law of sines, the law of cosines, and Heron's area formula. The concept of inverse functions is used to study inverse trigonometric functions and to solve trigonometric equations. Students are also introduced to sequences and the notion of the limit of a sequence from both an intuitive and rigorous approach. Students apply these ideas to explore concepts such as the limit of a series and the limit of a function, as well as, continuity and differentiability.

**Learning Outcomes:** In this course, you will develop your mathematical thinking by learning to

- make sense of problems and persevere in solving them
- reason abstractly and quantitatively
- construct viable arguments and critique the reasoning of others
- apply and adapt previous learning to solve new problems
- use appropriate tools strategically
- attend to precision
- look for and make use of structure
- make and investigate mathematical conjectures
- develop and evaluate mathematical proofs

**Learning indicators:** For each math Daily Lesson (see below), you will be provided a list of skills that will be indicators of your progress toward achieving the above learning outcomes.

**Learning Experiences and role of OES- inquiry:** (Explore, connect, create, commit reflect )

- **Daily Lessons (Explore and Connect):** Each class day, we will begin with greeting each other and then engaging in several intentional activities to support your learning. You will receive a printed lesson on which you will make considerable progress in class and then tie up the loose ends at home as needed. You will learn the math content through exploration exercises in the lessons, participation in guided classroom discussions, and watching related videos whose links are posted in the "[Daily Agenda](#)". For the final step of each lesson, you will take clear readable digital photos of your work to submit in our Google Classroom by the listed due date in the calendar.

- **Daily In-class Basics (Connect, Create):** Starting at the end of week-one, after our morning greetings, you will quickly transition into completing a low-stake, closed-book, independent (10 to 15 minutes) activity called a “BASIC” which covers basic concepts learned over the previous few days. You will use posted study guides as well as your work on lessons to prepare.
- **Small Group discussions after the completion of Basics (Connect, Reflect):** After you complete and submit to me your BASIC, you will begin your work on the daily lesson while I look through the submitted BASICS and place you into small discussion groups to discuss your work on your BASICS.
- **Math Talks between us (Reflect):** As a follow-up of the above activity, I will reflect with you in your group on what you are learning well and then offer you individualized and actionable feedback. Each class day, you will have a clear indication on whether you're ready to prepare for the next BASIC or whether it is in your best interests to retake a different version of the same BASIC the next class day after applying the given feedback.
- **Math Journals (Commit, Reflect):** You will keep track of your progress on the BASICS by jotting down in the journal your takeaway from the feedback and how you plan to use it. This is a Google doc that you will share with me. Details will be provided in class.
- **Midterm and Final Exam (Connect, Reflect):** These are closed book, in-person exams. You will use all the above learning experiences as well as posted review sheets to learn how to prepare for such exams by synthesizing and connecting a large number of ideas covered over several weeks.

**Feedback and Assessment of progress:** Throughout the year, you will receive individualized, actionable and encouraging feedback that is related to your growth on the learning indicators. Course grades are based on the evidence of your growth and progress on the learning indicators using your portfolio consisting of all your work for the course.

**A student who earns a grade in the A range** demonstrates proficiency on almost all the learning indicators in a timely manner and through a variety of learning experiences. With a clear focus of advancement on the learning outcomes, they immerse themselves into each learning experience. They seek and apply feedback to intentionally push themselves out of their comfort zone as they set increasingly challenging goals. *This student demonstrates that they are able to successfully apply concepts to new scenarios.*

**A student who earns a grade in the B range** works diligently and demonstrates proficiency on a large percent of the learning indicators. They apply feedback to make progress on almost all the remaining indicators. They are engaged in each learning experience but sometimes forget to focus on the learning outcomes. *This student demonstrates that they are able to apply concepts to new scenarios with some help and scaffolding from me.*

**A student who earns a grade in the C or D range** demonstrates proficiency and/or makes progress on a small percent of the learning indicators but shows no evidence of proficiency on a large percent of the indicators. *This student demonstrates that they are capable of using feedback to make progress on some indicators and are in the beginning phase of taking ownership of their learning.*

More detailed information can be found in your Google Classroom.