Welcome to Jesuit High School's Math Community!

Jesuit invites middle school and high school students to join a math community where they can collaborate and develop their mathematics, problem-solving, and communication skills. The program aims to:
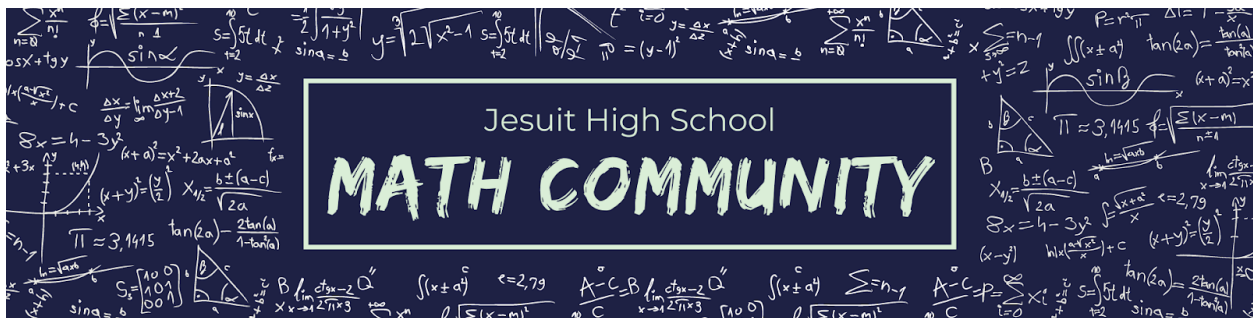
- Enhance a student's performance in their regular math class
- Provide opportunities to explore interesting topics beyond what is usually covered in a school's curriculum
- Assist students seeking to progress to a higher level of mathematics
- Support students interested in preparing for mathematics and science competitions
- Create a setting for advanced math students to explore STEM fields such as computer science and physics

Jesuit High School's Math Community courses are virtual and conducted in real time. Students participate in discussion-based lectures and collaborate to solve problems. Students are asked to participate with their video camera on during the class period.

2022 online Spring Session courses include:

- [#099 Problem-Solving with Prealgebra: Strategies](#)
- [#105 Python for Beginners: Simple Games](#)
- [#106 Python: Dynamic Games](#)
- [#119 Problem Solving with Algebra: Ratios, Percents, & Proportion](#)
- [#138 Geometry Part Three](#)
- [#146 AMC 10 Seminar: Sequences & Series](#)
- [#167 Physics (Mechanics): Friction, Work, & Energy](#)

Questions? Please email questions to onlinelearning@jesuitportland.org.

https://www.jesuitportland.org/academics/math-community

#099 Problem-Solving with Prealgebra: Strategies

4/2-6/11 (11 Saturdays)　　　　　　9:00 - 10:30 am　　　　　　$240 ($215 by 2/28)

Students will practice finding patterns, making lists, drawing pictures, and working backwards to simplify complex math problems, and then apply prealgebra concepts to arrive at a solution. Students will strengthen mathematical skills and intuition through conversation, problem-solving, and mathematical puzzles. Students will learn counting techniques that are helpful for competition-style problems.

Prerequisites: Students should have the ability to apply operations on multi-digit numbers, negative numbers, fractions, decimals, and variables. Willingness to work on word problems that involve more than one step will be particularly helpful. The course is a good choice for a student who can answer **22 or more** of the problems on this placement quiz (some questions have multiple problems). The problems below are examples of discussion topics for the course. They are not prerequisites.

Challenge 1
What is the units digit (ones digit) of 2^{2011}?

Challenge 3
All of the even numbers from 2 through 288, except those ending in 0, are multiplied together. What is the units digit of the product?

Challenge 4
Tanya spent exactly $7 for some 15-cent stamps and some 31-cent stamps. How many 15-cent stamps did she buy?

Challenge 5
Alice gave Bob as many dollars as Bob had. Bob then gave Alice as many dollars as Alice then had. At this point, each had 24 dollars. How much did Alice have at the beginning?
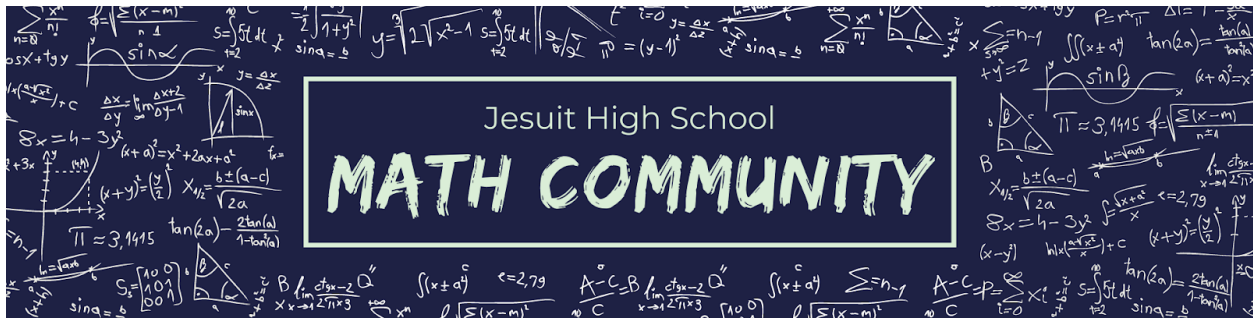
Challenge 6
A frog is at the bottom of a 12-meter well. Each morning he climbs up 5 meters. Each night he slides down 3 meters. If he starts climbing on a Sunday, on which day will he reach the top of the well and escape?

Challenge 7
Two-thirds of the people in a room are seated in three-fourths of the chairs. The rest of the people are standing. If there are 6 empty chairs, how many people are in the room?

Challenge 8
At the pound there are 40 dogs. If 22 dogs have spots and 30 dogs have short hair, what is the fewest number of dogs that can have short hair and spots?

Jesuit High School
MATH COMMUNITY

#105 Python for Beginners: Simple Games

4/2-6/11 (11 Saturdays)   11:00 AM - 12:30 PM $240 ($215 by 2/28)

This course is for students new to programming or who have not programmed with Python. Through writing code for simple games, students will acquire the programming skills necessary to create programs of their own. Although this course will use the Python programming language, concepts covered in this course will form the foundation necessary to learn other programming languages.

Prerequisites: This class does not require advanced math knowledge. It will require logic skills at a level similar to the level required of a student currently studying algebra 1 or higher.

Requirements: Students will receive instructions for downloading and installing Python on Microsoft Windows, Mac OS, or Ubuntu. Students will write code and view the instructor's code during class. Each student needs either a monitor large enough to view both the Zoom meeting and their coding window, or two devices (one for Zoom and one for typing code).

Become comfortable using the following statements:
```
import
while
if
elif
break
def
del
```
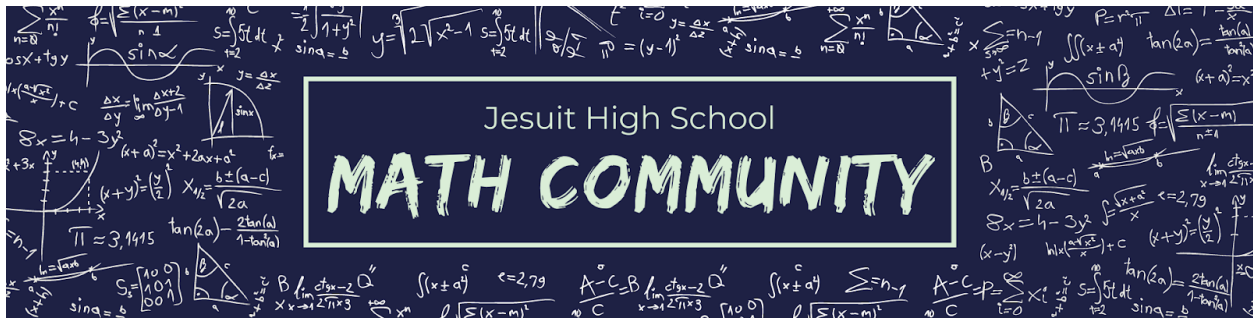
Use standard library functions:
```
print()
input()
randint()
list ()
range()
join()
```

Learn how to...

Apply proper syntax	Group with blocks	Distinguish between local scope and global scope
Evaluate expressions	Pass arguments to functions	
Store values in variables	Incorporate comparison operators	Debug
Name variables		Create flowcharts
Overwrite variables	Define conditions	Create simple ASCII art
Define constant variables	Call functions	Access items with indexes
Import modules	Write functions	Concatenate lists
Use loops to repeat code	Return values	Slice lists and strings

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#106 Python: Dynamic Games

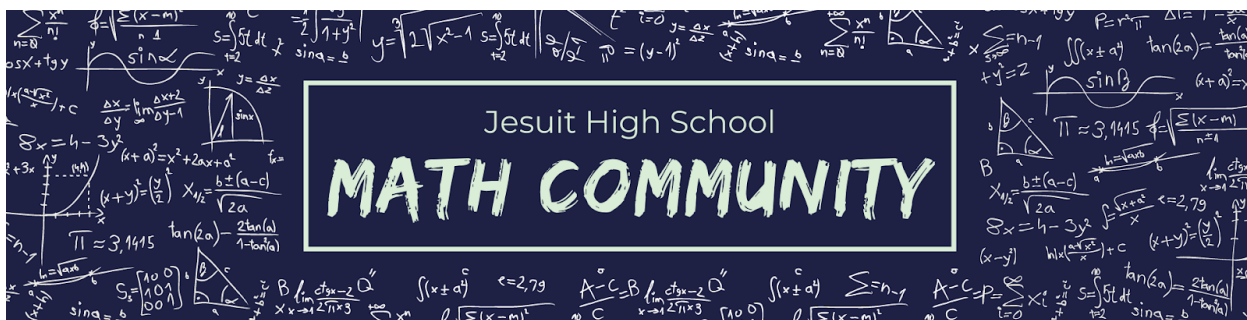4/2-6/11 (11 Saturdays)　　　　9:00 - 10:30 am　　　　$240 ($215 by 2/28)

Description: This course is for students familiar with basic Python syntax who would like to expand their skills to write more complex code. Students will learn about and compare basic AI techniques, use pygame to create game graphics, animate graphics, allow the player to move objects with a keyboard, incorporate image and sound files, create scoreboards, and incorporate clocks and timers.

Prerequisites: Ability to use basic Python commands.

Requirements: Students will write code and view the instructor's code during class. Each student needs either a monitor large enough to view both the Zoom meeting and their coding window, or two devices (one for Zoom and one for typing code).

Learn how to...
- Use simple encryption
- Keep score
- Create basic AI algorithms
- Use pygame
- Use a clock to pace a program
- Program keystrokes to manipulate graphics
- Incorporate sound files
- Incorporate image files
- Create options to end or pause a game

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#119 Problem Solving with Algebra: Ratios, Percents, & Proportion

4/2-6/11 (11 Saturdays)   11:00 AM - 12:30 PM $240 ($215 by 2/28)

Description: Ratios and proportions are essential to solving problems in science and engineering. By creating and solving equations involving ratios and proportions, students will expand their foundations to include skills that will be instrumental in mastering algebra. Students will discuss and build skills involving **ratios, conversions, percents, direct proportions, inverse proportions, joint proportions, and rates**.

Prerequisite: This class is for students with solid prealgebra skills who can successfully complete this placement quiz. The problems below are examples of discussion topics. They are not prerequisites.

Challenge 1
A chemist has 180 mL of solution that is 20& acid. How many mL of the solution must be replaced with pure acid in order to have a solution that is 30% acid?

Challenge 2
16 people together can clear a field in 18 hours. In how many hours could 12 people have cleared the same field?

Challenge 3
On planet Ghaap, two Gheeps are worth three Ghiips, two Ghiips are worth five Ghoops, and three Ghoops are worth two Ghuups. How many Ghuups are seven Gheeps worth?
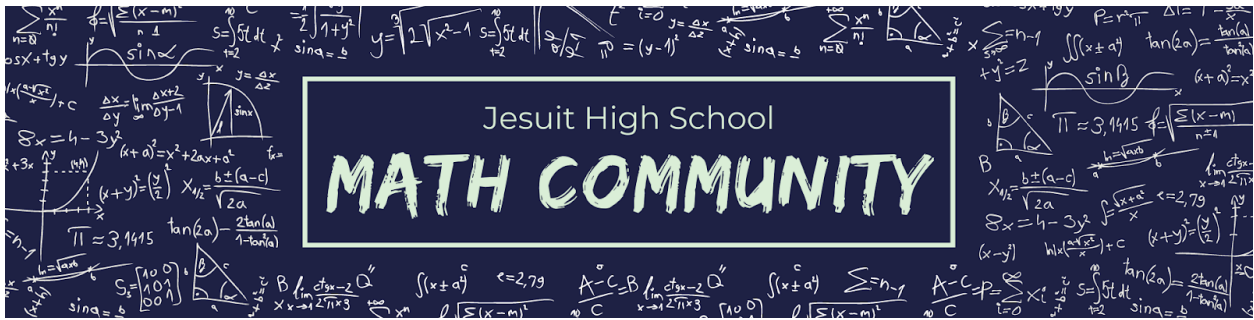
Challenge 5
Jack drives at 40 kilometers per hour for an hour, then at 50 kilometers per hour for 2 hours. What is his average speed?

Challenge 6
On Tuesday, a radio store reduces all its Monday prices by 20%. On Wednesday, by what percent must the store reduce the Tuesday prices such that each radio costs half its Monday price?

Challenge 7
The tail of a 1-mile long train exits a tunnel exactly 3 minutes after the front of the train entered the tunnel. If the train is moving 60 miles per hour, how long is the tunnel?

#138 Geometry Part Three

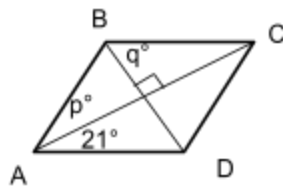4/2-6/11 (11 Saturdays)   1 - 3 PM $320 ($295 by 2/28)

This is the third part of a three-part series that covers all topics included in Jesuit's Summer Session *Geometry* course and Jesuit's Geometry Challenge Exam for incoming freshmen. Topics include **quadrilaterals (angle measures in polygons, properties of parallelograms, rhombuses, rectangles, squares, and trapezoids), properties of circles (tangents, arc measures, properties of chords, inscribed angles, angle relationships, and equations of circles) and length and area (triangles, quadrilaterals, similar figures, and regular polygons).**

Prerequisites: Familiarity with parallel lines, perpendicular lines, and congruent triangles. From Algebra 1, students will need the following: the ability to manipulate variables in order to solve linear equations and inequalities, ability to graph linear equations, and familiarity with simple radical expressions.
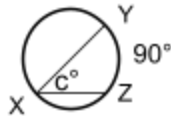
Challenge 1
ABCD is a parallelogram. Find the values of p and q.
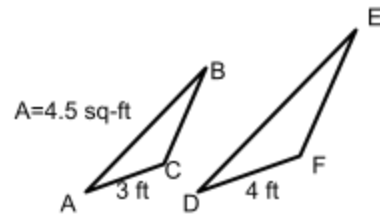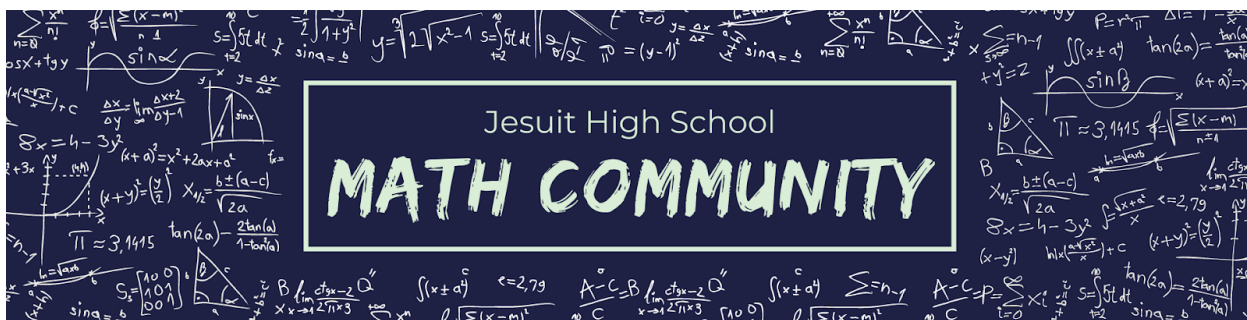
Challenge 2
Find the value of c.

Challenge 3
$\triangle ABC \sim \triangle DEF.$ Find the ratio of the perimeters and of the areas. Then find the unknown area.

#146 AMC 10 Seminar: Sequences & Series

4/2-6/11 (11 Saturdays)   9 - 10:25 AM $240 ($215 by 2/28)

Sequences and series are key topics in calculus and higher math. This class will use algebra to develop a basic understanding of these concepts. Topics include **arithmetic sequences, arithmetic series, geometric sequences, geometric series, telescoping, infinite series, and series notation.** Students will solve a variety of competition-style problems.

Whether or not a student plans to compete in math competitions, solving AMC exam questions builds problem-solving skills, logic, creativity, and patience. Collaboration and the growth mindset are encouraged throughout the course as essential tools for successful mathematical problem-solving.

Prerequisite: Solid algebra skills

Challenge 1
How many sets of two or more consecutive positive integers have a sum of 15?

Challenge 2
If the fourth term of an arithmetic sequence is 200 and the eighth term is 500, what is the sixth term?

Challenge 3
The Fibonacci sequence 1, 1, 2, 3, 5, 8, 13, 21… starts with two 1s, and each term afterwards is the sum of its two predecessors. Which one of the 10 digits is the last to appear in the units position in a numbering of the Fibonacci sequence?
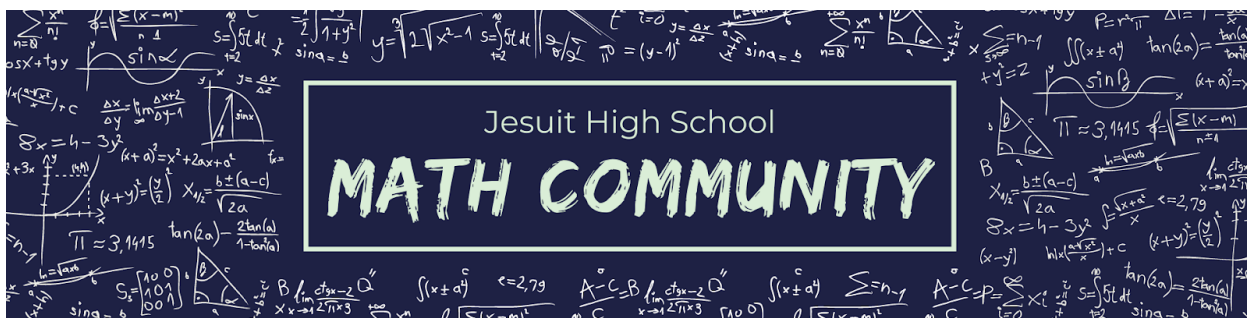
Challenge 4
A wall has been built in such a way that the top row contains one block, the next lower row contains 3 plocks, the next lower row contains 5 blocks, and so on, increasing by two blocks in each row. How many rows high is the wall if the total number of blocks used was 900?

Challenge 5
The sum of seven consecutive odd integers is 273. What is the largest of the integers?

Challenge 6
Prove that any two consecutive Fibonacci numbers are relatively prime.

#167 Physics (Mechanics): Friction, Work, & Energy

4/2-6/11 (11 Saturdays)   10:30 AM - noon $240 ($215 by 2/28)

This is the third part in a series of calculus-based physics. A traditional mechanics course covers units, conversions, vectors, kinematics, Newton's laws, dynamics, momentum, energy, conservation laws, harmonic motion, and rotational motion. This session will cover static and kinetic friction, work, and energy. This series is ideal for students planning to take college physics, study STEM fields, or complete the AAPT F=ma Exam. This course is also for students interested in exploring physics phenomena through a mathematical lens. Students will strengthen their calculus skills through scientific applications.

Prerequisite: Completion of or current enrollment in AP Calculus AB or the equivalent, the ability to apply conversion of units, and a basic knowledge of vectors.

Challenge 1
A streetcar rounds a flat corner of radius 9.1 meters at 16 km/h. What angle with the vertical will be made by the loosely hanging hand straps?
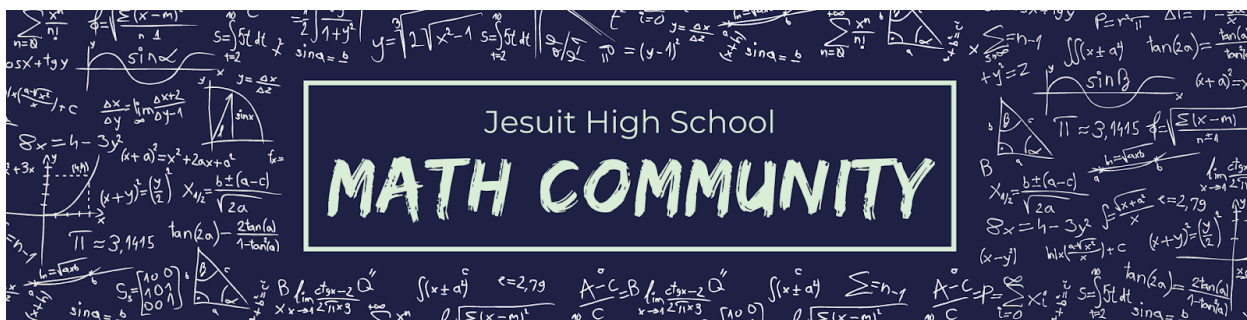
Challenge 2
A penguin sits in a sled (with a combined weight of 70 N) on a plane inclined 40 degrees to the horizontal. Between the sled and the plane μ_s = 0.25 and μ_k = 0.15. What is the minimum magnitude of a force parallel to the plane that will keep the sled from slipping?

Challenge 3
A certain ideal spring has a spring constant k of 4N/m A mass of 5 kg is attached to the end of the spring when it is compressed by 30 cm, on a horizontal, frictionless surface. The spring is then released. What is the velocity of the mass when the spring is at equilibrium?

Challenge 4
At a speed of 20 km/hr, a car of mass m accelerates at 3 m/s2 using 20 kW of power. How much power must be expended to accelerate the car at 2 m/s2 when its speed is 40 km/hr?

Jesuit High School Math Community FAQ

Will I receive credit for Jesuit's Math Community courses?

Math Community courses that do not take place in the summer are not for credit.

How will I access my course?

Students access courses through Canvas, the classroom management software system that Jesuit uses. Students will receive an email with instructions for logging into their course through Canvas. The course's Canvas page will include a Zoom link for the course's class meetings.

What materials will I need?

Course materials will be accessed online through Canvas.

What if I have a question to ask about my class?

Before the class begins you will receive an email address to contact your instructor.

If I will be attending Jesuit High School in the fall, will I still need to take a challenge exam if I complete a course with Jesuit's Math Community?

Yes. The three-part geometry series covers the material that is included on Jesuit's Geometry Challenge Exam; however, the class does not include the in-person evaluations Jesuit uses in courses for advancement. These classes are excellent opportunities to prepare for the on-campus challenge exams.

Will Jesuit's Math Community courses affect my GPA?

No. Some Math Community courses provide grades in order to give students feedback on their performance; however, the grades will not be included on a Jesuit transcript.

Does enrollment in Jesuit's Math Community affect admissions into Jesuit High School?

No. Jesuit's Math Community is not connected to Jesuit High School's admissions process.

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