

Jesuit High School 2021 Online Spring Session Math Courses

#098 Solving for X: Square Roots & Exponents

\$205 (\$180 by March 29)

Saturdays 9:00 am - 10:25 am

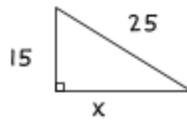
April 3 - June 12 (11 classes)

Description: Students will build on their knowledge of fractions and decimals in learning about square roots and exponents and applying their knowledge to solve a wide variety of challenging problems. Students will make connections between these concepts and applications in geometry, science, and everyday life. Topics include the Pythagorean theorem and scientific notation. By developing a stronger intuitive understanding of square roots and exponents, students will be positioned to succeed in their regular math and science classes and prepare for advanced coursework.

Prerequisites: A solid understanding of fractions and decimals, the ability to perform operations on fractions and decimals, and familiarity with using variables.

Challenge 1

Find the missing length.



Challenge 2

The dots on the grid below are spaced 1 unit apart. What is the side length of the square traced on the dot grid?



Challenge 3

If $7^w = 2$, what is 7^{w+1} ?

Challenge 2

If the mass of one atom of helium is about 7×10^{-24} grams how many grams of helium are in a balloon that holds 6×10^{23} helium atoms?

#118 Problem-Solving with Algebra: Equations, Proportions, & Ratios

\$205 (\$180 by March 29)

Fridays 4:00 pm - 5:25 pm

April 2 - June 11 (11 classes)

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

Jack drives at 40 kilometers per hour for an hour, then at 50 kilometers per hour for 2 hours. What is his average speed?



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.

Prerequisite: An understanding of the concept of a variable and the ability to manipulate an equation to solve for a variable.

#123 Problem-Solving with Algebra: Advanced Topics

\$190 (\$165 by March 29)

Sundays 2:30 pm - 3:55 pm

April 11 - June 13 (10 classes)

Description: Students in this class will use quadratics, optimization, and inequalities to solve interesting and challenging problems. The course will include an introduction to functions, which will provide essential knowledge for the transition to algebra 2 and precalculus.

Prerequisite: Ability to factor quadratics and to solve quadratic equations

Challenge 1: The height h of a ball (in meters) after t seconds is given by $h = -16t^2 + 48t + 45$. After how many seconds does the ball hit the ground? What is the greatest height the ball achieves?

Challenge 2: A farmer has 20 meters of fencing to build a rectangular pen, with one side bounded by a barn. What is the largest area he can encompass?

Challenge 3: If there are 12 items to vote on in the local election, 300 people will choose to vote. For every 2 items added to the ballot, 5 fewer people will vote. If all people who vote cast votes on every item, how many items should be placed on the ballot to maximize the total number of votes cast on all items?

Challenge 4: Alice opened a savings account that pays 3% interest, compounded annually. In ten years, this investment will be worth \$134,392. What is the value of Alice's initial investment?

#140 Problem-Solving with Trigonometric Functions

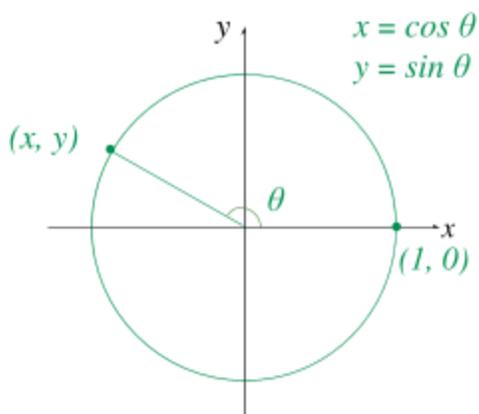
\$265 (\$240 by March 29)

Saturdays 1:00 pm - 2:55 pm

April 3 - June 12 (11 classes)

Description: The topic of trigonometric functions is essential for understanding algebra 2 and precalculus. Additionally, trigonometric functions are important tools used in physics and engineering.

This course will begin with an introduction to function concepts including graphing, composition, and inverse functions. Students will then learn about the unit circle, radians, graphs of trigonometric functions, transformations, and inverse trig functions. The course concludes with an introduction to trig identities.



Prerequisite: A solid understanding of algebra 1 and a familiarity with the Pythagorean theorem and right triangle trigonometry

Challenge 1

What is the number of solutions to the equation $\frac{x}{100} = \sin x$?

Challenge 2

If $f(a) = a-2$ and $F(a, b) = b^2+a$, find the value of $F(3, f(4))$.

Challenge 3

A cart is attached to a spring that is connected to a wall. The cart is pulled 3 meters away from the wall and then released, so that it rolls back and forth towards and away from the wall as the spring stretches and contracts. The distance from the cart to the wall varies sinusoidally with time. Suppose the distance between the cart and the wall varies between 1 meter and 3 meters, and that it takes 4 seconds for the cart to go from the point closest to the wall to the point that is farthest from the wall. Find a function that describes how far the cart is from the wall t seconds after it is released.

#146 AMC 10 Seminar: Sequences, Series, and Sets

\$265 (\$240 by March 29)

Saturdays 10:30 am - 12:25 pm

April 3 - June 12 (11 classes)

Challenge 1

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

Challenge 2

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 3

There are 20 students participating in an after-school program offering classes in yoga, bridge, and painting. Each student must take at least one of these three classes, but may take two or all three. There are 10 students taking yoga, 13 taking bridge, and 9 taking painting. There are 9 students taking at least two classes. How many students are taking all three classes?

Description: Sequences and series are key topics in calculus and higher math. This class will use algebra to develop a basic understanding of these concepts. 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: Strong algebra skills