

ALP Achievement Goal Ideas/Options:

Advanced Math



The Fantasy Sports Analytics Lab

- **The Project:** Act as a sports data analyst by tracking and predicting the real-life stats, percentages, and scores of your favorite sports team or professional athlete.
- **The Goal:** Learn how math is used in professional sports, mastering concepts like probability, average metrics, and data modeling to forecast whether a player's performance will go up or down.
- **The Application:** Build a digital "Sports Analytics Spreadsheet Tracker." You will graph a player's seasonal data over time, write a formula to predict their next game's scores, and create a fantasy sports advice card comparing your mathematical predictions against actual game results.



The Classroom Escape Room Cipher

- **The Project:** Study classic historical code systems (like the shift ciphers used by Julius Caesar) and use algebra to design your own secret code system for a classroom escape room game.
- **The Goal:** Master cryptology and pattern-breaking logic, learning how variables, equations, and number patterns can be used to hide messages in plain sight.
- **The Application:** Design a "Secret Code Crack-Kit." Your project will include a physical or digital cipher wheel, a written encrypted message that your classmates must solve using your math key, and a guide detailing the algebraic steps required to decode the message.



The \$100K Stock Market Simulation

- **The Project:** Pretend you have a fictional \$100,000 to invest in the real-world stock market, tracking how your favorite companies perform day by day.
- **The Goal:** Explore real-world finance math, learning how percentages, compounding growth, and market data graphs change your portfolio's total value over time.
- **The Application:** Compile a "Stock Investment Portfolio Report." Your final product will feature line graphs showing the value fluctuations of your stocks, a spreadsheet calculating your percentage gains or losses, and a reflection essay explaining why you chose to buy or sell specific companies.



Video Game Level Design & Coordinate Graphing

- **The Project:** Use a free coding platform like Scratch, Roblox Studio, or Minecraft to code your own playable obstacle course or video game level.
- **The Goal:** Apply coordinate geometry (X, Y, and Z axes), spatial reasoning, and conditional logic loops to program how objects move and interact within a digital space.
- **The Application:** Launch a playable "Digital Game Blueprint." You will submit your raw code blocks or coordinates alongside a written "Developer's Log" detailing the exact geometric rules you used to build boundaries, player spawn points, and scoring zones.

The Stadium Math & Blueprint Design

- **The Project:** Combine geometry and sports physics by analyzing how field dimensions, angles, and shapes affect how a ball travels or how fans see a game.
- **The Goal:** Learn how architects use surface area, volume, and perimeter formulas to build massive, safe structures that optimize athletic performance.
- **The Application:** Build a physical cardboard scale model or draw a digital 3D blueprint of a custom sports stadium. You will submit it with an "Engineering Design Sheet" showing the exact perimeter math and trajectory angle calculations used for your field layout.

The Nature Architecture Photo Essay (Fibonacci & Golden Ratio)

- **The Project:** Search your local neighborhood, parks, or architecture to take pictures of natural patterns like plant spirals, seashells, and geometric building designs.
- **The Goal:** Investigate the famous Fibonacci number sequence and the Golden Ratio ($\phi(1.618)$) to discover how math naturally structures the physical world around us.
- **The Application:** Create a "Nature's Geometry Photo Essay." Using a photo editing tool, you will overlay precise geometric grids and spirals on top of your pictures, writing a series of math equations to prove how perfectly your real-world photos match the Golden Ratio.

Mathematical Board Game Design

- **The Project:** Invent your own playable board game from scratch where players must take calculated risks using dice, cards, or spinners.
- **The Goal:** Master probability, fractions, and percentage combinations, learning how game developers balance risk and reward so a game is fun and fair.
- **The Application:** Construct a physical prototype of your board game. Your project must include a written "Game Rule Manual" that breaks down the exact mathematical percentage chance a player has of rolling a specific number or drawing a rare card.

Modular Origami & Polyhedra Sculptures

- **The Project:** Fold multiple identical pieces of paper into interlocking units to build complex 3D geometric shapes and sculptures without using any glue.
- **The Goal:** Study 3D spatial reasoning, geometry nets, and Euler's math formula ($V - E + F = 2$) to see how flat shapes combine into solid dimensions.
- **The Application:** Present a physical "Paper Polyhedra Sculpture." Your artwork will feature attached labels showing your exact mathematical calculations for all the vertices, edges, and faces, paired with a guide on the geometric properties of your shape.

The 3D Scale-Model Dream Room

- **The Project:** Sketch a blueprint and build a miniature 3D cardboard diorama of your absolute dream bedroom down to the smallest detail.
- **The Goal:** Practice measurement conversions, ratios, and scaling factors to learn how real interior designers shrink giant objects into tiny, perfect models.
- **The Application:** Deliver a 3D physical room model. You will include a side-by-side scaling chart showing the actual real-life size of the furniture (like a bed or desk) versus the exact

scaled-down math dimensions you used to build the cardboard pieces.

Perspective Art & Coordinate Grids

- **The Project:** Paint or draw an optical illusion landscape using one-point or two-point perspective lines to make a flat piece of paper look deeply 3D.
- **The Goal:** Research how historical artists used linear geometry and vanishing points to create realistic depth, mapping out your art lines across a coordinate grid.
- **The Application:** Assemble a "Perspective Art File." Your final product will be your finished drawing, layered over with a clear plastic sheet where you have traced the precise geometric vanishing lines back to their mathematical origin points on an X and Y axis.

Secret Message Coding in Python

- **The Project:** Write a simple computer program using Python that turns regular text messages into an encrypted secret code using a mathematical key.
- **The Goal:** Learn the basics of computer science, binary numbers, and modular arithmetic to understand how modern cybersecurity protects internet data.
- **The Application:** Run a functional "Encryption App." You will show your teacher the raw code for two functions: one that scrambles a sentence into numbers based on a math key, and a second function that decrypts the numbers back into normal text.

Data Science & Infographic Design

- **The Project:** Choose a trend you care about (like video game sales, shoe trends, or climate patterns), gather data from public internet databases, and clean up the numbers into a visual chart.
- **The Goal:** Learn data science skills, discovering how professional analysts find statistical averages, spot weird anomalies (outliers), and translate raw numbers into visuals.
- **The Application:** Design a colorful graphic poster or digital infographic using Canva. Your poster will showcase your data through clean charts, percentage breakdowns, and a short summary explaining what the statistics prove about your chosen topic.

The College "Is It Worth It?" Budget Sim

- **The Project:** Step into the shoes of a adult financial planner to calculate the true, hidden costs of going to your dream college and figure out if the degree pays off in the long run.
- **The Goal:** Apply real-world banking math, interest rates, percentages, and budget logic to analyze the economics of college debt versus future job salaries.
- **The Application:** Build a "Higher Education Financial Case Study." You will pick a specific college and career, research the real tuition and housing costs, calculate potential student loan interest, and design a 10-year post-graduation budget proving mathematically how long it will take to pay off the degree using that career's average starting salary.

Collection of Websites of Resources for Completing ALP Goals