

MORENO VALLEY HIGH SCHOOL AVIATION 1 CURRICULUM

Course Title: Aviation 1 Course Number: Aviation 1-01

Department: Science ADS Number: 0953A

Prerequisites: None

Length of Course: Year long Credit/PRI Area: .5 per semester Grade Level(s): 9 - 12

COURSE DESCRIPTION

The Aviation Science I class is NOT intended to turn out a group of pilots! The primary goal of the class is to introduce the students to the many facets of aviation and aerospace and how that realm affects their lives. A secondary goal of the class is to introduce the community to the school by involving citizens interested in aviation to visit the class or to engage community members as guest speakers. Aviation education is that branch of education concerned with communicating knowledge, skills, and attitudes about aviation and its impact upon society. Aviation I integrates content from other subject areas such as math, science and social studies.

Syllabus for Aviation I:

Units of Study:

1. History of Flight
 - a. Legendary Personalities
 - b. History of Powered and Non-Powered Flight
 - c. Aircraft Development During Period of War
2. Principles of Flight
 - a. Recognition of Aircraft Type
 - b. Aircraft Structures
 - c. Forces of Flight
 - d. Control Functions
 - e. Exploration of Engine Type
3. Aviation Weather
 - a. The Nature of Air
 - b. Air Pressure
 - c. Air Motion
 - d. Moisture and Temperature
 - e. Air Movement and Forecasting
4. Navigation and Communication
 - a. Navigation Aids and Aeronautical Chart Reading
 - b. Methods of Navigation
 - c. Basic Navigation Including Global Position Satellites
 - d. Basic Radio Communication
 - e. Federal Aviation Regulations

5. Aviation and Space In The Everyday World
 - a. New Mexico and the Space Age
 - b. Economics and Politics in Aviation
6. Project Nostradamus (Aviation II) Introduction
 - a. Radio Controlled Aircraft
 - b. U.S. Forest Service and Firefighting Tactics Utilizing Aviation
 - c. Air Force StarBase LaLuz Partnership

STRATEGIES:

1. Instruction will also be provided on two flight simulations: one for regular aircraft and the other for radio-controlled aircraft
2. Socratic Seminar by Richard Bach, Anne Morrow Lindbergh, Albert Einstein, Robert Oppenheimer plus selections on current issues topics.
3. Guest speakers
4. Field trips
5. Simulations
6. Computation
7. Projects (Individual and small group)
8. Map reading
9. Direct instruction (lecture)
10. Presentation/demonstration
11. Worksheets from Let's Fly (curriculum developed by the Texas Aviation and Space Education Forum.)

ASSESSMENTS:

- **Forced Choice Items** – multiple choice tests, true/false, fill-in-the-blank, matching.
- **Essay Questions**
- **Performance Tasks** – I.e. charting flight paths, flight tests on computer flight simulator
- **Socratic Seminar Rubric** – The framework of the rubric is listed below:
 1. **ACADEMIC SKILLS** – Textual understanding; speaking; listening; knowing how to learn; critical thinking
 2. **SOCIAL SKILLS** – Teamwork; Sensitivity/Good manners
 3. **PERSONAL SKILLS** – Honesty and integrity; Willingness to accept criticism; Responsibility and initiative
- **Teacher Observation** – Group participation and proficiency
- **Student Self-Assessment** – Self reflection and what was learned, strengths and weaknesses, and goal setting.

SUGGESTED TEXTBOOKS AND INSTRUCTIONAL MATERIALS

Aviation Career Awareness Program - - Cessna/Air Age Education
 Rod Machado's Private Pilot Handbook/Rod Machado's Private Pilot Workbook
 From the Group Up: MacDonald/Peppler
 Ready For Take-Off - - Robin Lawrie
 KING Schools Computerized Materials (Textbook and Testing Materials)
 Aviation Supplies and Academics Computerized Materials (Textbooks and Testing Materials)
 G3 Flight Simulator
 Aviation Flight Simulator 2005
 New Mexico Space Journal
 RC Flyer Magazine

Flight Journal Magazine
 Aircraft Owners and Pilots Association Magazine
 Experimental Aircraft Association Magazine
 Women In Aviation Magazine
 Flying Magazine
 Private Pilot Magazine
 Backyard Flyer Magazine

Specific Readings from various flight magazines and by authors such as Richard Bach, Anne Morrow Lindbergh, Albert Einstein, Robert Oppenheimer.

SUGGESTED TITLES/AUTHORS WEB SITES

- www.AVWEB.com
- www.Ninety-Nines.org
- www.kingschools.com
- www.nasa.gov
- www.rcflight.com
- www.aviationhighschool.com
- www.nifa.com
- www.universityaviationassociation.org
- www.faa.gov

STRAND I: LANGUAGE ARTS: READING AND LISTENING FOR COMPREHENSION
CONTENT STANDARD: STUDENTS WILL APPLY STRATEGIES AND SKILLS TO COMPREHEND INFORMATION THAT IS READ, HEARD, AND VIEWED.

A. **BENCHMARK:** *Listen to, read, react to, and analyze information*

GRADE	PERFORMANCE STANDARDS	ILLUSTRATIONS
9-12	Grade 10: #2. Respond reflectively (through small group discussion, class discussion, journal entry, essay, letter, dialogue) to written and visual texts. Grade 10: #4. Evaluate the information, explanations, or ideas of others by: <ul style="list-style-type: none"> • identifying clear, reasonable criteria for evaluation • applying those criteria using reasoning and substantiation Grade 11: #1. Demonstrate increasing insight and reflection to print and non-print text through personal expression. Grade 12: # 1. Express reflections and reactions to print and non-print texts as well as to personal experience by: <ul style="list-style-type: none"> • composing and presenting reflective texts that give an audience an understanding of complex thoughts and feelings, a sense of significance, and a sense of encouragement to reflect on own ideas • responding to texts make connections, reflecting on cultural and historical perspectives, examining own response, and recognizing 	Analyze newspaper articles and media materials on the subject of aviation in relation to their day-to-day lives.

GRADE	PERFORMANCE STANDARDS	ILLUSTRATIONS
	<p>features of the author's</p> <ul style="list-style-type: none"> • use of language and how the writer relates to the subject so that the audience will empathize <p>Grade 12: #2. Analyze and critique texts from various perspectives and approaches by:</p> <ul style="list-style-type: none"> • developing critiques based on establishing and applying clear, credible criteria for evaluation • substantiating assessments with reasons and evidence 	

STRAND I: LANGUAGE ARTS: READING AND LISTENING FOR COMPREHENSION
CONTENT STANDARD: STUDENTS WILL APPLY STRATEGIES AND SKILLS TO COMPREHEND INFORMATION THAT IS READ, HEARD, AND VIEWED.

B. BENCHMARK: *Listen to, read, react to, and analyze information*

GRADE	PERFORMANCE STANDARDS	ILLUSTRATIONS
9-12	<p>Grade 9: #1. Use a variety of techniques for researching topics including: cross-referencing while gathering information summarizing dialogue</p> <ul style="list-style-type: none"> • using news sources (e.g., newspapers, magazines, TV, radio, videotapes, Internet, email, government publications, microfiche, other library resources) <p>Grade 9: #2. Synthesize a variety of types of visual information including pictures and symbols.</p> <p>Grade 10: #1. Use a variety of information resources to critically interpret and evaluate experiences, language, and ideas.</p> <p>Grade 10: #3. Use multiple resources to gather information to evaluate problems, examine cause and effect relationships, and answer research questions to inform an audience.</p> <p>Grade 11: #4. Demonstrate proficiency in accessing and sending information electronically.</p> <p>Grade 12: #2. Use a variety of resources to gather information to critically analyze texts to gain meaning, develop thematic connections, and synthesize ideas.</p>	<p>Each week, students turn in a newspaper article, Internet article or synopsis of a news event related to aviation.</p> <ul style="list-style-type: none"> • Discussion and/or seminar about articles. • Written and oral summaries of articles

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CONTENT STANDARD: STUDENTS WILL APPLY STRATEGIES AND SKILLS TO COMPREHEND INFORMATION THAT IS READ, HEARD, AND VIEWED.

C. BENCHMARK: *Demonstrate critical thinking skills to evaluate information and solve problems*

GRADE	PERFORMANCE STANDARDS	ILLUSTRATIONS
9-12	<p>Grade 9: #1. Examine texts for arguments and develop informed opinions by: examining relevant reason and evidence</p> <ul style="list-style-type: none"> • noting the progression of ideas that substantiate the proposal • identifying and analyzing personal, social, historical, or cultural influences, contexts, or biases <p>Grade 9: #2. Support informed opinions by providing relevant and convincing reasons, using various types of evidence, language, and organizational structure, and demonstrating an awareness of possible questions, concerns, or counter-arguments.</p> <p>Grade 10: #1. Examine controversial issues by:</p> <ul style="list-style-type: none"> • sharing and evaluating personal response • researching and summarizing data • developing a framework in which to discuss the issue (creating the context) • compiling personal responses and researched data to organize the argument • presenting data in various forms (e.g., graph, essay, speech, video) <p>Grade 10: #2. Critically interpret and evaluate experiences, literature, language, and ideas by:</p> <ul style="list-style-type: none"> • making generalizations supported by specific references • reflecting on observations and their relationship to a current viewpoint • distinguishing fact from fiction and recognizing personal bias <p>Grade 10: #5. Read critically and independently to draw conclusions from research.</p> <p>Grade 11: #1. Use language persuasively in addressing a particular issue by: finding and interpreting information effectively</p> <ul style="list-style-type: none"> • recognizing propaganda as a purposeful technique • establishing and defending a particular perspective • responding respectfully to viewpoints and biases • demonstrating how selections reflect the cultures that shaped them. <p>Grade 11: #2. Analyze overall effectiveness of one's own writing.</p>	<p>Students will discuss the various aspects of New Mexico's involvement with aviation and aerospace.</p> <ul style="list-style-type: none"> • Los Alamos National Laboratories and the development of the atomic bomb • White Sands Missile Range and the testing of early rockets • New Mexico Spaceport and the development of Space Tourism

GRADE	PERFORMANCE STANDARDS	ILLUSTRATIONS
	<p>Grade 12: #1. Research, define, and present issues of public concern by:</p> <ul style="list-style-type: none"> • using a variety of resources such as media centers, on-line resources, interviews, and personal reflection • specifying the nature of an issue, including claims made and the reasoning that supports those claims • organizing and delivering a presentation that specifies reasons for the claim and makes a clear stance on the issue. <p>Grade 12: #3. Analyze the effects on a text of the attitudes and values of a period in which the text was written.</p>	

STRAND II: LANGUAGE ARTS: WRITING AND SPEAKING FOR EXPRESSION
CONTENT STANDARD: STUDENTS WILL COMMUNICATE EFFECTIVELY THROUGH SPEAKING AND WRITING.

A. **BENCHMARK:** *Communicate information in a coherent and persuasive manner using verbal and non-verbal language.*

GRADE	PERFORMANCE STANDARDS	ILLUSTRATIONS
9-12	<p>Grade 9: #1. Evaluate personal effectiveness in group discussions and make corrections as necessary.</p> <p>Grade 9: #2. Ask questions to broaden and enrich discussions.</p> <p>Grade 9: #3. Express an informed opinion that clearly states a personal view, is logical and coherent, and engages the reader's interest.</p> <p>Grade 9: #4. Support an informed opinion by using appropriate language, reason, and organizational structure for the audience and purpose.</p> <p>Grade 10: #1. Produce responses to editorials/literature for a neutral audience by providing:</p> <ul style="list-style-type: none"> • a clearly stated position or proposed solution • relevant, reliable support <p>Grade 10: #2. Make well-informed and well-organized formal presentations with a clear main point, adjusting the message, wording, and delivery to the particular audience and context.</p> <p>Grade 10: #3. Defend argumentative positions on literary and non-literary issues by:</p> <ul style="list-style-type: none"> • sharing and evaluating initial personal response • presenting researched and summarized information • creating a context to discuss the issue • researching and compiling data to organize the argument • presenting data 	<p>Students will choose an aviation “personality” for research. Each student will be responsible for a written draft of the report, they must develop a bibliography of reference materials. The report will be presented in both a final written form and a verbal presentation in front of the class. The presentation must include audio/visual components.</p>

GRADE	PERFORMANCE STANDARDS	ILLUSTRATIONS
	<p>Grade 11: #1. Use language persuasively in addressing a particular issue by:</p> <ul style="list-style-type: none"> • finding and interpreting information effectively • recognizing propaganda as a purposeful technique • establishing and defending a point of view • responding respectfully to viewpoints and biases <p>Grade 11: #2. Identify, analyze, and evaluate criteria used for formal and informal discussions to determine how well others engage in discussion.</p> <p>Grade 11: #3. Analyze differences in responses to focused group discussion in an organized and systematic way.</p> <p>Grade 12: #1. Develop oral formal presentations using clear enunciation, gestures, tone, vocabulary, and organization appropriate for a particular audience.</p> <p>Grade 12: #2. Make explicit use of various techniques for effective presentations (e.g., voice, inflection, tempo, gestures).</p> <p>Grade 12: #3. Organize and deliver an argument so that an intended audience will respond by:</p> <ul style="list-style-type: none"> • wording the claim clearly • specifying convincing reasons to support the claim • adopting a stance and appropriate tone toward the issue <p>Grade 12: #4. Design and apply criteria for evaluating oral presentations and arguments before delivering them</p>	

STRAND III: LANGUAGE ARTS: LITERATURE AND MEDIA
CONTENT STANDARD: STUDENTS WILL USE LITERATURE AND MEDIA TO DEVELOP AN UNDERSTANDING OF PEOPLE, SOCIETIES, AND THE SELF.

A. **BENCHMARK:** *Use language, literature, and media to understand the role of the individual as a member of many cultures.*

GRADE	PERFORMANCE STANDARDS	ILLUSTRATIONS
9-12	<p>Grade 9: #3. Respond to a variety of literary works and media (e.g., memoirs, vignettes, narratives, diaries, newspaper, movies) that offer an audience:</p> <ul style="list-style-type: none"> • an understanding of a student's personal reactions • a sense of how the reaction results from careful consideration of the text • an awareness of how personal and cultural influences affect the response 	Read and seminar about first person narratives such as Anne Morrow Lindbergh, Richard Bach, Charles Lindbergh, Diane Ackerman

STRAND II: MATHEMATICS: ALGEBRA, FUNCTIONS, AND GRAPHS
CONTENT STANDARD: STUDENTS WILL UNDERSTAND ALGEBRAIC CONCEPTS AND APPLICATIONS.

A. **BENCHMARK:** *Represent and analyze mathematical situations and structures using algebraic symbols.*

GRADE	PERFORMANCE STANDARDS	ILLUSTRATIONS
9-12	<p>6. Represent and analyze relationships using written and verbal expressions, tables, equations, and graphs, and describe the connections among those representations:</p> <ul style="list-style-type: none"> • translate from verbal expression to algebraic formulae (e.g., 'Set up the equations that represent the data in the following equation: John's father is 23 years older than John. John is 4 years older than his sister Jane. John's mother is 3 years younger than John's father. John's mother is 9 times as old as Jane. How old are John, Jane, John's mother, and John's father?') • given data in a table, construct a function that represents these data (linear only) • given a graph, construct a function that represents the graph (linear only) <p>7. Know, explain, and use equivalent representations for the same real number including:</p> <ul style="list-style-type: none"> • integers • decimals • percents • ratios • scientific notation • numbers with integer exponents <p>14. Factor polynomials, difference of squares and perfect square trinomials, and the sum and difference of cubes.</p> <p>15. Simplify fractions with polynomials in the numerator and denominator by factoring both and reducing them to the lowest terms.</p> <p>16. Manipulate simple expressions with + and - exponents.</p> <p>17. Use the four basic operations (+, -, x, ÷):</p> <ul style="list-style-type: none"> • linear expressions • polynomial expressions • rational expressions 	<p>Students will plan a cross-country flight which will necessitate figuring weight and balance of the aircraft, wind factoring on computing the flight path, fuel consumption and weather variables on aircraft performance. The student will utilize an E6B manual flight computer (circular slide rule) to perform those functions.</p>

STRAND II: MATHEMATICS: ALGEBRA, FUNCTIONS, AND GRAPHS
CONTENT STANDARD: STUDENTS WILL UNDERSTAND ALGEBRAIC CONCEPTS AND APPLICATIONS.

B. BENCHMARK: *Understand patterns, relations, functions, and graphs.*

GRADE	PERFORMANCE STANDARDS	ILLUSTRATIONS
9-12	<ol style="list-style-type: none"> 1. Distinguish between the concept of a relation and a function. 2. Determine whether a relation defined by a graph, a set of ordered pairs, a table of values, an equation, or a rule is a function. 3. Describe the concept of a graph of a function. 4. Translate among tabular, symbolic, and graphical representations of functions. 5. Explain and use function notation. 6. Determine the domain of independent variables and the range of dependent variables defined by a graph, a set of ordered pairs, or a symbolic expression. 7. Identify the independent and dependent variables from an application problem (e.g., height of a child). 8. Describe the concept of a graph of an equation. 9. Understand symmetry of graphs. 10. Analyze and describe middle and end (asymptotic) behavior of linear, quadratic, and exponential functions, and sketch the graphs of functions. 11. Work with composition of functions (e.g., find f of g when $f(x) = 2x - 3$ and $g(x) = 3x - 2$), and find the domain, range, intercepts, zeros, and local maxima or minima of the final function. 12. Use the quadratic formula and factoring techniques to determine whether the graph of a quadratic function will intersect the x-axis in zero, one, or two points. 13. Apply quadratic equations to physical phenomena (e.g., the motion of an object under the force of gravity). 	Students will utilize aircraft performance charts and aircraft manuals in cross-country flight planning.

STRAND II: MATHEMATICS: ALGEBRA, FUNCTIONS, AND GRAPHS
CONTENT STANDARD: STUDENTS WILL UNDERSTAND ALGEBRAIC CONCEPTS AND APPLICATIONS.

C. BENCHMARK: *Use mathematical models to represent and understand quantitative relationships.*

GRADE	PERFORMANCE STANDARDS	ILLUSTRATIONS
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GRADE	PERFORMANCE STANDARDS	ILLUSTRATIONS
9-12	<ol style="list-style-type: none"> 1. Model real-world phenomena using linear and quadratic equations and linear inequalities (e.g., apply algebraic techniques to solve rate problems, work problems, and percent mixture problems; solve problems that involve discounts, markups, commissions, and profit and compute simple and compound interest; apply quadratic equations to model throwing a baseball in the air). 2. Use a variety of computational methods (e.g., mental arithmetic, paper and pencil, technological tools). 3. Express the relationship between two variables using a table with a finite set of values and graph the relationship. 4. Express the relationship between two variables using an equation and a graph: <ul style="list-style-type: none"> • graph a linear equation and linear inequality in two variables • solve linear inequalities and equations in one variable • solve systems of linear equations in two variables and graph the solutions • use the graph of a system of equations in two variables to help determine the solution 5. Solve applications involving systems of equations. 6. Evaluate numerical and algebraic absolute value expressions. 7. Create a linear equation from a table of values containing co-linear data. 8. Determine the solution to a system of equations in two variables from a given graph. 9. Generate an algebraic sentence to model real-life situations. 10. Write an equation of the line that passes through two given points. 11. Understand and use: <ul style="list-style-type: none"> • such operations as taking the inverse, finding the reciprocal, taking a root, and raising to a fractional power • the rules of exponents 12. Verify that a point lies on a line, given an equation of the line, and be able to derive linear equations by using the point-slope formula. 	Students will use time/rate/distance situation to figure fuel consumption for a cross-country flight planning situation. The students will plot a cross-country course on an aviation sectional chart.

STRAND II: MATHEMATICS: ALGEBRA, FUNCTIONS, AND GRAPHS CONTENT STANDARD: STUDENTS WILL UNDERSTAND ALGEBRAIC CONCEPTS AND APPLICATIONS.

D. BENCHMARK: <i>Analyze changes in various contexts.</i>
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GRADE	PERFORMANCE STANDARDS	ILLUSTRATIONS
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GRADE	PERFORMANCE STANDARDS	ILLUSTRATIONS
9-12	<p>1. Analyze the effects of parameter changes on these functions:</p> <ul style="list-style-type: none"> • linear (e.g., changes in slope or coefficients) • quadratic (e.g., f[x-a] changes coefficients and constants) • exponential (e.g., changes caused by increasing x[x + c] or [ax]) • polynomial (e.g., changes caused by positive or negative values of a, or in a constant c) <p>2. Solve routine two- and three-step problems relating to change using concepts such as:</p> <ul style="list-style-type: none"> • exponents • factoring • ratio • proportion • average • percent <p>3. Calculate the percentage of increase and decrease of a quantity.</p> <p>4. Analyze the general shape of polynomial expressions and equations for different degree polynomials (e.g., positive and negative general shapes for third-, fourth-, and fifth-degree polynomials).</p> <p>5. Estimate the rate of change of a function or equation by finding the slope between two points on the graph.</p> <p>6. Evaluate the estimated rate of change in the context of the problem.</p> <p>7. Know Pascal's triangle and use it to expand binomial expressions that are raised to positive integer powers.</p>	Students will calculate a wind triangulation problem based on specific flight situations for planning a cross country flight trip. Students will also calculate fuel consumption given various wind and engine situations.

STRAND III: MATHEMATICS: GEOMETRY AND TRIGONOMETRY
CONTENT STANDARD: STUDENTS WILL UNDERSTAND GEOMETRIC CONCEPTS AND APPLICATIONS.

A. **BENCHMARK:** *Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships.*

GRADE	PERFORMANCE STANDARDS	ILLUSTRATIONS
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GRADE	PERFORMANCE STANDARDS	ILLUSTRATIONS
9-12	<ol style="list-style-type: none"> 1. Interpret and draw two-dimensional objects and find the area and perimeter of basic figures (e.g., rectangles, circles, triangles, other polygons [e.g., rhombi, parallelograms, trapezoids]). 2. Find the area and perimeter of a geometric figure composed of a combination of two or more rectangles, triangles, and/or semicircles with just edges in common. 3. Find and use measures of sides and interior and exterior angles of triangles and polygons to classify figures (e.g., scalene, isosceles, and equilateral triangles; rectangles [square and non-square]; other convex polygons). 4. Interpret and draw three-dimensional objects and find the surface area and volume of basic figures (e.g., spheres, rectangular solids, prisms, polygonal cones), and calculate the surface areas and volumes of these figures as well as figures constructed from unions of rectangular solids and prisms with faces in common, given the formulas for these figures. 5. Demonstrate an understanding of simple aspects of a logical argument: <ul style="list-style-type: none"> identify the hypothesis and conclusion in logical deduction use counterexamples to show that an assertion is false and recognize that a single counterexample is sufficient to refute an assertion 6. Demonstrate an understanding of inductive and deductive reasoning, explain the difference between inductive and deductive reasoning, and identify and provide examples of each: <ul style="list-style-type: none"> • for inductive reasoning, demonstrate understanding that showing a statement is true for a finite number of examples does not show it is true for all cases • unless the cases verified are all cases • for deductive reasoning, prove simple theorems 	Students will analyze aircraft structure and then build a functional aircraft model based on their calculations and perceptions.

STRAND III: MATHEMATICS: GEOMETRY AND TRIGONOMETRY
CONTENT STANDARD: STUDENTS WILL UNDERSTAND GEOMETRIC CONCEPTS AND APPLICATIONS.

B. BENCHMARK: *Specify locations and describe spatial relationships using coordinate geometry and other representational systems.*

GRADE	PERFORMANCE STANDARDS	ILLUSTRATIONS
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GRADE	PERFORMANCE STANDARDS	ILLUSTRATIONS
9-12	1. Demonstrate understanding of the construction of the coordinate plane, know the names of the origin, coordinate axes and four quadrants, draw and label them correctly, find the coordinates of an indicated point, and plot a point with given coordinates. 2. Determine the midpoint and distance between two points within a coordinate system and relate these ideas to geometric figures in the plane (e.g., find the center of a circle given two endpoints of a diameter of the circle). 3. Given two linear equations, determine whether the lines are parallel, perpendicular, or coincide. 4. Use basic geometric ideas (e.g., the Pythagorean theorem, area, and perimeter of objects) in the context of the Euclidean Plane, calculate the perimeter of a rectangle with integer coordinates and sides parallel to the coordinate axes and with sides not parallel.	Students will solve weight and balance problems for various aircraft. Students will learn the three axis of flight and the affect of movement of each of them for aircraft performance.

STRAND III: MATHEMATICS: GEOMETRY AND TRIGONOMETRY CONTENT STANDARD: STUDENTS WILL UNDERSTAND GEOMETRIC CONCEPTS AND APPLICATIONS.	STRAN CONTE
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C. BENCHMARK: <i>Apply transformations and use symmetry to analyze mathematical situations.</i>
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GRADE	PERFORMANCE STANDARDS	ILLUSTRATIONS
9-12	1. Describe the effect of rigid motions on figures in the coordinate plane and space that include rotations, translations, and reflections: determine whether a given pair of figures on a coordinate plane represents the effect of a translation, reflection, rotation, and/or dilation sketch the planar figure that is the result of a given transformation of this type 2. Deduce properties of figures using transformations that include translations, rotations, reflections, and dilations in a coordinate system: <ul style="list-style-type: none"> • identify congruency and similarity in terms of transformations • determine the effects of the above transformations on linear and area measurements of the original planar figure 	Students will solve weight and balance problems for various aircraft. Students will learn the three axis of flight and the affect of movement of each of them for aircraft performance

STRAND III: MATHEMATICS: GEOMETRY AND TRIGONOMETRY CONTENT STANDARD: STUDENTS WILL UNDERSTAND GEOMETRIC CONCEPTS AND APPLICATIONS.

D. BENCHMARK: *Use visualization, spatial reasoning, and geometric modeling to solve problems.*

GRADE	PERFORMANCE STANDARDS	ILLUSTRATIONS
9-12	<ol style="list-style-type: none"> 1. Solve real-world problems using congruence and similarity relationships of triangles (e.g., find the height of a pole given the length of its shadow). 2. Solve problems involving complementary, supplementary, and congruent angles. 3. Solve problems involving the perimeter, circumference, area, volume, and surface area of common geometric figures (e.g., 'Determine the surface area of a can of height h and radius r. How does the surface area change when the height is changed to $3h$? How does the surface area change when the radius is changed to $3r$? How does the surface area change when both h and r are doubled?'). 4. Solve problems using the Pythagorean theorem (e.g., 'Given the length of a ladder and the distance of the base of the ladder from a wall, determine the distance up the wall to the top of the ladder'). 5. Understand and use elementary relationships of basic trigonometric functions defined by the angles of a right triangle (e.g., 'What is the radius of a circle with an inscribed regular octagon with the length of each side being exactly 2 feet?'). 6. Use trigonometric functions to solve for the length of the second leg of a right triangle given the angles and the length of the first leg. (e.g., 'A surveyor determines that the angle subtended by a two-foot stick at right angles to his transit is exactly one degree. What is the distance from the transit to the base of the measuring stick?'). 7. Know and use angle and side relationships in problems with special right triangles (e.g., 30-, 45-, 60-, and 90-degree triangles). 	<p>Students will be given specific parameters to plan a successful cross country flight for various aircraft.</p> <ul style="list-style-type: none"> • Wind triangulation • Time/rate/distance for fuel consumption • Weight and Balance for loading passengers, baggage and fuel • Plotting a course on an aviation sectional chart

STRAND V: MATHEMATICS: DATA ANALYSIS AND PROBABILITY

CONTENT STANDARD: STUDENTS WILL UNDERSTAND HOW TO FORMULATE QUESTIONS, ANALYZE DATA, AND DETERMINE PROBABILITIES.

A. BENCHMARK: *Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.*

STRAND V: MATHEMATICS: DATA ANALYSIS AND PROBABILITY

CONTENT STANDARD: STUDENTS WILL UNDERSTAND HOW TO FORMULATE QUESTIONS, ANALYZE DATA, AND DETERMINE PROBABILITIES.

B. BENCHMARK: *Select and use appropriate statistical methods to analyze data.*

STRAND II: CONTENT OF SCIENCE: PHYSICAL SCIENCE
CONTENT STANDARD I: UNDERSTAND THE STRUCTURE AND PROPERTIES OF MATTER, THE CHARACTERISTICS OF ENERGY, AND THE INTERACTIONS BETWEEN MATTER AND ENERGY.

A. **BENCHMARK:** *Understand the properties, underlying structure, and reactions of matter.*

GRADE	PERFORMANCE STANDARDS	ILLUSTRATIONS
9-12	<p>Interactions of Energy and Matter</p> <p>7. Understand that electromagnetic waves carry energy that can be transferred when they interact with matter.</p> <ul style="list-style-type: none"> • 8. Describe the characteristics of electromagnetic waves (e.g., visible light, radio, microwave, X-ray, ultraviolet, gamma) and other waves (e.g., sound, seismic waves, water waves) <p>C. Understand the motion of objects and waves, and the forces that cause them.</p> <p>Forces</p> <p>1. Know that there are four fundamental forces in nature: gravitation, electromagnetism, weak nuclear force, and strong nuclear force.</p> <p>2. Know that every object exerts gravitational force on every other object, and how this force depends on the masses of the objects and the distance between them.</p> <p>6. Represent the magnitude and direction of forces by vector diagrams.</p> <p>7. Know that when one object exerts a force on a second object, the second object exerts a force of equal magnitude and in the opposite direction on the first object (i.e., Newton 's Third Law).</p> <p>Motion</p> <p>8. Apply Newton 's Laws to describe and analyze the behavior of moving objects, including:</p> <ul style="list-style-type: none"> • displacement, velocity, and acceleration of a moving object • Newton 's Second Law, $F = ma$ (e.g., momentum and its conservation, the motion of an object falling under gravity, the independence of a falling object's motion on mass) • circular motion and centripetal force. <p>9. Describe relative motion using frames of reference.</p> <p>10. Describe wave propagation using amplitude, wavelength, frequency, and speed.</p> <p>12. Describe how waves are used for practical purposes (e.g., seismic data, acoustic effects, Doppler effect).</p>	<p>Students will learn the forces of flight and experiment with the application on aircraft structures</p> <ul style="list-style-type: none"> • Lift • Thrust • Drag • Gravity <p>Students will experiment with Bernoulli's Principal in conjunction with the lifting forces of a wing structure</p>

STRAND II: CONTENT OF SCIENCE: LIFE SCIENCE

CONTENT STANDARD 2: UNDERSTAND THE PROPERTIES, STRUCTURES, AND PROCESSES OF LIVING THINGS AND THE INTERDEPENDENCE OF LIVING THINGS AND THEIR ENVIRONMENTS.

C. BENCHMARK: *Understand the characteristics, structures, and functions of cells.*

GRADE	PERFORMANCE STANDARDS	ILLUSTRATIONS
9-12	Biochemical Mechanisms 7. Describe how most cell functions involve chemical reactions, including: <ul style="list-style-type: none">• promotion or inhibition of biochemical reactions by enzymes• processes of respiration (e.g., energy production, ATP)• communication from cell to cell by secretion of a variety of chemicals (e.g., hormones).	Students will learn the aeromedical aspects of the flight environment.

STRAND II: CONTENT OF SCIENCE: EARTH AND SPACE SCIENCE

CONTENT STANDARD 3: UNDERSTAND THE STRUCTURE OF EARTH, THE SOLAR SYSTEM, AND THE UNIVERSE, THE INTERCONNECTIONS AMONG THEM, AND THE PROCESSES AND INTERACTIONS OF EARTH'S SYSTEMS.

B. BENCHMARK: *Examine the scientific theories of the origin, structure, energy, and evolution of Earth and its atmosphere, and their interconnections.*

GRADE	PERFORMANCE STANDARDS	ILLUSTRATIONS
9-12	Energy and the Earth's System 8. Describe the patterns and relationships in the circulation of air and water driven by the sun's radiant energy, including: <ul style="list-style-type: none">• patterns in weather systems related to the transfer of energy• differences between climate and weather• global climate, global warming, and the greenhouse effect• El Niño, La Niña, and other climatic trends.	Students will learn about weather in relationship to the realm of flight. Aviation weather charts will be studied. Students will learn about the affects of wind patterns for takeoff, cross country and landing situations. Students will learn the vocabulary associated with obtaining an aviation weather briefing for cross country flight planning purposes.

STRAND III: SCIENCE AND SOCIETY**CONTENT STANDARD: UNDERSTAND HOW SCIENTIFIC DISCOVERIES, INVENTIONS, PRACTICES, AND KNOWLEDGE INFLUENCE, AND ARE INFLUENCED BY, INDIVIDUALS AND SOCIETIES****A. BENCHMARK:** *Examine and analyze how scientific discoveries and their applications affect the world, and explain how societies influence scientific investigations and applications.*

GRADE	PERFORMANCE STANDARDS	ILLUSTRATIONS
9-12	Science and Technology 3. Evaluate the influences of technology on society (e.g., communications, petroleum, transportation, nuclear energy, computers, medicine, genetic engineering) including both desired and undesired effects, and including some historical examples (e.g., the wheel, the plow, the printing press, the lightning rod).	Students will be introduced to the Nostradamus Project (Aviation II) and the background for developing an unmanned vehicle to help the forest service spot hotspots in forest fighting.

STRAND I: HISTORY**CONTENT STANDARD 1: STUDENTS ARE ABLE TO IDENTIFY IMPORTANT PEOPLE AND EVENTS IN ORDER TO ANALYZE SIGNIFICANT PATTERNS, RELATIONSHIPS, THEMES, IDEAS, BELIEFS, AND TURNING POINTS IN NEW MEXICO, UNITED STATES, AND WORLD HISTORY IN ORDER TO UNDERSTAND THE COMPLEXITY OF THE HUMAN EXPERIENCE.****D. BENCHMARK:** *Skills: Use critical thinking skills to understand and communicate perspectives of individuals, groups, and societies from multiple contexts.*

GRADE	PERFORMANCE STANDARDS	ILLUSTRATIONS
9-12	1. Understand how to use the skills of historical analysis to apply to current social, political, geographic, and economic issues. 2. Apply chronological and spatial thinking to understand the importance of events. 3. Describe primary and secondary sources and their uses in research. 6. Interpret events and issues based upon the historical, economic, political, social, and geographic context of the participants. 7. Analyze the evolution of particular historical and contemporary perspectives. 8. Explain how to use technological tools to research data, verify facts and information, and communicate findings.	Students will examine various aviation and space developments in the state of New Mexico, including work at the Los Alamos National Laboratories, the development of the New Mexico Space Port and the historical aspects of these entities. This is also include discussion and analysis of the role of the state of New Mexico in the development of the atomic bomb.

STRAND II: GEOGRAPHY

CONTENT STANDARD 2: STUDENTS UNDERSTAND HOW PHYSICAL, NATURAL, AND CULTURAL PROCESSES INFLUENCE WHERE PEOPLE LIVE, THE WAYS IN WHICH PEOPLE LIVE, AND HOW SOCIETIES INTERACT WITH ONE ANOTHER AND THEIR ENVIRONMENTS.

A. BENCHMARK: *Analyze and evaluate the characteristics and purposes of geographic tools, knowledge, skills, and perspectives, and apply them to explain the past, present, and future in terms of patterns, events, and issues.*

GRADE	PERFORMANCE STANDARDS	ILLUSTRATIONS
9-12	1. Evaluate and select appropriate geographic representations to analyze and explain natural and man-made issues and problems. 2. Understand the vocabulary and concepts of spatial interaction, including an analysis of population distributions and settlements patterns.	Students will learn to use aviation sectional charts while recognizing the similarities and differences in conventional map reading applied to the realm of aviation.

STRAND II: GEOGRAPHY

CONTENT STANDARD 2: STUDENTS UNDERSTAND HOW PHYSICAL, NATURAL, AND CULTURAL PROCESSES INFLUENCE WHERE PEOPLE LIVE, THE WAYS IN WHICH PEOPLE LIVE, AND HOW SOCIETIES INTERACT WITH ONE ANOTHER AND THEIR ENVIRONMENTS.

D. BENCHMARK: *Analyze and evaluate how economic, political, cultural, and social processes interact to shape patterns of human populations, and their interdependence, cooperation, and conflict.*

GRADE	PERFORMANCE STANDARDS	ILLUSTRATIONS
9-12	7. Evaluate the effects of technology on the developments, changes to, and interactions of cultures.	Students study the historical and economic impact of aviation. Specific emphasis will be placed on the development of the New Mexico Spaceport.

STRAND III: CAREER READINESS

CONTENT STANDARD 3: STUDENTS WILL DEMONSTRATE THE TECHNOLOGICAL KNOWLEDGE AND SKILLS REQUIRED FOR FUTURE CAREERS.

A. **BENCHMARK:** *Explain how technology is used in communications and the arts; engineering, industry, and science; health and human services; and business and marketing.*

GRADE	PERFORMANCE STANDARDS	ILLUSTRATIONS
9-12	No performance standards listed.	Students study and use GPS devices, flight simulators, radio communication as it is utilized in the aviation industry.