

Newport-Mesa Unified School District
Office of Secondary Curriculum and Instruction
High School Course of Study

Course Title		Introduction to Engineering Design 1AB				Course Code			
Transcript Title:	Introduction to Engineering Design			Grades Levels:	9-12 (Pref. 9)		Board Adoption Date:		
Content Area:	Interdisciplinary			GPA Scale:	4.0		Date Course Submitted:		April 2014
Credential Req:			Graduation Subject Areas:		Applied Skills		Electives		
UC/CSU “A-G” Area Approvals:				School Site that wrote and submitted the course:				Project Lead The Way – wrote the course; Estancia High School – submitting the course for NMUSD Board Approval	
Prerequisite(s):	None								
Next course(s):	Principles of Engineering								

COURSE DESCRIPTION *(catalog summary):*

Introduction to Engineering Design™ (IED) is a high school level course that is appropriate for 9th or 10th grade students who are interested in design and engineering. The major focus of the IED course is to expose students to design process, research and analysis, teamwork, communication methods, global and human impacts, engineering standards, and technical documentation. IED gives students the opportunity to develop skills and understanding of course concepts through activity-, project-, and problem-based (APPB) learning. Used in combination with a teaming approach, APPB-learning challenges students to continually hone their interpersonal skills, creative abilities and understanding of the design process. It also allows students to develop strategies to enable and direct their own learning, which is the ultimate goal of education.

The course assumes no previous knowledge, but students should be concurrently enrolled in college preparatory mathematics and science. Students will employ engineering and scientific concepts in the solution of engineering design problems. In addition, students use a state of the 3D solid modeling design software package to help them design solutions to solve proposed problems. Students will develop problem-solving skills and apply their knowledge of research and design to create solutions to various challenges that increase in difficulty throughout the course. Students will also learn how to document their work, and communicate their solutions to their peers and members of the professional community.

Introduction to Engineering Design™ is one of three foundation courses in the Project Lead The Way® high school pre-engineering program. The course applies and concurrently develops secondary level knowledge and skills in mathematics, science, and technology.

The course of study includes:

- *Design Process*
- *Modeling*

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- *Sketching*
- *Measurement, Statistics, and Applied Geometry*
- *Presentation Design and Delivery*
- *Engineering Drawing Standards*
- *CAD Solid Modeling*
- *Reverse Engineering*
- *Consumer Product Design Innovation*
- *Marketing*
- *Graphic Design*
- *Engineering Ethics*
- *Virtual Design Teams*

GOALS (expected performance outcomes for students):

Students engage in open-ended problem solving, learn and apply the engineering design process, and develop vital teamwork, communication, and critical-thinking skills.

Unit 1

- *Identify and define the terminology used in engineering design and development.*
- *Identify the steps in an engineering design process and summarize the activities involved in each step of the process.*
- *Complete a design project utilizing all steps of a design process, and find a solution that meets specific design requirements.*
- *Utilize research tools and resources (such as the Internet; media centers; market research; professional journals; printed, electronic, and multimedia resources; etc.) to gather and interpret information to develop an effective design brief.*
- *Define and justify a design problem, and express the concerns, needs, and desires of the primary stakeholders.*
- *Present and justify design specifications, and clearly explain the criteria and constraints associated with a successful design solution.*
- *Write a design brief to communicate the problem, problem constraints, and solution criteria.*
- *Generate and document multiple ideas or solution paths to a problem through brainstorming.*
- *Clearly justify and validate a selected solution path.*
- *Construct a testable prototype of a problem solution.*
- *Describe the design process used in the solution of a particular problem and reflect on all steps of the design process.*
- *Justify and validate a problem solution.*
- *Identify limitations in the design process and the problem solution and recommend possible improvements or caveats.*
- *Analyze the performance of a design during testing and judge the solution as viable or non-viable with respect to meeting the design requirements.*
- *Explain the concept of proportion and how it relates to freehand sketching.*
- *Generate non-technical concept sketches to represent objects or convey design ideas.*
- *Organize and express thoughts and information in a clear and concise manner.*

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- *Adjust voice and writing style to align with audience and purpose.*
- *Support design ideas using a variety of convincing evidence.*
- *Utilize an engineering notebook to clearly and accurately document the design process according to accepted standards and protocols to prove the origin and chronology of a design.*
- *Document information sources using appropriate formats.*
- *Deliver organized oral presentations of work tailored to the audience.*
- *Establish objectives for the presentation that are appropriate for the audience.*
- *Facilitate engaging and purposeful dialog with the audience.*
- *Create drawings or diagrams as representations of objects, ideas, events, or systems.*
- *Select and utilize technology (software and hardware) to create high impact visual aids.*
- *Use presentation software effectively to support oral presentations.*
- *Define and differentiate invention and innovation.*
- *Assess the development of an engineered product and discuss its impact on society and the environment.*
- *Identify and discuss a Grand Challenge for Engineering (as identified by the National Academy of Engineering) and its potential impact on society and the environment.*
- *Identify and differentiate between mechanical, electrical, civil, and chemical engineering fields.*
- *Describe the contributions of engineers from different engineering fields in the design and development of a product, system, or technology.*
- *Differentiate between the work of an engineer and the work of a scientist.*
- *Demonstrate positive team behaviors and contribute to a positive team dynamic.*

Unit 2

- *Generate and document multiple ideas or solution paths to a problem through brainstorming.*
- *Identify flat patterns (nets) that fold into geometric solid forms.*
- *Explain the concept of proportion and how it relates to freehand sketching.*
- *Identify and define technical drawing representations including isometric, orthographic projection, oblique, perspective, auxiliary, and section views.*
- *Identify the proper use of each technical drawing representation including isometric, orthographic projection, oblique, perspective, auxiliary, and section views.*
- *Identify line types (including construction lines, object lines, hidden lines, cutting plane lines, section lines, and center lines) used on a technical drawing per ANSI Line Conventions and Lettering Y14.2M-2008 and explain the purpose of each line.*
- *Determine the minimum number and types of views necessary to fully detail a part.*
- *Choose and justify the choice for the best orthographic projection of an object to use as a front view on technical drawings.*
- *Apply tonal shading to enhance the appearance of a pictorial sketch and create a more realistic appearance of a sketched object.*
- *Hand sketch 1-point and 2-point perspective pictorial views of a simple object or part given the object, a detailed verbal description of the object, a pictorial view of the object, and/or a set of orthographic projections.*

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- *Hand sketch isometric views of a simple object or part at a given scale using the actual object, a detailed verbal description of the object, a pictorial view of the object, or a set of orthographic projections.*
- *Hand sketch orthographic projections at a given scale and in the correct orientation to fully detail an object or part using the actual object, a detailed verbal description of the object, or a pictorial of an isometric view of the object.*
- *Create drawings or diagrams as representations of objects, ideas, events, or systems.*

Unit 3

- *Identify and define the terminology used in engineering design and development.*
- *Identify the steps in an engineering design process and summarize the activities involved in each step of the process.*
- *Complete a design project utilizing all steps of a design process, and find a solution that meets specific design requirements.*
- *Generate and document multiple ideas or solution paths to a problem through brainstorming.*
- *Construct a testable prototype of a problem solution.*
- *Describe the design process used in the solution of a particular problem and reflect on all steps of the design process.*
- *Identify limitations in the design process and the problem solution and recommend possible improvements or caveats.*
- *Analyze the performance of a design during testing and judge the solution as viable or non-viable with respect to meeting the design requirements.*
- *Calculate statistics related to central tendency including mean, median, and mode.*
- *Represent data with plots on the real number line (e.g., dot plots, histograms, and box plots).*
- *Use statistics to quantify information, support design decisions, and justify problem solutions.*
- *Distinguish between sample statistics and population statistics and know appropriate applications of each.*
- *Calculate statistics related to variation of data including standard deviation, interquartile range, and range.*
- *Use a spreadsheet program to store and manipulate raw data.*
- *Use a spreadsheet program to perform calculations using formulas.*
- *Use a spreadsheet program to create and display a histogram to represent a set of data.*
- *Use function tools within a spreadsheet program to calculate statistics for a set of data including mean, median, mode, quartiles, range, and standard deviation.*
- *Use units to guide the solution to multi-step problems through dimensional analysis and choose and interpret units consistently in formulas.*
- *Choose a level of precision and accuracy appropriate to limitations on measurement systems.*
- *Convert between different units within the same measurement system including the SI and US Customary measurement systems.*
- *Define accuracy and precision in measurement.*
- *Evaluate and compare the accuracy and precision of different measuring devices.*
- *Measure linear distances (including length, inside diameter, and hole depth) with accuracy using a scale, ruler, or dial caliper and report the measurement using an appropriate level of precision.*
- *Identify and define technical drawing representations including isometric, orthographic projection, oblique, perspective, auxiliary, and section views.*

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- *Determine the minimum number of types of views necessary to fully detail a part.*
- *Identify and correct errors and omissions in technical drawings including the line work, view selection, view orientation, appropriate scale, and annotations.*
- *Dimension orthographic projections and sections views of simple objects or parts according to a set of dimensioning standards and accepted practices.*
- *Identify and correctly apply chain dimensioning or datum dimensioning methods to a technical drawing.*
- *Identify and correct errors and omissions in the dimensions applied in a technical drawing based on accepted practice and a set of dimensioning rules.*
- *Hand sketch isometric views of a simple object or part at a given scale using the actual object, a detailed verbal description of the object, a pictorial view of the object, or a set of orthographic projections.*
- *Hand sketch orthographic projections at a given scale and in the correct orientation to fully detail an object or part using the actual object, a detailed verbal description of the object, or a pictorial of an isometric view of the object.*
- *Generate non-technical concept sketches to represent objects or convey design ideas.*
- *Organize and express thoughts and information in a clear and concise manner.*
- *Adjust voice and writing style to align with audience and purpose.*
- *Support design ideas using a variety of convincing evidence.*
- *Utilize an engineering notebook to clearly and accurately document the design process according to accepted standards and protocols to prove the origin and chronology of a design.*
- *Create drawings or diagrams as representations of objects, ideas, events, or systems.*
- *Demonstrate positive team behaviors and contribute to a positive team dynamic.*

Unit 4

- *Identify and define the terminology used in engineering design and development.*
- *Identify the steps in an engineering design process and summarize the activities involved in each step of the process.*
- *Complete a design project utilizing all steps of a design process, and find a solution that meets specific design requirements.*
- *Describe a variety of brainstorming techniques and rules for brainstorming.*
- *Generate and document multiple ideas or solution paths to a problem through brainstorming.*
- *Clearly justify and validate a selected solution path.*
- *Construct a testable prototype of a problem solution.*
- *Describe the design process used in the solution of a particular problem and reflect on all steps of the design process.*
- *Justify and validate a problem solution.*
- *Identify limitations in the design process and the problem solution and recommend possible improvements or caveats.*
- *Analyze the performance of a design during testing and judge the solution as viable or non-viable with respect to meeting the design requirements.*
- *Calculate statistics related to central tendency including mean, median, and mode.*
- *Use statistics to quantify information, support design decisions, and justify problem solutions.*
- *Calculate statistics related to variation of data including standard deviation, interquartile range, and range.*

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- *Use a spreadsheet program to store and manipulate raw data.*
- *Use a spreadsheet program to graph bi-variate data and determine an appropriate mathematical model using regression analysis.*
- *Use function tools within a spreadsheet program to calculate statistics for a set of data including mean, median, mode, quartiles, range, interquartile range, and standard deviation.*
- *Represent constraints with equations and inequalities.*
- *Formulate equations and inequalities to represent linear relationships between quantities.*
- *Compute (using technology) and interpret the correlation coefficient of a linear fit.*
- *Construct a scatter plot to display bi-variate data, investigate patterns of association, and represent the association with a mathematical model (linear equation) when appropriate.*
- *Solve equations for unknown quantities by determining appropriate substitutions for variables and manipulating the equations.*
- *Explain the term “function” and identify the set of inputs for the function as the domain and the set of outputs from the function as the range.*
- *Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of context.*
- *Build a function that describes a relationship between two quantities given a graph, a description of a relationship, or two input-output pairs.*
- *Interpret a function to solve problems in the context of the data.*
- *Interpret the slope (rate of change) and the intercept (constant term) of a linear function in the context of data.*
- *Identify line types (including construction lines, object lines, hidden lines, cutting plane lines, section lines, and center lines) used on a technical drawing per ANSI Line Conventions and Lettering Y14.2M-2008 and explain the purpose of each line.*
- *Determine the minimum number and types of views necessary to full detail a part.*
- *Choose and justify the choice for the best orthographic projection of an object to use as a front view on technical drawings.*
- *Identify and correct errors and omissions in technical drawings including the line work, view selection, view orientation, appropriate scale, and annotations.*
- *Create a set of working drawings to detail a design project.*
- *Fabricate a simple object from technical drawings that may include an isometric view, orthographic projections, and a section view.*
- *Dimension orthographic projections and section views of simple objects or parts according to a set of dimensioning standards and accepted practices.*
- *Identify and correct errors and omissions in the dimensions applied in a technical drawing based on accepted practice and a set of dimensioning rules.*
- *Hand sketch isometric views of a simple object or part at a given scale using the actual object, a detailed verbal description of the object, a pictorial view of the object, or a set of orthographic projections.*
- *Hand sketch orthographic projections at a given scale and in the correct orientation to fully detail an object or part using the actual object, a detailed verbal description of the object, or a pictorial an isometric view of the object.*
- *Create three-dimensional solid models of parts within CAD from sketches or dimensioned drawings using appropriate geometric and dimensional constraints.*
- *Compare the efficiency of the modeling method of an object using different combinations of additive and subtractive methods.*

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- *Generate CAD multi-view technical drawings, including orthographic projections, sections view(s), detail view(s), auxiliary view(s) and pictorial views, as necessary, showing appropriate scale, appropriate view selection, and correct view orientation to fully describe a part according to standard engineering practice.*
- *Dimension and annotate (including specific and general notes) working drawings according to accepted engineering practice. Include dimensioning according to a set of dimensioning rules, proper hole and thread notes, proper tolerance annotation, and the inclusion of other notes necessary to fully describe a part according to standard engineering practice.*
- *Explain each assembly constraint (including mate, flush, insert, and tangent), its role in an assembly model, and the degrees of freedom that it removes from the movement between parts.*
- *Create assemblies of parts in CAD and use appropriate assembly constraints to create an assembly that allows correct realistic movement among parts. Manipulate the assembly model to demonstrate the movement.*
- *Organize and express thoughts and information in a clear and concise manner.*
- *Adjust voice and writing style to align with audience and purpose.*
- *Support design ideas using a variety of convincing evidence.*
- *Utilize project portfolios to present and justify design projects.*
- *Create drawings or diagrams as representations of objects, ideas, events, or systems.*

Unit 5

- *Complete a design project utilizing all steps of a design process, and find a solution that meets specific design requirements.*
- *Define and justify a design problem, and express the concerns, needs, and desires of the primary stakeholders.*
- *Generate and document multiple ideas or solutions paths to a problem through brainstorming.*
- *Construct a testable prototype of a problem solution.*
- *Identify limitations in the design process and the problem solution and recommend possible improvements or caveats.*
- *Analyze the performance of a design during testing and judge the solution as viable or non-viable with respect to meeting the design requirements.*
- *Use a spreadsheet program to store and manipulate raw data.*
- *Use a spreadsheet program to graph bi-variate data and determine an appropriate mathematical model using regression analysis.*
- *Use function tools within a spreadsheet program to calculate statistics for a set of data including mean, median, mode, quartiles, range, interquartile range, and standard deviation.*
- *Construct a scatter plot to display bi-variate data, investigate patterns of association, and represent the association with a mathematical model (linear equation) when appropriate.*
- *Solve equations for unknown quantities by determining appropriate substitutions for variables and manipulating the equations.*
- *Convert quantities between units in the SI and the US Customary measurement systems.*
- *Convert between different units within the same measurement system including the SI and US Customary measurement systems.*
- *Measure linear distances (including length, inside diameter, and hole depth) with accuracy using a scale, ruler, or dial caliper and report the measurement using an appropriate level of precision.*
- *Measure mass with accuracy using a scale and report the measurement using an appropriate level of precision.*
- *Measure volume with accuracy and report the measurement with an appropriate level of precision.*

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- *Identify three dimensional objects generated by rotations of two-dimensional shapes and vice versa.*
- *Define the term “physical property” and identify the properties of length, volume, mass, density, surface area, centroid, principle axes, and center of gravity as physical properties.*
- *Solve volume problems using volume formulas for rectangular solids, cylinders, pyramids, cones, and spheres.*
- *Solve real world and mathematical problems involving area and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, right prisms, cylinders and spheres.*
- *Calculate a physical property indirectly using available data or perform appropriate measurements to gather the necessary data (e.g., determine area or volume using linear measurements or determine density using mass and volume measurements).*
- *Use physical properties to solve design problems (e.g., design an object or structure to satisfy physical constraints or minimize cost).*
- *Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of context.*
- *Interpret the slope (rate of change) and the intercept (constant term) of a linear function in the context of data.*
- *Identify types of polygons including a square, rectangle, pentagon, hexagon, and octagon.*
- *Identify and differentiate geometric constructions and constraints such as horizontal lines, vertical lines, parallel lines, perpendicular lines, colinear points, tangent lines, tangent circles, and concentric circles.*
- *Identify types of angles including an acute angle, obtuse angle, straight angle, and right angle.*
- *Create three-dimensional solid models of parts within CAD from sketches or dimensioned drawings using appropriate geometric and dimensional constraints.*
- *Assign a specific material (included in the software library) to a part and use the capabilities of the CAD software to determine the mass, volume, and surface area of an object for which a 3D solid model has been created.*
- *Assign a density value to a new material (not included in the software library) and apply the material to a 3D solid model within CAD software in order to determine the physical properties of the object.*
- *Demonstrate positive team behaviors and contribute to a positive team dynamic.*

Unit 6

- *Evaluate and compare multiple materials and fastener choices for a product design based on the impact on the design's cost, performance, marketability, environmental impact, and expected service life.*
- *Measure linear distances (including length, inside diameter, and hole depth) with accuracy using a scale, ruler, or dial caliper and report the measurement using an appropriate level of precision.*
- *Measure mass with accuracy using a scale and report the measurement using an appropriate level of precision.*
- *Determine the minimum number of types of views necessary to fully detail a part.*
- *Choose and justify the choice for the best orthographic projection of an object to use as a front view on technical drawings.*
- *Hand sketch isometric views of a simple object or part at a given scale using the actual object, a detailed verbal description of the object, a pictorial view of the object, or a set of orthographic projections.*
- *Hand sketch orthographic projections at a given scale and in the correct orientation to fully detail an object or part using the actual object, a detailed verbal description of the object, or a pictorial an isometric view of the object.*

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- *Create three-dimensional solid models of parts within CAD from sketches or dimensioned drawings using appropriate geometric and dimensional constraints.*
- *Generate CAD multi-view technical drawings, including orthographic projections, sections view(s), detail view(s), auxiliary view(s) and pictorial views, as necessary, showing appropriate scale, appropriate view selection, and correct view orientation to fully describe a part according to standard engineering practice.*
- *Assign a specific material (included in the software library) to a part and use the capabilities of the CAD software to determine the mass, volume, and surface area of an object for which a 3D solid model has been created.*
- *Organize and express thoughts and information in a clear and concise manner.*
- *Adjust voice and writing style to align with audience and purpose.*
- *Utilize an engineering notebook to clearly and accurately document the design process according to accepted standards and protocols to prove the origin and chronology of a design.*
- *Deliver organized oral presentations of work tailored to the audience.*
- *Create drawings or diagrams as representations of objects, ideas, events, or systems.*
- *Select and utilize technology (software and hardware) to create high impact visual aids.*
- *Identify and describe the visual principles and elements of design apparent in a natural or man-made object.*
- *Define aesthetics and explain how the visual elements and principles of design affect the aesthetics and commercial success of a product.*
- *Describe the process of reverse engineering.*
- *Justify the use of reverse engineering and explain the various reasons to employ reverse engineering, including discovery, documentation, investigation, and product improvement.*
- *Perform a functional analysis of a product in order to determine the purpose, inputs and outputs, and the operation of a product or system.*
- *Perform a structural analysis of a product in order to determine the materials used and the form of component parts as well as the configuration and interaction of component parts when assembled (if applicable).*
- *Analyze information gathered during reverse engineering to identify shortcomings of the design and/or opportunities for improvement or innovation.*
- *Demonstrate positive team behaviors and contribute to a positive team dynamic.*

Unit 7

- *Identify the steps in an engineering design process and summarize the activities involved in each step of the process.*
- *Complete a design project utilizing all steps of a design process, and find a solution that meets specific design requirements.*
- *Utilize research tools and resources (such as the Internet; media centers; market research; professional journals; printed, electronic, and multimedia resources; etc.) to gather and interpret information to develop an effective design brief.*
- *Utilize research tools and resources (such as the Internet; media centers; market research; professional journals; printed, electronic, and multimedia resources; etc.) to validate design decisions and justify a problem solution.*
- *Define and justify a design problem, and express the concerns, needs, and desires of the primary stakeholders.*
- *Present and justify design specifications, and clearly explain the criteria and constraints associated with a successful design solution.*

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- Write a design brief to communicate the problem, problem constraints, and solution criteria.
- Generate and document multiple ideas or solution paths to a problem through brainstorming.
- Jointly develop a decision matrix based on accepted outcome criteria and constraints.
- Clearly justify and validate a selected solution path.
- Construct a testable prototype of a problem solution.
- Describe the design process used in the solution of a particular problem and reflect on all steps of the design process.
- Justify and validate a problem solution.
- Identify the shapes of two-dimensional cross sections of three-dimensional objects.
- Analyze the performance of a design during testing and judge the solution as viable or non-viable with respect to meeting the design requirements.
- Represent constraints with equations or inequalities.
- Determine the minimum number and types of views necessary to full detail a part.
- Choose and justify the choice for the best orthographic projection of an object to use as a front view on technical drawings.
- Create a set of working drawings to detail a design project.
- Create specific notes on a technical drawing to convey important information about specific features of a detailed object, and create general notes to convey details that pertain to information presented on the entire drawing (such as units, scale, patent details, etc.)
- Dimension orthographic projections and section views of simple objects or parts according to a set of dimensioning standards and accepted practices.
- Identify and differentiate between size dimensions and location dimensions.
- Identify and correct errors and omissions in the dimensions applied in a technical drawing based on accepted practice and a set of dimensioning rules.
- Read and interpret a hole note to identify the size and type of hole including through, clearance, blind, counter bore, and countersink holes.
- Model and annotate (with a hole note) through, clearance, blind, counter bore, and countersink holes.
- Identify and differentiate among limit dimensions, a unilateral tolerance, and a bilateral tolerance.
- Define and determine the specified dimension, tolerance, upper limit, and lower limit for any given dimension and related tolerance (or any distance that is dependent on given dimensions) shown on a technical drawing.
- Determine the allowance between two mating parts of an assembly based on dimensions given on a technical drawing.
- Differentiate between clearance and interference fit and identify the type of fit given a drawing, a description, or a physical example of two mating parts.
- Compare the effect of chain dimensioning and datum dimensioning on the tolerance of a particular specified dimension.
- Hand sketch orthographic projections at a given scale and in the correct orientation to fully detail an object or part using the actual object, a detailed verbal description of the object, or a pictorial of an isometric view of the object.
- Hand sketch a scaled full or half section view in the correct orientation to fully detail an object or part given the actual object, a detailed verbal description of the object, a pictorial view of the object or a set of orthographic projections.
- Create three-dimensional solid models of parts within CAD from sketches or dimensioned drawings using appropriate geometric and dimensional constraints.

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- *Generate CAD multi-view technical drawings, including orthographic projections, sections view(s), detail view(s), auxiliary view(s) and pictorial views, as necessary, showing appropriate scale, appropriate view selection, and correct view orientation to fully describe a part according to standard engineering practice.*
- *Dimension and annotate (including specific and general notes) working drawings according to accepted engineering practice. Include dimensioning according to a set of dimensioning rules, proper hole and thread notes, proper tolerance annotation, and the inclusion of other notes necessary to fully describe a part according to standard engineering practice.*
- *Explain each assembly constraint (including mate, flush, insert, and tangent), its role in an assembly model, and the degrees of freedom that it removes from the movement between parts.*
- *Create assemblies of parts in CAD and use appropriate assembly constraints to create and assembly that allows correct realistic movement among parts. Manipulate the assembly model to demonstrate the movement.*
- *Create a CAD assembly drawing. Identify each component of the assembly with identification numbers and create a parts list to detail each component using CAD.*
- *Organize and express thoughts and information in a clear and concise manner.*
- *Adjust voice and writing style to align with audience and purpose.*
- *Support design ideas using a variety of convincing evidence.*
- *Utilize an engineering notebook to clearly and accurately document the design process according to accepted standards and protocols to prove the origin and chronology of a design.*
- *Create a technical report according to the American National Standards Institute (ANSI) technical report layout and format specifics.*
- *Create drawings or diagrams as representatives of objects, ideas, events, or systems.*
- *Analyze information gathered during reverse engineering to identify shortcomings of the design and/or opportunities for improvement or innovation.*
- *Demonstrate positive team behaviors and contribute to a positive team dynamic.*

Unit 8

- *Complete a design project utilizing all steps of a design process, and find a solution that meets specific design requirements.*
- *Generate and document multiple ideas or solution paths to a problem through brainstorming.*
- *Construct a testable prototype of a problem solution.*
- *Identify limitations in the design process and the problem solution and recommend possible improvements or caveats.*
- *Analyze the performance of a design during testing and judge the solution as viable or non-viable with respect to meeting the design requirements.*
- *Formulate equations and inequalities to represent linear, relationships between quantities.*
- *Solve equations for unknown quantities by determining appropriate substitutions for variables and manipulating the equations.*
- *Identify three dimensional objects generated by rotations of two-dimensional shapes and vice versa.*
- *Identify and differentiate geometric constructions and constraints such as horizontal lines, vertical lines, parallel lines, perpendicular lines, colinear points, tangent lines, tangent circles, and concentric circles.*
- *Identify the proper use of each technical drawing representation including isometric, orthographic projection, oblique, perspective, auxiliary, and section views.*

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- *Determine the minimum number and types of views necessary to full detail a part.*
- *Choose and justify the choice for the best orthographic projection of an object to use as a front view on technical drawings.*
- *Create a set of working drawings to detail a design project.*
- *Create specific notes on a technical drawing to convey important information about specific features of a detailed object, and create general notes to convey details that pertains to information presented on the entire drawing (such as units, scale, patent details, etc.)*
- *Dimension orthographic projections and section views of simple objects or parts according to a set of dimensioning standards and accepted practices.*
- *Identify and correctly apply chain dimensioning or datum dimensioning methods to a technical drawing.*
- *Model and annotate (with a hole note) through, clearance, blind, counter bore, and countersink holes.*
- *Identify and differentiate among limit dimensions, a unilateral tolerance, and a bilateral tolerance.*
- *Hand sketch orthographic projections at a given scale and in the correct orientation to fully detail an object or part using the actual object, a detailed verbal description of the object, or a pictorial of an isometric view of the object.*
- *Create three-dimensional solid models of parts within CAD from sketches or dimensioned drawings using appropriate geometric and dimensional constraints.*
- *Generate CAD multi-view technical drawings, including orthographic projections, sections view(s), detail view(s), auxiliary view(s) and pictorial views, as necessary, showing appropriate scale, appropriate view selection, and correct view orientation to fully describe a part according to standard engineering practice.*
- *Create relationships among part features and dimensions using parametric formulas.*
- *Dimension and annotate (including specific and general notes) working drawings according to accepted engineering practice. Include dimensioning according to a set of dimensioning rules, proper hole and thread notes, proper tolerance annotation, and the inclusion of other notes necessary to fully describe a part according to standard engineering practice.*
- *Create sketch elements and relationships among part features in CAD using precise input (and an applicable coordinate system).*
- *Explain each assembly constraint (including mate, flush, insert, and tangent), its role in an assembly model, and the degrees of freedom that it removes from the movement between parts.*
- *Create assemblies of parts in CAD and use appropriate assembly constraints to create and assembly that allows correct realistic movement among parts. Manipulate the assembly model to demonstrate the movement.*
- *Create a CAD assembly drawing. Identify each component of the assembly with identification numbers and create a parts list to detail each component using CAD.*
- *Create an exploded view of a given assembly. Identify each component of the assembly with identification numbers, and create a parts list to detail each component using CAD.*
- *Utilize an engineering notebook to clearly and accurately document the design process according to accepted standards and protocols to prove the origin and chronology of a design.*
- *Create drawings or diagrams as representatives of objects, ideas, events, or systems.*
- *Demonstrate positive team behaviors and contribute to a positive team dynamic.*

Unit 9

- *Identify the steps in an engineering design process and summarize the activities involved in each step of the process.*

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- Complete a design project utilizing all steps of a design process, and find a solution that meets specific design requirements.
- Utilize research tools and resources (such as the Internet; media centers; market research; professional journals; printed, electronic, and multimedia resources; etc.) to gather and interpret information to develop an effective design brief.
- Utilize research tools and resources (such as the Internet; media centers; market research; professional journals; printed, electronic, and multimedia resources; etc.) to validate design decisions and justify a problem solution.
- Summarize key ideas in information sources including scientific and engineering texts, tables, diagrams, and graphs.
- Define and justify a design problem, and express the concerns, needs, and desires of the primary stakeholders.
- Present and justify design specifications, and clearly explain the criteria and constraints associated with a successful design solution.
- Explain design requirements and function claims using STEM principles and practices.
- Write a design brief to communicate the problem, problem constraints, and solution criteria.
- Generate and document multiple ideas or solution paths to a problem through brainstorming.
- Jointly develop a decision matrix based on accepted outcome criteria and constraints.
- Use a decision matrix to evaluate and compare multiple design solutions in order to select a solution path that satisfies the design requirements.
- Clearly justify and validate a selected solution path.
- Justify and validate a problem solution.
- Identify limitations in the design process and the problem solution and recommend possible improvements or caveats.
- Create and utilize a Gantt chart to plan, monitor, and control task completion during a design project.
- Identify the proper use of each technical drawing representation including isometric, orthographic projection, oblique, perspective, auxiliary, and section views.
- Determine the minimum number and types of views necessary to full detail a part.
- Choose and justify the choice for the best orthographic projection of an object to use as a front view on technical drawings.
- Create a set of working drawings to detail a design project.
- Create specific notes on a technical drawing to convey important information about specific features of a detailed object, and create general notes to convey details that pertains to information presented on the entire drawing (such as units, scale, patent details, etc.)
- Dimension orthographic projections and section views of simple objects or parts according to a set of dimensioning standards and accepted practices.
- Identify and correctly apply chain dimensioning or datum dimensioning methods to a technical drawing.
- Identify and differentiate between size dimensions and location dimensions.
- Model and annotate (with a hole note) through, clearance, blind, counter bore, and countersink holes.
- Identify and differentiate among limit dimensions, a unilateral tolerance, and a bilateral tolerance.
- Hand sketch orthographic projections at a given scale and in the correct orientation to fully detail an object or part using the actual object, a detailed verbal description of the object, or a pictorial of an isometric view of the object.
- Generate non-technical concept sketches to represent an object or part to convey design ideas.
- Create three-dimensional solid models of parts within CAD from sketches or dimensioned drawings using appropriate geometric and dimensional constraints.

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- *Generate CAD multi-view technical drawings, including orthographic projections, sections view(s), detail view(s), auxiliary view(s) and pictorial views, as necessary, showing appropriate scale, appropriate view selection, and correct view orientation to fully describe a part according to standard engineering practice.*
- *Create relationships among part features and dimensions using parametric formulas.*
- *Dimension and annotate (including specific and general notes) working drawings according to accepted engineering practice. Include dimensioning according to a set of dimensioning rules, proper hole and thread notes, proper tolerance annotation, and the inclusion of other notes necessary to fully describe a part according to standard engineering practice.*
- *Create assemblies of parts in CAD and use appropriate assembly constraints to create an assembly that allows correct realistic movement among parts. Manipulate the assembly model to demonstrate the movement.*
- *Create a CAD assembly drawing. Identify each component of the assembly with identification numbers and create a parts list to detail each component using CAD.*
- *Create an exploded view of a given assembly. Identify each component of the assembly with identification numbers, and create a parts list to detail each component using CAD.*
- *Identify an appropriate mode of two-way communication based on the audience and intended goal of the communication.*
- *Use an appropriate and professional tone and vernacular based on the audience of the correspondence.*
- *Document correspondence and conversations in an accurate and organized manner.*
- *Review and evaluate the written work of peers and make recommendations for improvement.*
- *Organize and express thoughts and information in a clear and concise manner.*
- *Adjust voice and writing style to align with audience and purpose.*
- *Support design ideas using a variety of convincing evidence.*
- *Utilize an engineering notebook to clearly and accurately document the design process according to accepted standards and protocols to prove the origin and chronology of a design.*
- *Utilize journaling as a means of documentation and reflection to demonstrate original thought and reasoning.*
- *Utilize project portfolios to present and justify design projects.*
- *Document information sources using appropriate formats.*
- *Deliver organized oral presentations of work tailored to the audience.*
- *Establish objectives for the presentation that are appropriate for the audience.*
- *Facilitate engaging and purposeful dialog with the audience.*
- *Create drawings or diagrams as representatives of objects, ideas, events, or systems.*
- *Select and utilize technology (software and hardware) to create high impact visual aids.*
- *Select and utilize videos and images from CAD software to convey information appropriate for the given audience.*
- *Use presentation software effectively to support oral presentations.*
- *Assess the development of an engineered product and discuss its impact on society and the environment.*
- *Describe the contributions of engineers from different engineering fields in the design and development of a product, system, or technology.*
- *Identify and describe the steps of a typical product lifecycle (including raw material extraction, processing, manufacture, use and maintenance, and disposal).*

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- *Identify and explain how the basic theories of ethics relate to engineering.*
- *Incorporate the use of the visual elements and principles of design in the design of an engineered product.*
- *Identify team member skill sets needed to produce an effective team.*
- *Identify and assign team member roles.*
- *Define the term group norms and discuss the importance of norms in creating an effective team environment.*
- *Identify strategies to resolve team conflict.*
- *Demonstrate positive team behaviors and contribute to a positive team dynamic.*
- *Establish common goals, equitable workloads, accountability, and create a set of team norms.*
- *Contribute equitably to the attainment of group goals based on assigned roles.*
- *Practice appropriate conflict resolution strategies within a team environment.*
- *Identify appropriate technology to support remote collaboration among virtual design team members (such as asynchronous communications, audio and video conferencing, instant messaging, synchronous file editing, and file transfer).*
- *Participate on a virtual team using remote collaboration tools to support team collaboration and problem solving.*

Unit 10

- *Complete a design project utilizing all steps of a design process, and find a solution that meets specific design requirements.*
- *Utilize research tools and resources (such as the Internet; media centers; market research; professional journals; printed, electronic, and multimedia resources; etc.) to gather and interpret information to develop an effective design brief.*
- *Utilize research tools and resources (such as the Internet; media centers; market research; professional journals; printed, electronic, and multimedia resources; etc.) to validate design decisions and justify a problem solution.*
- *Define and justify a design problem, and express the concerns, needs, and desires of the primary stakeholders.*
- *Present and justify design specifications, and clearly explain the criteria and constraints associated with a successful design solution.*
- *Explain design requirements and function claims using STEM principles and practices.*
- *Write a design brief to communicate the problem, problem constraints, and solution criteria.*
- *Generate and document multiple ideas or solution paths to a problem through brainstorming.*
- *Jointly develop a decision matrix based on accepted outcome criteria and constraints.*
- *Use a decision matrix to evaluate and compare multiple design solutions in order to select a solution path that satisfies the design requirements.*
- *Clearly justify and validate a selected solution path.*
- *Describe the design process used in the solution of a particular problem and reflect on all steps of the design process.*
- *Justify and validate a problem solution.*
- *Identify limitations in the design process and the problem solution and recommend possible improvements or caveats.*
- *Identify the proper use of each technical drawing representation including isometric, orthographic projection, oblique, perspective, auxiliary, and section views.*
- *Determine the minimum number and types of views necessary to full detail a part.*
- *Choose and justify the choice for the best orthographic projection of an object to use as a front view on technical drawings.*
- *Create a set of working drawings to detail a design project.*

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- *Create specific notes on a technical drawing to convey important information about specific features of a detailed object, and create general notes to convey details that pertain to information presented on the entire drawing (such as units, scale, patent details, etc.)*
- *Dimension orthographic projections and section views of simple objects or parts according to a set of dimensioning standards and accepted practices.*
- *Identify and correctly apply chain dimensioning or datum dimensioning methods to a technical drawing.*
- *Identify and differentiate between size dimensions and location dimensions.*
- *Determine the allowance between two mating parts of an assembly based on dimensions given on a technical drawing.*
- *Hand sketch isometric views of a simple object or part at a given scale using the actual object, a detailed verbal description of the object, a pictorial view of the object, or a set of orthographic projections.*
- *Generate non-technical concept sketches to represent an object or part to convey design ideas.*
- *Create three-dimensional solid models of parts within CAD from sketches or dimensioned drawings using appropriate geometric and dimensional constraints.*
- *Generate CAD multi-view technical drawings, including orthographic projections, sections view(s), detail view(s), auxiliary view(s) and pictorial views, as necessary, showing appropriate scale, appropriate view selection, and correct view orientation to fully describe a part according to standard engineering practice.*
- *Create relationships among part features and dimensions using parametric formulas.*
- *Dimension and annotate (including specific and general notes) working drawings according to accepted engineering practice. Include dimensioning according to a set of dimensioning rules, proper hole and thread notes, proper tolerance annotation, and the inclusion of other notes necessary to fully describe a part according to standard engineering practice.*
- *Create sketch elements and relationships among part features in CAD using precise input (and an applicable coordinate system).*
- *Explain each assembly constraint (including mate, flush, insert, and tangent), its role in an assembly model, and the degrees of freedom that it removes from the movement between parts.*
- *Create assemblies of parts in CAD and use appropriate assembly constraints to create an assembly that allows correct realistic movement among parts. Manipulate the assembly model to demonstrate the movement.*
- *Create a CAD assembly drawing. Identify each component of the assembly with identification numbers and create a parts list to detail each component using CAD.*
- *Create an exploded view of a given assembly. Identify each component of the assembly with identification numbers, and create a parts list to detail each component using CAD.*
- *Organize and express thoughts and information in a clear and concise manner.*
- *Utilize an engineering notebook to clearly and accurately document the design process according to accepted standards and protocols to prove the origin and chronology of a design.*
- *Document information sources using appropriate formats.*
- *Incorporate the use of the visual elements and principles of design in the design of an engineered product.*
- *Identify and assign team member roles.*
- *Define the term group norms and discuss the importance of norms in creating an effective team environment.*
- *Identify strategies to resolve team conflict.*
- *Demonstrate positive team behaviors and contribute to a positive team dynamic.*

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- Establish common goals, equitable workloads, accountability, and create a set of team norms.
- Contribute equitably to the attainment of group goals based on assigned roles.
- Practice appropriate conflict resolution strategies within a team environment.

CALIFORNIA CONTENT STANDARDS (how the course aligns with California and/or national curriculum standards):

PLTW is the nation's leading STEM program which is aligned with the CCSS in the following areas: Next Generation Science Standards, CCSS for Mathematical Practice, CCSS for ELA, and Technological Literacy.

Reading

Key Ideas and Details

1. Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text. (AS.R.1)
2. Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas. (AS.R.2)
3. Analyze how and why individuals, events, and ideas develop and interact over the course of a text. (AS.R.3)
4. Interpret words and phrases as they are used in a text, including determining technical, **connotative, and figurative meanings, and analyze** how specific word choices shape meaning or tone. (AS.R.4)
7. Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words. (AS.R.7)
8. Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence. (AS.R.8)
10. Read and comprehend complex literary and informational texts independently and proficiently. (AS.R.10)

Text Types and Purposes

1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence. (AS.W.1)
2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content. (AS.W.2)
4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (AS.W.4)

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5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach. (AS.W.5)
6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others. (AS.W.6)
7. Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation. (AS.W.7)
8. Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism. (AS.W.8)
9. Draw evidence from literary or informational texts to support analysis, reflection, and research. (AS.W.9)
10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences. (AS.W.10)

Comprehension and Collaboration

1. Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively. (AS.SL.1)
2. Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally. (AS.SL.2)
4. Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience. (AS.SL.4)
5. Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations. (AS.SL.5)
6. Adapt speech to a variety of contexts and communicative tasks, demonstrating command of formal English when indicated or appropriate. (AS.SL.6)

Conventions of Standard English

1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking. (AS.L.1)
2. Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing. (AS.L.2)

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3. Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening. (AS.L.3)

6. Acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression. (AS.L.6)

Geometry

Modeling With Geometry

1. Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).* (G.MG.1)

2. Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).* (G.MG.2)

3. Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).* (G.MG.3)

Geometric Measurement And Dimension

3. Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.* (G.GMD.3)

4. Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects. (G.GMD.4)

Number and Quantity

Quantities

1. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (N.Q .1)

2. Define appropriate quantities for the purpose of descriptive modeling. (N.Q .2)

3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (N.Q .3)

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Algebra

Creating Equations

1. Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions.* (A.CED.1)
2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. (A.CED.2)
3. Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.* (A.CED.3)
4. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law $V = IR$ to highlight resistance R .* (A.CED.4)

Reasoning With Equations And Inequalities

3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. (A.REI.3)
- 4.b. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b . (A.REI.4.b)
10. Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). (A.REI.10)

Statistics and Probability

Interpreting Categorical And Quantitative Data

-Summarize, Represent, And Interpret Data On A Single Count Or Measurement Variable

1. Represent data with plots on the real number line (dot plots, histograms, and box plots). (S.ID.1)

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4. Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve. (S.ID.4)

6.a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. *Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.* (S.ID.6.a)

6.c. Fit a linear function for a scatter plot that suggests a linear association. (S.ID.6.c)

7. Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data. (S.ID.7)

Functions

Interpreting Functions

1. Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x . The graph of f is the graph of the equation $y = f(x)$. (F.IF.1)

2. Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. (F.IF.2)

5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function $h(n)$ gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.** (F.IF.5)

6. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.* (F.IF.6)

Building Functions

1.a. Determine an explicit expression, a recursive process, or steps for calculation from a context. (F.BF.1.a)

Linear, Quadratic, And Exponential Models

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5. Interpret the parameters in a linear or exponential function in terms of a context. (F.LE.5)

Engineering Design

2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. (HS.ETS1.2)

3. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts. (HS.ETS1.3)

4. Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem. (HS.ETS1.4)

EVALUATION *(how the effectiveness of the course will be monitored and assessed):*

Given this is our first year in implementing the course, we will be relying on PLTW to provide us with direction on the data they need to measure the effectiveness of the course. We anticipate that our students will be assessed based on the rubric grading provided on how effective individual and group assignments are completed. We also feel that students who successfully complete this course will be prepared to take the next course in the sequence (Principles of Engineering) as 10th graders going into the 2015-16 school year. PLTW is pleased to provide exclusive resources to the network that will help teachers, districts, and states develop customized assessments to meet district or state specific needs. These resources will provide guidance on planning, writing, and delivering high-quality assessments that will enable teachers and students to monitor student progress. Measuring student progress throughout the school year is crucial to promote academic growth and engage students as active participants in their own learning.

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Unit 1	Length of Unit ... (Days / weeks / class sessions) ... 16 days			
	Key Vocabulary	Standards (referenced)	Model Tasks	Tools / Texts
Design Process <i>Reading</i>	<i>Technical meaning</i>	Reading	Activity 1.1 Instant Challenge: Cable Car	Engineering Design - 2nd Edition: An Introduction Karsnitz, Hutchinson, O'Brien ©2012 Workbook ISBN-13: 978-1-1116-4584-7
	<i>Connotative meaning</i>	<u>Key Ideas and Details</u>	Activity 1.2 Instant Challenge: Aerodynamic Distance	
	<i>Figurative meaning</i>	AS.R.1 AS.R.4 AS.R.7 AS.R.10	Activity 1.3 Concept Sketching	
	<i>Analyze</i>		Activity 1.4 Product Improvement	
	<i>Integrate</i>	<u>Text Types and Purposes</u>	Activity 1.5 Deep Dive	Instructor Resources ISBN-13: 978-1-1116-4585-4 Virtual & Physical Modeling for Engineering Design
	<i>Evaluate</i>	AS.W.2 AS.W.4 AS.W.5 AS.W.6 AS.W.7	Activity 1.6 Discover Engineering	
	<i>Quantitative</i>	AS.W.8 AS.W.9 AS.W.10	Activity 1.7 What Is It?	
	<i>Complex literacy</i>		Activity 1.8 Instant Challenge: Paper Bridge	
	<i>Informational Text</i>	<u>Comprehension and Collaboration</u>	Activity 1.9 Design Innovation	Student Activity Manual; Clark, Ernst ISBN-13: 978-1-4354-3905-4 CourseMate & eBook supplements available
	<i>Informative</i>	AS.SL.1 AS.SL.4 AS.SL.5 AS.SL.6		
	<i>Explanatory</i>			
	<i>Selection</i>			
	<i>Organization</i>	<u>Conventions of Standard English</u>		
	<i>Task</i>	AS.L.1 AS.L.2 AS.L.3 AS.L.6		
	<i>Purpose</i>			
	<i>Planning</i>			

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	Reflection Research Supporting Evidence Digital Media Visual Displays of Data				
Differentiation	Support -- for students who are struggling with the content	<i>Note: Lessons for support will be furnished to our teacher during intensive 2-week training at Cal Poly Pomona in Summer 2014</i> Content: <i>Reading (Key Ideas and Details, Text Types and Purposes, Comprehension and Collaboration, Conventions of Standard English)</i> Process: <i>Re-teaching, balanced group configurations, differentiated instruction, teacher's extra assistance, guided practice</i> Product: <i>Checking for Understanding tasks (i.e., exit slips, quick writes, feedback quizzes), re-testing, alternate assignments addressing the base-level standard mastery</i>			
	Extension – for high achieving students.	<i>Note: Lessons for extension will be furnished to our teacher during intensive 2-week training at Cal Poly Pomona in Summer 2014</i> Content: <i>Reading (Key Ideas and Details, Text Types and Purposes, Comprehension and Collaboration, Conventions of Standard English)</i> Process: <i>Project-based learning in applying content to real-world type assignments</i> Product: <i>Enriched interdisciplinary projects tied to content standards and assessment outcomes for the unit (Activity 1.5a Gossamer Condor Design Brief)</i>			
Evaluation	Formative Assessments (ongoing & mid-lesson): <i>Note: Formative Assessments will be furnished to our teacher during intensive 2-week training at Cal Poly Pomona in Summer 2014. Students demonstrate their knowledge throughout the course by completing activities, projects, and problems using a</i>				

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	<i>variety of assessment tools, such as performance rubrics and reflective questioning, to deepen and expand their knowledge and skills. In the future PLTW will provide teachers access to classroom assessments that can be used both for formative and summative purposes. Further details will be released to the network at the appropriate time. PLTW supports a balanced approach to assessment for all programs, integrating both formative and summative assessments. Through a balanced approach, assessment is an ongoing activity. Students demonstrate their knowledge throughout the course by completing activities, projects, and problems using a variety of assessment tools, such as performance rubrics and reflective questioning, to deepen and expand their knowledge and skills.</i> <i>Assessment FOR Learning- Formative assessment. Growth assessments are a system of assessments designed to help teachers realize each student's strengths and needs relative to the content being assessed. There are two different areas teachers can measure growth in (math and science). Armed with growth assessment data, teachers can adjust their instruction to increase their responsiveness to individual student differences and needs. Over time, repeated administration of growth assessments can create growth data which further informs teachers and students as to the gains that are being achieved.</i> Summative Assessments (unit final evaluation): <i>Note: Summative Assessments will be furnished to our teacher during intensive 2-week training at Cal Poly Pomona in Summer 2014. In the future PLTW will provide teachers access to classroom assessments that can be used both for formative and summative purposes. Further details will be released to the network at the appropriate time. PLTW supports a balanced approach to assessment for all programs, integrating both formative and summative assessments. Through a balanced approach, assessment is an ongoing activity. Students demonstrate their knowledge throughout the course by completing activities, projects, and problems using a variety of assessment tools, such as performance rubrics and reflective questioning, to deepen and expand their knowledge and skills.</i> • Assessment OF Learning- Summative assessment • Students are allowed 80 minutes total to complete an assessment. The test can be given in one 80 minute testing session or can be administered in two 40 minute testing periods. You should refer to the testing guidelines on the processes for delivering the assessments in one or two sessions. • Students will demonstrate an understanding of the characteristics and scope of technology. • Students will demonstrate an understanding of the core concepts of technology. • Students will demonstrate an understanding of the cultural, social, economic, and political effects of technology. • Students will demonstrate an understanding of the effects of technology on the environment. • Students will demonstrate an understanding of the attributes of design. • Students will demonstrate an understanding of engineering design. • Students will demonstrate an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving. • Students will demonstrate the abilities to apply the design process. • Students will demonstrate the abilities to use and maintain technological products and systems		

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	Students will demonstrate an understanding of and be able to select and use information and communication technologies.				
Unit 2	Length of Unit ... (Days / weeks / class sessions) ... 11 days				
	Key Vocabulary	Standards (referenced)	Model Tasks	Tools / Texts	
Technical Sketching and Drawing Geometry	Angles Perimeter Triangles Quadrilaterals Polygons Complementary Angles Supplementary Angles Right Angles Parallel Perpendicular	Geometry <u>Modeling With Geometry</u> G.MG.1	Activity 2.1 Isometric Sketching Activity 2.2 Perspective Sketching Activity 2.3 Glass Box Activity 2.4 Multiview Sketching Activity 2.5 Sketching Practice	Engineering Design - 2nd Edition: An Introduction Karsnitz, Hutchinson, O'Brien ©2012 Workbook ISBN-13: 978-1-1116-4584-7 Instructor Resources ISBN-13: 978-1-1116-4585-4 Virtual & Physical Modeling for Engineering Design Student Activity Manual; Clark, ErnstISBN-13: 978-1-4354-3905-4 CourseMate & eBook supplements available	
Differentiation	Support -- for students who are struggling with the content	<i>Note: Lessons for support will be furnished to our teacher during intensive 2-week training at Cal Poly Pomona in Summer 2014</i> Content: <i>Modeling with Geometry</i> Process: <i>Re-teaching, balanced group configurations, differentiated instruction, teacher's extra assistance, guided practice</i> Product: <i>Checking for Understanding tasks (i.e., exit slips, quick writes, feedback quizzes), re-testing,</i>			

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		<i>alternate assignments addressing the base-level standard mastery</i>		
	Extension – for high achieving students.	<i>Note: Lessons for extension will be furnished to our teacher during intensive 2-week training at Cal Poly Pomona in Summer 2014</i>		
		Content: <i>Modeling with Geometry</i>		
		Process: <i>Project-based learning in applying content to real-world type assignments</i>		
		Product: <i>Enriched interdisciplinary projects tied to content standards and assessment outcomes for the unit</i>		
Evaluation	Formative Assessments (ongoing & mid-lesson): <i>Note: Formative Assessments will be furnished to our teacher during intensive 2-week training at Cal Poly Pomona in Summer 2014. Students demonstrate their knowledge throughout the course by completing activities, projects, and problems using a variety of assessment tools, such as performance rubrics and reflective questioning, to deepen and expand their knowledge and skills. In the future PLTW will provide teachers access to classroom assessments that can be used both for formative and summative purposes. Further details will be released to the network at the appropriate time. PLTW supports a balanced approach to assessment for all programs, integrating both formative and summative assessments. Through a balanced approach, assessment is an ongoing activity. Students demonstrate their knowledge throughout the course by completing activities, projects, and problems using a variety of assessment tools, such as performance rubrics and reflective questioning, to deepen and expand their knowledge and skills.</i>			
	<i>Assessment FOR Learning- Formative assessment. Growth assessments are a system of assessments designed to help teachers realize each student's strengths and needs relative to the content being assessed. There are two different areas teachers can measure growth in (math and science). Armed with growth assessment data, teachers can adjust their instruction to increase their responsiveness to individual student differences and needs. Over time, repeated administration of growth assessments can create growth data which further informs teachers and students as to the gains that are being achieved.</i>			
	Summative Assessments (unit final evaluation): <i>Note: Summative Assessments will be furnished to our teacher during intensive 2-week training at Cal Poly Pomona in Summer 2014. In the future PLTW will provide teachers access to classroom assessments that can be used both for formative and summative purposes. Further details will be released to the network at the appropriate time. PLTW supports a balanced approach to assessment for all programs, integrating both formative and summative assessments. Through a balanced approach, assessment is an ongoing activity. Students demonstrate their knowledge throughout the course by completing activities, projects, and problems using a variety of assessment tools, such as performance rubrics and reflective questioning, to deepen and expand their knowledge and skills.</i> • Assessment OF Learning- Summative assessment • Students are allowed 80 minutes total to complete an assessment. The test can be given in one 80 minute testing session or can be administered in two 40 minute testing periods. You should refer to the testing			

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	guidelines on the processes for delivering the assessments in one or two sessions. Students will demonstrate an understanding of and be able to select and use information and communication technologies.				
Unit 3	Length of Unit ... (Days / weeks / class sessions) ... 14 days				
	Key Vocabulary	Standards (referenced)	Model Tasks	Tools / Texts	
Measurement and Statistics <i>Number and Quantity</i> <i>Algebra</i> <i>Geometry</i> <i>Statistics and Probability</i> <i>Reading</i>	<i>Formula</i>	Number and Quantity	Activity 3.1a Linear Measurement SI	Engineering Design - 2nd Edition: An Introduction Karsnitz, Hutchinson, O'Brien ©2012 Workbook ISBN-13: 978-1-1116-4584-7 Instructor Resources ISBN-13: 978-1-1116-4585-4 Virtual & Physical Modeling for Engineering Design Student Activity Manual; Clark, Ernst ISBN-13: 978-1-4354-3905-4 CourseMate & eBook supplements available	
	<i>Scale</i>	<u>Quantities</u>	Activity 3.1b Linear Measurement US		
	<i>Graph Display</i>	-Reason Quantitatively And Use Units To Solve Problems. N.Q .1 N.Q .2 N.Q .3	Activity 3.2 Unit Conversion		
	<i>Data Display</i>		Activity 3.2 Unit Conversion Homework		
	<i>Descriptive Modeling</i>		Activity 3.3 Making Linear Measurements		
	<i>Quantities</i>	Algebra	Activity 3.4 Linear Dimensions		
	<i>Quantitative Relationship</i>	<u>Creating Equations</u>	Activity 3.5 Applied Statistics		
	<i>Equations</i>	-Create Equations That Describe Numbers Or Relationships A.CED.3	Activity 3.6 Instant Challenge Fling Machine		
	<i>Inequality</i>		Activity 3.7 Statistical Analysis with Excel		
	<i>Viable Options</i>		Activity 3.8 Precision Accuracy Measurement		
	<i>Non-viable Options</i>	Geometry	Activity 3.9 Statistics Quality		
	<i>Constraints</i>	<u>Geometric Measurement And Dimension</u>	Activity 3.10 Instant Challenge Oil Spill		
	<i>Volume</i>	-Explain Volume Formulas And Use Them To Solve Problems G.GMD.3			
	<i>Cylinder</i>				

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	Pyramid Cone Sphere Real Number System Dot Plots Histograms Box Plots Mean Standard Deviation Normal Distribution	Modeling With Geometry -Apply Geometric Concepts In Modeling Situations G.MG.1 Statistics and Probability Interpreting Categorical And Quantitative Data -Summarize, Represent, And Interpret Data On A Single Count Or Measurement Variable S.ID.1 S.ID.4 Reading Comprehension and Collaboration AS.SL.1 AS.SL.2 AS.SL.4		
Differentiation	Support -- for students who are struggling with the content	Note: Lessons for support will be furnished to our teacher during intensive 2-week training at Cal Poly Pomona in Summer 2014 Content: Quantities, Algebra (Creating Equations), Geometry (Geometric Measurement and Dimension, Modeling with Geometry), Statistics and Probability (Interpreting Categorical and Quantitative Data), Reading (Comprehension and Collaboration) Process: Re-teaching, balanced group configurations, differentiated instruction, teacher's extra assistance, guided practice		

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		Product: <i>Checking for Understanding tasks (i.e., exit slips, quick writes, feedback quizzes), re-testing, alternate assignments addressing the base-level standard mastery</i>		
	Extension – for high achieving students.	<i>Note: Lessons for extension will be furnished to our teacher during intensive 2-week training at Cal Poly Pomona in Summer 2014</i> Content: <i>Quantities, Algebra (Creating Equations), Geometry (Geometric Measurement and Dimension, Modeling with Geometry), Statistics and Probability (Interpreting Categorical and Quantitative Data), Reading (Comprehension and Collaboration)</i> Process: <i>Project-based learning in applying content to real-world type assignments</i> Product: <i>Enriched interdisciplinary projects tied to content standards and assessment outcomes for the unit</i>		
Evaluation	Formative Assessments (ongoing & mid-lesson): <i>Note: Formative Assessments will be furnished to our teacher during intensive 2-week training at Cal Poly Pomona in Summer 2014. Students demonstrate their knowledge throughout the course by completing activities, projects, and problems using a variety of assessment tools, such as performance rubrics and reflective questioning, to deepen and expand their knowledge and skills. In the future PLTW will provide teachers access to classroom assessments that can be used both for formative and summative purposes. Further details will be released to the network at the appropriate time. PLTW supports a balanced approach to assessment for all programs, integrating both formative and summative assessments. Through a balanced approach, assessment is an ongoing activity. Students demonstrate their knowledge throughout the course by completing activities, projects, and problems using a variety of assessment tools, such as performance rubrics and reflective questioning, to deepen and expand their knowledge and skills.</i> <i>Assessment FOR Learning- Formative assessment. Growth assessments are a system of assessments designed to help teachers realize each student's strengths and needs relative to the content being assessed. There are two different areas teachers can measure growth in (math and science). Armed with growth assessment data, teachers can adjust their instruction to increase their responsiveness to individual student differences and needs. Over time, repeated administration of growth assessments can create growth data which further informs teachers and students as to the gains that are being achieved.</i>			
	Summative Assessments (unit final evaluation): <i>Note: Summative Assessments will be furnished to our teacher during intensive 2-week training at Cal Poly Pomona in Summer 2014. In the future PLTW will provide teachers access to classroom assessments that can be used both for formative and summative purposes. Further details will be released to the network at the appropriate time. PLTW supports a balanced approach to assessment for all programs, integrating both formative and summative assessments. Through a balanced approach, assessment is an ongoing activity. Students demonstrate their knowledge throughout the course by completing activities, projects, and problems using a variety of assessment tools, such as performance rubrics and reflective questioning, to deepen and expand their knowledge and skills.</i> • Assessment OF Learning- Summative assessment			

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	• Students are allowed 80 minutes total to complete an assessment. The test can be given in one 80 minute testing session or can be administered in two 40 minute testing periods. You should refer to the testing guidelines on the processes for delivering the assessments in one or two sessions. • Students will demonstrate an understanding of the core concepts of technology. • Students will demonstrate an understanding of the attributes of design. • Students will demonstrate an understanding of engineering design. • Students will demonstrate the abilities to apply the design process. • Students will demonstrate the abilities to assess the impact of products and systems.		

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Unit 4	Length of Unit ... (Days / weeks / class sessions) ... 17 days			
	Key Vocabulary	Standards (referenced)	Model Tasks	Tools / Texts
Modeling Skills	<i>Design</i>	Engineering Design	Project 4.1 Puzzle Design Challenge	Engineering Design - 2nd Edition: An Introduction Karsnitz, Hutchinson, O'Brien ©2012 Workbook ISBN-13: 978-1-1116-4584-7
<i>Engineering Design</i>	<i>Evaluate</i>	HS.ETS1.2 HS.ETS1.3 HS.ETS1.4	Activity 4.1a Puzzle Part Combinations	
<i>Number and Quantity</i>	<i>Cost</i>		Activity 4.1b Graphical Modeling	
<i>Algebra</i>	<i>Safety</i>	Number and Quantity	Activity 4.1c Mathematical Modeling	Instructor Resources ISBN-13: 978-1-1116-4585-4 Virtual & Physical Modeling for Engineering Design
<i>Functions</i>	<i>Reliability</i>	<u>Quantities</u>	Activity 4.1d and Activity 4.1.e - Software Modeling Introduction	
<i>Geometry</i>	<i>Aesthetics</i>	N.Q .1 N.Q .2	Activity 4.1f Software Modeling Introduction Reference	
<i>Statistics and Probability</i>	<i>Social Impact</i>	Algebra	Activity 4.1g Model Creation	Student Activity Manual; Clark, Ernst ISBN-13: 978-1-4354-3905-4
<i>Reading</i>	<i>Cultural Impact</i>	<u>Creating Equations</u>		
	<i>Environmental Impact</i>	A.CED.2 A.CED.4		
	<i>Units</i>			CourseMate & eBook supplements available
	<i>Coordinate Plane</i>	<u>Reasoning With Equations And Inequalities</u>		
	<i>Coordinate Axes</i>			
	<i>Linear Equation</i>	A.REI.3 A.REI.10		
	<i>Linear Inequality</i>	Functions		
	<i>Coefficient</i>	<u>Interpreting Functions</u>		
	<i>Variable</i>			
	<i>Domain</i>	F.IF.1 F.IF.2		

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	<i>Range</i> F.IF.5 F.IF.6 <i>Function</i> <u>Building Functions</u> <i>Function Notation</i> F.BF.1.a <i>Rate of Change</i> <u>Linear, Quadratic, And Exponential Models</u> <i>Interval</i> <i>Recursive Process</i> F.LE.5 <i>Linear Function</i> Geometry <u>Modeling With Geometry</u> <i>Exponential Function</i> G.MG.1 <i>Scatter Plot</i> Statistics and Probability <u>Interpreting Categorical And Quantitative Data</u> <i>Slope</i> <i>Intercept</i> S.ID.6.a S.ID.6.c S.ID.7 <i>Constant</i> Reading <u>Text Types and Purposes</u> <i>Research</i> <i>Reflection</i> AS.W.10 <i>Revision</i> <u>Comprehension and Collaboration</u> AS.SL.2		

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		AS.SL.4 AS.SL.5 AS.SL.6 <u>Conventions of Standard English</u> AS.L.1 AS.L.3 AS.L.6	
Differentiation	Support -- for students who are struggling with the content	<i>Note: Lessons for support will be furnished to our teacher during intensive 2-week training at Cal Poly Pomona in Summer 2014</i> Content: <i>Engineering Design, Number and Quantity, Algebra (Creating Equations, Reasoning with Equations and Inequalities), Functions (Interpreting Functions, Building Functions, Linear Models, Quadratic Models, Exponential Models), Geometry, Statistics and Probability (Interpreting Categorical and Quantitative Data), Reading (Text Types and Purposes, Comprehension and Collaboration, Conventions of Standard English)</i> Process: <i>Re-teaching, balanced group configurations, differentiated instruction, teacher's extra assistance, guided practice</i> Product: <i>Checking for Understanding tasks (i.e., exit slips, quick writes, feedback quizzes), re-testing, alternate assignments addressing the base-level standard mastery</i>	
	Extension – for high achieving students.	<i>Note: Lessons for extension will be furnished to our teacher during intensive 2-week training at Cal Poly Pomona in Summer 2014</i> Content: <i>Engineering Design, Number and Quantity, Algebra (Creating Equations, Reasoning with Equations and Inequalities), Functions (Interpreting Functions, Building Functions, Linear Models, Quadratic Models, Exponential Models), Geometry, Statistics and Probability (Interpreting Categorical and Quantitative Data), Reading (Text Types and Purposes, Comprehension and Collaboration, Conventions of Standard English)</i> Process: <i>Project-based learning in applying content to real-world type assignments</i> Product: <i>Enriched interdisciplinary projects tied to content standards and assessment outcomes for the unit (Activity 4.2 Puzzle Cube Package)</i>	

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Evaluation	Formative Assessments (ongoing & mid-lesson): <i>Note: Formative Assessments will be furnished to our teacher during intensive 2-week training at Cal Poly Pomona in Summer 2014. Students demonstrate their knowledge throughout the course by completing activities, projects, and problems using a variety of assessment tools, such as performance rubrics and reflective questioning, to deepen and expand their knowledge and skills. In the future PLTW will provide teachers access to classroom assessments that can be used both for formative and summative purposes. Further details will be released to the network at the appropriate time. PLTW supports a balanced approach to assessment for all programs, integrating both formative and summative assessments. Through a balanced approach, assessment is an ongoing activity. Students demonstrate their knowledge throughout the course by completing activities, projects, and problems using a variety of assessment tools, such as performance rubrics and reflective questioning, to deepen and expand their knowledge and skills.</i> <i>Assessment FOR Learning- Formative assessment. Growth assessments are a system of assessments designed to help teachers realize each student's strengths and needs relative to the content being assessed. There are two different areas teachers can measure growth in (math and science). Armed with growth assessment data, teachers can adjust their instruction to increase their responsiveness to individual student differences and needs. Over time, repeated administration of growth assessments can create growth data which further informs teachers and students as to the gains that are being achieved.</i>		
	Summative Assessments (unit final evaluation): <i>Note: Summative Assessments will be furnished to our teacher during intensive 2-week training at Cal Poly Pomona in Summer 2014. In the future PLTW will provide teachers access to classroom assessments that can be used both for formative and summative purposes. Further details will be released to the network at the appropriate time. PLTW supports a balanced approach to assessment for all programs, integrating both formative and summative assessments. Through a balanced approach, assessment is an ongoing activity. Students demonstrate their knowledge throughout the course by completing activities, projects, and problems using a variety of assessment tools, such as performance rubrics and reflective questioning, to deepen and expand their knowledge and skills.</i> • Assessment OF Learning- Summative assessment • Students are allowed 80 minutes total to complete an assessment. The test can be given in one 80 minute testing session or can be administered in two 40 minute testing periods. You should refer to the testing guidelines on the processes for delivering the assessments in one or two sessions. • Students will demonstrate an understanding of the core concepts of technology. • Students will demonstrate an understanding of the attributes of design. • Students will demonstrate an understanding of engineering design. • Students will demonstrate the abilities to apply the design process. • Students will demonstrate the abilities to use and maintain technological products and systems. • Students will demonstrate an understanding of and be able to select and use information and communication technologies.		

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Unit 5	Length of Unit ... (Days / weeks / class sessions) ... 13 days			
	Key Vocabulary	Standards (referenced)	Model Tasks	Tools / Texts
Geometry of Design <i>Algebra</i> <i>Geometry</i> <i>Reading</i>	<i>Quadratic Equation</i>	Algebra	Activity 5.1 Calculating Properties Shapes	Engineering Design - 2nd Edition: An Introduction Karsnitz, Hutchinson, O'Brien ©2012 Workbook ISBN-13: 978-1-1116-4584-7
	<i>Square Root</i>	<u>Creating Equations</u>	Activity 5.2a Geometric Constraints	
	<i>Completing the Square</i>	-Create Equations That Describe Numbers Or Relationships	Activity 5.2b Introduction to CAD Modeling Skills	
	<i>Quadratic Formula</i>	A.CED.1 A.CED.4	Activity 5.3 Determining Density	
	<i>Factoring</i>	<u>Reasoning With Equations And Inequalities</u>	Activity 5.4 Calculating Properties Solids	Instructor Resources ISBN-13: 978-1-1116-4585-4 Virtual & Physical Modeling for Engineering Design
	<i>Real Solution</i>	-Solve Equations And Inequalities In One Variable	Activity 5.5a CAD Model Features Part 1	
	<i>Complex Solution</i>		Activity 5.5b CAD Model Features Part 2	Student Activity Manual; Clark, Ernst ISBN-13: 978-1-4354-3905-4
	<i>2-D Cross Section</i>	A.REI.3 A.REI.4.b	Activity 5.6 Physical Property Analysis	
	<i>Rotation</i>	Geometry	Activity 5.7 Instant Challenge Choremaster	CourseMate & eBook supplements available
	<i>Density</i>	<u>Geometric Measurement And Dimension</u>		
	<i>Ratio</i>	-Visualize Relationships Between Two-Dimensional And Three-Dimensional Objects G.GMD.4 <u>Modeling With Geometry</u>		

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		-Apply Geometric Concepts In Modeling Situations G.MG.1 G.MG.2 G.MG.3 Reading <u>Comprehension and Collaboration</u> AS.SL.1 AS.SL.2 AS.SL.4 AS.SL.6 <u>Conventions of Standard English</u> AS.L.1 AS.L.6	
Differentiation	Support -- for students who are struggling with the content	<i>Note: Lessons for support will be furnished to our teacher during intensive 2-week training at Cal Poly Pomona in Summer 2014</i> Content: <i>Algebra (Creating Equations, Reasoning with Equations and Inequalities), Geometry (Geometric Measurement and Dimension, Modeling with Geometry), Reading (Comprehension and Collaboration, Conventions of Standard English)</i> Process: <i>Re-teaching, balanced group configurations, differentiated instruction, teacher's extra assistance, guided practice</i> Product: <i>Checking for Understanding tasks (i.e., exit slips, quick writes, feedback quizzes), re-testing, alternate assignments addressing the base-level standard mastery</i>	
	Extension – for high achieving students.	<i>Note: Lessons for extension will be furnished to our teacher during intensive 2-week training at Cal Poly Pomona in Summer 2014</i> Content: <i>Algebra (Creating Equations, Reasoning with Equations and Inequalities), Geometry (Geometric Measurement and Dimension, Modeling with Geometry), Reading (Comprehension and Collaboration, Conventions of Standard English)</i>	

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		Process: <i>Project-based learning in applying content to real-world type assignments</i> Product: <i>Enriched interdisciplinary projects tied to content standards and assessment outcomes for the unit</i>		
Evaluation	Formative Assessments (ongoing & mid-lesson): <i>Note: Formative Assessments will be furnished to our teacher during intensive 2-week training at Cal Poly Pomona in Summer 2014. Students demonstrate their knowledge throughout the course by completing activities, projects, and problems using a variety of assessment tools, such as performance rubrics and reflective questioning, to deepen and expand their knowledge and skills. In the future PLTW will provide teachers access to classroom assessments that can be used both for formative and summative purposes. Further details will be released to the network at the appropriate time. PLTW supports a balanced approach to assessment for all programs, integrating both formative and summative assessments. Through a balanced approach, assessment is an ongoing activity. Students demonstrate their knowledge throughout the course by completing activities, projects, and problems using a variety of assessment tools, such as performance rubrics and reflective questioning, to deepen and expand their knowledge and skills.</i> <i>Assessment FOR Learning- Formative assessment. Growth assessments are a system of assessments designed to help teachers realize each student's strengths and needs relative to the content being assessed. There are two different areas teachers can measure growth in (math and science). Armed with growth assessment data, teachers can adjust their instruction to increase their responsiveness to individual student differences and needs. Over time, repeated administration of growth assessments can create growth data which further informs teachers and students as to the gains that are being achieved.</i>			
	Summative Assessments (unit final evaluation): <i>Note: Summative Assessments will be furnished to our teacher during intensive 2-week training at Cal Poly Pomona in Summer 2014. In the future PLTW will provide teachers access to classroom assessments that can be used both for formative and summative purposes. Further details will be released to the network at the appropriate time. PLTW supports a balanced approach to assessment for all programs, integrating both formative and summative assessments. Through a balanced approach, assessment is an ongoing activity. Students demonstrate their knowledge throughout the course by completing activities, projects, and problems using a variety of assessment tools, such as performance rubrics and reflective questioning, to deepen and expand their knowledge and skills.</i> • Assessment OF Learning- Summative assessment • Students are allowed 80 minutes total to complete an assessment. The test can be given in one 80 minute testing session or can be administered in two 40 minute testing periods. You should refer to the testing guidelines on the processes for delivering the assessments in one or two sessions. • Students will demonstrate the abilities to use and maintain technological products and systems. • Students will demonstrate an understanding of and be able to select and use information and communication technologies.			

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Unit 6	Length of Unit ... (Days / weeks / class sessions) ... 13 days				
	Key Vocabulary	Standards (referenced)	Model Tasks	Tools / Texts	
Reverse Engineering <i>Reading</i>	<i>Analysis</i>	Reading	Activity 6.1 Visual Design Principles and Elements Identification	Engineering Design - 2nd Edition: An Introduction	
	<i>Reasoning</i>	<u>Text Types and Purposes</u>	Activity 6.2 Visual Analysis Automoblox	Karsnitz, Hutchinson, O'Brien ©2012	
	<i>Evidence</i>	AS.W.1	Activity 6.3 Functional Analysis Automoblox	Workbook	
	<i>Informative Text</i>	AS.W.2		ISBN-13: 978-1-1116-4584-7	
	<i>Explanatory Text</i>	AS.W.4	Activity 6.4 Structural Analysis Automoblox	Instructor Resources ISBN-13: 978-1-1116-4585-4	
	<i>Selection of Content</i>	AS.W.10			Virtual & Physical Modeling for Engineering Design
	<i>Organization of Content</i>	<u>Comprehension and Collaboration</u>	Project 6.5 Product Reverse Engineering Presentation	Student Activity Manual; Clark, Ernst ISBN-13: 978-1-4354-3905-4	
	<i>Analysis of Content</i>	AS.SL.1			CourseMate & eBook supplements available
	<i>Purpose</i>	AS.SL.2			
Differentiation	Support -- for students who are struggling with the content	AS.SL.4	<i>Note: Lessons for support will be furnished to our teacher during intensive 2-week training at Cal Poly Pomona in Summer 2014</i>		
		AS.SL.5			
		<u>Conventions of Standard English</u>			
		AS.L.6			
		Content: <i>Reading (Text Types and Purposes, Comprehension and Collaboration, Conventions of Standard English)</i>			
		Process: <i>Re-teaching, balanced group configurations, differentiated instruction, teacher's extra assistance, guided practice</i>			
		Product: <i>Checking for Understanding tasks (i.e., exit slips, quick writes, feedback quizzes), re-testing,</i>			

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	Extension – for high achieving students.	<i>alternate assignments addressing the base-level standard mastery</i> <i>Note: Lessons for extension will be furnished to our teacher during intensive 2-week training at Cal Poly Pomona in Summer 2014</i> Content: <i>Reading (Text Types and Purposes, Comprehension and Collaboration, Conventions of Standard English)</i> Process: <i>Project-based learning in applying content to real-world type assignments</i> Product: <i>Enriched interdisciplinary projects tied to content standards and assessment outcomes for the unit</i>	
Evaluation		Formative Assessments (ongoing & mid-lesson): <i>Note: Formative Assessments will be furnished to our teacher during intensive 2-week training at Cal Poly Pomona in Summer 2014. Students demonstrate their knowledge throughout the course by completing activities, projects, and problems using a variety of assessment tools, such as performance rubrics and reflective questioning, to deepen and expand their knowledge and skills. In the future PLTW will provide teachers access to classroom assessments that can be used both for formative and summative purposes. Further details will be released to the network at the appropriate time. PLTW supports a balanced approach to assessment for all programs, integrating both formative and summative assessments. Through a balanced approach, assessment is an ongoing activity. Students demonstrate their knowledge throughout the course by completing activities, projects, and problems using a variety of assessment tools, such as performance rubrics and reflective questioning, to deepen and expand their knowledge and skills.</i> <i>Assessment FOR Learning- Formative assessment. Growth assessments are a system of assessments designed to help teachers realize each student's strengths and needs relative to the content being assessed. There are two different areas teachers can measure growth in (math and science). Armed with growth assessment data, teachers can adjust their instruction to increase their responsiveness to individual student differences and needs. Over time, repeated administration of growth assessments can create growth data which further informs teachers and students as to the gains that are being achieved.</i>	
		Summative Assessments (unit final evaluation): <i>Note: Summative Assessments will be furnished to our teacher during intensive 2-week training at Cal Poly Pomona in Summer 2014. In the future PLTW will provide teachers access to classroom assessments that can be used both for formative and summative purposes. Further details will be released to the network at the appropriate time. PLTW supports a balanced approach to assessment for all programs, integrating both formative and summative assessments. Through a balanced approach, assessment is an ongoing activity. Students demonstrate their knowledge throughout the course by completing activities, projects, and problems using a variety of assessment tools, such as performance rubrics and reflective questioning, to deepen and expand their knowledge and skills.</i> • Assessment OF Learning- Summative assessment • Students are allowed 80 minutes total to complete an assessment. The test can be given in one 80 minute	

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	testing session or can be administered in two 40 minute testing periods. You should refer to the testing guidelines on the processes for delivering the assessments in one or two sessions. • Students will demonstrate an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving. • Students will demonstrate the abilities to use and maintain technological products and systems.		

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Unit 7	Length of Unit ... (Days / weeks / class sessions) ... 25 days			
	Key Vocabulary	Standards (referenced)	Model Tasks	Tools / Texts
Documentation	<i>Design</i>	Engineering Design	Activity 7.1 Dimensioning Standards	Engineering Design - 2nd Edition: An Introduction Karsnitz, Hutchinson, O'Brien ©2012 Workbook ISBN-13: 978-1-1116-4584-7
<i>Engineering Design</i>	<i>Evaluate</i>	HS.ETS1.2	Activity 7.2 Sectional Views	
	<i>Integrate</i>	HS.ETS1.3	Activity 7.3 Tolerances	
<i>Number and Quantity</i>	<i>Simulation</i>	HS.ETS1.4	Activity 7.4 Assembly Models	
<i>Geometry</i>	<i>Accuracy</i>	Number and Quantity	Project 7.5 Engineering Documentation Automoblox	Instructor Resources ISBN-13: 978-1-1116-4585-4 Virtual & Physical Modeling for Engineering Design
<i>Reading</i>		<u>Quantities</u>	Project 7.5a Engineering Documentation (Alternate)	
		-Reason Quantitatively And Use Units To Solve Problems.	Activity 7.6 Design Brief Apollo 13	Student Activity Manual; Clark, Ernst ISBN-13: 978-1-4354-3905-4
		N.Q .3	Problem 7.7 Automoblox Product Enhancement	
		Geometry	Problem 7.7a Product Improvement (Alternate)	CourseMate & eBook supplements available
		<u>Geometric Measurement And Dimension</u>		
		-Visualize Relationships Between Two-Dimensional And Three-Dimensional Objects		
		G.GMD.4		
		<u>Modeling With Geometry</u>		
		-Apply Geometric Concepts In Modeling Situations		
		G.MG.1		

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	G.MG.3 Reading <u>Text Types and Purposes</u> AS.W.2 AS.W.6 AS.W.10 <u>Comprehension and Collaboration</u> AS.SL.1 AS.SL.2 AS.SL.4 AS.SL.5 AS.SL.6 <u>Conventions of Standard English</u> AS.L.1 AS.L.2 AS.L.3 AS.L.6		
Differentiation	Support -- for students who are struggling with the content	<i>Note: Lessons for support will be furnished to our teacher during intensive 2-week training at Cal Poly Pomona in Summer 2014</i> Content: <i>Engineering Design, Number and Quantity, Geometry (Geometric Measurement and Dimension, Modeling with Geometry), Reading (Text Types and Purposes, Comprehension and Collaboration, Conventions of Standard English)</i> Process: <i>Re-teaching, balanced group configurations, differentiated instruction, teacher's extra assistance, guided practice</i> Product: <i>Checking for Understanding tasks (i.e., exit slips, quick writes, feedback quizzes), re-testing, alternate assignments addressing the base-level standard mastery</i>	
	Extension – for	<i>Note: Lessons for extension will be furnished to our teacher during intensive 2-week training at Cal Poly Pomona in Summer 2014</i>	

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	high achieving students.	Content: <i>Engineering Design, Number and Quantity, Geometry (Geometric Measurement and Dimension, Modeling with Geometry), Reading (Text Types and Purposes, Comprehension and Collaboration, Conventions of Standard English)</i>				
		Process: <i>Project-based learning in applying content to real-world type assignments</i>				
		Product: <i>Enriched interdisciplinary projects tied to content standards and assessment outcomes for the unit</i>				
Evaluation	Formative Assessments (ongoing & mid-lesson): <i>Note: Formative Assessments will be furnished to our teacher during intensive 2-week training at Cal Poly Pomona in Summer 2014. Students demonstrate their knowledge throughout the course by completing activities, projects, and problems using a variety of assessment tools, such as performance rubrics and reflective questioning, to deepen and expand their knowledge and skills. In the future PLTW will provide teachers access to classroom assessments that can be used both for formative and summative purposes. Further details will be released to the network at the appropriate time. PLTW supports a balanced approach to assessment for all programs, integrating both formative and summative assessments. Through a balanced approach, assessment is an ongoing activity. Students demonstrate their knowledge throughout the course by completing activities, projects, and problems using a variety of assessment tools, such as performance rubrics and reflective questioning, to deepen and expand their knowledge and skills.</i>					
	<i>Assessment FOR Learning- Formative assessment. Growth assessments are a system of assessments designed to help teachers realize each student's strengths and needs relative to the content being assessed. There are two different areas teachers can measure growth in (math and science). Armed with growth assessment data, teachers can adjust their instruction to increase their responsiveness to individual student differences and needs. Over time, repeated administration of growth assessments can create growth data which further informs teachers and students as to the gains that are being achieved.</i>					
	Summative Assessments (unit final evaluation): <i>Note: Summative Assessments will be furnished to our teacher during intensive 2-week training at Cal Poly Pomona in Summer 2014. In the future PLTW will provide teachers access to classroom assessments that can be used both for formative and summative purposes. Further details will be released to the network at the appropriate time. PLTW supports a balanced approach to assessment for all programs, integrating both formative and summative assessments. Through a balanced approach, assessment is an ongoing activity. Students demonstrate their knowledge throughout the course by completing activities, projects, and problems using a variety of assessment tools, such as performance rubrics and reflective questioning, to deepen and expand their knowledge and skills.</i>					
		• Assessment OF Learning- Summative assessment • Students are allowed 80 minutes total to complete an assessment. The test can be given in one 80 minute testing session or can be administered in two 40 minute testing periods. You should refer to the testing guidelines on the processes for delivering the assessments in one or two sessions.				

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	• Students will demonstrate an understanding of the core concepts of technology. • Students will demonstrate an understanding of the attributes of design. • Students will demonstrate the abilities to apply the design process • Students will demonstrate the abilities to use and maintain technological products and systems. • Students will demonstrate an understanding of and be able to select and use information and communication technologies.		

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Unit 8	Length of Unit ... (Days / weeks / class sessions) ... 12 days			
	Key Vocabulary	Standards (referenced)	Model Tasks	Tools / Texts
Advanced Computer Modeling	<i>Computer Modeling</i>	Algebra	Project 8.1 Model a Button Maker	Engineering Design - 2nd Edition: An Introduction Karsnitz, Hutchinson, O'Brien ©2012 Workbook ISBN-13: 978-1-1116-4584-7 Instructor Resources ISBN-13: 978-1-1116-4585-4 Virtual & Physical Modeling for Engineering Design Student Activity Manual; Clark, Ernst ISBN-13: 978-1-4354-3905-4 CourseMate & eBook supplements available
	<i>Computer Created Equations</i>	<u>Creating Equations</u>	Activity 8.2 Parametric Constraints	
	<i>Reasoning with Equations</i>	-Create Equations That Describe Numbers Or Relationships A.CED.1 A.CED.2	Activity 8.4 Working Drawings (Button Maker)	
	<i>Reasoning with Inequalities</i>	<u>Reasoning With Equations And Inequalities</u>	Activity 8.5 Instant Challenge: Air Vehicle	
	<i>Computer Linear Models</i>	-Solve Equations And Inequalities In One Variable		
	<i>Computer Quadratic Models</i>	A.REI.3		
	<i>Computer Exponential Models</i>	Functions		
	<i>Computer Modeling with Geometry</i>	<u>Linear, Quadratic, And Exponential Models</u> -Interpret Expressions For Functions In Terms Of The Situation They Model F.LE.5 Geometry <u>Modeling With Geometry</u>		

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		-Apply Geometric Concepts In Modeling Situations G.MG.1 Reading <u>Conventions of Standard English</u> AS.L.6		
Differentiation	Support -- for students who are struggling with the content	<i>Note: Lessons for support will be furnished to our teacher during intensive 2-week training at Cal Poly Pomona in Summer 2014</i> Content: <i>Algebra (Creating Equations, Reasoning with Equations and Inequalities), Functions (Linear, Quadratic, and Exponential Models), Geometry, Reading (Conventions of Standard English)</i> Process: <i>Re-teaching, balanced group configurations, differentiated instruction, teacher's extra assistance, guided practice</i> Product: <i>Checking for Understanding tasks (i.e., exit slips, quick writes, feedback quizzes), re-testing, alternate assignments addressing the base-level standard mastery</i>		
	Extension – for high achieving students.	<i>Note: Lessons for extension will be furnished to our teacher during intensive 2-week training at Cal Poly Pomona in Summer 2014</i> Content: <i>Algebra (Creating Equations, Reasoning with Equations and Inequalities), Functions (Linear, Quadratic, and Exponential Models), Geometry, Reading (Conventions of Standard English)</i> Process: <i>Project-based learning in applying content to real-world type assignments</i> Product: <i>Enriched interdisciplinary projects tied to content standards and assessment outcomes for the unit (Project 8.1a Model a Miniature Train; Activity 8.2a Parametric Constraints Practice; Activity 8.3 Auxiliary Views; Activity 8.4a Working Drawings (Miniature Train))</i>		
Evaluation	Formative Assessments (ongoing & mid-lesson): <i>Note: Formative Assessments will be furnished to our teacher during intensive 2-week training at Cal Poly Pomona in Summer 2014. Students demonstrate their knowledge throughout the course by completing activities, projects, and problems using a variety of assessment tools, such as performance rubrics and reflective questioning, to deepen and expand their knowledge and skills. In the future PLTW will provide teachers access to classroom assessments that can be used both for formative and summative purposes. Further details will be released to the network at the appropriate time. PLTW supports a balanced</i>			

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	<i>approach to assessment for all programs, integrating both formative and summative assessments. Through a balanced approach, assessment is an ongoing activity. Students demonstrate their knowledge throughout the course by completing activities, projects, and problems using a variety of assessment tools, such as performance rubrics and reflective questioning, to deepen and expand their knowledge and skills.</i> <i>Assessment FOR Learning- Formative assessment. Growth assessments are a system of assessments designed to help teachers realize each student's strengths and needs relative to the content being assessed. There are two different areas teachers can measure growth in (math and science). Armed with growth assessment data, teachers can adjust their instruction to increase their responsiveness to individual student differences and needs. Over time, repeated administration of growth assessments can create growth data which further informs teachers and students as to the gains that are being achieved.</i> Summative Assessments (unit final evaluation): <i>Note: Summative Assessments will be furnished to our teacher during intensive 2-week training at Cal Poly Pomona in Summer 2014. In the future PLTW will provide teachers access to classroom assessments that can be used both for formative and summative purposes. Further details will be released to the network at the appropriate time. PLTW supports a balanced approach to assessment for all programs, integrating both formative and summative assessments. Through a balanced approach, assessment is an ongoing activity. Students demonstrate their knowledge throughout the course by completing activities, projects, and problems using a variety of assessment tools, such as performance rubrics and reflective questioning, to deepen and expand their knowledge and skills.</i> • Assessment OF Learning- Summative assessment • Students are allowed 80 minutes total to complete an assessment. The test can be given in one 80 minute testing session or can be administered in two 40 minute testing periods. You should refer to the testing guidelines on the processes for delivering the assessments in one or two sessions. • Students will demonstrate an understanding of the attributes of design. • Students will demonstrate an understanding of engineering design. • Students will demonstrate the abilities to apply the design process. • Students will demonstrate the abilities to use and maintain technological products and systems. • Students will demonstrate an understanding of and be able to select and use information and communication technologies.		

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Unit 9	Length of Unit ... (Days / weeks / class sessions) ... 33 days			
	Key Vocabulary	Standards (referenced)	Model Tasks	Tools / Texts
Design Team	<i>Typography</i>	Engineering Design	Activity 9.1 Product Lifecycle	Engineering Design - 2nd Edition: An Introduction Karsnitz, Hutchinson, O'Brien ©2012 Workbook ISBN-13: 978-1-1116-4584-7
<i>Engineering Design</i>	<i>Engineering Design</i>	HS.ETS1.2 HS.ETS1.3 HS.ETS1.4	Problem 9.2 Design Ethics Design Brief	
	<i>Geometric Method</i>	Geometry	Project 9.3 Virtual Design Challenge	Instructor Resources ISBN-13: 978-1-1116-4585-4 Virtual & Physical Modeling for Engineering Design
		<u>Modeling With Geometry</u> -Apply Geometric Concepts In Modeling Situations G.MG.1 G.MG.3	Activity 9.4 Team Norms	
		Reading	Activity 9.5 Product Research	Student Activity Manual; Clark, Ernst ISBN-13: 978-1-4354-3905-4
		<u>Key Ideas and Details</u> AS.R.1 AS.R.2 AS.R.3 AS.R.4 AS.R.8 AS.R.10		
		<u>Text Types and Purposes</u> AS.W.1 AS.W.2 AS.W.4 AS.W.6		CourseMate & eBook supplements available

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		AS.W.7 AS.W.8 AS.W.9 AS.W.10 <u>Comprehension and Collaboration</u> AS.SL.1 AS.SL.2 AS.SL.4 AS.SL.5 AS.SL.6 <u>Conventions of Standard English</u> AS.L.1 AS.L.2 AS.L.3 AS.L.6	
Differentiation	Support -- for students who are struggling with the content	<i>Note: Lessons for support will be furnished to our teacher during intensive 2-week training at Cal Poly Pomona in Summer 2014</i> Content: <i>Engineering Design, Geometry, Reading, (Key Ideas and Details, Text Types and Purposes, Comprehension and Collaboration, Conventions of Standard English)</i> Process: <i>Re-teaching, balanced group configurations, differentiated instruction, teacher's extra assistance, guided practice</i> Product: <i>Checking for Understanding tasks (i.e., exit slips, quick writes, feedback quizzes), re-testing, alternate assignments addressing the base-level standard mastery</i>	
	Extension – for high achieving students.	<i>Note: Lessons for extension will be furnished to our teacher during intensive 2-week training at Cal Poly Pomona in Summer 2014</i> Content: <i>Engineering Design, Geometry, Reading, (Key Ideas and Details, Text Types and Purposes, Comprehension and Collaboration, Conventions of Standard English)</i> Process: <i>Project-based learning in applying content to real-world type assignments</i>	

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Evaluation		Product: <i>Enriched interdisciplinary projects tied to content standards and assessment outcomes for the unit</i>	
		Formative Assessments (ongoing & mid-lesson): <i>Note: Formative Assessments will be furnished to our teacher during intensive 2-week training at Cal Poly Pomona in Summer 2014. Students demonstrate their knowledge throughout the course by completing activities, projects, and problems using a variety of assessment tools, such as performance rubrics and reflective questioning, to deepen and expand their knowledge and skills. In the future PLTW will provide teachers access to classroom assessments that can be used both for formative and summative purposes. Further details will be released to the network at the appropriate time. PLTW supports a balanced approach to assessment for all programs, integrating both formative and summative assessments. Through a balanced approach, assessment is an ongoing activity. Students demonstrate their knowledge throughout the course by completing activities, projects, and problems using a variety of assessment tools, such as performance rubrics and reflective questioning, to deepen and expand their knowledge and skills.</i> <i>Assessment FOR Learning- Formative assessment. Growth assessments are a system of assessments designed to help teachers realize each student's strengths and needs relative to the content being assessed. There are two different areas teachers can measure growth in (math and science). Armed with growth assessment data, teachers can adjust their instruction to increase their responsiveness to individual student differences and needs. Over time, repeated administration of growth assessments can create growth data which further informs teachers and students as to the gains that are being achieved.</i>	
		Summative Assessments (unit final evaluation): <i>Note: Summative Assessments will be furnished to our teacher during intensive 2-week training at Cal Poly Pomona in Summer 2014. In the future PLTW will provide teachers access to classroom assessments that can be used both for formative and summative purposes. Further details will be released to the network at the appropriate time. PLTW supports a balanced approach to assessment for all programs, integrating both formative and summative assessments. Through a balanced approach, assessment is an ongoing activity. Students demonstrate their knowledge throughout the course by completing activities, projects, and problems using a variety of assessment tools, such as performance rubrics and reflective questioning, to deepen and expand their knowledge and skills.</i> • Assessment OF Learning- Summative assessment • Students are allowed 80 minutes total to complete an assessment. The test can be given in one 80 minute testing session or can be administered in two 40 minute testing periods. You should refer to the testing guidelines on the processes for delivering the assessments in one or two sessions. • Students will demonstrate an understanding of the core concepts of technology. • Students will demonstrate an understanding of the cultural, social, economic, and political effects of technology. • Students will demonstrate an understanding of the effects of technology on the environment. • Students will demonstrate an understanding of the attributes of design. • Students will demonstrate an understanding of engineering design. • Students will demonstrate the abilities to apply the design process.	

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	• Students will demonstrate the abilities to use and maintain technological products and systems • Students will demonstrate an understanding of and be able to select and use information and communication technologies.		

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Unit 10	Length of Unit ... (Days / weeks / class sessions) ... 12 days			
	Key Vocabulary	Standards (referenced)	Model Tasks	Tools / Texts
Design Challenges <i>Engineering Design</i>	<i>Design Challenges</i> <i>Principles of Engineering</i>	Engineering Design HS.ETS1.2 HS.ETS1.3 HS.ETS1.4 Geometry <u>Modeling With Geometry</u> -Apply Geometric Concepts In Modeling Situations G.MG.1 G.MG.3 Reading <u>Text Types and Purposes</u> AS.W.6 AS.W.8 AS.W.9 AS.W.10 <u>Comprehension and Collaboration</u> AS.SL.1 AS.SL.4 AS.SL.5 AS.SL.6	Presentation: Assembly Constraints Presentation: Portfolios Presentation: Creating Drawings CAD Project 10.1 Design Challenge	Engineering Design - 2nd Edition: An Introduction Karsnitz, Hutchinson, O'Brien ©2012 Workbook ISBN-13: 978-1-1116-4584-7 Instructor Resources ISBN-13: 978-1-1116-4585-4 Virtual & Physical Modeling for Engineering Design Student Activity Manual; Clark, Ernst ISBN-13: 978-1-4354-3905-4 CourseMate & eBook supplements available

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		<u>Conventions of Standard English</u> AS.L.1 AS.L.2 AS.L.6		
Differentiation	Support -- for students who are struggling with the content	<i>Note: Lessons for support will be furnished to our teacher during intensive 2-week training at Cal Poly Pomona in Summer 2014</i> Content: <i>Engineering Design, Geometry, Reading (Text Types and Purposes, Comprehension and Collaboration, Conventions of Standard English)</i> Process: <i>Re-teaching, balanced group configurations, differentiated instruction, teacher's extra assistance, guided practice</i> Product: <i>Checking for Understanding tasks (i.e., exit slips, quick writes, feedback quizzes), re-testing, alternate assignments addressing the base-level standard mastery</i>		
	Extension – for high achieving students.	<i>Note: Lessons for extension will be furnished to our teacher during intensive 2-week training at Cal Poly Pomona in Summer 2014</i> Content: <i>Engineering Design, Geometry, Reading (Text Types and Purposes, Comprehension and Collaboration, Conventions of Standard English)</i> Process: <i>Project-based learning in applying content to real-world type assignments</i> Product: <i>Enriched interdisciplinary projects tied to content standards and assessment outcomes for the unit</i>		
Evaluation	Formative Assessments (ongoing & mid-lesson): <i>Note: Formative Assessments will be furnished to our teacher during intensive 2-week training at Cal Poly Pomona in Summer 2014. Students demonstrate their knowledge throughout the course by completing activities, projects, and problems using a variety of assessment tools, such as performance rubrics and reflective questioning, to deepen and expand their knowledge and skills. In the future PLTW will provide teachers access to classroom assessments that can be used both for formative and summative purposes. Further details will be released to the network at the appropriate time. PLTW supports a balanced approach to assessment for all programs, integrating both formative and summative assessments. Through a balanced approach, assessment is an ongoing activity. Students demonstrate their knowledge throughout the course by completing activities, projects, and problems using a variety of assessment tools, such as performance rubrics and reflective questioning, to deepen and expand their knowledge and skills.</i> <i>Assessment FOR Learning- Formative assessment. Growth assessments are a system of assessments designed to help</i>			

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	<i>teachers realize each student's strengths and needs relative to the content being assessed. There are two different areas teachers can measure growth in (math and science). Armed with growth assessment data, teachers can adjust their instruction to increase their responsiveness to individual student differences and needs. Over time, repeated administration of growth assessments can create growth data which further informs teachers and students as to the gains that are being achieved.</i> Summative Assessments (unit final evaluation): <i>Note: Summative Assessments will be furnished to our teacher during intensive 2-week training at Cal Poly Pomona in Summer 2014. In the future PLTW will provide teachers access to classroom assessments that can be used both for formative and summative purposes. Further details will be released to the network at the appropriate time. PLTW supports a balanced approach to assessment for all programs, integrating both formative and summative assessments. Through a balanced approach, assessment is an ongoing activity. Students demonstrate their knowledge throughout the course by completing activities, projects, and problems using a variety of assessment tools, such as performance rubrics and reflective questioning, to deepen and expand their knowledge and skills.</i> • Assessment OF Learning- Summative assessment • Students are allowed 80 minutes total to complete an assessment. The test can be given in one 80 minute testing session or can be administered in two 40 minute testing periods. You should refer to the testing guidelines on the processes for delivering the assessments in one or two sessions. • Students will demonstrate an understanding of the core concepts of technology. • Students will demonstrate an understanding of the attributes of design. • Students will demonstrate an understanding of engineering design. • Students will demonstrate the abilities to apply the design process. • Students will demonstrate the abilities to use and maintain technological products and systems. • Students will demonstrate an understanding of and be able to select and use information and communication technologies.		