PLTW

POE Blueprint
The purpose of this assessment is to …

Table of Specifications

Days & % of Coverage Unit	Days & % of Coverage Lesson	Unit	Lesson	Knowledge and Skills	Item Type (ex. multiple choice, performance, true false, essay, etc.)	Complexity Webb's DOK #Level 1 (Recall)	Complexity Webb's DOK #Level 2 (Skill/ Concept)	Complexity Webb's DOK #Level 3 (Strategic Thinking)	Item Name(s)	Total # of Items	% Lesson	% Unit
49	17	1	1	K1 - Describe the job responsibilities of various types of engineers and engineering technicians.						0	#DIV/0!	#DIV/0!
				K2 – Know the six simple machines, their attributes, and components.						0	#DIV/0!	#DIV/0!
				K3 – Know the equations to solve for mechanical advantage, work, and power.						0	#DIV/0!	#DIV/0!
				S1 - Differentiate among the various types of engineering careers and engineering technicians.						0	#DIV/0!	#DIV/0!
33%	11%			S2 - Measure forces and distances related to mechanisms.						0	#DIV/0!	#DIV/0!
				S3- Distinguish among the six simple machines, their attributes, and components.						0	#DIV/0!	#DIV/0!
				S4 - Calculate mechanical advantage and drive ratios of mechanisms.						0	#DIV/0!	#DIV/0!
				S5 - Design, create, and test systems using simple machines and drive mechanisms.						0	#DIV/0!	#DIV/0!
				S6 - Calculate work and power in mechanical systems.						0	#DIV/0!	#DIV/0!
				S7 - Determine efficiency in a mechanical system.						0	#DIV/0!	#DIV/0!
				S8 - Design, create, test, and evaluate a compound machine design.						0	#DIV/0!	#DIV/0!
				S9 - Communicate a design for a machine using annotated sketches and other documentation.						0	#DIV/0!	#DIV/0!
				S10 - Collaborate effectively with others in a design team.						0	#DIV/0!	#DIV/0!
	9	1	2	K1 – Describe the characteristics of various sources of energy.						0	#DIV/0!	#DIV/0!
				K2 – Know types of nonrenewable, renewable, and inexhaustible energy sources.						0	#DIV/0!	#DIV/0!
				K3 – Know the equations for work and power.						0	#DIV/0!	#DIV/0!
				K4 – Know the equation for calculation the efficiency of a system.						0	#DIV/0!	#DIV/0!
				K5 – Know the equations related to describing the characteristics of simple circuits.						0	#DIV/0!	#DIV/0!
				S1 – Prepare and deliver a brief summary based on research.						0	#DIV/0!	#DIV/0!
	6%			S2 – Calculate work and power.						0	#DIV/0!	#DIV/0!
				S3 – Correctly use a digital multimeter as a voltmeter, ohmmeter, or ammeter.						0	#DIV/0!	#DIV/0!
				S4 – Calculate electrical power developed in a circuit.						0	#DIV/0!	#DIV/0!
				S5 – Calculate mechanical power developed when lifting an object.						0	#DIV/0!	#DIV/0!
				S6 – Determine efficiency of a system that converts an electrical energy to a mechanical energy.						0	#DIV/0!	#DIV/0!
				S7 – Calculate circuit resistance, current, and voltage using Ohm's law, including circuits with elements in series and/or parallel.						0	#DIV/0!	#DIV/0!
				S8 – Compare and contrast the behavior of electrical circuits with parallel and series circuit designs.						0	#DIV/0!	#DIV/0!
	10	1	3	K1 – Explain that hydrogen fuel cells transform chemical energy stored in hydrogen gas to electrical energy and heat, converting hydrogen and oxygen into water.						0	#DIV/0!	#DIV/0!
				K2 – Describe the use of reversible fuel cells as electrolyzers to store electrical energy for later use.						0	#DIV/0!	#DIV/0!
	7%			K3 – Describe the use of solar cells to convert light energy into electricity.						0	#DIV/0!	#DIV/0!
				K4 – Describe convection, conduction, and radiation as they relate to thermal energy transfer.						0	#DIV/0!	#DIV/0!
				S1 – Test and apply the relationships among voltage, current, and resistance in series and parallel circuits that incorporate photovoltaic cells and hydrogen fuel cells.						0	#DIV/0!	#DIV/0!
				S2 – Design a system to convert solar power to mechanical power using photovoltaic and fuel cells.						0	#DIV/0!	#DIV/0!
				S3 – Design, construct, and test insulation materials for reducing thermal energy transfer.						0	#DIV/0!	#DIV/0!
				S4 – Calculate the rate at which energy is transferred by conduction and radiation through materials having various R-values.						0	#DIV/0!	#DIV/0!
	13	1	4	K1 – Know the purpose of each part of a design brief.						0	#DIV/0!	#DIV/0!
				K2 – Describe a step-by-step, iterative design process.						0	#DIV/0!	#DIV/0!
	9%			S1 – Brainstorm and sketch possible solutions to an existing design problem.						0	#DIV/0!	#DIV/0!
				S2 – Create a decision making matrix for their design problem.						0	#DIV/0!	#DIV/0!
				S3 – Select an approach that meets or satisfies the constraints provided in a design brief.						0	#DIV/0!	#DIV/0!
				S4 – Create a detailed pictorial sketch or use 3D modeling software to document a proposed design.						0	#DIV/0!	#DIV/0!
				S5 – Present a workable solution to a design problem.						0	#DIV/0!	#DIV/0!
40	14	2	1	K1 – Differentiate between scalar and vector quantities.						0	#DIV/0!	#DIV/0!
				K2 – Identify magnitude, direction, and sense of a vector.						0	#DIV/0!	#DIV/0!
27%	9%			K3 - Know beam deflection is related to cross sectional geometry and material properties.						0	#DIV/0!	#DIV/0!
				K4 – Know the moment of inertia is related cross sectional geometry.						0	#DIV/0!	#DIV/0!
				K5 – Know the modulus of elasticity defines the stiffness of an object related to material and chemical properties.						0	#DIV/0!	#DIV/0!
				K6 – Know the forces acting on an object are in equilibrium.						0	#DIV/0!	#DIV/0!
				K7 – Understand how Newton's Laws are applied to determine the forces acting on an object.						0	#DIV/0!	#DIV/0!
				S1 – Create free body diagrams of objects, identifying all forces acting on the object.						0	#DIV/0!	#DIV/0!
				S2 – Mathematically locate the centroid of structural members.						0	#DIV/0!	#DIV/0!
				S3 – Calculate the area moment of inertia of structural members.						0	#DIV/0!	#DIV/0!
				S4 – Calculate the deflection of a center-loaded beam from the beam's geometry and material properties.						0	#DIV/0!	#DIV/0!
				S5 – Calculate the x- and y-components of a given vector.						0	#DIV/0!	#DIV/0!
				S6 – Calculate moments or torques given a force and a point of application relative to a specified axis.						0	#DIV/0!	#DIV/0!
				S7 – Use equations of equilibrium to calculate unknown external forces on a truss.						0	#DIV/0!	#DIV/0!
				S8 – Use the method of joints to calculate tension and compression forces in the members of a statically determinate truss.						0	#DIV/0!	#DIV/0!
				S9 – Construct and destructively test a truss, and relate observations to calculated predications.						0	#DIV/0!	#DIV/0!
	11	2	2	K1 – List material properties that are important too design including mechanical, chemical, electrical, and magnetic.						0	#DIV/0!	#DIV/0!
				K2 – Know common manufacturing processes related to create a product from raw materials.						0	#DIV/0!	#DIV/0!

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Days & % of Coverage Unit	Days & % of Coverage Lesson	Unit	Lesson	Knowledge and Skills	Item Type (ex. multiple choice, performance, true false, essay, etc.)	Complexity Webb's DOK #Level 1 (Recall)	Complexity Webb's DOK #Level 2 (Skill/ Concept)	Complexity Webb's DOK #Level 3 (Strategic Thinking)	Item Name(s)	Total # of Items	% Lesson	% Unit
				K3 - Know the steps of product life cycle for a common product.						0	#DIV/0!	#DIV/0!
				S1 – Conduct non-destructive tests for material properties on selected common household products including tests for continuity, ferrous metal, hardness, and flexure.						0	#DIV/0!	#DIV/0!
	7%			S2 – Measure or calculate weight, volume, mass, density, and surface area of selected common household products.						0	#DIV/0!	#DIV/0!
				S3 – Identify the manufacturing processes used to create the selected common household product.						0	#DIV/0!	#DIV/0!
				S4 – Identify materials that can be recycled.						0	#DIV/0!	#DIV/0!
	10	2	3	K1 – Distinguish between stress and strain.						0	#DIV/0!	#DIV/0!
				K2 – Distinguish between elastic and plastic deformation.						0	#DIV/0!	#DIV/0!
	7%			K3 – Describe the relationship between the tensile force applied to a material and the elongation of the material as it deforms elastically, plastically, and then ruptures.							#DIV/0!	#DIV/0!
				K4 – Define the modulus of elasticity.							#DIV/0!	#DIV/0!
				S1 – Calculate minimum or maximum design parameters to ensure a safe or reliable product using material strength properties.						0	#DIV/0!	#DIV/0!
				S2 – Measure axial force and elongation data of material samples and create stress-strain diagrams describing the intrinsic properties of the materials.						0	#DIV/0!	#DIV/0!
				S3 – Identify and calculate test sample material properties using a stress-strain curve.						0	#DIV/0!	#DIV/0!
	5	2	4	K1 – Know the purpose of each part of a design brief.						0	#DIV/0!	#DIV/0!
				K2 – Describe a step-by-step, iterative design process.						0	#DIV/0!	#DIV/0!
				S1 – Brainstorm and sketch possible solutions to an existing design problem.						0	#DIV/0!	#DIV/0!
				S2 – Create a decision-making matrix for a design problem.						0	#DIV/0!	#DIV/0!
	3%			S3 – Select an approach that meets or satisfies the constraints provided in a design brief.						0	#DIV/0!	#DIV/0!
				S4 – Create a detailed pictorial sketch or use 3D-modeling software to document a proposed design.						0	#DIV/0!	#DIV/0!
46	16	3	1	K1 – Distinguish between digital and analog data, and between the inputs and outputs of a computational system.						0	#DIV/0!	#DIV/0!
				K2 – Distinguish open and closed loop systems based on whether decisions are made using time delays or sensor feedback.						0	#DIV/0!	#DIV/0!
31%	11%			K3 – Identify the relative advantage of an open-loop or closed-loop control system for a given technological problem.						0	#DIV/0!	#DIV/0!
				K4 – Describe the market demand and salary range for one type of engineer or engineering technician, and understand the education path that leads to that career.						0	#DIV/0!	#DIV/0!
				S1 – Choose appropriate input and output devices based on the need of a technological system.						0	#DIV/0!	#DIV/0!
				S2 – Create a flow chart to describe an algorithm.						0	#DIV/0!	#DIV/0!
				S3 – Create pseudocode to describe an algorithm.						0	#DIV/0!	#DIV/0!
				S4 – Analyze and describe an algorithm represented as a flowchart or as programming code.						0	#DIV/0!	#DIV/0!
				S5 – Create a computer program to implement an algorithm, including conditional statements and iterations.						0	#DIV/0!	#DIV/0!
				S6 – Predict the behavior of a control system by examining the program it is going to execute.						0	#DIV/0!	#DIV/0!
				S7 – Evaluate algebraic and logical expressions involving programming variables.						0	#DIV/0!	#DIV/0!
				S8 – Use a variety of methods for finding, identifying, and correcting bugs in a program.						0	#DIV/0!	#DIV/0!
				S9 – Design and create a control system, including the inputs, computer program, and outputs, based on given needs and constraints.						0	#DIV/0!	#DIV/0!
				S10 – Brainstorm and sketch possible solutions to an existing design problem.						0	#DIV/0!	#DIV/0!
				S11 – Create a decision making matrix for a design problem.						0	#DIV/0!	#DIV/0!
				S12 – Select an approach that meets or satisfies the constraints provided in a design brief.						0	#DIV/0!	#DIV/0!
				S13 – Create a detailed pictorial sketch or use 3D modeling software to document a proposed design.						0	#DIV/0!	#DIV/0!
				S14 – Present a workable solution to a design problem.						0	#DIV/0!	#DIV/0!
	15	3	2	K1 – Identify the advantages of hydraulic and pneumatic systems relative to each other.						0	#DIV/0!	#DIV/0!
				K2 – Identify and explain basic components and functions of fluid power devices.						0	#DIV/0!	#DIV/0!
	10%			K3 – Distinguish between pressure and absolute pressure.						0	#DIV/0!	#DIV/0!
				K4 – Distinguish between temperature and absolute temperature.						0	#DIV/0!	#DIV/0!
				S1 – Identify devices that utilize hydraulic and pneumatic power.						0	#DIV/0!	#DIV/0!
				S2 – Distinguish between hydrodynamic and hydrostatic systems.						0	#DIV/0!	#DIV/0!
				S3 – Design, create, and test a hydraulic device.						0	#DIV/0!	#DIV/0!
				S4 – Design, create, and test a pneumatic device.						0	#DIV/0!	#DIV/0!
				S5 – Calculate design parameters in a fluid power system utilizing Pascal's Law.						0	#DIV/0!	#DIV/0!
				S6 – Calculate values in a pneumatic system utilizing the ideal gas laws.						0	#DIV/0!	#DIV/0!
				S7 – Calculate flow rate, flow velocity, power, and mechanical advantage in a fluid power system.						0	#DIV/0!	#DIV/0!
	15	3	3	K1 – Know the purpose of each part of a design brief.						0	#DIV/0!	#DIV/0!
				K2 – Describe a step-by-step, iterative design process.						0	#DIV/0!	#DIV/0!
				S1 – Brainstorm and sketch possible solutions to an existing design problem.						0	#DIV/0!	#DIV/0!
				S2 – Create a decision making matrix for a design problem.						0	#DIV/0!	#DIV/0!
	10%			S3 – Select an approach that meets or satisfies the constraints provided in a design brief.						0	#DIV/0!	#DIV/0!
				S4 – Create a detailed pictorial sketch or use 3D modeling software to document a proposed design.						0	#DIV/0!	#DIV/0!
				S5 – Present a workable solution to a design problem.						0	#DIV/0!	#DIV/0!
15	5	4	1	K1 – Name measures of central tendency and variation and describe their meaning.						0	#DIV/0!	#DIV/0!
				K2 – Distinguish between sample statistics and population statistics and know appropriate applications of each.							#DIV/0!	#DIV/0!
				S1 – Evaluate how personal career interests align or do not align with one or more fields of engineering or engineering technology.						0	#DIV/0!	#DIV/0!

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10%	3%			S2 – Calculate the theoretical probability that a simple event will occur.						0	#DIV/0!	#DIV/0!
				S3 – Produce a frequency distribution to describe experimental results and create a histogram to communicate these results.						0	#DIV/0!	#DIV/0!
				S4 – Calculate the probability of making a set of observations in a series of trials where each trial has two distinct possible outcomes.						0	#DIV/0!	#DIV/0!
				S5 – Apply AND, OR, and NOT logic to probability.						0	#DIV/0!	#DIV/0!
				S6 – Apply Bayes' Theorem to calculate a probability in a manufacturing context.						0	#DIV/0!	#DIV/0!
				S7 – Calculate the central tendency of a data set, including mean, median, and mode.						0	#DIV/0!	#DIV/0!
				S8 – Calculate the variation in a set of data, including range, standard deviation, and variance.						0	#DIV/0!	#DIV/0!
	10	4	2	K1 – Describe freefall motion of a projectile as having constant velocity in the horizontal direction and uniformly accelerating motion in the vertical direction.						0	#DIV/0!	#DIV/0!
				K2 – Know the purpose of each part of a design brief.						0	#DIV/0!	#DIV/0!
	7%			K3 – Describe a step-by-step, iterative design process.						0	#DIV/0!	#DIV/0!
				S1 – Calculate distance, displacement, speed, velocity, and acceleration from data.						0	#DIV/0!	#DIV/0!
				S2 – Design, build, and test a machine that efficiently channels mechanical energy when friction and limited input energy are significant constraints.						0	#DIV/0!	#DIV/0!
				S3 – Calculate acceleration due to gravity given data from a free-fall trajectory.						0	#DIV/0!	#DIV/0!
				S4 – Calculate the x- and y-components of a projectile motion.						0	#DIV/0!	#DIV/0!
				S5 – Determine the angle needed to launch a projectile a specific range given the projectile's initial velocity.						0	#DIV/0!	#DIV/0!
				S6 – Brainstorm and sketch possible solutions to an existing design problem.						0	#DIV/0!	#DIV/0!
				S7 – Create a decision making matrix for a design problem.						0	#DIV/0!	#DIV/0!
				S8 – Select an approach that meets or satisfies the constraints provided in a design brief.						0	#DIV/0!	#DIV/0!
				S9 – Create a detailed pictorial sketch or use 3D modeling software to document a proposed design.						0	#DIV/0!	#DIV/0!
				S10 – Present a workable solution to a design problem.						0	#DIV/0!	#DIV/0!
Total Days					**Total**	0	0	0		0		
150					**% of Total**	#DIV/0!	#DIV/0!	#DIV/0!				