

GRADE LEVEL: 10

SUBJECT: PRINCIPLES OF ENGINEERING (PLTW)

DATE: 2017-2018

GRADING PERIOD: QUARTER 1

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CONTENT	STANDARD INDICATORS	SKILLS	ASSESSMENT	VOCAB	PRIORITY
SIMPLE MACHINES					
<ul style="list-style-type: none"> Six Simple Machines 	POE – 10.1: Adapt and apply six simple machines, their attributes, and components.	<ul style="list-style-type: none"> Identify the six simple machines. Apply simple machines to solve a problem. 	<ul style="list-style-type: none"> Formative assessment Summative assessment Practical quiz with a product 	<ul style="list-style-type: none"> Simple Machine Inclined Plane Wedge Screw Lever Wheel & Axle Pulley 	Critical
<ul style="list-style-type: none"> Mechanical Advantage Calculations 	POE – 10.2: Calculate mechanical advantage of different machines.	<ul style="list-style-type: none"> Calculate ideal mechanical advantage. Calculate actual mechanical advantage. 	<ul style="list-style-type: none"> Formative assessment Summative assessment Practical quiz with a product 	<ul style="list-style-type: none"> Force Effort Force Load Displacement Vector Mechanical Advantage 	Critical
<ul style="list-style-type: none"> General Design Process 	POE – 10.3: Design, create, and test gear, pulley, and sprocket systems.	<ul style="list-style-type: none"> Perform steps of the design process. Identify qualities of a good design. Develop products. Create products. Analyze products. 	<ul style="list-style-type: none"> Formative assessment Summative assessment Practical quiz with a product 	<ul style="list-style-type: none"> Gear Sprocket 	Critical
<ul style="list-style-type: none"> Work and Power Calculations 	POE – 10.4: Calculate work and power in mechanical systems.	<ul style="list-style-type: none"> Calculate work. Calculate Power. 	<ul style="list-style-type: none"> Formative assessment Summative assessment Practical quiz with a product 	<ul style="list-style-type: none"> Work Power Efficiency Friction 	Critical

CONTENT	STANDARD INDICATORS	SKILLS	ASSESSMENT	VOCAB	PRIORITY
SIMPLE MACHINES					
• Efficiency	POE – 10.5: Determine efficiency in a mechanical system.	• Calculate efficiency	• Formative assessment • Summative assessment • Practical quiz with a product		Important
• Force and Distance	POE – 10.6: Measure forces and distances related to mechanisms	• Calculate force • Calculate distance	• Formative assessment • Summative assessment • Practical quiz with a product		Critical
CONTROL SYSTEMS					
• Programming	POE – 7.1: Create control system operating programs that utilize computer software.	• Create a program using a syntax language.	• Formative assessment • Summative assessment	• Input • Process • Output • Programming language	Critical
• Flowchart	POE – 7.2: Create system control programs that utilize flowchart logic.	• Create a program using a flowchart.	• Formative assessment • Summative assessment	• Flowchart • Ladder logic	Critical
• Devices	POE – 7.3: Choose appropriate input and output devices based on the need of a technological system.	• Identify and recommend appropriate input and output devices.	• Formative assessment • Summative assessment	• Analog signals • Digital signals • Sensor • Microcontroller	Critical
• Digital and Analog Devices	POE – 7.4: Differentiate between the characteristics of digital and analog devices.	• Differentiate between the characteristics of digital and analog devices.	• Formative assessment • Summative assessment		Critical
• Looping System Structure	POE – 7.5: Judge between open and closed loop systems in order to choose the most appropriate system for a given technological problem.	• Judge between open and closed loop systems. • Choose the most appropriate looping system for a given technological problem.	• Formative assessment • Summative assessment	• Closed loop system • Open loop system	Critical

CONTENT	STANDARD INDICATORS	SKILLS	ASSESSMENT	VOCAB	PRIORITY
CONTROL SYSTEMS					
• Automation Application	POE – 7.6: Describe applications of process control and automation systems.	• Describe applications of process control and automation systems.	• Formative assessment • Summative assessment	• Automation • PLC • Process Control	Critical
• Automation Design	POE – 7.7: Apply design concepts to problems in process control and automation systems.	• Apply design concepts to problems in process control and automation systems.	• Formative assessment • Summative assessment		Critical
DESIGN AND DOCUMENTATION					
• Ideation	POE – 8.1: Brainstorm and sketch possible solutions to an existing design problem.	• Develop possible solutions. • Communicate solutions through sketches.	• Formative assessment • Summative assessment • Engineering notebook entries	• Brainstorm • Design process • Research • Constraints	Critical
• Design ideas	POE – 8.2: Create a decision matrix for design problems.	• Prepare a decision matrix for evaluation.	• Formative assessment • Summative assessment • Create a decision matrix	• Decision Matrix • Criteria	Critical
• Design solution	POE – 8.3: Select an approach that meets or satisfies the constraints provided in a design brief.	• Select an approach that meets or satisfies the constraints provided in a design brief.	• Formative assessment • Summative assessment • Create a design brief	• Design brief	Critical
• Design Documentation	POE – 8.4: Create a detailed pictorial sketch and use 3D modeling software to document the best choice.	• Develop graphical solutions.	• Formative assessment • Summative assessment • CADD documents • Engineering notebook entries		Critical
• Communicate Solution	POE – 8.5: Present a worktable solution to the design problem.	• Communicate solutions verbally as well as graphically.	• Formative assessment • Summative assessment • Presentation		Critical

CONTENT	STANDARD INDICATORS	SKILLS	ASSESSMENT	VOCAB	PRIORITY
DESIGN AND DOCUMENTATION					
• Engineering Notebook	POE-8.6: Document daily work and progress toward a solution in an engineering notebook.	• Document daily work and progress toward a solution in an engineering notebook.	• Daily notebook entries evaluated		Critical

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GRADING PERIOD: QUARTER 2

MASTER COPY 4-2-2018

CONTENT	STANDARD INDICATORS	SKILLS	ASSESSMENT	VOCAB	PRIORITY
ENERGY AND POWER					
• Energy Source Categories	POE – 1.1: Categorize energy sources.	<ul style="list-style-type: none"> Determine the source of where the energy is coming from. Categorize energy sources. 	<ul style="list-style-type: none"> Formative assessment Summative assessment Practical quiz with a product 	<ul style="list-style-type: none"> Renewable Non-renewable Potential Kinetic 	Critical
• Energy Source Processes	POE – 1.2: Analyze energy source process.	<ul style="list-style-type: none"> Understand how energy is used. Assess the process used to acquire energy. 	<ul style="list-style-type: none"> Formative assessment Summative assessment 		Critical
• Energy Efficiency	POE – 1.3: Determine systems efficiency and energy use.	<ul style="list-style-type: none"> Understand energy conversion. Determine systems efficiency. 	<ul style="list-style-type: none"> Formative assessment Summative assessment Canvas Quiz 		Critical
• Power Conversion	POE – 1.4: Identify and describe the possible types of power conversion.	<ul style="list-style-type: none"> Identify and describe the possible types of power conversion. 	<ul style="list-style-type: none"> Formative assessment Summative assessment Student powerpoint presentation 		Critical
• Energy Sources	POE – 1.5: Assess energy sources that can be combined to convert energy to useful forms.	<ul style="list-style-type: none"> Assess energy sources that can be combined to convert energy to useful forms. 	<ul style="list-style-type: none"> Formative assessment Summative assessment Lab practicum 		Critical
• Circuit Calculation	POE – 1.6: Calculate circuit resistance, current, and voltage.	<ul style="list-style-type: none"> Calculate circuit resistance, current, and voltage. 	<ul style="list-style-type: none"> Formative assessment Summative assessment Homework calculations Calculation quiz 	<ul style="list-style-type: none"> Voltage Current Resistance Ohm's Law 	Critical

CONTENT	STANDARD INDICATORS	SKILLS	ASSESSMENT	VOCAB	PRIORITY
ENERGY AND POWER					
<ul style="list-style-type: none"> • Series Circuits • Parallel Circuits 	POE – 1.7: Compare the advantages and disadvantages of parallel and series circuit design.	<ul style="list-style-type: none"> • Compare the advantages and disadvantages of parallel and series circuit design. 	<ul style="list-style-type: none"> • Formative assessment • Summative assessment 	<ul style="list-style-type: none"> • Series circuit • Parallel circuit • Combination circuit 	Important
<ul style="list-style-type: none"> • Voltage • Current • Resistance 	POE – 1.8: Analyze the relationships between voltage, current, and resistance.	<ul style="list-style-type: none"> • Analyze the relationships between voltage, current, and resistance. 	<ul style="list-style-type: none"> • Formative assessment • Summative assessment 		Critical
<ul style="list-style-type: none"> • Alternative Energy • Mechanical Power 	POE – 1.9: Explore ways to produce mechanical power using alternative energy.	<ul style="list-style-type: none"> • Explore ways to produce mechanical power using alternative energy. 	<ul style="list-style-type: none"> • Formative assessment • Summative assessment 	<ul style="list-style-type: none"> • Horsepower 	Critical
HYDRAULICS AND PNEUMATICS					
<ul style="list-style-type: none"> • Hydrodynamic • Hydrostatic 	POE – 6.1: Distinguish between hydrodynamic and hydrostatic.	<ul style="list-style-type: none"> • Distinguish between hydrodynamic and hydrostatic. 	<ul style="list-style-type: none"> • Formative assessment • Summative assessment 	<ul style="list-style-type: none"> • Hydraulic • Hydrostatic • Hydrodynamic • Viscosity • Laminar flow • Turbulent flow • Flow rate 	Important
<ul style="list-style-type: none"> • Fluid Power Calculations 	POE – 6.2: Calculate values in a fluid power system.	<ul style="list-style-type: none"> • Calculate values in a fluid power system. 	<ul style="list-style-type: none"> • Formative assessment • Summative assessment • Build a pneumatic system to perform calculations on 	<ul style="list-style-type: none"> • Pressure • Volume • Area • Temperature 	Critical

CONTENT	STANDARD INDICATORS	SKILLS	ASSESSMENT	VOCAB	PRIORITY
HYDRAULICS AND PNEUMATICS					
<ul style="list-style-type: none"> • Pressure • Absolute Pressure 	POE – 6.3: Distinguish between pressure and absolute pressure.	<ul style="list-style-type: none"> • Distinguish between pressure and absolute pressure. 	<ul style="list-style-type: none"> • Formative assessment • Summative assessment 	<ul style="list-style-type: none"> • Absolute pressure • Gauge pressure • Pascal's law • Bernoulli's principle • Boyle's law 	Critical
<ul style="list-style-type: none"> • Temperature • Absolute Temperature 	POE – 6.4: Distinguish between temperature and absolute temperature.	<ul style="list-style-type: none"> • Distinguish between temperature and absolute temperature. 	<ul style="list-style-type: none"> • Formative assessment • Summative assessment 	<ul style="list-style-type: none"> • Absolute temperature • Charles' law • Guy-Lussac's Law 	Critical
<ul style="list-style-type: none"> • Pneumatic System Calculations 	POE – 6.5: Calculate values in a pneumatic system.	<ul style="list-style-type: none"> • Calculate values in a pneumatic system. 	<ul style="list-style-type: none"> • Formative assessment • Summative assessment 		Critical
<ul style="list-style-type: none"> • Fluid Power Characteristics 	POE – 6.6: Distinguish between the characteristics of pneumatic and hydraulic systems.	<ul style="list-style-type: none"> • Distinguish between the characteristics of pneumatic and hydraulic systems. 	<ul style="list-style-type: none"> • Formative assessment • Summative assessment 	<ul style="list-style-type: none"> • Fluid power 	Critical
<ul style="list-style-type: none"> • Fluid Power Devices 	POE – 6.7: Identify and explain basic components and functions of fluid power devices.	<ul style="list-style-type: none"> • Identify and explain basic components and functions of fluid power devices. 	<ul style="list-style-type: none"> • Formative assessment • Summative assessment 		Critical

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MASTER COPY 4-2-2018

CONTENT	STANDARD INDICATORS	SKILLS	ASSESSMENT	VOCAB	PRIORITY
STATICS					
• Structural Elements	POE – 2.1: Classify different structural elements of a system.	• Classify different structural elements of a system.	• Classroom participation in discussion	• Member • Joint • Connection • Supports	Critical
• Structural Forces	POE – 2.2: Analyze forces acting upon an object in a given situation.	• Analyze forces acting upon an object in a given situation.	• Formative assessment • Summative assessment • Analysis using software	• Coplanar • Non-coplanar • Dynamic load • Static load • Rigid body • Internal force • External force	Critical
• Moment	POE – 2.3: Illustrate the moment of inertia of structural members.	• Illustrate the moment of inertia of structural members.	• Classroom participation in discussion	• Moment • Free body diagram	Critical
• Vectors	POE – 2.4: Differentiate between scalar and vector.	• Differentiate between scalar and vector.	• Classroom participation in discussion	• Vector • Scalar	Critical
• Vector Calculations	POE – 2.5: Demonstrate appropriate scalar and vector calculations.	• Demonstrate appropriate scalar and vector calculations.	• Canvas Quiz		Critical
• Force Calculations	POE – 2.6: Calculate unknown forces using equations of equilibrium.	• Calculate unknown forces using equations of equilibrium.	• Canvas Quiz		Critical
• Methods of Joint Calculation Strategy	POE – 2.7: Determine forces acting on an object using the methods of joints strategy.	• Determine forces acting on an object using the methods of joints strategy.	• Truss Calculations		Important

CONTENT	STANDARD INDICATORS	SKILLS	ASSESSMENT	VOCAB	PRIORITY
MATERIAL PROPERTIES, TESTING, AND STRUCTURAL ANALYSIS					
<ul style="list-style-type: none"> • Non-Destructive Material Tests 	POE – 3.1: Verify non-destructive material property tests on selected common products.	<ul style="list-style-type: none"> • Verify non-destructive material property tests on selected common products. 	<ul style="list-style-type: none"> • Class demonstration and participation of physical products 	<ul style="list-style-type: none"> • Tension • Compression • Shear • Torsion • Stress • Strain • Deformation • Mechanical properties 	Important
<ul style="list-style-type: none"> • Product Mass Properties 	POE – 3.2: Demonstrate calculation of product mass properties as used for properties and testing documentation.	<ul style="list-style-type: none"> • Demonstrate calculation of product mass properties as used for properties and testing documentation. 	<ul style="list-style-type: none"> • Canvas Quiz 		Critical
<ul style="list-style-type: none"> • Common Products Manufacturing Process 	POE – 3.3: Identify and describe the manufacturing processes used to create common products.	<ul style="list-style-type: none"> • Identify and describe the manufacturing processes used to create common products. 	<ul style="list-style-type: none"> • Classroom participation in discussion 	<ul style="list-style-type: none"> • Casting • Forging • Forming • Extrusion • Drawing • Thermoforming • Drilling 	Critical
<ul style="list-style-type: none"> • Property Analysis 	POE – 3.4: Analyze material properties used to create products.	<ul style="list-style-type: none"> • Analyze material properties used to create products. 	<ul style="list-style-type: none"> • Class demonstration and participation of physical products • Manufacture a dog-bone and test it 		Critical

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MASTER COPY 4-2-2018

CONTENT	STANDARD INDICATORS	SKILLS	ASSESSMENT	VOCAB	PRIORITY
STUDY OF MOTION					
<ul style="list-style-type: none"> • Projectile Motion 	POE – 4.1: Demonstrate the calculation of projectile motion given parameters.	<ul style="list-style-type: none"> • Demonstrate calculations of objects moving to determine their trajectory. 	<ul style="list-style-type: none"> • Given a ballistic devices parameters students will be required to predict the height and distance an object will go based upon mathematical calculations 	<ul style="list-style-type: none"> • Firing Angle • Initial Velocity • Gravity • Projectile • Distance 	Critical
<ul style="list-style-type: none"> • Propulsion 	POE – 4.2: Examine propulsion of an object.	<ul style="list-style-type: none"> • Understand speed, velocity, and acceleration on how an object is propelled. 	<ul style="list-style-type: none"> • Teacher observation, Formative 	<ul style="list-style-type: none"> • Speed • Velocity • Acceleration 	Critical
<ul style="list-style-type: none"> • Gravity 	POE – 4.3: Explain how gravity effects motion.	<ul style="list-style-type: none"> • Explain and give examples of how gravity effects a projectiles motion. 	<ul style="list-style-type: none"> • Classroom discussion 	<ul style="list-style-type: none"> • Gravitational acceleration 	Critical
<ul style="list-style-type: none"> • Laws of Motion 	POE – 4.4: Apply the laws of motion to solutions.	<ul style="list-style-type: none"> • Identify, understand, and apply Newton's laws of motion to projectile problems. 	<ul style="list-style-type: none"> • Classroom discussion 	<ul style="list-style-type: none"> • Newton's Law's 	Critical
<ul style="list-style-type: none"> • Forces on an Object 	POE – 4.5: Analyze the forces acting on an object while in motion.	<ul style="list-style-type: none"> • Point out and select the different forces acting on an object. 	<ul style="list-style-type: none"> • Looking for verbal responses with key words or concepts that indicate comprehension 		Critical

CONTENT	STANDARD INDICATORS	SKILLS	ASSESSMENT	VOCAB	PRIORITY
STUDY OF MOTION					
<ul style="list-style-type: none"> Relationships Among Force, Mass, and Changes in Motion 	POE – 4.6: Describe the relationships among force, mass, and changes in motion.	<ul style="list-style-type: none"> Identify the force, mass, and changes in motion to a projectile. 	<ul style="list-style-type: none"> Identify the forces, mass, and change in motion on a quiz with a ballistic story problem. Communicate in writing how these relationships work together 	<ul style="list-style-type: none"> Force Mass Change in Motion 	Critical
STATISTICS					
<ul style="list-style-type: none"> Data 	POE – 5.1: Compare theoretical and experimental data.	<ul style="list-style-type: none"> Consider and evaluate theoretical data versus experimental data. 	<ul style="list-style-type: none"> Critique the difference between theoretical probability of how many of each color of M&M's are in a package verses what the experimental probability is and compare the data 	<ul style="list-style-type: none"> Theoretical data Experimental data Probability 	Critical
<ul style="list-style-type: none"> Statistics 	POE – 5.2: Use statistics to determine theoretical outcomes.	<ul style="list-style-type: none"> Understand how statistics are used to determine outcomes. 	<ul style="list-style-type: none"> Classroom discussion of the M&M activity 	<ul style="list-style-type: none"> Statistics 	Critical
<ul style="list-style-type: none"> Design Process and Statistics 	POE – 5.3: Illustrate the use of statistics in the engineering design process.	<ul style="list-style-type: none"> Illustrate the use of statistics in the engineering design process through plant tours and guest lecturers. 	<ul style="list-style-type: none"> Discussions with local engineers 	<ul style="list-style-type: none"> Design Process 	Important
<ul style="list-style-type: none"> Data Collection 	POE – 5.4: Utilize data collection to graphically present findings.	<ul style="list-style-type: none"> Create graphs to represent data collections. 	<ul style="list-style-type: none"> Create an Excel document with data cells and a graph using the data 	<ul style="list-style-type: none"> Data collection Graph 	Critical

CONTENT	STANDARD INDICATORS	SKILLS	ASSESSMENT	VOCAB	PRIORITY
CAREERS					
<ul style="list-style-type: none"> Career Research 	POE – 9.1: Conduct research on the current and future outlook for engineering and engineering technology careers.	<ul style="list-style-type: none"> Learn to conduct research on the current and future outlook for engineering and engineering technology careers. 	<ul style="list-style-type: none"> Create a document with information gathered about the future outlook for engineering and engineering technology careers 		Important
<ul style="list-style-type: none"> College Major Research 	POE – 9.2: Research college/technical schools for class requirements for entering engineering and engineering technology career majors.	<ul style="list-style-type: none"> Analyze college/technical schools for class requirements for entering engineering and engineering technology career majors. 	<ul style="list-style-type: none"> Classroom discussion 		Important
<ul style="list-style-type: none"> Engineering Disciplines 	POE – 9.3: Identify and describe different engineering disciplines.	<ul style="list-style-type: none"> Understand the different engineering disciplines. 	<ul style="list-style-type: none"> Classroom Discussion 		Additional