

Student Name:

Project Lead the Way

Instructors:

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### **Math and Measurement**

utilize precision measurement tools

calculate mean, median, mode, and standard deviation

plot points using absolute, relative (incremental) and polar coordinates.

measure using standard and metric systems

convert measurements between metric and standard inch systems.

read technical drawings

### **Design Process**

apply the steps of the design process to solve problems.

### **Sketching and Visualization**

produce two-dimensional geometric figures.

interpret annotated sketches

develop properly annotated sketches

### **Computer Part Modeling**

generate a model using a CAD software package.

draw a two-dimensional sketch using a CAD package.

apply geometrical and dimensional constraints to a sketch

generate a three-dimensional model.

use of work features to construct a model.

use work planes, axes, and points

modify a sketch or feature of a model.

create circular and rectangular patterns

### **Assembly Modeling**

place and create components in the assembly modeling environment.

apply assembly constraints to successfully construct a multi-part object.

employ sub-assemblies during the production of assemblies

### **Model Analysis and Verification**

extract mass properties data from solid models

### **Model Documentation**

represent three-dimensional drawings into orthographic drawing views.

create the following drawing views: isometric, section, auxiliary, detail view

generate an isometric view from orthographic drawing views

demonstrate appropriate dimensioning rules and practices

apply appropriate annotations on sketches and drawings.

### **Engineering Systems**

calculate mechanical advantage  
calculate gear and speed ratios  
contrast open and closed loop control systems  
design, diagram and implement a program to control a device  
apply of mechanical, electrical, and control systems to solve problems

### **Materials, Statics, and Strength of Materials**

properly draw free body diagrams  
mathematically analyze a simple truss  
analyze the stresses and forces acting on an object.  
explain the effects stress has on a material and predict how the material will react.

### **Kinematics**

calculate range velocity, and initial acceleration  
analyze test data and utilize the results to make decisions

### **DE Fundamentals**

draw and label the parts of a simple circuit  
will build and test a variety of series and parallel circuits  
calculate the resistance, current and voltage in a circuit using Ohm's Law  
convert values from one number system to another  
use schematics and symbolic Algebra to represent digital gates  
create truth tables  
formulate and employ a Karnaugh Map  
create circuits to solve a problem using NAND or NOR gates  
restate and simplify a digital design problem  
design a circuit to control a seven segment display  
design and implement combinational logic circuits using reprogrammable logic devices  
demonstrate understanding of binary addition and subtraction  
construct and test simple latches and flip-flops  
to interpret waveform diagrams from circuits  
design, simulate, build and test Mod counters

### **CNC Milling**

identify the axis relative to various CNC machines  
apply various work holding devices commonly used for CNC machining.  
explain how cutting tool materials affect the speed and feed rates used by machine tools  
select appropriate cutting tools to efficiently, safely and accurately cut parts using a CNC machine  
write a basic NC part program  
create a simple NC part program using CAD and CAM programs  
identify and correct errors found in NC part program files  
use simulation software to verify an NC program operation  
set up and edit a tool library  
calculate appropriate spindle speeds and feed rates

### **Robotics**

identify and compare the four different types of Robots.  
design and build a working model of a robot  
identify and work envelopes of robots

use Robocell software to write a program and manipulate the components of a simulated robot program a robot to perform several tasks

**Manufacture**

to interpret a drawing to produce a part.  
prepare a prototype model from CAD drawing using a rapid prototype machine  
simulate a complete CIM system using Fischertechnik

**Research and Development**

Apply engineering notebook standards and protocols when documenting work  
Demonstrate time management skills as related to a project  
Write a concise problem statement  
properly document research  
create product specifications  
objectively evaluate proposed design solutions using specific criteria and a decision matrix  
Build a working prototype that can be tested  
Document test results and project progress  
Orally present an effective technical presentation on the chosen design solution to a panel of experts

**Communication Skills**

plan and compose a written technical report  
design and create tables, charts, and graphs  
complete a portfolio displaying projects and demonstrating skills learned in each of the five PLTW classes  
Write a resume to prepare for an interview  
Student will complete a mock job interview.

**PERSONAL QUALITIES**

**WORK EFFORT**

Ignores directions  
Follows some directions, works inefficiently  
Follows directions and works satisfactorily X  
Steady conscientious worker  
Accurate, resourceful, efficient

**SAFETY HABITS**

Hazardous to self and others  
Needs improvement  
Generally works safely  
Meets required safety standards  
Neat, conscientious, careful X

**WORK AREA ORGANIZATION**

Unacceptable  
Disorganized  
Adequate  
Consistent X  
Meets business standards

**ON TASK BEHAVIOR**

Off task	
Inconsistent	
Adequate	
Consistent	X
Meets business standards	

**RESPONSIBILITY**

Unreliable	
Inconsistent	
Adequate	
Conscientious/reliable	X
Seeks additional responsibility	

**INITIATIVE**

Unacceptable	
Inconsistent	
Adequate	
Seeks & completes additional work	X
Exceeds expectations	

**TEAM WORK**

Uncooperative	
Inconsistent	
Adequate	
Team worker	X
Excels	

**RESPECT**

Disrespectful	
Indifferent	
Tolerant/Accepting	
Cooperative	
Respectful	X

**INTERPERSONAL SKILLS**

Unacceptable	
Inconsistent	
Adequate	
Consistent	X
Meets business standards	

**STUDENT PROFICIENCY**

Number of competencies with three or better  
 Total number of competencies  
 Proficiency Percentage

Check Box

