Unit 4 Modeling Skills Lesson Plan

COURSE:
Introduction to Engineering Design (Honors)

TEACHER:
Jason D. Redd

DURATION:
24 Days

STANDARDS:
This course connects to standards in the following:
>   Common Core State Standards for English Language Arts Anchor Standards
>   Common Core State Standards for English Language Arts
>   Common Core State Standards for Mathematics
>   Next Generation Science Standards
>   Standards for Technological and Engineering Literacy

PLTW FRAMEWORK:
Provided by Project Lead the Way (PLTW), the PLTW Framework provides an overview of the levels of understanding that each student will build upon throughout the lesson/unit. It includes: Established Goals, Transfer, Understandings, Knowledge and Skills, and Essential Questions. The most fundamental level of learning is defined by course Knowledge and Skills statements. Each Knowledge and Skills statement reflects specifically what students will know and be able to do after they've had the opportunity to learn the course content. Students apply Knowledge and Skills to achieve Learning Objectives, which are skills that directly relate to the workplace or applied academic settings.

Established Goals
It is expected that students will:
>   Demonstrate an ability to identify, formulate, and solve engineering problems.
>   Demonstrate an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
>   Demonstrate an ability to design and conduct experiments, as well as to analyze and interpret data.
>   Demonstrate an ability to apply knowledge of mathematics, science, and engineering.
>   Demonstrate an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
>   Pursue the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
>   Demonstrate an understanding of professional and ethical responsibility.
>   Demonstrate an ability to function on multidisciplinary teams.
>   Demonstrate an ability to communicate effectively.
>   Gain knowledge of contemporary issues.

Solve equations for unknown quantities by determining appropriate substitutions for variables and manipulating the equations.

Use function notation to evaluate a function for inputs in its domain and interpret statements that use function notation in terms of a 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.

Compare the efficiency of the modeling method of an object using different combinations of additive and subtractive methods.

ESSENTIAL QUESTIONS:

Students will keep considering:

How should one decide what information and/or artifacts to include in a portfolio? Should a portfolio always include documentation on the complete design process?

Did you use every possible type of model during the design and construction of your puzzle cube? Describe each model that you used?

How reliable is a mathematical model?

EQUIPMENT / MATERIALS / RESOURCES:

Students will need or utilize:

- ☒ Assignment Handouts / Instructions
- ☒ CAD Software
- ☒ Classroom Materials / Equipment
- ☒ Computer / Device
- ☒ Internet Access
- ☒ Microsoft Office Software

- ☒ Online Resources
- ☐ Other Software
- ☒ Schoology
- ☒ Teacher Handouts
- ☐ Other:

AGENDA / ACTIVITIES / INSTRUCTIONAL PROCEDURES:

Teacher Activity (Introduction to New Material)

The teacher will:

Review the Learning Objectives and Essential Questions for the lesson (at the beginning and throughout).

Lead a class discussion about the Learning Objectives and Essential Questions for the lesson.

Provide an overview of assignments that will be worked on throughout the lesson.

Demonstrate expectations / skills.

Lead a class discussion via the teacher-led PowerPoint presentation called "Modeling".

Provide instructions for *Project 4.1 Puzzle Design Challenge*.

Provide instructions for *Activity 4.1A Puzzle Part Combinations*.

Provide instructions for *Activity 4.1B Engineering Graphics*.

Provide instructions for *Activity 4.1C Software Modeling Introduction*.

Provide instructions for creating an Onshape account.

Lead a class discussion via the teacher-led PowerPoint presentation called "Additive and Subtractive Solid Modeling".

Provide instructions for *Activity 4.1D Model Creation*.

Provide guidance for *creating 5 puzzle pieces (Onshape)*.

Lead a class discussion via the teacher-led PowerPoint presentation called "Basic Assembly Constraints".

Provide guidance for *assembling 5 puzzle pieces (Onshape)*.