

Williams Tech-Ed Pre-Engineering 8th Final Innovation and Invention,

Fill in the following blanks as a sentence stem for each step

The engineering design process involves a series of steps that lead to the development of a new product or system. In this design challenge, students are to complete each step and document their work as they develop solution. The students should be able to do the following:

STEP 1: Define the Problem - Students should state the challenge problem in their own words

How can I design a _____ that will _____?

STEP 2: Research the Problem- Identify Criteria and Constraints –

Define Criteria-

Define Constraints -

STEP 3: Brainstorm Possible Solutions - Each student in the group should sketch his or her own ideas as the group discusses ways to solve the problem. Labels and arrows should be included to identify parts and how they might move. These drawings should be quick and brief.

Why is this important?

STEP 4: Choose a final design - In this step, each student should develop two or three ideas more thoroughly. Students should create new drawings that are orthographic projections (multiple views showing the top and side.) These are to be drawn neatly, using rulers to draw straight lines and to make parts proportional. Parts and measurements should be labeled clearly.

How should the top and side drawings line up to each other and what is mean to be a 1:1 scale?

STEP 5: Build a Model or Prototype - Students will construct a **full-size or scale model** based on their drawings. The teacher will help identify the criteria and constraints and have the student acquire appropriate modeling materials.

Can someone use material or construct something that does not meet criteria and constraints, why or why not?

STEP 6: Test - Students should work in teams and test the prototype. Groups must determine if the test was successful and did it meet criteria and constraints. What if did not meet criteria and constraints?

STEP 7: Communication - Groups may enlist students from other groups to review the solution and help identify changes that need to be made. Based on criteria and constraints, teams must identify any problems and proposed solutions. Is this collaboration?

STEP 8: Refine the Design - Students will examine and evaluate their prototypes or designs based on the criteria and constraints and begin the Engineering Design Process again to refine their design. Why do this?

Assessment –

Using the Engineering Design Process, this page will help document your team innovation or invention. Use the 8 steps to create that item. You are going to build a prototype and give details of what your expectations are. Determine a way to test your solution.

Write in full and complete sentences and name each step.

Step 1 _____

Step 2 _____

Step 3 _____

Step 4 _____

Step 5 _____

Step 6 _____

Step 7 _____

Step 8 _____
