Understanding By Design 1-Page Template

Title: Engineering Communication
Standards:
Standard #8: Students will develop an understanding of the attributes of design.

- The design process includes defining a problem, brainstorming, researching and generating ideas, identifying criteria and specifying constraints, exploring possibilities, selecting an approach, developing a design proposal, making a model or prototype, testing and evaluating the design using specifications, refining the design, creating or making it, and communicating processes and results.
- Design problems are seldom presented in a clearly defined form.

Standard #12: Students will develop an understanding of and be able to select and use information and communication technologies.

- Document processes and procedures and communicate them to different audiences using appropriate oral and written techniques.
- Use computers and calculators to access, retrieve, organize, process, maintain, interpret, and evaluate date and information in order to communicate.

Standard #17: Students will develop abilities to use and maintain technological products and systems.

- There are many ways to communicate information, such as graphic and electronic means.
- Technological knowledge and processes are communicated using symbols, measurement, conventions, icons, graphic images, and languages that incorporate a variety of visual, auditory, and tactile stimuli.

Stage 1: Desired Results

Understandings

Students will understand…

- The basic communication skills needed by engineers
- How mathematics play a role in engineering
- How to create technical drawings in 2-D & 3D methods
- How to use technical drawings with the engineering design process to create a technological product

Essential Questions	Knowledge & Skill
♦ Why can't engineering communication be defined as a single skill? ♦ What part does mathematics play in the communication of design ideas? ♦ How has technology changed the way we communicate design ideas graphically? ♦ How has the language of drafting stayed the same? Why?	♦ Mathematic expressions in engineering definition & function ♦ Communication skills in engineering definition & function ♦ Basic concepts of 2-dimensional drafting. ♦ How to create 2- dimensional drawings ♦ How to create 3-dimensional drawings using drafting techniques ♦ How to use 3-dimensional modeling software to create 3-dimensional drawings ♦ Engineering Design process parts & function

♦ How can you to use technical drawings with the engineering design process to create a technological product?	

Stage 2: Assessment Evidence

Performance Task Summary	Rubric Titles
♦ 3-D Marble Maze	♦ 3-D Marble Maze Rubric

Self-Assessments	Other Evidence, Summarized
♦ Check each section of project against rubric	♦ Communication Skills Debates ♦ 2-Dimensional Drafting practice ♦ 3-Dimensional Drafting exercises ♦ 3-Dimensional Modeling exercises

Stage 3: Learning Activities

- Where: Introduce essential questions & discuss pre-established knowledge
- Hook: Mathematical expression & Communication Skills Debates
- Explore & Equip: Complete PowerPoints, Web Quests, and exercises in 2-dimensional and 3 dimensional drawing
- Rethink & Revise: Use 3-D modeling software to create your maze on the computer from an isometric drawing
- Evaluate Understandings: 3-D Marble Maze Project
- Tailor: Give students to create all details on the maze including the placement of elements, theme & name.
- Organize & Sequence:
  Day 1: Mathematical Expression & Communication Debates
  Day 2: Alphabet of lines
  Day 3: Orthographic projection introduction
  Day 4: Simple Orthographic projection drawings
  Day 5 - 6: Drafting Pack
  Day 7: Isometric Drawing exercise
  Day 8: 2-Point Perspective exercise
  Day 9: Exploded View, Sectional Drawing, and Assembly drawings quest & discussion
  Day 10 - 11: Autodesk Inventor Activity 1
  Day 12 – 15: Autodesk Inventor Skills tutorial
  Day 15 – 20: 3-D Marble Maze Project
  Day 21: Maze Testing