Criteria and Constraints

4.3.1
Unit 4, Lesson 3
Explanation
The Unit Big Idea

The Engineering Design process is a systematic, iterative problem solving method which produces solutions to meet human wants and desires.
The Lesson Big Idea

Throughout the design process, designers must constantly compare the solution to the criteria and constraints of the problem.
Criteria Defined

- Criteria the desired elements and features of a product or system
- Criteria includes what the design is supposed to do, related to function, aesthetics, efficiency, etc.
Constraints Defined

- Constraints: are limitations on a design
- Constraints involve time, budget, safety among other constraints
- Throughout the design process, designers must compare the solution to the criteria and constraints of the problem.
Requirements of a design, such as criteria, constraints, and efficiency, sometimes compete with each other.
A trade-off is a decision process recognizing the need for careful compromises among competing factors.
A trade-off example

- Increasing the takeoff power of a spacecraft and using lightweight materials
- Increased power results in larger engines, heavier
- Newly developed materials may offset weight concerns
Example Design Challenge

For the given design challenge, what would be the criteria and constraints?

- Materials
  - Water Tower capacity of 1,000 gallons
  - Safety of Design
  - Time to complete challenge

- Must transport water to the tower without losing water.
- Must fill water tower completely.
- Water tower must fill in the fastest amount of time.