HONORS Science and Engineering Study Guide

Below are the expectations for each point level for the Science and Engineering objective.

Objective 1: **SWBAT: use the steps of the Engineering Design Process**

1 point – (Basic)

- Be able to match stages of the Engineering Design Process with stages of a scenario given

2 points – (Developing)

Skills from the 1 point questions plus:

- Be able to decipher between criteria, constraints, and errors

3 points – (Proficient)

Skills from the 1 and 2 point questions plus:

- When given a scenario, walk through and explain each step of the Engineering Design Process using the information from the scenario. You will be asked to "become the engineer".

4 points – (Exemplary)

Skills from the 1, 2, and 3 point questions plus:

- Be able to identify the constraints with your design solution for the scenario given.

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4 points – (Exemplary)

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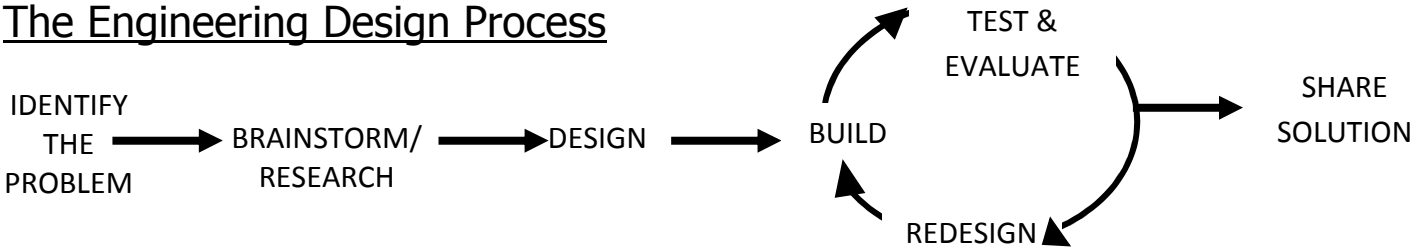
- Be able to identify the constraints with your design solution for the scenario given.

Complete the following problems to help you get ready for the test:

Objective 1: **SWBAT use the steps of the Engineering Design Process**

The Engineering Design Process



Match each of the steps of the Engineering Design Process to its definition.

1. _____ Identify the Problem
2. _____ Brainstorm
3. _____ Design
4. _____ Build a Prototype
5. _____ Test and Evaluate
6. _____ Re-designing
7. _____ Re-build
8. _____ Re-test and Re-evaluate
9. _____ Share Solution/Conclusion

A. She decided to first try diluted vinegar.
B. Instead of using the store-bought products, she decided to try some other household products that she had around her house. She looked through her cabinets and came up with a number of ideas of products that she could try using.
C. After applying that to the stove top and scrubbing for a little bit, it did remove the grease.
D. She ended up writing an email to all of her friends about what had worked in case they were having the same problem themselves.
E. She mixed the 2 tablespoons of baking soda with a tablespoon of water in a small dish.
F. The cleaners that she bought from the store just never seemed to cut through the grease on her stove top very well.
G. She took a spray bottle and filled it up half way with vinegar and the other half with water.
H. After that she decided to try making a paste of water and baking soda.
I. She sprayed the stove top, dried it off and determined that it still did not take off the grease as good as she wanted.

10. State whether the following are examples of a criteria, a constraint, or an error.
    A. The wind picks up during an experiment outdoors
    B. A person trips and falls when testing how well new running shoes aid in speed
    C. A scientists forgets to press record on the video camera while hoping to document their experiment
    D. The rubber bands that you were going to use for your experiment were old and broke extremely easily
    E. The purpose of the experiment was to test and see if the new running shoes aid in allowing a runner to go faster.

Use the following scenario to answer questions 27 and 28:
You and your engineering colleagues designed a juice box. The juice box has been out on the market for a few months but your superiors are already pushing for a new and improved container. You and your colleagues then design the juice pouch. Using the design process of an engineer, write about what you and your colleagues went through at each step of the design process. Put yourselves in the shoes of an engineer (it is ok to make up data).

11. Given the following scenario, walk me through **each** of the steps of the design process. **Pretend that you are the engineer on the project.**

12. Identify as many constraints that you can think of that you might run into for the scenario above.

13. Which of the following best defines the word constraint?
    A. Restriction B. Opportunity C. Idea D. Option

14. The organized and orderly approach to solving problems is known as the ___.
    A. engineering design process B. building design process C. aesthetic process D. architectural process

15. **True or False**: Constraints make coming up with an engineering design more difficult.