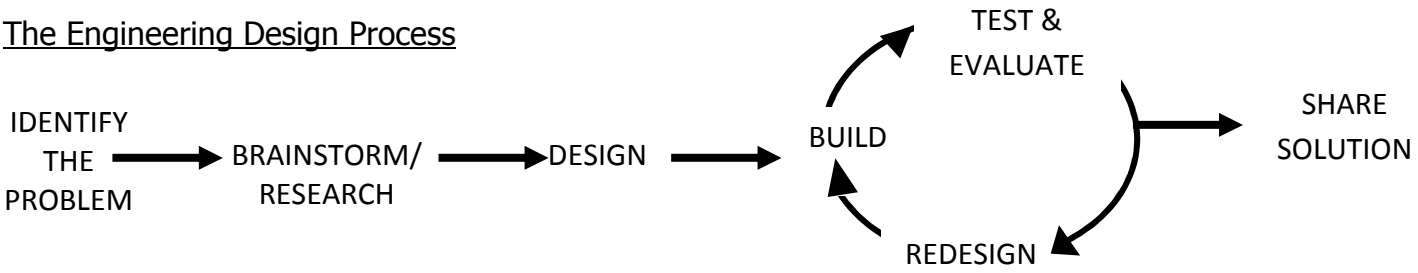
Science and Engineering Study Guide KEY

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. **F** Identify the Problem
2. **B** Brainstorm/Research
3. **A** Design
4. **G** Build
5. **I** Test and Evaluate
6. **H** Re-designing
7. **E** Re-build
8. **C** Re-test and Re-evaluate
9. **D** 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.

Use the following scenario to answer questions 10 and 11: 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).

10. Given the following scenario, walk me through **each** of the steps of the design process.
Pretend that you are the engineer on the project.
Identify the Problem: Design a new and improved juice box/pouch.

Brainstorm/Research: plastic, foil, holds 6 ounces, holds 12 ounces, bright and colorful design, plastic straw, oval shaped, flat bottom, flexible

Design: make a rectangle shaped juice pouch that angles to the middle, out of foil that holds 8 ounces of juice that will be consumed using a straw

Build: build a prototype of the new juice pouch

Test and Evaluate: hand out prototypes of the new juice pouch to middle school students and have them fill out a survey

Redesign: based on the results from the survey, modify the sides of the pouch so that it is easier for a kid to hold

Rebuild: build a prototype of the redesigned juice pouch

Retest and Reevaluate: hand out the redesigned prototypes of the juice pouch to middle school students and have them fill out a survey

Share Solution: share the results and a diagram of the new pouch of the surveys with the juice box company

11. Identify as many constraints that you can think of that you might run into for the scenario above.
Cost, time limit, many students did not fill out the survey after trying the juice box, limited materials to use, only a specific age group of kids were tested.

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

13. The organized and orderly approach to solving problems is known as the ___.
a. engineering design process c. aesthetic process
b. building design process d. architectural process

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