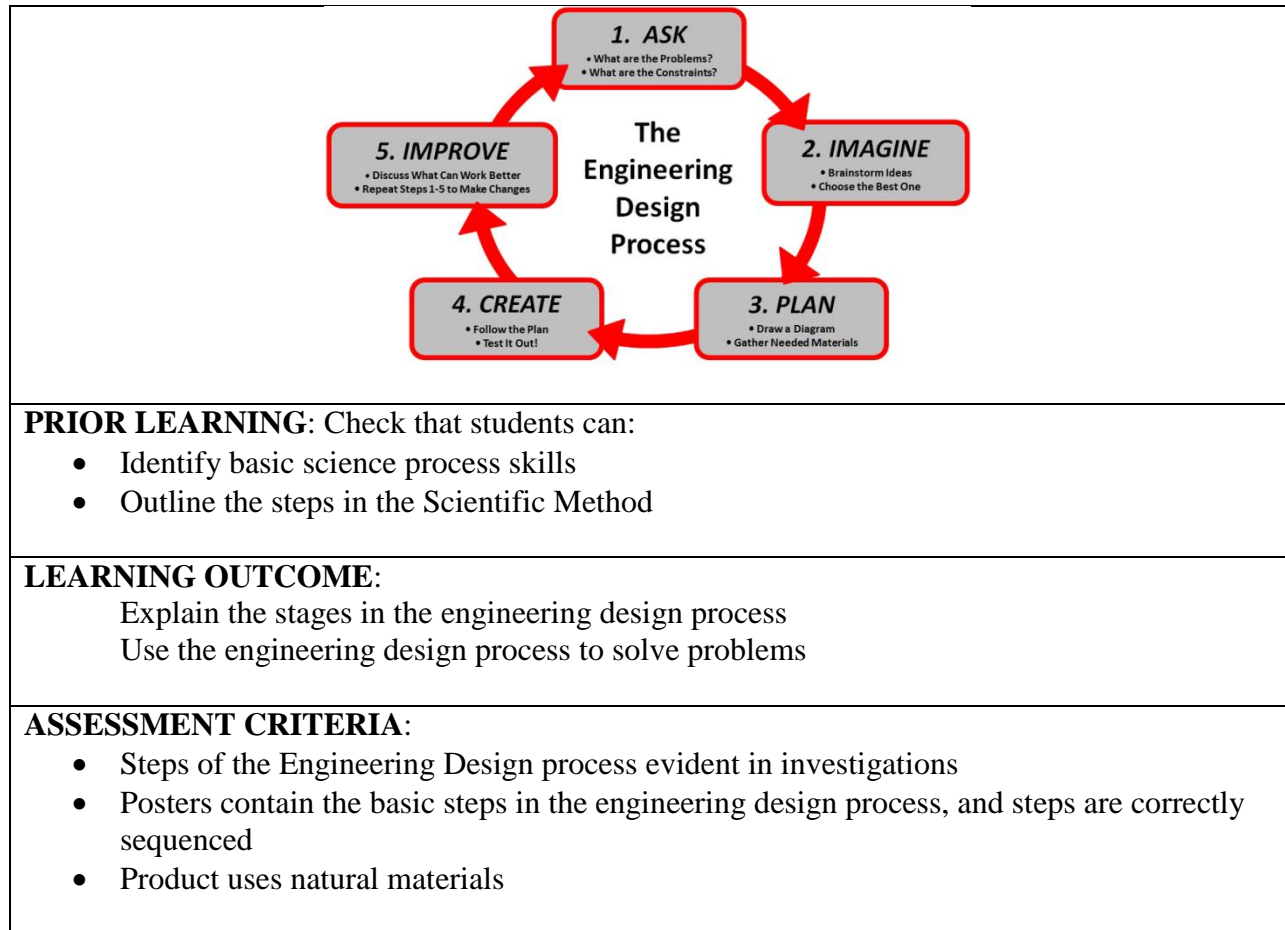


SUBJECT: Science
GRADE: 7
DATE: January 2018.
DURATION: 60 minutes
TOPIC: Application of the Engineering Design Process
ATTAINMENT TARGET: <ul style="list-style-type: none"> Apply scientific knowledge and processes to the solution of real world problems.
BENCHMARKS: <ul style="list-style-type: none"> Apply scientific skills, processes and methods in everyday situations and be aware of safety precautions involved in scientific work. Use scientific principles in the design of solutions to a problem taking into account potential impacts on man and the natural environment.
SPECIFIC OBJECTIVES: <ul style="list-style-type: none"> Explain the stages in the engineering design process Apply the engineering design process to solve everyday problems Write a report of an engineering design project. Evaluate a product used to solve a given problem Appreciate individual uniqueness and identity.
KEY SKILLS: Collaborate, research, manipulate, communicate, create, think critically – analyse, evaluate, draw conclusions, compare, solve problems
KEY VOCABULARY: engineering design process, design requirements, problem specification, constraints, evaluate, test, brainstorm, plan and design, prototype
MATERIALS/RESOURCES: computers, cartridge paper, markers, cardboard, lime, virgin castor oil, virgin coconut oil, virgin olive oil, lemon, oats, sugar, salt, banana, baking soda, vinegar, water, cutting instruments, grater, mortar, pestle
CONTENT OUTLINE: <ul style="list-style-type: none"> Scientists solve everyday problems using the Scientific Method and the Engineering Design Process. In the Engineering Design Process, a cyclical series of steps are used beginning with the problem to be solved, brainstorming different solutions, choosing a solution that meets design constraints, creating and testing the prototype or model and evaluating the solution based on the initial problem. Open-ended design is used since the best solution is not known at the outset. The use of prototypes or early versions of the design (or a model or mock-up) helps to further understanding of the problem, identify missing requirements, evaluate design objectives and product features, and provide needed feedback from others.



PROCEDURES/ACTIVITIES

Engage - *How can I get students interested in this?* Use of an interesting picture. (5 min)

- A short video (or pictures) showing the effects of skin bleaching using various products will be shown. Students will discuss the issue in the Jamaican context and will be tasked to find solutions to this problem.
- *Teacher will direct students to discuss issues of identity and valuing themselves.*

Explore - *What tasks/questions can I offer to help students puzzle through this?* Use of a simple investigation. (15 min)

- Students will discuss in groups how they can address the problem. Guided by the following questions: (answers to be provided from Internet research)
What is the importance of the skin?
How do diet or skin care products affect the skin?
How can I take care of my skin naturally?
What natural products can be used to benefit the skin?
What kind of natural skin care product can I make?

Explain - *How can I help students make sense of their observations?* Class presentation and discussions. (10 min)

- Each group will present to the class their approach to solve the problem. Assessment of these approaches will be carried out by students and teacher.
- Teacher will offer clarifications and additional information as required.

Elaborate - *How can my students apply their new knowledge to other situations?* Application of what they learned. (20 min)

- Students will use the materials provided to make an initial sample or prototype of their product to solve the problem of skin bleaching. All the steps and materials used in the product design will be recorded on a chart (board). The products will first be tested using members of the group and the results presented for discussion.
- *Teacher will direct groups to use the Engineering Design Rubric when designing their product.*

Evaluate - *How can I help my students self-evaluate and reflect on the teaching and learning, and how can I evaluate the students learning of concepts and skills.* Assessment (10 min)

- Students will be guided to identify the steps that were used. Students will create a poster/diagram showing the steps used. Students will be shown that they were actually using the Engineering Design Process (EDP) and the steps will be identified as: ASK, IMAGINE (brainstorm), PLAN, CREATE, and IMPROVE.
- Students will then use the chart of the EDP steps provided to self-assess and determine if they followed all the steps involved.
- An Engineering Design rubric will be used to assess the product design and the application of the EDP process.

EXTENDED LEARNING: Students will continue work on the solution to the problem by improving the design of their product for presentation in the next class.

LINKS TO OTHER SUBJECTS:

- Resource & Technology, Technical Vocation Education, HFLE, Social Studies

POST-LESSON REFLECTION:
