

Activity Title:	What Do You Do With a Problem? - Engineering Design Process
Timeframe:	At Least 3 - 40 Minute Class Periods
Big Ideas and/or Essential Questions:	<ul style="list-style-type: none"> • How can I use the Engineering Design Process to design something that will help others? • How can I make a creation with limited supplies? (<i>optional constraint</i>) • How do 4Cs behaviors help me work through the Engineering Design Process?
NGSS Science Practices:	<ul style="list-style-type: none"> • Asking Questions and Defining Problems • Developing and Using Models • Planning and Carrying Out Investigations • Using Mathematics and Computational Thinking <i>**Optional</i> • Constructing Explanations and Designing Solutions • Obtaining, Evaluating, and Communicating Information
Learning Target(s):	<ul style="list-style-type: none"> - I can use 5 items (<i>optional constraint</i>) and the Engineering Design Process to design something that will help others. - I can model 4Cs behaviors.
Materials:	<ul style="list-style-type: none"> • What Do You Do with a Problem? Book by Kobi Yamada • Upcycle Supplies (Recyclable Materials, Arts & Crafts Supplies) • Paper & Drawing Utensils for Blueprinting • Optional Youtube Video: Crash Course Kids Engineering Design Process - https://www.youtube.com/watch?v=fxJWin195kU
Activity Procedures:	<ol style="list-style-type: none"> 1. Read story - What Do You Do with a Problem? Book by Kobi Yamada 2. Talk about use of 4C's in the story (communication, collaboration, critical thinking, creation); review classroom expectations of modeling 4Cs behaviors when working in groups 3. Have students talk about a time they had a problem and solved it. 4. Briefly Teach/Review Engineering Design Process - Optional Crash Course Kids Youtube Video: https://www.youtube.com/watch?v=fxJWin195kU 5. Split class into groups of 3-5 6. Directions for Design Process: <ol style="list-style-type: none"> a. Define the Problem: How can you use the EDP to design something that will help someone?

- i. ***This is a great time to establish a classroom problem that you want students to solve if you would like to add an additional constraint to the design process.*
 - ii. ****Or If you teach older kids/have a longer time frame to expand this project, this is great opportunity to connect students' projects to the [UN Sustainable Development Goals](#) - students could work to solve global problems/issues.*
- b. Identify Any Possible Constraints:
 - i. You may only use 5 materials to build the model.
 - ii. Your creation may not be bigger than...
 - iii. Your project must help someone.
- c. Brainstorm:
 - i. Think of a variety of design ideas
 - ii. You need to draw up blueprints for your car
 - iii. You will need to create a supply list -- remember you may only use 5 materials to build your creation.
 - iv. ***Optional: If time allows, have students seek peer feedback before moving on to the building stage.*
- d. Select the most promising solution
- e. Prototype Your Design: You will need to create a model of your design, not full size
- f. Test: Pair up with another group to provide feedback -- consider glows/grows approach
- g. Iterate: Allow students time to make design better.
- h. Communicate: Student share out of blueprints and projects.
7. Wrap-up Group Conversation: How did you use the 4Cs with your group members? What do you love about your design? What didn't turn out the way you wanted it to? What would you do differently if you could do it again? How did you use the Engineering Design Process? How does your project help others?

Note: This activity is designed to allow students to plan a creation and see it through to completion. You can customize the design challenge as you see fit for your class. The learning is in the problem solving, resiliency and creation.

Extension Activities/Math Connections:

- Add a monetary amount to each item used. Ask students to

	come in below a certain budget.
Assessments:	Wrap-up Group Conversation: How did you use the 4Cs with your group members? What do you love about your design? What didn't turn out the way you wanted it to? What would you do differently if you could do it again? How did you use the Engineering Design Process? How does your project help others?

