

[ED] Ideate

Description

What solutions can we identify?

Work together to brainstorm potential solutions to the engineering design challenge. Focus on generating as many ideas as possible while avoiding ruling any out at this stage.

Time To Complete: 1-3 Hours

Common Core Standards

- ELA.WHST.1, 2, 4, 7, 8, 9

NGSS Assessed:

- HS-ETS1-2, 1-3

I Can Statements

- I can brainstorm solutions to my engineering challenge that:
 - Address the engineering challenge
 - Include sufficient detail
 - Are non-obvious, creative, or innovative
- I will know if my brainstorming is of high quality if it:
 - Addresses the engineering challenge
 - Includes sufficient detail
 - Includes non-obvious, creative, or innovative ideas

Suggestions for Assessing Student Readiness to Move Forward:

- Confer with students, asking probing questions about their brainstormed ideas to gauge how well they meet the quality criteria.
- Ask students to describe their brainstorming process and the solutions they generated, and to explain (orally or in writing) how the quality criteria for a high quality challenge are met.
- Ask students to self-evaluate their work after completing one of the activities below.

Possible Activities

Have students “draw-storm,” using large pieces of paper or storyboard to brainstorm nonverbally.

Use de Bono’s Six Thinking Hats approach to help students explore ideas:

http://www.debonogroup.com/six_thinking_hats.php

Have students generate and respond to randomly generated or “forced” questions:

<http://jcflowers1.iweb.bsu.edu/rlo/brainstorming2.htm>

If students have been provided with limited materials to complete the design challenge, have them describe the attributes of the materials to discover non-obvious uses:

<http://jcflowers1.iweb.bsu.edu/rlo/brainstorming2.htm>

Resources

- Steve Jobs and his team brainstorm as they design the NeXT computer: <http://tnw.co/1Gl2tu5> (starts at the 6-minute mark)
- Brainwriting, a technique for generating ideas: <http://bit.ly/1rw2YIH>
- How to generate multiple solutions in the design process: <http://www.sciencebuddies.org/engineering-design-process/alternative-solutions.shtml#howtocreatemultiplesolutions>
- Decision-Making Matrix Analysis: http://www.mindtools.com/pages/article/newTED_03.htm
- Example engineering drawings: <http://bit.ly/10SBcyZ>
- Storyboarding as part of the design process: <http://www.fastcodesign.com/1672917/the-8-steps-to-creating-a-great-storyboard>