

GETTING STEM TASTIC STACY/STAN TO THE CDC



LESSON OVERVIEW

In this activity, students must brainstorm a way to move Stacy/Stan through a field of zombies in order to deliver them to safety. Through the engineering design process, students will problem solve, build, and test a creation that will get Stacy/Stan to the CDC.

STANDARDS

NGSS MS-ETS1-1	Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
NGSS MS-ETS1-2	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
NGSS MS-ETS1-3	Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
CCSS – ELA W.8-12.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
CCSS – ELA W.6.2	Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.

OBJECTIVES

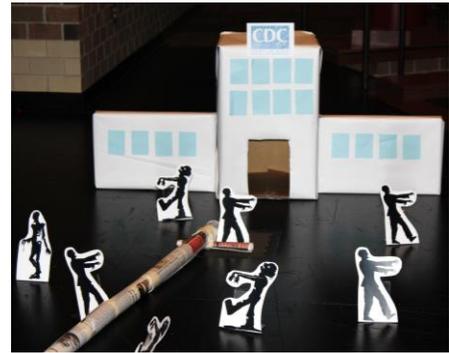
- Students will build and test a prototype that transports Stacy/Stan to the CDC.
- Students write an explanation of their use of the engineering design process, as well as the strengths, weaknesses, and ways to improve their designs.
- Students will discuss their designs with the class and explain how they crafted their prototype to deliver Stacy/Stan and would could make their solution stronger.

MATERIALS

- Engineering Design Process handout
- Newspaper
- Masking tape
- Popsicle Sticks
- Colorful scraps of paper
- Glue
- Other miscellaneous materials (i.e. cardboard, paper cups/plates, plastic utensils)
- Camera to take pics and send them to us
- Computers/mobile devices for videos
- CDC Box with opening in front
- Zombie Cutouts

PROCEDURES

1. Discuss the steps of the engineering design process and how it can help us solve problems. Relate it to other processes, such as the writing process or scientific investigation process.
2. Set out a hoarde of zombies across the room and a cardboard box on one end of the room with a hole in it. Label the box with a CDC sign, and place a line of tape at the opposite end of the room
3. Explain to the students how they will use each step of the engineering design process to develop a contraption that will safely transport STEMtastic Stacy/Stan to the CDC.
4. Allow time for the students to conduct research, brainstorm ideas for their solution, and build their prototype.
5. Encourage students test their prototypes and improve their prototypes and retest if necessary.
6. Have students write a short paragraph defining the criteria and constraints of the challenge and describing how their design serves as a solution that will save mankind. Students should cite any research used during the design process.
7. Have the students do a final test in front of the entire group to determine the effectiveness of their solutions. Use a rubric for evaluation.
8. Have the students discuss the similarities and differences among the design solutions to identify the best characteristics of each. Discuss how the best characteristics could be combined into other possible solutions.



ENGINEERING DESIGN PROCESS

IDENTIFY THE PROBLEM

What is the problem, and why is it important?

RESEARCH AND BRAINSTORM

Research: What has been done to solve this problem? Who is affected by this problem? What current solutions are available?

Brainstorm: What sort of things can be used to solve this problem? How can current solutions be improved? What materials will you need? Create concept designs.

BUILD

Decide upon your best design, gather your materials, and build your prototype.

TEST

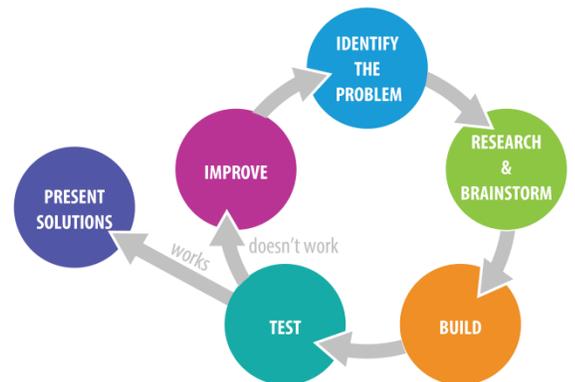
Test your prototype to determine its challenges, problems, and level of effectiveness.

Improve

If the prototype does not work, repeat the process by identifying problems with the prototype design, conducting more research and brainstorming possible improvements, modifying or rebuilding the prototype, and performing additional testing until a solid solution is found.

PRESENT SOLUTIONS

Once an effective solution is discovered, present your work to others. Possible forms of presentation include a project board or multimedia presentation at a meeting or conference, documentation made accessible to those who can benefit from the work, and electronic communication of the solution via email, social media, blogs, websites, digital signs, videos, etc.



RUBRIC

	Target (3)	Meets (2)	Partially Meets (1)	Does Not Meet (0)
Conceptual Design	Effectively demonstrates understanding of conceptual design for a specific purpose.	Demonstrates some understanding of conceptual design but some elements do not reinforce the purpose.	Attempts to demonstrate understanding of conceptual design but the design provides limited evidence of this knowledge.	Does not demonstrate understanding of conceptual design.
Use of Materials in Prototyping	Inventively and successfully chooses materials that produce visual interest and serves to support the project's purpose.	Appropriately chooses materials that serve to support the project's purpose.	Chooses materials but some work against the purpose of the project.	Does not choose appropriate materials.
Collaboration / Discussion	Works well with others and discusses ideas in a fair, respectful, and encouraging way and is considerate of the feelings of others.	Works okay with others and discusses ideas in a fair, respectful way, but may not have been encouraging. Considers the feelings of others.	Works with others, but did not contribute a fair share of work OR was discouraging and did not consider the feelings of everyone.	Did not work well with others and/or discusses ideas in an unfair, disrespectful way.
Prototype	The prototype is thoughtfully constructed to accomplish the assigned task.	The prototype is constructed to accomplish the assigned task but has minor flaws.	The prototype was constructed but has major flaws in accomplishing the assigned task.	The prototype was not constructed to accomplish the assigned task.
Requirements	Meets all of the requirements for the project.	Meets most of the requirements for the project.	Meets some of the requirements for the project.	Does not meet the requirements for the project.
Demonstration of knowledge of Curricular Content in Discussions and Activities	Demonstrates an advanced understanding of the curricular content covered in class related to this project.	Demonstrates an adequate understanding of the curricular content covered in class related to this project.	Demonstrates limited understanding of the curricular content covered in class related to this project.	Does not demonstrate an understanding of the curricular content covered in class related to this project.
Total				/18

ZOMBIE CUTOUTS

