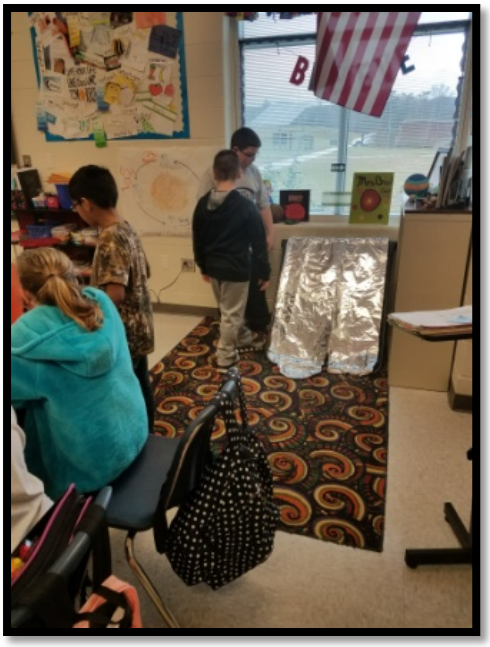
Bobsledding into the Olympic Games

Submitted by: Kimberly Brasel, 5th Grade
Dyllis Springs Elementary School, Oliver Springs, TN

Target Grade: 5th Grade Science

Time Required: 90 minutes



Standards:

Science

- **5.ETS1.1** Research, test, re-test, and communicate a design to solve a problem.
- **5.ETS2.1** Use appropriate measuring tools, simple hand tools, and fasteners to construct a prototype of a new or improved technology.

Speaking and Listening

- CCSS.ELA-Literacy.SL.5.1.a
- CCSS.ELA-Literacy.SL.5.1.b
- CCSS.ELA-Literacy.SL.5.1.d

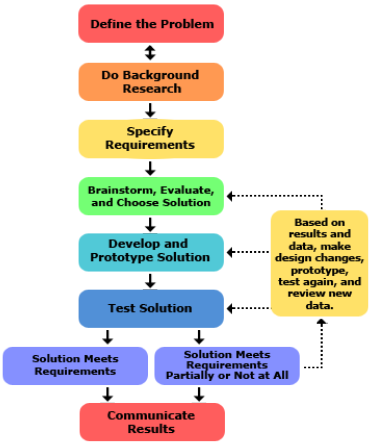
Lesson Objectives:

The learner will:

- design a model of a bobsled using up-cycled materials
- test and re-test the group's bobsled prototype
- communicate findings of the bobsled performance and future improvements to bobsled design

Central Focus:

This lesson allows students to take their engineering skills to the next level in the unit plan. Students will be designing and building their own bobsled with their team members. During this lesson students are continuing to build and enhance their team building skills and understanding of engineering and design by using a variety of up-cycled materials. This lesson also reminds students to reduce their carbon footprint by reusing materials and supplies around them.



Background Information:

- List all key concepts and terminology necessary for students to understand the concepts as well as meet the standards, goals, and objectives of the lesson.
- Students need to be familiar with the engineering design process.
- Students should understand that gravity pulls objects down toward the center of the earth.

Materials

- computer w/ Internet
- PowerPoint (intro, goal, purpose, and rules)
- medals or prizes for the winning teams
- timer or stopwatch
- teacher-made race track (made from aluminum foil)
- reflection worksheets
- student notebooks

Container of supplies per group:

- paper for sketches/designs
- 1-2 pairs of scissors
- 1 toilet paper roll
- 1 paper towel roll
- 2 plastic straws
- 1 sheet of aluminum foil
- 6 popsicle sticks
- 1 plastic cup
- 12 inches of masking tape
- 24 inches of duct tape (optional)

Day 1 Instruction:

Introduction (10 minutes)

- Show presentation to introduce the lesson and activity.

  Problem- Billy Bob needs your help. His bobsled is missing, and he needs a new one. Your team has been asked to design a new bobsled for him to use in the Olympic finals.

  Rules/Guidelines

  - You and your team will have a total of 35 minutes to design a bobsled.
  - During your 35 minutes you may do one test run to test your prototype.
  - You are allowed to use any of the materials that have been given to you in your box.
  - When the 35 minutes are up, you will meet at the ice to see how your bobsled performs against the other teams. The winner takes gold!

- Share introduction video of Bobsledding: https://www.youtube.com/watch?v=UGbOP79EhT0
- Refer to objectives

Engineer Activity (45 minutes)

- Divide students into teams of 4-5, distribute materials to groups, and display directions on the board.
- Students work in groups to design the bobsled on paper.
- After designing, students use the up-cycled materials to construct their prototype.
- Once students have built their prototype, students can test their prototype on the "race track."
- Students return to table to improve or modify their bobsled based on the test run.
- Teacher circulates classroom asking higher-order thinking questions: Why are you choosing to construct your bobsled in this way? Are there any factors that you predict will increase the speed of the bobsled? What happened during your test run that will influence how you improve your prototype? Etc.

Race (15 mins)

- After 35 mins, teams compete to see which bobsled has the fastest time and best design.
    - Teams bring their bobsled prototype to the race track.
    - Teacher uses stopwatch to time how long it takes the bobsled to finish the track.
    - Hint: the longer you make the track, the easier it will be to record the time because it will stretch the bobsled time.
    - Groups record the time of all groups in their notebooks.
    - The fastest bobsled will win as long at the design and structure stays in place through the finals/race.

Differentiation

Due to the activity being completed in teams, special needs students will be paired with regular education students to complete the activity. Additional time is always allowed, too, but only if it is needed.

Closure (Think-Pair-Share) (20 minutes)

- Think: After times have been calculated, students will individually complete the reflection worksheet (see below).
- Pair: Students discuss in their groups what they wrote down to see if they agree with each other's answers. Students choose a speaker for the class discussion.
- Groups meet at the Winner's Circle. Teacher announces the gold, silver, and bronze winners and medals are distributed.
- Share: Speakers represent their group and discuss what their group has reflected on.

- Extension: The gold medal winning teams in each block will be interviewed by the teacher and will have their design and interview posted to the 5th grade class web page.

Assessment

Formative assessment

- Via questioning during the engineer activity, teacher checks for understanding that students are designing their bobsled prototype with intention. Also, to make sure students are identifying appropriate tools to construct their prototype.
- During class discussion, teacher checks for understanding that groups can verbally communicate their findings.

Summative assessment

- The reflection worksheet assesses whether students can communicate in writing the process of testing and re-testing a prototype to solve the bobsled problem.

Checkout the video of our S.T.E.M. Lesson in action: https://youtu.be/fQSSiPUKrLw

Name: _____ Date: _____ Class: _____

Group members: _____

Bobsledding into the Olympic Games

Directions: Answer the questions below in complete sentences.

1. How did your bobsled perform compared to other model and designs? Why?

2. If you could improve or enhance your bobsled, what modifications would you make? Why?

3. When engineers build real bobsleds, they go through many steps like you did. Why do they have to design and test a bobsled prototype before building the actual bobsled?

4. What impact did you have on the environment by using up-cycled materials to construct your bobsled?