December 2020/January 2021 STEM Challenge

Build the Strongest Snow Fort Challenge

Due Date: February 2, 2021

The Challenge: The neighborhood kids are planning a snowball war and need to build forts to protect themselves. Can you build a strong enough snow fort to protect your team and withstand being knocked over or falling apart during a snowball war using the provided materials?
Procedure:

- Design and draw the optimal snow fort on paper.
- Construct a snow fort using the provided materials.
- Throw (snowballs) at your fort to see how many it can withstand before tumbling or falling apart.
- Record the classroom data on the provided data sheet.

The Materials:

- Newspaper/construction paper
- Toilet paper/paper towels
- Masking tape
- Pom poms/large marshmallows/bean bags

Submission:

- Draw or take a picture of your teams’ creation and list the materials used in the construction of your snow fort.
- Answer the challenge question.
- Complete the classroom data sheet.
- What changes would you make, if any, to your design and explain why you would make those changes.
- Please submit your drawing/picture, answer to the challenge question, and classroom data sheet to us in the “PONY” to the GST BOCES Science Center (mark STEM challenge)
- PLEASE be sure each submission has the child’s name, school district, grade level, and teacher name included

Standards:

- CDOS 3a Universal Foundation Skills; Students will demonstrate mastery of the foundation skills and competencies essential for success in the workplace: Thinking skills lead to problem solving, experimenting, and focused observation and allow the application of knowledge to new and unfamiliar situations; Personal qualities generally include competence in self-management and the ability to plan, organize, and take independent action; Positive interpersonal qualities lead to teamwork and cooperation in large and small groups in family, social, and work situations; Technology is the process and product of human skill and ingenuity in designing and creating things from available resources to satisfy personal and societal needs and wants.
- CDOS 3b Engineering/Industrial Processes: demonstrate knowledge of planning, product development and utilization, and evaluation that meets the needs of industry.

The Experiment:

- Use the Ask, Think and Plan sheet on the next page to come up with a fort design that you think will work best.
Name: ____________________________  Response Sheet for Challenge

Step 1: Group students. Recommendation would be pairs or triads.

Step 2: Students should get the same number of materials.

Step 3: Plan how you will design your fort to withstand the snowball war.

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<th>Step 4: Ask – What do you already know about forts?</th>
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<th>Step 5: Think – Which design do you think will work best?</th>
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<th>Step 6: Plan – Design and draw a sketch of what you think your fort will look like.</th>
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Step 7: Create and Test - build your fort and make sure it can stand up without supports. Toss “snowballs” at the fort, 1 at a time (keeping track of how many “snowballs” you have thrown) until the fort topples.

Step 8: Questions to Consider – did you build a structure wide or tall? How did you construct the fort walls? Did you make the walls thick or did you reinforce them with buttresses? How do you think that affected how long it took your fort to fall?? Try the experiment again to see how the wall supports affect how easily the wall fell down or apart.

Step 9: Re-design and test again – after seeing how many “snowballs” it took to topple your fort, build another fort using the same materials to see if you can create a design that will better withstand the snowball war.

Step 10: Conclusion – How did the design of the fort affect how long your fort could stay upright/together? Did the placement of the walls affect how soon the fort fell? What design features of the fort do you think made it stay standing or fall apart longer?

What was your favorite part of this challenge?

DATA Set

How many snowballs hit your snow fort before the walls broke or fell down?

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<th>Group Name/Members</th>
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<td>Number of Snowballs attempt #2</td>
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