Gr. 3 – Understanding Structures & Mechanisms

Strong and Stable Structures

Strong Shapes/Which is Strongest?

**Specific Expectations:**

2.1 Follow established safety procedures during science and technology investigations.

2.2 Investigate, through experimentation, how various materials and construction techniques can be used to add strength to structures.

2.3 Investigate, through experimentation, the effects of pushing, pulling, and other forces on the shape and stability of simple structures.

2.4 Use technological problem-solving skills, and knowledge acquired from previous investigations, to design and build a strong and stable structure that serves a purpose.

2.5 Use appropriate science and technology vocabulary, including compression, tension, strut, ties, strength, and stability, in oral and written communication.

3.1 Define a structure as a supporting framework, with a definite size, shape, and purpose, that holds a load.

3.3 Identify the strength of a structure as its ability to support a load.

3.4 Identify the stability of a structure as its ability to maintain balance and stay fixed in one spot.

3.7 Describe ways to improve a structure’s strength and stability.

**Big Idea (for lesson):**

Students will build and experiment with different shapes to discover that the triangle is the strongest shape, and will incorporate this finding into building a 3-dimensional structure that can support some weight.

**Accommodations:**

- Increase time
- Visual Aids
- Manipulatives
- Chunking
- Step-by-Step
- Scaffolding
- Copy of Notes
- Student Grouping

**Differentiated Instruction:**

- Content: Use demo to show the content as you offer verbal descriptions.
- Process: Have students work in pairs and support each other if physical impediments exist.
- Product: Students may show their final product in pairs, and communicate their findings either verbally, visually, or through written means.

**Bloom’s Taxonomy:**

- Knowledge

**Multiple Intelligence:**

- Verbal/Linguistic
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Strong and Stable Structures

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<th>Logical/Mathematical</th>
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Delivering The Lesson:

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<td>Minds On: 5 mins</td>
<td>W S I</td>
<td>Teacher can do a demonstration to introduce the notion of a “strong shape”, regardless of how heavy or stable the object is itself: -Fold the paper lengthwise several times, making an accordion shape. -Use 2 books as supporters, and place the paper across them like a bridge. -Ask students what will happen if you place the other 2 books on top of the paper? -Place the load on the bridge, and notice that the paper is able to support a weight much heavier than itself. (Source: <a href="http://www.mathsinthecity.com/sites/most-stable-shape-triangle">http://www.mathsinthecity.com/sites/most-stable-shape-triangle</a>) Ask students the following questions: -Would the paper have supported the books if it weren’t folded? (Answer: No) -What did the folds do for the paper? (Answer: it made the paper stronger.) Tell students to keep the following question in mind (and write it up on the board for reference): Why did the folds change how strong the paper was?</td>
<td>1 piece of paper at least 8.5x14” (preferably cardstock) 4 books (about an inch thick, ideally)</td>
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<td>Action: 30 mins</td>
<td>W S I</td>
<td>Have students complete the shapes and structures activities according to the instructions on the handout. Teacher can circulate and ask questions of the different groups: -What shapes do you notice are strongest? (Answer: Triangle) -How do you know it is strong? (Answer: It will</td>
<td>Strong Shapes &amp; Which is Strongest? Handout (Materials listed)</td>
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### Gr. 3 – Understanding Structures & Mechanisms

**Strong and Stable Structures**

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<th>Consolidate: 5 mins</th>
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- How can you make the other shapes stronger? *(Answer: by adding diagonal beams and trusses to make triangular shapes.)*
- How can you take advantage of triangular shapes in your structure? *(Answer: add diagonal beams where possible, try to stick with triangular supports.)*

Have students circulate and look at one another’s structures. As a group, have students give ideas of what worked well for them and make a list of good designs to keep in mind when trying to build a strong structure. Include a discussion of different materials and their advantages (i.e.: lightness, flexibility, strength...)

Leave them overnight, if possible, and observe which are still standing the next morning.

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<th>Chart Paper Markers</th>
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