

Name: _____ Class: _____ Date: _____

Sneeze-Proof Strength - Examining Tissues

Learner Outcomes:

- Interpret examples of variation in the design of structures that share a common function and evaluate the effectiveness of the design

Key Terms:

Laminations

Composite

Knit material

Background Information: Tissue is a thin material that has enough strength to resist sneezes. Tissue manufacturers often boast about the strength and quality of their product.

Investigative Question: What properties influence the strength of different brands of tissue?

Hypothesis: Examine all the brands of tissue and predict which brand will be the strongest

Materials:

Magnifying glass

Pennies or washers

Large empty
container

Several (3) brands of
tissue

Procedure:

Part 1:

1. Take a piece of facial tissue and observe and record its characteristics.
2. Take one piece of facial tissue and partly separate it into its layers. Look at its fibers through a magnifying glass and record your observations.
3. Put one layer of the tissue flat on a desk. Gently pull the top two corners apart. Rate how easy it is to tear the tissue on a scale of 1(easy) to 5(hard).
4. Turn the tissue 90 degrees and pull apart the same layer again. Record your observations.

This investigation / activity has been adapted from:

Bullard J, Krupa G, Krupa M, et al. *Science Focus 7*. Toronto, ON: McGraw-Hill Ryerson.

Part 2:

5. Place a piece of tissue over the empty container on a desk.
6. Holding the sides of the container to keep the tissue tight across the top of the container, add pennies to the centre of the tissue.
7. Count and record the number of pennies you added until the tissue tears.
8. Weigh the pennies to determine how much weight was required to tear the tissue.

Observations:

Analysis:

1. Are the layers of tissue arranged with their grains pointing in the same or different directions? Which arrangement is strongest?

2. Are the fibers pressed or woven together?

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3. In which direction is the tissue easiest to tear?

4. Which tissue was the strongest? What features made this tissue the strongest?

5. What other properties of tissues could affect their function or their sales?

6. Which of the tissues tested would you buy? Why?

Conclusion: Summarize what properties make a tissue strong.

Extension:

- A) Repeat the experiment with damp tissues.

- B) Repeat the experiment using different types of paper products such as newspaper, writing paper, paper towel, toilet paper, etc.