

Preliminary Planning Sheet Grades 3-5 – Best Raincoat Material

Time Required for the Task:

Approximately two 45-minute sessions.

Disciplinary Core Ideas

PS1.A

Crosscutting Concepts

- Cause and Effect
- Patterns
- Structure and Function
- Systems and System Models

Science and Engineering Practices

- Analyzing and Interpreting Data
- Asking Questions and Defining Problems
- Constructing Explanations and Designing Solutions
- Developing and Using Models
- Engaging in Argument from Evidence
- Obtaining, Evaluating, and Communicating Information
- Planning and Carrying Out Investigations
- Using Mathematics and Computational Thinking

Context

There are several ways in which to use this task. It can be used as part of a unit on liquids, to investigate the concept of absorption; as well as a means to help students design better testing criteria and procedures, as a way to reinforce science process skills and, finally, as a fun activity to do in April, when the rain seems never-ending!

Suggested materials

- Four different types of fabrics (jeans, linen, cotton, leather or suede are some examples)
- Eye droppers (one/two students)
- Hair dryer
- Water in easy-to-pour bottles
- Cups or bowls and measuring cups
- Clock or stopwatch
- Recording sheets

If you cut small pieces of cloth ahead of time, students will not need scissors. Styrofoam meat trays or sheets of plastic can be used under the fabrics to catch the water and make clean up easy.

Note: Be careful when using hair dryers, which should not be near water. I suggest setting up a designated hair-dryer area that can be easily supervised by the teacher.

Teaching Tips and Guiding Questions

It is important to have a variety of fabrics available to test. Make sure that all of the samples have equal chances of working (that one, such as the actual raincoat material, is not obviously better than the others). As students are brainstorming criteria, it is helpful to ask them how they would test each one. "Thinking aloud" with students should be done over and

over again before they will begin to do it on their own.

You want to ensure that the criteria are testable. Review the idea of fair testing and ask students how they will design their tests. Some questions to help guide their thinking are:

- How would you test that idea? Can it be tested fairly? Explain how you would do it. What variable(s) must stay the same each time?
- How many drops should you use? Do you want to simulate a light shower or a downpour? How will you be sure to make it the same for each trial?
- How will you be able to tell if it repels water? What will you do to test this? What will you watch for?
- How will you represent your data? Could you use a chart? a graph?
- Why is that fabric better than the others? How did you decide this? Can you support your decision using the results you got?

Possible Solutions

Some fabrics do work better than others, but the results that the students get will depend upon the work they do during their investigation and the fabrics that are selected for this test. A testable question should be stated and conclusions should refer to what was tested. Check to make sure that the students' conclusions accurately reflect their results (actual data collected and recorded). The students' solutions must include all the steps in their investigation, a representation of the results gathered, and their conclusions. Charts and units of measure (records, drops, etc.) should be labeled.