

Try This, Not That: Writing a Problem Question for Science Fair

People often use baking soda and vinegar volcanoes as an example of a typical Science Fair project. But making a volcano isn't exactly an experiment—it's just an admittedly fun thing to try out. In order to conduct an experiment using the scientific method, you need a testable question, or problem question, about how one thing affects something else.

A strong problem question should include your two variables, which are the two things that change in your experiment.

The independent variable (IV) is the one that the scientist changes. If you want to be a little cheesy, you could remember that the "I" in independent stands for "I change it."

The dependent variable (DV) "depends" on the other part of the experiment. You don't get to change this one. The dependent variable is the one you'll measure and ultimately, what will give you the results of your experiment.

One easy way to phrase your problem question is, "What is the effect of _____ (independent variable) on _____ (dependent variable)?"

Here are three interesting, but not very testable, problem questions. We've given each a rewrite to make it a strong science fair contender.

Instead of: Which material is most eco-friendly to use in household products and packaging?

Try: How does the type of packaging material used affect the amount of time needed for composting breakdown?

Your IV is the type of household material you test. You can get more specific—perhaps try out different kinds of food scraps, aluminum foil, cotton, plastic wrap, and more. You could even test out a new product claiming to be biodegradable ([like bioplastics](#)). Your DV is the amount of time it takes for each item to break down. Make sure you

keep the amount of each material the same, as well as all the conditions—moisture levels, temperature, light, and how often you stir it.

Instead of: How can you clean up an oil spill?

Try: What is the effect of different types of clean-up methods on the amount of oil collected in a spill simulation?

You can create your own oil spill using cooking oil and a shallow bin of water. Your IV will be the methods you use for clean-up, which has the added benefit of allowing you to get creative with the engineering process. You may want to emulate some of [these existing spill solutions](#), or design your own devices to compare. Your DV will be the amount of oil collected by your methods. Make sure to keep the amount of time constant, as well as all the conditions of the simulated spill itself.

Instead of: Why are humans still exhausting renewable natural resources like forests and freshwater?

Try: How does the rising rate of demand affect the amount of a natural resource available over time?

You can simulate the extraction and demand for a resource using basic props. For example, wooden popsicle sticks could represent trees in a forest. Your IV will be the rate at which you “cut down” trees, and you could try different rates of demand—exponential (such as doubling) versus arithmetic (such as adding a set amount each time). You can use a constant rate at which your resource, such as trees, renews itself. Or, you could try and simulate the difference between old growth and new growth forest—in fact, a few years ago, studies proved that [older trees actually grow faster](#) than younger ones! In this case, your DV will be how your forest looks after a certain amount of time. How many trees are left and how long will it take for the resource to be depleted?

These are just a few examples, but there are so many ways to rewrite interesting environmental questions to be testable science fair problem questions. You can kick your volcano to the curb this year!