

Science Project Question

Once you have chosen a topic of interest, you will need to create a related scientific question. Without a good question, your whole science fair project will be much harder, if not impossible! It is important to select a question that is going to be interesting to work on for at least a few weeks and that is specific enough to allow you to find the answer with a simple experiment. A scientific question usually starts with: How, What, When, Who, Which, Why, or Where. Here are some characteristics of a good science fair project question:

- The question should be interesting enough to read about, then work on for the next few weeks.
- There should be at least three sources of written information on the subject. You want to be able to build on the experience of others!
- The question should contain one factor (variable) that you can change in your experiment and at least one factor (variable) that you can measure.

Now, for something like a STEM fair project, it is important to think ahead. This will save you a lot of stress and unhappiness later. Visualize the experiment you might perform to answer your question. How does that possible experiment stack up against the following issues?

- The experiment should measure changes to the important factors (variables) using a number that represents a quantity such as a count, percentage, length, width, weight, voltage, velocity, energy, time, etcetera. Or, just as good might be an experiment that measures a factor (variable) that is simply present or not present. For example, lights *on* in one trial, then lights *off* in another trial, or *use* fertilizer in one trial, then *do not use* fertilizer in another trial. If you cannot observe or measure the results of your experiment, you are not doing science!
- You must be able to control other factors that might influence your experiment, so that you can do a fair test. A "fair test" occurs when you change only one factor (variable) and keep all other conditions the same.
- Is your experiment safe to perform?
- Do you have all the materials and equipment you need for your science fair project, or will you be able to obtain them in a reasonable amount of time at a cost that is okay for your family?
- Do you have enough time to do your experiment before the science fair? For example, most plants take weeks to grow. If you want to do a project on plants, you need to start very early! For most experiments you will want to allow enough time to do a practice run in order to work out any problems in your procedures.
- Does your science fair project meet all the rules and requirements for your science fair?
- Have you avoided the bad science fair projects listed in the Science Fair Topics to Avoid table in this project guide?

If you do not have good answers for these issues, then you probably should look for a better science fair project question to answer.

REMEMBER: Projects that involve human subjects, vertebrate animals (animals with a backbone) or animal tissue, bacteria, mold, fungi, viruses, parasites, DNA, or controlled or hazardous substances, NEED approval from Mrs. Jepsen **beforehand**.

Good Science Project Question Checklist

1. Is the topic interesting enough to read about, then work on for at least the next few weeks?
2. Can you find at least three sources of written information on the subject?
3. Can you measure changes to the important factors (variables) using a number that represents a quantity such as a count, percentage, length, width, weight, voltage, velocity, energy, time, etcetera?
4. Or, just as good, are you measuring a factor (variable) that is simply present or not present? For example,
 - Lights **ON** in one trial, then lights **OFF** in another trial,
 - **USE** fertilizer in one trial, then **DO NOT USE** fertilizer in another trial.
5. Can you design a "fair test" to answer your question? In other words, can you change only one factor (variable) at a time, and control other factors that might influence your experiment, so that they do not interfere?
6. Is your experiment safe to perform?
7. Do you have all the materials and equipment you need for your science fair project, or will you be able to obtain them quickly and at a low cost?
8. Do you have enough time to do your experiment more than once before the science fair?
9. Does your science fair project meet all the rules and requirements for your science fair?
10. Have you checked to see if your science fair project will require SRC (Scientific Review Committee) approval?
11. Have you avoided the bad science fair project topic areas listed in the "Science Project Topics to Avoid" table?

Examples of Good Science Project Topics/Questions

- How does water purity affect surface tension?
- When is the best time to plant soy beans?
- Which material is the best insulator?
- How does arch curvature affect load carrying strength?
- How do different foundations stand up to earthquakes?
- What sugars do yeast use?

Examples of Science Project Topics/Questions You Should Avoid

Projects to Avoid

Any topic that boils down to a simple preference or taste comparison. For example, "Which tastes better: Coke or Pepsi?"

Most consumer product testing of the "Which is best?" type. This includes comparisons of popcorn, bubblegum, makeup, detergents, cleaning products, and paper towels.

Any topic that requires people to recall things they did in the past.

Effect of colored light on plants.

Effect of music or talking on plants.

Effect of running, music, video games, or almost anything on blood pressure.

Effect of color on memory, emotion, mood, taste, strength, etc.

Any topic that requires measurements that will be extremely difficult to make or repeat, given your equipment.

Why

Such experiments do not involve the kinds of numerical measurements you want in a science fair project. They are more of a survey than an experiment.

These projects only have scientific validity if the investigator fully understands the science behind why the product works and applies that understanding to the experiment. While many consumer products are easy to use, the science behind them is often at the level of a graduate student in college.

The data tends to be unreliable.

Several people do this project at almost every science fair. You can be more creative!

Difficult to measure.

The result is either obvious (the heart beats faster when you run) or difficult to measure with proper controls (the effect of music).

Highly subjective and difficult to measure.

Without measurement, you cannot do science.

Projects to Avoid

Why

Why
Why

Graphology or handwriting analysis.

Questionable scientific validity.

Astrology or ESP.

No scientific validity.

Any topic that requires dangerous, hard-to-find, expensive, or illegal materials.

Violates the rules of virtually any STEM fair.

Any topic that requires drugging, pain, or injury to a live vertebrate animal.

Violates the rules of virtually any STEM fair.

Any topic that creates unacceptable risk (physical or psychological) to a human subject.

Violates the rules of virtually any STEM fair.

Any topic that involves collection of tissue samples from living humans or vertebrate animals.

Violates the rules of virtually any STEM fair.