Westover Elementary Science Fair

INFORMATION PACKET

Investigation Format for Grades 2-5 (optional for K-1)

This packet belongs to: _____

Important dates:

Early to mid-February, 2025: Research your project idea. Make hypotheses, plan experiments, and begin collecting data! Pro tips: take lots of photos, and be sure to record references to all of your source material.

February 19, 2025 (evening): Attend the virtual Brainstorming Workshop to generate project ideas and get answers to your questions about best practices for designing, executing, and presenting your project.

Late February/early March 2025: Plot data, make graphs, take photos, make your conclusions and start making your tri-fold display poster.

February 26, 2025: Last day to register for the Science Fair!

February 28th & March 7, 2025: Tri-fold display boards will be delivered (provided at no charge to all participants.)

March 13, 2025: Present your project at the Science Fair!

Steps to Prepare a Science Fair Project

1. Select an interesting scientific question: Choose something that is interesting to you. Use your local library, science teacher, and/or the internet to find ideas. Be sure to record where you obtained your references and source material.
2. Design one or more practical experiments that you think will help answer all or part of your question. Use the "Scientific Method" (see below). Take multiple measurements whenever possible and keep careful records of your experiment. Decide how to show your results.
3. Make an exhibit or display: tri-fold boards will be distributed in early March.
4. Practice explaining your presentation: Tell the story of your project – what your question is and what experiment you designed to answer it. You will definitely want to add photos or drawings. Practice presenting your findings to your family and friends.
5. Come to the Fair and have fun sharing what you learned with everyone!

What is the "Scientific Method"?

1. Students should use the scientific method when doing their projects. This is a process of investigation that scientists use. Here are the steps to follow:
2. Ask a Question: Ask a question about the physical world that you are curious about. Consider if there is, in fact, an answer to your question?
3. Make a guess (Constructing a Hypothesis): What do you think the answer is? Write down why you think this. Often the original question is too broad. Refine your question so that parts of your original question can be tested by experiments or measurements?
4. Test your guess (The Experiment): Think up a simple test that will tell you if your guess is correct. In nearly all cases, a numerical measurement can be made that allows the comparison between experimental conditions. Be sure to design your experiment to test only one *variable* at a time. Remember to keep everything else the same.
5. Watch and record your results (Data Collection): What happened when you did your experiment? Be sure to repeat your measurements to see how reliable the data is. Record all your observations. Sometimes it is useful to record things you don't immediately see as important, like the time of day or the room temperature. These may later help you to figure out your results. You can also use graphs, charts, drawings or photographs to see patterns in your measurements.
6. Draw your conclusions (Discussion and Conclusions): What do the results of all your measurements considered together tell you about your question? Was your guess correct or incorrect? Often, your first attempt at an experiment shows that you need to refine your experiment or the problem is more complicated than you originally thought. *Remember, experiments that don't turn out the way you predicted are not failures. They nearly always teach us something we didn't know.*

What Rules Must Be Followed When Doing a Science Fair Project?

- ➢ 1. Do not use dangerous or potentially hazardous chemicals in your experiment.
- ➢ 2. Have an adult present to be sure that your experiment is conducted safely.
- ➢ 3. Do not bring live animals to school for your presentation.

Pre-Experiment Organizer

Use this organizer to help you plan your investigation and set up your tri-fold board.

Experimental Procedure: (What are the sequence of steps you will take in the investigation?)

1.
2.
3.
4.
5.
6.
7.
8.

Continue on a separate sheet if necessary.

Data Collection: (Sketch or use a computer to construct a table, chart, or graph to display your data.)

Results: (What does your data tell you about the experiment?)

Write a paragraph or make a bulleted list of your conclusions based on evidence from your investigation. Explain the results. Also include any questions you may have now that you have finished your investigation.

Understanding Variables

Variable – any factor in an experiment that can affect what happens in the experiment. Examples are: length, weight or mass, height, temperature, time, location, wind, weather, materials used, amount (concentration), size, shape, or speed.

Independent Variable (manipulated variable) – the factor that will be intentionally changed during the experiment to find out what effect it has on something you are measuring. An example of an independent variable is using different lengths of string to construct a pendulum to observe the effect the length of the string has on the swing of the pendulum.

Dependent Variable (responding variable) – the factor that is *observed and measured* to see if it is affected by the change in the independent variable. An example of a dependent variable is the time it takes for a pendulum to swing back and forth when the string length is changed.

Controlled Variable – the factors in the experiment that must be kept exactly the same to make sure that they are not having any effect on the dependent variable. Variables that would need to be controlled in the pendulum experiment might be the weight of the pendulum, the type of string, avoiding wind, and the release height of the pendulum.

*Examples***:**

Variables that can affect the growth of plants include: amount of light, amount of water, temperature, type of water, how closely they are planted together, or fertilizer.

Variables that can affect the flight of a paper airplane include: wind speed, wind direction, size of the plane, weight of the plane, how hard you throw it, the type of paper, or design of the wings.

Designing a Fair Test

Only one variable at a time should be changed by the investigator during an experiment. This ensures that any changes in the data you collect (the dependent variable) are due to the one variable that was changed (the independent variable). This is called a fair test.

Measurements

The dependent variable should be measured many times to observe how reliable the measurement or experiment is. This is often when a variable you hadn't considered is discovered. It is common to report the *average* value that you measured. Be sure to discuss any variability in your results! To be a true scientist, you must be careful to keep measurements even if they don't agree with your original hypothesis.

How to Prepare Your Science Project for Display

A typical layout for the tri-fold display board:

<table>
<tr><td colspan="3">Title
Name and Grade</td></tr>
<tr><td>Introduction and Question</td><td rowspan="2">Description of Experiments</td><td rowspan="2">Results and Interpretations</td></tr>
<tr><td>Hypothesis</td></tr>
<tr><td>Discussion of Experimental Variables</td><td rowspan="2">Data and Observations</td><td>Conclusions</td></tr>
<tr><td>Materials Used</td><td>Acknowledgments</td></tr>
</table>

- Text about your study can be either handwritten (use pen or marker) or typed. Attach information sheets onto your display board. The printing should be large enough to be easily read by your audience at least 4 feet away. Be sure to include your name and grade on the front of the board!
- You may want to include photographs of yourself during the experiment to help illustrate how the data was taken.
- On the day of the Science Fair, you may want to bring a few of the smaller materials you used in your study to display with your poster.
- Please put your name and grade on the back of your presentation.
- In the Acknowledgments, be sure to write down where you got your information, equipment, any help or guidance from someone! This includes photos or graphics from the internet or wording from someone’s web page.

Questions You May Be Asked About Your Project at the Fair

Purpose:

- Why did you select this project?
- How did you start researching this topic?

Procedure:

- Explain what you did in the investigation.
- What was your procedure for carrying out the experiments?

Scientific Procedure/Hypothesis/Variables/Data:

- What do you know now that you didn't know when you started this project?
- Why did you do this experiment “x” number of times?
- Can you use your graph to explain your experiment? Why is this bar lower/higher than the other bars?
- If you keep growing these for 50 days, 100 days, or one year, what might happen? What would happen if you did “x” to your sample?
- If you used “x” instead of “y”, do you think you would get the same results? Why or why not? If your graph were to continue in such a pattern, what would you conclude?

Conclusions:

- How does your experiment relate to our everyday experiences (bridges, machines, cars, home appliances, etc.)?
- How could you continue testing or experimenting to learn more about your topic? Can you think of any new questions that make you curious about this problem or any other problem relating to your project?

Acknowledgment:

- Who assisted you in your project and how?