

# Science Fair Guide

## Using the Scientific Method:

### 1.) Define the problem:

- a. You see something and you want to know **why** or **how** it occurs.
- b. The problem is a testable question.

**Example** → My tree in my back yard has not grown in 7 years and looks pretty unhealthy...*WHY* isn't it growing like the other trees?

### 2.) Preliminary Observations:

- a. Go and look! Examine what is happening...write out your initial observations as bullet points.

**Example** → I walked outside and got very close to the tree...I noticed some ants in the roots and bark of the tree.

### 3.) List out what I already know about my problem:

- a. Even if you're not sure if your thoughts are correct or not, just list out in bullet form all the things you know or think you know in relation to the problem.

**Example** → - I don't think ants are supposed to actually be in the roots and bark.

- The tree is visibly shorter than any other trees of the same species in my yard.
- Maybe it isn't getting enough water
- Maybe it's getting too much sun
- Maybe it needs fertilizer...

### 4.) Preliminary Research:

- a. Find out what could be causing your problem

**Example** → ants are not healthy for trees, especially when they're in the roots. Also I have to be careful how I get rid of them or I could kill the tree or other animals in my yard.

### 5.) Make an Inference:

- a. Put your preliminary observations together with your research and what you already know in a small paragraph as a summary.

**Example** → Trees need to be able to absorb nutrients in order to survive and grow. Since the tree isn't dead I think the ants are taking just enough nutrients from the tree to keep it alive yet feed them. I need to get rid of the ants first, and then I can test for other things.

### 6.) Form a Hypothesis:

- a. This is a possible explanation for the problem using what you already know and have gathered through research and observations. Must be in an if/then statement and must not simply repeat the problem.
- b. The key here is it's an **educated** guess. Anything else is just a guess and that is not true science! By combining my research, observations and prior knowledge my guess should be very educated!

**Example** → If I get rid of the ants, then the tree will begin to grow and become healthier.

### 7.) List and gather Materials:

- a. What will you need to carry out your experiment?

## 8.) Variables:

- a. A variable is a factor that can cause a change in the results of an experiment.
- b. There are two variables:
  - i. The dependent variable → the factor that changes as a result of the other variable.
  - ii. The independent variable → what you mess with...the factor that as you change it, it will affect the dependent variable.

**Example** → In my experiment the independent variable is getting rid of the ants, the dependent variable is the growth/health of the tree.

## 9.) Line out a Procedure:

- a. Plan out how you're going to test your hypothesis on your problem. Number your steps and be specific. I should be able to follow your procedure without any help from you. (PB & J sandwich)

## 10.) Constants and Control:

- a. Be sure to list out the things you will keep constant like the amount of water, sunlight, soil etc...
- b. Have a control; a standard by which the test results can be compared to. Like another tree that is left perfectly natural and is not messed with at all. (Like if I had two trees that were infested, I would only test one and leave the other as my control)

## 11.) Record Lab Experiment Observations:

- a. In bullet form list out all you notice as you're doing your experiment.

## 12.) Organize Data:

- a. Record your results in a graph. I should be able to tell what happened in your experiment just by looking at this picture!
- b. be sure to label the x and y axis of your graph (the x is the horizontal line and the y is the vertical line)

## 13.) Conclusion:

- a. This should **ANSWER YOUR PROBLEM!!!** And let us know if your hypothesis was correct.  
**Example** → just because I know you're dying to know...the boiling water did work, however I didn't kill the queen ant, so she just had more kids and the process started over. The tree perked up and did begin to grow until the next generation came along. Eventually I went out and spent \$15.00 on a safe ant killer. But my nephews and children loved when I poured the boiling hot water onto the ants!



- **Board no larger than 4' x 6.5'**
- **Pictures with no human faces or identifying marks**
- **Categories of sci method clearly labeled**

# Journal:

- Composition notebooks, 3 ring binders or spiral bound notebooks with NO LOOSE PAPERS!
- NO NAME!!
  - Put your name and what grade you're in on a sticky note that can be removed when you place your journals in front of your boards for the judges.
- Journal must be in the following order:
  - if you have any questions please refer to the scientific method sheet included in your science fair packet for step by step instructions
  - 1. Title page
  - 2. Project problem/question
  - 3. Preliminary Observations
  - 4. W.I.A.K.
    - A list of What I Already Know about the problem/question before beginning.
  - 5. Hypothesis
    - In "if/then" format
  - 6. Materials needed
    - In bullets (be sure to include amounts of each material)
  - 7. Procedure
    - Numbered down the left side
  - 8. Observations during project
    - In bullets
  - 9. Data table/chart
    - With x and y axis labeled (x is the independent variable, y is the dependent variable)
  - 10. Conclusion
    - Answer the problem and state whether your hypothesis was correct.
  - 11. Personal Reflection paragraph
    - Your personal feelings and opinions of this project.

## *Writing an abstract*

*An abstract is a brief summary of the project.*

*It is normally ½ -1 page long and includes this information:*

### **Objective or Goal:**

State the objective, goal, or hypothesis upon which the project is based. Example: My objective was to learn if the feeding habits of hummingbirds are affected by color.

### **Materials and Methods:**

Indicate the materials, methods, and experimental design used in your project. Briefly describe your experiment or engineering methods.

### **Results:**

Summarize the results of your experiment and indicate how they pertain to your objective.

### **Conclusion/Discussion:**

Indicate if your results supported your hypothesis or enabled you to attain your objective. Discuss briefly how information from this project expands our knowledge about the category subject.

Name  
Class  
Period  
Date

## **Science Fair Project Design**

**(Copy this on another paper)**

### **1. Project question:**

### **2. Hypothesis:** (something testable, if/then statement)

### **3. Constants and Control:**

- Be sure to list out the things you will keep constant like the amount of water, sunlight, soil etc...
- Have a control; a standard by which the test results can be compared to. Like another tree that is left perfectly natural and is not messed with at all. (Like if I had two trees that were infested, I would only test one and leave the other as my control)

### **4. Independent Variable and Dependent Variable:**

- The dependent variable → the factor that changes as a result of the other variable.
- The independent variable → what you mess with...the factor that as you change it, it will affect the dependent variable.

### **5. Materials:** (bullets)

### **6. Procedure:** (numbered)

### **7. Timeline:**

- Specific dates...
  - On what exact date will you begin your project?
  - How many days/hours/minutes will it take?
  - What do you have planned to do for each day of your project?