Science & Invention Fair

A step by step guide for your successful project!

Presearch

- Read about your area of interest.
- Record possible research topics, information about these topics, and ideas and questions you have.
- Explore topics that you would like to study in depth.

Concept Map

- Make a web of your ideas.
- Put your area of interest in the center and brainstorm as many ideas about your area as you can.

Areas to Consider

- Biology
- Chemistry
- Astronomy
- Mathematics
- Computer Science
- Physics (motion, gravity, light & optics)
- Electronics / Engineering

Chronobiology
Meteorology
Earth Science
Invention

Selecting a Topic

- Select a topic that can be answered only by experimenting / or an invention that solves a problem.

- Write your topic as a QUESTION to investigated or PROBLEM to be solved.

Topic Choice

Good Topics:

1. Do different colored mints dissolve at the same rate?

   This is a good topic because it requires experimentation that you can do yourself.

Poor Topics:

1. How volcanoes erupt.

   This topic will not allow experimentation. Making a model that erupts is a demonstration not an experiment.

Topic Choice

Good Topics:

2. What surfaces do mealworms prefer?

This topic suggests the use of an experimental method. Asking a questions is a good approach toward developing your topic.

Poor Topics:

2. Microscopes

The topic is too general. Telling how one works is not experimentation.

Topic Choice

Good Topics:

3. Do all brands of paper towels absorb water at the same rate?

This is an investigation where only one variable is being manipulated.

Poor Topics:

3. Do different brands of paper towels soak up different temperatures of water at the same rate?

This topic needs to be narrowed down to one investigation. Only one variable should be manipulate din an investigation.

Selecting a Topic

- Help in finding a topic:
  - READ in science books, magazines, newspapers.
  - TALK to your teachers, family, friends
  - VISIT professional people, museums, zoos.

Selecting a Topic

- Select a topic you know nothing about. Something new may arouse your curiosity.
- Select a topic that you know something about but want to investigate further.
- Most importantly, select a topic that genuinely interests you.

Purpose / Project Description

- Purpose - One to three sentences that explains why you are doing this investigation.

- Description - A brief summary of what you are going to do.

Hypothesis

- The hypothesis states what you think is going to happen when you investigate a question.

- Question: Does light affect the way plants grow?
- Hypothesis: Plants will grow toward the light.
- Hypothesis: Plants will grow away from the light.
- Hypothesis: Light will make no difference in the way plants grow.

Procedure

- Project Plan - Step by Step directions
- Materials - materials and equipment needed - be specific.
- Identify the variables - both independent and dependent.

Project Plan

- Project Plan - Step by step directions. This is like a recipe. Anyone who reads them will be able to duplicate your investigation and get the same results. This will be modified as you go through your experiment. It will become important as a way of recording what you do.

Materials

- List all the materials used in your investigation.
- Include what, how much, and what kinds of materials you used. Keep in mind quantities are important. Be sure to use only metric units.

Variables

- **Independent** - a variable that is manipulated by the experimenter. Also known as a factor.
- **Dependent** - a variable that is measured by the subject. Also known as a dependent measure.

Variables

- Quantitative - variables are measured on an ordinal, interval, or ratio scale. In other words can be measured in some degree.
- Qualitative - variables are measured on a nominal scale. Nominal measurement consists of assigning items to groups or categories. No quantitative information is conveyed and no ordering of the items is implied.

Variables - Quantitative vs. Qualitative

- Example: If five-year old subjects were asked to name their favorite color, then the variable would be qualitative. If the time it took them to respond were measured, then the variable would be quantitative.

- The qualitative variables could then be analyzed using statistics.

Example of Variables

- Question: Do all brands of paper towels absorb the same amount of water?
- Independent Variable: Brands of paper towels.
- Dependent Variable: Amount of water that is absorbed by each towel.
- Keep all other variables constant: Size of paper towel, amount of water poured on each towel, temperature of the water used, container towels are placed in, method of pouring.

Data / Log

- Data refers to information gathered during your investigation. Writing in a notebook is the most convenient way to keep a log.
- Keep a daily record in your log book of what you did in your experiment / invention and what results you gathered.

Log Book

Should include:

A list of materials you used each time you worked on your project.

Notes on preparations.

Information about resources.

Detatiled day-by-day Notes on progress:

- What you are actually doing
- Problems you are encountering
- Things you would change

Drawings

Data Gathered - Notes, charts, tables, graphs

Judging Criteria - Science

- Scientific Thought - 30 points
- Creative Ability (Originality) - 30 points
- Thoroughness - 10 points
- Skill - 10 points
- Clarity - 10 points
- Dramatic Value - 10 points

Judging Criteria - Invention

- Originality of Idea - 30 points
- Inventing Process - 30 points
- Invention Effectiveness - 10 points
- Practicality - 10 points
- Need - 10 points
- Dramatic value - 10 points

Due Dates

- Concept Map - Dec. 3rd
- Project Proposal Form - December 10th
- Research Questions - December 17th
- Research Paper - January 14th
- Experiments completed - January 28th
- Display and final project - February 4th