Lincoln County R-III

Elementary Science Fair

Handbook

Why a Science Fair Project?

The Lincoln County Science fair is an opportunity for students to apply the scientific method to conduct independent research. The results of each student's research is presented in a school wide science fair, where the student's efforts are displayed to determine scientific merit. Students who have been judged to have used the scientific method properly and who have demonstrated thoroughness in their studies and effort could be awarded prizes and could advance to compete in regional science fairs.

Science Fair Expectations for Elementary Grades K-6

- All 5th graders will be expected to complete a science fair project either by themselves or with a partner. Partners must be from the same building grade level.
- All 4th graders will be expected to complete a science fair project either by themselves or with a partner. Partners must be from the same building grade level.
- All 3rd grade classes will complete a science fair project as a group and enter the project into the science fair.
- Any individual, partners, groups or classes in grades K-3 can complete a science fair project and enter into the school science fair.
- All buildings will hold a science fair.
- Building winners will be chosen in the following categories: Individual projects: Earth and Environmental, Biology, Physical Science, and Applied Consumer Science. There will be one partner project chosen in 5th grade and one partner project chosen in 4th grade.
- Winners of the school science fairs will participate in the Tri County Regional Science Fair that is held at St. Charles Community College.

<u>Parents Helping Kids</u>

How can I help my child with a science fair project?" This is a question many teachers been asked. It is important for parent to know that the more they are involved with their child's educations, the more the child will learn. As a parent, you are an important MENTOR (one who is a good listener and questioner) and COACH (one who teaches skills as the need arises) for your child.

1. **ENCOURAGE** your child's natural curiosity and sense of wonder by sharing in their observations.
2. **BE A GOOD LISTENER.** What are your child's interests? Help them focus and narrow their questions to ideas that are meaningful to them.
3. **BE POSITIVE.** If you have a positive attitude toward the science fair project, your child will develop that same positive attitude. They will also learn more if you are encouraging!
4. **LOOK AROUND FOR IDEAS.** Take your child to the Botanical Garden, Zoo, Science Center, library, etc. for ideas.
5. **SEEK OUT PEOPLE TO HELP YOU.** Contact people you know who have experience on a specific science area; electrician, doctor, vet and teachers.
6. **HELP YOUR CHILD KEEP A DAILY LOG OF THEIR RESEARCH ACTIVITIES!!**
7. **PROOFREAD YOUR CHILD'S REPORT.** Don't criticize their work, but rather suggest ways they may improve it or make it more presentable.
8. **HELP YOUR CHILD BUILD A DISPLAY FOR THEIR PROJECT.** Don't do it for them, just assist them.
9. **GO TO THE SCIENCE FAIR WITH YOUR CHILD.** Remember to focus on learning, and not what color ribbon they receive! Take pictures for future project ideas. Talk to your child about future science fair projects.
10. **REMEMBER…IT IS THEIR PROJECT!!!** Please help and encourage your child to do the best job that they can do, but don't do it for them. This is a chance for the child to showcase their work and what they have learned, not the parent.

"But I don't know what experiment to do!"

Many people have trouble choosing a topic for their science fair experiment.

Ideas:

- **Use library resources**
- **Talk to your teacher**
- **Internet resource**
- **www.all-science-fair-projects.com**
- **www.sciencebuddies.org**
- **www.sciencebob.com**

Be careful that your project is a true <u>experiment</u> and not a display. Talk to your teacher if you are not sure.

What a Science Fair Project Is:

✓ **A problem that needs an answer.**
Example: What color clothing absorbs the most heat?

✓ **A relevant, scientific question.**
Example: How much trash is kept out of landfills by recycling paper and plastic?

✓ **A question that generates further questions to answer.**
Example: Does the mass of an object affect the buoyancy of the object?

Which leads to: Does the volume of an object affect its buoyancy?

Which leads to: What is the relationship between mass and volume?

WARNING: When searching "science fair" books or websites, be careful! Not all suggested projects follow the criteria or guidelines for a science fair experiment. When in doubt, <u>ask your teacher.</u>

What a Science Fair Project is NOT:

X **A model**

Examples: Volcanoes that erupt, a model of an eye

X **A collection**

Examples: A rock collection; collecting different leaves

X **Observations**

Examples: Watching dog behavior, observing changes in nature

Due to the intense level of pre-approval required, students in grades K-5 are prohibited from performing research involving any vertebrates, including humans which include the following:

- Taking a person's finger prints
- Conducting surveys
- Sports activities/exercise
- Video gaming
- Medical procedures
- Culturing bacteria from human/animal subjects
- Pets(including aquarium fish)

Things not Allowed to be displayed at the Project

- Living organisms including plants
- Taxidermy specimens or parts
- Human or animal food
- Human/animal parts or body fluids
- Plant materials: living, dead or preserved. EXCEPTION: wood as a construction material in project of display
- All chemicals including water
- All weapons- including lasers
- Dry ice
- Sharp items(needles, nails, syringes, pipettes, knives)
- Flames or highly flammable items
- Batteries with open top cells

- Awards from other competitions
- School name or identification
- Photographs with faces or showing organisms in unnatural states(necropsy, dissection)
- Glass or glass objects
- Any other apparatus that is deemed unsafe by the Science Fair directors.
- There will be no electricity provided at the fair.

THE EXPERIMENT

I. Question (problem)

A. Select a topic that interest YOU!!!!

Topic: *Airplanes*

B. Choose something you can:

1.Investigate yourself

2.Measure (length, time, weight, etc.)

3.Construct inexpensively (project should not be costly)

C. State your topic as a question you can answer by experimentation.

Question: *Will the length of a paper airplane's wing span affect the time it will stay in flight?*

II. Research

A. Find as much background information on the topic as possible.
You may want to use:

1.Encyclopedia
2.Book, magazines, textbooks, etc.
3.Library resources

4. The internet

B. Keep a notebook about what you learn.
Include:
1. All procedures followed in the experiment
2. Dates and times of observations
3. Materials used
4. Observation notes
5. Thoughts and ideas
6. Ways to improve the experiment
7. Cite your sources that were used for research. This is your bibliography.

III. Hypothesis

A. A hypothesis is an educated **guess** that will answer your experimental question (the problem you are trying to solve).

1. The hypothesis is stated and written down **before** you go any farther!
2. The hypothesis is where you decide what you **think** is going to happen when you do your experiment.
3. The hypothesis should be written in an **"if...then..."** format.
4. Include the **independent** and **dependent** variables in the hypothesis.
   a. The *independent variable* is the **one** thing that is changed in the experiment.
   b. The *dependent variable* is the **effect** (or result) that the independent variable will have on the experiment.

Example:

Hypothesis: **If** *the length of a paper airplane's wingspan is is increased,* **then** *the time of flight will increase.*

Independent Variable: Length of wingspan

Dependent Variable: Time the plane remains in flight.

IV. Gather and List Materials

A. Develop a specific list of materials needed to do the experiment.
B. List exact quantities, measures and amounts.
C. **ONLY** use metric measurement.

V. Procedures

A. Write out a **step by step** set of directions that you will use to do your experiment. **(Number each step.)**
B. Make sure your procedure is easy to follow.
C. Perform your experiment.
D. Keep records of all data in a special notebook. (handwritten)
E. Perform all tests a **minimum** of **3** times.
F. Consider taking photographs throughout the experiment (remember: no faces).

VI. Results

A. What happened in the experiment?
B. Organize all of your data.
C. Draw charts, tables and graphs to exhibit results.
D. Write a detailed summary of your observations and results.

VII. Conclusion

A. Compare your results with your hypothesis.
B. Explain your results.
C. State whether your hypothesis was right or wrong (supported or rejected).
D. Write down what you learned from the experiment.
E. Explain what you would do differently if you were to do it again.
F. List anybody that helped you, but don't use first or last names (i.e. Mom, Dad, my teacher, my dad's friend who is an electrician, etc.)
G. Do not use first person pronouns. (ie: I, me, we, my, etc…)

VIII. Project Display

A. Give your project a title (be creative)!
B. Be neat and use correct spelling.
C. Be creative in your display.

D. Display picture (if applicable) on your display or in a small photo album.
E. Remember that correct information is the most important part of your display.
F. Include the following on the display board so that it is visible to the judges:
    1. Title
    2. Question
    3. Hypothesis
    4. Materials list
    5. Procedures
    6. Results (charts/graphs, etc.)
    7. Conclusion
    8. Written report or Science Journal.
    9. Bibliography

THE SCIENTIFIC METHOD

1. Topic

What scientific topic will be

2. Rationale

What do you want to find out about your topic?

3. Hypothesis

What do you think will happen? (make this **educated guess** before you begin any experimenting) Make a prediction on what you think will happen. A good hypothesis will be an **"If….then…"** statement.

4. Variables

Independent: the part of the experiment that is changed by the researcher, YOU (the "if" part of the hypothesis)

Dependent: results that take place because of the change in the independent variable (the "then" part of the hypothesis)

5. Control

The part of the experiment against which all test results are compared. (Never changes)

6. Background

Information about the topic. Must also state the scientific principle(s).

7. Materials

What do you need to use? Give exact amounts and sized, using metric measurements only.

8. Procedures

What will you do to find an answer to your question? Give a step by step listing, numbering each step. Anyone following your procedures should be able to reproduce the experiment.

9. Pictures

Put pictures of your experiment, before, during and after. Remember to label all pictures and NO faces!

10. Observations and Results

Use charts, tables, graphs (line, bar, pie). Data must be measurable, using numbers only. Descriptive language (color, gas production, etc.) is to be recorded in the spiral notebook. (log book)

11. Conclusions

Should have the following items included:

- ➢ Restate you hypothesis
- ➢ Tell whether or not your data supported you hypothesis.
- ➢ Explain why or why not you got the results you predicted.
- ➢ Tell what changes you would make if you were to re-do you r experiment.

12. Further Study: References

These three panels represent the three parts of you project board.

Use this as your model when you put your board together.

Project Dimensions

50 cm front to back
56 cm side to side
96 cm table top to project top

Appropriate sized displays can be purchased from your child's elementary school.

Student displays must be within the maximum dimensions as stated or they will receive a three (3) point deduction in score.