Wentzville School District

Science Fair Handbook

K-12th Grade

Dates to Remember
Science Fair Competition Date:
Entry Deadline:
Project must be turned in on:
My school's Science Fair Coordinator:
Project Boards will cost:
Project Boards will be available on:
Other Notes I Need to Remember for Science Fair:

Parents Helping Kids

"How can I help my child with a science fair project?" This is a question many teachers have heard. It is important for parents to know that the more they are involved with their child's education, 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, teachers, and the building science fair coordinator.
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 received! Take pictures for future project ideas. Talk to your child about future science fair projects.
10. **REMEMBER…IT'S 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, 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:

1. **Library/book store resources**
2. **Internet resources**
3. **Talk to your child's teacher**
4. **Talk to the building science fair coordinator**
5. **Be careful that your project is a true <u>experiment</u> and not a display**

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: Does the appearance of food affect its taste?

_ 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?

What a Science Fair Project is NOT:

¸A model

Examples: Volcanoes that erupt; a model of an eye

¸A collection

Examples: A rock collection; collecting different leaves

¸Observations

Examples: Watching dog behavior; observing changes in nature

These are all great ideas for a science display. However, they do not follow the criteria or guidelines for a science fair experiment.

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, ask your teacher or building science fair coordinator.

The prohibitions and rules for the Wentzville School District Science Fair follow the same guidelines set up by the *Missouri Tri-County Regional Science &*

***Engineering Fair*.** **This is to ensure that students from our district will not be disqualified from the next level of competition. These guidelines are available at:**
mtrsef.wordpress.com/page2/

Display and Safety Regulations

1. No faces or names allowed in the report, in pictures, or on the display.
2. No animal or human food items may be displayed no matter how well packaged.
3. Do not display liquids, including water.
4. Do not display any bacterial cultures or fungi (molds).
5. Do not display any live or preserved plants, embryos, or animals including insects.
6. Do not display soil or waste samples.
7. Do not display any chemicals (undamaged batteries are acceptable).
8. Do not display any sharp items.
9. Do not display any poisons, drugs or any controlled substances.
10. Do not display dry ice or other sublimating (fog producing) materials.
11. Do not display flames or highly flammable material.
12. Do not display glass or glass objects.
13. No loose items. Please secure any items such as log book.

Important: *Human research, vertebrate animal research, and psychological or other surveys MUST be reviewed and approved by a local Scientific Review Committee (SRC) prior to the start of research. Contact the building science fair coordinator if your project fits into these categories or if you have questions. Projects without prior approval are subject to possible disqualification from the judging.*

ℓ **GRADES K-8 - EFFECTIVE 2014-15 ACADEMIC YEAR:** Absolutely NO human or animal subjects ("no vertebrate rule") may be used in **Grade K-8** projects. This includes (but not limited to):

* Taking a person's fingerprints
* Conducting surveys (including taste tests)
* Sports activities/exercise
* Video gaming
* Medical procedures
* Culturing bacteria from human/animal subjects
* Pets (including aquarium fish)

Project Dimensions

54 cm. wide across front — 28 cm wide across back
36 cm. deep — 96 cm maximum height with title board

Appropriate sized displays can be ordered from Science Fair Supply Company at 1-800-556-3247 or http://www.science-fair-supply.com/

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

ENTRY GUIDELINES

For Kindergarten – 8th Grade

All students grades K-8, including self-contained Special Education, may enter an individual or partner project.

An individual project is a project that one (1) student performs.

A partner project is a project that two (2) students perform together. Students may be in different grades, but they will be evaluated at the higher grade level.

Teachers of grades K-3 may submit class projects.

CATEGORY DESCRIPTIONS

For Kindergarten – 8th Grade

Individual Projects

Individual projects may be entered in one of the following categories:

Biological – the category of biology may contain anything having to do with the functions, behaviors and structures of living things or human health. Projects that include human subjects, animals, plants, bacteria, fungus, nature studies, etc. would be considered Biology projects.

Chemistry – Projects that reflect chemical principles such as density, boiling point, freezing point, acid/base relationships, etc. would be considered Chemistry projects.

Physical – Projects that reflect principles of physics such as friction, pulleys, gravity, etc., as well as earth science topics such as astronomy, plate tectonics, earthquakes, volcanoes, etc., would be considered Physical Science projects.

Applied Consumer Science – Projects that compare or test the effectiveness of household projects or projects that are new inventions.

*Engineering projects may fit in Physical Science or Applied Consumer Science.

Partner Projects

Partner projects will be judged by grade level but not by category.

CATEGORY DESCRIPTIONS

For High School (Grades 9-12)

Individual Projects

High School individual projects will be judged by categories and not by grade level. Categories include: Biology, Chemistry, Medical/Health, Physics.

Team Projects

All high school team projects will be judged in one category.

International Projects

All students entering International high school **must** complete ISEF forms in order to be considered for the International Science and Engineering Fair.

THE EXPERIMENT

I. Question (problem)

A. Select a topic that interests 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. Encyclopedias
2. Books, magazines, textbooks, etc.
3. Library resources
4. The internet to contact university professors (they will help!)

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

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 dependant variable in the hypothesis.

a. *the independent variable* is the **1** thing that is changed in the experiment.
b. The *dependant variable* is the effect that the independent variable will have on the experiment.

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

Independent Variable: Length of wingspan

Dependant 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. 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.
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?
A. Organize all of your data.
B. Draw charts, tables & graphs to exhibit results.
C. 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. That anybody that helped you, but don't use first or last names (*i.e. Mom, Dad, my teacher, my doctor, my dad's friend who is an electrician, 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 pictures (*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

IS MY PROJECT AN AWARD WINNING SCIENCE FAIR PROJECT?

TITLE:

1. Is it creative?
2. Does it draw interest?

QUESTION:

1. Is it concise and to the point?
2. Is it phrased as a question?
3. Is it specific?

HYPOTHESIS:

1. Is it an **"If…Then…"** format?
2. Does it relate to the question?

(#3 and #4 below apply ***only*** to High School)

3. Are the independent and dependant variables mentioned in the hypothesis?
4. Are the independent and dependant variables stated separately?

MATERIALS:

1. Is everything needed in the experiment listed?
2. Are specific quantities of all materials stated?
3. Are metrics used?

PROCEDURE:

1. Is it step by step?
2. Is each step numbered?
3. Is it easy to follow?
4. Is it easy to understand?
5. If somebody else wanted to repeat the experiment, could they follow the directions easily?

**Independent and dependant variable data is required at the regional level ONLY. The local fair judges at the elementary level do NOT access variables.*

DATA / STATISTICS:

1. Did you use charts to show results of the experiment?
2. Did you use graphs to explain data?
3. Were METRICS used?
4. Are the results easy to understand?

ADEQUACY OF DATA:

1. DID YOU USE METRICS?
2. Was the experiment run at least three (3) times? *(For a truly outstanding experiment, run it lots of times: 5,10,15 or more.)*

CONCLUSION:

1. Did you state if the hypothesis was supported or rejected (right or wrong) by the experiment?
2. Did you explain why *<u>you</u>* think your hypothesis was supported or rejected.
3. What did you learn?
4. Did you thank everybody that helped you? (*<u>Remember</u>: don't use their names.*)
5. What could you do differently if you were to do the experiment again?

PRESENTATION:

1. Is your project easy to follow?
2. Is everything spelled correctly?
3. Did you use correct punctuation?
4. Did you avoid using first person pronouns? (*you, me, my, I, our – etc*.)

<u>OTHER HELPFUL HINTS:</u>

1. Is your project original? Were you creative?
2. Is your project neat and attractive?
3. Did you take lots of pictures and display them?
4. Does your project show evidence of total student involvement?
5. Did you keep a record of your experiment in a separate log book and include it with your report? This should include your procedure, dates and times of observations, materials used, thoughts and ideas at each stage of the experiment, etc.

THE SCIENTIFIC METHOD

1. Topic
What scientific topic will be investigated?

2. Problem
What do you want to find out about your topic?

3. Hypothesis
What do you think will happen? (make this guess before you begin any experimenting) Make a prediction on what you think will happen. A good hypothesis will be state: If…., then….

4. Variables
Independent: the part of the experiment that is changed by the researcher (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.

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 sizes, 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 of your experiment, before, during and after.

Label all pictures.

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.

11. Conclusions
Should have the following items included:
*Restate your hypothesis
*Tell whether or not your data supported your hypothesis
*Explain why or why not your got your results
*Tell what changes you would make if you were to re-do your experiment.

12. Further Study

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

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

SCIENCE FAIR JUDGING SHEET

1. Question/Problem Statement _____ Points
____ Relates to Problem
____ Relates to Hypothesis

2. Background Information _____ Points
____ Relates to problem
____ Correct information
____ Source(s)

3. Hypothesis _____ Points
If –Then Statement Written in 3rd person
Relates to Experiment
Award 2 points (fair), 4 points (good), 6 points (excellent)

4. Variables _____ Points
____ Clearly defined
____ Includes control (if applicable)
____ Measured values relate to the project

5. Materials List _____ Points
____ Metric Measurements
____ All materials used are listed

6. Procedure _____ Points
Steps of Investigation are Logical
Sequential
Award 2 points (fair), 4 points (good), 6 points (excellent)

7. Adequacy of Data _____ Points
____ Mathematical Accuracy
____ Appropriate Sample Size
____ Repetition (Multiple Trials)

8. Data/Statistics _____ Points
Mathematical Accuracy
Use of Appropriate Charts/Graphs
Graphs/Tables Labeled Correctly (Metric when appropriate)
Award 2 points (fair), 4 points (good), 6 points (excellent)

9. Conclusion _____ Points
Restates Hypothesis and Rejects/Accepts Hypothesis
Explains the Results
Award 2 points (fair), 4 points (good), 6 points (excellent)

10. Presentation Characteristics _____ Points
____ Creative/Original Topic
____ Photos/Drawings/Diagrams
____ Spelling Correct
____ Grammar

Total Points: _____

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Notes

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