ACSI student ACTIVITIES

SCIENCE FAIR STUDENT/ PARENT PACKET

I. ACSI Science Fair Philosophy

The Psalmist declares that God is the Creator and Sustainer of the world in which we live (89:11). Paul reminds us that this world is governed in an orderly way by specific laws and properties of matter and energy that God has established (Colossians 1:16-17). In order to fulfill His biblical mandate to subdue the earth and be good stewards of its resources, we must discover and understand all we can about the world in which we live.

Integrating the Bible with the school's science curriculum goes deeper than the use of scientific facts to illustrate spiritual truth, though such use is clearly scriptural. It also goes deeper than merely quoting Bible verses that refer to scientific subjects. It involves finding the scientific facts and principles that are taught in the Bible and incorporating them into the teaching where they are relevant to the subject at hand, thus consolidating truth gained from Bible study and from observations by men.

II. Purpose

ACSI provides the Science Fair so that students in our member schools can research, observe, analyze and draw conclusions in an area of science that is of interest to them. The Science Fair is designed to encourage students to study science from a biblical perspective. While we realize that younger students will need some assistance in developing their ideas and supervision as they do their experiments, 90% of the work is to be done by the students.

This packet is provided to help parents understand the process students are to follow in preparation for the Science Fair. Please direct specific questions to the science teacher at your child's school.

III. How To Help as a Parent

It is up to the student to decide what to study. You can help by motivating your child and listening to his or her ideas. However, it is crucial to remember that it is up to your child to design and execute the entire project. Judges at a science fair take particular care to note that the work is the student's and that the student understands the topic, the research, the experiments, the analysis of data, and the conclusion. The judges expect that the student has received some help from another person, such as a parent or teacher, **and that such help will be credited in the display.**

Support the Troops

Your child may need more attention than a teacher can give to each student in a large class. Some class time will be devoted to researching at the library; however, your child may find it helpful to do more library research outside of school. Expect your child to spend time brainstorming, researching, planning, experimenting, analyzing data, writing a report, and constructing a display. You may offer to spend time with your child at the library. You can also help by encouraging your child to record everything in his or her science project journal, such as notes from brainstorming, sources used during research, and observations made during data collection.

Your child has been told that an adult must be present during all data collection. Please supervise the experimental phase for safety purposes. You may refer to the Safety Guide to help avoid accidents during data collection.

When You Should Help

It is very easy to take control of a student's project, especially if you think it should be done differently. Remember that this project is a learning experience for your child, and he or she will not benefit from a project performed by you. If your child is performing all the necessary tasks to an acceptable standard and is not requesting assistance, your job is to supervise. If your child asks for help, appears to be struggling, or is performing below acceptable standards or with disregard for safety measures, then you may wish to offer assistance. (Science Fair Guide: Resources for Students, http://go.hrw.com/resources/go_sc/hst/HSTGP221.PDF)

IV. Five Parts of the Science Fair Project

1. The experiment using the Scientific Method
2. The Logbook
3. The Written Report
4. The Display Board
5. The Oral Presentation

A. The Experiment

A project is experimental if it meets the following criteria:

- A hypothesis is posed (a statement, not a question)
- A student experiment is conducted, using the scientific method
- Data/records are collected and analyzed (the experiment results in data that can be measured)
- The solution to a problem is sought

Steps in the Scientific Method

1. **Select a topic.** The topic should be interesting, original, allow for completion by the due date, not be too expensive, and it should have data that is measurable.
2. **Research and plan.** Check with the classroom teacher as to how many resources are required. The research should help the student in planning the experiment and developing the hypothesis statement. The hypothesis is an educated guess, based on the research, about the answer to the investigative question (title). Don't forget—professionals are also a good resource.
3. **Experiment.** Plan the experiment. What materials will you need and what steps will you take in testing your hypothesis? Record these steps in your logbook. Test the hypothesis at least three times. There should only be ONE variable in the experiment. The more times you repeat the experiment, the more reliable your results will be. Be sure to collect data for all trials. You can take photos to document your work as you go.
4. **Observe, record and analyze data.** Write down the steps that were followed and the data results in the logbook. Organize data from the research and experiment, looking for patterns.
5. **Draw a conclusion.** Determine if the hypothesis is supported or disproved by the experimental results.
6. **Write the report.** The written report is not written the same way a report may be written for an English class. Please follow guidelines for writing this report.
7. **Create the display.** The classroom teacher has the specific dimensions of the display board. Although it is tempting for students to use all computer graphics—or for younger students to have parents develop computer graphics, the best display boards are not always the "prettiest" boards. Please allow your student to design their board with your guidance.
8. **Give the oral presentation.** Students will give an oral presentation describing how they did their experiment, what they learned, what they would do differently, etc., to the judges. Students should be comfortable explaining their project to the judges. Judges may also ask questions to clarify their understanding of the process.

B. The Logbook

Everything you do on your project is in your logbook!

- ☐ History and record of progression of project (begin day of assignment, end the day turned in)
- ☐ Like a diary of science project—every time you work on your project record in logbook
- ☐ When experimentation begins, include procedure in detail and write out step-by-step
- ☐ Include drawings and labels
- ☐ Explain how all variables are controlled

Include

- ☐ **Title page:** title of project; name of student researcher; name of student's school
- ☐ **Second page** (and those following): question being investigated; list of materials; method for conducting experiment (plan); notations of safety precautions
- ☐ **ACSI Project Approval Form,** any required ISEF forms, consent forms: for photographs of individuals used on display or in reports
- ☐ **Subsequent pages:** record experimental procedures; actual data should be written down immediately (not scribbled on scraps of paper and entered later); dated pages

The logbook should be with you at all times while you are working on your experiment.

- Remember: an experiment can support or not support the hypothesis. Thomas Edison failed more times than he succeeded in his lifetime, but is still considered one of the greatest inventors of all times. The important thing is that the student uses the data in analyzing what happened and drawing a conclusion as to why it happened.

C. Written Report

Requirements:

- ☐ Grades 1–2: few sentences; handwritten
- ☐ Grades 3–4: min. of 200 words; neatly handwritten or word processed
- ☐ Grades 5–6: min. of 250 words; word processed

A Science Fair report is not written the same way a report would be written for an English class. When finished, the written report should be a neatly word processed or handwritten summary of your logbook. The written report should be divided into sections with headings labeled according to the list below.

Content

- ☐ **Title page:** include title (question format) and date
- ☐ **Table of contents:** shows organization of report
- ☐ **Introduction:** begins with hypothesis
  - Include background research (information needed to understand project) and biblical illustration ends with statement of how it relates to the project

Content *(continued)*

- ☐ **Materials & methods:** detailed information so someone could repeat your experiment
  - Using lists and step-by-step format NOT WRITTEN as paragraph
  - Include variables and control
- ☐ **Results/data:** uses data from logbook, in sequence; include graphs and charts NOT explaining results
- ☐ **Discussion:** EXPLAIN what did or did not happen in your experiment (do not repeat data, DISCUSS it)
  - Explain possible sources of errors
  - Cite literature to support conclusions
  - DO NOT state hypothesis was proven or disproven, only that data supports or disagrees
- ☐ **Conclusion:** summarize major discoveries found in experiment
- ☐ **Acknowledgements**: students acknowledge outside help received in performing project or conduction of research
- ☐ **Literature cited:** all sources must be identified/referenced, including internet and computer software—only works quoted are to be included, not research in preparation

  Book format: author last name, first name initials, date of publication, title of book, location where published Ex: *Jones, T. Hypertension in Young Adults. New York: HarperCollins, 1998.*

  Webpages format: you can do an online search for how to cite Internet sources

D. Display Board

- ☐ **Title:** use question format
  - Use on BOARD, LOGBOOK, and REPORT
- ☐ **Biblical application/illustration:** each project must include a biblical illustration to be displayed on board and included in report
  - Students should demonstrate an understanding in written report and oral presentations
  - Use on BOARD and WRITTEN REPORT
- ☐ **Abstract:** summary description of what was done; this is the same abstract that appears in the written report
  - Use on BOARD, LOGBOOK, and REPORT
- ☐ **Background information:** including problem, hypothesis, variables, control
- ☐ **Results:** include tables and graphs of data
  - Use on BOARD, LOGBOOK, and REPORT
- ☐ **Conclusion :** state whether hypothesis was correct
  - State changes that could be done to alter the outcome of the hypothesis or broaden the scope of the problem
  - Use on BOARD, LOGBOOK, and REPORT
- ☐ **Written report:** this MUST be with your display

- ☐ **Logbook** (including ACSI Project Approval form): MUST be with display and separate from written report
- ☐ **Equipment, samples, or other items from experiment** may be included: do NOT include prohibited items such as glass, chemicals, etc.); photographs may be used of items not allowed to be in the display
- ☐ **Photographs and/or diagrams**: included on display board and/or logbook to demonstrate the experimental process
  - Origins must be credited if not part of student's experimental process
  - Photographs of human subjects (other than student) must be accompanied by consent forms
- ☐ **Science fair ID label:** on lower right hand side of display board

Each display must include two written documents: a WRITTEN REPORT and a project LOGBOOK. Those documents are separate, though interconnected in their content, and are composed over the course of the science fair project.

A note about the use of computers in the display: Computer-generated graphics and lettering must be the student's work. Power Point Presentations (or other visual/sound presentations) are not to be part of the display.

E. Oral Presentation

Students will have several minutes to discuss their projects with the judges. Judges are interested in knowing if a student is knowledgeable about the topic. Can the student explain the project in knowledgeable/scientific terms and explain background information? Can the student accurately interpret the results of the experiment? Has a biblical application/illustration been integrated into the presentation? (Fifth through sixth graders should give a short presentation; younger students should be led, or prompted, by judges' questions to draw out the information.)

Examples of questions a judge may ask (depending on age of the student):

- Why did you decide on this topic?
- What is the purpose of your project?
- What was your hypothesis?
- Which variable did you change?
- For each value of the variable that you changed (the independent variable), how many trials did you conduct?
- What response did you observe or measure?
- What are some of the things you were careful not to let change (the constants) as you did the experiment?
- What procedures did you follow?
- In your experiment, what was the control? What sample did you use to compare the others with?
- What results did you find?
- What conclusions did you draw?

- How did your results relate to your original hypothesis?
- If you had a mentor, in what ways did your mentor assist you?
- In doing your library research, what related research did you find that was helpful to you in conducting your project?
- What would you do differently if you were to do the project again?
- What might you do in the future to continue your project?

V. Resources

For more detailed information please contact the classroom teacher. The ACSI Science Fair Coordinator Handbook contains more detailed descriptions of the written report, logbook and display board. You may also do an Internet search for grade-level science fair project ideas.

VI. Not Allowed in Project Display

Anything that could potentially be dangerous to the public is NOT allowed to be included in your ACSI Science Fair display, including, but not limited to, the following list.

Note: The following rules only apply to what is included in the actual display. The following items can be used for the project only if they are represented by photographs, drawings, or artificial items in the actual display.

- ☐ No glass or glass objects
- ☐ No living organisms, including plants
- ☐ No taxidermy specimens or parts
- ☐ No preserved vertebrate or invertebrate animals
- ☐ No human or animal food
- ☐ No human/animal parts or body fluids (for example, blood, urine, TEETH)
- ☐ No plant materials (living, dead, or preserved) that are in their raw, unprocessed, or non-manufactured state (exception: manufactured construction materials used in building the project or display)
- ☐ No laboratory/household chemicals, including water (exception: water that is integral to an enclosed apparatus)
- ☐ No poisons, drugs, controlled substances, hazardous substances or devices (for example, firearms, weapons, ammunition, reloading devices)
- ☐ No dry ice or other sublimating solids
- ☐ No sharp items (for example, syringes, needles, pipettes, knives)
- ☐ No flames or highly flammable materials
- ☐ No batteries with open-top cells
- ☐ No photographs or other visual presentations showing vertebrate animals in surgical techniques, dissections, necropsies, or other lab procedures
- ☐ No active internet or e-mail connections as part of displaying or operating the project at the ACSI Science Fair
- ☐ No apparatus deemed unsafe by entrant's adult sponsor and event chair (for example, large vacuum tubes or dangerous ray-generating devices, empty tanks that previously contained combustible liquids or gases, pressurized tanks)

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