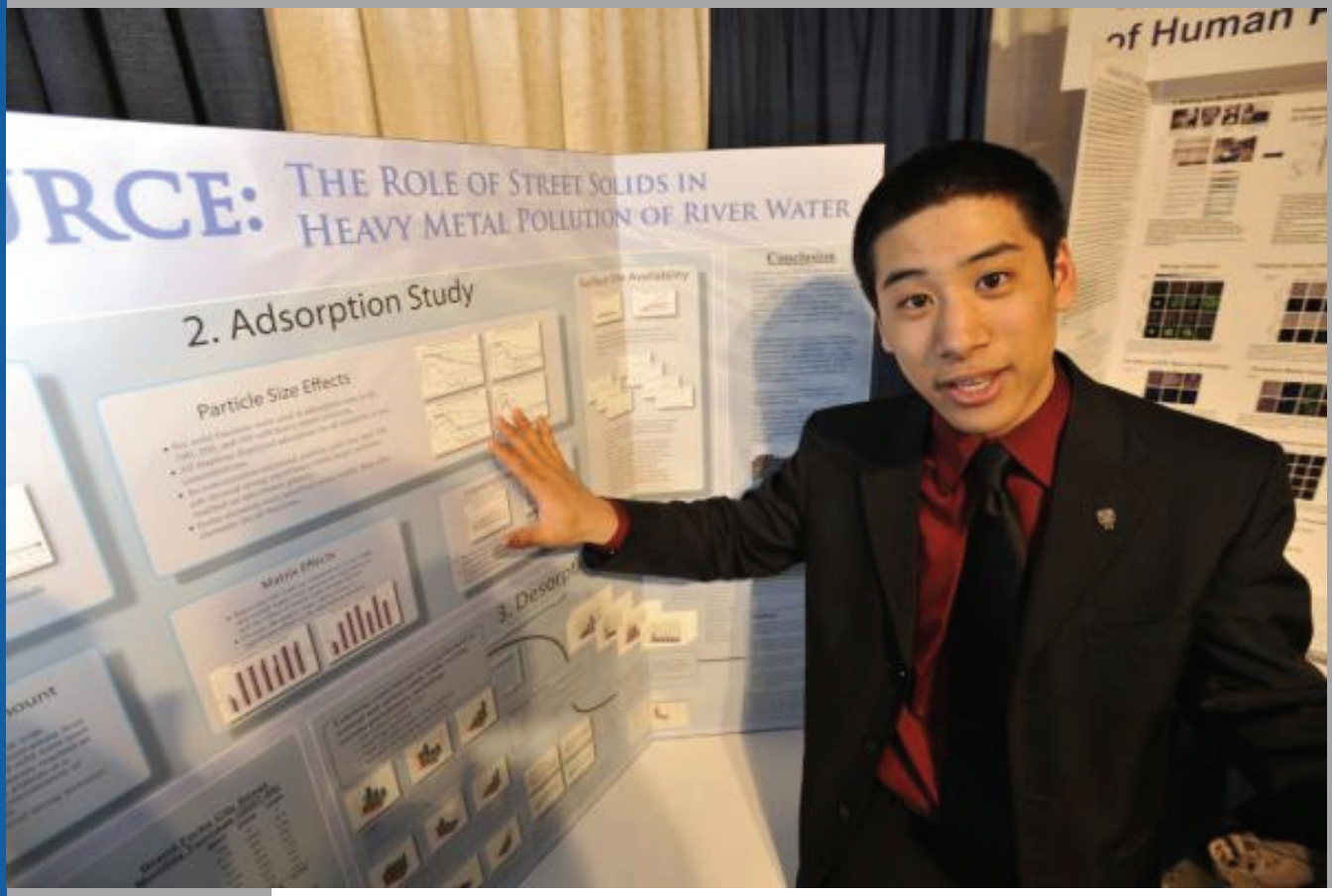
Section III



Appendices

Contents

Section III – Appendices

Appendix A: Glossary

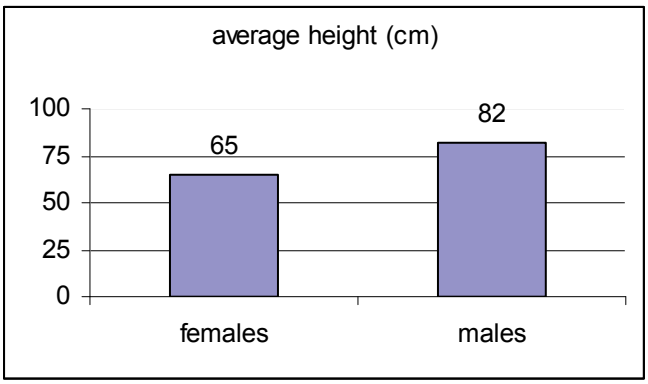
Abstract
A summary of the investigational question, hypothesis, methodology and chief conclusions of an investigation

Affiliated Fair
A fair that follows the Intel® ISEF rules and sends its winners on to compete at the next level in the Intel® ISEF system of fairs - In an Affiliated Fair, all rules and procedures established by Intel® ISEF must be followed by participants.

Analysis
A statement of the outcome of the investigation, including an answer to the experimental question based on the results obtained - The analysis is often stated in terms of whether the original hypothesis was supported or not. It should also include a discussion of sources of error and limitations of the investigation.

Animal tissue
See Intel® ISEF rules for exact definitions. Beginning in 2005, the rules no longer contain an exemption for tissues obtained from food sources. The definition includes all body fluids, teeth and hair.

Bar graph
A graph format used to portray data where the independent variable (horizontal axis) can be grouped into distinct categories (Compare to Line graph and Pie Graph below.)



Conclusion
See "Analysis" above.

Controlled Substances
According to Intel® ISEF rules, these include US Drug Enforcement Administration-classed substances, prescription drugs, consumable ethyl alcohol, explosives and tobacco.

Controlled variable
The conditions the investigator works to hold constant while measuring changes in the dependent variable caused by manipulating the independent variable

Data table
A record of the original, unprocessed data made at the time of experimentation or observation - Contrast this with a table of results which represents calculations and other ways to highlight trends in the results that also may be in table form.

Dependent variable
Often called the "measured" variable - The investigator is seeking to see how much change is made in this variable by changes in the independent variable.

Designated Supervisor
An adult who is directly responsible for overseeing student experimentation - The Designated Supervisor must be thoroughly familiar with the student's project and must be trained in the student's area of research.

Experimental variable
Another term for Independent Variable (See below).

Fair Director
The individual in charge of conducting an Intel® ISEF-Affiliated Fair according to the rules and organizational structure provided by Intel® ISEF.

Framing the question
Explaining the context for the investigation question based on previous experience of the researcher, prior research by others, or the testing of popular, long-held (but untested) beliefs - Also includes a summary of related research and background scientific understanding. For middle school students, a brief statement of the science they understand to be related to the subject of the investigation from middle school materials is all that is expected.

Hazardous material
In Intel® ISEF rules, "Hazardous Substances or Devices" include hazardous chemicals, firearms, radioactive substances, flammables, explosives, toxic chemicals, pesticides, mutagens or carcinogens and anything requiring a federal and/or state permit. It is best to see the Materials Data Safety Sheet (MSDS) for any substance in question.

Host City
The city selected by Science Service to host the International Intel® ISEF - in Indianapolis IN; in 2007, in Albuquerque NM.

Human Subject
Any human who is the subject of a study - Intel® ISEF rules include any human who participates in:

- any physical activity (e.g., physical exertion, ingestion of any substance, any medical procedure);
- any psychological or opinion survey (e.g., survey or test or questionnaire of any kind);
- any behavioral observation.

Permission of a teacher, school administrator, parent or the subject is not sufficient to exempt a human study investigation from the Intel® ISEF rules.

A student's design often includes doing some type of testing on him or herself. The human subject rules apply here, as well as to testing on a family member.

Hypothesis

A proposed explanation for a phenomenon - An investigation looks into the correctness of the hypothesis and tries to draw a conclusion as to whether the results support or refute the hypothesis. At the outset, investigators try to write the clearest hypothesis possible whether or not they think it will be supported or refuted. Clearly refuting a hypothesis is just as valuable for furthering knowledge as clearly supporting one.

Independent variable

Often called the "manipulated variable" - It is the condition that the investigator believes causes change in the variable to be measured. In observational investigations, the investigator takes data in a number of situations and then organizes the results in sequence by increase (or decrease) in this variable and looks for trends in the dependent ("measured") variable.

Inquiry science

The educational method of teaching science by having students actually go through the steps a scientist takes to gain new knowledge

Intel®

The world's largest manufacturer of microchips. The corporate sponsor of the Intel® ISEF competition.

Intel® ISEF (International Science and Engineering Fair)

The annual world meeting of about 1200 high school-age science fair finalists from over 53 countries for their final competition - All of the finalists won the right at an Intel® ISEF Affiliated Fair to compete at the international level.

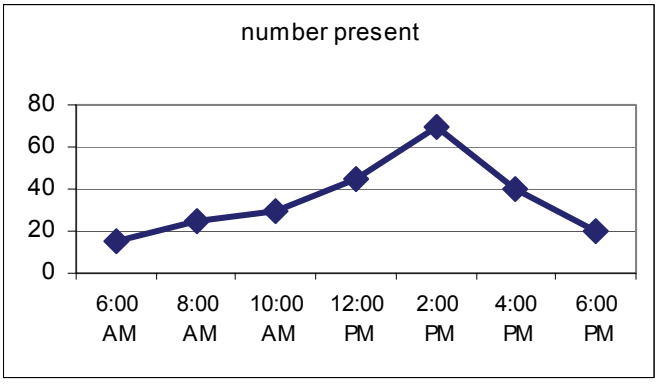
IRB (Institutional Review Board)

The group of adults (organized by the Fair Director) that must give approval to any project involving human subjects *before experimentation starts* **-** The IRB has a minimum of three members, including a science teacher, a school administrator and one or more of the following: a medical doctor, physician's assistant, registered nurse, psychiatrist, licensed psychologist or licensed social worker. This group evaluates the risk involved to the human subjects.

Line Graph

A graph format used to represent data where the independent variable (horizontal axis) is a continuum even if data is only taken at certain points.

(Compare to Bar graph above and Pie Graph below.)



A line graph should not be used if the variable is made of distinct groups and the spaces between the data points would have no meaning. For example, if you graph the average weight of various animals and your data groups are robins, salmon and crows, you wouldn't use a line graph because that would imply that there are animals that are part robin and part salmon, but you just didn't gather data on them. You'd use a bar graph in such cases.

Minimal Risk (related to human subjects)

Intel® ISEF rules define as "minimal risk," situations in which the probability and magnitude of harm or discomfort anticipated in the research are no greater than those ordinarily encountered in DAILY LIFE or during the performance of routine physical or psychological examinations or tests.

Specifically listed as "more than minimal risk" are:

- exercise other than that ordinarily encountered in DAILY LIFE by that subject;
- ingestion of any substance, including food, or exposure to any potentially hazardous materials;
- participation in any survey, questionnaire, viewing of stimuli or experimental condition that could potentially result in emotional stress;
- any activity that could potentially result in negative consequences for the subject due to invasion of privacy or confidentiality.

All human subject investigations must be approved by the SRC prior to experimentation. If approved, investigations involving more than minimal risk will require documentation of informed consent by the subject (and parent if the subject is a minor).

Measured variable

See "dependent variable" above.

MSDS (Materials Safety Data Sheet)

An information sheet provided by retailers and chemical suppliers along with almost any chemical substance - If one is not provided, contact the retailer or the chemical manufacturer, or look on line. One source is http://www.ilpi.com/msds/ . MSDS exist for such simple substances as vinegar and salt and for every hazardous substance.

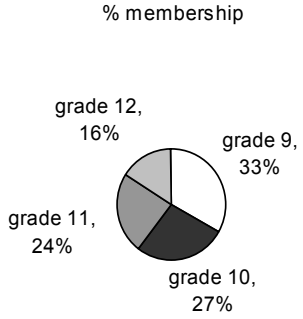
Observational projects

Investigations that involve only passive observation of variables - In the case of human or animal behavior, the investigator may not attempt to influence the behavior in any way and may have no contact with the subject. Usually the subject is unaware of the observation.

Pathogen

Intel® ISEF rules include all bacterial cultures (with three specific exceptions – visit website for more information), all animal and human wastes, viruses, fungi or parasites. All such investigations require prior approval of the SRC before experimentation.

Pie Chart
A graph used where traits of subparts of something usually considered as a whole are illustrated (Compare to Line graph and Pie Graph above.)



Procedure
The step-by-step instructions explaining the methodology of the investigation

Protocol
The set of rules for the investigation - These rules are found either in the step-by-step procedures or in separate protocols for handling special situations.

Qualified Scientist
A volunteer scientist who assists students with highly technical projects - The Intel® ISEF rules specify which projects require Qualified Scientists and their level of expertise. Generally they have a Ph.D. or equivalent in the field of the student's project. The rules specify that a master's degree and experience or expertise equivalent to a doctoral degree is acceptable if the experience or expertise is documented on Intel® ISEF Form 2.

Research design
The methodology for data gathering and handling of the investigation, usually a set of step-by-step records of what was done in the investigation and how special situations were handled - It also includes instructions for processing data into derived results.

Research plan
An Intel® ISEF term for the research design

Results
A term differentiating original measurement taken in the lab or field from the outcome of data processing such as calculations - For example, in a footrace, time and distance would be measured data. The runner's speed would be a calculated result. Students should be recording original measured data so someone can check the math in their calculated results.

Science Coach
A person with a scientific background who helps students develop their investigation question and design

Science Fair Support Volunteer
A person (with or without scientific experience) who helps the students with their investigations and assists the teacher with group operations- -Volunteers might assist with materials and arrangements, typing, encouraging students and chaperoning on the Fair Day.

SRC (Scientific Review Committee)
A group of volunteers (organized by your Fair Director) that will review each project for compliance with the Intel® ISEF rules - A student must receive SRC approval **before starting experimentation** in projects involving (1) nonhuman vertebrates, (2) pathogenic agents, (3) controlled substances, (4) recombinant DNA and (5) human or animal tissues. Investigations involving human subjects must receive prior approval from a different group, the Institutional Review Board (IRB).

Science Service
The non-profit organization which stages the Intel® International Science and Engineering Fair (Intel® ISEF). Information about local affiliates, rules, forms and investigations can be found at http://www.societyforscience.org/

Variable
Something that changes (or could change) during an experiment

Vertebrate animal
An animal with a backbone - The actual Intel® ISEF rule category is "nonhuman vertebrate animal." See Intel® ISEF rules for details of restrictions and documentation. In this category, the rules include: live, non-human vertebrate mammalian embryos or fetuses; bird and reptile eggs within 72 hours of hatching; and all other nonhuman vertebrates at hatching or birth.

Appendix B: Sample Calendars

Sample Calendar: group meets twice a week

If you use a calendar such as this, notice that the first column refers to your actual meeting weeks and the third column refers to the "weeks" in the *Guide* where you will find the activities. It is realistic for you to plan to meet with students more often in the last weeks before the fair. You might not need to see every student in the group every day, but many will need extra attention.

		Do lessons indicated in *Guide* for weeks	Lesson Title	Notes
Stage 1 Getting Ready				
		Guide Week 1	Gearing up for an After-school Science Club	
		Guide Week 2	Publicize Science Club/Students Apply	
Your Week 1	Session A	*Guide* Week 3	Selection and Notification of New Members	Send letters of acceptance and have meeting late the same week. Perhaps, move "Magic Candle Activity" up from *Guide* Week 4.
Stage 2 Learning Through Group Investigations				
Your Week 1	Session B	*Guide* Week 4	First Science Club Meeting	Eliminate the "Magic Candle Activity" from *Guide* Week 4.
Your Week 2	Session A	*Guide* Week 5	Introduction to Science Inquiry: Cars & Ramps	
	Session B	*Guide* Week 6	Writing Procedures	
Your Week 3	Session A	More *Guide* Week 6		
	Session B	*Guide* Week 7	Group Investigation: "Comeback Can" Races	
Your Week 4	Session A	*Guide* Week 8	More Group Investigations	
	Session B	*Guide* Week 9	Managing Data and Bar Graphs	
Your Week 5	Session A	*Guide* Week 10	Managing Data and Line Graphs	
	Session B	*Guide* Week 11	Investigative Questions	
Stage 3 Students Prepare for Their Own Investigations				
Your Week 6	Session A	*Guide* Week 12	Brainstorming Topics and Generating Questions	
	Session B	More *Guide* Week 12		
Your Week 7	Session A	*Guide* Week 13	Polishing Questions	
	Session B	More *Guide* Week 13		
Your Week 8	Session A	*Guide* Week 14	Background Research	
	Session B	*Guide* Week 15	Background Research (cont.)	
Your Week 9	Session A	*Guide* Week 16	Hypothesis	
	Session B	*Guide* Week 17	Investigation Design	
Your Week 10	Session A	*Guide* Week 18	Investigation Design (cont.)	
	Session B	*Guide* Week 19	Design Revision and Forms	

Your Week 11	Session A	*Guide* Week 20	Preliminary Data Collection	
	Session B	*Guide* Week 21	Developing a Data Format	
Stage 4 Conducting Investigations				
Your Week 12	Session A	*Guide* Week 22	Investigations Begin	
	Session B	More *Guide* Week 22		
Your Week 13	Session A	*Guide* Week 23	Abstract Lesson	
	Session B	*Guide* Week 24	Transforming Investigations Into Displays	
Your Week 14	Session A	*Guide* Week 25	Work on Display Boards	
	Session B	*Guide* Week 26	Analyzing Results	
	Session C	*Guide* Week 27	Work Continues on Investigations and Displays	
Your Week 15	Session A		Work Continues on Investigations and Displays	
	Session B		Work Continues on Investigations and Displays	
	Session C	*Guide* Week 28	Finish Displays	
Stage 5 Getting Presentations Ready for the Fair				
Your Week 16	Session A	*Guide* Week 29	Presentations	
	Session B	*Guide* Week 30	Practice Presentations – Prepare for the Fair	
	Session C	*Guide* Week 31	Final Fair Preparations	
Your Week 17		*Guide* Week 32	The Fair!	

Sample Calendar: group meets three times a week

If you use a calendar such as this, notice that the first column refers to your actual meeting weeks and the third column refers to the "weeks" in the *Guide* where you will find the activities. For a few weeks, it would not be reasonable to try to speed up students in some processes (your Week 2 and 3, for example).

		Do lessons indicated in *Guide* for weeks	Lesson Title	Notes
Stage 1 Getting Ready				
		Guide Week 1	Gearing up for an After-school Science Club	
		Guide Week 2	Publicize Science Club/Students Apply	
Your Week 1	Session A	*Guide* Week 3	Selection and Notification of New Members	Send letters of acceptance and have meeting late the same week. Perhaps, move "Magic Candle Activity" up from *Guide* Week 4.
Stage 2 Learning Through Group Investigations				
Your Week 1	Session B	*Guide* Week 4	First Science Club Meeting	Eliminate the "Magic Candle Activity" from *Guide* Week 4.
Your Week 2	Session A	*Guide* Week 5	Introduction to Science Inquiry: Cars & Ramps	
	Session B	*Guide* Week 6	Writing Procedures	
	Session C	More *Guide* Week 6		
Your Week 3	Session A	*Guide* Week 7	Group Investigation: "Comeback Can" Races	
	Session B	*Guide* Week 8	More Group Investigations	
	Session C	*Guide* Week 9	Managing Data and Bar Graphs	
Your Week 4	Session A	*Guide* Week 10	Managing Data and Line Graphs	
Stage 3 Students Prepare for Their Own Investigations				
Your Week 4	Session B	*Guide* Week 11	Investigative Questions	
	Session C	*Guide* Week 12	Brainstorming Topics and Generating Questions	
Your Week 5	Session A	More *Guide* Week 12		
	Session B	*Guide* Week 13	Polishing Questions	
	Session C	More *Guide* Week 13		
Your Week 6	Session A	*Guide* Week 14	Background Research	
	Session B	*Guide* Week 15	Background Research (cont.)	
	Session C	More *Guide* Week 15		
Your Week 7	Session A	*Guide* Week 16	Hypothesis	
	Session B	*Guide* Week 17	Investigation Design	
	Session C	*Guide* Week 18	Investigation Design (cont.)	
Your Week 8	Session A	*Guide* Week 19	Design Revision and Forms	
	Session B	*Guide* Week 20	Preliminary Data Collection	
	Session C	*Guide* Week 21	Developing a Data Format	
Stage 4 Conducting Investigations				
Your Week 9	Session A	*Guide* Week 22	Investigations Begin	

	Session B	More *Guide* Week 22		
	Session C	*Guide* Week 23	Abstract Lesson	
Your Week 10	Session A	*Guide* Week 24	Transforming Investigations Into Displays	
	Session B	*Guide* Week 25	Work on Display Boards	
	Session C	*Guide* Week 26	Analyzing Results	
Your Week 11	Session A	*Guide* Week 27	Work Continues on Investigations and Displays	
	Session B		Work Continues on Investigations and Displays	
	Session C		Work Continues on Investigations and Displays	
Your Week 12	Session A	*Guide* Week 28	Finish Displays	
Stage 5 Getting Presentations Ready for the Fair				
Your Week 12	Session B	*Guide* Week 29	Presentations	
	Session C	*Guide* Week 30	Practice Presentations – Prepare for the Fair	
Your Week 13	Session A	*Guide* Week 31	Final Fair Preparations	
	Session B	*Guide* Week 32	The Fair!	

Sample Calendar: group meets four times a week

If you use a calendar such as this, notice that the first column refers to your actual meeting weeks and the third column refers to the "weeks" in the *Guide* where you will find the activities. For a few weeks, it would not be reasonable to try to speed up students in some processes (Your Week 2 and 3 for example.)

		Do lessons indicated in *Guide* for weeks	Lesson Title	Notes
Stage 1 Getting Ready				
		Guide Week 1	Gearing up for an After-school Science Club	
		Guide Week 2	Publicize Science Club/Students Apply	
Your Week 1	Session A	*Guide* Week 3	Selection and Notification of New Members	Send letters of acceptance and have meeting late the same week. Perhaps, move "Magic Candle Activity" up from *Guide* Week 4.
Stage 2 Learning Through Group Investigations				
Your Week 1	Session B	*Guide* Week 4	First Science Club Meeting	Eliminate the "Magic Candle Activity" from *Guide* Week 4.
Your Week 2	Session A	*Guide* Week 5	Introduction to Science Inquiry: Cars & Ramps	
	Session B	*Guide* Week 6	Writing Procedures	
	Session C	More *Guide* Week 6		
	Session D	*Guide* Week 7	Group Investigation: "Comeback Can" Races	
Your Week 3	Session A	*Guide* Week 8	More Group Investigations	
	Session B	*Guide* Week 9	Managing Data and Bar Graphs	
	Session C	*Guide* Week 10	Managing Data and Line Graphs	
	Session D	*Guide* Week 11	Investigative Questions	
Stage 3 Students Prepare for Their Own Investigations				
Your Week 4	Session A	*Guide* Week 12	Brainstorming Topics and Generating Questions	
	Session B	More *Guide* Week 12		
	Session C	*Guide* Week 13	Polishing Questions	
	Session D	More *Guide* Week 13		
Your Week 5	Session A	*Guide* Week 14	Background Research	
	Session B	*Guide* Week 15	Background Research (cont.)	
	Session C	*Guide* Week 16	Hypothesis	
	Session D	*Guide* Week 17	Investigation Design	
Your Week 6	Session A	*Guide* Week 18	Investigation Design (cont.)	
	Session B	*Guide* Week 19	Design Revision and Forms	
	Session C	More *Guide* Week 19		
	Session D	*Guide* Week 20	Preliminary Data Collection	
Your Week 7	Session A	*Guide* Week 21	Developing a Data Format	
Stage 4 Conducting Investigations				
Your Week 7	Session B	*Guide* Week 22	Investigations Begin	

	Session C	More *Guide* Week 22		
	Session D	*Guide* Week 23	Abstract Lesson	
Your Week 8	Session A	*Guide* Week 24	Transforming Investigations Into Displays	
	Session B	*Guide* Week 25	Work on Display Boards	
	Session C	*Guide* Week 26	Analyzing Results	
	Session D	*Guide* Week 27	Work Continues on Investigations and Displays	
Your Week 9	Session A		Work Continues on Investigations and Displays	
	Session B		Work Continues on Investigations and Displays	
	Session C	*Guide* Week 28	Finish Displays	
Stage 5 Getting Presentations Ready for the Fair				
Your Week 9	Session D	*Guide* Week 29	Presentations	
Your Week 10	Session A	*Guide* Week 30	Practice Presentations – Prepare for the Fair	
	Session B	*Guide* Week 31	Final Fair Preparations	
	Session C	*Guide* Week 32	The Fair!	

Appendix C: Resource List

Science Fair Web Resources

Discovery Education™ Science Fair Central
http://school.discoveryeducation.com/sciencefaircentral/
This resource from Discovery Education provides engaging digital resources to schools and homes with the goal of making science educators more effective, increasing student achievement, and connecting classrooms and families to a world of inquiry-based learning.

Science Buddies
http://www.sciencebuddies.org/
The award-winning, non-profit Science Buddies empowers K-12 students, parents, and teachers to quickly and easily find free project ideas and help in all areas of science from physics to food science and music to microbiology. Whether your goal is to find a fun science activity for your kids or win the international science fair, ScienceBuddies.org puts comprehensive, scientist-authored tools, tips, and techniques at your fingertips.

Intel Education: Design and Discovery
http://educate.intel.com/en/designdiscovery
Design and Discovery is an academic enrichment curriculum that engages students in hands-on design activities that enhance knowledge and problem solving skills in the areas of science and engineering.

All Science Fair Projects
http://www.all-science-fair-projects.com/
This site contains science fair projects, with complete instructions, for all grade levels. Includes a search option for any science-related topic.

Science News for Kids
http://www.sciencenewsforkids.org/
This website is published by Society for Science & the Public (SSP) and is devoted to science news for children of ages 9 to 14. Their goal is to offer timely items of interest to kids, accompanied by suggestions for hands-on activities, books, articles, Web resources, and other useful materials.

Society For Amateur Scientists
http://www.sas.org/
The mission of the Society for Amateur Scientists (SAS) is to remove the roadblocks that prevent ordinary people, of all ages, from participating in extraordinary science.

The WWW Virtual Library: Science Fairs
http://physics1.usc.edu/~gould/ScienceFairs/
This Library page is an attempt to provide a single comprehensive list of *every* science fair accessible through the World Wide Web, whether of global or local scope.

Johnnie's Math Page
http://jmathpage.com/JIMSStatisticspage.html
This site contains interactive math tools and activities for kids and teachers. Students can make graphs, sort data, and even complete an activity on data interpretation.

Science Fair Competitions

Discovery Channel Young Scientist Challenge
http://www.youngscientistchallenge.com
The Discovery Education 3M Young Scientist Challenge is the premier national science competition for students in grades 5 through 8. The Young Scientist Challenge is designed to encourage the exploration of science and innovation among America's youth and to promote the importance of science communication.

Broadcom MASTERS National Middle School Competition
http://www.elmers.com/broadcommasters
Elmer's Products is honored to partner with Broadcom and Society for Science & the Public to continue a tradition of encouraging young scientists, engineers, and innovators to pursue their interests through competition that rewards independent research, scientific inquiry, hands-on learning, and teamwork.

Google Science Fair
http://www.google.com/events/sciencefair/index.html
Google is looking for the brightest, best young scientists from around the world to submit interesting, creative projects that are relevant to the world today. Submit and view other science projects online.

Intel International Science and Engineering Fair
http://sciserv.org/isef/
This official site of the Intel International Science and Engineering Fair (ISEF) contains information about Affiliated Fairs and rules/guidelines for entering a science fair.

Books and Multimedia

These books are a good asset for any science teacher. They include lessons on science skills, inquiry-based learning and science experiment design.

Science Experiments and Projects for Students by Cothron, Giese and Rezba.
ISBN: 0-7872-6478-4 Kendall/Hunt Publishing Company

Science Process Skills by Rezba, Sprague and Fiel.
ISBN: 0-7872-7779-7 Kendall/Hunt Publishing Company

Students and Research by Cothron, Giese and Rezba.
ISBN: 0-7872-6477-6. Kendall/Hunt Publishing Company

This movie shows the fun and hard work involved in getting to a science fair.
October Sky, Universal Studios, 1999. Rated PG

Appendix D: Curriculum Alignment with Science Content Standards

Oregon and National Science Content Standards: Grade 6

Curriculum Activities	Oregon Science Content Standards	National Science Content Standards
Week 4: Dr. Pepper and Mentos Demonstration, Magic Candle Demonstration	6.3S.1 Based on observations and science principles, propose questions or hypotheses that can be examined through scientific investigation.	NS.5-8.1 As a result of activities in grades 5-8, all students should develop: • Abilities necessary to do scientific inquiry • Understandings about scientific inquiry
Week 5: Introduction to Science Inquiry: Cars and Ramps	6.3S.1 Based on observations and science principles, propose questions or hypotheses that can be examined through scientific investigation. Design and conduct an investigation that uses appropriate tools and techniques to collect relevant data. 6.3S.2 Organize and display relevant data, construct an evidence-based explanation of the results of an investigation, and communicate the conclusions.	NS.5-8.1 As a result of activities in grades 5-8, all students should develop: • Abilities necessary to do scientific inquiry • Understandings about scientific inquiry
Week 6: Writing Procedures	6.3S.1 Based on observations and science principles, propose questions or hypotheses that can be examined through scientific investigation. Design and conduct an investigation that uses appropriate tools and techniques to collect relevant data.	NS.5-8.1 As a result of activities in grades 5-8, all students should develop: • Abilities necessary to do scientific inquiry • Understandings about scientific inquiry
Week 7: "Comeback Can" Races Week 8: More Group Investigations	6.3S.1 Based on observations and science principles, propose questions or hypotheses that can be examined through scientific investigation. Design and conduct an investigation that uses appropriate tools and techniques to collect relevant data. 6.3S.3 Explain why if more than one variable changes at the same time in an investigation, the outcome of the investigation may not be clearly attributable to any one variable.	NS.5-8.1 As a result of activities in grades 5-8, all students should develop: • Abilities necessary to do scientific inquiry • Understandings about scientific inquiry
Week 9: Managing Data and Bar Graphs Week 10: Managing Data and Line Graphs	6.3S.1 Design and conduct an investigation that uses appropriate tools and techniques to collect relevant data. 6.3S.2	NS.5-8.1 As a result of activities in grades 5-8, all students should develop: • Abilities necessary to do scientific inquiry • Understandings about scientific

	Organize and display relevant data, construct an evidence-based explanation of the results of an investigation, and communicate the conclusions.	inquiry
Week 11: Investigative Questions Week 12: Brainstorming Topics and Generating Questions Week 13: Polishing Questions Weeks 17 & 18: Investigation Design	6.3S.1 Based on observations and science principles, propose questions or hypotheses that can be examined through scientific investigation. Design and conduct an investigation that uses appropriate tools and techniques to collect relevant data. 6.4D.1 Define a problem that addresses a need and identify science principles that may be related to possible solutions. 6.4D.2 Design, construct, and test a possible solution to a defined problem using appropriate tools and materials. Evaluate proposed engineering design solutions to the defined problem.	NS.5-8.1 As a result of activities in grades 5-8, all students should develop: • Abilities necessary to do scientific inquiry • Understandings about scientific inquiry
Week 20: Preliminary Data Collection Week 21: Developing a Data Format and Display	6.3S.2 Organize and display relevant data, construct an evidence-based explanation of the results of an investigation, and communicate the conclusions.	NS.5-8.1 As a result of activities in grades 5-8, all students should develop: • Abilities necessary to do scientific inquiry • Understandings about scientific inquiry
Week 22: Investigations Begin	6.3S.1 Based on observations and science principles, propose questions or hypotheses that can be examined through scientific investigation. Design and conduct an investigation that uses appropriate tools and techniques to collect relevant data.	NS.5-8.1 As a result of activities in grades 5-8, all students should develop: • Abilities necessary to do scientific inquiry • Understandings about scientific inquiry
Week 24: Transforming Investigations into Displays Week 25: Work on Display Boards Weeks 27 & 28: Work Continues on Investigations and Displays	6.3S.2 Organize and display relevant data, construct an evidence-based explanation of the results of an investigation, and communicate the conclusions.	NS.5-8.1 As a result of activities in grades 5-8, all students should develop: • Abilities necessary to do scientific inquiry • Understandings about scientific inquiry
Week 26: Analyzing Results	6.3S.3 Explain why if more than one variable changes at the same time in an investigation, the outcome of the investigation may not be clearly attributable to any one variable.	NS.5-8.1 As a result of activities in grades 5-8, all students should develop: • Abilities necessary to do scientific inquiry • Understandings about scientific inquiry

Oregon and National Science Content Standards: Grade 7

Curriculum Activities	Oregon Science Content Standards	National Science Content Standards
Week 4: Dr. Pepper and Mentos Demonstration, Magic Candle Demonstration	7.3S.1 Based on observations and science principles, propose questions or hypotheses that can be examined through scientific investigation.	NS.5-8.1 As a result of activities in grades 5-8, all students should develop: • Abilities necessary to do scientific inquiry • Understandings about scientific inquiry
Week 5: Introduction to Science Inquiry: Cars and Ramps	7.3S.1 Based on observations and science principles, propose questions or hypotheses that can be examined through scientific investigation. Design and conduct a scientific investigation that uses appropriate tools and techniques to collect relevant data. 7.3S.2 Organize, display, and analyze relevant data, construct an evidence-based explanation of the results of an investigation, and communicate the conclusions including possible sources of error.	NS.5-8.1 As a result of activities in grades 5-8, all students should develop: • Abilities necessary to do scientific inquiry • Understandings about scientific inquiry
Week 6: Writing Procedures	7.3S.1 Based on observations and science principles, propose questions or hypotheses that can be examined through scientific investigation. Design and conduct a scientific investigation that uses appropriate tools and techniques to collect relevant data.	NS.5-8.1 As a result of activities in grades 5-8, all students should develop: • Abilities necessary to do scientific inquiry • Understandings about scientific inquiry
Week 7: "Comeback Can" Races Week 8: More Group Investigations	7.3S.1 Based on observations and science principles, propose questions or hypotheses that can be examined through scientific investigation. Design and conduct a scientific investigation that uses appropriate tools and techniques to collect relevant data. 7.3S.3 Evaluate the validity of scientific explanations and conclusions based on the amount and quality of the evidence cited.	NS.5-8.1 As a result of activities in grades 5-8, all students should develop: • Abilities necessary to do scientific inquiry • Understandings about scientific inquiry
Week 9: Managing Data and Bar Graphs Week 10: Managing Data and Line Graphs	7.3S.1 Design and conduct a scientific investigation that uses appropriate tools and techniques to collect relevant data.	NS.5-8.1 As a result of activities in grades 5-8, all students should develop: • Abilities necessary to do scientific inquiry • Understandings about scientific

	7.3S.2 Organize, display, and analyze relevant data, construct an evidence-based explanation of the results of an investigation, and communicate the conclusions including possible sources of error.	inquiry
Week 11: Investigative Questions Week 12: Brainstorming Topics and Generating Questions Week 13: Polishing Questions Weeks 17 & 18: Investigation Design	7.3S.1 Based on observations and science principles, propose questions or hypotheses that can be examined through scientific investigation. Design and conduct a scientific investigation that uses appropriate tools and techniques to collect relevant data. 7.4D.1 Define a problem that addresses a need and identify constraints that may be related to possible solutions. 7.4D.2 Design, construct, and test a possible solution using appropriate tools and materials. Evaluate the proposed solutions to identify how design constraints are addressed.	NS.5-8.1 As a result of activities in grades 5-8, all students should develop: • Abilities necessary to do scientific inquiry • Understandings about scientific inquiry
Week 20: Preliminary Data Collection Week 21: Developing a Data Format and Display	7.3S.2 Organize, display, and analyze relevant data, construct an evidence-based explanation of the results of an investigation, and communicate the conclusions including possible sources of error.	NS.5-8.1 As a result of activities in grades 5-8, all students should develop: • Abilities necessary to do scientific inquiry • Understandings about scientific inquiry
Week 22: Investigations Begin	7.3S.1 Based on observations and science principles, propose questions or hypotheses that can be examined through scientific investigation. Design and conduct a scientific investigation that uses appropriate tools and techniques to collect relevant data.	NS.5-8.1 As a result of activities in grades 5-8, all students should develop: • Abilities necessary to do scientific inquiry • Understandings about scientific inquiry
Week 24: Transforming Investigations into Displays Week 25: Work on Display Boards Weeks 27 & 28: Work Continues on Investigations and Displays	7.3S.2 Organize, display, and analyze relevant data, construct an evidence-based explanation of the results of an investigation, and communicate the conclusions including possible sources of error.	NS.5-8.1 As a result of activities in grades 5-8, all students should develop: • Abilities necessary to do scientific inquiry • Understandings about scientific inquiry
Week 26: Analyzing Results	7.3S.3 Evaluate the validity of scientific explanations and conclusions based on the amount and quality of the evidence cited.	NS.5-8.1 As a result of activities in grades 5-8, all students should develop: • Abilities necessary to do scientific inquiry • Understandings about scientific inquiry

Oregon and National Science Content Standards: Grade 8

Curriculum Activities	Oregon Science Content Standards	National Science Content Standards
Week 4: Dr. Pepper and Mentos Demonstration, Magic Candle Demonstration	8.3S.1 Based on observations and science principles, propose questions or hypotheses that can be examined through scientific investigation.	NS.5-8.1 As a result of activities in grades 5-8, all students should develop: • Abilities necessary to do scientific inquiry • Understandings about scientific inquiry
Week 5: Introduction to Science Inquiry: Cars and Ramps	8.3S.1 Based on observations and science principles, propose questions or hypotheses that can be examined through scientific investigation. Design and conduct a scientific investigation that uses appropriate tools, techniques, independent and dependent variables, and controls to collect relevant data. 8.3S.2 Organize, display, and analyze relevant data, construct an evidence-based explanation of the results of a scientific investigation, and communicate the conclusions including possible sources of error. Suggest new investigations based on analysis of results.	NS.5-8.1 As a result of activities in grades 5-8, all students should develop: • Abilities necessary to do scientific inquiry • Understandings about scientific inquiry
Week 6: Writing Procedures Week 7: "Comeback Can" Races Week 8: More Group Investigations	8.3S.1 Based on observations and science principles, propose questions or hypotheses that can be examined through scientific investigation. Design and conduct a scientific investigation that uses appropriate tools, techniques, independent and dependent variables, and controls to collect relevant data.	NS.5-8.1 As a result of activities in grades 5-8, all students should develop: • Abilities necessary to do scientific inquiry • Understandings about scientific inquiry
Week 9: Managing Data and Bar Graphs Week 10: Managing Data and Line Graphs	8.3S.2 Organize, display, and analyze relevant data, construct an evidence-based explanation of the results of a scientific investigation, and communicate the conclusions including possible sources of error. Suggest new investigations based on analysis of results.	NS.5-8.1 As a result of activities in grades 5-8, all students should develop: • Abilities necessary to do scientific inquiry • Understandings about scientific inquiry
Week 11: Investigative Questions Week 12: Brainstorming Topics and Generating Questions Week 13: Polishing Questions Weeks 17 & 18: Investigation Design	8.3S.1 Based on observations and science principles, propose questions or hypotheses that can be examined through scientific investigation. Design and conduct a scientific investigation that uses appropriate tools, techniques, independent and	NS.5-8.1 As a result of activities in grades 5-8, all students should develop: • Abilities necessary to do scientific inquiry • Understandings about scientific inquiry

	dependent variables, and controls to collect relevant data. 8.4D.1 Define a problem that addresses a need, and using relevant science principles investigate possible solutions given specified criteria, constraints, priorities, and trade-offs. 8.4D.2 Design, construct, and test a proposed engineering design solution and collect relevant data. Evaluate a proposed design solution in terms of design and performance criteria, constraints, priorities, and tradeoffs. Identify possible design improvements.	
Week 20: Preliminary Data Collection Week 21: Developing a Data Format and Display	8.3S.2 Organize, display, and analyze relevant data, construct an evidence-based explanation of the results of a scientific investigation, and communicate the conclusions including possible sources of error. Suggest new investigations based on analysis of results.	NS.5-8.1 As a result of activities in grades 5-8, all students should develop: • Abilities necessary to do scientific inquiry • Understandings about scientific inquiry
Week 22: Investigations Begin	8.3S.1 Based on observations and science principles, propose questions or hypotheses that can be examined through scientific investigation. Design and conduct a scientific investigation that uses appropriate tools, techniques, independent and dependent variables, and controls to collect relevant data.	NS.5-8.1 As a result of activities in grades 5-8, all students should develop: • Abilities necessary to do scientific inquiry • Understandings about scientific inquiry
Week 24: Transforming Investigations into Displays Week 25: Work on Display Boards Weeks 27 & 28: Work Continues on Investigations and Displays	8.3S.2 Organize, display, and analyze relevant data, construct an evidence-based explanation of the results of a scientific investigation, and communicate the conclusions including possible sources of error. Suggest new investigations based on analysis of results.	NS.5-8.1 As a result of activities in grades 5-8, all students should develop: • Abilities necessary to do scientific inquiry • Understandings about scientific inquiry
Week 26: Analyzing Results	8.3S.2 Suggest new investigations based on analysis of results.	NS.5-8.1 As a result of activities in grades 5-8, all students should develop: • Abilities necessary to do scientific inquiry • Understandings about scientific inquiry