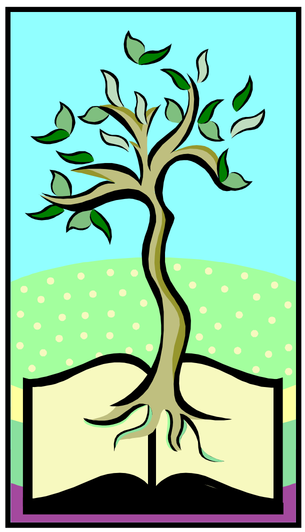
Science Fair
Tips for Teachers



Chandler Unified School District
Instructional Resource Center

Teacher's Role: Your role in the science fair project process is that of a mentor, or facilitator of science. Remember that a true inquiry approach science project is driven by the student's question. Keep in mind also, that the <u>process</u> of doing a project is where the learning happens.

This handbook is not a guide or curriculum; it is simply a collection of helpful tips that have been gathered from many sources. Teachers in the Chandler Unified School District have generously provided a lot of the tips. Other teachers who have been through the process are the BEST source for information.

Contents:

I. Helping the students to get organized and excited.

Students are naturally excited about science from a young age. It involves exploring the world around them, questioning the world around them and participating in hands-on experimentation. One of the best contributions you can make to a student is to keep their natural excitement for science going. Students instinctively know how their teachers feel and will often model what they see in you. If a teacher approaches a unit of study in a less than "thrilled" manner, the students will often follow suit. If you are already a fan of science, share your enthusiasm and ideas with your colleagues. Show them the light!

Students are motivated by visuals. Motivational movie clips (three minutes or less please) from popular science movies can be used as a "spark" for the start of the science fair project unit. Use caution when showing a movie clip, be sure to screen for appropriateness before showing to the class. Cool science demonstrations are also good to spark student interest.

Getting the students organized and ready for the upcoming science fair project. Students will need to set up a **journal or logbook.** The main idea of the logbook is to track the student's progression in the scientific process. Everything covered in class could go into the logbook or it can be used simply to track their individual efforts with their science fair project. Some teachers require students to have a notebook with dividers and the dividers correlate with the following items:

1- topic
2- question
3- research notes
4- experimental design
5- research proposal
6- pre-lab report
7- observations and data
8- conclusion

(This list looks a lot like the table of contents for this handbook!)

II. Helping students to choose a topic.

- First, find out what interests your students. Model that real science questions come from the world around us by posing questions to your students from your experiences. ("I was noticing yesterday that the water in my birdbath seems to evaporate faster than the water in my fountain…")
- Then, have students make a long list of "things" that interest them. Guide your students to go from the general to the specific when making their lists of interests.
- Using the Four Question Strategy below, students will then fit in topics from their list and place it into the parentheses of the questions. See the example below. (This is where you help guide students to pick one that you know will lead to a decent and manageable science fair project.)

The following strategy is adapted from *Students and Research, Practical Strategies for Science Classroom Competitions, 2nd addition,* by Julia Cothron, Ronald Giese, and Richard Rezba.

Four Question Strategy (4Q's)

1. What materials are readily available for conducting experiments on (   )?
2. How do (   ) act?
3. How can I change the set of (   ) materials to affect the action?
4. How can I measure or describe the response of (   ) to the change?

<u>EXAMPLE</u>

I am interested in…

(typical first responses)	(after your guidance)
animals	lizards, snakes, iguanas
computers	internet
bikes	racing bikes
sports	softball, volleyball
Disney movies	just the recent ones
Dance	hip hop, jazz

1. What materials are readily available for conducting experiments on (volleyballs)?

various types of volleyballs
various sizes of volleyballs
air pressure gauge
nets
air pumps
different types of courts (sand, hard floor)

2. How do (volleyballs) act?

They fly through the air when served/hit.

3. How can you change the set of (volleyball) materials to affect the action?
   - change the type of ball
   - change the sizes of the ball
   - change the air pressure in the ball

4. How can you measure or describe the response of the (volleyball) to the change?

   - measure how fast the volleyball travels
   - measure how far the ball travels
   - describe how easy or hard it is to hit

Tip: Some teachers suggest giving the students a list of reasonable topics and practicing the 4Q's strategy as a group before students do it individually.

III. Helping students develop a question and hypothesis.

- Once students use the 4Q's strategy, it is usually pretty easy to help them develop a question. Repeat the process by brainstorming again.

<u>Example</u>

Will changing the size of the volleyball effect how fast it travels?

Will changing the air pressure inside the volleyball effect how fast it travels?

Will changing the air pressure inside the volleyball effect how far it travels?

- Once the students have a good question, they need to turn it into a prediction or hypothesis. The key to the hypothesis is that they state WHY they think what they think.

IF…………..THEN…………………..BECAUSE or DUE TO…………

<u>Example</u>

IF the air pressure inside the volleyball is lowered THEN the volleyball will not travel as fast BECAUSE the volleyball is softer.

Notice the hypothesis is not perfect but it is a start. A pretty good start and the student is ready to do some research!

IV. Helping students with research.

Most teachers set aside some class time to take their students to the library. Utilize your media specialist to help make the most of this time.

Before taking your students to the library, establish exactly what you want your students to do while they are there. Note cards or notebook entries are a good place to start. It helps if all students start with a specific format that they are to follow. Some teachers require a minimal number of entries/notecards by a specific date. Others use the research component as an opportunity to bring in more parental involvement. *Caution: It is the student's responsibility to do the research. Parents may need to be reminded of this.*

Example

Notes on General Sources:

Name ____ Your topic=____ Your question = ____ ____ Title of book/magazine/website: ____ Information/notes:
Reference cited: author, publisher, year, pages

V. Helping Students with Experimental Design.

Along with the science process skills that your students will be developing, they will also need to become proficient in identifying major concepts of experimental design. **Below is a list of concepts that must be understood in order to develop a good science fair project.**

- hypothesis
- dependent variable
- independent variable
- control
- constants
- qualitative (descriptive observations)
- quantitative (numerical observations)
- repeated trials

One of the best and easiest ways for kids to understand these concepts is to model them and have them record information from a ***class activity***. The following is an example of a class activity that could be used to help all of your students to understand the science concepts listed above.

Sample Class Activity: Diffusion (movement of molecules)

Don't let the title fool you. It's just a glass of water and food coloring. The goal here is **not** to understand molecular homeostasis but to understand the scientific concepts listed above.

1. You set out a clear glass; then pour in some water. Next show the kids the vial of food coloring (a dark color works best). As a class, develop a **question**. Ex. "What will happen to the color of the water when food coloring is added?"

2. Now work on a **hypothesis** as a class. Ex. "If blue food coloring is added to water then the water will eventually turn to blue because the food coloring will mix with the water"

3. Now you are ready to discuss **independent variables** (iv) and **dependent variables** (dv). Ask the students which liquid they think

will change and why. The water will change color "depending" upon the addition of the food coloring. The water is the dependent variable. The food coloring is the independent variable. In most experiments the independent variable is the variable that you manipulate to cause an action (ie. increasing the amount of food coloring will increase the intensity of water color).
Tip: The ***__(dv)_____*** *will change depending upon the* ***__(iv)___.***

4. A **control** is needed in all experiments. Why? Because maybe it's not really the food coloring that's turning the water a blue color, maybe the water just does this over time regardless. (You and your students know that this is not the case, but remember it is SCIENCE so prove it by using a control). The control should be a glass of water that has no food coloring added to it or plain water added to it instead of food coloring.

5. Now that the importance of a control is established this is a good time to introduce the concept of **constants**. The control and the experimental set up should be IDENTICAL except for the one variable being tested.

   Take out various sizes of glasses and ask the class which glass you should use when setting up the control. Make sure you have an identical glass to the original one. Next pour in a small amount of water. Ask the class if this is ok or not. Eventually the students should be able to tell you that the size of glass, amount of water, and number of drops of food coloring added to the experimental glass and the number of drops of water added to the control glass should be exactly the same – **constant.**
   Tip: Some clever students may even discuss the need for the temperature of the water samples to be constant. This leads to experiment ideas.

6. When you are just about ready to run the experiment, ask the students how to make observations. What exactly should they be looking for? The obvious answer is color change – a **qualitative observation**. How the liquid looks is a descriptive observation or qualitative observation. Ask the students other ways that they could record their observations. Lead them to ways in which they can numerically record their observations – **quantitative observations**. You could

time how long it takes for the water to turn blue (use warm water so it doesn't take too much time), count the number of times it needs to be stirred, measure depth of the color after a certain amount of time, etc.

7. **Repeated trials** act to validate your results. If the experiment shows the same results time after time, then you can be pretty sure that the results are correct. Record the quantitative result obtained from the class experiment. (Ex. Teacher demo. = 75 sec. for the water to turn blue). Now let your students work in groups to repeat the experiment. Each group should have the same amount of water for the control and experimental set ups and the same amount of food coloring should be added to the experimental water. Students will record both qualitative and quantitative results. List the results on the board.

Ex. Teacher demo.	Class experiments (repeated trials)
75 sec. to turn blue	group 1 = 72 sec.
	group 2 = 80 sec.
	group 3 = 75 sec.
	group 4 = 60 sec.
	group 5 = 83 sec.
	group 6 = 70 sec.
	group 7 = 68 sec.
	group 8 = 71 sec.
	group 9 = 77 sec.

So is the answer 75 seconds? Or did one of the student groups have the correct answer? Everyone had the right answer and now you can work with your class on the importance of repeated trials, how to find averages, how to find patterns in numbers, how to graph data, etc. Run with it!

After the class works through these important science concepts with you, it is important to reinforce with independent practice. Mini-lab stations are hands-on and fun. Some teachers differentiate the mini-labs according to student ability. For example, students may be assigned to a lab that replicates the class model where colored drink powder and measuring spoons take the place of food coloring and drops. Other students may be assigned to a lab area that explores using a range of water temperatures and how this effects diffusion, or a lab that explores whether increasing or decreasing the number of drops has an effect on diffusion. Homework with parents can be as simple as: make lemonade with your parents and identify as many science concepts as possible.

Regardless of the reinforcement activity, students should be able to determine: hypothesis, dependent variable, independent variable, control, constants, qualitative results (descriptive observations), quantitative results (numerical observations) and repeated trials.

VI. Helping students with research proposals.

After students understand the various scientific concepts, they can apply these concepts to their **own** project. The students need to return to the topics of their interest and design a preliminary draft of what they intend to do – a **Research Proposal**. Use the form found in the appendix when students are ready to formally present their idea.

> Ex. Research proposal for volleyball experiment
>
> Question: How far will the volleyball travel when the ball's air pressure is changed?
>
> Project Description:
> I plan on getting one type and size of volleyball. Then I will inflate the ball to a certain air pressure and measure it with an air gauge. I will serve the ball and see how far it travels. I will measure the distance then let some air out, serve the ball and measure the distance again.
>
> Project area: physical sciences

Keep in mind that the proposal is brief. It is too brief to use as an assessment for understanding of scientific concepts. It is, however, useful for screening purposes.

Two main purposes of the research proposal:

1) **to ensure that students have a project in the making.**
2) **to ensure that students have project ideas that are SAFE.**

You, the teacher, are the first in line to ensure that the students are performing safe and ethical science fair projects. All research proposals should be carefully reviewed for safety issues. They can also be used to assess how far along your students are and what guidance they may need.

To help guide you, the science fair coordinators will be giving you rules and guidelines for projects. The following is a brief list of acceptable and unacceptable project topics.

Acceptable	Not Acceptable
*plants/seeds *soil and rocks *math projects *most physics projects *preference surveys ! be careful to preview *grocery store chemistry *inventions *mousetrap car (6-8 grades only)	*growing mold/fungus/bacteria *experiments involving human subjects (some surveys are OK) *vertebrate experiments (fish, snakes and turtles are vertebrates) *harmful chemicals

If students are proposing anything potentially harmful, please redirect their efforts!

VII. Helping students with their actual experiment.

Once research proposals have been reviewed for safety and content they are to be submitted to your site science fair coordinator. He or she will give you a deadline date for submitting the proposals**. Be sure you make and keep copies for yourself before turning them over to the coordinator**.

Now you are ready to help the students finalize their experimental details and run the experiments. Writing a detailed procedure is difficult for many students. The entire class can work on this skill by picking an ordinary event such as making a sandwich, taking attendance, or playing a videotape. Then have the students write a step-by-step procedure for the event. Have various students read their procedures out loud to you and do only what their directions tell you to do. Students will realize what you mean by DETAILED PROCEDURE. The procedure must show an understanding of the science concepts learned, such as a control set up, constants and repeated trials.

Before allowing students to run experiments, especially if they are to be performed during school time and in your room, require a written pre-lab. The pre-lab consists of the question, hypothesis, materials, detailed procedure of what is to be done and data collection idea(s).

HALF-WAY THERE!

Volleyball Pre-lab

Question: How many centimeters will a volleyball travel when the ball's air pressure is decreased?

Hypothesis: If a volleyball's air pressure is continually decreased then it will not travel as far when projected through the air because decreasing the air pressure inside the ball results in a type of drag that slows down the ball causing it to travel less distance.

Materials: one volleyball, air pressure gauge, air pump, table by a tree, football tee, pendulum volleyball server (rope with a heavy object attached such as a brick), meterstick, chalk

Procedure:

1) Place a card table by a tree with low branches.
2) Attach a weight to a long piece of rope. (The weight is a brick covered by a sock).
3) Tie the rope securely around a tree branch above the table so that the weight is hanging over the table.
4) Use the chalk to mark the table under the weight. Place the football tee on this chalk mark. The tee must be set up at the same place every time so that the volleyball is set up at the exact spot every time.
5) Use the chalk to mark a line on the tree. Have a partner hold a meter stick at this chalk mark.
6) Practice pulling the weight back to the end of the meter stick and releasing it so that this can be done in the same way over and over again. (It should be a smooth motion, like a tire swing moving back and forth.)
7) Measure the volleyball's initial pressure using the air pressure gauge.
8) Record the initial pressure in psi's.
9) Place the volleyball on the football tee for balance.
10) Pull back the weight to the end of the meter stick and release as practiced. The weight "serves" the volleyball as it hits it off the table.
11) The ball is served into sand or grass so a mark is left from the initial hit on the ground. Mark this with chalk.
12) The distance the ball traveled is measured in centimeters from the base of the table to the front of the ball's mark.
13) Air is released from the volleyball, and the air pressure is measured using an air gauge.
14) The new air pressure is recorded.
15) The volleyball is placed on the tee and steps 10 – 14 are repeated three more times.

Data Collection:

air pressure (psi)	distance traveled (cm)
initial =	
trial 1 =	
trial 2 =	
trial 3 =	

Now all the student has left to do is run the experiment. By requiring a pre-lab, you can correct procedural mistakes that end up making the students frustrated and screen for safety issues one more time.

VIII. Helping students with data collection and graphs.

Charts for data collection should be done in pre-lab. **Be sure students write a title for their charts and graphs**. The harder part is putting the data into a graph. Basically the student can choose between three main types of graphs: line, bar and pie.

- Use line graphs when….. the data is dealing with measurements, standardized scale and intervals (centimeters, grams, time in seconds or minutes, etc.).

- Use bar graphs when….. the data is dealing with categories (days of week, brands, gender, color, number of times a behavior occurred, etc.)

- Use pie graphs when…. comparing percentages.

Tip: Use a best fit line for the line graphs not a connect the dots line. The line shows a trend or relationship between two variables.

IX. Helping students draw conclusions.

The following questions will help students to develop their conclusion. They can start by directly answering these questions but the final product should read as a flowing statement.

- What does the research say about the topic of my science fair project?
- What is the data showing? (look at graph trends)
- Does the data support my hypothesis?
- **Why** did the data support my hypothesis or **why** not?
- How can I improve this project?

X. Helping students with the final report.

If a student creates a good pre-lab report, the final report is very easy. Simply take the pre-lab and add in the results (charts and graphs), a conclusion and the title.

It may seem strange to wait until the end for the title but a proper title is really very difficult to come up with in the beginning stages. Many teachers allow students to use a generic title until a more scientific one is ready to be generated. It is best to use the following format for the written report title: *The effect of* ______________ *on* ___________________.

PUTTING IT ALL TOGETHER!

Title: The effect of decreased air pressure on the distance in which a volleyball will travel.

Question: How many centimeters will a volleyball travel when the ball's air pressure is decreased?

Hypothesis: If a volleyball's air pressure is continually decreased then it will not travel as far when projected through the air because decreasing the air pressure inside the ball results in a type of drag that slows down the ball causing it to travel less distance.

Materials: one volleyball, air pressure gauge, air pump, table by a tree, football tee, pendulum volleyball server (rope with a heavy object attached such as a brick), meterstick, chalk

Procedure:

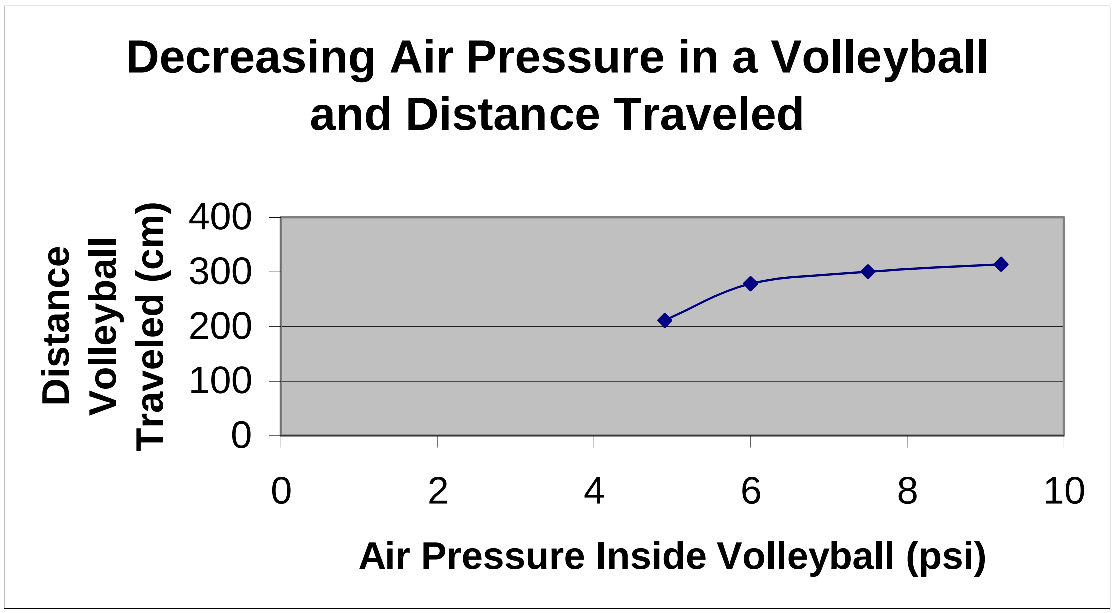
1) Place a card table by a tree with low branches.
2) Attach a weight to a long piece of rope. (The weight is a brick covered by a sock).
3) Tie the rope securely around a tree branch above the table so that the weight is hanging over the table.
4) Use the chalk to mark the table under the weight. Place the football tee on this chalk mark. The tee must be set up at the same place every time so that the volleyball is set up at the exact spot every time.

5) Use the chalk to mark a line on the tree. Have a partner hold a meter stick at this chalk mark.
6) Practice pulling the weight back to the end of the meter stick and releasing so that this can be done in the same way over and over again. (It should be a smooth motion and look like a tire swing moving back and forth.)
7) Measure the volleyball's initial pressure using the air pressure gauge.
8) Record the initial pressure in psi's.
9) Place the volleyball on the football tee for balance.
10) Pull back the weight to the end of the meter stick and release as practiced. The weight "serves" the volleyball as it hits it off the table.
11) The ball is served into sand or grass so a mark is left from the initial hit on the ground. Mark this with chalk
12) The distance the ball traveled is measured in centimeters from the base of the table to the front of the ball's mark.
13) Release air from the volleyball and measure the air pressure using the air gauge.
14) The new air pressure is recorded.
15) The volleyball is placed on the tee and steps 10 – 14 are repeated three more times.

Results:

Chart A: Air pressure of the volleyball and distance traveled	
air pressure (psi)	distance traveled (cm)
initial = 9.2 psi	314 cm
trial 1 = 7.5 psi	300 cm
trial 2 = 6.0 psi	278 cm
trial 3 = 4.9 psi	211 cm

Graph A



Conclusion:

Two of the books I checked out explained that the air pressure inside a ball, balloon or tire could not be greater than the outside air pressure. If air pressure inside something like a balloon gets too high, then the balloon will pop. The more equal the inside and outside pressures are, the better the situation. This is the case, too, for volleyballs. Volleyballs will serve better if they are “pumped up” to an air pressure of about 9 psi’s. If you increase the air pressure too much the volleyball might also pop. If you decrease the ball’s air pressure, it is harder to serve because the air pressure outside of the ball is higher than the pressure inside. The greater pressure on the outside of the ball causes the ball to slow down, and by slowing down, the ball cannot travel as far. The data shows that this is true. As the air pressure inside the ball decreased, the distance traveled also decreased. This data supports my hypothesis because I predicted the volleyball would not be able to travel as far with less air, and the results showed this to be true. I would improve this experiment by adding more trials and by figuring out a way to release the air better from the ball. I would have liked to reduce the air pressure 1 psi at a time,but that was hard to do.

Some teachers help students produce a PowerPoint presentation and then help them to develop a written report and display board based on this presentation.

Choose whatever works best for your individual teaching style, and most importantly, what works best for your students.

XI. Helping students with the display board.

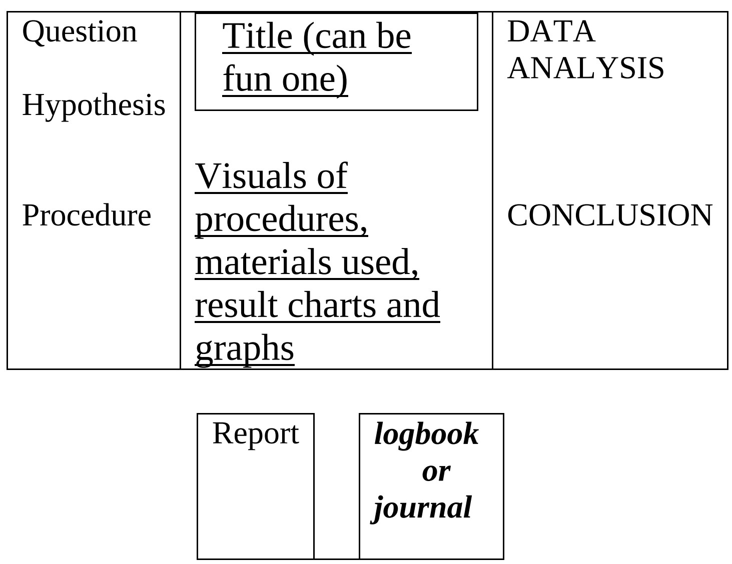
This is actually the easiest step and a lot of fun. We'll start with some rules and then describe the general format used for display boards.

RULES

1) Display boards should be no longer than:
   76 cm (30 in.) deep
   122 cm (48 in.) wide
   274 cm (108 in.) high including display table

2) Display boards should not have student's names or pictures of faces displayed on the front.

GENERAL FORMAT FOR DISPLAY BOARDS



Students can be very creative with their displays. Just be sure the creativity doesn't distract from the important information being displayed.

XII. Final Tips

a. Be sure to work with your school's science fair coordinator when developing timelines, etc. Your science fair coordinator took on a lot of responsibility and could always use extra help.

b. Ask for a copy of the judging rubric that will be used (if the projects are going to be judged). Share this information with your students.

c. If time allows, have a class science fair to celebrate all of the excellent projects.

d. Many teachers do oral presentations in class. Some middle and high school students are interviewed by judges at the time of their local science fair. This is an excellent way to enhance and increase communication and presentation skills.

e. Use the Internet! Go to any search engine and type in "science fair," "science fair projects," etc. There are too many sites to mention.

f. Go to your local library or bookstore. Again, there are many published books on science fair and science fair projects. No need to reinvent the wheel.

g. Have fun. Science can really help you teach many other important subjects, and kids really do enjoy science when they experience it!

Best wishes for a scientifically smooth science fair!

<u>Appendix:</u>

***A**. The following timelines (2) are for sites that integrate the science fair project yearlong.*

EX. 1) Teacher Timeline (yearlong integrated timeline)

Help students choose a topic of interest and do research.	***Sept. 29 – Oct. 3 (They may want to continue researching on their own over fall intersession)***	Teacher Handbook
Help students to develop their question. (Individual conferences recommended).	***Oct. 20 – Oct. 24***	
Help students write a research proposal. (Encourage parent involvement).	***Oct. 27- Oct. 31***	
Thoroughly review research proposal to ensure safety/ethical issues are being met.	***Oct. 31-Nov. 5***	
Work with students to revise proposal if needed.	***Oct. 31-Nov. 5***	
Turn ALL proposals into science fair coordinator. (Mark and place questionable ones on top).	***Nov. 5***	
Set up individual conferences concerning project needs (materials, fine tuning a procedure, etc.)	***Nov. 19 – Dec. 1***	
Help students perform their experiments.	***Dec. 1 – Dec. 12***	
Help students write their reports. (Power pt/ research paper)	***Dec. 15- Dec. 17***	
Help students create their display boards and finalize their projects.	***Jan. 8- Jan. 16***	
Local Science Fair		
HISEF	***Feb. 28, 2004***	
CARSEF (optional: site decision/responsibility)		

EX. 2 Teacher Timeline (yearlong integrated timeline) submitted by Conley Elementary

Science Fair Timeline
(Approx. 12 weeks)
September 8th-Decemeber 18th

Dates:
Monday, Sept. 8th-26th

Classroom Experiments (Whole Group)

- Teachers introduce each step of the Scientific Method through whole class experiments.
- Experiments are done over a 2-3 day period. Students will conduct between 3 to 4 group or class experiments.

Teachers will construct a class board from one of the whole class experiments. Students will learn how to put together a Science Fair Board.

8 Weeks

Week 1 September 29th-Oct. 3rd

- Students choose a topic to investigate or explore
- Form Groups (students pick their groups)
    - **Scientific Method #1:** Students Choose a problem (state the problem as a question)

    Write your Question?
- **Scientific Method #2:** Students Research the problem (read, get advice, and make observations).

Break 6th-21st

Week 2 and 3 Oct. 22-31st (Short week)

- Continue **Scientific Method #2 Research**
- **Scientific Method #3:** Students Develop a Hypothesis (make a prediction about what will happen)
- **Scientific Method #4:** Students Design and experiment (plan how you will test your hypothesis
- Write Proposal – Students need to submit proposal to teacher. Approval needed before starting experiment
    - Proposal needs to include: (See proposal page)
    - Student Name (s) no more than 3 students in a group
    - Project Title
    - Problem (state the problem as a question), Hypothesis (make a prediction about what will happen), Experiment Procedures (plan how you will test the hypothesis), List of Materials needed

- Start a notebook for keeping records

Week 4

Nov. 3rd- 7th

- Collect or buy materials for display
- Begin setting up experiment or demonstration
- Continue adding information to project notebook

Week 5 Nov. 10th- 14th

Week 6 Nov. 17th-21st
Week 7 Nov. 24th-26th

Week 8 Dec. 1st – 5th

- **<u>Scientific Method #5 Test the hypothesis</u>** (conduct the experiment and record the data).
- Scientist need to conduct at least 3 trials
- Continue adding information to project notebook
- Work on photographs
- **<u>Scientific Method #6 Organize the data</u>**
- Chart data (begin designing charts, graphs, or other visual aids for the display board).

Week 9 December 8th-12th

- Experiment is completed
- Record final observations
- Photograph anything that won't be presentable by Science Fair date
- **<u>Scientific Method #7 Draw Conclusions</u>** (analyze your data and summarize the findings)

Week 10 December 15th-18th (Short Week)

- Set up outline for board. All of the experiment pieces are written out and edited.

Week 11 and 12 January 6th – 16th

- Construct display boards
- Prepare signs, titles and labels for display board
- Type or print final draft for display boards (proofread)
- Proofread your written report or display log (consult with teacher or helper)
- Check, double-check, and triple-check everything before gluing on display board

B. *The following timeline is for sites that implement the science fair project as a unit of study.*

Submitted by Conley Elementary**:**

Science Fair Tentative Schedule

Jan. 5-9	***Review standards and expectations for the project Become familiar with Internet policies/permission slips Whole class experiments to model the project***
Jan. 12-16	***Finish whole-class modeling of the project Small group experiments***
Jan. 20-23	***Project topics chosen Development of ideas, purposes, etc. Research proposal sheet submitted Approval/disapproval reported back***
Jan. 26-30	***Students research topics Gather materials Begin experiments Begin journals Start writing reports***
Feb. 2-6	***Continue with journals by recording observations Make measurements/add to journals Gather data Begin preliminary conclusions***
Feb. 9-11	***Continue with journals Organize results Make charts and graphs***
Feb. 12-13	***Finalize charts, graphs, results Draw conclusions Finalize reports Construct exhibits***
Feb. 17-19	***Oral presentations to class***
	Science Fair

C. *The following timeline is for middle school and the science fair project is incorporated yearlong.*

Submitted by Santan K-8 for middle school timeline

Due Dates – Eighth Grade

☺/☹ Question Proposals
– due Friday November 15

☺/☹ Hypothesis/Introductory Paragraph
– due Friday November 22

☺/☹ Background Research
– due Wednesday November 27

☺/☹ Experimental Design
– due Monday December 2

☺/☹ Data Collection Format
– due Friday December 6

☺/☹ First Data Check
For all projects - due Friday December 13

☺/☹ Second Data Check
For all projects - due Wednesday/Thursday January 8-9

☺/☹ Data Analysis
for all projects – due Friday January 17

☺/☹ Rough Draft of Paper
for A projects only - due January 27th

☺/☹ **Final Projects – due Friday February 7th**

Science Fair – Thursday February 13, 2003

D. **Science Fair Research Proposal Form (**teachers make a copy of these then give to science fair coordinator)

RESEARCH PROPOSAL (4-8)

____ Individual Project

Name:______________________________Class:_______________________

____Team Project (2 or 3 Students)

Name: _____________________________Class: ______________________

Name: _____________________________Class: ______________________

Name: _____________________________Class: ______________________

Project Question: ____
____

Project Description (be brief): ____________________________________
____
____
____
____
____
____
____
____

Project area (circle one):

Behavioral/Social Sciences
Environmental/Ecology
Life Sciences (Botany, Microbiology, Zoology)
Health/Medicine

Math/Computers
Earth/Space
Physical Sciences (Chemistry, Biochemistry, Physics)
Engineering/Inventions

*Mousetrap Car Design
(This competition is only open to 6-8 grade teams of three students)

Teacher Approval: _________________________ Date: _________

E. Websites and book titles.

http://www.sciserv.org/isef/
Intel International Science and Engineering Fair

http://school.discovery.com/sciencefaircentral/

http://www.scifair.org/

http://www.hallbar.com/sciencecenter.html

http://www.accessexcellence.org/RC/CT/fun_science_fair_projects.html
The above site provides one detailed science project and an extensive listing of science fair books available for purchase.

Scientific American's The Amateur Scientist:
Science Fair Edition, Publisher: Tinker's Guild, released 2002.
Price: $39.99

Janice VanCleave's Science Project Books:

Janice VanCleave's Science Project Books

Each contains 101 simple, hands-on, low-cost experiments that have been tested repeatedly - and really work! (each book costs about $11.00)

Biology for Every Kid
Earth Science for Every Kid
Astronomy for Every Kid
Physics for Every Kid
Chemistry for Every Kid

So You Have To Do A Science Fair Project
By Joyce E. Henderson, Heather Tomasello ISBN: 0471202568
Price: $14.95
Wiley and Sons (395); August 2002

http://www.booksmatter.com/results.asp?au=&ti=&qs=science+fair+project&pu=&o=d
-lists many science fair books and their prices