

Broadmor PTA Science Fair Handbook



Second & Third Grades

Research Notebook for the Broadmor PTA Science Fair 2019

Any questions regarding this year's science fair packet, please direct them to **Stephanie Milam-Edwards**, smilam@tempeunion.org or **Erin Kirkpatrick**, kirkpatrickerin@hotmail.com.

This packet and enrollment information plus updates on the science fair will be posted on the www.broadmorpta.org/science website for your convenience.

FOR IMPORTANT SCIENCE FAIR DATES, TURN TO THE END OF THE PACKET INCLUDING DATES OF EXCITING ACTIVITES LEADING UP TO THE FAIR!

Name: _____

Dear Family Members,

Science Fair Week starts **February 19th**! The PTA's goal is to provide an opportunity for students to explore their world through science and for them to share their resulting discoveries. This may be the first time that your child has been given the opportunity to participate in a science fair. Things you should know:

- Students will present to a guest evaluator or team of judges;
- Every child is encouraged to participate; and,
- Each participant will receive a ribbon/certificate and prize.

Please consider letting your child do a project. Science is all about asking questions, and no one asks better questions than an elementary school child does.

Animals (zoology), people (human behavior), sports (physics), food (chemistry), Mars (astronomy) are just some of the topics your child can explore. There's science in just about everything we do. If your child can't think of a topic immediately, take a look at the suggestions on the websites below:

<http://school.discoveryeducation.com/sciencefaircentral>

<http://bit.ly/IDdLQZ>

<http://www.sciencebuddies.org>

Keep it simple! Help your child choose a topic that:

- Is interesting to them and relates to their own experiences;
- Suits the child's level of understanding and ability;
- Is realistic for the time available;
- Allows your child can be a BIG participant; and
- Is creative and original.

It is the family member's role to be:

- Lab Assistant – help gather materials, assist with construction, and supervise activities;
- Consultant – ask questions, give advice, make suggestions, ask student to explain his or her reasoning, help with understanding the requirements, keep on track; and,
- Chair of the board – approves project based on cost and materials available, determines project safety.

Team Projects are allowed. Be sure to allow each student to have an active role in the project.

Get Started!

- Read the handbook as a team (scientist and assistants).
- Create a plan of attack using the deadlines from the schedule provided in the handbook.
- Within the first week after the science fair booklet is received, submit an enrollment form to the child's teacher. This is appreciated, but not required to help us plan for the correct number of volunteers.
- Conduct your research, create your tri-fold display, and practice your interview.

- Bring your project before or after school on Tuesday, the first day of the Science Fair.

Please read this aloud with your child(ren):

2nd & 3rd graders,

We are happy that you will be working on a project for the science fair!

What is science? It is the study of the world around us. Your science fair project will answer questions and help you learn more about the world.

You will be a scientist for the next few weeks. As a scientist, you will need to ask questions, make a plan, do science work, write down things you learn, and make a display to show your project.

Please have your parents help you with all of the steps—they are your lab assistants. This is your project, but you will need your parents' help to pick a project, do the work and complete your display. You may need them to help you write things down. That's ok!

Take your time with your project and make sure that you have all the parts you need. Ask many questions, write down everything you learn, and take pictures.

Okay, now get to work on your project!

What's that? You still need help getting started?

All you need to do is follow these easy steps and you too can create a wonderful award winning science project, thought up entirely by you!

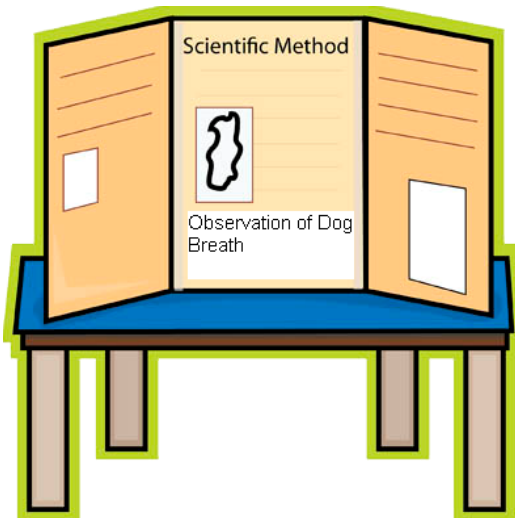
As part of your finished project and display...

- Include this completed planner (do only the sections appropriate to your project).
- Include your scientific notebook (composition, school notebook, or folder) to keep and record your information and for people to see your hard work.
- Use a tri-fold board to display your all that you learned.

From this point forward you are now... A SCIENTIST!

Types of Science Projects

There are three types of science projects for 2nd and 3rd graders: Observation, Collection and Experiment. Here is the difference between them:



An Observation or Collection:

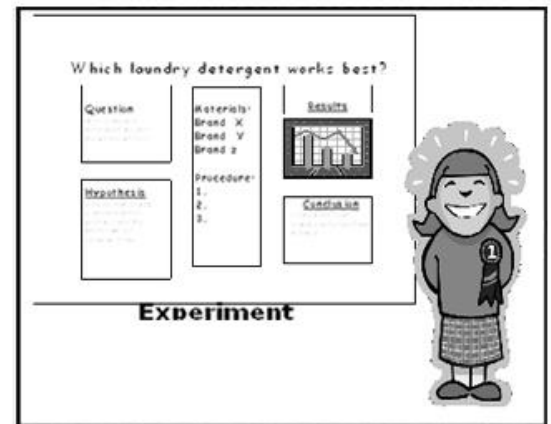
Shows how something works in the real world, but doesn't really test anything.

Examples of collection projects can be: "The Solar System," "Types of Dinosaurs," "Types of Rocks," "My gum collection." Examples of observations might be: "How much water does my dog drink in a day?," "How Clouds Look Each Day?," or "What Does a Plant Look Like When It Grows?"

An Experiment or Survey:

Lots of information is given, but it also has a project that shows testing being done and the gathering of data.

Examples of experiments can be: "The Effects of Detergent on the Growth of Plants", "Which Paper Towel is more Absorbent?" or "What Structure can Withstand the Most Amount of Weight." You can tell you have an experiment if you are testing something several times and changing a variable to see what will happen. We'll talk about variables later....



An experiment can also take the form of a scientific survey:

Students ask a question and create a survey of questions to gain information from the input of their subjects. This information is used to determine a mindset of a group of people. For example, "How many people recycle? What color makes you feel happiest? Information is arranged in a graphical way to report on public perception, behavior, or opinion.

So What Type of Project Should You Do? (Any of the three categories in any discipline)

Life science: All animal, plant and human body questions that you might have. **Remember that it is against Science Fair Rules to intentionally hurt an animal during an experiment.**

Physical Science: Topics about matter and structure, electricity, magnetism, sound, light or anything else that you might question, "How does it work and what if I do this to it, will it still work?"

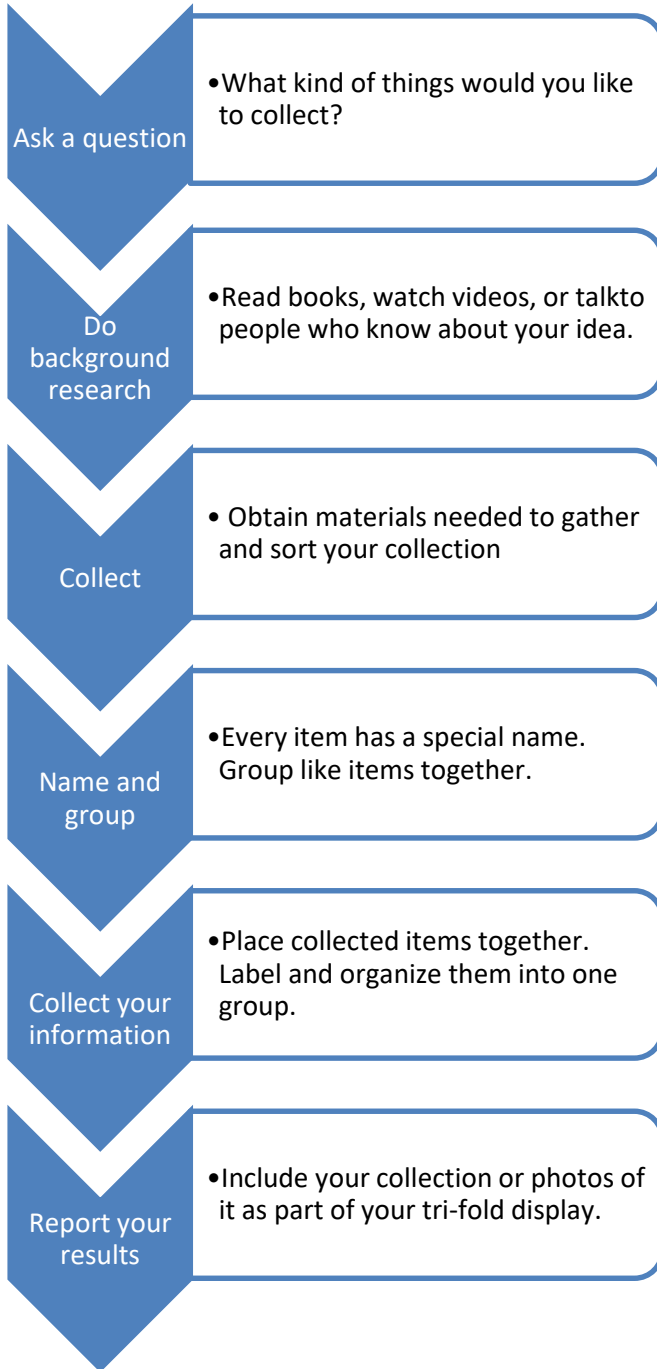
Earth and Space Sciences: Covers all sorts of topics that deal with the Earth or objects in space, including weather, oceanography, and geology.

Social science: Topics about human behavior, interaction, and emotions based on perception of the environment around them.

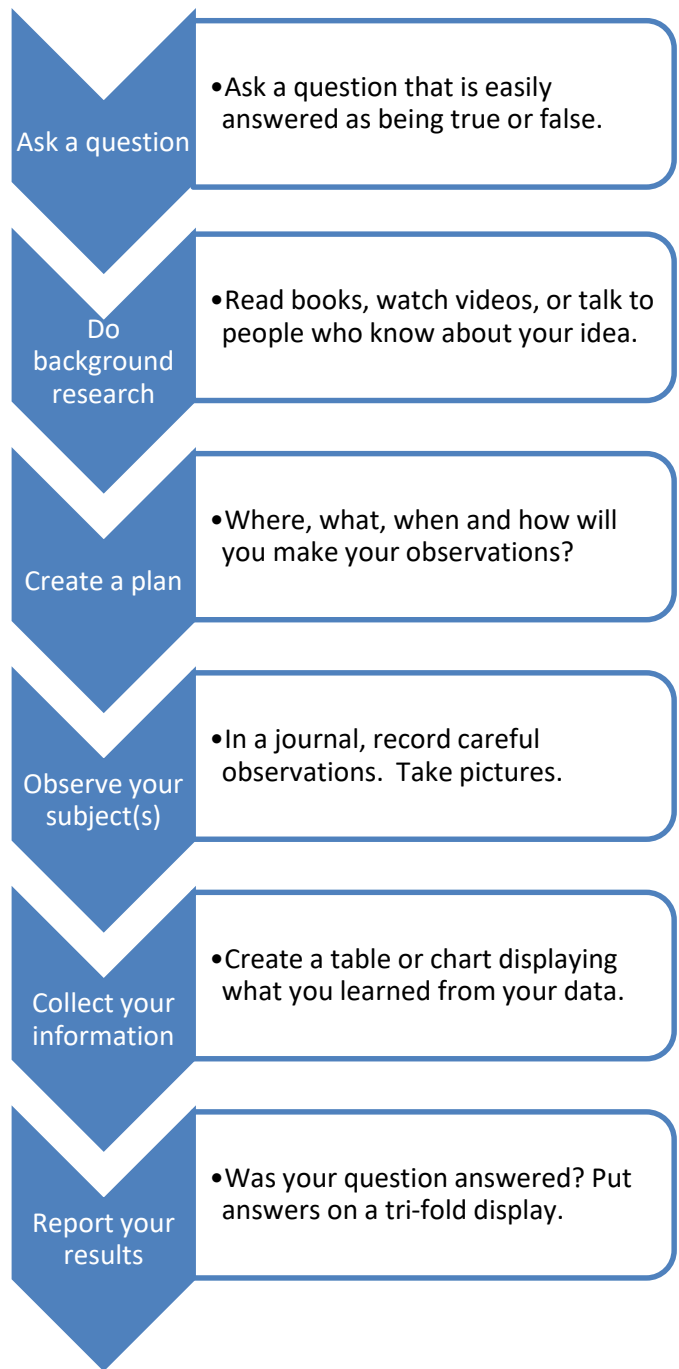
ALWAYS CONDUCT YOUR RESEARCH WITH PARENTAL PERMISSION AND SUPERVISION!!!

Follow the steps on this page to use the Scientific Method as it applies to the project you'd like to do:

Collection

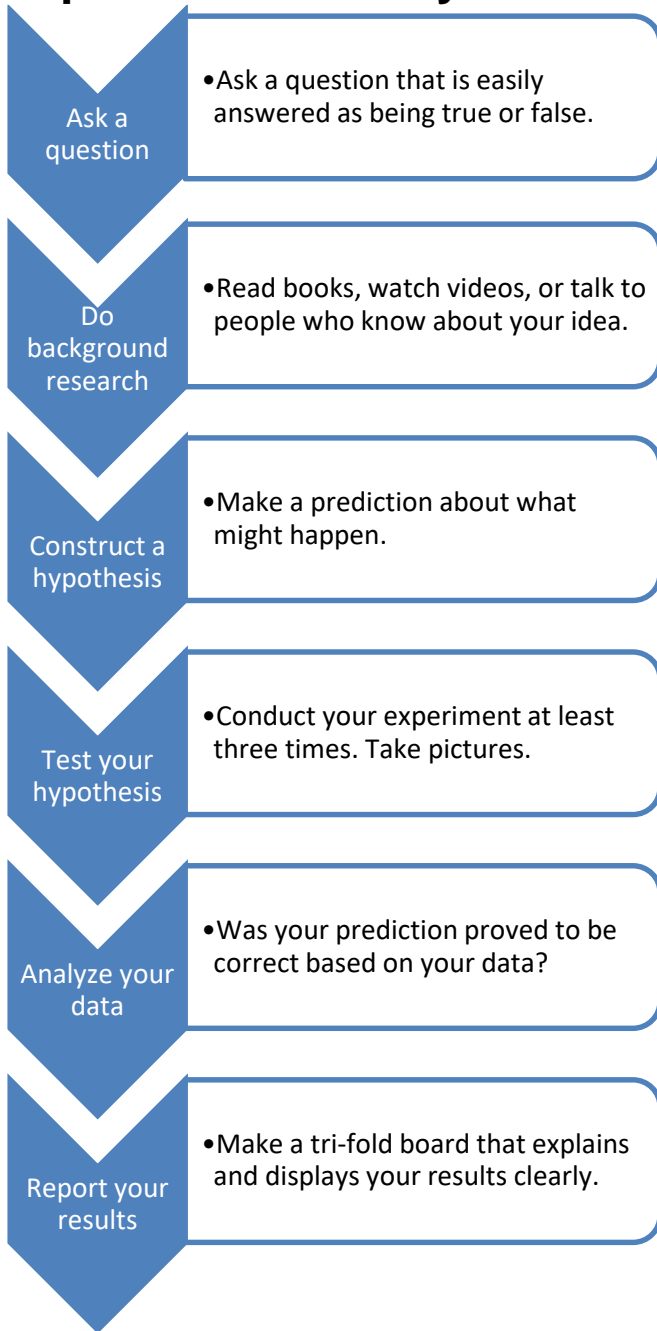


Observation



SEE NEXT PAGE FOR THE SCIENTIFIC METHOD FLOW CHART FOR OTHER TYPES OF PROJECTS.

Experiment / Survey



My project is this type: Collection Observation Experiment Survey

(circle one)

My favorite Science Fair project discipline is: (circle one)

Life Science

Physical Science

Earth/ Space Science

Social Science

I want to do a project involving (specific topic): _____

Collection: a project about collecting, identifying and grouping items from the environment around you.

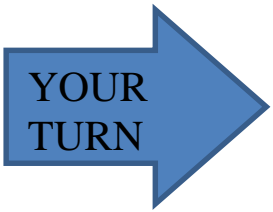
Step 1: Ask a question

Choose a topic that you are interested in learning more about. Ask a one sentence question that you will find the answer to by collecting something. You can get ideas of what you might want to collect and the question you want to answer by taking a walk, looking around your room, or thinking about what you like the most. *Write this question in your science notebook.*

Examples: What kinds of insects live in my backyard?
 What kinds of leaves grow in my neighborhood?
 What different twigs grow on trees in the park by my house?

Follow this format: What kinds of _____?

(item)	(verb)	(location)
birds	are	in my neighborhood
leaves	are	in the park
trains	are	in the world
dinosaurs	were	in the world



My Question: _____?

Step 2: Background Research

Now it is time to research your item as much as possible. Become an expert at your collected item.

How do you become an expert?

YOU READ!

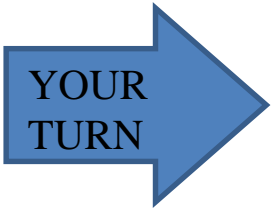
READ about your topic. READ encyclopedias. READ magazine articles and books from the library. READ articles from the internet. Take *note of any new science words you learn in your notebook* and use them. Track of all the books and articles you read. You'll need that list for later.

YOU DISCUSS!

Talk about it with your parents. Talk about it with your teachers. Talk about it with experts like Veterinarians, Doctors, Weathermen or others who work with the things you are studying. ***Hint: take pictures of yourself interviewing people*

Sometimes websites will give you e-mail addresses to experts who can answer questions.

DO NOT WRITE TO ANYONE ON THE INTERNET WITHOUT PARENTAL PERMISSION & SUPERVISION!



Research: My items are: _____
(birds, trains, leaves, bark, insects, dinosaurs, minerals, liquids, etc.)

Write your sources in your science notebook

Books I found in the library on my topic are:

Title:

Author:

Internet sites that I found on my topic are:

Website Title:

URL:

People I talked to about my topic are:

Name:

Title:

Some important facts that I learned about my topic are:

Step 3: Collect

Before you start, you'll need a plan. What materials will you need to collect and sort your items? Are you going to need to copy pictures instead of collecting actual items?

Example:

What types of birds are in my neighborhood?

1. I will collect between Rural and College and Broadway and Alameda.
2. I will take pictures of every bird I see.
3. I will print all my pictures with mom's help.
4. I will need a photo album.

After you've begun making your collection, you may find that your procedure needs changing. That's okay. Just be sure to record the changes you've made.

**YOUR
TURN**

My Plan or Procedure:

Write a step-by-step plan here and record it in your scientific notebook.

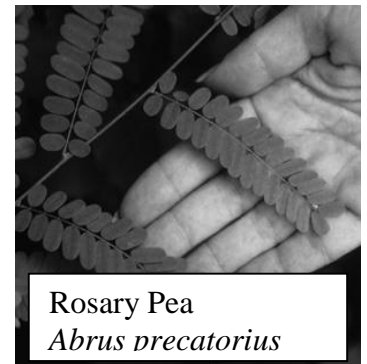
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2

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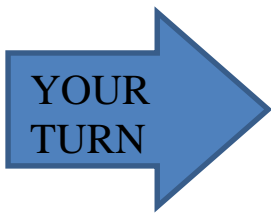
Step 4: Name and Group

Every item you've collected has a special name. For example, their names may come from the types of minerals they're made of or from the types of plants you collected them from. Once you have your collection, find the proper scientific name for each item using books or the internet for help. Create labels for each item to help you remember its name. *Record this info in your notebook.*

Look carefully at the items you've collected. Look at their colors, shapes, sizes, or at other things about them. How are some of the items alike? How are they different? Those items that are alike in some way, put them together in a group. Can the other items of your collection be put into similar groups for that same reason?

Example – A collection of rocks could be put into groups by color. There may be a group of red rocks, brown rocks, and green rocks. Every rock needs to be placed in one of the groups.

Of all the many different ways you could group the items of your collection, choose your favorite and present them grouped in that way at the science fair.

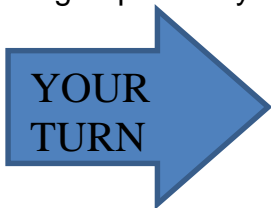


You will need to record your item names separately in your scientific notebook.

How did you group your objects?

Step 5: Collect Your Information

Put all of your collected items together. Make sure they are labeled Organize them into one type of group. Then you need to draw some conclusions.



Conclusions: Now tell us what you learned from this.

Did you answer your question? What did the results tell you?

Application:

(How does this apply to real life?)

It is important to know about this item because.....

Skip to **Step 6: Report Your Results** section.

Observation: a project about finding something in the natural world to watch closely and learn about.

Step 1: Ask a question

Think about what you want to observe and make a question that describes what you're hoping to learn. Choose a topic that you are interested in learning more about. Ask a one sentence question that you will find the answer to by making observations of the natural world. You can get ideas of what you might want to observe and the question you want to answer by taking a walk, looking around your room, or thinking about what you like the most. *Write this question in your science notebook.*

- Examples: How much water does my dog drink each day?
 What insects come to my back porch light at night?
 How many birds visit my back yard?
 What color is the sunset?

Use one of these formats to form your question:

The "How Much/Many" Question:

How much/many _____ (verb) _____ ?
 food does my dog eat
 birds visit my back yard
 bugs are in the park

The "What" Question:

What _____ (verb) _____ (environment) ?
 types of bird visit my yard
 types of clouds are in the sky each day
 color is the sunset
 insects come to my back porch light at night



My Question: _____ ?

Step 2: Background Research

Now it is time to research your item as much as possible. Become an expert at your collected item.

How do you become an expert?

YOU READ!

READ about your topic. READ encyclopedias. READ magazine articles and books from the library. READ articles from the internet. Take *note of any new science words you learn in your notebook* and use them. Track of all the books and articles you read. You'll need that list for later.

YOU DISCUSS!

Talk about it with your parents. Talk about it with your teachers. Talk about it with experts like Veterinarians, Doctors, Weathermen or others who work with the things you are studying. ***Hint: take pictures of yourself interviewing people*

Sometimes websites will give you e-mail addresses to experts who can answer questions.

DO NOT WRITE TO ANYONE ON THE INTERNET WITHOUT PARENTAL PERMISSION & SUPERVISION!



**YOUR
TURN**

Research: My observation is mostly about this subject: _____

(sample topics... magnetism, electricity, absorbency, taste, or plant growth.)

Write your sources in your science notebook

Books I found in the library on my topic are:

Title:

Author:

Internet sites that I found on my topic are:

Website Title:

URL:

People I talked to about my topic are:

Name:

Title:

Some important facts that I learned about my topic are:

Step 3: Create a plan

Before you start, you'll need a plan. Where will you make your observations? When? How? What will you do? What will you be looking for? etc.

Example:

How much water does my dog drink each day?

1. Measure how much water it takes to fill my dog's water dish.
2. Choose one particular time of the day to measure how much water is left in the dish.
3. Each day during my observation and at the correct time, I need to:
 - measure how much water is left in my dog's dish
 - subtract that amount from how much was in it to start with
 - in the notebook, record the day and how much water was drunk for that day
 - refill the water dish and return it to where it belongs
4. If the water dish is ever empty, then I need to get a larger dish.

Be sure to write your plan or procedures in your scientific notebook before you start.

After you've begun making your observations, you may find that your procedure needs changing. That's okay. Just be sure to *record any changes you've made in your scientific notebook.*



YOUR
TURN

My Plan or Procedure:

Write a step-by-step plan here and record it in your scientific notebook.

- 1
- 2
- 3
- 4
- 5

Step 4: Observe Your Subject(s)

Record everything that you observe about your subject. Watch carefully. Is there something that surprises you?

Draw sketches. Take photographs. Record information in your scientific journal.

Example:

How much water does my dog drink each day?			
Day	How much water fills the dish?	How much was left at 6:00 each night?	How much water my dog drank?
Monday	2 cups	1 cup	1 cup
Tuesday	2	1 ½	½
Wednesday	2	½	1 ½
Thursday	2	1 ¼	¼
Friday	2	1	1
Saturday	2	1 ¼	¾



YOUR
TURN

You will need to create a data table or chart and record your scientific notebook. Sketch a data table or chart to organizer your data. It's okay if you need to change it as you actually record your observations

Step 5: Collect Your Information

Put data into a table or chart. Review all the information you have in your notebook.

Start by stating each observation. Do you have an answer to the question that you started with?

Next, try to brainstorm reasons why your subject did what it did. What did you learn from observing? What surprised you?

Example:

Question - How much water does my dog drink each day?

Data statement - My pet drinks from $\frac{1}{2}$ to $1\frac{1}{2}$ cups of water each day.

Possible reasons –

- 1) The day she drank the $1\frac{1}{2}$ cups was a really hot day.
- 2) We played a lot in the yard on the days she drank $1\frac{1}{2}$ cups of water.
- 3) She slept a lot on the days she only drank $\frac{1}{2}$ cup water.



YOUR
TURN

My Question:

My Data statement: (How did the data answer my question?)

Possible reasons for the observations I saw:

Conclusion: Now tell us what you learned from this. Did you answer your question? What did the results tell you? Did you find a reason for your observations?

Application: (How does this apply to real life?) It is important to observe this because.....

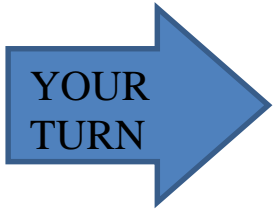
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YOU DISCUSS!

Talk about it with your parents. Talk about it with your teachers. Talk about it with experts like Veterinarians, Doctors, Weathermen or others who work with the things you are studying. ***Hint: take pictures of yourself interviewing people*

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Write your sources in your science notebook

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Title:

Author:

Internet sites that I found on my topic are:

Website Title:

URL:

People I talked to about my topic are:

Name:

Title:

Some important facts that I learned about my topic are:

Step 3: Construct a hypothesis

Now it is the time to PREDICT what you think will happen if you test your problem. This type of “SMART GUESS” or PREDICTION is what real scientists call A HYPOTHESIS.

Since you already have your question, now you just have to answer it BEFORE you do the experiment. In other words, what do you think will happen during your experiments. Remember you need to do your experiment at least three times.

Example Problem: Which brand of paper towel is more absorbent?

Example Hypothesis: I think Brand X will be more absorbent because it's a more popular brand, it is thicker and the people I interviewed said that the more expensive brands would work better

(This hypothesis not only predicts what will happen in the experiment, but also shows that the “Scientist” used research to back up his prediction.)



YOUR
TURN

Hypothesis: Create a Hypothesis based on what you have researched.

I think that (will happen) because (my research shows...)

Step 4: Doing the Experiment to Test Your Hypothesis

Now we've come to the good part.... the EXPERIMENT! **Take lots of pictures!!!!**

Designing an experiment is really cool because you get to use your imagination to come up with a test for your problem, and most of all, you get to prove (or disprove) your Hypothesis. Now **Science Fair Rules state that you cannot perform your experiment live**, so you'll have to take plenty of pictures as you go through these seven very simple steps.

First: Gather up your materials: What will you need to perform your experiment? The safest way to do this is get that adult you recruited to help you get the stuff you need. Take pictures or draw pictures of your materials. This will come in handy when you are making your board display.

Second: Write a PROCEDURE. A procedure is a list of steps that you did to perform an experiment. Why do you need to write it down? Well it's like giving someone a recipe to your favorite dish. If they want to try it, they can follow your steps to test if it's true. Scientists do this so that people will believe that they did the experiment and also to let other people test what they found out.

Third: Identify your variables. The variables are any factors that can change in an experiment. Remember that when you are testing your experiment you should only test one variable at a time in order to get accurate results. In other words, if you want to test the affect that water has on plant growth, then all the plants you test should be in the same conditions, these are called controlled

variables: same type of dirt, same type of plant, same type of location, same amount of sunlight, etc. The only variable you would change from plant to plant would be the amount of water it received. This is called the independent or manipulated variable. The independent variable is the factor you are testing. The results of the test that you do are called the dependent or responding variables. The responding variable is what happens as a result of your test. Knowing what your variables are is very important because if you don't know them you won't be able to collect your data or read your results.

Fourth: TEST, TEST, TEST. Remember, your results should be consistent in order to be a good experiment. In other words, when you cook from a recipe you expect the outcomes to be the same if you followed the directions (or procedure) step by step. So that means you need to do the experiment more than once in order to test it properly. We recommend three times or more. More is better! Don't forget to take pictures of the science project being done and the results.

Fifth: Collect your DATA. This means write down or record the results of the experiment every time you test it. Be sure you also organize it in a way that it is easy to read the results. Most scientists use tables, graphs and other organizers to show their results. Organizing makes the results easy to read, and much easier to recognize patterns that might be occurring in your results. But don't make a graph or table because we asked you to, use it to benefit your project and to help you make sense of the results. There is nothing worse than having graphs and tables that have nothing to do with answering the question of a science project.

How Do You Collect Data?!?

- Keep data in a scientific notebook. Draw diagram and pictures and jot down any additional observations or questions you have as you do the experiment. Be sure to include what things are being measured in as well. Are your temperatures in Fahrenheit or Celsius? Are your lengths in inches, centimeters, meters? The recommended standard of measurement in science is metric so if you can keep your measurements in meters, liters, Celsius, grams, etc, you are doing great!

- Be accurate and neat!



Materials: (take pictures!)

List the Materials that you will need for your science experiment here:

Variables:

List the variables that you will control or keep the same and the variable that you will change to test your hypothesis.

Example: I will control the amount of water I use, where I pour it, how I pour it and how I put the paper towel on the spill. I will change the type of paper towel I use to see which is better.

My controlled variables are (the stuff that will always stay the same):

My experimental variable (the ONE thing that changes from one experiment to the next, what you are testing):

Procedure: (Don't forget to take pictures and write this in your scientific notebook)

List the steps that you have to do in order to perform the experiment here (use more if needed):

1

2

3

4

5

Data Chart(s): Create a data chart to record data in your scientific notebook.

Step 5: Analyze Your Data and Draw a Conclusion

Write a Conclusion. Tell us what happened. Was your hypothesis right or wrong or neither? Were you successful, did it turn out okay? Would you change anything about the experiment or are you curious about something else now that you've completed your experiment. And most of all, TELL WHAT YOU LEARNED FROM DOING THIS.

Understand its Application. Write about how this experiment can be used in a real life situation. Why was it important to know about it?

Conclusion: Now tell us what you learned from this and if you were able to prove your hypothesis. Did it work? Why did it work or why didn't it work? What did the results tell you? Sometimes not being able to prove a hypothesis is important because you still proved something. What did you prove?

Application:

(How does this apply to real life?)

It is important to know about this experiment because.....

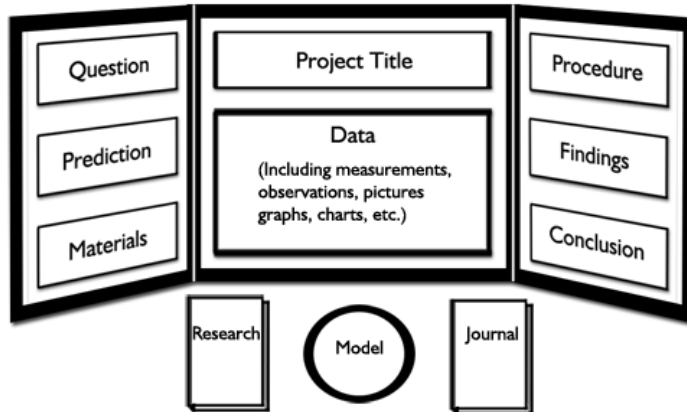
Go to **Step 6: Report Your Results**

Report Your Results: Make a display to showcase your project.

Step 6: Reporting Results or Why You Needed All Those Pictures

Your display board is kind of like an advertisement for all your hard work. So take our advice: BE NEAT! The judges like to see a nice, easy to read display, that has neat writing, easy to read graphs and tables and you guessed it.... lots and lots of pictures!!

This is an example of a neat looking Science Fair display board. It is just an example. Depending on your information and the amount pictures, tables and graphs, you may have a different layout. Just make sure it is neat.



Display Beauty Secrets:

- Use a computer to type out your information, but if you can't, write out your information in your best writing. Printing the titles is usually best. If you are using a computer, make sure the fonts are readable and only use one or two type faces. Your Lab Assistant should help you with this.
- Use spray adhesive or glue stick to paste up your papers. It is less messy
- Mount white paper, pictures, graphs and tables on colored papers (making sure the colored paper is larger so it creates a border for the white paper).

Bring items to show what you did.

- Bring in items to show what you did. For an observation, this might be photos, drawings or another representation of your work. For a collection, you can bring the items themselves or photographs that show the items labeled and classified. For an experiment, you can bring in models, experiment hardware or photos.
- This completed handbook should be with your project.
- Limit your total display to 36" wide by 15" deep (there is no height restriction).
- No liquids. This includes volcanoes—no eruptions. Take pictures instead.
- No insects or animals.
- Nothing that needs to be plugged into an outlet.

If you completed everything in this packet you probably have a terrific science fair project, and you are now a real scientist! Good Job!

Doing the Interview:

Time to tell people what you learned from your project.

Look sharp, feel sharp and you will be sharp. Dress nice that day and you will show the evaluators that you have confidence.



Stand to the side of the display so that the guest evaluator can see it

The guest evaluators will ask you some questions about your project. They might ask:

Why did you choose this project?

Can you tell me about what you did?

What was your question?

What did you learn about your topic?

What research did you do?

What was your favorite part of the project?

The evaluators are just there to talk to you about your project. If you get lost or forget where you are, look at your display and find the answer. If you want to talk about something the evaluator didn't ask about, go ahead! When you are done, shake hands with the evaluators and thank them for their time, remember that they are volunteers who care about you!

General Guidelines

1. Be sure your project is no larger than 36" wide and 15" deep (there is no height restriction). A standard pre-made display back is a good choice. Projects must be freestanding. Wall space is not available to hang or lean posters.
2. You will be most successful if you follow all of the steps from this handbook.
3. Fill out **ALL** of the needed sections of this packet. Also, be sure to include your scientific notebook with your display. **Fill out an entry form when you drop off your project.**
4. Any work with animals must follow humane procedures. No live animals, including mammals, birds, reptiles, amphibians, fish, insects or invertebrates, may be displayed because we cannot care for them.
5. High-voltage electricity, such as 110 volt current, may not be used. Instead, rely on low-voltage, battery powered circuits. There are no electrical outlets available for demonstrations. Please don't bring items that need to be plugged in to an outlet.
6. Do not use dangerous chemicals, highly flammable materials or other dangerous objects. Do not use any glass in the display. Use plastic instead. Please no liquids in your display.
7. Any project that breaks district rules or state/federal laws is not permitted.
8. Please always have adult help and supervision.
9. Firmly attach all small parts of your project to the backboard to prevent pieces from being lost or taken. **Please do not display anything valuable.**
10. Please print material clearly for your backboard. Our younger students have not yet learned to read cursive writing.

Science Fair Schedule:

Friday, January 11th , 2019

Handbooks delivered to students

There are three levels: K-1st, 2nd – 3rd, and 4th – 5th

They will also be posted on www.broadmorpta.org/science

Monday, January 14th –
Friday, 18th, 2019

SCIENCE, WOW! Week

Look for fun science activities on the playground before school from 8:30 to 9am and displays in the office to start off the excitement!

January 30th, 2019 – 6:00 – 7:00 pm

Bobcats' Night at the Planetarium

*Join us for a special night on the ASU campus at the Marston Gallery of Scientific Exploration
781 E. Terrace Road
Tempe, AZ 85281*

Friday, February 9th – 19th, 2019

Science Fair Registration Open

**Registration will be online this year on the PTA website:
www.broadmorpta.org/science**

Registering is very helpful to the Science Fair Planning Committee, even if your child's topic changes.

Tuesday, February 20th, 2019

Deliver projects to gym

Before school from 8:00 – 8:55 a.m. OR

After school is dismissed from 3:30 – 4:00 p.m.

Choose which round of interviews your child will attend.

Tuesday, February 19th, 2019

1st round of student interviews

5:30 p.m. – 7:30 p.m.

Wednesday, February 20th, 2019

2nd round of student interviews

5:30 p.m. – 7:30 p.m.

Tuesday – Thursday,
February 19th – 21st

Class tours throughout the day

Thursday, February 21st

STEM NIGHT – Open house

6:00 p.m. – 7:00 p.m.

Join us in celebrating our student's achievements while engaging with scientific partners and organizations from around the valley.

Friday, February 22nd

Any remaining projects will be bagged and given to students in their classroom. We are not responsible for damage. If possible, parents should pick up projects at the Open House.

REMINDER: PLEASE NO VALUABLES OR LIQUIDS ON YOUR DISPLAY!