How can I help my child with a project?

1. Designing a scientific method project is for any curious, interested child.

2. Be positive.

3. The project goals are to use and strengthen basic problem-solving skills. Your child may need guidance and encouragement. You may not know all the answers to questions that come up. That is okay.

4. The basic science process skills your child will use to complete this project are:
   - Asking a question and finding an answer (research)
   - Organizing
   - Experimenting
   - Measuring
   - Writing the results or new knowledge (What do you know now that you didn't know before?)
   - Reporting or presenting to others

5. Stick to a schedule. Use the plan that is included to keep track of progress. A project may take between 4-6 weeks, depending on how difficult the question is.

6. Help your child with things like photography, construction, or tasks where safety is important. Your child should be able to print, draw, color, make a graph, or use a computer to complete the written report.

7. Hands-on activities are the best way for your child to understand. It might get messy, but your child will enjoy mixing, growing plants or building objects. Use items that you can easily obtain.

8. Consider the cost as you select a topic. How difficult will it be to get the materials?

9. Allow plenty of time for thinking and exploring. Help your child stay relaxed. Be a good listener and learn along with your child. Be careful not to do for your child many things he or she can do for him/herself.

10. Check the project for neatness, good grammar, spelling and accuracy.

STAY ORGANIZED WITH A SCHEDULE

This may be the first time you have attempted a long range project, so it is very important to make a schedule and stay organized. Science projects often require several weeks for completion. Don't let a due date that is many weeks away throw your planning off; there are many things to do. Here is an example of a project plan, starting six weeks before the STEAM Exhibition.

Check Off

	Week 1: Think about your project. Talk to people, read, and collect ideas. Decide on the purpose of your project. Write an objective title. State a hypothesis. Describe what you will do. Do you need to check with an adult?
	Week 2: Change title or idea if necessary. Collect information. Conduct experiments. Collect data.
	Weeks: 3 & 4 Continue experiments. Collect and check your data (answers) to see that your experiments are working. Write a rough draft of what you have done. Get opinions from a parent or other adult on what you have done.
	Week 5: Chart your results. Graph your data. Look for patterns in your answers. Write a summary of your experiments and conclusion about your results. Begin drawings and posters. Get all materials for your display.
	Week 6: Finish your reports. Put together your exhibit. Show it to classmates, friends and family. Ask for ways to improve your exhibit. Make sure the topic and your results are easy to understand.

Traditional Scientific Method Process

Following is an example of the scientific process that we suggest you use.

1. TOPIC ---> 2. PURPOSE ---> 3. HYPOTHESIS ---> 4. PROCEDURE (Experiment) --->

5. RESULTS (Data) ---> 6. CONCLUSIONS ---> 7. DISPLAY

1.TOPIC

Select a topic that can be answered only by experimenting. Write your topic as a *question* to be investigated.

IDEAS FOR SELECTING A TOPIC:

1. *READ* science books, magazines, and newspapers. *TALK* to your teacher, family, and friends. *VISIT* professional people, museums, and zoos.

2. Select a topic you know nothing about. Something new may arouse your curiosity.

3. Select a topic that you know something about, but you want to investigate further.

4. Select a topic that genuinely interests you.

Good Topics	Poor Topics
1. Do different colored mints dissolve at the same rate? *This is a good topic because it required experimentation that you can do yourself. You must use the scientific method in completing this project.*	1. How volcanoes erupt. *This topic will not allow experimentation without visiting real volcanoes. Making a model that erupts is a demonstration not an experiment.*
2. What surfaces do mealworms prefer? *This topic suggests the use of an experimental method. Asking a question is a good approach towards developing your topic.*	2. Microscopes *The topic is too general. Telling how one works is not experimentation.*
3. Do all brands of paper towels absorb water at the same rate? *This is an investigation where only one variable is being manipulated.*	3. Do different brands of paper towels soak up different temperature of water at the same rate? *This topic needs to be narrowed down to one investigation. Only one variable should be manipulated in an investigation.*

Categories & Titles of Science Experiments

Please do not select any experiments that use dangerous materials.
These titles are listed only for ideas. Please come up with your own title.

Environmental Science *Does pollution affect plant growth?* *What is the best way to store bananas?* *Which paper towel is strongest?* *What causes rust?* *What are the effects of sunlight on colored paper?* *Which plastic trash bag is the strongest?*	**Engineering and Computers** *Will a ball bounce higher if it is dropped farther from the floor?* *Which type of paper airplane will fly the farthest?* *What materials will a TV remote penetrate?* *Which glue is the strongest?* *Can a boat with holes float?*
Botany *How long does it take for bread to mold?* *Which houseplant fertilizer works best?* *Do different liquids affect plant growth?* *How does light affect plant growth?*	**Health Science** *How do video games affect heart rate?* *How does smoke affect living things?*
Earth and Space Science *Is 12:00 noon the warmest part of the day?* *Do all liquids evaporate at the same rate?* *How much water does each soil hold?* *Which materials keep ice cubes from melting for the longest time?*	**Behavior Science** *What effect does music have on memory?* *How can you teach a mouse to run a maze faster?*

2. PURPOSE

The purpose is one to three sentences that explain why you are doing this investigation.

"The purpose of this project is....."

If your purpose is well worded, you will have little difficulty writing a title for your project.

3. HYPOTHESIS

A hypothesis states what you think is going to happen when you investigate a question.

Examples:

Question: *Does light affect the way plants grow?*

Hypothesis: Plants will grow toward the light.
Hypothesis: Plants will grow away from the light.
Hypothesis: Light will make no difference in the way plants grow.

Question: *Which glue is the strongest?*

Hypothesis: Sugar glue is stronger than all the others.
Hypothesis: Elmer's glue is stronger than Super glue.
Hypothesis: There is no difference between colored glue strength and white glue strength.

4. PROCEDURE (EXPERIMENT)

1. Materials

2. Variables

3. Step-by-Step Directions

MATERIALS

List all materials used in your investigation. Include what, how much, and what kinds of materials you used. Keep in mind quantities are important.
Be sure to use only metric units.

GOOD LISTING	POOR LISTING
3 – 15 x 15 cm. Sq. each of: Brawny, Gala, Scott, generic paper towels 250 ml. Graduated beaker 750 ml. Water 20 C 1 – 20 x 20 cm. sq. cake pan Celsius thermometer Clock with a second hand	Paper towels Measuring cup Water Container Thermometer Clock

VARIABLES

There are three types of variables:

1. Manipulated Variable: What you change on purpose in an investigation.

2. Responding Variable: The responding variable is what changes by itself because you manipulated (changed) something in your investigation.

3. Variable Held Constant: Everything else in your investigation must be held constant (kept the same). This is often called *control*.

Example Question:
Do all brands of paper towels absorb the same amount of water?

Manipulated Variable: Brands of paper towels

Responding Variable: Amount of water that is absorbed by each towel.

Variables held Constant: Size of paper towel
Amount of water poured on each towel
Temperature of the water used
Container Towels are placed in
Method of pouring

STEP-BY-STEP DIRECTIONS

Your step-by-step directions are like a recipe. Anyone who reads them should be able to duplicate your investigation and get the same results.

QUESTION: Do all brands of paper towels absorb the same amount of water?

DIRECTIONS:

1. Cut 3 – 15 x 15 cm. sq. from each brand of paper towels.

2. Label each cut piece with brand name.

3. Pour 50 ml. of 20 C water into 20 x 20 cm. sq. pan.

4. Place one square of generic brand paper towel into water & pan.

5. Leave for 30 seconds.

6. Remove paper towel.

7. Measure water remaining in pan and record.

8. Dry the cake pan.

9. Repeat steps 4-8 for each brand of paper towel.

10. Repeat entire process twice more for each brand of paper towel.

5. RESULTS (DATA)

1. Graphs

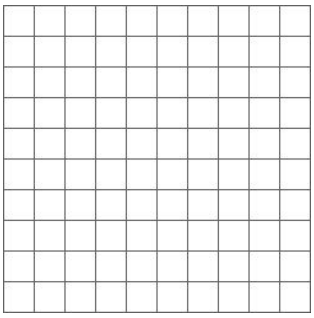
2. Charts

3. Illustrations

4. Photos

GRAPHS

Responding Variable (vertical Axis)



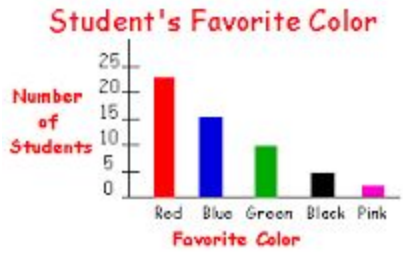
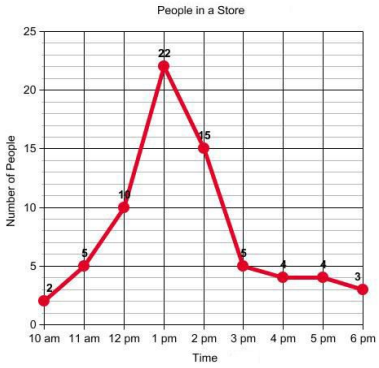
Manipulated Variable (Horizontal Axis)

Title: The title is a short description of the data being displayed.

Horizontal Axis: The manipulated variable (what you changed on purpose) is displayed on the horizontal axis.

Vertical Axis: The responding variable (what happened as a result of what you changed) is displayed on the vertical axis.

There are two main types of graphs: bar graphs and line graphs. Plan your graph so that your data will be evenly distributed across the horizontal and vertical axes.

Bar Graph	Line Graph
A bar graph is used to display data that does not occur in a continuous manner. 	A line graph is used to display data that occurs in a continuous manner. 

6. Conclusion

Before you write your conclusion, carefully examine all your data: graphs, charts, and tables.

Ask yourself these questions:
1. Did you get the results you expected to get?

2. Were there any unexpected problems or occurrences that may have affected the results of your investigation?

3. Do you think you collected sufficient data? Were there enough trials?

4. Do I need to revise my original hypothesis? If you write a revised hypothesis, DO NOT use it to replace your original hypothesis for this project!

Your conclusion should include:
1. Statement of support or non-support of the original hypothesis.

2. Description of any problems or unusual events that occurred during your investigation.

3. What you would do differently next time.

4. Revised hypothesis, if data did not support your original hypothesis.

Example:

Question: *Do all brands of paper towels absorb the same amount of water?*

Hypothesis: The cheaper the paper towel, the less water it will absorb.

Conclusion: The data collected does not support the original hypothesis. The cheapest paper towel (generic) did not absorb the least amount of water. The higher priced paper towel (Brawny) did not absorb the most. My revised hypothesis is the price of the paper towels does not affect the amount of water absorbed.

7. Display Board

The maximum height and width is 60 inches x 48 inches.

<table>
<tr>
<td>Purpose

Hypothesis

Procedure
Materials
Variables

Step-by-Step Directions</td>
<td>Title

Student’s Name

Results (data)

Charts, Graphs, Pictures</td>
<td>Conclusions</td>
</tr>
<tr>
<td colspan="3">On the table: journal and equipment</td>
</tr>
</table>

JOURNAL

A journal is like a diary of your scientific investigation. It will serve to help you document observations, problems and progress of your investigation.

Your journal should include:
1. Detailed day-by-day notes on the progress of your project.
2. What you are actually doing each day (observations, progress).
3. Problems you have with your investigation.
4. Things you would change if you were doing this investigation again.
5. Any drawings/photos that you aren't using on the display that might help explain your work.

These are your rough notes, not to be redone.

BIBLIOGRAPHY

List alphabetically all books, articles, people, or other sources used for researching.

Last name, First name, Title of Book, City, Publisher, Date Published.

Last name, First name, "Article," Magazine, Pages, Date Issued.

FINE PRINT

SAFETY RULES & REGULATIONS

1. Dangerous chemicals, open flames and explosives will not be permitted.

2. Poisonous or dangerous plants will not be permitted.

3. Ordinary doorbell push buttons will not be allowed to control electric current of 110 volt or higher. Electronic equipment must be properly insulated. This rule is essential to prevent serious electric shock.

4. If batteries are used, they must be sufficient to maintain operation throughout the time of the fair. Storage batteries shall be protected so that they will not cause damage.

5. The Science Fair Committee reserves the right to refuse any exhibit, which is unsafe or inappropriate.

PROJECT LIMITATIONS AND REQUIREMENTS

- No live animals will be exhibited at the fair.

- Exhibit spoiled foods; molds, bacteria, microorganisms or any other type of cultured growth is not permitted, unless they are in a sealed plastic container.

- Liquids may be exhibited as long as they are in sealed plastic containers.

Model and Collection Definitions

Model	Collection
An object that is built or created to represent something from the scientific world.	A group of objects collected, identified, and assembled together. Consider how you will sort or explain your collection. Examples include: size, color, shape, or another property.
• Boat: How does it float? • Bridge: Why did you build it the way you did? • Diagram of an eye: Label the parts	• Rock Collection • Solid vs. Liquids • Magnetic vs. Non Magnetic • Animal Classification

Model or Collection Display Example

Your student can create a display to showcase his/her model or collection. Below is an example that could be used when creating their display.

<table>
<tr><td rowspan="2">Description

Materials</td><td>Title

Photographs
or
Diagram</td><td rowspan="2">Reason

Fun Facts</td></tr>
<tr><td colspan="2">Model or Collection</td></tr>
</table>