New Prague Elementary Science Fair packet for grades 4-6....
Take a soaring leap into science and engineering!

Brought to you by: New Prague Community Education and the Gifted and Talented Program
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<table>
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<th>District wide Elementary Science Fair</th>
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Why do a Science Fair project?

A Science Fair Project can help students learn how to think like a scientist. The project asks students to utilize the scientific method to investigate and experiment. They will solve an authentic problem, on a topic of their interest, and come up with a real life solution. This will help them develop and demonstrate skills across curriculum areas while encouraging an enthusiasm towards science.

When is the Districtwide Science Fair? Saturday, March 7, 2015
New Prague Middle School, 11:30AM-12:30PM Registration/Set up, 12:30-1:30 and 1:30-2:30 half of the group will be judged while the other enjoys a great science program and then flip. 2:30-2:50 Open viewing of projects. 2:50-3:15 Awards Ceremony where ribbons will be handed out and numerous special award gift cards will be awarded! Each child will receive a super cool participant pin, ribbon and coupon for a local treat!

What are the Project Requirements?
1. Submit a copy of the Elementary Project Approval Form to Community Ed. or your school’s coordinator PRIOR to starting the project. The form MUST be signed by students, parents and a Science Fair Coordinator or Science Teacher. It must also be with the student’s project at the Science Fair.

2. If the project involves humans or animals there are additional forms. A Science Fair Coordinator must also review the project for potential risk PRIOR to starting the project. A complete research plan and additional forms may be required. Please contact a science fair coordinator for more information.

3. Students MUST register for the Science Fair online here by February 20. There is no cost as this opportunity is sponsored by Community Education and the Gifted/Talented Program. Or use the quick start form in this booklet.

4. Tables for project displaying will be provided. They should also bring a 8’ grounded, electrical extension cord if their project requires electricity. Students will need to request the use of electricity when registering for the Science Fair.

5. Review the Project Safety Rules. Although this is the student’s project, parents are asked to use common sense in regards to safety. Please supervise and assist as appropriate.
Where can I get help with my project?
Talk to one of the Science Fair Coordinators listed on the cover, or sign up for a help session. There will be a licensed teacher there to help answer questions, guide students through the steps of the scientific method, and give advice on topics such as picking a project, using the internet for research, and putting a display together. These are optional meeting times and parents are welcome to attend with their child at any of the schools, regardless of which school they attend. 6th Graders are also welcome to attend! Registration is available online here.

Located at NP Community Education Central Ed Campus-enter at Comm Ed doors. Tues Jan 20 (7PM), Thurs Feb 5 (5PM), Tues Feb 17 (7PM) and Tues March 3 (7PM). Please sign up online or on the quick start form please so we can plan the number of teachers who will be helping.

PROJECT SAFETY RULES

Anything which could be hazardous to public display is PROHIBITED. This includes:

- Living Organisms (Animals)
- Syringes, pipettes and similar devices or any glass items
- Flames, open or concealed
- Highly flammable/combustible gases, liquids or solids
- Dangerous chemicals including caustics and acids
- Poisons, toxic and hazardous chemicals, drugs and other controlled substances
- Dry ice or other sublimating solids
- Tanks which have contained combustible liquids or gases (unless purged with CO2)
- Operation of a Class III or IV laser
- Projects with unshielded belts, pulleys, chains and moving parts with tension or pinch points

Proper attention to safety is expected, including the following requirements:

- Plants may be exhibited. Photos are encouraged vs. bringing live plants.
- Liquids may be exhibited, as long as they are in sealed plastic containers. This liquid may not be harmful in any way, should it accidentally be opened.
- Exhibiting spoiled foods, molds, bacteria, microorganisms or any other type of cultured growth is prohibited, unless they are in a sealed plastic container
- The exhibition of human and animal parts is prohibited. Except: teeth, nails, animal bones, sealed insects, histological sections and liquid tissue slides may be displayed if properly acquired.
- Photographs depicting graphic dissection or other lab techniques may be shown to judges
- Anything producing temperatures that will cause burns must be adequately insulated.
- Batteries with open top cells are not permitted. Other types of batteries may be used.
- High voltage equipment MUST be shielded with a grounded metal box or cage
- Large vacuum tubes or dangerous ray-generating devices MUST be properly shielded.
- High voltage wiring switches and metal parts MUST be located out of reach of observers and designed with an adequate overload safety factor.
- Electrical circuits for 125-volt AC must have an Underwriters Laboratories-approved cord of proper load-carrying capacity, which is equipped with a standard grounded or polarized plug.
- All wiring MUST be properly insulated. Nails, tacks or un-insulated staples MUST not be used.
• Bare wire and exposed knife switches may be used only in circuits of 12 volts or less; otherwise standard enclosed switches are required.
• Electrical connections in 125-volt circuits MUST be soldered or attached with approved connectors and connecting wire properly insulated
STEP 1: Brainstorm...here is one way to do it! It is now time to start your scientific journal...a notebook or logbook works well. Date each entry! (for both engineering and scientific method projects)

The best way to choose a topic is to think about what interests you. This could be a hobby, a sport or something you want to know more about. Set a timer for 10 minutes and brainstorm or mindmap ideas related to the topic.

Next you will narrow your list down by thinking about questions that you could ask about your topic. Is there a problem that you would like to solve or something you are wondering about? A good question should be simple and tests only one variable. This means that only one factor changes in your experiment while everything else remains the same. The items that remain constant are called controls.

Keep in mind that your project needs to be an experiment based on the scientific method and not a model or simply a report on your topic. Not all of your questions will work because of safety, lack of materials or other reasons. Feel free to add and cross things off of your list.

My Question: Will more sunlight help my flower grow?
The Variable: The amount of sunlight
The Controls: Pots, Same amount of soil, seeds and water

Project Idea or Question/Problem:
______________________________________________________________________________
______________________________________________________________________________
(For scientific method projects: )
The Variable________________________________________________________________________
______________________________________________________________________________
The Controls:________________________________________________________________________
______________________________________________________________________________

Now that you have your idea, fill out the Elementary Project Approval Form. Have a Science Fair Coordinator or a Science Teacher sign your project form. A copy will need to be submitted to Community Education prior to starting your project.
STEP 2: Study, Observe and Gather

Collect information about your topic. You can read books, research on the internet or interview an expert. You should include three to five sources of information. This will help you create an educated guess or hypothesis that answers your question if you are doing the scientific method project. It is typically written as an If/Then Statement.

If you doing an engineering project, you will want to learn about what is out there already to help solve your problem or what has been tried and this will give you more ideas for something new!

Make sure to take notes and site your sources of information for your report’s bibliography. To create a bibliography, you will list your sources in alphabetical order by Last Name. Here is a guide to help you get started. You can also use an online resource such as www.easybib.com (very helpful!)

**Book:**
Author Last name, First name. *Book*. City of Publication: Publisher, Year of Publication.

**Encyclopedia Article:**
Author Last Name, First Name. “Title of Article.” *Name of Encyclopedia*. Date of edition.

**Periodical Article:**
Author Last Name, First Name. “Title of Article.” *Periodical*. Date: Pages.

**Newspaper Article:**
Author Last Name, First Name. “Title of Article.” *Newspaper*. Date, edition. Pages

**Interview**
Person interviewed Last name, First name. Type of interview. Date interviewed.

**Internet**
(when available) Author Last Name, First name. “Title of Article.” Date published. [http://internet address](http://internet). Date accessed.

**Websites to help you get started:**
www.sciencebuddies.org
school.discoveryeducation.com/sciencefaircentral
www.sciencestuff.com
www.sparticl.org
[http://www.mnsu.edu/sciencefair/elementary-division/](http://www.mnsu.edu/sciencefair/elementary-division/)
[https://student.societyforscience.org/intel-isef](https://student.societyforscience.org/intel-isef)
http://www.easy-science-fair-projects.net/
[http://pbskids.org/designsquad/](http://pbskids.org/designsquad/)
[https://engineering.purdue.edu/INSGC/K12/JustForKids/JustForKidsLinks](https://engineering.purdue.edu/INSGC/K12/JustForKids/JustForKidsLinks)
[http://www.eie.org/overview/engineering-design-process](http://www.eie.org/overview/engineering-design-process)
http://www.sciencekids.co.nz/engineering.html
Research Worksheet (for both scientific method and engineering projects)

Source 1 Bibliography info__________________________________________________________

Source 1 Research:
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Source 2 Bibliography info__________________________________________________________

Source 2 Research:
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Source 3 Bibliography info__________________________________________________________

Source 3 Research:
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_____________________________________________________________________________________
Now that you have researched, form a hypothesis about your question. It is best to write it as an if/then statement: (this is for the scientific method projects)

If ____________________________________________________________,

Then ________________________________________________________

For example: My research tells me that plants need sunlight. I also noticed that the flower in my garden where it’s sunny grow than the ones in the shade. So, my hypothesis is IF a plant has less sunlight, THEN it will not grow as tall.

What are the reasons or facts that support the hypothesis you chose?

__________________________________________________________________________________________________________

__________________________________________________________________________________________________________
STEP 3: Experiment and Record Results

(Scientific Method Project): You must design each experiment so you can observe the results when only one variable is changed. It is very important to include a “control”. When you have a control you are going to compare the results to this. It shows the normal results from your experiment if you don’t change anything. There are times when you may not have a control in your experiment. Talk to your teacher if you are not sure. (Engineering): You will also design a plan of how you are going to solve your problem, except you would not have variables or a control.

The procedure for your experiment is like a recipe. Be precise and write each direction as a step. Be specific and plan ahead. Create a list of materials you will need and then gather them.

For example: Procedure

1. Fill 12 pots with .5kg of soil
2. In each pot, plant 3 bean seeds 3 cm deep.
3. Give 4 pots (label A) 3 hours of sunlight each day
4. Give 4 pots (label B) 6 hours of sunlight each day
5. Give 4 pots (label C) regular amount of sunlight
6. Measure each plant and record results daily

Materials
- 6 kg Soil
- 12 Pots
- 36 Bean Seeds
- Ruler

List the materials you will need. Be specific:

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List the steps to perform the experiment or how you will design your prototype (like a recipe):

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As you conduct your experiment or build your prototype, make sure to keep accurate records. Use a science journal or notebook to record your data. You may also want to take pictures of your experiment or engineering steps as you go. These can be used with your project display.
For the Engineering Project:

Test your prototype. Did what you engineer help to solve your problem? Why or why not?

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Now think about revamping your prototype. What could you change or do differently to make it even more efficient or better?

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How will you accomplish this?

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Test your prototype again and write what happened.

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Did it work better this time? Why or why not?

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What did you learn through the engineering process?

_____________________________________________________________________________________

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Thinking about the real world, how would this make a difference in our world?

_____________________________________________________________________________________

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Organize your results into tables, graphs, or charts. Then write a paragraph that tells what happened during your experiment. Explain whether your results support your hypothesis or not. It is also important to include what you learned by doing the project and how you can apply this to your life. (For engineering and scientific method projects)

Put your data into a table. See this site for help: http://nces.ed.gov/nceskids/createagraph/

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<tr>
<th>Tester #</th>
<th>resting heart rate</th>
<th>exer-gaming heart-rate</th>
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You can display results in a graph...
For engineering and scientific method....

What does the data tell you? Analyze the results.

Was your hypothesis correct? Why or why not? Remember, it’s ok if your experiment didn’t turn out as you guessed. It is normal and is part of the scientific process. For the engineering project did you solve a problem?

For the scientific method project what would you do differently next time? What could be a source of error in your data?

For the engineering project, how are you going to revamp your design and why?

What did you learn? How could this apply to problems of the world or everyday life?

Who could benefit from what you learned and how will you share it with them?

Who do you thank for helping you and why?
STEP 5: Report and Project Display

Organize all of your written information, charts, and graphs into a report and a visual display. All the steps you have taken so far have helped you complete your project. Now you just need to organize and display it in a way that the judges will appreciate. Make sure to check for correct spelling and grammar.

For scientific method projects:
The following is a suggested order for your report:
1. Title page w/name, grade, school, scientific method project
2. Table of Contents
3. Question or Purpose
4. Hypothesis
5. Research
6. Experiment procedure/materials
7. Variables
8. Results
9. Graphs, charts, tables
10. Conclusion
11. Bibliography/Acknowledgements

For the engineering project:
1. Title Page w/name, grade, school, engineering project
2. Table of Contents
3. Question or purpose or problem
4. Research
5. My Design
6. Procedure/materials
7. Testing
8. Results
9. Graphs, charts, tables
10. Revision
11. Conclusion
12. Bibliography/Acknowledgements
Science Fair Display Checklist:

- Is your display neat, colorful and uncluttered?
- Are all of the words spelled correctly?
- Is the title of your display in a place where it catches the eye?
- Does your project include a hypothesis? (For scientific method)
- Did you include data on your display in the form of measurements, graphs, tables, pictures, or observations? These could also be included by providing a science notebook.
- Does your display include a written conclusion?
- Bring your report and your science log/notebook, along with your approval form.
- Show and tell. As long as it is safe you can bring things like plants or other aspects of your project to show.

Prepare for the fair:

- Practice your presentation with a friend or family member prior to the Science Fair. Have them interview you. They can use the judging rubric in this packet.
- Be prepared. Make sure you eat prior to the fair and bring along a book to read while you are waiting to be judged.
- A table and chair is provided.
- Dress nicely. After all of the hard work you have put in, you should be very proud and your attire should match that pride.
- When talking to a judge. Make sure to shake their hand and introduce yourself and your project. Stand tall, make eye contact and answer each question to the best of your knowledge. Speak clearly and try not to rush.

Congratulations on completing your project! Use the following rubrics to help you make sure you have what is expected for your project. These are the judging forms that will be used!
# Scientific Method Judging Form

Name __________________________ Grade_____ School________ Teacher_________________

Project #___________ Judge #_________ (circle score and fill in the line, add total, leave comments)

**Project Name__________________________________________________**

1.  Is the purpose of the project clearly stated in writing and orally?
   - 1   2   3   4   5   6   7   8   9   10 _______

2.  Did the student research the topic (background info) using books, magazines, interviews, visiting a location, websites.
   - 1   2   3   4   5   6   7   8   9   10 _______

3.  Did they follow the scientific method process and include a hypothesis?
   - 1   2   3   4   5   6   7   8   9   10 _______

4.  Can the student explain the procedures used to answer the basic question or purpose? A plan with logical steps and materials.
   - 1   2   3   4   5   6   7   8   9   10 _______

5.  Did they repeat the experiment for validity? More than one trial?
   - 1   2   3   4   5   6   7   8   9   10 _______

6.  Did the student use a variety of methods to collect data? Observations, research, experimenting
   - 1   2   3   4   5   6   7   8   9   10 _______

7.  Is the data expressed using charts, tables, graphs, illustrations, photos?
   - 1   2   3   4   5   6   7   8   9   10 _______

8.  How well does the student understand the project and how it relates to the real world?
   - 1   2   3   4   5   6   7   8   9   10 _______

9.  Did the student provide thoughtful and enthusiastic answers to the questions you had?
   - 1   2   3   4   5   6   7   8   9   10 _______

10. Did the student have a creative question and approach the answer in a creative way?
    - 1   2   3   4   5   6   7   8   9   10 _______

Total Score _____________  Comments:
Engineering Judging Form

Name __________________________ Grade______ School_________ Teacher_________________

Project #___________ Judge #_________ (circle score and fill in the line, add total, leave comments)

Project Name__________________________________________________

1. Is the problem stated clearly?
   1  2  3  4  5  6  7  8  9  10 ______

2. Have they explored/researched the problem with books, magazines, interviews, location visit, websites?
   1  2  3  4  5  6  7  8  9  10 ______

3. Did they include a plan, model or drawing with details of their proposed prototype/model?
   1  2  3  4  5  6  7  8  9  10 ______

4. Did the student effectively build and test their prototype/model according to their plan and test it multiple times?
   1  2  3  4  5  6  7  8  9  10 ______

5. Did the student use tables and graphs to display the data they collected?
   1  2  3  4  5  6  7  8  9  10 ______

6. Did the student modify/improve the design and try it again?
   1  2  3  4  5  6  7  8  9  10 ______

7. Is the project attractively displayed, organized, neat and contain correct spelling?
   1  2  3  4  5  6  7  8  9  10 ______

8. Does the student understand the engineering design process and can they communicate it clearly?
   1  2  3  4  5  6  7  8  9  10 ______

9. The student recognizes the potential impact of their solution to the problem for the real world.
   1  2  3  4  5  6  7  8  9  10 ______

10. The student provided thoughtful and enthusiastic answers to my questions.
    1  2  3  4  5  6  7  8  9  10 ______

Total Score ___________   Comments:
Please turn in to Mrs Ilkka (Raven), Mr Triplett (EV) or Mrs Prchal (FR)
The Science and Engineering Fair sound awesome...sign me up!
(Return by Feb 20th)
Name ________________________________
Grade____
School_________________________
Teacher_________________________

Project Title (if known, or topic you are thinking about)
________________________________________________

_____ Engineering Project   or       _____ Scientific Method Project

Contact information:
Parent Name ________________________________
Full Address
____________________________________________________________________
Phone ____________________
Email __________________________

_____ Yes my child can be in photographs/videos for science fair
_____ Yes, please have community education sign me up for the fair or
_____ No thanks, I signed us up already online for the fair
More Info Online: www.np.k12.mn.us/commed/sciencefair.shtml

_____ I need a display board for $5. Send money or check to Jodi Prchal at
Falcon Ridge Elementary. Boards will be dropped off to Eagle or Raven in
a few weeks for pickup. They are available at Walgreens, but are much
smaller.

Help Session Sign Up...(held at the CEC)Please sign me up for the following:
_____ Tues Jan 20 (7PM)       _____ Thurs Feb 5 (5PM)
_____ Tues Feb 17 (7PM)       _____ Tues March 3 (7PM)