

Oak Grove Elementary Science and Engineering Fair 2019 – 2020

Engineering is the making of things that did not previously exist,
whereas Science is the discovering of things that have long existed.

-David Billington, pioneer of structural art

It's time to start preparing for the Oak Grove Science and Engineering Fair, which is sure to be an impressive display of the curiosity and skills of our future scientists and engineers. Participation is mandatory for all fifth graders. The key to a positive experience is NOT waiting until December to get started. The best topics are related to real-world issues.

Our school fair will be held at OG on Friday, December 13, 2019 at 8:00AM. Parents are welcome to visit *for the first 30 minutes*. Outside judges will rate each project. The winners from our school fair will compete at the DCSS S&E Fair in February.

Each student will design and execute...

****EITHER** a Science project that seeks to answer a specific question, following the steps of the Scientific Method

****OR** an Engineering project that seeks to solve a problem by improving something that already exists or inventing something new, following the steps of the Engineering Design Process (EDP)

Each project includes BOTH a typed report AND a detailed tri-fold. The tri-fold displays photos and/or other evidence of the experiment, and contains the same information that is in the report (minus the cover sheet and bibliography).

The tri-fold can be any color, any size, and they are available at Office Depot/Max, Staples, Michaels, etc. It is best NOT to purchase the ones that have the top "title" flap...they can be cumbersome.

Timeline

Monday, Oct. 21 - Deadline for Project Detail Page to be approved by Ms. Hopkins and then signed by a parent

Friday, Nov. 7 - Deadline for Research portion of the report to be completed, along with the Bibliography

Thursday, Dec. 12 or earlier- Trifolds and Reports are due at school

Friday, Dec. 13- Oak Grove Science and Engineering Fair 8:00 – 9:30AM in the cafeteria

Items that are not allowed to be part of the DCSS Science and Engineering Fair display

Glass, food, seeds, powders, gels, liquids, wax, chemicals, teeth, blood stains, heat sources, pinch points, sharp items, sand, plant matter, animal matter, exposed electrical connections

Science Project Guidelines

The first step is to choose a topic that you are genuinely interested in. Look for ideas online and in books. Make notes in your S&E Fair notebook as you think of ideas and plan your experiment. This will prove that your ideas and plans were yours from the beginning.

Keep in mind that....

- *You are seeking to answer a specific question with a specific experiment.
- *Your hypothesis must begin with the words “I predict that...”.
- *Your experiment must have only ONE variable.
- *Your results must be measureable with a number.

Once you've met with Ms. Hopkins to finalize the Project Detail Page, then have a parent sign it no later than Oct. 21. When you are ready to write the report, create a word document with the headings below. You will add to each section throughout the process, and revise/edit it along the way. The report will also be part of your trifold.

These are required in the report. (All but the cover sheet and bibliography are also required on the trifold.)

1. **Cover sheet** – contains the title of the project and your name
2. **Question/Purpose** – this states what your project is about in the form of a specific question.
Possible examples:
What is the effect of _____ on _____?
Does _____ have an effect on _____?
3. **Research** – a combination of your research and background knowledge, written in your own word, should be one or two paragraphs
4. **Hypothesis** – a single statement that starts with “I predict that...”
5. **Experiment** – this is what you did, written step-by-step in command sentence form, and should include a list of **Materials**. If your experiment involves the presence or growth of bacteria cultures, you can order agar and petri dishes from any Science supply website.
6. **Results** - this includes both a written explanation AND a graph or a chart. Also state whether your hypothesis was correct. See below: **Displaying your Results***
7. **Conclusion** - this summarizes what you learned about your topic and what you would do differently next time, if you were to recreate this experiment, or a similar one
8. **Bibliography** – list your sources; must have a minimum of two.
www.easybib.com is a user-friendly bibliography generator

***Displaying your Results**

The Results of your experiment must be expressed in two ways – qualitative (words) and quantitative (chart or graph). Use this website to help you create a graph: <http://nces.ed.gov/nceskids/createagraph/default.aspx> (If you type “create a graph” in your search engine, this should come up as the first link.)

Click on “Create a Graph Tutorial” to learn how to create different types of graphs.

Steps of the scientific method

1. Ask a specific science-related **question** – What do you want to learn or find out?
2. **Research** the topic – What information is already known about your topic?
3. Construct a **hypothesis** – Predict the results or outcome of your experiment. (“I predict that...”)
4. Test your hypothesis – Carefully design and carry out an **experiment** that tests ONE variable.
5. Analyze your **results** – Accurately record the results and decide whether or not your hypothesis was correct.
6. Draw a **conclusion** – Decide what your results mean. If you were to repeat this experiment, what might you do differently next time? What similar experiment might be a logical next step?

Sample Questions that a S&E Fair Judge might ask you

- Why did you choose this topic?
- Describe what you did for this project.
- What was your hypothesis?
- What were the steps of your experiment?
- Did the results surprise you? How did you organize your results?
- What is your conclusion?
- Did this process make you more interested in a related topic?
- If you were to do this again, would you do anything differently?
- If you were to take this project to another level, what would you do next?
- What did you learn? Did you have fun?

Useful websites

www.sciencebuddies.org click on “project ideas” and “project guide”

www.school.discoveryeducation.com/sciencefaircentral/

www.stevespanglerscience.com/experiments

www.sciencefair-projects.org/

www.virtualsciencefair.org

www.bnl.gov/education/contests/scienceFair/ (watch the video)

Search “science fair” or “cool science fair ideas” or “fun science experiments” and see where it takes you.

Write other websites here:

Science is not a set of facts to be memorized and then forgotten.

Science is learning how to gather and test information that enables us to draw reasonable conclusions that give meaning and purpose to our existence.

Engineering Project Guidelines

The first step is to choose a topic that you are genuinely interested in. Look for ideas online and in books. Make notes in your S&E Fair notebook as you think of ideas and plan your experiment. This will prove that your ideas and plans were yours from the beginning.

Keep in mind that....

- *You are seeking to solve a specific problem with a specific solution.
- *Your results must be measurable with a number.
- *The BEST projects connect the experiment to a current real-world issue.

Once you've met with Ms. Hopkins to finalize the Project Detail Page, then have a parent sign it no later than Oct. 21. When you are ready to write the report, create a word document with the headings below. You will add to each section throughout the process, and revise/edit it along the way. The report will also be part of your trifold.

These are required in the report. (All but the cover sheet and bibliography are also required on the trifold.)

1. **Cover sheet** – contains the title of the project and your name
2. **Question/Problem** – this explains what your project is about and what problem you hope to solve
3. **Research** – a combination of your research and background knowledge, written in your own word, should be one or two paragraphs
4. **Imagine** – describe a few ideas you've thought of that could be solutions to the problem
5. **Plan** – describe the best possible solution in detail, why you think it will work, and include a list of **Materials**
6. **Create** – design and test your plan with a model or prototype, and discuss whether or not it worked, including both a written explanation AND a graph or a chart that reflects the data. See below: **Displaying your Results***
7. **Improve** – reflect on what you learned about your topic and what you would do differently next time, if you were to try to solve the same problem
8. **Bibliography** – list your sources; must have a minimum of two.
www.easybib.com is a user-friendly bibliography generator

***Displaying your Results**

The Results of your experiment must be expressed in two ways – qualitative (words) and quantitative (chart or graph). Use this website to help you create a graph: <http://nces.ed.gov/nceskids/createagraph/default.aspx> (If you type “create a graph” in your search engine, this should come up as the first link.)

Click on “Create a Graph Tutorial” to learn how to create different types of graphs.

Steps of the Engineering Design Process

1. **Ask** – what problem are you trying to solve?
2. **Imagine** – what are some possible solutions?
3. **Plan** – describe/draw in detail the best solution you can think of
4. **Create** – build your model/prototype, try your solution and measure the results
5. **Improve** – how can you improve your solution so that it’s even better?

Sample Questions that a S&E Fair Judge might ask you

- Why did you choose this problem to solve?
- Describe the model or prototype you created for this project.
- What were the solutions that you imagined?
- Why did you choose this particular solution?
- Did the results surprise you?
- What would you do differently next time to improve your solution?
- Did this process make you more interested in a related topic?
- If you were to take this project to another level, what would you do next?
- What did you learn? Did you have fun?

Useful websites

<https://www.sciencebuddies.org/science-fair-projects/engineering-design-process/engineering-design-process-steps>

<https://www.teachengineering.org/k12engineering/designprocess>

<https://www.mastersindatascience.org/blog/the-ultimate-stem-guide-for-kids-239-cool-sites-about-science-technology-engineering-and-math/>

<https://leftbraincraftbrain.com/engineering-projects-for-kids/>

Search “elementary engineering” or “engineering design process” or “fun engineering experiments” and see where it takes you.

Write other websites here:

*“I haven’t failed. I’ve just found 10,000 ways that a light bulb won’t work.”
-Thomas Edison*

Science Project Detail Page

Complete and return just this page *after* you have met with Ms. Hopkins and received project approval.

Name / HR _____ Due Date _____

For the Student:

I have read this packet and listened carefully in class. I understand what is required of me and I am aware of the timeline and deadlines. I know that this must be my own work. I know that sometimes results are surprising, but that there is no "right" or "wrong". I understand that it is important to have only ONE variable.

The question I will answer is _____
_____.

The topic/s I will research is/are: _____
_____.

A brief explanation of my experiment is _____

_____.

The ONE variable in my experiment will be _____

The other details in my experiment that I must control and keep the same are _____
_____.

The materials I will need are _____
_____.

Student Signature _____ Ms. Hopkins' initials _____

For the Parent:

I have read this packet and I understand what is required of my child as s/he works through each stage of his/her project. I am aware of the timeline and the deadlines. I will offer verbal support and make general suggestions as needed, but I will not take the lead in designing or executing the project. I will not write the report or design the tri-fold display myself. I understand that both the project and report must be the student's work.

Parent Name _____ Parent Signature _____

Best ph. # _____ Email _____

Engineering Project Detail Page

Complete and return just this page *after* you have met with Ms. Hopkins and received project approval.

Name / HR _____ Due Date _____

For the Student:

I have read this packet and listened carefully in class. I understand what is required of me and I am aware of the timeline and deadlines. I know that this must be my own work. I know that sometimes results are surprising, but that there is no "right" or "wrong". I understand that it is important to follow the steps of the EDP.

The problem I am trying to solve is _____

The topic/s I will research is/are: _____

A brief explanation of my plan is _____

The materials I will need are _____

Student Signature _____ Ms. Hopkins' initials _____

For the Parent:

I have read this packet and I understand what is required of my child as s/he works through each stage of his/her project. I am aware of the timeline and the deadlines. I will offer verbal support and make general suggestions as needed, but I will not take the lead in designing or executing the project. I will not write the report or design the tri-fold display myself. I understand that both the project and report must be the student's work.

Parent Name _____ Parent Signature _____

Best ph. # _____ Email _____

Bibliography Information

The last page of your report is the Bibliography, which is a list of sources you used to write the Research section of your report. List the sources in alphabetical order using the author's last name. If a source has more than one author, alphabetize using the first one. If an author is unknown, alphabetize that source using the title instead. Use the Bibliography Worksheet (on the back) to help you keep track of your sources.

www.easybib.com is a great resource for organizing your bibliographic details.

The bibliographic information for different types of resources is located in different places, so you may need to search to find all that you need. You may not find every bibliographic detail for every source.

Collect this information for each printed source (book, magazine, encyclopedia) if it is available:

- Author's name
- Title of book or magazine
- Title of article or section
- Date and place of publication
- Publishing company

Collect this information for each internet source:

- Web address
- Author or editor's names (if available)
- Title of page (if available)
- Last date you looked at the page

Examples of the ways different sources are listed in a Bibliography:

Website or Webpage – check the top or bottom of the website

Format: Author's last name, first name . Title of site or database. Date of last time you visited. <full URL>.

Examples

Devitt, Terry. "Lightning injures four at music festival." Jan. 23, 2002
<<http://whyfiles.org/137lightning/index.html>>

Levy, Steven. "Great Minds, Great Ideas." Newsweek June 10, 2002 <http://www.msnbc.com/news/754336.asp>

Interview – with a professional whose work is related to your topic

Format: Person's last name, first initial. (Date of interview). Personal interview.

Example

Soriano, A. (2008, April 5). Personal interview.

Books – check the title page

Format: Author's last name, first name. Book title. City of publication: Publishing company, publication year.

Examples

Allen, Thomas. Vanishing Wildlife of North America. Washington, DC: National Geographic Society, 1974.

Boorstin, Daniel. The Creators: A History of the Heroes of the Imagination. New York: Random, 1992.

Encyclopedia – check the title page and entry page

Format: Author's last name, first name. "Title of Entry." Title of Encyclopedia. Date.

Examples

"Equatorial Projection." Merriam-Webster's Collegiate Dictionary. 1993.

Pettingill, Olin. "Falcon and Falconry." World Book Encyclopedia. 1980.

Bibliography Worksheet

Use this sheet to record the information from your sources so that you can create your Bibliography later. Your Bibliography should include a **minimum of two** sources. (You probably won't fill all of these blanks.)

Website #1

Title of website or data base _____

Author or editor _____

Last date you visited _____

URL address _____

Website #2

Title of website or data base _____

Author or editor _____

Last date you visited _____

URL address _____

Interview

Name of person you interviewed _____

Date of interview _____

Book #1

Title _____

Author _____

Place and year of publication _____

Publishing company _____

Book #2

Title _____

Author _____

Place and year of publication _____

Publishing company _____

Encyclopedia article

Title and author of article _____

Title of Encyclopedia and year of publication _____