



LEGACY

TRADITIONAL SCHOOL

Engineering Fair

Workbook

Grades 7 & 8

(Page kept intentionally blank)

Dear Parents/Guardians,

Welcome to our Annual Legacy Traditional School Science and Engineering Fair! Over the next three months, your child will be completing their project and participating in our LTS Science and Engineering Fair, to be held on {School Science and Engineering Fair Date}.

For our Science and Engineering Fair, each student has the option of doing a project using the **scientific method** (a study that involves asking a question, constructing a hypothesis, and testing the hypothesis) or using the **engineering design process** (defining a problem, creating a solution to the problem, and testing it). This packet defines the requirements for the engineering design process.

During the engineering design process, designers frequently jump back and forth between steps. Going back to earlier steps is common. This way of working is called “iteration,” and it’s likely that your child’s process will do the same.

Remember: While engineers create new things—such as projects, websites, environments, and experiences—scientists study how nature works. If your child’s project involves making observations and doing experiments, their project might better fit the scientific method.

For your child’s safety, the science teacher must approve the project. It’s important that you understand what topic your child has chosen and how they plan to accomplish it. Although your child should do all the work, they may need your support and advice.

We hope you are as excited as we are for the chance to support your child in this project. If you have any questions regarding the science and engineering fair, contact me via email (coordinator’s email). Please read the important notes below and sign this paper to let me know you received this letter.

Sincerely,

{____Coordinator’s Name____}

IMPORTANT NOTES:

- This is a long-term assignment.
- Each assignment that is due will not be accepted late. A grading rubric is attached.
- Your student will receive **two** packets. The Engineering Fair Directions Packet includes specific directions, requirements, and rubrics used to grade the project. The Engineering Fair Workbook includes templates and outlines that will help guide your student in completing each step.

PARENT/GUARDIAN AGREEMENT:

I support my child’s efforts in creating a Science and Engineering Fair project. I understand that this is a **long-term assignment**. If work is not turned in by the due date, my child will earn a zero for that assignment, as stated in the Parent/Student Handbook.

Parent/Guardian’s signature:_____Date:_____

(Page kept intentionally blank)

First Steps for the Student Engineer

STEP 1: LOGBOOK SETUP

The following are examples of entries you should include in your logbook:

- Initial brainstorming ideas
- A description of the project topic
- A statement of the real problem or need to be addressed (brainstorm criteria and constraints necessary to solve this problem)
- Exploration of alternatives to answer the need or problem
- Plans for the prototype
- A **complete list** of the materials needed/used
- A **complete description** of testing procedures
- Thoughts about how the process is going
- Observations during the testing
- Charts, graphs, and tables of data collected from the results of the trials.
- Conclusion
- Questions that arise during the project.

NOTE: Judges look for systematic data collection and analysis, so keep your notes thorough!

STEP 2: TOPIC SELECTION

Due Date: _____

Choose a Topic:

For the purposes of this fair, **engineering is the designing, building, and testing of a made-at-home project**. It's the "invention category" of the science fair. You'll need to choose a topic you want to explore and define a problem you want to solve.

1. Explain the problem that you ultimately want to solve.

2. What is your initial idea for how to solve this problem?

3. Briefly explain what you will design and build to solve this problem.

STEP 3: PROJECT PROPOSAL

Due Date: _____

Engineering Fair Proposal

I, _____, propose the following engineering topic for my Science and Engineering Fair project.

Problem Statement: Define a problem that your design will solve.

Design Ideas: What do you think you'll design and build in order to solve the problem detailed above?

STUDENT: I agree that this will be the Science and Engineering Fair topic I'll be working on. If I need to change my project, I will contact my teacher and discuss the change. I agree to put forth my best work, and I understand that the Science and Engineering Fair project is **my** responsibility. I will seek help when needed, but I am fully aware that all work is to be on my own. I also understand that this is a **long-term assignment**. As such, if work is not turned in by the due date, I will earn a zero for that assignment, as stated in the Student-Parent Handbook.

Student's signature: _____ Date: _____

PARENT/GUARDIAN: I support my child's efforts in doing this Science and Engineering Fair project and approve the project chosen. I understand that I will be responsible for obtaining materials needed and will provide appropriate oversight.

Parent/Guardian's signature: _____ Date: _____

TEACHER: This project meets requirements for the Science and Engineering Fair.

Teacher's signature: _____ Date: _____

Please print, sign, scan, and email this form to your science teacher. A copy of your proposal will be made and returned to you.

This form will be added to your Final Report Notebook and Logbook. If you need to make a change to your original proposal, you must get approval from your science teacher.

STEP 4: WORKS CITED & GLOSSARY

Due Date: _____

Works Cited Examples (MLA format)

Woodwell, George M., et al. "Plant." *Encyclopedia Britannica*, 15 Jun. 2021,
<https://www.britannica.com/plant/plant>. Accessed 21 July 2021.

Schons, Mary. "Sweet Secrets. *National Geographic*, 21 Jan. 2011,
<https://www.nationalgeographic.org/article/sweet-secret/7th-grade/>. Accessed 24 July 2021.

More MLA examples on slides 50-51 of [Science and Engineering Practices Presentation](#).

Work Cited Template (MLA format)

Source 1

Source 2

Source 1

Glossary Example

Cohesion—is the attraction of molecules for other molecules of the same kind

Glossary Template



STEP 5: RESEARCH SUMMARY

Due Date: _____

Research Summary Outline

(ROUGH DRAFT OUTLINE – Final copy must be in paragraph form, typed or written neatly in pen):

Below are some examples of information you should be looking for in your research.

- Explanation of engineering concepts behind project
- Analysis of relationship between glossary term and experiment
- History of similar designs
- What experts already know about the topic
- How this design could impact everyday life
- Importance of this topic

PARAGRAPH 1 (SOURCE 1)

A. Define the problem you are trying to solve:

B. Title and author(s) of first source: _____

C. Find the main idea from first source: _____

a. Supporting detail: _____

b. Supporting detail: _____

PARAGRAPH 2 (SOURCE 2)

A. Title and author(s) of second source: _____

B. Find the main idea from second source: _____



a. Supporting detail: _____

b. Supporting detail: _____

PARAGRAPH 3 (SOURCE 3)

A. Title and author(s) of third source: _____

B. Find the main idea from third source: _____

a. Supporting detail: _____

b. Supporting detail: _____

C. State the proposed solution to the problem based on the research found in this paper.

IMPORTANT: *Before continuing*, ask yourself if you gathered enough information to design and build a prototype that will solve the problem you picked?

STEP 6: REPORT, PART 1

Due Date: _____

Report Part 1 (**ROUGH DRAFT OUTLINE – Final Copy must be typed or written neatly in pen in this format**):



Name: _____

A. Problem statement: _____

B. Proposed solution: _____

C. Design requirements (Define **criteria** and **constraints**): _____

D. Preliminary drawings (need at least 5 different models; use another blank piece of paper for more room)

E. Final drawing, including metric labels (use another blank piece of paper for more room).

F. Materials:

- _____
- _____
- _____

- _____
- _____
- _____



- A. Procedures (this numbered list must account for five trials of the prototype):**

STEP 7: BUILD, TEST, RECORD, AND ANALYZE RESULTS

STEP 7.1: REDESIGN, RETEST, RECORD, AND ANALYZE RESULTS

Record all procedures, measurements, observations, and pictures (only of the project, not of people) in your log book. Refer to the Engineering Fair Directions Packet for more detail.

STEP 8: REPORT PART 2 AND ABSTRACT

Due Date: _____

(ROUGH DRAFT OUTLINE – Final copy will continue with Report Part 1 and must be typed or written neatly in pen in this format):

Refer to the Engineering Fair Directions Packet and the rubric for specifics on what to include.

H. First prototype data and graphs:

H. Redesigned final solution data and graphs:

I. Data analysis: _____



J. Conclusion: _____

K. Limitations: _____

L. Application: _____

M. Future research: _____

STEP 9: ABSTRACT

Due Date: _____

(ROUGH DRAFT OUTLINE – Final copy must be typed or written neatly in pen in paragraph form):

Refer to the Engineering Fair Directions Packet and the rubric for specifics on what to include.

STEP 10: ASSEMBLE THE FINAL REPORT NOTEBOOK

Due Date: _____

Merge Report Part 1 and Report Part 2 into the Final Report in your folder or binder. Remember to put your name and your teacher's name on the **inside back cover** of your report. Reference engineering fair directions packet for specifics.

STEP 11: CREATE YOUR DISPLAY BOARD

Refer to the Engineering Fair Directions Packet for specifics.

STEP 12: ORAL PRESENTATION

Outline what you will cover in your oral presentation below. Reference science fair direction packet for specifics. Practice a few times before presenting in front of the class. :)



Congratulations! You've completed your Engineering Fair project! You should be so proud of yourself. :)