



SARSEF

Science and Engineering Fair

Step by step process

This helps you break down your science or engineering research project into smaller steps, allowing you to plan ahead to meet any deadlines. Be sure to record everything in a lab notebook.

Step 1 – Generate a question

- Think: What topics are you interested in? What topics do you care about? What have you noticed and wondered about your world lately?
- Generate three ideas about that topic that you are curious about, or if your topic has to do with solving a problem, think about what needs to be done better, faster, or correctly.
- Narrow down to one favorite idea you would like to explore.
- Put your idea in the form of a question.
- Start researching the history of this problem and what research has already been done on the topic.
- Write a report about the problem. Explain what you learned. This will become part of your “Introduction” for your project presentation.

Step 2 – Plan your research

- Write down why you are interested in this question or problem and what you will do. This will be the other part of your “Introduction.”
- Think about all the various outcomes to the question you are asking.
- Brainstorm ways to test and answer your own question. This will be your research plan.
- Submit your research plan for Scientific Review Committee (SRC) approval if it involves humans, animals or things that could be dangerous.

Step 3 – Prepare to investigate

- Make a list of materials you’ll need to carry out your investigations or to build prototypes of your design.
- Write your specific method for testing, step by step.
- Think of all the variables you can control. Choose one that you will change as part of your investigations or design trials.
- Think of all the variables you cannot control but will discuss at the end that might have affected your results. All good researchers acknowledge this.

Step 4 – Perform investigations

- Begin your testing. Collect data.
- Take photos during the research/testing phase, if possible.

- Write everything down in your journal – even mistakes!
- Review your procedures. Do you need any additional data? Make changes and test again as needed.

Step 5 – Perform iterations

- If you're doing an engineering project, make any changes to your prototype based on your previous investigations and test again.
- Repeat the process of designing, building, and testing multiple times. Each repetition of this process is called an "iteration."
- Continue performing iterations until you have solved the problem, completed the scope of your project, or need to move on to analysis and conclusion in the interest of time. You may not have solved the problem fully, but a presentation and report on what you have learned throughout the process will help other scientists or engineers pick up where you left off.

Step 6 – Analyze and interpret data

- Prepare to analyze data, using mathematics, statistics, and/or graphs.
- Perform any necessary calculations to allow you to analyze your data thoughtfully.
- Look for patterns in your data.
- Experiment with different graphs that can help you interpret the data you've collected.
- Organize the data into clear charts that will help you communicate your findings to others.

Step 7 – Form conclusions

- Write claims, based on using data as evidence. The claims should answer your initial question or solve your primary problem.
- Expand upon your claims by providing scientific reasoning and discussing how your predictions were met or not.
- Discuss the challenges you encountered and limitations, such as variables that could have influenced results.
- Discuss implications. Explain why your research is important.
- Brainstorm additional questions you have and any other ideas you have for further research.

Step 8 – Create presentation

- Pull important information from your lab notebook to fulfill sections in your project presentation pdf.
- Create a title page (PreK-8) or quad chart (9-12).
- Select pages of your lab notebook that best represents your journey and note-taking.
- Optional: Write a final research paper.
- Add reference section to your report.