INVENTION: ENGINEERING NEW IDEAS

CREATING A SCIENCE FAIR INVENTION PROJECT USING THE ENGINEERING DESIGN PROCESS

For Grades 3 through 5 ONLY

Nearly everything we use, work with, or wear is engineered. Someone had to think of how to design that object to solve a particular problem. Anyone can be an engineer! An engineer is someone who uses knowledge of science and math, and their own creativity to design objects or processes (inventions) to solve problems.

I. PROBLEM

Ask a question about an everyday problem you would like to solve. Inventions can be almost anything created to solve a problem or meet a need. Examples include pencils, cups, cell phones, processes to clean water or move heavy objects, etc.

II. RESEARCH

Research products/processes already available to meet a need or serve a similar function. To do your research, look online, visit stores, and interview experts as well as potential invention users.

III. POSSIBLE SOLUTIONS

Brainstorm possible solutions. Imagine a few different set-ups or designs. Compare and talk about the positive and negative points of each idea. Do not just try your first idea, but choose the *best* one. Reach consensus on which idea is the best possible solution.

IV. PLAN & CREATE

- **A. Draft Plan:** Make a plan and explain it. Draw a diagram and label the parts of your diagram. Use symbols to label the parts.
- **B. Materials:** Make a list of the materials you would like to use for your invention and the amounts you will need. Collect the materials you will need for your invention. It is best to borrow, make, or use inexpensive materials.
- **C. Build:** Build your invention according to your "plan."
- **D. Obstacles:** Keep a log of difficulties you run into and how you address them.

V. TEST & IMPROVE

- **A. Test:** See if it works! Keep a data log of when and how you tested. Evaluate the results.
- **B. Improve:** Gather information from the "test" of your first design to help find problems that need improvement. Improve your first design to make it better!
- **C. Re-Test:** See if it works better! Add the new data to your data log to show the change.

VI. CONCLUSION & APPLICATIONS

Review how well your invention worked and how it might be useful to others.

ELEMENTARY INVENTION

WRITTEN REPORT CONTENT

3rd through 5th Grades

- **TITLE PAGE**
  See Written Report Format on next page.

- **PURPOSE**
  In three sentences or less, tell why you did your science project on the topic you chose.

- **ACKNOWLEDGEMENTS**
  In one or more sentences, say "Thank You" to those who have helped you with your project. You should include those who gave you guidance, materials, and the use of facilities or equipment.

- **TABLE OF CONTENTS**
  List each of the following sections and the page numbers for each. Type the page number at the bottom of each page after you have finished the final copy of your report.

- **PROBLEM**
  State the problem in the form of a *question*. The problem is one sentence long and specific. Your page numbering begins here.

- **RESEARCH**
  This is where you summarize information that was found by other engineers, designers, and potential users of your invention.

- **POSSIBLE SOLUTIONS**
  Describe and/or diagram possible solutions you considered. Include a table that shows positive and negative points (strengths and weaknesses) for each. Identify the solution you chose to try, explaining why you chose it.

- **PLAN & CREATE**
  A. DRAFT PLAN
  Describe and explain the details of **how your invention will work**. Show your diagram (drawing) with the parts labeled, using symbols.
  B. MATERIALS
  List and describe the materials you used and briefly tell how and where you obtained them
  C. BUILD
  Explain how you put your invention together according to your plan.
  D. OBSTACLES
  Make a log of the troubles you run into with materials or the building process. Discuss how you make changes or discover ways to make it work.

- **TEST & IMPROVE**
  A. TEST
  Use your data log, diagram with labels, and any charts you created to explain the ways you tested your invention. Use two or three sentences to evaluate how well your invention worked.
  B. IMPROVE
  Based on your data, describe changes you made to your invention so that it would work even better.
  C. RE-TEST
  Tell about the results of your improved design. Did the redesign help or not?

- **CONCLUSION & APPLICATIONS**
  Now that you have finished your project, use this section to share with others your thoughts about this experience. What would you do differently next time? What went well? Explain how what you learned applies to the real world.

- **SOURCES / BIBLIOGRAPHY**
  List all books, articles, pamphlets and other communications or sources that you used for researching your topic and writing your paper. You must have at least two sources, and only one may be an encyclopedia. Interviews with experts in your field of study are encouraged.

BOXED *topics are part of the rubric criteria for judging. The other parts are used only for grading the written report by the teacher.*