ENGINEERING EXHIBIT GUIDELINES

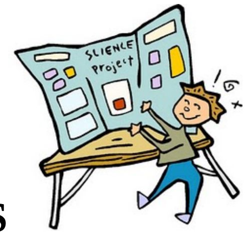
Thursday, February 28th 2019
6PM-8PM

This Science EXPO guide gives you all of the information you need to Exhibit in the 2019 Clark Science EXPO under the category: **ENGINEERING**

This may be the first time that you have been given the opportunity to participate in a Science EXPO. Things you should know:

- Every child at Clark is encouraged to participate.
- Students will deliver their completed exhibits to school on February 28th
- Exhibits will be on display at the Science EXPO on 2/28 between 6pm & 8PM.
- While students may choose to actively participate in their exhibit, they will not be required to do so. We want everyone, including student exhibitors to enjoy all of the exhibits on display at the EXPO.
- Students will be able to take their exhibits home immediately following the event.

In this information guide you will find:



SCIENCE EXPO QUESTIONS AND ANSWERS

WHY ENTER THE SCIENCE EXPO?

It's fun to discover! It is your chance to learn about something you are interested in and share what you've learned with others. We hope to see you there.

CAN I DO A PROJECT WITH A PARTNER?

Yes!

HOW DO I PICK MY TOPIC? Think of a problem that you desire or can envision a solution to. Talk to your family, your teacher, or the librarian.

The crux of the design process is creating a satisfactory solution to a need. The need may be to improve an existing situation or to eliminate a problem. In any case, it is what engineering is all about—using knowledge and know-how to achieve a desired outcome.

HOW DO I KNOW MY TOPIC IS OK?

Almost any topic is great! Remember that you cannot bring anything to the school that is against school rules. Valuable things could be stolen. Dangerous things should not be on display where other kids could handle them.

CAN I BRING AN ANIMAL TO THE SCIENCE FAIR?

NO The Issaquah School District now has a policy that states no animals are allowed at school. So, if your project involves an animal, please take pictures and mount those on your display.

DATES, INTERNET RESOURCES, DISPLAY BOARDS & VOLUNTEERING

Important Dates

February 26th	Registration Deadline
February 28th 9:15	Deliver your completed exhibit to school! Bring to PTA office.
February 28th 6 p.m. – 8 p.m.	Family Engineering Night and viewing of projects (TAKE HOME PROJECTS)

Internet Resources

http://clarkelementary.oursciencefair.com/SchoolHome.aspx

http://www.sciencekids.co.nz/projects.html

Display Boards

Display boards can be purchased at Michael's or Office Depot

ENGINEERING PROJECT STEPS & GUIDELINES

Engineering projects involve creative problem solving and they are not hypothesis testing. Each engineering design project should have a goal which can fit the following model statement:

"The design and construction of a (engineered product) for (target user) to do (some useful function)."

Where can you get project ideas? You may get suggestions from parents, teachers, or mentors. You can also use the web (www.sciencekids.co.nz/projects.html , www.sciencebuddies.org, www.madsci.org). Some high school technology curricula address the engineering design process (www.engineering-ed.org, www.gears-id.org) and many college and professional engineering societies have on-line resources.

You will use the engineering design process to create your EXPO entry. This process is typical of those used by practicing engineers; the definition of terms and the number of steps may vary, but these are "essential steps." Your very first step is to start a project notebook in which you will record every step of your process and the results of your design efforts. The process is iterative, meaning the designer will often repeat steps until he or she is confident the design will meet the needs. Note: the terms product, invention, project, design, and solution are often used interchangeably in Fair Guidelines.

The Engineering Design Process:

1. Define a need; express as a goal
2. Establish design criteria and constraints
3. Evaluate alternative designs
4. Draw a Sketch of your design and/or Build a prototype
5. Test and evaluate the prototype using the design criteria
6. Analyze test results, make design changes, and retest
7. Communicate the design

Step 1. Identify a need

The need (also called the problem you are solving or the Engineering Goal) is frequently identified by customers–the users of the product. Customers may express needs by describing a product (I need a car) or as a functional requirement (I need a way to get to school). The need should be described in a simple statement that includes what you are designing (the product), who it is for (customer), what need does it satisfy (problem to solve), and how does it improve previous designs (easier to use, less expensive, more efficient, safer).

Step 2. Establish design criteria and constraints

Design criteria are requirements you specify that will be used to make decisions about how to build and evaluate the product. Criteria are derived from needs expressed by customers. Criteria define the product's physical and functional characteristics. Some examples of criteria are shape, size, weight, speed, ruggedness, and ease of manufacture. Constraints are factors that limit the engineer’s flexibility. Some typical constraints are cost, time, and knowledge; legal issues; natural factors such as topography, climate, raw materials; and where the product will be used. Good designs will meet important design criteria within the limits fixed by the constraints. Good designs are also economical to make and use because cost is always a design constraint!

Step 3. Evaluate alternative designs

Your research into possible solutions will reveal what has been done to satisfy similar needs. You’ll discover where knowledge and science limit your solutions, how previous solutions may be improved, and what different approaches may meet design objectives. You should consider at least two or three alternative designs and consider using available technology, modifying current designs, or inventing new solutions. Superior work will demonstrate tradeoff analyses such as comparing the strength vs. cost of various bridge-building materials. It’s important to document in your project notebook how you chose and evaluated alternative designs.

Step 4. Draw your concept or Build a prototype of best design

Choose the design that best meets criteria considering the constraints, then draw a sketch of your design or build a prototype. A prototype is the first full scale and usually functional form of a new type or design.

Step 5. Test and evaluate the prototype against important design criteria to show how well the product meets the need

You should develop a test plan describing what you will test, how you will test, and how you’ll perform analysis. You must test your prototype under actual or simulated operating conditions.

Step 6. Analyze test results, make design changes and retest

Testing will disclose some deficiencies in your design. Sometimes the testing fails completely and sends the designer “back to the drawing board.” Make corrections and retest OR prepare an analysis of what went wrong and how you will fix it. As always, document your analyses, fixes, and retests in your notebook.

Step 7. Communicate the design

The designer’s real product is the description of a design from which others will build the product. Use your notebook and the EXPO exhibit to communicate the design to others. Your product description will be conveyed in drawings, photos, materials lists, assembly instructions, test plans and results. Consider listing lessons so future designers need not repeat any of your "frustrations."

ENGINEERING PROJECT - Planning worksheet

Name ____ Date ______________

Define a need; express as a goal:

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Establish design criteria and constraints:

Evaluate alternative designs:

Draw a Sketch of your design and/or Build a prototype

Test and evaluate the prototype using the design criteria:

TESTING PROCESS USED

Analyze test results, make design changes, and retest
Data/Results:

Changes Required? Y/N (If no make changes and retest)

Retest Results

Communicate the final design with Visual Aids (FINAL SKETCH and/or PROTOTYPE)