

# Science, Technology and Engineering

## Department 115

Premium: Blue \$2.00, Red \$1.50, White \$1.00

- Entries must have been made and selected during the current project
- All Articles made from kits, must be so labeled
- If power tools are used by youth in making projects, youth must be 12 years and older
- In addition to the entry card, an additional paper must be attached that gives an explanation of the project including tools and materials used, length of time to complete and its intended use
- **Birdhouses entered in class 1 will not be evaluated under wood science standards. Superintendents may move birdhouse to the wildlife class under Environmental Education Section, if appropriate**

### Section 1 Wood Science

1. Hand Tool-Item made in a Wood Science Project that was cut out, assembled and finished with hand tools only
2. Power Tool-item made in a Wood Science Project that has been partially or totally completed with power tools
3. Kit Item made in a Wood Science Project that is made from materials precut by an outside resource (i.e. commercial supplier or woodworking leader) but is assembled and finished by the exhibitor. Judges will place emphasis on the quality of workmanship performed by exhibitor. No commercial manes on exhibits
4. Miscellaneous Shop
  - Items must be a Wood Science Project that does not fit in above categories
  - Judges will place emphasis on quality of workmanship by exhibitor and the intended use of the project
  - Exhibits to be entered in this division will be at the discretion of the superintendents

### Section 2 Electrical Science

1. Electrical Division
  - Article made in an Electric Project, such as a trouble lamp, test lamp, portable bench light, extension cords, pin-up or study lamp, or the rewiring of an old lamp is acceptable
  - Tension restraint device must in place. Where appropriate underwriters knot should be used, especially in lamp sockets
  - Due to safety code compliance, molded polarized and/or prefabricated cords with polarized plugs, where applicable are allowed
  - Lamps without bulbs or shades will not be considered complete and will be evaluated accordingly □ Projects involving both woodworking and electrical tasks will be evaluated on the merits of both
2. Electronic Division:
  - Article made in an Electric Project utilizing principles and construction procedures relating to electronics is acceptable

- Projects will be evaluated on the basis of soldering and connection techniques, neatness of assembly and other assembly procedures for electronic project
- Projects must be hand wire and no breadboard kits will be accepted
- Projects must be operable (I.e. contain all necessary batteries)
- **In addition to the entry card, include a short explanation of why or how the exhibit works and what use it has**

### Section 3 Rocketry

#### 1. Junior Division:

- Any rocket made in a rocket program either from a non-kit materials any totally assembled and finished b youth 13 years of age or younger
- Evaluators will place emphasis on proper kit assembly and finishing

#### 2. Senior Division:

- Any rocket made from non-kit materials and totally constructed and finished by a youth 14 years and older
- Evaluators will place emphasis on proper construction techniques and finished product
- Kits may be used when incorporated with other materials to meet the requirements of an educational display as outlined in section 4 class 1

### Section 4 Construction Projects with Manufactured Components

- Youth entering projects in the following classes use manufactured construction pieces to complete projects.

Examples are Lego\*, K'nex\*, Brio\* and Mechano\*, but projects are not limited to these examples

- Projects can incorporate design, following instructions, three dimensional thinking, design modifications, problem solving, creativity, architecture, structural design, principles of mechanics and use of color on the planning and design process
- These skills relate to the professions of engineering, science, construction, architecture and art
- Judging will be based on completion, complexity, presentation and explanation of design, understanding of principles and visual presentations
- **Following items must be included:**
  - a. **Number of pieces:** Youth must know the approximate number of pieces used in assembly. For kits, this number is on the box. It is understood that after a long creative process, it may be difficult to know exact number of small pieces, the youth must provide an estimate rounded to 25
  - b. **Diagrams:** diagrams are required. A diagram could be a photograph printed on printer paper, a scale drawing on graph paper, a photocopy on an instruction sheet or a variable scale rough drawing. Relevant labels and explanations must be added. The diagram must include: 1) Name of youth; 2) The Title of the project; 3) The exact or approximate number of pieces and a self-judgment of

Complexity level (a. easy, less than one hour to assemble; b) medium, 1-3 hours construction time; or c) complex, more than 3 hours of construction time. Juniors may use a photocopy of kit provided drawings for the basis of their diagrams, but brand logo must be covered and not visible. The diagram can be displayed in a plastic stand, mounted on poster board or attached in a folder. Art value, ability of written work to attract, use of color and use of font added to design presentation.

c. **Protection:** Youth may prepare a display box for the project. There is no evaluation or points for this box; it is merely protection. A simple box could be a cardboard box with two sides removed and replaced with plastic wrap.

1. **Kit:** This category is restricted to juniors (ages 8-13). Juniors are limited to two projects in this class. If two projects are entered, they must differ significantly (for example a creature, a building or a vehicle). Youth must enter a completed kit. Original story must describe design process and describing play with the model. Judging criteria includes: completion, complexity (number of pieces), diagram (of the completed model and key elements labeled), explanation of the design process, difficulties and interesting elements; describe plan value, imaginative play, what steps could be taken to improve model and overall presentation.

2. **Original Model:** Youth are limited to two projects in this class, projects must differ significantly. The project can be a scene, diorama, model, building, vehicle, plants or creature. Judging criteria includes: completion, design (number of pieces, moving parts-gear systems, axle systems (wheels), hidden entrances, pulleys, joints, projectiles and hinged components; unity of design-originality, use of color, symmetry of creativity, fully developed concept diagrams-comprehensive and detailed: an overall diagram of the completed model with key elements labeled, of moving part(s) or independent component, explanation/story/written report-of design process, difficulties encountered and their solutions, description of play value, future expansion of project and overall presentations.

3. **Model Demonstrating a Mechanical Science Concept:** Projects must be original, no kits and can include level arms, gears, pulleys, friction, belts, airfoils (flight, wine), catapults and load bearing bridges and beams. Science concepts can include energy transfer, stress, analysis, Newton's Law's, gravity, etc... Entries in this class must include a working model, an equation describing a principal of science, a labeled diagram of the project and written explanation of the science involved. Evaluation will also include presentation and visual impact of the project. Youth may conduct experiments with model and provide results in written report. Judging criteria includes: working model that demonstrates a principle of mechanical with equation displayed, labeled diagram provided that labels major parts of the model and also notes how parts or movement relates to equation; written report (no more than two pages) which explains the principle and how model illustrates the principle (may include additional page of experimental results using the model): written explanation that explains designs and construction of the model, including any difficulties and how they were overcome, description of the principle of mechanical science that is demonstrated, clear understanding of scientific principle and explanation of how the model illustrates principle; and overall visual impact of project as prepared for display, including attractiveness of display.

4. **Transportation Designs:** applies transportation pieces as Brio\* in which youth design a transportation system (road, railroad). Drawings are to be hand drawn. Judging criteria: presentation labeled with name of exhibitor and title of project to include schematic of system drawn to scale, roads, railroads and bridges clearly labeled or identified in the legend, senior to use 11 x 17 drawing paper, must have fully developed concept, clear details, completeness of system (no dead ends) and show creativity; legend that explains the meaning of symbols such as roads, railroads, bridge, water, vegetation, buildings; written explanation that explains the design and the visual impact as prepared for display and attractiveness

## Section 5-Science Experiments and Exhibits

### 1. Educational Display/Descriptive Science

- A series of posters (at least 14" X 22") and/or a 3 dimensional exhibits related to an engineering science project
- Display should be self-explanatory through use of signs or labels and limited to approximately card table size
- Topics may include such things as engine parts or bicycle parts display boards, electric circuit boards, electric quiz games, safety rules for bicycling or working in a wood shop or with electricity
- Entry will be evaluated on the purpose or principle idea, effectiveness in illustrating one idea, appearance, arrangements and description of display

## 2. Citizen Science Project

- Exhibits can be of any public service, citizen science or public education watch activity you took part in that had a scientific component to it
- Watershed rehabilitation, loss lady bug project, recycling program and educational models are just a few possibilities here
- Project exhibit posters must be clearly labeled with a written statement of what the project is, how it is related to science, and why you are interested in that project

## 3. Science Experiments

- An opportunity for participants to learn about and experience science concepts in an area of agriculture, human ecology of life sciences that the participant really enjoys
- Individual or group entries are encouraged
- Entries must follow Rules and Regulations of the Youth Building
- Entry Card must be attached to the exhibit
- Any type or combination of the types of science projects below along with creativity is encouraged
- Attach photos and diagrams, along with sheets of white paper that include your experiment description within these sections: 1) introduction; 2) Hypothesis; 3) methods; 4) results: and 5) your conclusion