Homeschool Family Science Night

Compass Science Fair
Show-What-You-Know Expo
Albert Einstein Living History Presenter
Hands-On Science Experiments and Lab Stations

Date: Wednesday January 29, 2014

Time: 5:00 pm - 8:00 pm

Location: UUCF Program Building

Address: 2705 Hunter Mill Road, Oakton, VA 22124

Make-Up Date: Thursday, January 30, 2014 (same time, details)

Fees/Admission:

	Show What You Know Expo (Includes Science Night Admission for Student)	Compass Science Fair Entry (Includes Science Night Admission for Student)	Admission to Family Science Night (for parents, siblings, non-exhibiting students)
In Advance (registered/paid by Jan. 18)			
Compass Families	$6.00	$6.00	$6.00
Non-Compass Families	$10.00	$10.00	$12.00
At the Door/Same Day			
Compass	N/A	N/A	$10.00
Non-Compass Families	N/A	N/A	$15.00

Payment: Entry fees and admissions can be paid in person at Compass by cash or check or online through the Compass website at www.compassclasses.com **Please note, online payment and registration is through the "Store" tab of the Compass website rather than the "Registration" tab.

Because of space limitations, Show-What-You-Know exhibits are limited to the first 45 entries, and Science Fair is limited to the first 30 entries.

Science Fair/ Show What You Know

Show-What-You-Know Expo

(Grades K-4th*)

"Show-What-You-Know" Expo is a fun, low-pressure project or exhibit on any STEM (science, technology, engineering, or mathematics) topic that interests the student. Show-What-You-Know should highlight and showcase something that the student is passionate about or will have fun with! How about a display on "My 10 Favorite Lego Vehicles", "Coolest Facts About Dinosaurs", "Paper Airplanes", or "How to Make Homemade Slime"? The options are unlimited, but the topic should be something your child will love telling others about.

The Show-What-You-Know (SWYK) exhibits can include as much or as little of the scientific method or investigation as the student and parent what to include. Parents can opt to guide their child through the full scientific method and requirements of a science fair project (below) if desired. SWYK exhibits can include models, pictures, and projects. SWYK projects can also take the style of science reports on topics such as What are galaxies? How are coral reefs endangered? How does a laser work? Discovery Education Science Fair Central defines this approach as,

> these projects are interesting, but students do not experiment or investigate new information. Students learn what other scientists have done, but the student doesn't actually conduct an investigation or create anything (other than a nice display). Students may make models and they may even repeat some data they have found, but it's still [more like] a science report."

Show-What-You-Know exhibits must be on a 48" X 36" tri-fold display board and include a title. Each student will be asked to stand with his/her project for a half hour during Science Night and answer questions from friendly students, parents, and visitors. All SWYK exhibitors will receive a participation ribbon.

(Note that 4th grade students may participate in either Show-What-You-Know or the judged Science Fair depending on readiness/interest level.)*

* *See Compass policy/definition of grades for homeschoolers on page 12.*

Compass Science Fair

(Grades 4th-9th*)

The Compass Science Fair will be a judged science fair for students in 4th-9th grade*. The Compass Science Fair is an introductory level science fair that does not feed into other regional or state competitions, however the guidelines and judging criteria are derived from several nationwide competitions. The Compass Science Fair can include projects that are Investigation or Invention in nature. A panel of three (3) judges will evaluate the science fair entries. Students will be asked to stand with their projects for a half hour and make a brief 3-5 minute oral presentation/explanation about their investigation or innovation to the judges. Ribbons will be awarded for Best Investigative and Most Innovative in 4th-5th, 6th-7th, and 8th-9th grades*. See below for the Judging Criteria rubric judges will use to evaluate projects. All Science Fair entries will receive a participation ribbon.

Types of Science Fair Projects

Students may develop either an (a) Investigation or (b) Invention project. For either type of project, students are expected to use the scientific method in which the they:

- Define a problem or pose a question
- Perform background research or explain the significance of the problem
- Formulate a hypothesis
- Develop and execute a procedure
- Experiment, investigate, or construct
- Document the materials used
- Collect, report, and summarize data
- Explain the results
- State a conclusion

In an Investigation Project, the student must ask a “testable” question, form a hypothesis, or "educated guess", and work through the scientific method to draw a conclusion about the question. Remember that even when testable question is simple and an adult might know the answer, the student benefits from practicing the scientific process and finding out for him/herself.

The following page on Discovery Education's Science Fair Central has good examples of how broad questions can be refined into testable questions:

http://school.discoveryeducation.com/sciencefaircentral/Getting-Started/Investigation.html

In an Invention Project, the student also asks a testable question, but rather than developing an experiment, he/she designs and builds an innovative creation to address the question posed. Where possible, the student should still measure and record data to evaluate how his/her invention compares to the metrics of the conventional approach and to determine if the invention improves the outcome or performance of the testable question.

* *See Compass policy/definition of grades for homeschoolers on page 12.*

Display Board

The display board (for either Show-What-You-Know or Science Fair), should be a store-bought, tri-fold board measuring 36" X 48" overall. These are available in corrugated cardboard or foam core board and sold at Michaels, AC Moore, Joann Fabrics, Walmart, Target, Amazon, and other school supply/teacher stores, art stores, and discount stores.

The visual display is the first thing the judges and visitors at the science fair see and is the best way to make a first impression, capture interest, and tell the story of the project. The display board should include a bold title, required sections (see below), and photographs, charts, or graphs to document the approach. Text should be neatly printed or typewritten. Papers should be cut straight with a straight edge or paper cutter. Double sided tape or glue stick should be used to affix papers in lieu of all purpose glue (which makes wavy or wrinkled paper). The display should tell the scope of the project in a logical way. The student's name should be included on the back of the display board.

See the example photograph (above) and Discovery Education link for tips on creating a successful exhibit board.

http://school.discoveryeducation.com/sciencefaircentral/Science-Fair-Presentations/How-to-Create-a-Winning-Science-Fair-Display-Board.html

Display Board- Required Sections

The following sections must be included on the Compass Science Fair display board:

- Project title
- Problem (or Question)
- Background Research/ Significance of Problem
- Hypothesis
- Procedure, Experiment, or Invention (better shown as step-by-step format)
- Materials Used
- Data (charts, graphs, tables)
- Results
- Conclusion
- Name/Grade on back of board

Display/Exhibit Space

Space for supplemental exhibit/display space will be limited to the 12" X 24" table area immediately in front of the student's display board. All loose items included with a student's exhibit should be labeled with the student's name. Examples of items that can be displayed along with the display board:

- Model(s)
- Photo album
- Journal
- Lab Notebook
- Report
- Books, resources on the topic
- Inert/Inanimate Samples (see list of prohibited display items)

Items Prohibited from Displays:

- Living organisms including plants, insects, molds, fungus, bacteria, microorganisms
- Food or perishable items
- Human or animal parts, tissue, or body fluids
- Liquids of any type, including water
- Chemicals of any type
- Sand, soil, granular, or powdered particles unless stored in a tightly sealed, plastic container
- Dry ice or other sublimating solids
- Hazardous substances
- Glass or glass objects
- Flames or highly flammable materials

- Valuable equipment or models
- Lasers or flashing lights
- Equipment or inventions making loud noises (such as sirens or alarms)
- Sharp items (for example, syringes, needles, pipettes, knives)
- Objects, equipment, or lighting requiring an electrical connection via wall/floor outlet cannot be accommodated. Power cords/extension cords cannot be used because of the tripping hazard. Battery powered equipment conforming to other requirements may be displayed.
- Any organisms covered by the "Potentially Hazardous Biological Agents Rules"
- Any substance covered by the "Hazardous Chemicals, Activities or Devices Rules"
- Any apparatus deemed unsafe or unsuitable by Compass staff or judges

Judging Criteria

A panel of three (3) judges will evaluate student Science Fair projects based a rubric with the following criteria and scoring.

Presentation: 0-10 points (10%)
- Display has all required sections
- Neatness
- Clarity of Text
- Use of drawings, photographs, graphics, tables, and graphs

Student's Ownership of Project: 0-20 points (20%)
- Student's explanation as to why this project was selected and interested him/her
- Student can explain key points in own words
- Student's explanation of what he/she received parent help on

Testable Question: 0-10 points (10%)
- References a cause and effect relationship and a measureable change OR
- Is a proposed solution/invention
- References a specific outcome and a measureable change

Clearly Stated Hypothesis: 0-10 points (10%)

Variables: 0-5 points (5%)
- Variables are clearly defined
- Variables are identified as independent, controlled, and dependent. (May be worded as “What I changed,” “What I kept the same,” and “What I measured”)

Materials: 0-5 points (5%)
- Are appropriate for experiment/invention
- Detailed list of materials is given

Procedure: 0-10 points (10%)

- Is sequential
- Describes the investigation clearly

Data: 0-10 points (10%)
- Quantitative data: numbers, standard metric units, or student's own scale
- Qualitative Data: words, descriptions of physical or behavioral changes

Analysis: 0-10 points (10%)
- Describes the trends or patterns found in the data
- May have comments on reasons for trends or patterns

Conclusion: 0-10 points (10%)
- Based on analysis of the data; acceptance or rejection of hypothesis or success of invention/solution
- Suggestions for further efforts or follow-up

Total Possible Score: 100 points

Example Timeline to Prepare for Science Fair

The student and parent should agree on a realistic timeline for completing the project. Students should make sure that the project concept or testing approach fit within the time frame with sufficient additional time for re-testing, rework, and revisions if necessary. Following is a suggested timeline for planning and scheduling for the Compass Science Fair:

- Decide on topic and develop question or solution..... 6-8 weeks before science fair
- Background research on topic ..... 6-7 weeks before science fair
- Determine materials and purchase them ..... 5-6 weeks before science fair
- Set up project and begin to collect data..... 5 - 4 weeks before science fair
- Shop for project display supplies ..... 3 weeks before science fair
- Prepare project display ..... 2 weeks before science fair
- Prepare oral presentation ..... 1 week before science fair
- Deliver display to Compass .....Last Day

Collaboration

Students may work in pairs or small groups for the Show-What-You-Know projects, but all judged science fair projects are to be unique, individual projects developed by the student specifically for the Compass Science Fair. Projects should not be borrowed or recycled from a previous project.

Parent Participation

The Science Fair project or Show-What-You-Know exhibit is an effective, multi-disciplinary opportunity for homeschooled students to explore science and engineering concepts in addition to practicing communication and presentation skills. Home educators can use these projects to teach the scientific method, practice planning, budgeting, and scheduling concepts, or explore skills such as synthesizing information, research, measurement, recording data, or written, verbal, visual communication skills, and graphic design.

The parent's role in either the Science Fair project or Show-What-You-Know project is a balance of coaching and support while allowing the student to have control and ownership for his/her own project submission. This expectation is important enough that 20% of the overall score on the judged Science Fair projects is a rubric reflecting student's own work, understanding of his/her own project, and the student's ability to explain what he/she did and how the parent(s) contributed. In other words, projects in which a parent dictated how experiments were conducted or adults played a significant role in the creation of the display will be penalized.

The appropriate level of parent participation is not quite hands-on, but not entirely exactly hands-off either. The parent may serve as the chief facilitator for the student's project, assisting with such tasks as helping narrow the project choice, approving the student's project plan and intended experiment, helping gather and purchase supplies, reminding about deadlines, and ensuring safety. A parent may want to serve as lead photographer to document the student's work so his/her hands are free during the experiments and procedures. Towards the end of the process, the parent could offer constructive advice on the student's exhibit (while allowing the student to complete it himself/herself) and serve as a practice audience to the student's presentation. The parent has full responsibility for working with the student to evaluate any possible risks involved in order to ensure the health and safety of the student conducting the research and the humans and/or animals involved in the study. Potential risks should be discussed with the student and adapted/adjusted to preserve the intent of the student's experiment and ensure safety in the areas of chemical and equipment usage, experimental techniques, research involving human and/or vertebrate animals, cell cultures, microorganisms, or animal tissues, or any procedures or materials that are regulated by state, federal or non-U.S. national laws.

Selecting a Project Idea

Choosing a topic can be a difficult task, as the possibilities can seem endless. Parents can help with subtle suggestions and reality checks, but students should ultimately come up with their own idea based on their own personal interests - one they'll be motivated to stick with over the 6-week period. Parents should resist the urge to propose their own ideas. Discovery Education.com elaborates on this advice when they explain,

> *use your knowledge of how scientists come up with their own questions to get your child to think about what they would like to learn and what kind of investigation they'd like to conduct. Something that seems to be common knowledge to you will be new*

to them and worth exploring and learning on their own. Science projects should be about experiencing the process of science.

In selecting a topic for a Science Fair project or Show-What-You-Know exhibit, there are numerous websites and books devoted to suggested topics and project ideas. Several good websites are listed below. Another approach to narrowing a topic is to scan categories of science and engineering specialties. See below for sample science and engineering categories.

http://www.education.com/science-fair/

http://www.all-science-fair-projects.com/

The following Discovery Education Science Fair Central website has a clickable table of sample science fair topics by elementary and middle school level in the areas of Life Science (plants, animals, health/human body, microorganisms, and environment), Earth Science (weather, geology, and space), and Physical Science (chemistry, energy/force, and matter). This table shows example testable questions, what is tested (variables), what stays the same (controls) and what data is collected.

http://school.discoveryeducation.com/sciencefaircentral/Getting-Started/idea-finder.html

Special Topic Areas

Live Animals- If a student plans to use live animals in his/her scientific investigation, an additional set of guidelines must be followed to ensure humane and ethical treatment of animals. The Compass Science Fair has adopted the ISEF protocol live animals. Students and parents can download a copy of the "Live Animal Rules" at the following link:

http://www.compassclasses.com/wp-content/files/Science%20Fair-%20Live%20Animal%20Rules.pdf

Hazardous Substances- The Compass Science Fair has adopted two ISEF protocols for hazardous substances. Students and parents can download copies of "Potentially Hazardous Biological Agents Rules" and "Hazardous Chemicals, Activities or Devices Rules" at the following link:

http://www.compassclasses.com/wp-content/files/Science%20Fair-%20Hazardous%20Substance%20Guidelines.pdf

Human Subjects- The Compass Science Fair has adopted the ISEF protocol for human subjects. Students may conduct investigations that involve human subjects exposed to only "minimum psychological risks" such as observations, surveys, questionnaires, or viewing of stimuli. However, if these techniques induce emotional stress, additional guidelines apply.

Some examples include: answering questions related to personal experiences such as sexual or physical abuse, divorce, depression, anxiety; answering questions that could result in feelings of depression, anxiety, or low self esteem; or viewing violent or distressing video images. Similarly, students may conduct investigations of human subjects performing actions with "minimal physical risk" which are equivalent to ordinary activities of daily life. Any additional physical involvement including smelling or tasting, is considered great physical risk, and additional guidelines apply. If involving human subjects, Students and parents can download a copy of "Human Participant Risk Assessment" at the following link. Furthermore, students must take steps to ensure confidentiality of human participants including privacy issues and breach of confidentiality, and appropriate treatment of protected classes.

http://www.compassclasses.com/wp-content/files/ Science Fair-%20Human%20Participant%20Risk%20Assessment.pdf

Example Project Subject Areas

Following is a list of project categories suggested by Discovery Education:

PHYSICAL SCIENCE
- Aerodynamics & Hydrodynamics
- Astronomy
- Chemistry
- Cooking & Food Science
- Music
- Digital Photography & Video
- Physics
- Sports Science

ENGINEERING
- Civil Engineering
- Electricity & Electronics
- Energy & Power
- Environmental Engineering
- Materials Science
- Mechanical Engineering
- Robotics

BEHAVIORAL & SOCIAL SCIENCE
- Human Behavior
- Sociology

LIFE SCIENCE
- Biotechnology Techniques
- Genetics & Genomics
- Human Biology & Health
- Mammalian Biology
- Medical Biotechnology
- Microbiology
- Plant Biology
- Zoology

EARTH & ENVIRONMENTAL SCIENCE
- Environmental Science
- Geology
- Ocean Sciences
- Weather & Atmosphere

MATH & COMPUTER SCIENCE
- Computer Science
- Pure Mathematics
- Video & Computer Games

Following is a list of project categories suggested by International Science and Engineering Fair:

ANIMAL SCIENCES
- Animal Husbandry
- Development
- Ecology
- Pathology
- Physiology
- Populations Genetics
- Systematics

BEHAVIORAL & SOCIAL SCIENCES
- Clinical & Developmental Psychology
- Cognitive Psychology
- Physiological Psychology
- Sociology

BIOCHEMISTRY
- General Biochemistry
- Metabolism
- Structural Biochemistry

CELLULAR & MOLECULAR BIOLOGY
- Cellular Biology
- Cellular and Molecular Genetics
- Immunology
- Molecular Biology

CHEMISTRY
- Analytical Chemistry
- General Chemistry
- Inorganic Chemistry
- Organic Chemistry
- Physical Chemistry

COMPUTER SCIENCE
- Algorithms, Data Bases
- Artificial Intelligence
- Networking and Communications
- Computational Science, Computer Graphics
- Computer System, Operating System
- Software Engineering., Programming Languages

EARTH & PLANETARY SCIENCE
- Climatology, Weather
- Geochemistry, Mineralogy
- Paleontology
- Geophysics
- Planetary Science
- Tectonics

ENGINEERING: Electrical & Mechanical
- Electrical Engineering, Computer Engineering, Controls
- Mechanical Engineering,
- Robotics
- Thermodynamics, Solar

ENGINEERING: Materials & Bioengineering
- Bioengineering
- Chemical Engineering
- Civil Engineering, Construction Eng.
- Industrial Engineering, Processing
- Material Science

ENERGY & TRANSPORTATION
- Aerospace and Aeronautical Engineering, Aerodynamics
- Alternative Fuels
- Fossil Fuel Energy
- Vehicle Development
- Renewable Energies

ENVIRONMENTAL MANAGEMENT
- Bioremediation
- Ecosystems Management
- Environmental Engineering
- Land Resource Management, Forestry
- Recycling, Waste Management

ENVIRONMENTAL SCIENCES
- Air Pollution and Air Quality
- Soil Contamination and Soil Quality
- Water Pollution and Water Quality

MATHEMATICAL SCIENCES
- Algebra
- Analysis
- Applied Mathematics
- Geometry
- Probability and Statistics

MEDICINE & HEALTH SCIENCES
- Disease Diagnosis and Treatment
- Epidemiology
- Genetics
- Molecular Biology of Diseases
- Physiology and Pathophysiology

MICROBIOLOGY
- Antibiotics, Antimicrobials
- Bacteriology
- Microbial Genetics
- Virology

PHYSICS & ASTRONOMY
- Astronomy
- Atoms, Molecules, Solids
- Biological Physics
- Instrumentation and Electronics
- Magnetics and Electromagnetics
- Nuclear and Particle Physics
- Optics, Lasers, Masers
- Theoretical Physics, Theoretical or Computational Astronomy

PLANT SCIENCES
- Agriculture/Agronomy
- Development
- Ecology
- Genetics
- Photosynthesis
- Plant Physiology (Molecular, Cellular, Organismal)
- Plant Evolution

* Compass Policy on Grades (as referenced on pages 2-3)
The following is adapted from the Compass enrollment policy:

Age/Grade Level Definitions: Compass Homeschool Enrichment understands and celebrates that a benefit of homeschooling is the flexibility to blend and customize instruction based on a student's needs. We understand that the definition of a student's grade may be blurred and encompass work across a range of conventional grade levels. Grade levels referenced in Science Fair and Show-What-You-Know Expo are based on a student's age-corresponding grade if enrolled in traditional school. Some students may perform the academic work at an advanced or delayed grade level from his/her age, so parents may allow a student to participate a year beyond or below (+/-1) the posted grade range. In terms of the Science Fair, this would allow a mature, academically advanced 3rd grader to participate in the Science Fair and be judged among 4th graders or allow a 5th grader to exhibit in the Show-What-You-Know Expo.