INSTRUCTIONS FOR SCIENCE PROJECT NOTEBOOKS

Don't be overwhelmed by the prospect of creating a science notebook. A three-pronged report folder will due. Remember the judges need to be able to read your handwriting easily. This is very important since the lab sheets will be done by hand while the experiment is in progress. In most cases, the writing is kept to a minimum. We want to keep these projects fun and exciting. Where actual reports are required, please type them.

Essentially, a notebook is just a report folder with a collection of diagrams, facts, schematics, or instructions etc. pertaining to the project and/or a report if one is required. For experiment driven projects, the lab sheet, materials list, and/or instructions take the place of a written report in most cases. However, at the senior level, 4-H'ers should also include some lab notes, clearly written, describing their experimental process in more detail beyond just the basic information included in the lab sheet. (Examples: I had some trouble keeping my Bunsen burner going…I discovered that my yeast was out-of date and it skewed my results…I determined one brand of cleanser reacted better than others.) These notes may even include drawings, math equations if applicable, unusual outcomes and events, etc. (The fire department was REALLY prompt when smoke came rolling out of the school science lab windows!)

Note to parents and leaders of children with disabilities. The project superintendent is willing to accommodate any skill level at the fair just please call Mark for adjusted requirements and suggestions for appropriate projects.

Due to the wide range of academic disciplines utilized during science projects, the grade at the time the project was begun should be taken into account. So, though a youth might be age 14 by January 1st of this year, he/she may be in the 8th grade, not the 9th. Therefore, the option is available to either enter in Intermediates since the youth only recently completed middle school or if he/she wants the challenge, may instead enter at the senior level.

Parents are encouraged to note on entry forms pertinent information for the judges. This could be anything from listing a reading or writing disability or noting that the child has advanced experience for his/her age range (maybe the child is in advanced classes at school or working above grade level).

It is also important that wind and solar projects be duly noted on entry forms so that we can accommodate outdoor demonstrations or in case of inclement weather, be prepared to provide small fans or full-spectrum lighting.

If a kit is used for the project, please do not discard the box the components came in. These should be neatly flattened to be displayed with the project.

Contact information: You can call the project superintendent, Mark Hansen, at (989) 872-3480 in the evenings. If you have an awesome idea, but aren't sure how to get started, you may be able to attend a Deford Dazzler 4-H Club meeting and get help directly from Mark.

CHEMISTRY

Get a science fair book and choose an experiment appropriate for your age level. Create a lab sheet (I can supply this for you), make a materials list, record your results, and create a poster of pictures (with captions) of you performing your experiment. If possible, make a display about your project to go with your poster. The lab sheet and materials list are in place of a report. Be prepared to describe what you did and the outcome.

Create a molecular model out of K-nex, legos, Styrofoam balls, tinker toys, etc. Include a color chart to show which pieces correspond with each element in the compound. Include a quick fact sheet about the substance you modeled and its uses. Make a poster about the substance and include a copy of the chemical formula. (There are many science fair websites that show chemical formulas for compounds and usually the clip-art can be printed for free.) One suggestion: leave the organic compounds (sugars, other carbohydrates) to high school age entrants – these compounds are incredibly complex and the chemical formulas are huge. I'd be impressed if someone chose to do one for a project but just understand that it will take quite a while to assemble and will need to be triple checked for errors (very easy to make when working with long formulas) before bringing to the fair. For younger students, I suggest the petroleum based compounds or alcohols be considered.

PHYSICS

Get a science fair book and choose a physics experiment. Create a lab sheet and include a materials list. Describe your process and include any schematics sheets (diagrams of the steps involved, or the mechanical plan) if you are doing an engineering/building project. Record what you learned or what you found interesting. Make a poster with pictures of you and your experiment in progress.

Pick a physics topic (gravity, light, nuclear power, solar power, etc.) and create a display, report, and poster about this topic. (Report length: 1-2 pages for intermediates, 3-pages or more for seniors).

Build a trebuchet from a kit or from scratch. Include a poster with historical facts about trebuchets and the mechanical plans for your project. Be prepared to demonstrate trebuchet. No notebook requirement.

Build your own telescope using mirrors and cardboard tubing. Make a poster about telescopes and include some pictures (available online) of the Hubble Space Telescope. Be prepared to demonstrate. No notebook requirement.

Look up paper airplane designs. Choose a design and make three planes using a different weight or type of paper each time. Wait for a non-windy day and fly them each several times. Which paper material flew the longest, the farthest, the highest, etc. What were your results? Create a poster about aeronautics or your favorite type of plane. Include in notebook, your flying log (results), design plan, and materials list.

Build a paper airplane launcher and create three different paper airplane designs to launch. Make a poster that includes the design plans of both the planes and the launcher. Be prepared to demonstrate. No notebook required.

Use an age appropriate Physics Kit to demonstrate physical laws, properties of matter, atomic theory, etc. Make a poster about your project. Include design plans or schematics, materials list, and lab sheet or instructions list in your notebook. Bring completed project for display with poster and notebook. Be prepared to demonstrate if you have a working model.

Get the "Backyard Ballistics creation/s and make a poster about and display of your inventions. Be prepared to demonstrate. No notebook required.

Hydraulics – Make a drawbridge from balsa wood (check websites for free plans) and power it with surgical tubing, empty syringes (cheap at T.S.C), and a puff of air or purchase a kit (we saw a really neat on at Hobby Lobby in Saginaw.) Make a poster about hydraulics and include design plans, materials list, and notes about what you learned in notebook.

Build a Helium blimp. Contact me for Mylar and plans. I know helium is expensive so if anyone is interested in doing this I will see if I can get an area florist to fill the balloon for free twice - once during the project so you can check for leaks and the morning of the Fair. Poster and notebook required. Include design plans and materials list in notebook plus a short fact sheet (a minimum of 8 facts for intermediates/full sheet for seniors) about the history of blimps. Bring a signed thank you card for the florist that will be kept on display with your project and then mailed at the end of the fair week. If several 4-H'ers choose to try this, I will ask the welding company in Cass City to donate the helium.

If you are a high school junior, senior, or post-graduate and interested in a possible "near space" project (the current record is 94,000 ft.) please contact me. I have information for you and may be able to help guide your project depending on my work schedule. This would also be an excellent "team" project for a group of high schoolers.

ROBOTICS

All Ages – Lego MindStorms – Use program and components to create and power your own uniquely designed robot and make a poster about your project. Be prepared to demonstrate your robot. (Enter project according to age guidelines)

Junior (ages 9 – 10) – Build a robot out of your favorite building toy, make a diagram for your poster and label all of the parts, include a few captions about what you imagine that your robot would do if it were motorized. How would it help people?

Intermediate (ages 11 – 14) – Purchase an age appropriate kit (nearly all science kits include an age guideline), follow the instructions, include the schematic drawings in your display, and make a poster about some interesting uses of robots in America or focus on one particular area such as medical robots or industrial robotics. Be prepared to demonstrate your robot to the judge. Bring

your batteries – if your robot is solar or wind powered, the judge will be more than happy to go outside for the demonstration.)

Advanced (ages 15 – 19) – Build a self-designed robot from scratch, create the schematic, and power it. Due to the difficulty level of this project, no written report is required. However, a poster with pictures of the work in progress and a materials/source list should be included.

Robotics Teams: If in any club would be interested in a group robotics project, please let me know. This is a category suggestion from M.S.U.

ASTRONOMY

Create a phases of the moon chart with labels, display a homemade model of the moon (clay or Styrofoam works well), print pictures off the internet for your science poster, make captions for the pictures and include a fact sheet about the moon.

Write a biography of your favorite astronaut or a one/two page article about a NASA mission. There are many wonderful pictures available to print through NASA's education website. You can even chat online with astronauts on the space station. Make a poster with pictures, captions, and facts about the astronaut or mission. Seniors should have a very detailed, neatly organized, poster and well-written article.

Build a papier-mâché or clay model of your favorite planet and its moons. Include a planet fact sheet and create a picture poster with captions.

Create a model of our solar system, include a fact sheet, and make an informative picture poster with captions.

Build a model of the international space station out of K-nex, Legos, Tinker Toys, pipe cleaners, balsa wood, etc. Intermediates include a one page report. Seniors include a 2 - 3 page report on living in space and make a poster with NASA photos of astronauts performing their tasks on the station.

ELECTRONICS

Junior (ages 9 – 10) – Create an electronics project using SNAP Circuits or other junior level electronics kit. Include diagrams/schematics on poster. Be prepared to demonstrate your project.

Intermediate (ages 11 – 14) – Use an age appropriate kit such as "All in One Electronics" and choose an experiment. Make a poster and include the schematic of your circuit/circuits.

Advanced (15 – 19) – Design your own circuits with an experimenter's breadboard and electronics components. Create a poster, include your schematic, and write a 1-page report about your project. Notebook required.

Other non-engineering electrical options

These are notebook/report driven projects so nice posters and neatly written reports are key to getting an A rating.

Create a "Thomas Edison's Greatest Inventions" display with a poster of pictures of some of his drawings, laboratories, etc. Include captions and write up a "Did you know" fact sheet about Mr. Edison to be included in your notebook. (Your fact sheet is in place of a regular report or biography.)

Interview an electrical journeyman, ask to observe him or her on the job, and write a 1-2 page article about this career. Make a poster detailing elements of the job and some pictures of the journeyman at work. (Think of this as a science journalist project.) Your article is your report.

Create a poster with a properly labeled diagram of how to wire a light switch, a simple motor, etc. Make a step-by-step instruction sheet for your notebook and list the necessary safety precautions that one should take if attempting to do the wiring. (Your "How To" instructions and safety guidelines fulfill the report requirement for this project.)

SCIENCE RESOURCES

www.sciplus.com This is the website for American Science and Surplus in Chicago. This business buys surplus items from laboratories and bulk suppliers for the public schools. The items are heavily discounted. There are some great kits, lots of components, and tons of ideas available and their shipping is reasonable. Think of this place as "Mad Scientist Heaven". You will get lots of ideas from perusing their catalog.

www.homeschoolsciencetools.com Another business that sells science supplies and kits but not in the large bulk amounts that the public school and laboratory supply vendors require.

www.allelectronics.com This is a major source of experimenter's breadboards, copper boards for etching, etching supplies, and electrical components. Before purchasing etching supplies, please call me. I may be able to give you some from my personal supply.

www.ebay.com You just never know what science bargain you might find.

There are many, many science fair websites with suggested projects across the full range of student ages and abilities. Most of these websites are free and the projects are generally not expensive to complete.

Roger's Hobbies on State Street in Saginaw (just two blocks east of Wal-Mart on the north side of the road). Roger's stocks a variety of model rockets as well as some science supplies and kits.

Hobby Lobby in Saginaw is currently stocking a wide variety of neat science kits.

Michael's Craft Store in Saginaw also has some science kits, solar system models, etc.

Middle and High School Science teachers are full of ideas that many times they would love to implement but don't have time for in the classroom. Your teacher might be excited to get you going on a neat experiment and could have resources and supplies available that you don't even know about. Don't be afraid to ask.

Junior Science Books:

"Chemistry for Every Kid" by Janice Van Cleave - Available at Barnes and Nobles and Amazon or possibly even the public or school library.

Janice Van Cleave has books in this age range on physics and astronomy. However, these were not available at Barnes and Nobles in Saginaw so you will need to find the titles online or ask the librarian to do a search.

Intermediate Science Books:

"Prize Winning Science Fair Projects" ages 9-13

"The Book of Totally Irresponsible Science, 64 Daring Experiments for Young Scientists" by Sean Connolly. I have this book and all I can say is "HUGE SCIENCE FUN"! I particularly enjoyed the potato gun! Parents should not be scared. The title may sound alarming but most of it is not likely to damage your child in any lasting way. I would recommend this book for youth in 6th – 8th grades.