SCIENCE OLYMPIAD NEWSLETTER

Exploring the World of Science

Volume 11, No. 1
John C. Cairns

Fall, 2003
Gerard J. Putz

A NEW FORMAT

20/30

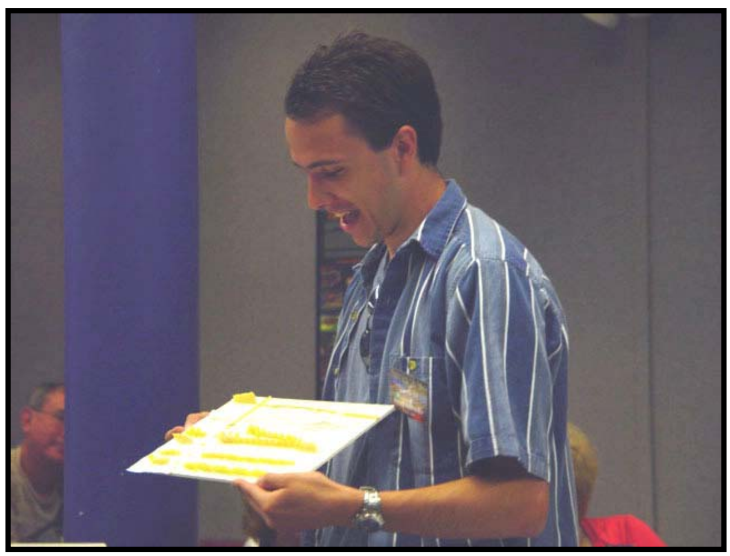
A new organizational concept was introduced at the State Directors meeting at the Holiday Inn in Columbus following the Ohio State national tournament last year. The concept has been called by many names. For the purpose of this article, it will be known as the 20/30 proposal. It could just have easily been called the 25/35 or 15/18, etc.

The major concept involves pre-registering for up to twenty different Science Olympiad activities several weeks before the tournament, as is the case today. Teams choose from a menu of 30 different Olympiad activities. All 30 events will be run on tournament day. Teacher/coaches choose the Science Olympiad events that best fit the school's curriculum and student interests. The coach chooses events that can be best covered by the student's strength. As teams progress from regional to state and finally to the national tournament, coaches need to continue to pre-register and make decisions about competitive events for students. Since each level of competition is independent of the others, coaches may choose to enter different events at different locations.

The concept is simple. Pick the events that fit your students' interests and abilities. Pre-register prior to the Science Olympiad. If a particular student(s) is (are) unable to attend the tournament for any reason; a coach may make changes on the morning before the tournament begins. But the coach may change only up to 10% of the previously registered events. Thus with the 20/30 format, a coach may on the day of the tournament re-register for up to two events that are different from his/her previous choices.

With a menu of 30 different activities, strong teams that have taken many medals will now not be able to collect medals from all activities. Thus the Olympiad will be able to spread medals around to different schools. The Science Olympiad will be able to recognize a greater number of young people.

The strongest teams are still the strongest team! The strongest team will in all probability win the day, but it will require greater skill by the coach. The weaker schools/teams are still the weaker teams. So what is the big deal? Why do I want to become involved in this new concept?



Medals will be given to places one through three for all thirty events. Since the strong schools (like all schools) many enter only 20 events, then other schools may get medals and points towards the championship from entering events that they feel more comfortable with. If you reward students with medals in 30 events, it is obvious that more medals will be awarded with thirty events as compared with twenty events!
Then, beyond allowing for the awarding of more medals, why is this system better or different? It is very much

the same in some situations and very, very different in others. I have outlined the ways for which the system is similar, above. But there is a great difference.

Assume a regional tournament of 25 B teams. Today points are awarded from one to twenty five based upon relative placement of the teams. No-shows and disqualification under current rules require 25 + 1 or 25 + 2 points respectively. Under the new procedure teams will be awarded points from one to X where X may be different in almost every event. Examples below will illustrate the concept. X is the number of teams signing up for a particular activity. If as a coach I choose to put students in a very difficult event, I may do poorly, relatively, but very well actually. For example:

1. As a coach of a team with little ability to build devices for such activities as Mission Possible, Robo Billiards, Bridge Building; I choose not to enter these events, but enter Password instead. If Mission Possible has only twelve teams signing up, then the scores for that event will run from 1 to 12. Even if I do not do well and come in dead last I still earn 12 points! Password may be significantly easier to prepare for, but with all 25 teams entering; points with be accumulated from 1 through 25. Thus even ending up with a relatively high score, you may end up with a poor score relative to other teams, thus getting 15 points, as an example. It might have been better to enter a device in the Mission device and earn 13 points. (From the example, above.)

2. As a teacher with a strong background in chemistry, physics, and mathematics I really can prepare my students in the quantitative physical sciences. I will take advantage of this situation and enter students into the chemistry and physics events and skip those earth science and biology events that I have never been able to properly assist students prepare for. I realize, as a coach, that I can prepare kids in areas of chemistry and physics, but I am clueless to prepare for other areas. My students will be able to collect more medals and points in areas that are important to me. I do not have to make excuses to the principal for not winning many medals when I never really had a chance when we had to enter those cursed biology events! As a teacher/coach, I might even be able to make the point to the principal, superintendent, or school board that with greater assistance from others in the science department, the school team could do considerably better in the competition.

3. I teach chemistry and physics, as in example 2, I want to enter those events. But this year I have a student whose father is a doctor and another whose mother is a highway engineer. This is a temporary situation. It is good for this year only, but I will take advantage of my good fortune by getting the doctor to assist with some biology events and the engineer to assist with some of the building events. Other coaches who are planning their events know that I will enter the chemistry and physics events, but may be surprised to learn about the others.

4. We have just driven from school to the State tournament. The trip took two hours and the students are tired. One misstep and the bridge is wiped out! What can I do? I have obviously pre-registered for Bridge Building. It was one of the events that we spent a great deal of time on and put in a great deal of effort. What can I do? I simply register for all the other 19 events, but instead of Bridge Building, I put students in any of the other ten events that we did not pre-register for. I may have a backup Mission Possible device that I know is not very competitive, but it is better than not entering anything. Or I may put students in one of biology events that I cannot coach, but that my students have some background.

5. One of my students is hurt in an automobile accident two days before the tournament. I need

to get my best alternate for the big day! The alternate will be better at Polymers or Science Crime Busters than the original student. She was more interested in Astronomy and Map Reading. Thus you can still put together your strongest possible team under the new set of circumstances.

6. I pre-register for the twenty events that are closest to the strengths and interests of my students, but the schedule comes out and I have several conflicts. I may make changes on the day of the tournament to put students in competitive events will help the team make its best showing.

7. Things out of your control:

    a. Three weeks before the tournament an event supervisor becomes ill and nobody can be found to replace him/her! The State Director notifies all the teams that have prescheduled for that event and allows them to choose a different 20 activities with no penalty. All schools will be notified of the problem but only those teams who have previously pre-registered may make changes.

    b. Three days before the tournament the same scenario takes place. There is not enough time to fully inform the schools and it would not be fair to just let the pre-registered teams try at the last minute to rearrange their schedule, thus for score keeping, only 19 scores would be totaled. These 19 would be chosen and would be the 19 best showings of each of all the individual teams. Not all teams are in the same activity thus the Director would choose the 19 events that are unique to a given school. It's a variation of the concept of a teacher throwing out the poorest score when figuring a final grade for a student. Many teachers do it all the time.

    c. The event supervisor does not show up or there is a problem with the scoring on his/her event. See item b above. Go with the best 19 activities for each of the registered teams.

    d. In each of the examples listed above, no student would be denied a medal. If an event is thrown out for final score purposes, it has no impact upon the individual student(s) competing in the events. If you qualify for a medal, you get it! You may not necessarily get team points (see above), but you do get your medals and proper recognition at the awards assembly!

As I indicated above, this system takes into consideration that a team is made up of 15 students that must cover 20 pre-registered events. The teacher/coach is responsible for choosing the events that should be entered. Students will earn medals for first through third place. They will also accumulate points depending upon their relative placement in the events that they choose to enter. Greater numbers of teams will in all probability earn medals, but the strong will still accumulate the greater number of points, and thus win the regional or State Science Olympiad!

There are several problems with 20/30. It requires detailed pre-registration. It requires finding 30 event supervisors instead of the current 23. 30 events obviously require a greater number of rooms of various sizes as compared to the current situation. You can make event supervisors very angry. They may become upset if they must give up the greater part of a day to have only ten or fifteen teams compete in their particular event. This will be particularly a problem if they prepare for 25 and have only a few teams show up. If you notify the supervisor of the numbers early, then security could be compromised. The middle school coach will be very interested in how many of each schools will register for each event. Thus security is critical. No one must know the actual number of teams pre-registered for any event. This will be a major problem if a high school teacher runs a middle school event. This will be particularly true if there is a team from the same district and entering a middle school competition. If the event supervisor gives info to his friends at the middle/junior high schools there could be hell to pay! Final registration must be made before the competition begins.

Several states have indicated that they will try this or some variation of the concept in the spring of 2004. Some may try this concept at one level only or others may try it for one group such as a B tournament. This concept has been tried in one or more variations in Delaware. It will not take place that the national level until at least several other states have tried it and found it to be a better system than the one currently in use. Good luck to all participants. Currently teams enter 23 events. Several states will do 25/35 in 2004! If you are interested in this concept, talk to your regional or state director. Talk to other coaches at staff development workshops. Talk to others at your state Science Teacher Conference or Convention.

Science Olympiad and the Science Education Standards

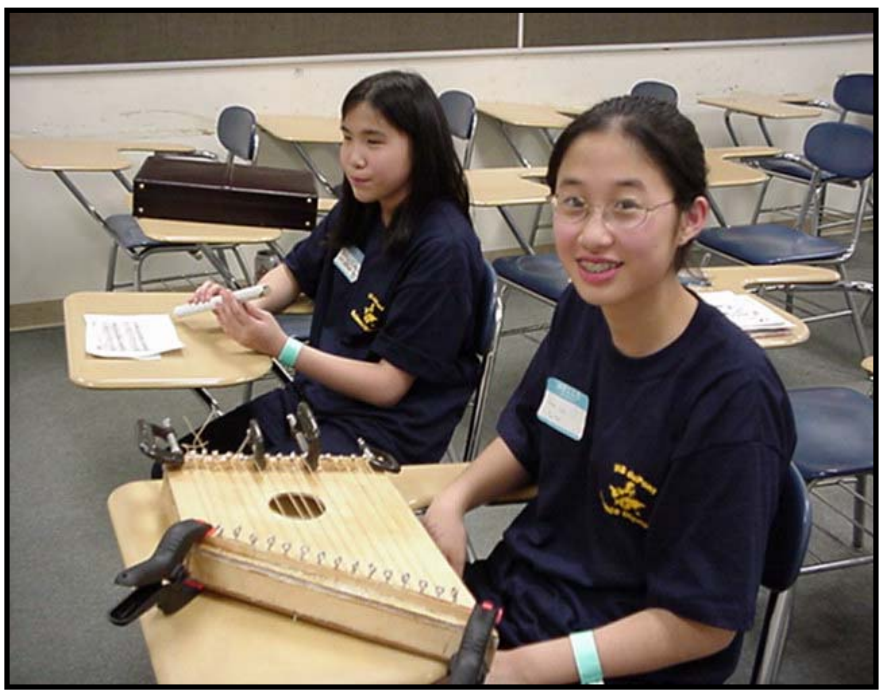
The National Research Council in cooperation and funding from the National Science Foundation, the U.S. Department of Education, NASA, National Institute of Health, and the National Academy of Science in 1966 developed the Science Education Standards. The goal of this collaborate effort of these august bodies was to define "what" all-American students in science should know and be able to do. "The Standards spell out a vision of science education that will make science literacy for all a reality in the 21st century".[1]

The document uses the Science Olympiad as an example of the "relationship between teaching and assessment. "Further the document states, "The assessment tasks are developmentally appropriate…including recognition of students' physical skills and cognitive abilities. As students move from station to station displaying their understanding and ability in science, members of the community evaluate the students' achievement and can observe that the students had the opportunity to learn science".[2]

The Standards document contains: Teaching Standards, Professional Development Standards, Assessment Standards, Science Content Standards, Science Education Program Standards, and System Standards.

The Science Olympiad is highlighted in the Science Teaching Standards with a truncated description of a Science Olympiad tournament and later as an outstanding example of the richness of the relationship mentioned above with **Sounds of Music**.

Genetics (**Designer Genes**) is used as an example of another Science Olympiad activity in the Standards for Professional Development**. Egg Drop** and **Experimental Design** are used as examples in the chapter on Content Standards. Below is a copy of the standards as they relate mathematics and science prepared by Karen Lancour of Apena, Michigan for use in her monograph on Experimental Design.



Correlation to National Science and Math Standards

National Science Education Standards
National Academy of Sciences

SCIENCE AS INQUIRY

Content Standard A: As a result of activities in grades 5-8, all students should develop:

- Abilities necessary to do scientific inquiry
- Understandings about scientific inquiry

Students in grades 5-8 can begin to recognize the relationship between explanation and evidence.

ABILITIES NECESSARY TO DO SCIENTIFIC INQUIRY

- IDENTIFY QUESTIONS THAT CAN BE ANSWERED THROUGH SCIENTIFIC INVESTIGATIONS.
- DESIGN AND CONDUCT A SCIENTIFIC INVESTIGATION.
- USE APPROPRIATE TOOLS AND TECHNIQUES TO GATHER, ANALYZE, AND INTERPRET DATA.
- DEVELOP DESCRIPTIONS, EXPLANATIONS, PREDICTIONS, AND MODELS USING EVIDENCE.
- THINK CRITICALLY AND LOGICALLY TO MAKE THE RELATIONSHIPS BETWEEN EVIDENCE AND EXPLANATIONS.
- RECOGNIZE AND ANALYZE ALTERNATIVE EXPLANATIONS AND PREDICTIONS.
- COMMUNICATE SCIENTIFIC PROCEDURES AND EXPLANATIONS.
- USE MATHEMATICS IN ALL ASPECTS OF SCIENTIFIC INQUIRY.

Content Standard A: As a result of activities in grades 9-12, all students should develop:

- Abilities necessary to do scientific inquiry
- Understandings about scientific inquiry

In grades 9-12, students should develop sophistication in their abilities and understanding of scientific inquiry.

ABILITIES NECESSARY TO DO SCIENTIFIC INQUIRY

- IDENTIFY QUESTIONS AND CONCEPTS THAT GUIDE SCIENTIFIC INVESTIGATIONS.
- DESIGN AND CONDUCT SCIENTIFIC INVESTIGATIONS.
- USE TECHNOLOGY AND MATHEMATICS TO IMPROVE INVESTIGATIONS AND COMMUNICATIONS.
- FORMULATE AND REVISE SCIENTIFIC EXPLANATIONS AND MODELS USING LOGIC AND EVIDENCE.
- RECOGNIZE AND ANALYZE ALTERNATIVE EXPLANATIONS AND MODELS.
- COMMUNICATE AND DEFEND A SCIENTIFIC ARGUMENT.

USE MATHEMATICS IN ALL ASPECTS OF SCIENTIFIC INQUIRY

Mathematics is essential to asking and answering questions about the natural world. Mathematics can be used to ask questions; to gather, organize, and present data and to structure convincing explanations.

MEASUREMENT:

Understand measurable attributes of objects and the units, systems, and processes of measurement.

5– 8th grade expectations

- understand both metric and customary systems of measurement
- understand relationships among units and convert from one unit to another within the same system
- understand, select, and use units of appropriate size and type to measure angles, perimeter, area, surface area, and volume

9-12th grade expectations

- make decisions about units and scales that are appropriate for problem situations involving measurement

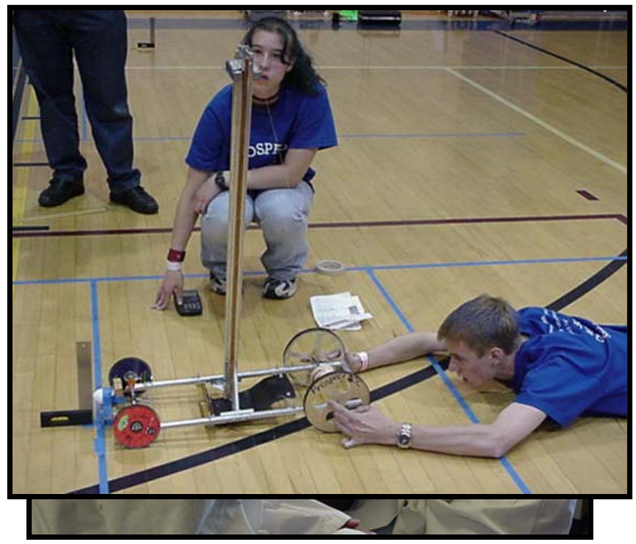
Apply appropriate techniques, tools, and formulas to determine measurements.

5– 8th grade expectations

- use common benchmarks to select appropriate methods for estimating measurements
- select and apply techniques and tools to accurately find length, area, volume, and angle measures to appropriate levels of precision
- develop and use formulas to determine the circumference of circles and the area of triangles, parallelograms, trapezoids, and circles and develop strategies to find the area of more-complex shapes
- develop strategies to determine the surface area and volume of selected prisms, pyramids, and cylinders
- solve problems involving scale factors, using ratio and proportion
- solve simple problems involving rates and derived measurements for such attributes as velocity and density

9-12th grade expectations

- analyze precision, accuracy, and approximate error in measurement situations
- understand and use formulas for the area, surface area, and volume of geometric figures, including cones, spheres, and cylinders
- apply informal concepts of successive approximation, upper and lower bounds, and limit in measurement situations
- use unit analysis to check measurement computations



DATA ANALYSIS AND PROBABILITY:

Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer.

5– 8th grade expectations

- formulate questions, design studies, and collect data about a characteristic shared by two populations or different characteristics within one population
- select, create, and use appropriate graphical representations of data, including histograms, box plots, and scatterplots

9-12th grade expectations

- understand the differences among various kinds of studies and which types of inferences can legitimately be drawn from each
- know the characteristics of well-designed studies, including the role of randomization in surveys and experiments
- understand the meaning of measurement data and categorical data, of univariate and bivariate data, and of the term variable
- understand histograms, parallel box plots, and scatterplots and use them to display data
- compute basic statistics and understand the distinction between a statistic and a parameter

<u>Select and use</u> appropriate statistical methods to analyze data.

5– 8th grade expectations

- find, use, and interpret measures of center and spread, including mean and interquartile range
- discuss and understand the correspondence between data sets and their graphical representations, especially histograms, stem-and-leaf plots, box plots, and scatterplots

9-12th grade expectations

- for univariate measurement data, be able to display the distribution, describe its shape, and select and calculate summary statistics
- for bivariate measurement data, be able to display a scatterplot, describe its shape, and determine regression coefficients, r egression equations, and correlation coefficients using technological tools
- display and discuss bivariate data where at least one variable is categorical
- recognize how linear transformations of univariate data affect shape, center, and spread
- identify trends in bivariate data and find functions that model the data or transform the data so that they can be modeled

<u>Develop and evaluate</u> inferences and predictions that are based on data.

5– 8th grade expectations

- use observations about differences between two or more samples to make conjectures about the populations from which the samples were taken
- make conjectures about possible relationships between two characteristics of a sample on the basis of scatterplots of the data and approximate lines of fit
- use conjectures to formulate new questions and plan new studies to answer them

9-12th grade expectations

- use simulations to explore the variability of sample statistics from a known population and to construct sampling distributions
- understand how sample statistics reflect the values of population parameters and use sampling distributions as the basis for informal inference
- evaluate published reports that are based on data by examining the design of the study, the appropriateness of the data analysis, and the validity of conclusions
- understand how basic statistical techniques are used to monitor process characteristics in the workplace

<u>Understand and apply</u> basic concepts of probability.

5– 8th grade expectations

- understand and use appropriate terminology to describe complementary and mutually exclusive events
- use proportionality and a basic understanding of probability to make and test conjectures about the results of experiments and simulations
- compute probabilities for simple compound events, using such methods as organized lists, tree diagrams, and area models

9-12th grade expectations

- understand the concepts of sample space and probability distribution and construct sample spaces and distributions in simple cases
- use simulations to construct empirical probability distributions
- compute and interpret the expected value of random variables in simple cases
- understand the concepts of conditional probability and independent events
- understand how to compute the probability of a compound event

The National Academy was very kind to the Science Olympiad by using us as an example for the kind of teaching and learning techniques that define the reform.

This short article is designed to answer the question, “Does the Science Olympiad follow the National Standards or Is the Science Olympiad in concert with the National Standards?” If you’ll peruse the aforementioned materials, I believe that you will come to the same conclusion that I do. The Science Olympiad is on the cutting edge of the reform sweeping the science education community and is a model. **And it’s fun and exciting to see, and more importantly fun to do.**

The National Standards are more than just content. Published Science Olympiad materials show how each and every SO event ties to the Content Standards. These materials are found on our web site (SOInc.org) and in the coach’s manual for Division B and C. Check it out!

Smart Kids
By Brenda Marcischak

Smart kids don’t always show their best at school until something sparks the fire. I knew Alyssa was smart and others noticed also. Our neighbor asked if my two daughters could come and play with her two daughters, and the neighbor remarked to me at the end of the play time that she had to keep reminding herself that she was talking to a three-year-old. Alyssa was smart, but not very motivated. At four she was paying her sister to make her bed. Once in school she was an average student.

Her sister entered eighth grade and Alyssa was entering sixth when a friend wanted her sister to join the Science Olympiad Team. I was always a mother who never let my children go anywhere under another person’s supervision until I knew that person well, so I hung around the Science Olympiad meetings also. Dr. Anne Clouser, Chardon Middle School Head Coach, is a well known and loved dentist in town, but that wasn’t enough for me to just leave my child there since I didn’t know her. I soon learned why she was so loved and they were doing some interesting things here. I saw that I could help with crowd control of about 40 students. Alyssa decided some of it interested her and since she had to be there every week with mom anyway she should join.

Alyssa soon found her niche in several events and when the fire was sparked she started winning ribbons and medals at the competitions. Alyssa quickly became a social child and still pressed forward even when friends moved onto things other than Science Olympiad. Alyssa's grades started improving in school and she moved from being an average student into being an excellent student.

By eighth and ninth grade she received a ribbon once in awhile, but now lots of medals lined her neck. In ninth grade she received the Principals medal for academic excellence. The Principals medal was given to the one Olympian who not only learned the most events, but also who unselfishly volunteered to step in when scheduling conflicts kept the regularly scheduled student from being there and someone who showed the best sportsmanship conduct. Alyssa stepped in and built an airplane when we were short on flyers and held the bucket for bridges. She won a medal in airplane, which she deserved and gave the medal she won for bridges to the student who she stepped in for.

Alyssa has moved onto the high school Science Olympiad Team and I just received her interim and it was lined with straight A's. Science Olympiad motivated my child to be the best she was created to be.

Science Olympians
Win Place at Sciencescape
By Dr. Ann Clouser

While most students at Chardon Middle School prepared for summer vacation, three Science Olympians prepared for a great adventure. They were among the 24 7th graders chosen from across the United States to participate in a week long science enrichment program and summer vacation meant a huge science adventure out west. Lauren Cline, Katie Crookshanks, and Stellie Spear, did their homework, packed their bags, boarded a plane, and headed for Cottey College.

The three young women were accepted to *Sciencescape*, a unique weeklong science camp June 15 - 21, 2003, on the Campus of Cottey College located in Nevada, Missouri. The three girls had to prepare applications and secure recommendations early in March and never dreamed that all three would be accepted to the program. As their coach I was not sure how I would handle it when likely only one would be accepted. They knew they were competing with each other for a very limited number of slots. Imagine our excitement as one by one the calls came in to my office and all three had been selected!

For one entire week, the girls lived on campus while taking advanced courses in science and math. They took field trips to Prairie State Park, The Nevada Vet Clinic, and a nearby Planetarium. "From kaleidoscopes to microscopes to telescopes, professors helped students nurture their interests in science," Cottey College officials add "In addition to great hands-on learning opportunities, students meet girls the same age from all over the country and see what it is like to be a college student."

You might think that the story ends there, but it doesn't. A local P.E.O. Chapter (A women's philanthropic organization that supports education for women) came forward with over $600 in individual scholarships to support the girls venture into science. Stellie Spear took the challenge one step farther and wrote a grant application to Abbott Pharmaceuticals and received a $150 scholarship to defray the cost of tuition. The excitement and enthusiasm the girls brought back to our Science Olympiad Program after their adventure was infectious and already this years seventh graders are lining up for their chance to attend Sciencescape this summer. Our local P.E.O. has taken steps to establish a permanent fund that will award annual scholarships to girls from Chardon Middle School Science Olympiad to attend Sciencescape in the future.

This is just one more example of how Science Olympiad has not only brought our community together but also brought our talented Chardon Middle School students to new experiences that will widen their horizons and expand their understanding of the world around them. Chardon Middle School, the Middle School Science Olympiad team, and our Local P.E.O. Chapter DU, salute the youth of our community, and all those young people across the country that participate in Science Olympiad. We admire their determination and their ability. They are after all, our future.

For information regarding Cottey College Summer Sciencescape, be sure to visit their official website at www.cottey.edu

Reaching for the Stars…..
By Donna Young

Everyone involved with Science Olympiad, from coaches to event supervisors, are involved for one reason only – to show students that science is interesting and fun and something that everybody can be successful with. We all work hard at coaching and running events and we hope that we are succeeding in making a positive difference in the lives of students. Every now and then we discover that we have made a difference, and that makes us even more committed to our involvement with Science Olympiad. There are many success stories involving students who participate in the Science Olympiad. One of these stories is about Dusty Schroeder.

Dusty was a freshman at Solon High School with a 2.8 GPA and he hated school. He became involved with the Science Olympiad team and discovered the love of learning. Dusty graduated from Solon High School with a 4.8 GPA and became the first member of his family to attend college; he is currently in his sophomore year at Bucknell University with a double major – physics and electrical engineering.

At Solon High School Dusty was the captain of both the C and B division teams. He participated in the Scrambler, Mission Possible, and Reach for the Stars events. Dusty was successful in all these events at the state and national level – however his favorite event was astronomy. One evening, while preparing for national competition in the astronomy event, Dusty took a break and went outside and looked up at the stars. He realized that here he was – a 17-year old kid looking up at the night sky – who with a little knowledge of algebra could calculate the distances to the stars, and Dusty felt empowered. Preparing for national competition had taught Dusty that nothing is impossible if pursued with adequate passion – and showed him that he had the power to not simply be handed "truth" from a teacher but could investigate for himself the realities of his universe. This is what Science Olympiad is all about, helping young people like Dusty realize the power and beauty of science.

Dusty feels indebted to his community, his teachers, and the Science Olympiad for the preparation and support he has been given. He especially wants to repay the Science Olympiad – which Dusty feels has enabled him to work in a particle astrophysics lab on a dark matter experiment, speak at the groundbreaking ceremony for the Planetarium at the Cleveland Museum of Natural History, and get enough scholarships to make his college education possible. At Bucknell University he is building an instrument to detect cosmic ray muons for the physics department, and next summer Dusty is applying for an internship at the Harvard-Smithsonian Astrophysical Observatory in Cambridge, Massachusetts.

Dusty won two first place medals at national competition for Reach for the Stars. Last year he co-supervised the 2003 Ohio State Reach for the Stars competition and assisted at nationals at Ohio State. At the National Science Olympiad 2004 competition Dusty will be a Co-Event Supervisor for the Astronomy C event.

Letter to the Editor

I thought that you might appreciate what happens when the 2nd generation of folks reaches Science Olympiad volunteering stage.

My older daughter, Betsy, is finishing her doctoral thesis (U. Mich.). She just got married, moved to Texas a few months ago, and has been writing steadily to finish the thesis. She was looking for something to occupy her time afterwards (while she post-docs) and thought of volunteering to help with the local Science Olympiad. So she called this guy at a small church-related school two blocks away from her home in Austin. She went to first the place and figured this was about as backwater as it could get. After introducing herself to the coach, they started talking and she mentioned that she was originally from Delaware and had participated in the Olympiad both in Delaware and at Nationals. The coach said that her name was familiar – "did she happen to know somebody named Lloyd Abrams?" When Betsy told him that Lloyd was her father, Chuy Garcia couldn't stop laughing – we had become good acquaintances via e-mail and in person at the past 2 Olympiads. Small world, isn't it?

Science Olympiad Summer Institute University of Wisconsin, Madison

July 19 – 23, 2004

The purpose of this Institute is to introduce the new events for the 2004-05 Science Olympiad and to help coaches develop a better understanding of the events along with strategies for their classroom implementation. Many Science Olympiad coaches attribute theirs successes as Regional State or National tournaments to concepts learned at the Summer Institutes. Over 99% rate the institutes as good or excellent and say that their batteries are recharged, that they learn so much and are glad to be with other educators that are passionate about learning science.

The setting will be the Friedrick Conference Center; 1950 Willow Drive, Madison WI 53706 (608-231-1341) on the UW Campus. Housing will be single or double occupancy rooms with private baths and a complimentary continental breakfast. The mal plan fee covers dinner the first night and lunch each day (Tuesday – Friday), and an afternoon break (compliments UW Teacher Enhancement) but dinner is on your own at numerous campus and local locations. Parking is included with the housing fee. Off site participants should plan on paying $7.50 a day for parking at the University/Conference Center.

All participants must pay the $330 registration fee for the Institute. The registration fee includes all instruction; draft rule changes for the coming year, classroom materials and activities that will help you meet your state's core curriculum science benchmarks and standards. The Science Olympiad must receive this registration form before June 17th to guaranteed housing at the Friedrick Center. Forms for registration and housing can be found on the Science Olympiad website at 222.soinc.org. One-hour credit will be available through the University of Wisconsin.

Mail your completed forms to **Science Olympiad, 5955 Little Pine Lane, Rochester, MI 48036** with a minimum deposit of **$200.00** to hold a space. Final payment is du by June 15th.

All purchase orders must be accompanied by payment.

A $25.00 fee will be applied to any returned checks.

DISTINGUISHED SERVICE AWARDS

The Distinguished Service Awards were established during the early history of the Science Olympiad to honor those that had given an extra measure of time, energy, and talent to the organization. Their peers recognized event supervisors, state and regional directors, and others who have made significant contributions to the Science Olympiad and its goals.

Over the years we have continued the practice of recognition of these persons, but we have not written about them in the newsletter. Beginning with an earlier edition, we gave you short biographies of the honorees. To set the record straight, since 1994 the following individuals have been so honored at the ceremonies at the National Tournament. Each received a plaque and the thanks of the Science Olympiad Board of Directors. Those honored were:

1994	Richard Smith	PA	PA – State Director
	Michael Kobe	IN	School City of Hammond
	Charles Gosselin	MO	Penn Valley Community College
	Linder Winter	CO	Woodland Park Middle School
1995	Dick/Shirley Prouty	WA	Everett Community College
	George Renwick	SC	Newberry College
	Karen Lancour	MI	Henry Ford High School
1996	James Woodland	NE	NE – State Director
	Dale Reynard	DE	Wilmington Friends School
	Harry Dillner	DE	DE Science Olympiad
1997	Charles Hoyt	AZ	Arizona Alliance for Science
	Vicky Boyd	DE	Lake Forest High School
	Lynn Dewey	MI	Macomb Science Olympiad
1998	Harold Miller	NY	NY – State Director
	Allan Jacobs	MI	Anchor Bay High School
	Tim Taylor	OH	Roseville Middle School
1999	Barbara Neureither	MI	MI – State Director/Holt High School
	Kathy Melvin	DE	Delaware Dept. of Education Van Project
	Bill/Penny Hall	DE	DE Science Olympiad
2000	Ervin/Carolyn Zimmerman	MI	Selfridge Air Force Base
	Philip Dail	NC	NC – State Director
2001	Mark Van Hecke	MI	Anchor Bay High School
	Dr. Becky Litherland	MO	MO – State Director/Columbia School
2002	Sandy Wolford	DE	Colonial School District
	Brother Nigel Pratt	NY	Coach/Regional Director
	Manley Midgett	NC	Associate Director
2003	Drew Kirian	OH	Teacher Solon Schools
	Patty Sherman	NY	Teacher/Event Supervisor

Patty Sherman

Patty Sherman, a coach, regional, state and national event supervisor, regional coordinator in New York and facilitator of the state tournament at New Paltz for Division B. Patty won the spirit Award at the North Carolina nationals in 1997. The students on her team are her family and her dedication to them is remarkable. One of her favorite things to energize herself is to come to the Summer Institutes to connect with other teachers who share her passion and we have managed to convince her to teach too so they can benefit from her expertise.

Patty is our definition of an outstanding educator. She is a mentor, friend, teacher and leader at her school, in her state and in the nation.

Congratulations, Patty Sherman!

Sandy Wolford

Over fifty years ago when I was in the eighth grade, our English teacher gave us an assignment to write our autobiography. One of the sections in the autobiography was to be on what you hoped to accomplish in life. I listed three goals in this order: become an airline stewardess, teach science, and do something worthwhile in the field of science. My interest in science began in the seventh grade in Mr. Ater's classroom. He always had us doing science not just reading about it. I was fascinated by learning why things happened. Mr. Hydell, my biology teacher, instilled a love for life science and inquiry as he questioned, questioned, and questioned. In chemistry class I was one of five girls taking the class. Mr. Wilson gave us a research project as the major assignment for the year. Without help of the internet, I researched how to make glass. I had to learn how to get the extreme high temperatures I needed with very little available equipment. I built my furnace on a back lab table and until we took it down we did not know that the temperatures I produced had laid open a half inch crack in a two and a half inch thick heat and chemical resistant lab surface. Mr. Wilson never said a thing, but I made glass and I got my A. I took physics and learned that there are some people who should not be teaching. Thank goodness for "Teach" Clinton, she kept the three girls in the advanced math class holding their own. She was a gifted teacher.

You couldn't teach science in Delaware without being involved in the Science Olympiad. My first experience was assisting with the Science Bowl under the direction of John Yanaitis. At one of our meetings, Jacks said we needed an event which would involve writing. I volunteered to take on the assignment and "Write It/Do It" was born. I did it in my classroom, then in the Delaware competition, and finally the event became a national event. It has been a wonderful experience being at nationals and meeting so many students and hearing their comments on something you put together. Statements range from "This person ahs got to be crazy" to "This is my favorite event". Receiving the Distinguished Service Award from the National Science Olympiad is an honor I shall always cherish.

Last June 30th I retired, but I continue to do the things I like best to do: being involved with teaching earth science to sixth and ninth grade teachers and assessment for understanding. Working with Rachel Wood, Dr. Mary Ellen Harmon, and Dr. Rich Shavelson in the assessment field has expanded my thinking and helps me to know you "can teach old dogs new tricks." It is invigorating to be a part of this project.

Looking forward to seeing you at Juniata College in May, 2004 with "Write It/Do It".

Drew Kirian

Drew Kirian is a survivor of the "Pocono Experience". About seventeen years ago the Olympiad had its largest national summer institute at PEEC, in Pennsylvania. It ought to have been the best workshop we ever had except…..

The location of the project was at an old "honeymoon lodge". It was somewhat crude in its facilities. We have done many programs at outdoor facilities, but this one was done in the hottest summer we have experienced on the East Coast in 100 years. It was tough!!

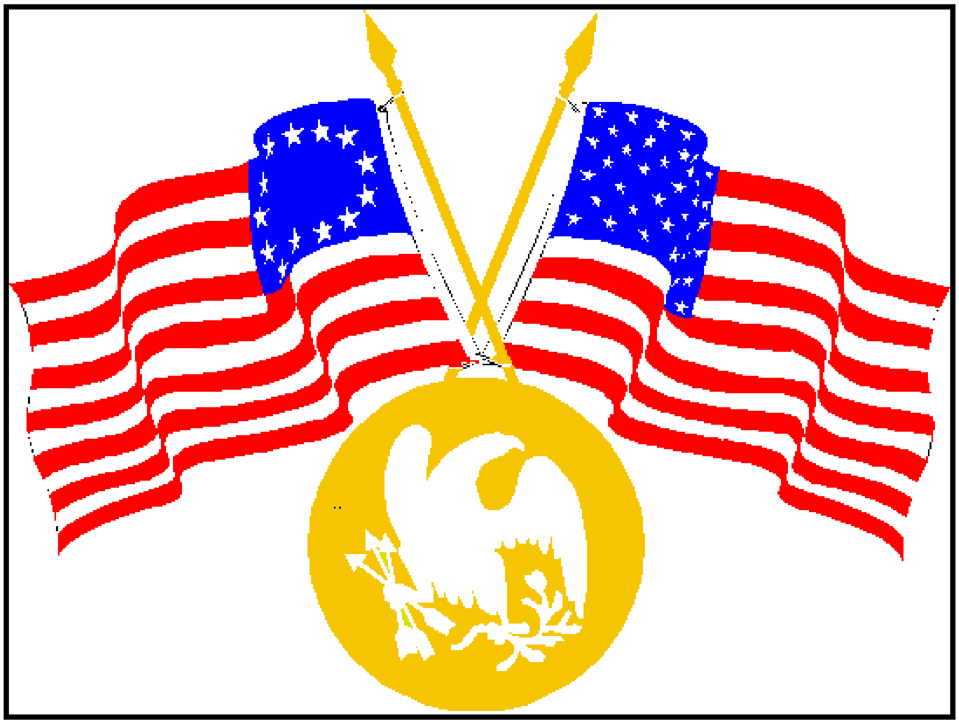
In any case, Drew was there and he and his family survived. Drew's daughter was a baby then, and she is now a high school participant. He has been her coach in middle and high school, and state and regional director in Ohio. He attended the Delaware Invitational as a coach with his daughter's team.

Letter to the Editor

My twin sons just completed an interesting scientific study, which I hope will be inspiring to others.

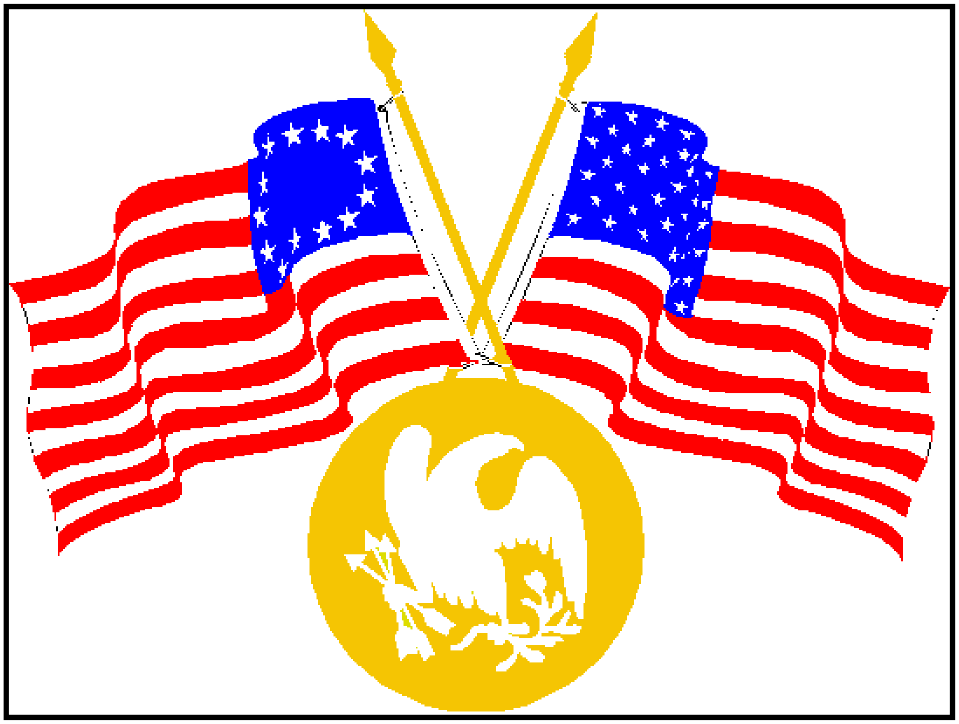
Both applied to the University of Purdue College of Engineering. They are choosing engineering based on their enjoyment and success in the S.O. projects. Mission has been the center of their lives since they met it 6 years ago. One is choosing Aeronautical Engineering based on his experience in Wright Stuff and the other wants to do Chemical Engineering. They have virtually equivalent transcripts, GPA's, and test scores. One has a Gold and Bronze medal from State competition while the other doesn't. Both were accepted. The one with the medals also received an $11,000 merit scholarship grant.

Its hard to express how happy and proud I am of their achievements and how much appreciation I have for the S.O. program. I would like to take this time to say a big thanks to all the coaches, event supervisors, volunteers, and organizers that make this such a positive and productive social movement. My children have benefited tremendously and are the richer for it (especially Dan!).



2003 National Science Olympiad
Top Ten Winning Teams
Division B

1	J. C. Booth Middle School, GA
2	Thomas Jefferson Middle School, IN
3	El Rancho Charter School, CA
4	Rising Star Middle School, GA
5	Lakeshore Middle School, MI
6	A. W. Coolidge Middle School, MA
7	White Pines Middle School, NJ
8	Community Middle School, NJ
9	Stroudsburg Jr. High School, PA
10	Chardon Middle School, OH



2003 National Science Olympiad
Top Ten Winning Teams
Division C

1	Troy High School, CA
2	Solon High School, OH
3	Harriton High School, PA
4	Prairie High School, WA
5	Centerville High School, OH
6	Poudre High School, CO
7	Lower Merion High School, PA
8	Prospect High School, IL
9	New Trier High School, IL
10	Maine-Endwell High School, NH

Fermi Questions

Lloyd Abrams, Ph. D.
DuPont, CR&D/CCAS
Wilmington, DE

When Jack Cairns asked me to provide a write-up describing the event, Fermi Questions, I was confronted with the same sort of dilemma that was expressed to me by a coach, "How do I teach for the event?". I jumped at the opportunity since I believe that Fermi Questions represent some of the most favorable features of the Science Olympiad. After considerable internal debate (i.e., talking to myself), I've come to the conclusion that this event is a 'culmination event', that is, it uses the knowledge, logic, and critical thinking concepts, developed during a person's lifetime, to attack and solve problems. Fermi Questions are essentially problems requiring the correct order of magnitude as the solution which otherwise is either too difficult to measure or whose answer is imprecise.

I have been supervising Fermi Questions as a state event in Delaware for the past twenty years or so. It has been especially rewarding to me to watch how well the students (generally, teams of two) collaborate to solve the problems. Knowing how much effort I expend in making the exam, I am quite gratified to watch these budding scientists expend their mental energies in kind. For that reason, I try to make the questions fun, a learning experience, and relevant to their quest for knowledge. Each year, I provide copies of the Fermi Questions event to a half dozen university professors who then administer it to their students (both graduate and undergraduate) as a learning/teaching exercise.

In the course of making up the event, I consider several kinds of questions:

- math (straight) – where the answer can be calculated using a calculator or computer but, since such aids are not allowed in the competition, it forces the student to consider other routes to provide a reasonable answer
- how answers from one problem relate to other problems – as with many facets of life, an answer to one problem leads to many other choices and problems.
- having solutions to problems relate to 'real life', for example, a problem might ask for an estimate of the amount of gasoline used by passenger cars in the U.S., how an increase in gas mileage would relate to a decrease in green-house gas production, and how the amount of water produced by same relates to other items such as rainfall or filling of swimming pools.

In short, if something has numbers associated with it, that subject is fair game for a Fermi Question.

Underlying Considerations

Behind each problem set that I create is the tacit assumption that the contestants have a reasonable knowledge of mathematics, specifically, the use and operations of exponential notation. The lack of math skills is not too apparent when the answers to the problems are in the range 0.001 to 1000 (Fermi Question notation –3 to +3). But when I ask the students to calculate the number of iron atoms on the head of a pin, the inability to handle exponents readily shows (there are approximately $3*10^{13}$ iron atoms – Fermi Question answer +13; see Example xiv. below). I can't count thenumber of times that I've seen students cover the scrap paper (that I distribute for them to use in their deliberations) with zeroes. For that reason, it is imperative to stress the use of exponential notation (which also serves as the basis for the metric system). Not only does the use of exponential notation make calculations faster, but it also helps avoid problems with writing, transcribing, and counting the correct number of zeroes. So much so, that in some branches of science there are specially named units that have very large (or very small) numbers associated with them, such as, one Angstrom = 10^{-8} cm, one Light Year = $5.9*10^{12}$ miles, Avogadro's Number = $6.023*10^{23}$.

As I noted previously, an important component of the event is logical, critical thinking. Reading and understanding the problem is one important component; the other important component is to develop a plan to provide the answer in the requested units.

And finally, time is a critical parameter. The ability to think and calculate rapidly can be learned – the keywords are, in the immortal words of a Hall-of-Fame football coach, "practice, practice, and more practice". I have watched students (when I was a coach) significantly lower the times required to solve these problems. In fact, some of them have returned from college and told me that the same skills (required to solve Fermi Questions) permitted them to handle tests and problem sets much faster than their contemporaries.

Typically, the first time that a team tries to solve a problem, they try to be too exact. For example, if the Fermi Question is "how many toothpicks are equivalent to the perimeter of Colorado?", they discuss the length of a toothpick ("is it 2.0, 2.25, 2.45 inches?); then they try to estimate the perimeter of the state; and finally, they calculate a value. Any time there is a discussion, time is lost. Since the answer to any question is the correct order of magnitude, an error of a factor of two or three will probably yield the correct exponent (the Fermi Question answer). Hence, they should pick a value and work up their answer. The time that they save will be needed to solve other problems.

Below is the presentation that I delivered at the October Coaches Clinic in Hammond, Indiana. Almost all of the attendees were very positive about the event as I presented it; several State Directors, in attendance, told me that they were definitely going to have Fermi Questions as a State Event. I have volunteered to send them the questions (with all work shown and answers) that I use next year in Delaware which they can adapt for use in their own State. If your State would like me to assist with preparing the Fermi Question event, please send me an e-mail at Lloyd.Abrams@USA.DuPont.com. At present, at least a dozen States will have Fermi Questions as an event in 2004. As I noted previously in this article, I have supervised the Fermi Event in Delaware for almost 20 years. I've kept most of the problem sets (and solutions) and I will assembling them into a workbook for future generations of Fermi Questions contestants. All of this, of course, is in preparation for the time when Fermi Questions will be a National Science Olympiad event.

Presentation at the Science Olympiad Coaches Clinic, Hammond, Indiana, Oct 3,4, 2003

Fermi Questions is named after Enrico Fermi, a Nobel Laureate in Physics, who was famed for being able to do order-of-magnitude calculations in his head. For example, after watching the first atomic bomb explosion, he immediately calculated that the strength of the explosion was equivalent to the explosion of 20 kilotons of TNT. It took another three weeks for a panel of the Manhattan Project's best scientific brains to do an 'exact' calculation; the answer that they came up with, yes, you guessed it - 20 kilotons. Such calculations are sometimes called 'ballpark estimates' or 'back-of-the-envelope' calculations. While these calculations were important, years ago, because one had to keep track of decimal places when using a slide rule, these calculations are still very important because an approximate answer will often dictate the amount of resources required to attack a problem. For example, when you consult a wedding consultant to plan the affair, they often ask the question, "How many people will attend the dinner?". Your approximate answer will allow them to estimate the amount of food required, the number of tables and their layout, the size of the hall to be rented, etc., etc. Fundamental to the solution of these problems is a skill called Critical Thinking - essentially a method of attacking such problems in an orderly, logical way. This skill can be learned and it is the underlying basis for the event.

Why this event? Numbers (when you think about it) are a measure of our surroundings and life.

Examples

- how many air molecules are in this room (where I was presenting this lecture)?
- how many pounds of CO_2 and H_2O does the U.S. population expel in a year?
- how many tons of food are consumed in Chicago during the course of a day?
- how many people are involve in delivering and preparing that food?
- how many gallons of paint do you need to paint the walls of your school?
- how many baseballs are used during the course of a Major League season?
- how many pizzas were eaten last year in the U.S.?

The scoring for the event is like horseshoes:

5 points for the correct exponent
3 points for the correct exponent ± 1
1 point for the correct exponent ± 2

The answer to a Fermi Question is the correct exponent of 10 (if an answer is $5*10^n$, round the answer up to the next power of 10; I try to manage the problems so that answers are not $5*10^n$). Generally, if a team averages 3 points per problem and there are 30 problems, the 90 points that they will have achieved will garner them first or second place. Calculators, computers, or any other device, including crib sheets, lists of constants, formulae, etc., are not permitted. All the contestants need are pencils (with erasers) and a good night's sleep - I supply scratch paper (to simulate the 'back-of-envelopes'). Positive exponential values are the default; negative exponents MUST have the - (minus) sign as part of the answer.

Some considerations involved when learning to solve these problems:

1. **Exponents are short-hand notation** (knowledge of which makes it easier and faster to solve the problems). The notation used below is: Ex. = example; Ans. = Answer; FA = Fermi Answer.
   Ex. What is the population of New York City? Ans. $7,000,000 = 7*10^6 \sim 10^7$ FA **7**
   Ex. What is the distance, in miles, from the Earth to the Sun? Ans. $100,000,000 = 10^8$ FA **8**

2. **Properties of exponents**.
   $500 = 5*10^2$; 5 is the coefficient, 10 is the base, 2 is the exponent
   when multiplying, add exponents of the same base
   Ex. $200*4000 = 2*10^2 * 2^2*10^3 = 2^3*10^5 = 8*10^5 \sim 10^6$ FA **6**
   when dividing, subtract exponents of the same base
   Ex. $200 \div 800 = 2*10^2 \div 2^3*10^2 = 2^{-1}*10^0 = 2^{-1}*1 \sim 10^{-1}$ FA **-1**
   note that $10^0 = 1$
   $10^{20} = (10^4)^5 = (10^2)^{10}$; $2^{10} \sim 10^3$

3. **Round off values BEFORE doing a calculation**. This makes it much easier and faster to do the problems. Why? Because the FA is the correct order of magnitude which means that there is a large range that yields the correct answer. For example, the FA for the distance, in miles, from the Earth to the Sun is 8 (shown previously in 1.) but the range of values giving the same answer is $5*10^7$ to $4.99*10^8$!! In this context, I suggest using the values below which are somewhat different from the exact values:

Item	Exact Value	Fermi Value (for ease of calculation)
1 day	24 hours	25 hours
1 mile	5280 feet	5000 feet
1 yard	0.9144 meter	1 meter
1 foot	30.48 cm	30 cm
1 pound	453.6 g	500 g
1 hour	3600 seconds	4000 seconds

4. **Always keep the units as part of working a problem**. In some instances, keeping track of the units will lead to the correct answer. I am particularly sensitive to the use of units since I have degrees in both engineering (British units are used, pounds, feet, BTU, etc.) and chemistry (metric units, grams, meters, calories, etc.) AND the U.S. uses both of these systems. Sometimes the units get left off solutions to real problems with tragic, unforeseen results. As an example, most US cooks know what a $^1/_4$ pound of butter looks like - it is a stick about 1 inch x 1 inch x 5 inches. But ask them what 100 g of butter looks like and they may throw up their hands in defeat. The answer is that the stick is almost the same size since 100 g is close to $^1/_4$ pound.

5. **What subject matter is covered**? Everything is fair game! If the item in question has numbers associated with it, I might use it. In the past, I have given questions on math, chemistry, physics, biology, geology, geography, economics, swimming, basketball, running, census, food, waste generation, ...

Examples. (abbreviation: F?s = Fermi Question solution) These can be done by the students as practice; have them show all work and what assumptions they made in solving the problems.

i. How many seconds are there in a year?
Exact solution: 60 sec/min * 60 min/hr * 24 hr/day * 365 day/year = $3.15*10^7$ s/y FA 7
F?s: 4000 s/h * 25 h/d * 400 d/y = $4*10^3 * 2.5*10^1 * 4*10^2 = 4*2.5*4*10^6 = 4*10^7$ FA 7
Note that both answers are the same. Budding Fermi Question experts should remember that there are $3*10^7$ seconds in a year - this will probably save them time in solving another F?.

ii. How many miles are there in a light-year?
Exact solution: 186,000 m/s * $3.15*10^7$ s/y = $1.86*3.15*10^{12} = 5.9*10^{12}$ m/y FA 13
F?s: $2*10^5$ m/s * $3*10^7$ s/y = $6*10^{12}$ m/y
This quantity is a basic unit used in astronomy. As noted in problem i., knowing that there are $3*10^7$ seconds in a year has shortened the work considerably.

iii. How many kilometers are there in a light-year?
F?s: $6*10^{12}$ mi/y * 1.6 km/mi = $10*10^{12}$ km/y = 10^{13} FA 13

iv. For the average American woman, how many times will her heart beat during her lifetime?
Assumptions: 1 heartbeat per second, lifetime of 80 years
F?s: $3*10^7$ s/y * 1 hb/s * 80 y/lifetime = $2.4*10^9$ FA 9

v. How many heartbeats are there in a year for the entire world's population?
Assumptions: 1 heartbeat per second, $6*10^9$ people
F?s = $3*10^7$ s/y * 1hb/s * $6*10^9 = 18*10^{16} = 1.8*10^{17}$ FA 17

vi. How many pounds of rice were consumed in the U.S. in the year 2001?
Assumptions: 20 pounds of rice eaten per year by a person, $3*10^8$ people in the U.S.
F?s: 20 #/p * $3*10^8$ p = $6*10^9$ # = 10^{10} FA 10
This answer was checked using data from the U.S. Dept. of Agriculture; $5.2*10^9$ lbs. If the students assume 2-10 or 200-1000 #/p, they would still get 3 points.

vii. What is the density of butter in g/cc?
Assumptions: 1 pound of butter is a package 2 inch x 2 inch x 5 inches.
F?s: V = 2 in * 2.5 cm/in * 2 in * 2.5 cm/in * 5 in * 2.5 cm/in = 5 * 5 * 12 = 300 cm^3
Density = M/V = 500 g / 300 cm^3 = 1.5 $g/cm^3 \sim 1 = 10^0$ FA 0

viii. What fraction of a mile is a cm?
F?s: 1 cm / (5000 f/mi * 30 cm/f) = $1 / 3*5*10^4 = 1 / 1.5*10^5 = 10^{-5}$ FA -5

ix. What is the area, in sq. miles, of the original 48 states of the U.S.?
Assumption: the U.S. is shaped like a rectangle; 3000 miles wide x 1000 miles
F?s: $3*10^3 * 1*10^3 = 3*10^6$ FA 6
Note: when areas are requested, it is much easier to use a rectangle.

x. What is the area of the U.S. (prob. ix.) in cm^2?
F?s: $3*10^6$ mi^2 * 1.6^2 km^2/mi^2 * $(10^3)^2$ m^2/km^2 * $(10^2)^2$ cm^2/m^2
$= 3*2.5 * 10^{(6+6+4)} = 7.5 * 10^{16} \sim 10^{17}$ FA 17

xi. What is the area of Lake Superior in sq. miles?
Assumption: the lake is shaped like a rectangle; 300 miles wide x 100 miles
F?s: $3*10^2$ mi * $1*10^2$ mi = $3*10^4$ FA 4

xii. Estimate the volume of Lake Superior in cubic kilometers.
V = Area * Depth; Assumption: Average depth is 200 m
F?s: $3*10^4$ mi^2 * 1.6^2 km^2/mi^2 * 200 m * 1 km/1000 m
$= 3 * 2.5 * 2 * 10^{(4+2-3)} = 15 * 10^3 = 1.5*10^4$ FA 4

xiii. How many cubic kilometers of rain fall of the U.S.(48 states) in one year? Assume an average rainfall of 10 inches.
F?s: $3*10^6$ mi^2 * 1.6^2 km^2/mi^2 * 10 in * 2.5 cm/in * 1 m/10^2 cm * 1 km/10^3 m

$= 3*2.5*2.5 * 10^{(6+1-2-3)} = 20 * 10^2 = 2 * 10^3$ FA 3

Note that Lake Superior has 7 times the total volume of rainfall: the Great Lakes have about half of the Earth's fresh water.

xiv. How many iron atoms are on the head of a pin?
Assumption: the head is 1 mm in diameter, diameter of an iron atom is 2.5 Angstroms
Area of the head of a pin: $^1/_2*pi*D^2 = 1.5 * (1 \text{ mm} * 1 \text{ cm}/10 \text{ mm})^2 = 1.5 * 10^{-2} \text{ cm}^2$
Assume that the head of a pin is half a sphere
Area covered by an iron atom: $^1/_4*pi*D^2 = 0.75 * (2.5*10^{-8})^2 \text{ cm}^2 = 5 * 10^{-16} \text{ cm}^2$
F?s: $1.5*10^{-2} \text{ cm}^2 / 5*10^{-16} \text{ cm}^2 = 0.3*10^{14} = 3 * 10^{13}$ FA 13

Note: this problem can also be solved using the rectangle approach.

Assumption: the head is 1 mm on a side, an iron atom is 2.5 Angstroms on a side
Area of the head of a pin: $^1/_2*6*S^2 = 3 * (1 \text{ mm} * 1 \text{ cm}/10 \text{ mm})^2 = 3 * 10^{-2} \text{ cm}^2$
Area covered by an iron atom: $S^2 = (2.5*10^{-8})^2 \text{ cm}^2 = 6.25 * 10^{-16} \text{ cm}^2$
F?s: $3*10^{-2} \text{ cm}^2 / 6.25*10^{-16} \text{ cm}^2 = 0.4*10^{14} = 4 * 10^{13}$ FA 13

SECONDARY SCIENCE OLYMPIAD SUMMER INSTITUTES

SAN JOAQUIN CONFERENCE CENTER, STOCKTON, CA JUNE 8 – 11, 2004

LEELANAU ENVIRONMENTAL CENTER, GLEN ARBOR, MI JULY5 – 9, 2004
FRIEDRICK CONFERENCE CENTER, MADISON, WI JULY 19-23, 2004

********Please check the www.coinc.org website for the current dates, rates and locations********

Educators are eligible to use the Title II programs ($3.1 billion) funds to attend Science Olympiad Summer Institutes designed for teachers, Coaches, Supervisors and Administrators grades 6 –12. Classes will cover events such as Bridge Building, Road Scholar, Experimental Design, Remote Sensing, Robots, Bottle Rocket, Fossils, Crime Busters, Chem. Lab. Disease Detective, Wright Stuff, Water Quality, Dynamic Planet and more plus New Events for next year. Also learn how to build a team and gain support for your science program. The registration fee includes all instruction, rules manual, changes for next year, classroom materials and activities that will help you meet your state's core curriculum science benchmarks and standards. Commuters must pay a facility and meals fee, which is included in the housing fees. ***Many Science Olympiad coaches at State & National finals attribute their success to concepts learned at the SO Summer Institutes. Over 98% rate the institutes as good or excellent and say that their batteries are recharged, that they learn so much and are glad to be with other educators that are passionate about learning science!***

The Leelanau Environmental School, Michigan is located in the famous resort area of Traverse City along the Sleeping Bear Dunes National Park in northern Michigan, a short walk away from the sandy shoreline of Lake Michigan. Housing is in single or double occupancy dorm rooms (2 twin beds) that share a bath. Linens and towels are provided. Meals are served cafeteria style from dinner on Monday to lunch on Friday.

The Frederic Conference Center, Wisconsin is located on the shores of Lake Mendota on the University of Wisconsin campus. Housing (includes continental breakfast, lunch and registration dinner) is in single or double occupancy hotel rooms with private baths. Bed and bath linens are provided. A group lunch will be included in the facility cost (dinner on your own).

The San Joaquin County Office of Education in Stockton, California is hosting the institute at the county offices that are located East of San Francisco. Rooms can be booked at the Hampton Inn (includes continental breakfast) located one-half mile from the facility. A group lunch will be included in the facility cost (dinner on your own).

Please check the www.soinc.org website for the current dates, housing rates and locations.

A $200 deposit will hold a place at the Institute of your choice.

REGISTRATION FORM - DRAFT SUBJECT TO CHANGE
(Register early as space is limited)

NAME__________________________M/F____SCHOOL_________________________DIV_________________
HOME ADDRESS__________________________________CITY________________STATE____ZIP_________
SCHOOL PHONE ____/____/_______HOME PHONE_____/_____/______________________________________
REGISTRATION FOR COURSE $330

Please check the www.soinc.org website for the current dates, housing rates and locations.

Deposit ($200 due with registration and non-refundable 30 days before Institute) Deposit______________

Return Form to:	**Science Olympiad**	**Phone:**	**248-651-4013**
	5955 Little Pine Lake	**Fax**	**284-651-7835**
	Rochester, NY 48306		