Using Science Olympiad Events to Meet Next Generation Science Standards AND to Bridge the STEM Gap in Curriculum

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SCIENCE OLYMPIAD™

Exploring the World of Science

- **<u>The purpose for Science Olympiad</u>** is to promote scientific study while using inquiry and scientific method.

- Students learn new concepts, new subject areas, add to old subject area topics, and develop a sense of personal connection when working within a team or other group.

3 Types of Science Olympiad Events (Activities)

- Project based inquiry – example: Electric Vehicle (see handout)
- Fact based inquiry – example: Invasive Species (see handout)
- Experiment based inquiry – Chemistry Lab (see handout)

Note the use of "inquiry" in each activity type . Science Olympiad is all about learning for the sake of learning.

Using Science Olympiad in the Classroom

- *Use creativity to adapt a Science Olympiad event to your classroom needs and to supplement curriculum.*

(1) Develop hands-on activities (such as lab experiments, demonstrations, etc.) to bring additional experimentation into your lessons.

(2) Develop inquiry based labs where students used prior knowledge along with new ideas to design and implement a lab experiment.

(**SEE HANDOUT** of the aluminum foil thickness experiment)

(3) Improve team/student group communication skills.

(**SEE HANDOUT** for Write It, Do It activity --- which by the way can be scaled down to elementary level.)

3 Grade Levels for Science Olympiad:

Division A (elementary K – 5)

Division B (middle school 6 – 8)

Division C (high school 9 – 12)

SCIENCE OLYMPIAD™

Exploring the World of Science

Organizing a team

- Assess student interest within your classes and/or with other teachers' classes.
- Meet with interested students describing the concept of team competition, the importance of commitment, and the way you would implement a team with team practice schedules.
- Meet with administrator to seek approval (if needed).
- Register the team. (**www.miscioly.org**)

How do you “jump in”?

- Once you get the team commitment, permission to have a team, and other administrative things done, you meet with the parents of the students who want to be on the team.
- Have a plan….perhaps a schedule of practices (before school, after school, Saturdays).
- Start small. You don’t necessarily have to have 15 students on your team.
- Work with the events for which the students have the most interest. (Strive for success in competition in a few really interesting events to gain experience.)

"Jumping in" --- continued

- Attend coach workshops.
- Take your students to local invitationals. (Links and other information for these are found at the Michigan Science Olympiad web site,
- www.miscioly.org)
- E-mail your regional director if you have questions.
- E-mail the membership liaison (Sue West at either: suewest300@gmail.com OR weste@gvsu.edu

Using Science Olympiad to Bridge the STEM Gap

(Elementary Levels K through 5)

Elementary Science Olympiad

National Science Olympiad (NSO) --- Division A

www.soinc.org

<u>2 programs in place in Michigan</u>:

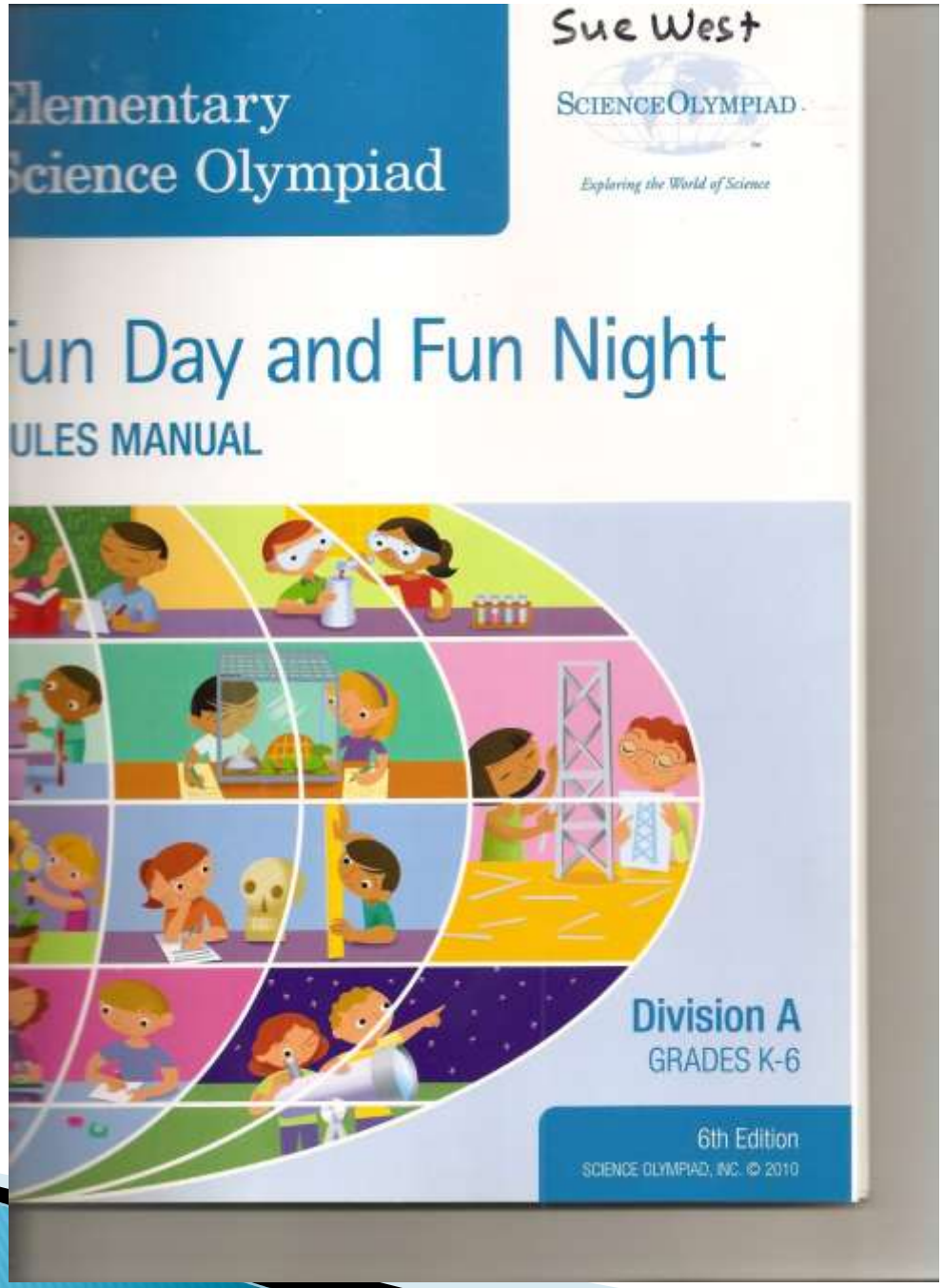
(1) Macomb County (region 7 & 8 in Michigan Science Olympiad Program) --- competitive program

http://macombso.org/index.php/esoevents

(2) Grand Haven (Ottawa County) --- parent organized and in it's beginning developmental stages ***(The Regional Math and Science Center at Grand Valley State University can connect you with this program.)***

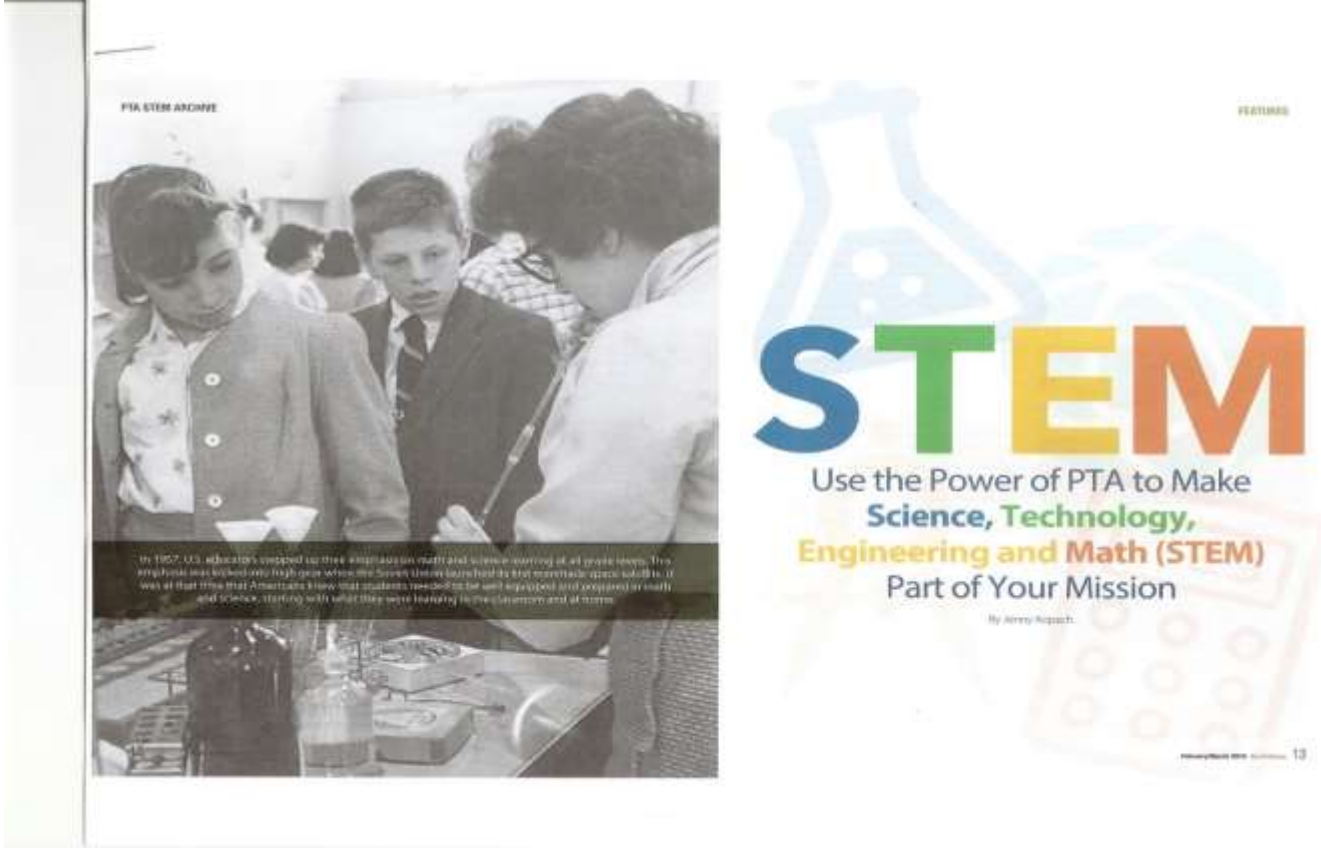
STEM Lesson Ideas

- Available at the Grand Valley State University Regional Math and Science Center are boxed kits with various equipment, lesson plans, and ideas.
- Teachers may check them out for a week to use with their students.
- Contact Diane Miller **(milledia@gvsu.edu)** for information.
- We have several examples for elementary teachers to look at today.



Good Lab Lesson Plan Book

Available @ the National Science Olympiad Web Site



PTA STEM ARCHIVE

FEATURES

STEM

Use the Power of PTA to Make Science, Technology, Engineering and Math (STEM) Part of Your Mission

By Jenny Rogach

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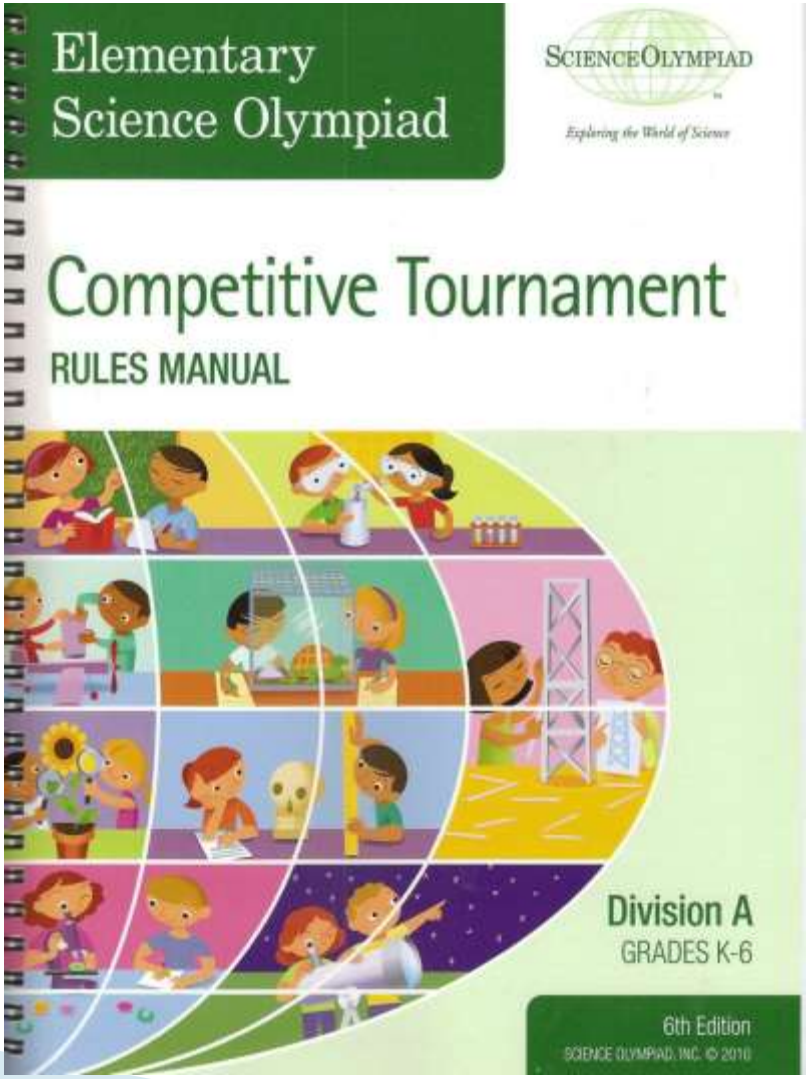
- **<u>SEE</u> --- article copy handout**

(This article applies to **<u>ALL</u>** grade levels.)

Science Olympiad

Division A Events Rule Book



Two examples of 2016 season Division A Science Olympiad events (copies provided as handouts)

SIMPLE MACHINES

DESCRIPTION:
Participants will identify, use, and answer questions about simple machines and recognize the relationships between work, force and distance as they apply to each simple machine. Knowledge of the following six simple machines will be demonstrated: lever, inclined plane, pulley, screw, wheel and axle, and wedge. Students should know and understand the concept of mechanical advantage and be able to estimate it by comparing the ratio of forces or distances.

TEAM SIZE: 1 or 2 students **APPROXIMATE TIME:** 30 minutes

THE COMPETITION:
Participant(s) will move between stations containing pictures or examples of devices made up of one or more simple machines. Teams must move at the time indicated by the event supervisor to ensure that all teams have equal opportunity to use the equipment at each station (e.g. 2 minutes per station). Students may carefully handle and manipulate objects found at each station.

At each station students will answer questions designed to test their ability to:

1. identify the simple machines illustrated
2. identify parts of the simple machines (e.g. load, effort, fulcrum)
3. use equipment to measure some variable(s) such as length, force or weight
4. recognize the relationships between work, force and distance as they apply to each simple machine
5. know and understand the concept of mechanical advantage and be able to estimate it by comparing the ratio of forces or distances
6. perform simple calculations

Possible question formats could include:

1. identifying simple machines as parts of an object (yes or no for each type)
2. matching
3. multiple choice
4. true/false

SCORING:
Points will be awarded for correct answers. **Questions will be worth either 1 or 2 points.** The team with the highest total points for all stations will win. Ties will be broken by a predetermined set of questions.

If a rule clarification is posted on the Macomb Science Olympiad website, the supervisor will score this event accordingly. Please visit: http://macombsci.org/index.php/rules/faqs.

WILDLIFE SAFARI

DESCRIPTION: In this event, students will demonstrate their ability to identify wildlife and their habitats, as well as answer general information about the animals through the use of field guides.

TEAM SIZE: 1 or 2 Students **APPROXIMATE TIME:** 30 Minutes

THE COMPETITION:
Students will demonstrate their ability to identify **fish of Michigan and answer questions from the *Fish of Michigan Field Guide*. Students should be familiar with the entire book, because questions may be selected from any part of it.**

Teams will rotate among approximately 20 stations where they may view photographs of fish, fish anatomy, fish diseases and fish habitats. Each station will consist of 4 to 6 questions and each team will have about 1 minute to answer all questions at a station. Questions will vary in degree of difficulty and will be graded accordingly. Question format will be multiple choice and true/false. **The tie breaker questions will be fill-in-the-blank format questions.** Answer sheets, including Scantron forms will be provided.

Students will be responsible for bringing pencils, **and up to one field guide per student. A field guide may be either the *Fish of Michigan* publication, or a student-created field guide. A student-created field guide must be contained in a binder or notebook with no loose pages.** Students may highlight and/or place tabs in the ***Fish of Michigan* field guide, but writing and post-its in that book are not allowed.** No other materials will be allowed in the competition.

All questions will be based on the *Fish of Michigan* field guide.

SCORING:
Each correct answer will be worth between 1 and 3 points. For the tie breaker questions, exact spelling is not required. A secondary tie breaker will be based on the number of difficult questions answered correctly.

RESOURCES:
Fish of Michigan Field Guide
By Dave Bosanko
ISBN-13: 9781591931935
ISBN-10: 159191931932
Publisher: Adventure Publications
Publication date: 2007
Pages: 176

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Using Science Olympiad to Bridge the STEM Gap

(High School --- Grades 9-12)

Matching Science Olympiad Events to Next Generation Science Objectives.

- ***<u>SEE HANDOUT</u>*** *<u>– Matches each of this year's S.O. events with Next Generation Objectives</u>*
- **Example:** <u>AIR TRAJECTORY</u> – **Prior to the competition, teams will design, construct, and calibrate a single device capable of launching projectiles onto a target and collect data regarding device parameters and performance.**
- *<u>Science and Engineering Practices 2-6</u>*
- 2. Developing and using models
- 3. Planning and carrying out investigations
- 4. Analyzing and interpreting data
- 5. Using mathematics and computational thinking
- 6. Constructing explanations (for science) and designing solutions for engineering.

Sample Lesson Plan – Grades 9-12

- SEE --- Handouts for ideas
- Example of detailed lesson plan is the aluminum foil thickness lab activity. This came from an old Chemistry Lab event that Science Olympiad used in 1995.
- The idea was expanded and altered to fit the needs of a chemistry class for an inquiry lab activity.

Summary

- Decide if Science Olympiad events might be an asset to your school STEM program.
- Keep in mind that Science Olympiad events meet many Next Generation Science objectives.
- Seek assistance from parent groups like PTA or PTO. (They can provide physical and financial support.)
- Remember that no matter how you use Science Olympiad, any way you get more science at a higher level of thinking into your classroom, IT'S A GOOD THING !!