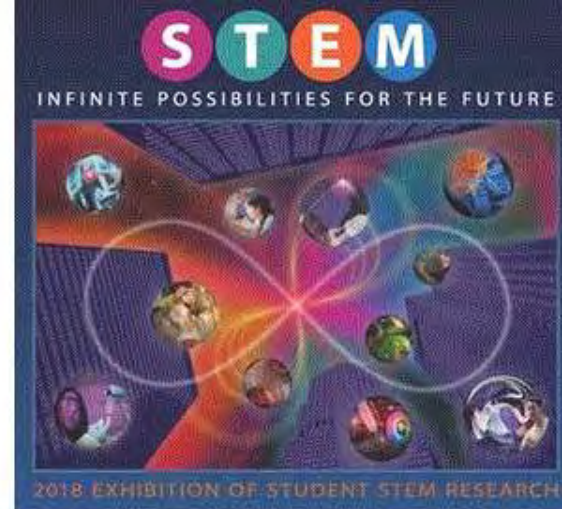




68th Annual Chicago Public Schools  
STEM Exhibition

# 2017-2018 Exhibition of Student STEM Research Information Update

Prepared by Roy Coleman & Luba Johnson  
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E-mail: [ljohnson131@cps.edu](mailto:ljohnson131@cps.edu)  
Website: <http://cssf.org>



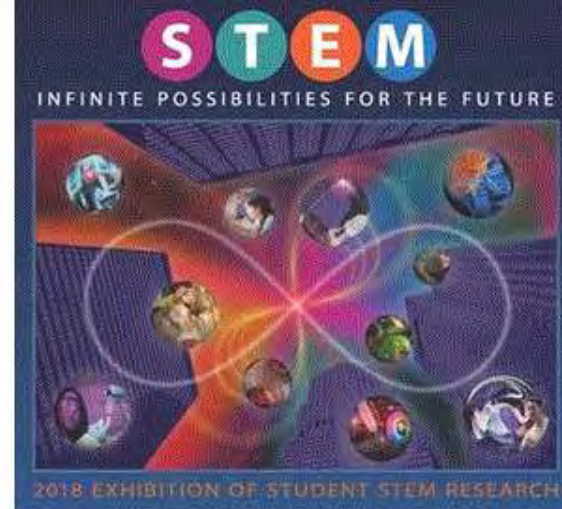


## Student STEM Exhibition Dates

- The City STEM Exhibition is March 13 - 18, 2018 with the Symposium presentation on March 15, 2018 and Opening Day on March 16, 2018.
- Regional STEM Expositions will be held in January 2018
- School STEM Exhibitions should be held prior to December 15, 2017
- Classroom presentations could be scheduled early to mid November

Please refer to the STEM Exhibitions Calendar of Events on the [WWW.CSSF.ORG](http://WWW.CSSF.ORG) website for the most current dates, especially the due dates for any submissions that are marked with a #.

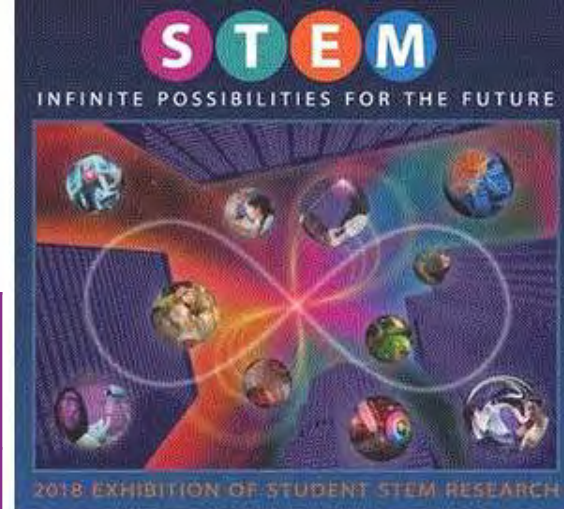
Students have been exposed to inquiry-based science/math instruction since the beginning of the school year and from instruction in previous years.





# STEM Exhibition Categories

Aerospace Science ** (IJAS-Astronomy)	Chemistry	Engineering	Mathematics**
Behavioral Science*	Computer Science**	Environmental Science	Microbiology* (IJAS-Cellular & Molecular Biology)
Biochemistry*	Earth Science	Health Science*	Physics
Botany	Electronics	Materials Science (IJAS-Consumer Science*)	Zoology*



\* Special rules apply for projects in this category. See the *2018 STEM Exhibition Handbook* (at [cssf.org](http://cssf.org)) about biological hazards and applying for appropriate endorsements:

- Request for Non-Human Vertebrate Animal Endorsement
- Request for Humans As Test Subjects Endorsement
- Request for Human or Vertebrate Animal Tissue Endorsement
- Request for Microorganism Endorsement
- Request for Recombinant DNA Endorsement

**NOTE: For projects conducted in a university, hospital or research laboratory under the supervision of a Doctor, Professor or Scientist, endorsement(s) and supporting documents are due **October 12, 2017#**. All other endorsements must be submitted in duplicate by **November 17, 2017#**.**

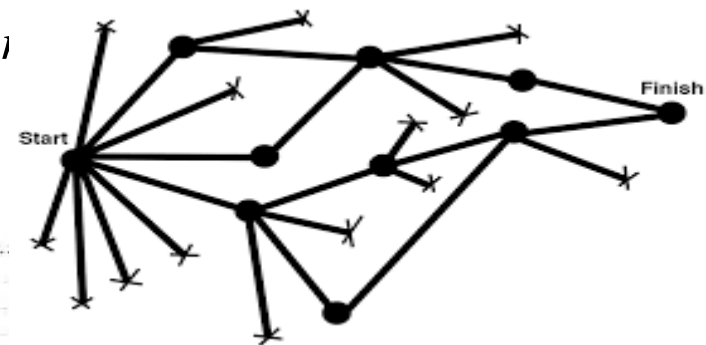
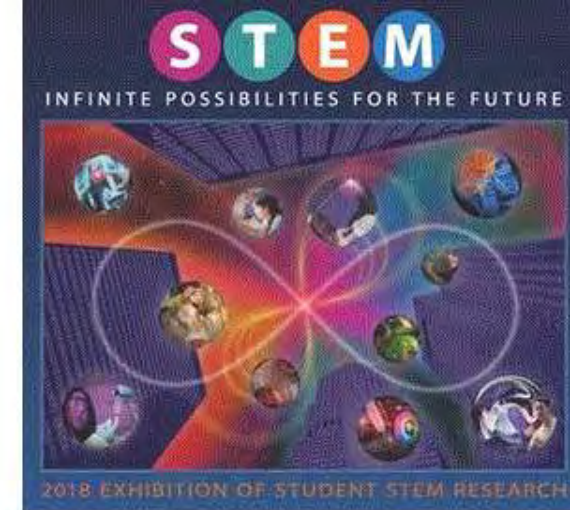
**\*\* When a control group is not possible, a comparison among trials is acceptable.**



For the past several years there has been a new way to do STEM Research projects.

It is called a 'Design Project' where the student designs and tests a new product, algorithm, model or procedure.

For more details, see the handout entitled 'A Comparison of the Scientific Method and the Design Process' or pages 2-4 of the STEM Exhibition Handbook ([cssf.org](http://cssf.org)).

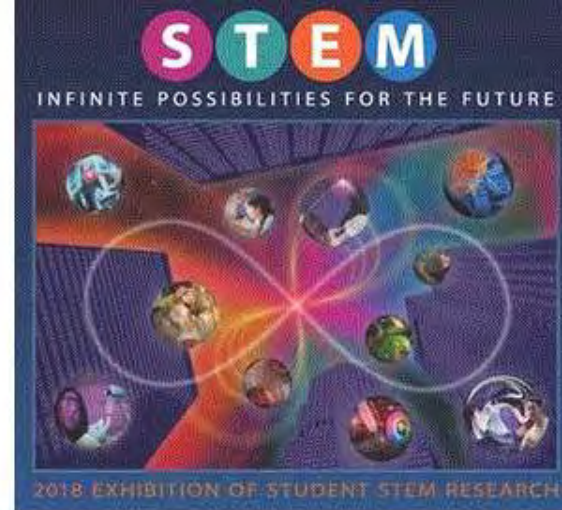


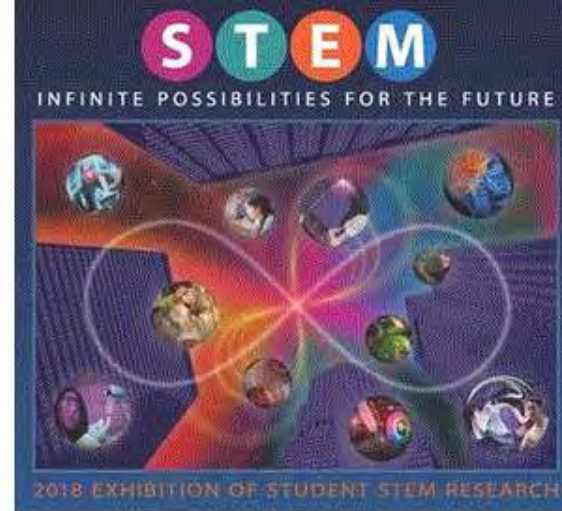


# Assistance for Students Advise-A-Student

This program is designed to assist students who have exhausted the help of teachers and parents. Upon receipt of an application demonstrating that the student has completed library research, the committee attempts to match the student with a research scientist who will provide expert help. The research scientist only offers suggestions on improving the project and should not be asked to provide equipment, laboratory space or funds.

Students will most likely communicate with the research scientist via phone calls or email. It is unlikely that face-to-face communication will occur.





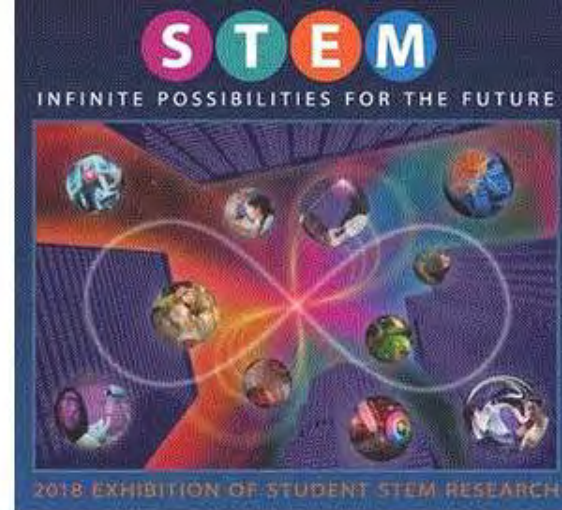
# Financial Assistance for Students

## Mini Research Grant Program

Awards a maximum of \$100 per semester or \$200 per year to help finance the research of students in Grades 7-12. All equipment and supplies become the property of the school when the project is completed.

All grants are evaluated on the basis of scientific merit, scientific approach, and potential for further development. See suggested submission dates listed in the Calendar of Events (at [cssf.org](http://cssf.org)).





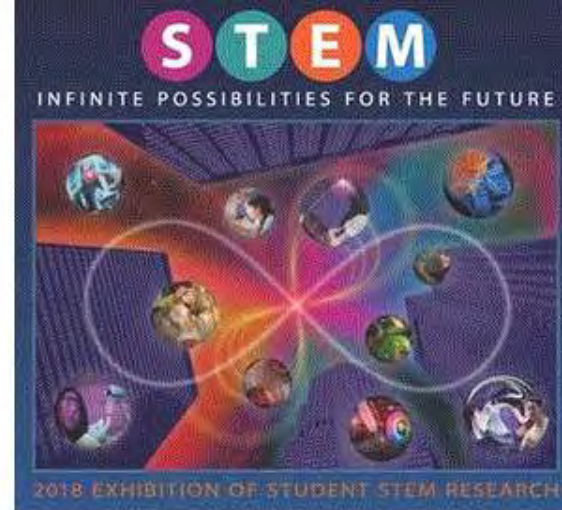
## Financial Assistance for Students

### Maxi Research Grant Program

Awards a maximum of \$500 to help finance the research of students in Grades 9-12. All equipment and supplies become the property of the school when the project is completed.

All grants are evaluated on the basis of scientific merit, scientific approach, and potential for further development. See suggested submission dates listed in the Calendar of Events (at [cssf.org](http://cssf.org)).





## Scholarships mean MORE MONEY!

Scholarships are awarded to graduating seniors based upon STEM Exhibition participation, not financial need. This past spring over \$80,000 was awarded in STEM Exhibition scholarships.

If you are a senior and have participated in a Regional Networks or Citywide STEM Exhibition you should apply.

The application deadline is **March 23, 2018**#

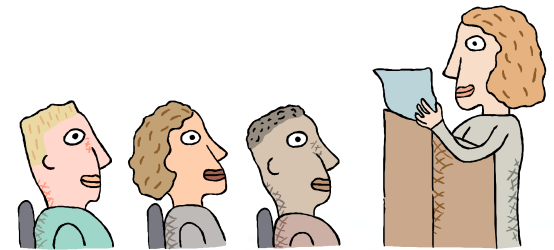
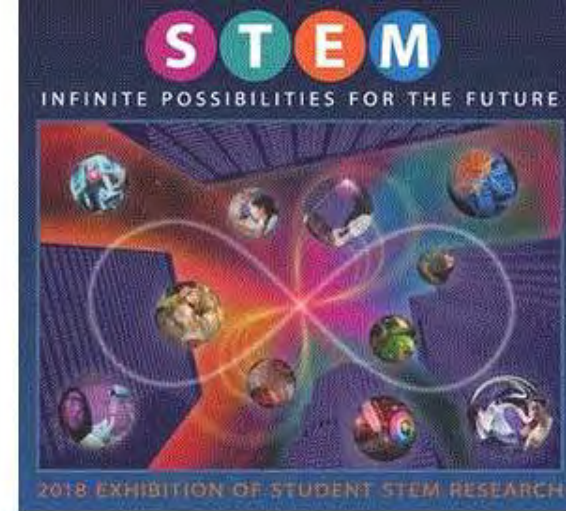






# Stem Exhibition Workshops

- Workshops conducted by university professors for students, parents, and teachers; also a workshop to help students with data analysis
- CPS SSF workshops for Credentials Checkers and Safety Inspectors
- Workshops for parents
- Student STEM Exhibitions PowerPoint available on our website and Youtube
- Workshops for new science teachers and for school STEM Exhibition coordinators



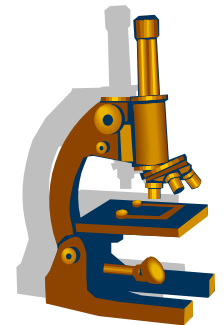
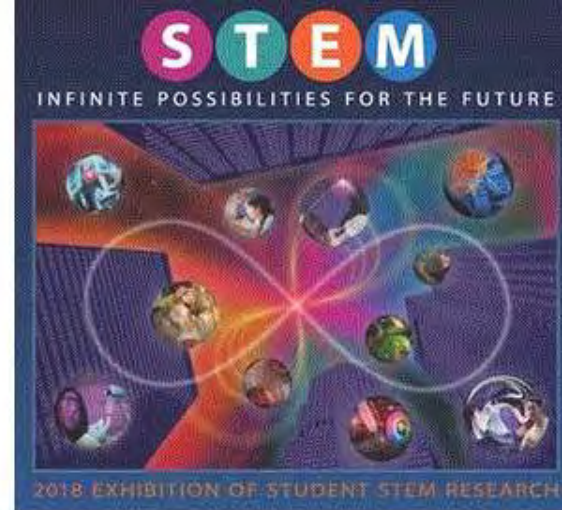


## Project Planning and Selection

- Encourage students to explore an interest, a fascination, an idea that raises a question that would be stimulating to answer.
- A list of STEM Exhibition (Science Fair) Websites is provided
- Guide students to proceed with a **scientific** or **design** project:
  - decide on a **purpose**, or **problem**;
  - research the topic;
  - **formulate a hypothesis** or **establish a design criterion**;
  - **design an experiment** or **create a preliminary design**;
  - **Conduct the experiment** or **build and test a prototype**;
  - Collect and analyze data;
  - draw conclusions and/or **redesign and retest**;
  - write a research summary with a reference list using APA format. (APA Resources are also provided)

*(See the flowchart handout or page iv at the beginning of the STEM Exhibition Handbook.)*

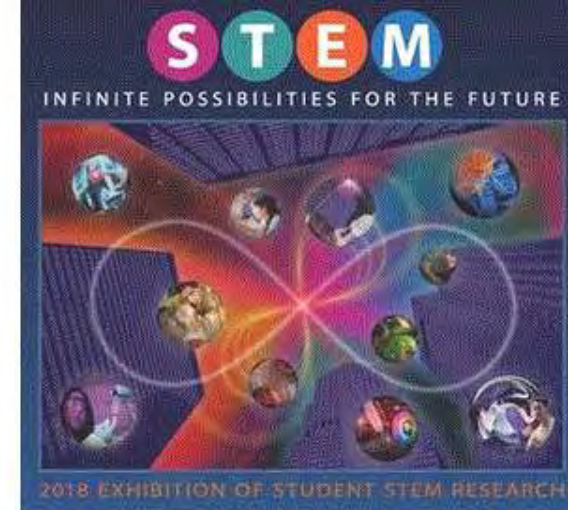
ALL students should be strongly encouraged to perform and present some type of scientific independent study project even if it does not result in a STEM Research project.

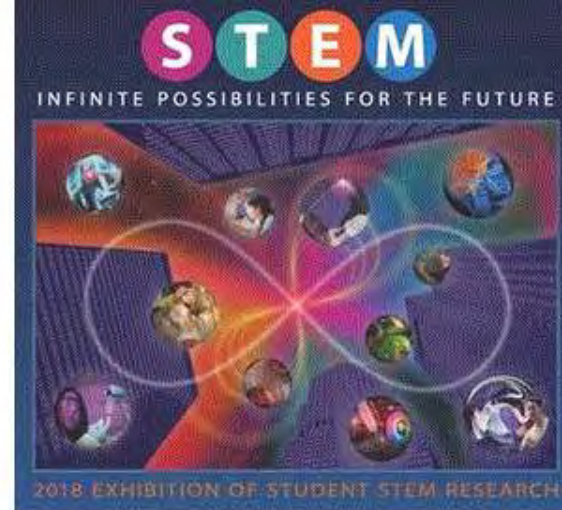




## Continuation of Projects

- Students who have participated in the STEM Exhibitions in the past may enter only the most recent year's research.
- This project year includes research conducted over a maximum of 12 months from April 2017 to March 2018.
- Any project in the same field of study from a previous year's project is considered a continuation unless the student clearly documents that there is additional research which is new and different from prior work (e.g. testing a new variable or new line of investigation, etc.).
- Repetitions of previous experimentation or increasing sample size are examples of an unacceptable continuation.





## Exhibit Design and Evaluation

- The maximum dimensions of the display board are 61 cm (24”) deep, 107 cm (40”) wide, and 152 cm (60”) high. **(NOTE NEW SIZE)**
- You can purchase three-sided display boards from: Showboard, Office Depot, Science Fair Supply, and the Education Depot.
- The title of the project may contain no more than 45 characters, including spaces.
- Abstract, safety sheet and endorsements (if needed) must be posted on the front of the display board.

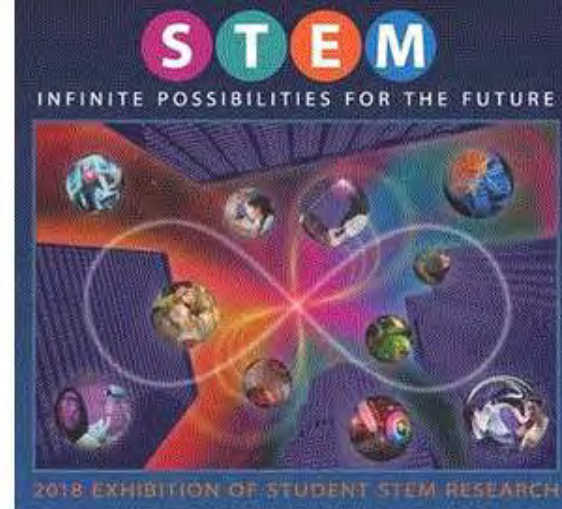




# Estimating Experimental Error

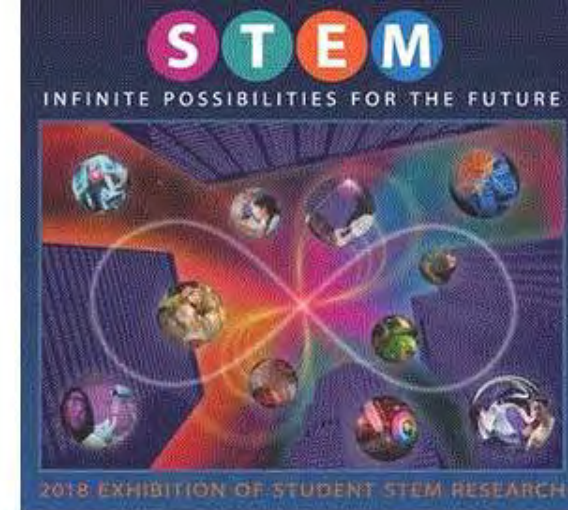
- Science is all about measurement.
- Science can be defined as a system for measuring the world around you and drawing conclusions from those measurements.
- It is a fundamental scientific truth that no measurement is ever 100% accurate.
- Since there is always some error, it is important for students to understand where measurement errors are likely to occur.
- Measurement errors may come from the person doing the experiment, from variables, or from unidentifiable random error.
- In order to draw valid conclusions from measurement data, a student must understand how measurement error affects those conclusions.

Why are my results wrong? I measured everything with this ruler!





## IJAS Essay Contest



### State Essay

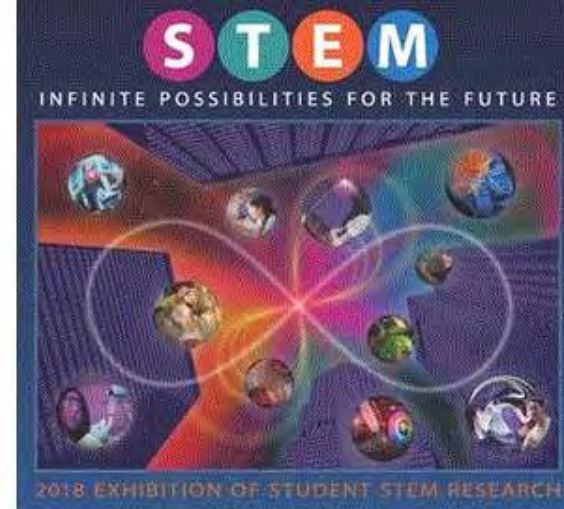
- **2018 IJAS Student Essay theme – Science is Universal**
- **Chicago Essay Contest For Students in Grades 7-12**
- Same topic as the IJAS Student Essay.
- The top essays will receive cash awards.
- The first place essay will represent CPSSSF, Inc. at IJAS in April.

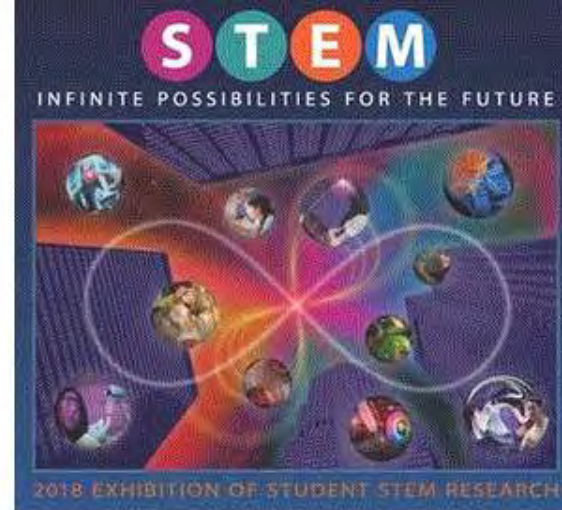
DUE DATE for all essays is **January 12, 2018#**



# IJAS Cover Design Contest

- The theme for the IJAS cover design is **Science is Universal**
- Students are to use an 8½” x 11” sheet of white paper and use only black ink. The design must include “Illinois Junior Academy of Science”. Keep the design simple.
- Entries are to be submitted to Luba Johnson by **December 15, 2017#**.
- The winning entry will be displayed at the State Science Exposition and the winning entry’s designer will receive a monetary award.



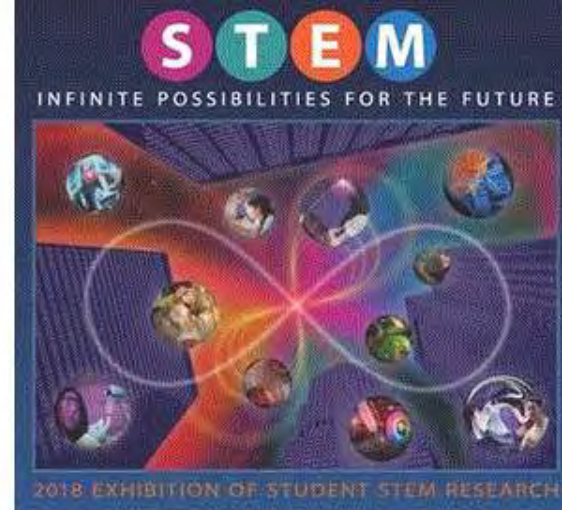


## Guidelines for Judging Exhibits

- Regional Networks and schools are encouraged to use or modify the Judging Rubric utilized at the City's Exhibition of Student Research.
- Refer to the guidelines described in the *2018 STEM Exhibition Handbook* (at [cssf.org](http://cssf.org)). It is recommended that you send a copy of the judging rubric to your judges before the exhibition.
- Sources of judges include: scientists working in local research institutions, university professors who teach science courses, scientists from private industry, students enrolled in high school AP science classes, family doctors and other medical professionals, students enrolled in college or university science classes, retired science teachers, and the Army Corp of Engineers.
- Ask parents and students to suggest the names of individuals working in science-related careers to serve as a school or regional network judge.

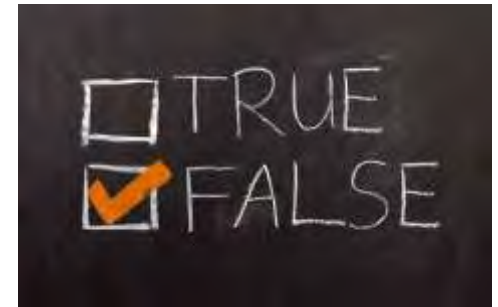






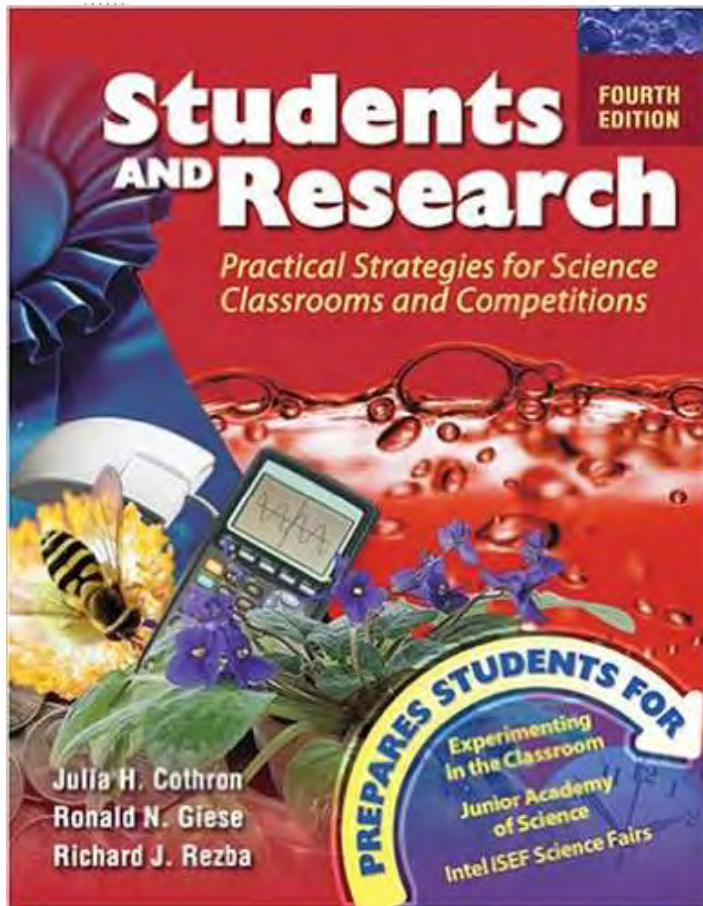
## Misconceptions About STEM Exhibitions

- STEM Exhibitions are only for nerds—those smart kids.
- Teachers have to set time aside to teach *STEM Research*.
- Doing STEM Research projects is only an extracurricular activity and is beyond the Illinois Learning Goals.
- STEM Research projects are short-term assignments done overnight or over the weekend.
- Models and demonstrations make good STEM Research projects.
- STEM Research projects are best done by parents, older siblings, good friends, or professional researchers.
- Data can be collected and analyzed by ‘professionals’ and presented as the project.





## Suggested Reference:

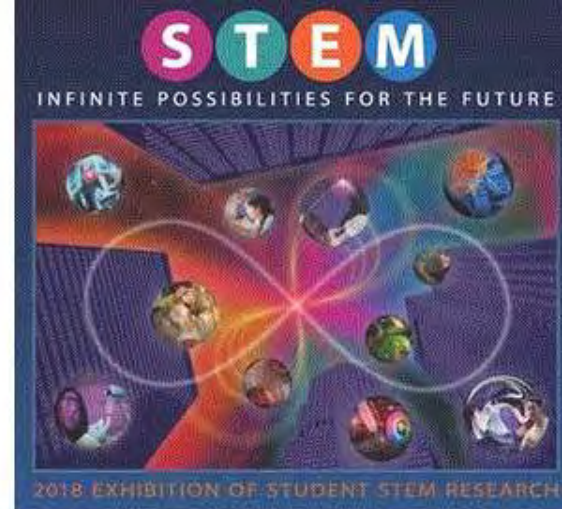


Cothron, Julia H., Giese, Ronald N., & Rezba, Richard J. (2006). *Students and Research: Practical Strategies for Science Classrooms and Competitions (4th ed.)*. Dubuque, IA: Kendall/Hunt Publishing Co.

ISBN: 978-0-7575-1916-1

Call 1-800-770-3544

E-mail: [orders@kendallhunt.com](mailto:orders@kendallhunt.com)



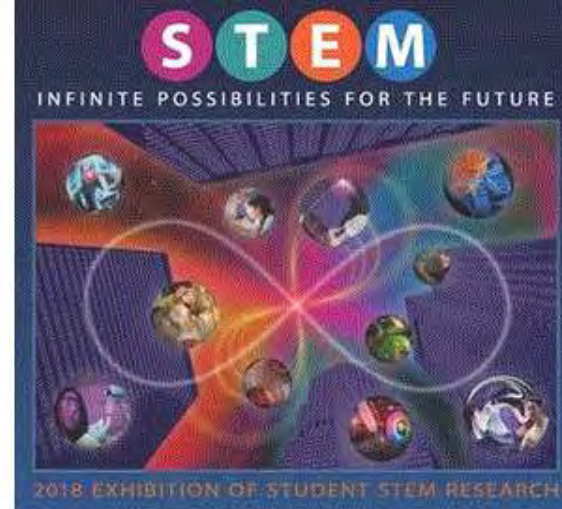


68th Annual Chicago Public Schools  
STEM Exhibition

# Safety Issues

**Pamela Sims**

**pamelacs@comcast.net**





## Safety is the watchword when developing a STEM research project.

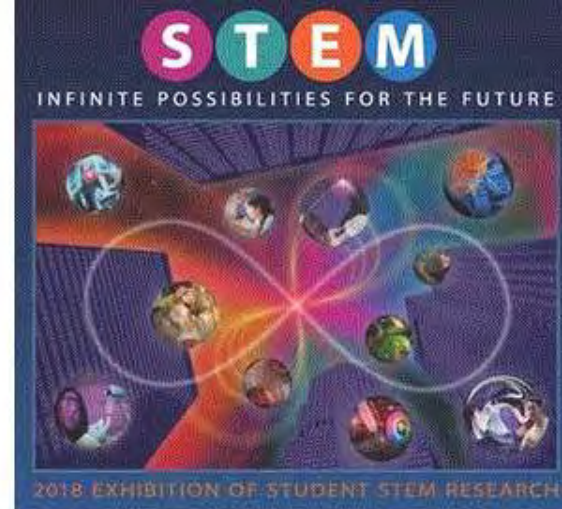
Safety concerns are divided into two major areas:

- Review **Safety Guidelines for Experimentation** with your students during the planning stage of their projects. (pp. 10-22 in the handbook at [cssf.org](http://cssf.org))
- Revisit the safety issue when your students start developing their presentation display by reviewing **Safety Guidelines for Project Display** (pp. 35-37) and **Rules and Regulations** (pg. 1) in the *STEM Exhibition Handbook* at [cssf.org](http://cssf.org).

For IJAS and/or ISEF information, visit the following websites:

IJAS Policy & Procedure Manual at: <http://www.ijas.org> pp. 14-18

<https://student.societyforscience.org/international-rules-pre-college-science-research>

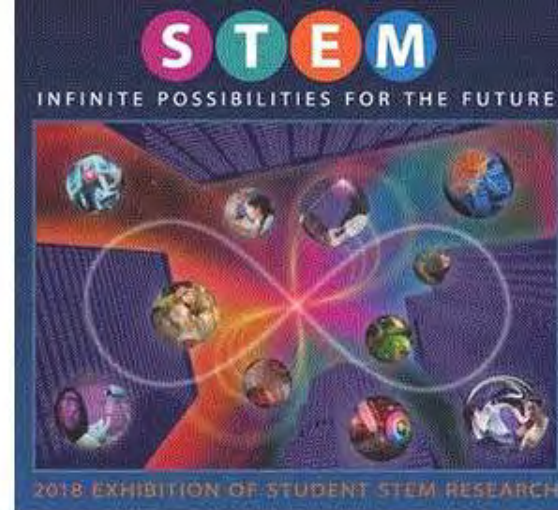




# ALL projects must have a signed Safety Sheet

There are no exceptions to this rule. No matter how safe a project might be, we still want to teach students that safety issues must be addressed. Discuss with students the “safe” choices they made while working on their projects.

**P.S. Don't say “None” when a safety inspector asks what safety precautions you took.**



**SAFETY SHEET**  
The Illinois Junior Academy of Science

**Directions:** The student is asked to read the introduction carefully, fill out the bottom of this sheet. The science teacher and/or advisor must sign in the indicated space. By signing this sheet, the sponsor assumes all responsibilities related to this project.

**Safety and the Student:** Experimentation or design may involve an element of risk or injury to the student, test subjects and to others. Recognition of such hazards and provision for adequate control measures are part of responsibilities of the student and the sponsor. Some of the more common risks encountered in research are those of electrical shock, infection from pathogenic organisms, uncontrolled reactions of combustible chemicals, eye injury from materials or procedures, and fire or explosion or work area. Controlling these hazards and others with suitable controls is an integral part of good science for research. In the sheet below, list the principal hazards associated with your project, if any, and what specific precautions you have used or will use. It is also to read the entire section in the Policy and Procedures Manual of the Illinois Junior Academy of Science entitled "Safety Guidelines for Experimentation" before completing this form.

Describe hazard.	Precautions taken to deal with such hazard.

Please check off any other possible endorsements needed. Include these documents in your paper and on your board.

- Illinois or Ohio Subjects - for any projects involving bioactive microbe
- Mitigation plan for any projects involving bacteria, viruses, yeasts, fungi or parasites
- Non-Hazardous Verbalization - for any projects involving fish, amphibians, reptiles, birds or mammals
- Tissue Culture for any projects involving growing eukaryotic tissues or cell cultures
- Recombinant DNA must be conducted in a registered research laboratory under professional supervision
- Use of Firearms - including all required documents
- Letter from institution where research was done or IJAS SRC if an exception to the IJAS rules has been granted.

**SIGNED** \_\_\_\_\_  
Student (Lastname)(s)

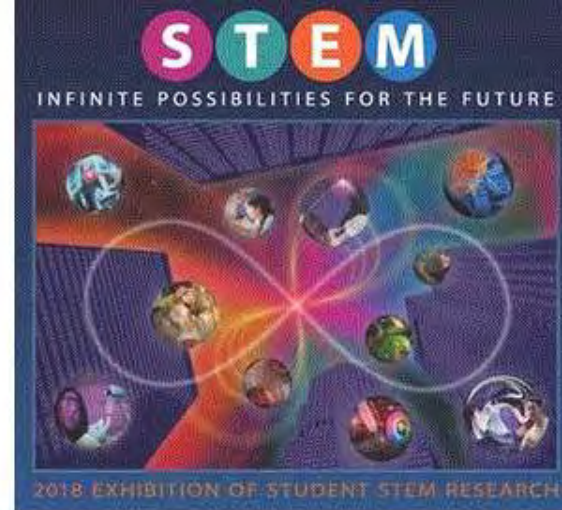
**SIGNED** \_\_\_\_\_  
Sponsor\*

\*As a sponsor, I assume all responsibilities related to this project. This sheet must be typed and this form must be displayed on the front of the exhibitor's display board. It may be reduced to half a sheet of paper, 8.5 inches (vertical) X 5.5 inches (horizontal), from a 10 1/2 inch x 14 inch.



## Research Labs

*Any student working in a research lab on a project which may exceed IJAS human and non-human vertebrate guidelines must notify the Illinois Junior Academy of Science at least two weeks prior to the state exhibition.*



### Regional Winners!

Mail a copy of this letter to:

Illinois Junior Academy of Science  
Scientific Review Committee  
PO Box 268958  
Chicago, IL 60626

This means anyone going on to the city exhibition must have on file a letter from their sponsor, on institution letterhead, stating that the student worked under supervision and followed all institutional guidelines regarding the ethical treatment of animals during research. This is IN ADDITION to the necessary endorsement forms.

**NOTE:** For projects conducted in a university, hospital or research laboratory under the supervision of a Doctor, Professor or Scientist, endorsement(s) and supporting documents are due **October 12, 2017#**.



# Humans as Test Subjects

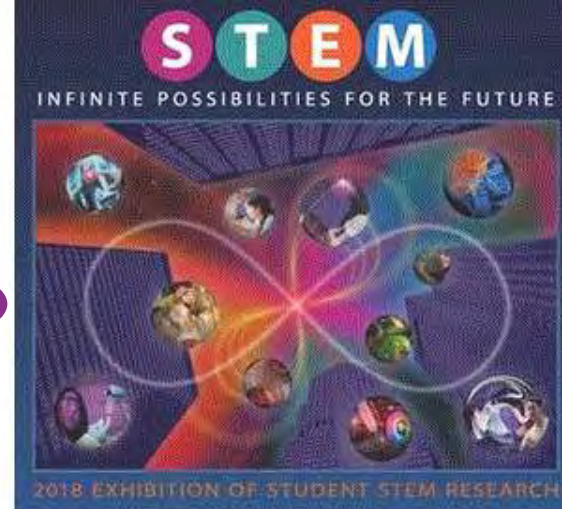
NEEDS  
SIGNATURES

All projects involving humans must have an approved Humans as Test Subjects Endorsement signed by the designated committee member (see the form for details (pp. 63-64)).

An Informed consent form must also be kept on file. (see pg. 65 of the handbook at [cssf.org](http://cssf.org)).

If the project involves exercise and its effect on pulse, respiration rate, blood pressure, and so on, a valid, normal physical examination along with documentation from authorized school personnel must be on file for each test subject.

**NOTE:** For projects conducted in a university, hospital or research laboratory under the supervision of a Doctor, Professor or Scientist, endorsement(s) and supporting documents are due **October 12, 2017#**. All other endorsements must be submitted in duplicate by **November 17, 2017#**.



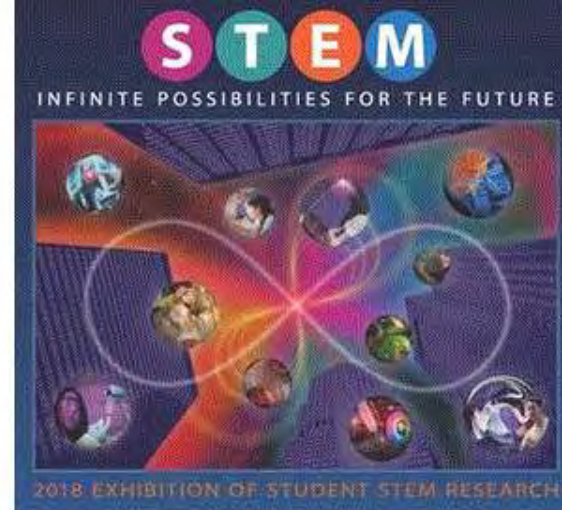


## Human or Vertebrate Animal Tissue Endorsement

All projects involving vertebrate animal tissue (human or non-human) must have an approved Tissue Endorsement signed by the designated committee member (see the form for details p. 71-72 at [cssf.org](http://cssf.org)).

NEEDS  
SIGNATURES

**NOTE:** For projects conducted in a university, hospital or research laboratory under the supervision of a Doctor, Professor or Scientist, endorsement(s) and supporting documents are due **October 12, 2017<sup>#</sup>**. All other endorsements must be submitted in duplicate by **November 17, 2017<sup>#</sup>**.



This endorsement  
no longer applies to  
processed animal products.

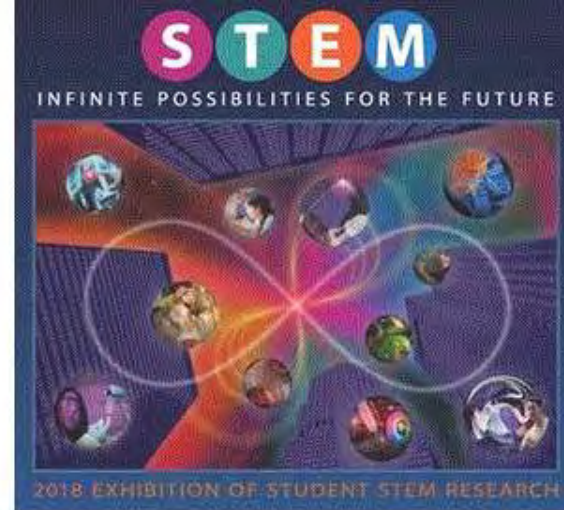
However, be sure your safety sheet  
addresses the prevention of  
microbial growth  
(during and after)  
experimentation.





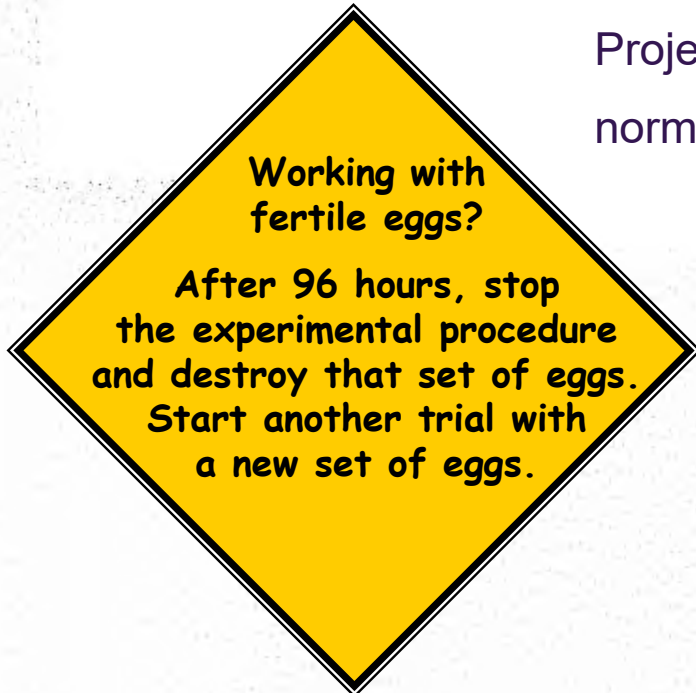
# Non-Human Vertebrate Endorsement

NEEDS  
SIGNATURES

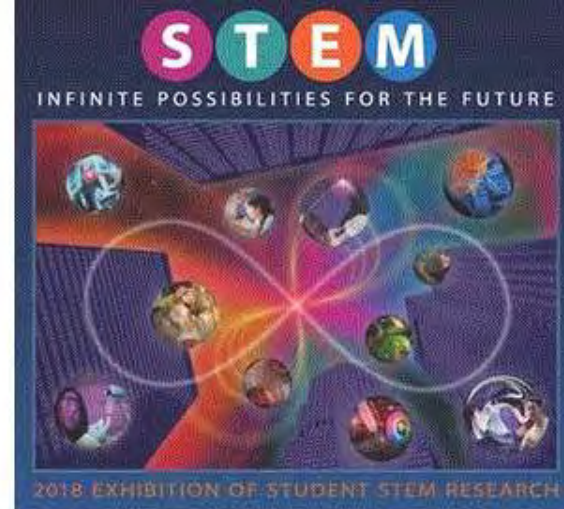


All projects involving live animals with bones must have an approved Non-Human Vertebrate Endorsement signed by both a licensed veterinarian **AND** the designated committee member (see the form for details pp. 67-68 (at [cssf.org](http://cssf.org))).

Projects involving changes in an animal's normal environment will **NOT** be approved.



**NOTE:** For projects conducted in a university, hospital or research laboratory under the supervision of a Doctor, Professor or Scientist, endorsement(s) and supporting documents are due **October 12, 2017#**. All other endorsements must be submitted in duplicate by **November 17, 2017#**.



## Microorganism Endorsement

NEEDS  
SIGNATURES

All projects involving microorganisms must have an approved Microorganism Endorsement signed by the designated committee member (see the form for details pp.69-70 at [cssf.org](http://cssf.org)).

No more  
'kitchen' cultures!!!

All microorganisms should be grown in Bio-safety level 1 laboratories (i.e. a school science lab).

Exceptions: Baker's  
Yeast

Don't even think about culturing micro-organisms from humans or other warm-blooded animals. These are strictly forbidden.

And don't grow anything outside a laboratory.

**NOTE:** For projects conducted in a university, hospital or research laboratory under the supervision of a Doctor, Professor or Scientist, endorsement(s) and supporting documents are due **October 12, 2017**. All other endorsements must be submitted in duplicate by **November 17, 2017**.

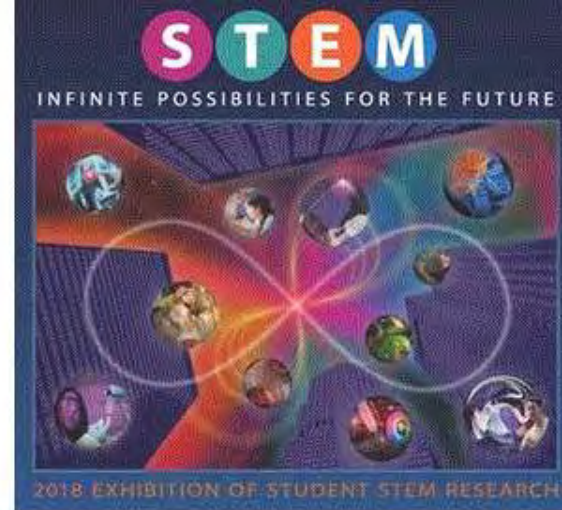
For more information go to  
[www.science-projects.com/safemicrobes.htm](http://www.science-projects.com/safemicrobes.htm)



# Recombinant DNA Endorsement

NEEDS  
SIGNATURES

All projects involving recombinant DNA technologies must have an approved DNA Endorsement signed by the designated committee member (see the form for details p.73-74 at [cssf.org](http://cssf.org)).



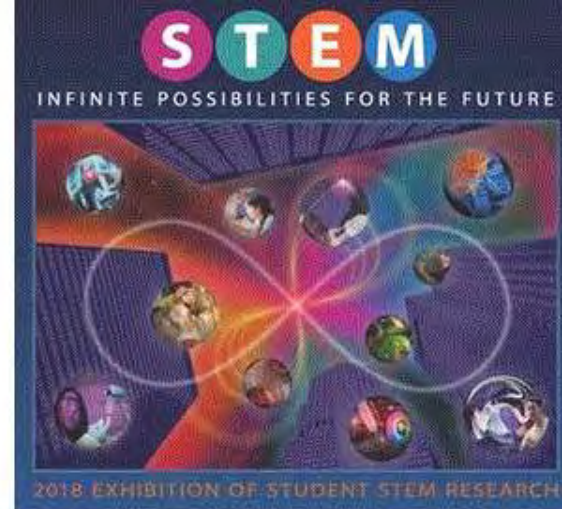
**NOTE:** For projects conducted in a university, hospital or research laboratory under the supervision of a Doctor, Professor or Scientist, endorsement(s) and supporting documents are due **October 12, 2017<sup>#</sup>** ; **All other endorsements must be submitted in duplicate by November 17, 2017<sup>#</sup>** ;



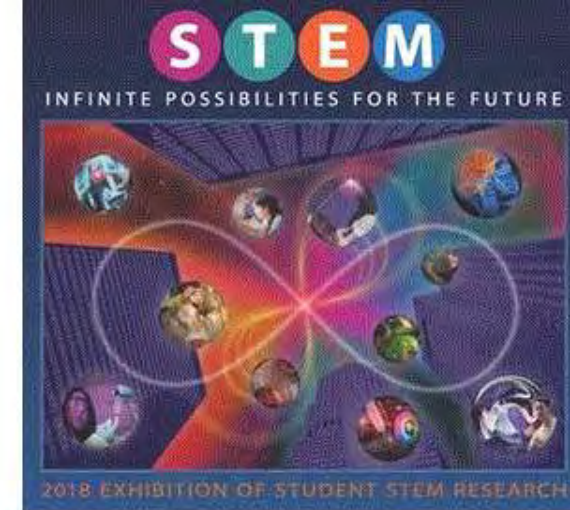
**Alcohol  
production?  
Be sure to  
check out  
the new ATF guidelines  
(pg.20 at [cssf.org](http://cssf.org))**

**Only teachers can apply for permits  
and the still has to be on school premises.**

**P.S. The application goes to  
IRS- just to be sure you're  
not supplementing your  
teacher's income.**



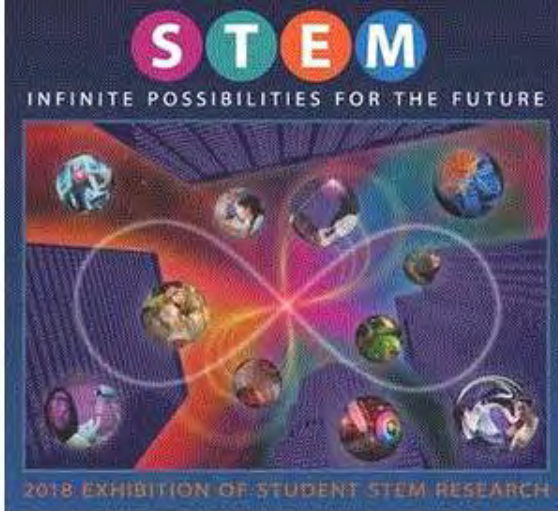
Students MUST obtain permission from the Scientific Review  
Committee BEFORE beginning their investigation.



# Lasers and Drones

Lasers and drones **MAY** be used in a STEM Research project provided ALL Federal, State, Local and STEM Exhibition laws, regulations and rules are obeyed and clearly addressed on the Safety Sheet **AND** in the Procedure section of the research paper. See pages 17-20 of the *STEM Exhibition Handbook*.



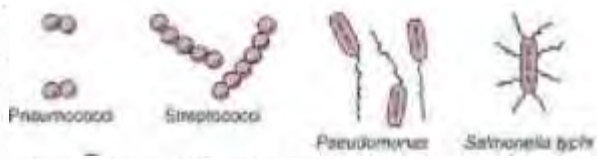


# ACHOOO !

Leave your mold at home.



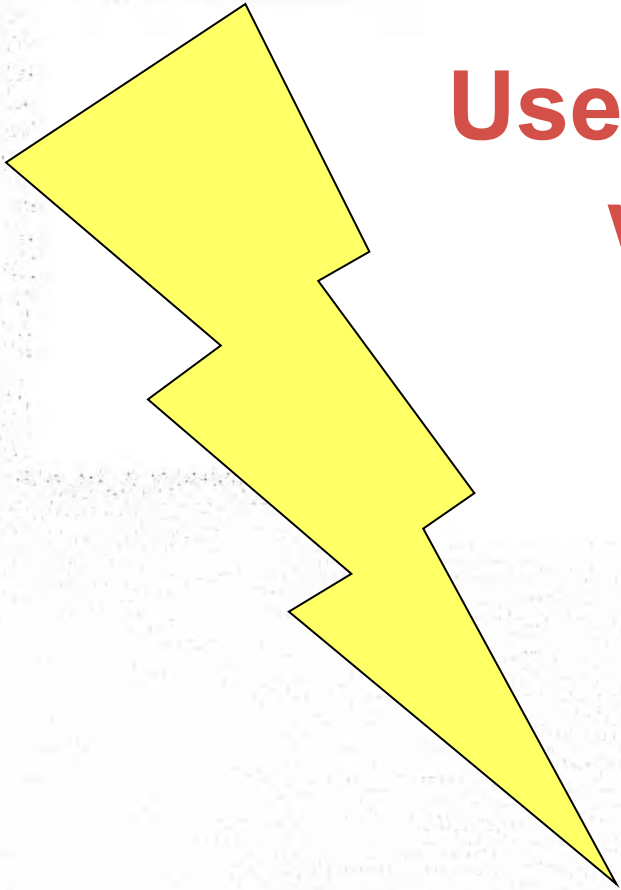
Speaking of humans, animals, plants and microorganisms; leave them all at home. You are not allowed to display any living things.



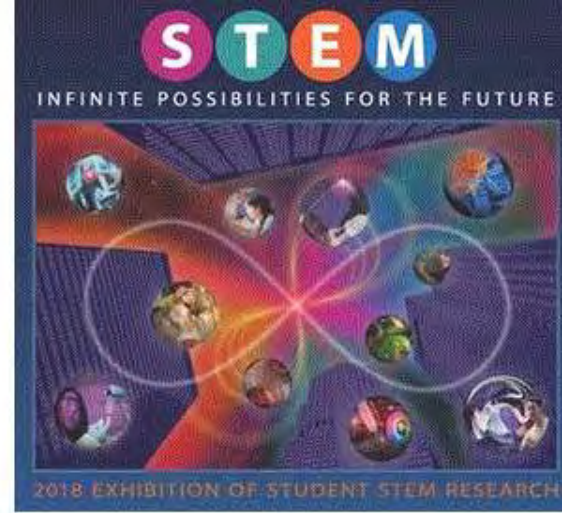


# Electrical Projects

**Use batteries  
whenever  
possible**

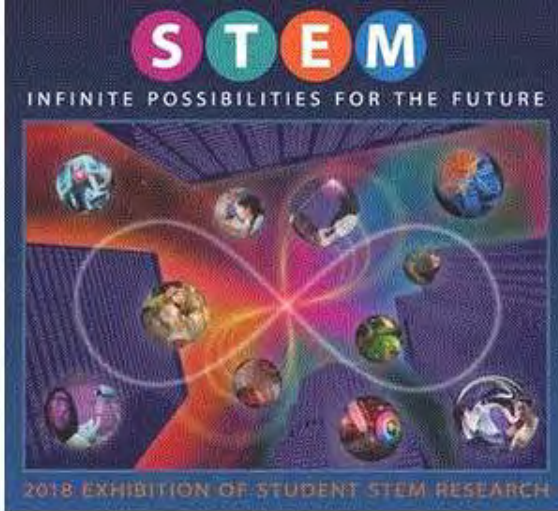
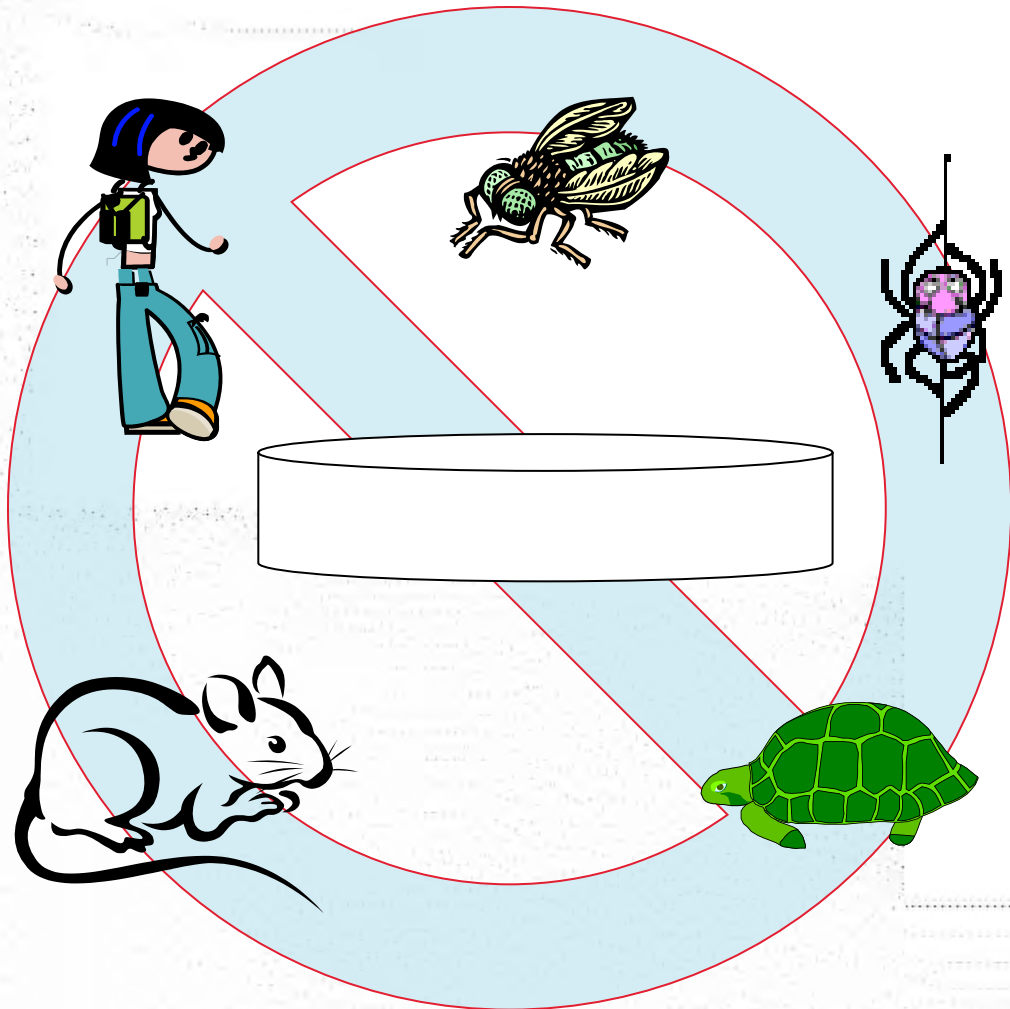


However, if you are going to use a laptop, be sure to have your battery pack charged. No electrical outlets for use of laptops.

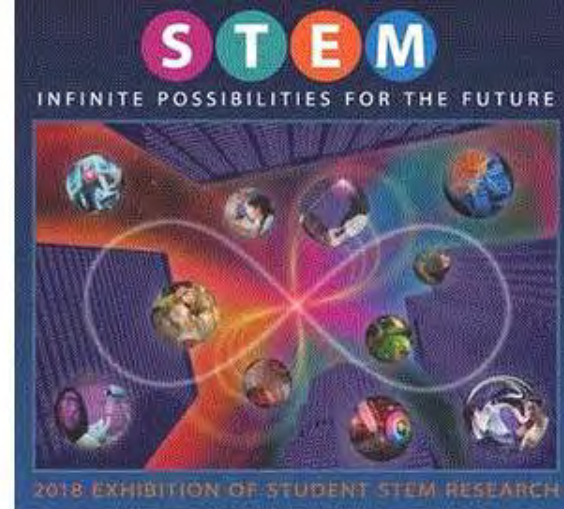




# DO NOT DISPLAY







# *Hazardous Materials*

*Can be used in experiments (if handled properly and safely) – but are **not** to be displayed at the exhibition.*

**NO** matches.

**NO** open flames.

**NO** electric heaters.

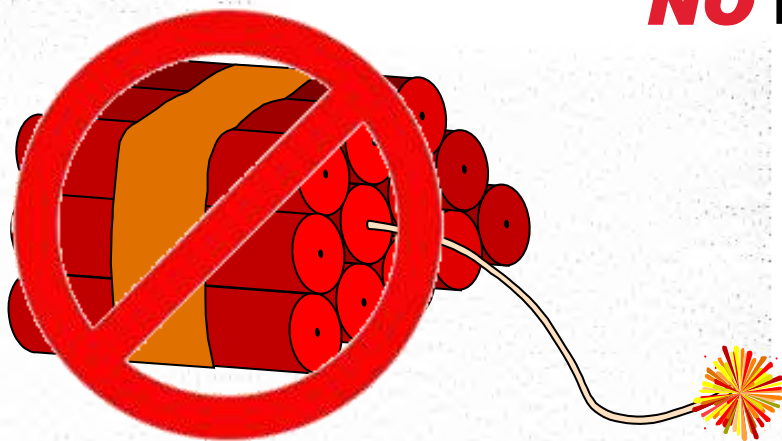
**NO** lasers

**NO** chemicals.

**NO** compressed gas cylinders.

**NO** radioactive materials.

**NO** firearms or explosives





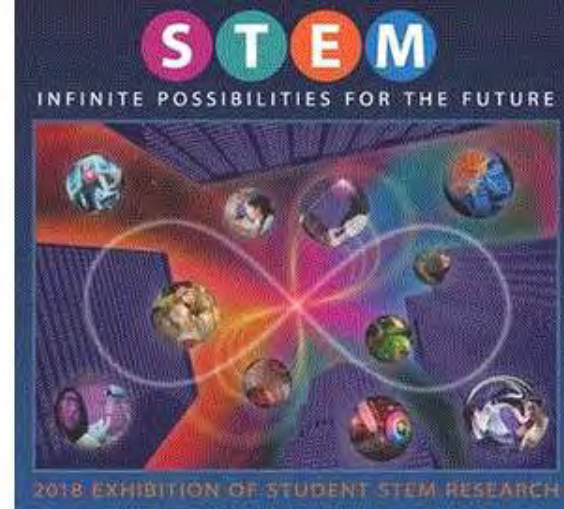
***Ordinary home chemicals and supplies can be used in experiments (if handled properly and safely) – but are not to be displayed at the exhibition.***

**NO** salt,  
**NO** sugar,  
**NO** water,  
**NO** food coloring,  
**NO** chemicals will be allowed on display.

**NO**  
**means**  
**NO**



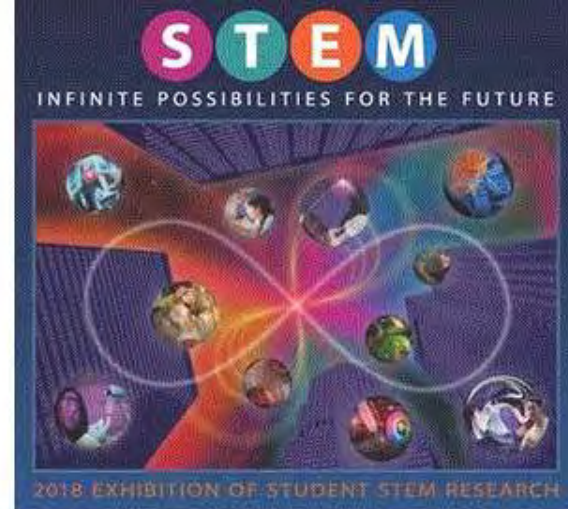
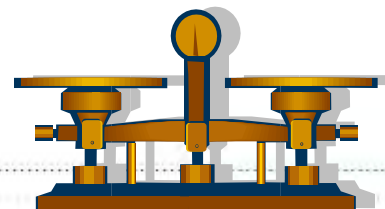
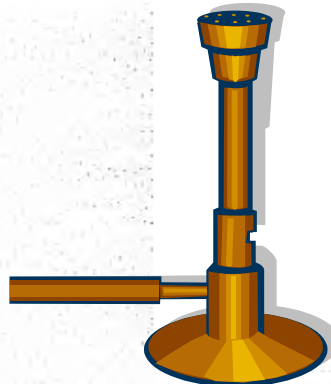
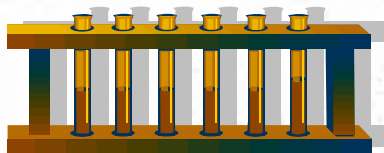
*Sealed, plastic containers are the only type allowed, but since you aren't displaying anything you don't need to bring them.*

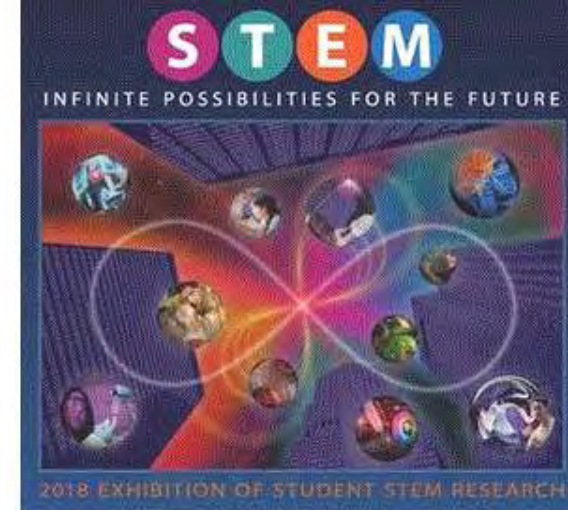




# Laboratory Apparatus

Judges know what beakers, graduated cylinders, balances, thermometers, etc. look like — leave them at school.





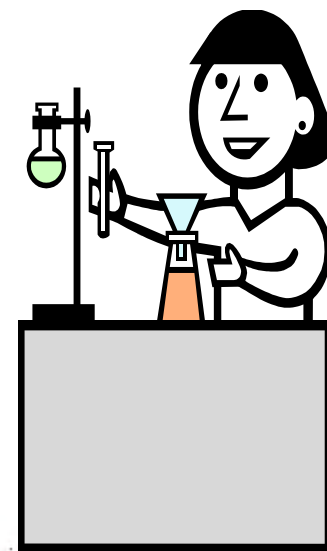
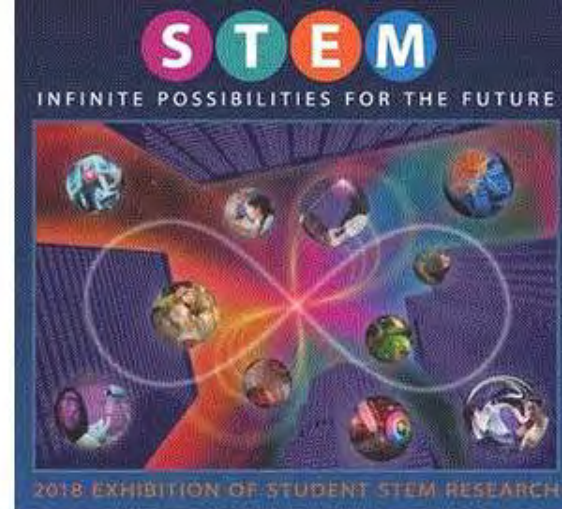
It is suggested that you have at least one photograph of you **doing** your experiment posted on your board or available at your display.

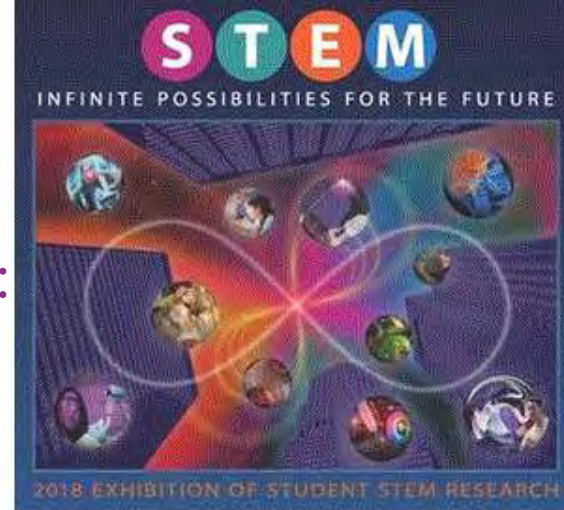


## Note to students:

**You have completed your project at home. You are not coming to the STEM Exhibition to do an experiment you are coming to communicate your Results and Conclusions with the judges. Unless you have a design project and the items are necessary to show your innovation, leave all your “stuff” at home; bring us your charts, graphs, pictures, drawings, explanations, and other information.**

**Remember, this is Tell - not *Show and Tell*.**





**Websites:**

**Chicago Public Schools Student Science Fair, Inc.:  
[www.cssf.org](http://www.cssf.org)**

**Illinois Junior Academy of Science:[www.ijas.org](http://www.ijas.org)**

**International Science and Engineering Fair:  
[student.societyforscience.org/intel-isef](http://student.societyforscience.org/intel-isef)**

**People you should know:**

Elizabeth Copper, Chairperson 2017/18 – [escopper@cps.edu](mailto:escopper@cps.edu)

Elizabeth Copper, Advise-A-Student – [escopper@cps.edu](mailto:escopper@cps.edu)

Jeannette Bartley, Scientific Review – [bartleyj84@yahoo.com](mailto:bartleyj84@yahoo.com)

Pamela Sims, Safety – [pamelacs@comcast.net](mailto:pamelacs@comcast.net)

Luba Johnson, Communications/Publications – [ljohnson131@cps.edu](mailto:ljohnson131@cps.edu)

Thank you for being here and participating.

Be good, be safe and, above all, have fun with

**Science, Technology, Engineering and Mathematics!**