

Western Upper Peninsula Science Fair

Thursday, April 12, 2018

Memorial Union Ballroom

Michigan Technological University, Houghton, MI

STUDENT PLANNING GUIDE

GRADES 4-8

"These materials were developed under a grant awarded by the Michigan STEM Partnership and Michigan Department of Education to the Western UP Center for Science, Math and Environmental Education"

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Sponsored by:

The Western UP Science Fair is sponsored by the Michigan Tech's Omega Chi Epsilon Chemical Engineering Honor Society, Carnegie Museum and the Western UP Center for Science, Mathematics and Environmental Education.

GENERAL RULES

PROJECTS MUST MEET ALL GENERAL RULES IN ORDER TO BE ELIGIBLE FOR ENTRY!

1. Students in 4th – 8th grades may submit a science fair project (display board and report) to communicate the findings of an investigation they conducted on any topic of interest.
2. Science fair projects are to be designed and carried out by the student entering the Western UP Science Fair. The project idea and its execution should belong to the student, although students should seek guidance from parents and teachers as they research and complete their projects.
3. Students may work individually on a project or in pairs. There will be separate competition categories for pairs and individuals in each grade level.
4. Students are responsible for transporting and setting up their projects on the day of the fair from 4:15 to 5:00pm EST on Thursday, April 12, 2018. Judging will start at 6:15 pm EST. Students will need to be available to explain their projects to the judges from 6:15 to 8:30pm EST. Only participating students, judges and volunteers are allowed in the judging area during the judging period (6:15-8:30pm). The science fair will be open to the public from 5:00-6:00pm, at which time parents and students can view all of the projects.
5. The number of projects that can enter the Western UP Science Fair will be limited to 200 on a first-come basis.
6. A completed Science Project Registration Form and a signed Parent Consent Form is required for each project. These forms are located in the back of this Student Guide. **BOTH COMPLETED FORMS MUST BE RECEIVED BY THE WESTERN UP CENTER OFFICE BY Friday, March 16, 2018 by 4:00pm. NO REGISTRATIONS WILL BE ACCEPTED AFTER THIS DATE.**
7. On the day of the science fair, each project will be assigned a number. The judges will refer to each project by number, so that the judges do not know the identity of the student.
8. Students should bring two copies of their written report to the science fair.
9. Projects should fit in a space enclosed by a standard size display board: 36” (height) by 48” (width). Standard size white display boards can be purchased from Western UP Center for \$2.00 each. To obtain a board, see classroom teacher or contact Loret Roberts at 482-0331 or loret@copperisd.org
10. No commercial kits and/or computer programs are allowed except in support of data of the project.
11. Safety first! Do not use any materials or techniques that harm you, others or the environment. No live vertebrate animals are allowed in your display.
12. Questions, please contact the Western U.P. Science Fair coordinator, Shawn Oppliger at 482-0331 or shawn@copperisd.org
13. Additional resources, student guides and registration forms can be found at <http://www.wupcenter.mtu.edu/> . Final results of the Western UP Science Fair will also be available at this website.

ENJOY DESIGNING YOUR OWN SCIENTIFIC INVESTIGATION!

PROJECT REQUIREMENTS

A science fair project is a presentation of an investigation conducted by the student using the scientific process. A science fair project submitted to the Western UP Science Fair must have two parts:

Part 1: The Display Unit

Part 2: The Science Fair Report

Part 1: The Display Unit

The display unit consists of three parts:

- 1. Display board:** This forms the background for the project. A standard-size display board is 36” (height) by 48” (width). It may be constructed or purchased (see #9, page 2). It is usually three-sided and sturdy enough to stand on its own for several days. Various parts of the written report, graphs, charts, photographs and other materials are attached to the display board.
- 2. Models, materials, devices and samples:** These should relate to the science fair project experiment and may be shown in front of the display unit. **Safety First!** These items should present no hazards to observers who may be viewing the display. No breakable or dangerous items should be included. Avoid using open containers of liquids or smelly items, as they may be a hazard to observers and neighboring displays.
- 3. Information from the written report:** This information should be on the display unit in form that is NEAT, CONCISE, and EASY TO READ manner. You should include the following:
 - **First name (only)** of student(s) and their grade
 - **Purpose:** The problem stated in the form of a question. (This is also the **title** of your project.)
 - **Hypothesis:** A prediction of how the investigation will turn out, worded in terms of the independent and dependent variables. The hypothesis is developed based on findings of the research on problem or question.
 - **Investigation & Materials List:** A summary of the procedure that was followed to conduct the investigation, including summary of materials used.
 - **Results:** The data collected, as part of the experiment, should be displayed in tables, charts, and/or graphs. Photographs, diagrams, and drawings that describe what was done and what was learned may be included.
 - **Conclusion:** A summary of the findings of the investigation, concerning whether the data and evidence supports the hypothesis.

Part 2: The Science Fair Report

It is important to follow the scientific process when you design your science fair project. The **scientific process** includes designing and conducting an investigation to explore a question. You will be gathering evidence to answer the question and then communicating your findings to others through your science fair report.

The following worksheets will help you with write each component of the written report. Make sure that your written report has all of the components below. Use the information from the completed worksheets to write your written report. The report should be a minimum of 4-6 pages long including the title page.

Title Page

Should include the question to investigate (Worksheet 1), first name and grade of the student(s) only.

Worksheet 1: The Question.

Ask a very specific question about the problem or phenomenon that you want to investigate. State your question in terms of independent and dependent variables.

Worksheet 2: Research and Bibliography.

Gather information from at least three scientific resources such as magazines, books or websites and write summary of what you found concerning the question. The bibliography should list all the resources you consulted in investigating the question. Items should be listed in alphabetical order in a standard format.

Worksheet 3: Hypothesis.

Based on the findings of your research, write an if-then statement (hypothesis) of how you think the investigation will turn out. In your hypothesis, you should predict how changing the independent variable would affect the dependent variable. There should be an explanation how your hypothesis is supported the background information that you gathered from reviewing scientific resources.

Worksheet 4: Design the Investigation

Design an investigation that looks at the effect of changing the independent variable on the dependent variable. It is important that only one independent variable be changed at a time and that only one dependent variable is measured at a time. Determine in what increment the independent variable will change and how to measure the result of the change on the dependent variable. The design of the investigation should include information about your control, materials used (including appropriate units and amounts), and a step-by-step list of steps. All parts should be clear enough for others to follow your investigation.

Worksheet 5: Data Table and Observations

Conduct the investigation. Record the data collected and what you observed during the investigation. Also, record any errors that may have occurred during the investigation.

Worksheet 6: Results

Analyze the data that you collected, looking for patterns to draw a conclusion based on the analysis of the data and evidence. The data gathered may not support the original hypothesis. This happens to scientists all the time and it is a normal part of the scientific process.

Worksheet 7: Conclusion

Write a summary of findings concerning whether the data and evidence supports the hypothesis or not. The conclusion represents what you actually learned by conducting the investigation.

Worksheet 8: Analysis of the Investigation.

Write a discussion of the errors in the investigation procedure and what improvements could be made. Include any discoveries that were not originally planned and what unanswered questions you have concerning the investigation.

**Look for the *Light Bulb!*
It will tell you when it is *Your*
Scientific Investigation!**



Turn to add more information to your

Worksheet 1: The Question

Explanation

Here you will formulate a very specific question about a problem or phenomenon you wish to investigate. Phenomena are things that happen in the real world that can be observed, such adding salt to the ice on the roads melts the ice. This question should be written in the terms of independent and dependent variables.

Helpful Definitions

Variables: Conditions of the investigation that are either kept the same or changed or are the measure of the change.

Independent Variable: The variable that is changed and tested in the investigation.

Dependent Variable: The measure of change caused by changing the independent variable.

Constants: Conditions of the investigation that are kept the same.

Example ~ The Question

Phenomenon: Recipes call for adding salt to cooking water, so pasta will cook faster.

Question: Will the amount of table salt affect the boiling point temperature of water?

Independent Variable: Amount of salt added to the solution

Dependent Variable: Boiling point temperature (°C) of solution

Constants: Amount and the purity of water; pot, thermometer and stove used in the experiment.

Your Turn

Problem or phenomenon you wish to investigate.

List some questions you have about the problem or phenomenon.

From the questions above, you will need to choose a question to investigate. This question should involve factors (variables) that can be easily measured using a number or a trait that can easily be identified such as

change in color. The question should allow you to design an investigation where you change one factor (independent variable) and you can measure the effect of changing that factor (dependent variable).

What question you would like to investigate?

What is the independent variable for your question? (The variable you will change)

What is the dependent variable for your question? (The measure of the change)

State the question in terms of the independent and dependent variables.

Worksheet 2: Research and Bibliography

I. Making a List

Start by thinking about your question. Make a list in the space below of everything that you know about your question. Also list things that you want to learn to help you in designing your investigation.



II. Locating Information

Find information about things in your list in scientific resources such as books, magazines, websites etc. Choose at least *three sources* to do your research. Write down the background information that will be helpful to develop the hypothesis and conduct the investigation. Make sure to write bibliography information (see standard format for bibliography).

1st Source Bibliography:

Background Information from 1st source:

Worksheet 2 (cont.)

2nd Source Bibliography:

Background Information from 2nd source:

3rd Source Bibliography:

Background Information from 3rd source:

Worksheet 2 (cont.)

III. Bringing the Information Together ~ First Draft

On a separate sheet of paper, compile the background information from each resource and rewrite in your own words your first copy of the Review of Literature. This is your first draft.

IV. Review of Literature ~ Final Draft

Have someone proofread your first draft for spelling, punctuation, grammar, etc. On a separate sheet of paper, rewrite your first draft to be part of the final written report.

Standard Format for Bibliography

Book:

Author's last name, author's first name. (Copyright date). Title of book (pages read). Place of publication: Publisher

Example: Martin, Jacqueline. (1998). Snowflake Bentley (p. 3-12). New York, N: Houghton-Mifflin Company

Magazine:

Author's last name, author's first name. (Date of publication). Title of article. Title of magazine, volume number, page numbers of article.

Example: Hembrock, Tony. (2003). Stay Out! Stay Alive!. Science Scope, v24, p. 30

Newspaper

Author's last name, author's first name. (Date of publication). Title of article. Name of newspaper, Page numbers of article.

Example: Buoniconti, Sergio. (2003, April 22). Superior Studies. The Daily Mining Gazette, p. 2A.

Encyclopedia

Title of article. Name of encyclopedia, volume number. Place of publication: publisher, year of publication, page number of article.

CD-ROM Encyclopedia

Name of program, version or release number, name of supplier, address of supplier.

Internet Source

Author's last name, author's first name. Title of document. Name of organization that posted the document, Date given on the document, Web site address.

Worksheet 3: Hypothesis

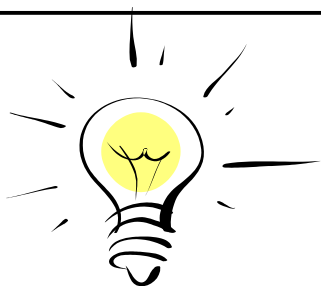
Explanation

Based on your research from worksheet 2, write an *if and then* statement of how changing the independent variable of your question will affect the dependent variable. Write a statement from your research to support your hypothesis.

Example ~ Hypothesis

Hypothesis: If the amount of salt added to water is increased, the boiling point temperature (°C) of the solution will increase. This is because the addition of salt lowers the vapor pressure of the solution requiring it to be heated to a higher temperature in order to come to a boil.

Your Turn



Write an *if and then* statement of how changing the independent variable of your question will affect the dependent variable. It should express what you believe the outcome of the experiment will be based on your research in step 2.

Write a *this is because* statement of evidence from your research in step 2 to support your hypothesis.

Worksheet 4: Design the Investigation

Explanation

When you design an investigation, you are writing a step-by-step list of what you will do to test the hypothesis. It should be written clearly and the steps should be clear so that someone else could take your paper and could perform the investigation.

I. Keep Your Variables Simple

- Make sure you are only using one independent and one dependent variable in your investigation. If you are changing more than one variable, you will not be able to know for sure which variable was causing the results you recorded. All other factors involved in the investigation should not change. The factors that do not change are your controlled variables.
- Determine in what increment you are going to change the independent variable.
- Determine how you are going to measure the change in the dependent variable.
- Make sure that appropriate units are used.

Example ~ Variables

Independent Variable	Amount of salt added to the solution will be increased by 1 Tablespoon
Dependent Variable	Boiling point temperature of solution will be measured in °C using a thermometer
Controlled Variables	Amount of water, pot and stove used in the experiment, use of distilled water each time and the thermometer used

Your Turn



In what increment will your independent variable change? Give units and the device to measure.

How will you measure the change in your dependent variable? Give units and the device to measure.

What are the controlled variables in your experiment?

Worksheet 4 (cont.)

II. Control

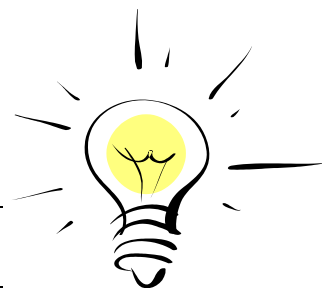
Each investigation needs a "control trial" for comparison so that you can see how changing the independent variable affects your results and observations. The control is a standard to test your experimental results against. The control trial will be set up exactly the same as all the other trials, but the trial is not treated with independent variable.

Example ~ Control Trial

The control trial is the measurement of the boiling point temperature in °C of the solution without any salt (independent variable) added to it. This solution should contain only water.

Your Turn

What will the control trial be for your experiment?



III. List of Materials

List all materials and equipment you will need for this investigation. Make sure to specify the amount of each material that you will need.

Example – List of Materials

- * Table Salt (1lb)
- * Distilled water (4 gallons)
- * Cooking pot (2 qt. size)
- * Measuring Cup (1 cup size)
- * Measuring Spoon (1T)
- * Celsius Thermometer (0-150 °C)
- * Stirring Spoon

Your Turn

Write out the materials list for your investigation.



Worksheet 4 (cont.)

IV. Step-by-Step Procedure

- Instructions should be written in clear, easy-to-follow steps.
- Describe in detail how the independent variable will be changed and how the dependent variable will be measured.
- A control trial will be conducted using the procedure but not treated with the independent variable. Conduct at least three trials of the control trial.
- At least 3 trials of the procedure should be performed for each change in the independent variable. You should use the same procedure for all trials.
- It is a good idea to have someone else read your procedure to be sure it is easy to follow!

Example ~ Procedure for the Investigation

Step 1: To measure the control, bring 4c of distilled water to a boil on the stove. Measure the temperature in °C of the boiling water. Record the highest temperature reading in the data table. Repeat this procedure two more time.

Step 2: Measure out 1T of table salt using the measuring spoon. Record the amount of salt with units in the data table.

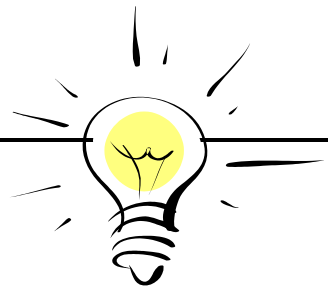
Step 3: Add the measured salt to 4c of distilled water, stir, and bring to a boil. Measure the temperature in °C of the boiling water. Record the highest temperature reading with units in the data table.

Step 4: Repeat the procedure twice more for Trial 2 and Trial 3.

Step 5: Repeat the entire procedure using 2T, 3T, and 4T of salt.

Your Turn

Write out the step-by-step procedure to describe how the independent variable is changed and how the dependent variable is measured. Make sure that it is clear and easy to understand. You may want to have someone else read it to be sure it is easy to follow



Worksheet 5: Data Table and Observations

Explanation

In this section, you will design a data table to help you to record the data you will measure in the investigation. You will also learn about making observations during your investigation. Collecting data and observations is very important. They will be valuable in helping you to draw a conclusion and locate any experimental errors. Below is a list of things to remember when conducting the experiment and collecting data and observations.

- Conduct at least 3 trials of your experimental procedure for the control trial and for each change in the independent variable.
- Record all measurements in data table.
- Use the same units when recording data.
- Use the same materials and procedure for each trial.
- Use the same measuring device to record the changes.
- Record all observations during the investigation, things that happen, problems encountered and errors made.

Example ~ Data Table and Observations

Data Table

Independent Variable Amt. of salt (T)	Dependent Variable Boiling Temperature (°C) of Solution			Average Temperature (°C)
	Trial 1	Trial 2	Trial 3	
0 T (Control)	100.0	100.5	99.8	100.1
1T	100.4	101.6	100.8	100.9
2T	101.8	101.7	102.0	101.8
3T	102.5	102.8	102.6	102.6
4T	103.8	103.5	103.7	103.6

Observations

When the salt was added to distilled water it took longer for the water to reach a boil compared to the control. The water with salt in it also boiled more vigorously than the control. If the bulb of the thermometer rested on the bottom of the pot, it read a higher temperature. Heat from the stove burner makes the thermometer read higher.

In trial 2, we spilled some of the 1T. of salt before adding it to the water.

Worksheet 5 (cont.)

Your Turn

Use the data sheet below to record your data. The calculation of the average will be done in Worksheet 6.

Data Table

Independent Variable	Dependant Variable			Average
	Trial 1	Trial 2	Trial 3	
Control				

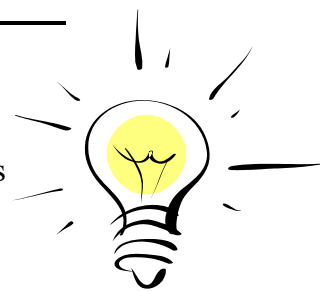
Record your observations in the space below while you are conducting the trials. Make sure to include any problems you have or mistakes you make.

Observations

Worksheet 6: Results

Explanation

After all of the data has been collected, it should be analyzed so that a pattern can be noticed and a conclusion formulated. Using your data and observations from Worksheet 5, complete the following:



I. Averages

Using your data from Worksheet 5, calculate the average value for each dependent value. Record the averages in your data table. Show your work below or on a separate piece of paper.

II. Calculations

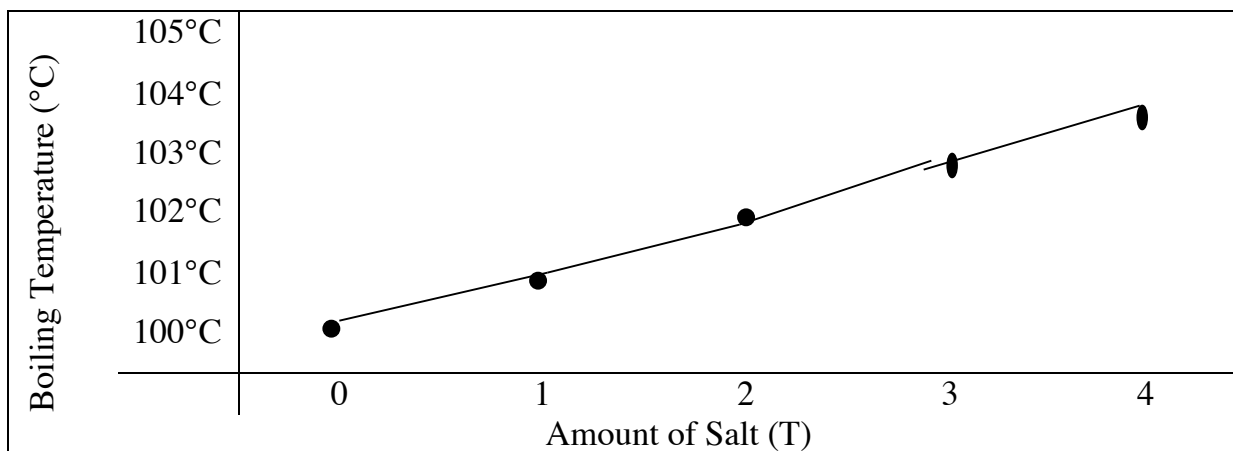
Perform any other mathematical calculations on your data using the average values that were calculated. Show your work on a separate piece of paper.

III. Graph

Design a graph(s) for your data on a separate sheet of graph paper. Remember to choose the correct type of graph to display your data! Some possibilities include: a bar graph, line graph, or pie graph. Make sure to label horizontal (x) axis and vertical (y) axis. Don't forget units and a title for your graph! Here is an example graph!

Example ~ Graph of Experimental Data

The Effect of Table Salt on the Boiling Temperature of Water



Worksheet 7: Developing a Conclusion

Explanation

Using your evidence gathered (data, graph(s), and observations) you will develop a conclusion on whether your evidence supports or does support your hypothesis. The conclusion should include statements of how the evidence supports or does not support the hypothesis. Statements made in the conclusion should refer to the evidence gathered from your investigation that supports those statements. The conclusion represents what you actually learned by conducting the investigation. It should include a statement describing the importance of the investigation.

Example ~ Conclusion

The data shows that the boiling point temperatures of the water increased as more salt was added. When no salt was added to the water it boiled at 100.1°C , while the addition of 1T of salt increased the boiling temperature to 100.9°C . Salt was added one tablespoon at a time and the boiling point temperature was measured until when 4T of salt was added, a boiling point temperature of 103.6°C was observed. The data collected in this experiment supports my hypothesis, "As the amount of table salt added to water increases, the boiling temperature of the water increases." I also observed that the water with salt added takes longer to reach a boil and boiled more vigorously than water without salt in it.

This experiment is important because it relates to why we add salt to water while cooking. Many recipes ask for salt to be added to water before bringing it to a boil so the water will boil at a higher temperature and the food will cook faster.

I am wondering if adding salt to water will affect the freezing point also. I know that salt is used in the winter on the roads to melt ice. It would be interesting to see how the amount of salt affects the freezing point. This could be useful to know the minimum amount of salt needed to make sure ice does not form on the roads at a particular temperature.

Worksheet 8: Analysis of the Investigation

Explanation

Scientists critically analyze their investigations to further their exploration of the phenomenon. They look at errors in the procedure, observations they made and consult additional scientific resources to improve their investigation. During and after the investigation, they record questions that come up and design further investigations to explore the phenomenon.

Example~ Analysis

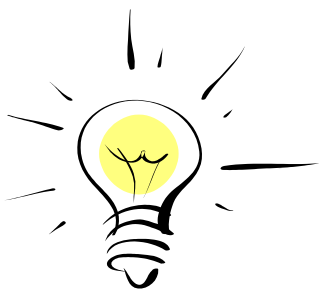
There were some problems with my experiment. The temperature readings were hard to make because of the heat from the burner. I had to wear gloves to keep my hands from getting too hot. If I rested the thermometer on the bottom of the pan, the temperature reading was higher than the rest of the water. This was due to the heat from burner of the stove. Next time, I would add a step to my procedure that explains how to take the temperature correctly. I would recommend holding the thermometer in the middle of the water so it is not resting on the bottom of the pan.

I would like to run the experiment again using smaller increments of salt each time. For example, I would measure the salt in grams and increase the amount of salt by 5 grams each time. I believe that this would give me a better idea of what is happening to boiling point as the result of the amount of salt in the water.

During the experiment, I was wondering why they put salt on icy roads. Further research using the article:

John Margrave. "Why do we put salt on icy sidewalks in the winter?" Scientific American. December 26, 2005. <http://www.scientificamerican.com/article/why-do-we-put-salt-on-icy/>

I found that salt also affects the freezing point of water. I would like to design a similar investigation to see how the concentration of salt affects the freezing point of water



1. What problems did you encounter? What mistakes did you make?

2. How would you improve your investigation?

3. As the result of the investigation, what other questions would you like to explore?

4. On a separate sheet of paper, re-write your analysis in paragraph form. Look at the example if you need help. After you are finished with your first draft, have someone else read it and help you proofread it.

WESTERN UPPER PENINSULA SCIENCE FAIR and FESTIVAL

Thursday, April 12, 2018

Memorial Union Ballroom, Michigan Technological University, Houghton

SCHEDULE (All times are EDT)

Time (EDT)	Event
4:15-5:00pm	Set up projects in the ballroom Each project will be given a project number. Students will set up their projects in the ballroom on the table that corresponds with your project number. Student nametags will be at your designated area indicated by your project number in the ballroom.
5:00-6:00pm	Science fair open to the public
6:00-6:15	Preview period of projects by the judges
6:15-8:30pm	Judging of Projects – Interview Period One: 6:15-7:15 and Interview Period Two 7:30-8:30 <ul style="list-style-type: none">• Each student will be assigned an interview time, this will be noted on the project tag and the student's nametag. All students must be available next to their projects during their interview time to answer questions by two judges.• All students must wear their nametag during the judging period.• Students should not leave the judging area during your interview time.• Students should have two copies of their written report (one for each judge)• Only participants, volunteers and judges will be allowed in the ballroom from 6:00-8:30pm. Parents will not be allowed in the judging area after 6:00pm.• No food in the judging area.
7:15-7:30	Students schedule for the first interview period remove projects from the ballroom.
4:30-7:30pm	Science and Engineering Festival: Exciting activities are located in the Memorial Union Commons Area on the ground floor for all participants and family members.
8:30-8:45pm	Students schedule for the second interview period remove projects from the ballroom.

Confirmation Letters: Each registered student will receive a confirmation letter by Thursday, April 5, 2018. These letters will be sent to their classroom teacher for distribution to participants. This letter will have the student's project number and interview time. Please contact Loret Roberts at loret@copperisd.org or 906-482-0331, if you did not receive a confirmation letter.

DISPLAY OF PROJECTS AT THE CARNEGIE MUSEUM

Students who received Bronze, Silver or Gold rating at Western UP Science Fair have the opportunity to display their projects at the Carnegie Museum in Houghton, MI from April 26- May 12, 2018. Details will be sent to these students immediately after the fair.

JUDGING OF PROJECTS

- On the day of the fair, each project will be assigned a number. The judges will refer to each project by number, so that the judges do not know the identity of the student(s).
- Two judges will score each project independently of each other. Judges will be volunteers from Michigan Technological University and other educators from the community.
- The judges will determine whether the project meets all the requirements listed in the Student Planning Guide.
- Each student *should be available next to his or her project* during his or her scheduled interview time. The student's interview with each judge will be part of the total score for their project. Projects will receive a composite score from the two judges.
- Parents should pick up their children when the judging period is over. (See schedule on p.21)

AWARDS

Awards will be given to students who receive 80% of the points on their score sheet. Student will receive a rating indicating their project's success.

- Bronze- 80 to 86% of points
- Silver- 87 to 93% of points
- Gold- 94 to 100% of points

This system will give students more feedback as to their success of accomplishing the criteria on score sheet. The criteria on the score sheet can be found on the project checklist on p. 24-25.

Award will be distributed to schools by Thursday, April 19, 2018 for distribution to students.

WHAT THE JUDGES WILL BE LOOKING FOR

Scientific Thought

- Does the project meet all the requirements given in the Student Planning Guide?
- Does the project have a title, question to be investigated and hypothesis clearly stated?
- Does the project represent sincere study and effort?
- Does the project form conclusions based on the data or information gathered?
- Does the project show that the student is familiar with the topic?

Is the investigation designed to test the stated hypothesis?

- Does the project illustrate controlled experimentation?

Originality

- Does the project demonstrate ideas arrived at by the student?
- Does the project show a high degree of accomplishment? Is the degree of accomplishment consistent with the student's age level?
- Is the project primarily the work of the student?

Thoroughness

- Does the project tell a complete story?
- Are all the parts of the project well done, including the visual display and the interview with the judges?

Technical Skill and Neatness

- Does the project show effort and creativity by the student?
- Are the display unit and written report clear, neat and easy to read?

2018 WESTERN UP SCIENCE FAIR CHECKLIST

~ Grades 4-8 ~

WRITTEN REPORT

- ___ Is there a title page that includes the question, first name of student(s) and grade only.
- ___ Is the independent variable correctly stated and relate to the phenomenon?
- ___ Is the dependent variable correctly stated and measure the change of the independent variable?
- ___ Are the controlled variables defined and relate to the phenomenon?
- ___ Is the problem written in the form of question using the independent and dependent variables?
- ___ Is the hypothesis written as an *if-then statement* using the independent and dependent variables?
- ___ Does the hypothesis include a *this is because* statement from the research that supports the hypothesis?
- ___ Does the background research relate to the question and hypothesis?
- ___ Does the research represent a diversity of sources, at least 3 sources cited in a bibliography using the standard format?
- ___ Are all the materials used in the investigation listed clearly?
- ___ Are specific amounts of each material given with appropriate units in the procedure of investigation?
- ___ Are the steps in the procedure of the investigation listed in logical order and easy to follow?
- ___ Was a control trial used in the investigation?
- ___ Is the investigation designed to test the hypothesis?
- ___ Were three trials of the procedure conducted for each change in the independent variable?
- ___ Were the observations and data recorded with appropriate units in a clear and concise manner?
- ___ Are graphs, charts or pictures used to present the evidence gathered (data and observations)?
- ___ Does the conclusion address the hypothesis and is it supported by the evidence gathered?
- ___ Does the conclusion address what was learned by conducting the investigation and a statement describing the importance of the investigation
- ___ Are experimental errors, problems encountered and areas of improvement in the procedure addressed in the analysis?
- ___ Is there a discussion of questions that came up during the investigation and what further investigations would like to be done to address those questions
- ___ Overall, is the written report clear, neat and easy to read?

DISPLAY (includes the exhibit materials)

- _____ Is the question neat and easy to read?
- _____ Is the hypothesis neat and easy to read?
- _____ Is the procedure and materials summarized and easy to read?
- _____ Are the results and conclusions clearly stated and easy to read?
- _____ Are there photographs, charts, graphs or drawings that support the information in the project?
Are they neat and attractive?
- _____ Does the display show original and creative work of the student?
- _____ Is the display of the project clear and logical?

STUDENT INTERVIEW

- _____ Can the student explain why he/she chose the topic or phenomenon to research and did the student gain new knowledge from the project?
- _____ Can the student describe how he/she formulated the hypothesis from the research of the question?
- _____ Can the student explained why he/she chose the procedure to test the hypothesis?
- _____ Can the student explain why he/she chose the particular graphs, pictures, etc. in their report to represent the evidence gathered?
- _____ Can the student explain how he/she formulated the conclusion?
- _____ Can the student explain what he learned from the investigation and why it is important.
- _____ Does the student see where improvements or changes can be made?
- _____ Can the student share questions that came up during investigation?

WESTERN UPPER PENINSULA SCIENCE FAIR

Thursday, April 12, 2018

Memorial Union Ballroom at Michigan Technological University, Houghton, MI

~ GROUP PROJECT REGISTRATION FORM ~

Deadline- Friday, March 16, 2018 at 4:00pm

- **SUBMIT ONE FORM PER GROUP PROJECT ONLY!**
- **Give the name, complete home mailing address, and phone number for both students.**
- **A signed parent/guardian consent form is needed for each student.**
- **Questions, contact Loret Roberts at 906-482-0331 or loret@copperisd.org.**

Students Information (please print clearly)

Student 1. Full Name _____

Home Mailing Address _____

City _____ MI Zip _____

Phone Number _____ Email _____

Student 2. Full Name _____

Home Mailing Address _____

City _____ MI Zip _____

Phone Number _____ Email _____

School Information

School _____ Grade _____

Teacher's name _____

**Completed registration and parent/guardian consent forms must be received by
Friday, March 16, 2018 by 4:00pm. Send to:**

Loret Roberts, Western UP Center for Science, Mathematics and Environmental Education
809 Hecla St., Hancock, MI 49930 Fax- 906-487-9348

WESTERN UPPER PENINSULA SCIENCE FAIR

Thursday, April 12, 2018
Memorial Union Ballroom at Michigan Technological University, Houghton, MI

~ GROUP PROJECT PARENT/GUARDIAN CONSENT FORM ~ **Deadline- Friday, March 16, 2018 by 4:00pm**

I give my consent for _____ to participate in the Western UP Science Fair on Thursday, April 12, 2018 at Michigan Technological University. I will make sure that their science fair project will be transported to MTU Memorial Union Ballroom on the day of the fair for set up between 4:15 and 5:00pm EST. I will pick up my child and their project from the MTU Memorial Union Ballroom after their assigned judging period is complete. My child will follow all of the general rules in the Student Planning Guide.

I understand that only participating students, judges and volunteers are allowed in the judging area from 6:00-8:30pm. The science fair will open to the public from 5:00-6:00pm.

Additional resources, student guides and registration forms can be found at www.wupcenter.mtu.edu. Final results and pictures of the Western UP Science Fair will also be available at this website.

[A signed parent/guardian form is required for each student](#)

Parent/guardian name _____

Parent/guardian signature _____ Date _____

**Completed registration and parent/guardian consent forms must be received by
Friday, March 16, 2018 by 4:00pm, Send to:**

Loret Roberts, Western UP Center for Science, Mathematics and Environmental Education
809 Hecla St., Hancock, MI 49930 Fax- 906-487-9348

WESTERN UPPER PENINSULA SCIENCE FAIR

Thursday, April 12, 2018

~ INDIVIDUAL PROJECT REGISTRATION FORM ~

Deadline- Friday, March 16, 2018 by 4:00pm

- **SUBMIT ONE FORM PER PROJECT ONLY!**
- **Give the name, complete home mailing address and phone number**
- **A parent signature is needed on the bottom of this form.**
- **Questions, contact Loret Roberts at 906-482-0331 or loret@copperisd.org.**

Students Information (please print clearly)

Student Full Name _____

Home Mailing Address _____

City _____ MI _____ Zip _____

Phone Number _____ Email _____

School Information

School _____ Grade _____

Teacher's name _____

Parent/Guardian Consent

I give my consent for _____ to participate in the Western UP Science Fair on Thursday, April 12, 2018 at Michigan Technological University. I will make sure that their science fair project will be transported to MTU Memorial Union Ballroom on the day of the fair for set up between 4:15 -5:00pm EST. I will pick up my child and their project from the MTU Memorial Union Ballroom after their judging period is complete. My child will follow all of the general rules in the Student Planning Guide.

I understand that only participating students, judges and volunteers are allowed in the judging area from 6:00to 8:30pm. The science fair will be open to the public from 5:00-6:00pm.

A parent/guardian signature is required on this form.

Parent/guardian name _____

Parent/guardian signature _____ Date _____

Completed **registration and parent/guardian consent forms must be received by Friday, March 16, 2018 by 4:00pm. Send to:**

Loret Roberts, Western UP Center for Science, Mathematics and Environmental Education
809 Hecla St., Hancock, MI 49930 Fax- 906-487-9348