Harney County Rural School Science Competition 2018

Science Inquiry Project Entry Form & Scoring Guide Cover Sheet

Entry Level: Individual____ Team_____

Science Area: Life____ Physical____ Earth____

Project Title:_____

Student Name_____ Grade_____

Student Name_____ Grade_____

Student Name_____ Grade_____

(For team entry, please list each student's name above. For individual entries, please list just the individual's name once.)

School_____ or

Home School Provider_____

Schedule for Science Competition and Science Discovery Day
March 7, 2018, at Crane Elementary School & Elementary Gym

8:00-9:30-Setup: Students participating in the Science Competition will set up their projects in the Gymnasium to be ready for viewing.

9:30-9:45- Group session in Multi Purpose Room conducted by Keynote presenter for students. Judges will walk through student projects in Gymnasium.

9:50-10:30

First session of project presentations to judges: exhibition presenters K-2 will be pulled out of activity session in Classroom 2 in small groups to make presentations to judges. Concurrently, 40 min Science Discovery sessions for Grades 3-5 & 6-8.

Classroom 1: Grade K-2: Going Batty by OMSI. Project presentations to judges, kids will be pulled out in small groups (40 min).

Classroom 2: Grade 3-5: Jolts, Volts & Wires by OMSI (40 min)

Classroom 3: Grade 6-8: Microscopic Zoo by OMSI (40 min)

10:35-11:15

Second session of project presentations to judges: exhibition presenters 3-5 will be pulled out of activity session in Classroom 1 in small groups to make presentations to judges. Concurrently, 40 min Science Discovery sessions for Grades K-2 & 6-8.

Classroom 3: Grade 3-5: Rollercoaster Madness (40 min). Project presentations to judges, kids will be pulled out in small groups. (40 min)

Classroom 4: Grade 6-8: Jolts, Volts & Wires by OMSI (40 min)

Classroom 1: Grade K-2: Kiddie Chemistry by OMSI (40 min)

11:15-11:45-Lunch

11:50-12:30

Third session of project presentations to judges: exhibition presenters 6-8 will be pulled out of activity session in Classroom 1 in small groups to make presentations to judges. Concurrently, 40 min Science Discovery sessions for Grades K-2 & 3-5.

Classroom 3: Grade 6-8: Rollercoaster Madness by OMSI (40 min). Project presentations to judges, kids will be pulled out in small groups (40 min)

Classroom 5: Grade K-2: Weather 101 by OMSI (40 min)

Classroom 1: Grade 3-5: Earth in Motion by OMSI (40 min)

12:35-1:35-Gymnasium: All project participants will present projects to visiting public, answer any final questions for judges, etc.

1:35-1:45-Break

1:45-2:40-Gymnasium: Final assembly, React-O-Blast presentation by OMSI

2:40-3:00-Present prizes.

3:00-End

Science Inquiry Competition and Discovery Day

(Hosted at Crane Elementary School)

March 7, 2018 *Science Inquiry Competition/Discovery Day in Crane at Crane Elementary School*

Prior to the event, teachers are encouraged to facilitate students completing their science projects within the classroom setting, not at home.

On the day of the event, all rural schools, K-8 meet at Crane Elementary School to set up their projects in preparation for judging. Grades K-2 will be exhibition only. Grades 3-8 will compete for prizes. While projects are being evaluated, students will attend classroom presentations in science, put on by OMSI. Prizes at the individual levels will be given following classroom presentations and general assembly. Science Discovery Day t-shirts are available for purchase for $15. Pre-order is preferred so that we have enough on hand for everyone. Other chaperones, parents and preschoolers will need to bring a sack lunch for the day. We also suggest bringing snacks and water for your students.

Please read on for details:

Included in the information you will find:

- The entry requirements for projects. Projects should be presented on a display board or poster.
- Benchmark 1, 2, and 3 guides/worksheets to aid in the development of projects
- Sample inquiry questions

Steps to the Scientific Inquiry Process
Early Primary (K-2)

SECTION 1

FORMING A QUESTION OR HYPOTHESIS

TITLE

Name of your experiment

QUESTION

What are you trying to find out?

HYPOTHESIS

What you predict will happen?

BACKGROUND

Tell why you think your hypothesis is true.

SECTION 2

DESIGNING AN INVESTIGATION

VARIABLES AND CONTROLS

Tell the things that change.(variables)

Tell the things that stay the same. (controls)

- ❖ How do you know that the test is fair?

MATERIALS

What things (materials) will you need for this experiment?

PROCEDURE

Tell how to do your experiment.

Illustrate and label your setup.

SECTION 3

COLLECTING AND PRESENTING DATA

OBSERVE, COLLECT AND RECORD DATA

Tell what you notice about your experiment. (smell, hear, see, feel)
Measure how things change

- ❖ Use a table to record your data.
- ❖ Do your experiment and write down what you learn.

PRESENT DATA

Make a graph of your data

SECTION 4

ANALYZING AND INTERPRETING RESULTS

ANALYZING

CONCLUSION

Tell what happened in your experiment.
Make sure that you talk about your hypothesis.

INTERPRETING

CONCLUSION

Did your experiment prove your hypothesis or not?
Did everything work the way you thought it would? If not, tell about it.

Steps to the Scientific Inquiry Process
Early Primary (K-2)
Work Pages

SECTION 1

FORMING A QUESTION OR HYPOTHESIS

TITLE

_____

QUESTION

_____

_____

_____

HYPOTHESIS

_____

_____

_____

BACKGROUND

SECTION 2

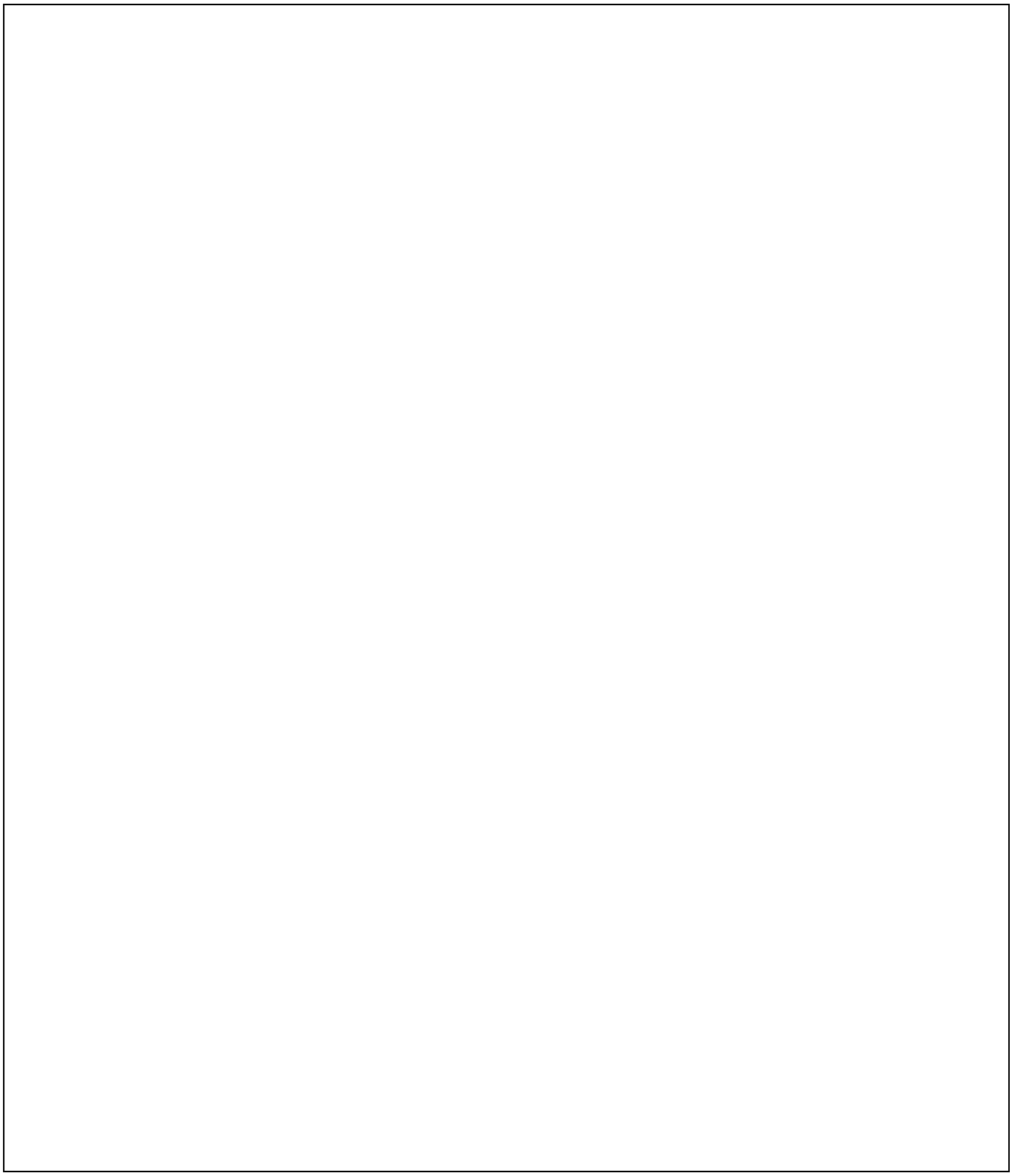
DESIGNING AN INVESTIGATION

VARIABLES

CONTROLS

MATERIALS

PROCEDURE



SECTION 3

COLLECTING AND PRESENTING DATA

OBSERVE, COLLECT AND RECORD DATA

Use the Data Table provided for you

PRESENT DATA

Make a graph, table or chart that shows what you learned

SECTION 4

ANALYZING AND INTERPRETING RESULTS

ANALYZING

CONCLUSION

INTERPRETING

CONCLUSION

Steps to the Scientific Inquiry Process
Working toward Benchmark 2

SECTION 1

FORMING A QUESTION OR HYPOTHESIS

TITLE

Gives a descriptive name to your experiment

RESEARCH QUESTION

Tells the reader what you are going to do or what you are trying to figure out

- In your own words, explain the question you want to answer.

HYPOTHESIS

Explains to the reader what you think will happen
Your hypothesis must answer the question!
(It is ok if your hypothesis is not correct)

BACKGROUND INFO/OBSERVATIONS

Previous knowledge or observations

- Tell what led you to your question or hypothesis—mention your science knowledge, observations you have made, and/or other things that interest you

SECTION 2

DESIGNING AN INVESTIGATION

VARIABLES AND CONTROLS

Identify variables
Identify controls

- Decide what must be done to have a fair test of your question or hypothesis.

MATERIALS

List the materials you will be using in the experiment

PROCEDURE

List detailed steps so anyone could follow your procedure
Illustrate and label your setup

SECTION 3

COLLECTING AND PRESENTING DATA

OBSERVE, COLLECT AND RECORD DATA

Record data that describes characteristics using the appropriate senses

Quantitative data or observations: Data that requires measurement or numerical calculation. You need numbers for quantitative data.

- Design a data table or other format for your measurements and/or observations
- Carry out your investigation, recording the measurements and observations you need to answer your question or test your hypothesis.

PRESENT DATA

Transform your measurements or observations (by doing calculations, reorganizing, making graphs, etc.) to make them easier to understand.

SECTION 4

ANALYZING AND INTERPRETING RESULTS

ANALYZING

CONCLUSION

Summary of Data

Relate back to your hypothesis

INTERPRETING

CONCLUSION

Does your data support your hypothesis or not support it?

Discuss any sources of error

- Report the results of your investigation and identify patterns that you find
- Use your results to answer your question (or tell if your hypothesis was correct). If you cannot answer your question (or tell if your hypothesis was correct), tell why.
- Form a new hypothesis if your first one was incorrect
- What might you do differently next time?

Steps to the Scientific Inquiry Process
Working toward Benchmark 2
Work Pages

SECTION 1

FORMING A QUESTION OR HYPOTHESIS

TITLE

_____

RESEARCH QUESTION

_____

_____

HYPOTHESIS

_____

_____

BACKGROUND INFO/OBSERVATIONS

_____

_____

_____

_____

_____

_____

SECTION 2

DESIGNING AN INVESTIGATION

VARIABLES

CONTROLS

MATERIALS

PROCEDURE

SECTION 3

COLLECTING AND PRESENTING DATA

OBSERVE, COLLECT AND RECORD DATA

Create Data Table

PRESENT DATA

Convert recorded data into a graph, table or chart

SECTION 4

ANALYZING AND INTERPRETING RESULTS

ANALYZING

CONCLUSION

INTERPRETING

CONCLUSION

Steps to the Scientific Inquiry Process
Working toward Benchmark 3

SECTION 1

FORMING A QUESTION OR HYPOTHESIS

TITLE

Gives a descriptive name to your experiment

RESEARCH QUESTION

Tells the reader what you are going to do or what you are trying to figure out

- ❖ Write your idea as a question you want to answer and a hypothesis you want to test

HYPOTHESIS

Explains to the reader what you think will happen
Your hypothesis must answer the question!
(It is ok if your hypothesis is not correct)

- ❖ Clearly explain your hypothesis

BACKGROUND INFO/OBSERVATIONS

Previous knowledge or observations

- ❖ Describe the background knowledge or preliminary observations that helped you frame your question/hypothesis

SECTION 2

DESIGNING AN INVESTIGATION

VARIABLES AND CONTROLS

Identify variables
Identify controls

- ❖ Decide what must be done to have a fair test of your question or hypothesis.

MATERIALS

List the materials you will be using in the experiment

PROCEDURE

List detailed steps so anyone could follow your procedure
Illustrate and label your setup

SECTION 3

COLLECTING AND PRESENTING DATA

OBSERVE, COLLECT AND RECORD DATA

Record data that describes characteristics using the appropriate senses

Quantitative data or observations: Data that requires measurement or numerical calculation. You need numbers for quantitative data.

- ❖ Design a data table or other format for your measurements and/or observations
- ❖ Carry out your investigation, recording the measurements and observations you need to answer your question or test your hypothesis.

PRESENT DATA

Transform your measurements or observations (by doing calculations, reorganizing, making graphs, etc.) to make them easier to understand.

SECTION 4

ANALYZING AND INTERPRETING RESULTS

ANALYZING

CONCLUSION

Summary of Data

Relate back to your hypothesis

INTERPRETING

CONCLUSION

Does your data support your hypothesis or not support it?

Discuss any sources of error

- ❖ Report the results of your investigation, identify patterns and propose explanations. Use science concepts, models and terminology in your explanations.
- ❖ Address your question (answer it or explain why you cannot) and/or explain how the test of your hypothesis came out—use your results to support your conclusions.
- ❖ Review your investigation for possible errors in the measurements or observations. Explain the limitations of your conclusions.
- ❖ Form a new hypothesis if your first one was incorrect
- ❖ What might you do differently next time?

Steps to the Scientific Inquiry Process
Working toward Benchmark 3
Work Pages

SECTION 1

FORMING A QUESTION OR HYPOTHESIS

TITLE

_____

RESEARCH QUESTION

_____

_____

HYPOTHESIS

_____

_____

BACKGROUND INFO/OBSERVATIONS

_____

_____

_____

_____

_____

_____

SECTION 2

DESIGNING AN INVESTIGATION

VARIABLES

CONTROLS

MATERIALS

PROCEDURE

SECTION 3

COLLECTING AND PRESENTING DATA

OBSERVE, COLLECT AND RECORD DATA

Create Data Table

PRESENT DATA

Convert recorded data into a graph, table or chart

SECTION 4

ANALYZING AND INTERPRETING RESULTS

ANALYZING

CONCLUSION

INTERPRETING

CONCLUSION

For your presentation you must be prepared to present a walk-through of your project including all of the areas in your plan using your props (board and other materials) and answer questions from the people viewing the project.

Sample Inquiry Questions

Note: The following questions are given to you as a pool of ideas, but are by no means comprehensive. They should give you an idea of possible inquiry-style questions. Questions are not grouped under any particular science—they were randomly generated by Mr. Chuck Morlan over the course of several years. You will find that some of the questions' wording needs to be altered to improve their "testability". Questions avoid a "yes" or "no" answer, and can be modified to accommodate older or younger learners.

Idea cluster #1

1. Electromagnet: How will the number of winds affect the magnet's strength?
2. Wind-up car: How will different surfaces affect how far the car can travel?
3. Mirrors: How do different kinds of mirrors affect the "footprint" of a laser beam?
4. Magnet Strength: How does the number of times a piece of steel is stroked with a magnet affect its strength?
5. Pulse: How does a timed-test affect your heart rate compared with an un-timed test?
6. Sound: How is sound affected by different materials?
7. Flight: How does the shape (or length) of helicopter blades affect how fast the helicopter falls?
8. Heat: How does temperature affect the size of a balloon?
9. Air resistance: How does shape of an object affect its movement in response to moving air?
10. Oxidation: How do different liquids affect the rusting of a metal?
11. Energy: How does the temperature of a ball affect its bounce?
12. Pitch: How does pitch affect a sound-wave pattern?
13. Air pressure: How does air pressure affect the size of an air-filled object?
14. Energy: How does temperature of water affect the speed of a liquid compound mixing in water?
15. Electricity: How does the length of a conductive material affect voltage?
15. Tensile Strength: How does water affect the tensile strength of cotton string?
16. Light-to-heat energy: How does black or white paper inside a container exposed to light affect the inside temperature?
17. Liquid properties: How do different liquids affect how many drops a penny will hold?
18. Liquid properties: How will oil affect how many drops of water a dime will hold?
19. Buoyancy: How is buoyancy affected when different substances are dissolved in the water?
20. Chemical reactions: How does temperature affect oxidation rates?
21. Light: How does distance affect the "footprint" of a laser beam?
22. Buoyancy: How does the type of liquid affect buoyancy?
23. Properties of Air: How does temperature affect air currents?

Idea cluster #2

1. How do anti-fungals affect sprouting success rate? (productivity and efficiency)
2. How do fertilizers affect a plant's growth rate? (productivity/quality)
3. How does temperature affect a plant's growth rate? <sprouting/growth> (plant requirements)
4. How does irradiating affect shelf-life? (product storage)
5. How does the type of soil affect sprouting or growth rate? <many variables> (plant requirements)
6. How does soil compaction affect sprouting success? (tilling for aeration)
7. How does distance between seeds affect plant growth? (productivity/efficiency)
8. How do additives affect shelf-life? (product freshness)
9. How does steaming or boiling affect product color, texture, smell or taste? (product processing)
10. How does soil sterility affect sprouting success or growth rate? (soil preparation)
11. How does the amount of water given to plants affect their growth? (irrigation/soils/climate)
12. How is germination, sprouting or plant growth affected by different colors of light? (plant requirements)
13. How does the amount of light received affect sprouting or plant growth? (plant requirements/season)
14. How does the type of medium affect sprouting time? (soils availability/plant requirements)
15. How does air circulation affect plant growth? (nurseries: growing plants in "closed" settings)
16. How does an "invasive" plant affect the growth of desired plants (weed control)
17. How does the way plants are watered from top/furrows/bottom) affect growth? (productivity/efficiency)
18. How does the way a plant is fertilized (foliar or root) affect growth? (productivity/efficiency)
19. How does the amount of time seed are soaked prior to planting affect their sprouting time? (productivity/efficiency)
20. What amount of nitrogen, phosphorus or potassium (or different ratios of these) produces the best growth? (productivity)

21. What effect does a seed's planting depth have on its sprouting time/success/growth/quality? (productivity)
22. How does distilled vs. well-water (pH) affect plant growth? (productivity/plant quality)
23. How does soil pH affect plant growth? (productivity/quality/efficiency)
24. How does amending a soil with Perlite or ? affect plant growth? (productivity/quality/efficiency)
25. How does a non-permeable container affect root development/mass/size? (production in nurseries)
26. How do 3 different kinds of store-bought fertilizers perform? (consumer education)
27. How do consumers rank a set of products for taste: color, smell, packaging,? (marketing)
28. What packaging "style" of a product will consumers he attracted to most? (marketing)
29. How do consumers relate color of a product to the flavor it might have? (marketing)
30. How will turning a plant onto its opposite side each day affect (a parameter of) a plant's growth?
31. How does the color of light affect the amount of stem between sets of leaves on a plant?
32. How does seed size relate to plant size (from the normal variance found within a given set of seeds)?
33. How is (a plant growth parameter) affected by being watered with milk, starch or sugar added?
34. How do different brands of popcorn vary in their % of kernels that pop?
35. How does light affect the taste the taste of milk?
36. What is the affect of mint on a chosen insect's behavior?
37. How does salt being added to water affect a plant's growth rate?
38. How do brands of a seed type compare with each other in terms of germination %?
39. How does giving a plant no darkness affect its growth?
40. What is the affect of chlorinated water on a plant's growth (or germination success)?
41. How does freezing affect the % of seed germination?
42. How does the way a seed or bulb is planted (direction) affect its sprouting time?
43. How does the type of water affect the growth of plants?
44. How does adding sugar (or ???) to water affect the life of cut flowers?
45. How do different types of food wrapping affect how long an apple will remain un-oxidized?
46. How does temperature affect oxidation (or some freshness parameter)?
47. How does detergent affect plant growth?
48. How do types of soils vary in their ability to hold water?
49. How do earthworms react to different kinds of soils (pH, sand:clay:loam ratios)?
50. How does moving water and still water affect plant or root growth in a hydrponic system?
51. How does the depth a seed is planted affect its ability to sprout?
52. How does oxygen deprivation affect seed germination?
53. How does volcanic ash affect soil quality (plant growth)?
54. How is the germination of different seed types affected by germination inhibitors?
55. How does the surface color of soil affect plant growth?
56. How does the amount light affect the % of, or time of germination, or the characteristics of germinated seeds?
57. How does too much water affect the growth of plants? (related to #11)

Idea Cluster #3

1. How is the temperature of a liquid affected by the reaction of vinegar and baking soda?
2. How does the color of a plastic filter affect how much light is turned into heat?
3. How is the intensity of sound affected by different materials?
4. How is the boiling point of water affected by the addition of salt?
5. What affect do different metals have on the conductivity of heat?
6. What affect do different materials have on a magnetic field's strength?
7. How does the color of water affect how much light is converted into heat?
8. How is the loss of heat affected by the viscosity of a liquid?
9. How does the color of a surface affect the amount of light that is reflected?
10. How does the color of a surface affect how much light is changed into heat?
11. How does the number of winds in an electromagnet affect the strength of its magnetic field?
12. How does temperature affect a ball's bounce?
13. How do different types of materials affect the transfer of heat?
14. What affect does temperature have on how a ball bounces?
15. How do different colors affect the amount of light being converted into heat?
16. How does the height of a ramp's release point affect how (fast) or (far) an object will travel?
17. How does distance (or heat) affect the strength of a magnetic field of something that's been magnetized?
18. How does a (smoke) affect the temperature in a closed container exposed to heat?

Please feel welcomed to talk to Ms. Koskela about developing inquiry-based questions, 495-2405.

Harney County Rural School Science Competition 2018

Science Inquiry Entry Form & Scoring Guide Cover Sheet

Entry Level: Individual____ Team_____

Science Area: Life____ Physical____ Earth____

Project Title:_____

Student Name_____ Grade_____
Student Name_____ Grade_____
Student Name_____ Grade_____

(For team entry, please list each student's name above. For individual entries, please list just the individual's name once.)

School_____ or

Home School Provider_____

Science Inquiry Scoring Guide-----Point Summary Name:_____

A. Framing a Question/Hypothesis **POINTS**

Student poses a testable, open-ended question (cannot be a yes/no question).

0 1 2 3 4 5 6 7 8 9 10 _____

Weak **Strong**

B. Designing an Investigation

A procedure with properly sequenced steps will effectively test the hypothesis.

0 1 2 3 4 5 6 7 8 9 10 _____

Weak **Strong**

Student identifies the experiment's variables and control(s).

0 1 2 3 4 5 6 7 8 9 10 _____

Inaccurate **Accurate**

C. Collecting and Presenting Data

A data table and visual aid or graph is included that makes the collected data easy to understand.

0 1 2 3 4 5 6 7 8 9 10 _____

Ineffective **Effective**

D. Analyzing and Interpreting Results

Student describes the data, and forms a conclusion related to the question/hypothesis based upon the results.

0 1 2 3 4 5 6 7 8 9 10 _____

Weak **Strong**

E. Overall score reflecting the quality of the presentation

Communication to judges:

0 1 2 3 4 5 6 7 8 9 10 _____

Not there yet **Appropriate for age/grade** **Above expectation**

Organization of project display and materials:

0 1 2 3 4 5 6 7 8 9 10 _____

Not there yet **Appropriate for age/grade** **Above expectation**

Total points out of 70 possible: _____

Comments:_____

_____

_____

Please complete and return by February 20, 2018

Science Competition and Science Day T-Shirt Order 2018

T-Shirt Cost $15.00

Name_____

School _____

	Size:
Youth Small	_____
Youth Medium	_____
Youth Large	_____
Youth X-Large	_____
Adult Small	_____
Adult Medium	_____
Adult Large	_____
Adult X-Large	_____

Please make sure all of this information gets to Earlyna Hammond, frglen16@harneyesd.k12.or.us, or Cindy Lofts, info@frenchgleneducationfoundation.org , 541-589-1965