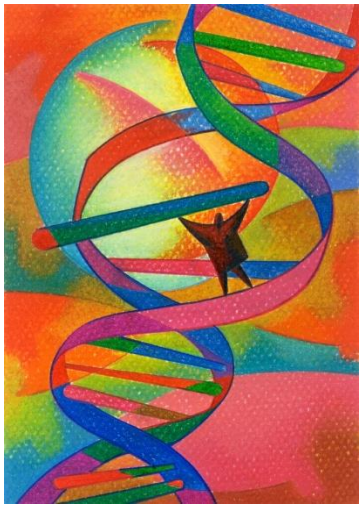
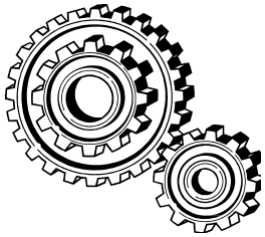
Everett Innovation Expo

Middle School STEM Competition

Student/Parent Handbook

2017





Purpose

The Everett Innovation Expo (a merger of the Celebration of Innovation and STEM Expo) grew out of a realization that many kinds of learning experiences, both in and beyond the classroom, contribute significantly to the education of students. The Innovation Expo provides a valuable opportunity for young people to be creative, develop scientific understanding through research or hands-on learning, and build 21st Century skills. The goal of having a middle school competition at the Innovation Expo is to help students become more proficient in their scientific questioning, problem solving and communication skills, so that in later grades, students are adept at generating ideas and solving highly challenging problems with original experimentation. In addition to the middle school STEM competition, the Innovation Expo will showcase the progression of PreK-12 STEM and Innovative learning in Everett Public Schools and spotlight STEM careers through interactive hands-on exhibits by Everett students and members of the STEM community.

Student Competition Goals

1. To emphasize and support state science standards through meaningful applications of science and mathematics.
2. To provide a focus for students to apply skills and concepts learned in science, mathematics, reading, writing, technology and art.
3. To help students develop self-reliance, organizational skills, and productive work habits.
4. To provide our schools and community with the opportunity to recognize and encourage student interest in STEM.

Everett Innovation Expo - Parent Letter

Dear Parents/Guardians,

Everett Public Schools has merged the winter Celebration of Innovation and the spring STEM Expo into one culminating event titled the **Innovation Expo**. The Innovation Expo provides a valuable opportunity for young people to be creative, develop STEM understanding through research or hands-on learning, and build 21st Century skills. The Student STEM Competition at the Innovation Expo provides a unique setting where selected student projects from across the district will be displayed and viewed in a common public area. Students will first submit their projects to their science teacher who will then select two projects to move on to the Innovation Expo. Projects selected for the Innovation Expo will then be reviewed at the Expo by Everett teachers using the rubrics provided for each project entry type. All students selected for the Innovation Expo will receive recognition for their work. The Student STEM Competition at the Innovation Expo will showcase and celebrate the very best STEM projects from across the district. This will be an exciting experience for your child!

Event: Everett's Innovation Expo
Date: Thursday, June 8th, 2017
Location: XFINITY Arena
Time: 5:00 – 8:00 PM (Set-up from 3:00 – 5:00 PM; Clean-up from 8:00 – 9:00 PM)

Specific details and updates about the Innovation Expo will be distributed to schools as well as communicated via Everett Newslinks, Peachjar and on the district website.

Individual students can also submit entries for the Student STEM Competition even if their whole classroom is not participating.

There are three project types that students can chose from for consideration into the Innovation Expo. Some of these project types require less materials and time outside of school. Rubrics for each project type are included at the end of this packet.

Project Entry Types:

- **Experiment** - Dive into the world of science by investigating original, student-driven scientific questions! Students will conduct an experiment to investigate a scientific question/problem, using the steps of the inquiry process (asking a question, doing preliminary research, making a prediction, planning and conducting an experiment, and analyzing results).

- **Research Project** – Have you ever had an interesting science or math question that you didn't know the answer to? Do you love to read informational texts to learn new information and enjoy teaching what you've learned to others? Now you can do both at the same time!! Students will come up with an interesting science or math question/problem to research and will look for the answer/solution by reading books, talking to experts, and gathering information from other sources such as schools and public libraries. Students can use independent reading time to research their questions using informational texts. Examples: How does a solar cell work? How are fractals mathematical? How are tessellations mathematical? The research projects students do will become their presentations.

- **Engineering Design** - Everyone is an engineer! Students will use science, math, and creativity to redesign an object or a process to solve a real life problem. Using **The Engineering Design Process** will take students through all the necessary steps: asking a question, imagining or brainstorming possible solutions, planning, creating, testing, and redesigning the chosen solution to make it even better.

Students who would like to submit a STEM project to their teacher so that they can be considered for participation in the Innovation Expo Student Competition will need to:

- Have a **written report** based on the criteria outlined on their chosen rubric. This written report can mirror and accompany their presentation boards.
- Have a completed **project presentation board** that is based on the criteria outlined in the Project Presentation Board Guidelines sheets.

Support and encouragement are essential to your child's success. A general rule of thumb to go by is:

- Students should be doing the entire STEM project by themselves. However, they may need encouragement to follow the format given and to get their project completed on time.

The STEM project allows children to use critical thinking and problem solving skills learned in science, math and literacy.

Attached is a **STEM Project Proposal Form**. Please complete the form with your child and have your child return it to his/her science teacher.

Sincerely,

Shannon Lacey
Secondary Science/Engineering Instructional Facilitator

Everett Innovation Expo
Helpful Hints for Parents

Welcome to the Everett Innovation Expo!

This should be a fun project! Success is when your child asks their own question, completes their project with a smile, and knows more than when they started. Enjoy this time of discovery and fun for you and your child!

- ☐ The goal is that your child learns the steps of the inquiry process, research skills, or the engineering design process through direct experience.

- ☐ For their daily reading, recommend they choose a science book that can be a research resource for their project.

- ☐ A **Report** is part of the process.
  - It needs to be typed and in the student's own language, to be considered for the Everett Innovation Expo.
  - Use the attached Project Rubric as a guide to write the report.

- ☐ A **Project Presentation Board** is part of the process.
  - It needs to be put together by the student, to be considered for the Expo.
  - Use the attached **Project Presentation Board guidelines sheets** as a guide to create the presentation board.

- ☐ It is best to guide and answer your child's questions with questions. You may know the answer, but help them discover it themselves.

- ☐ Encourage your child's artistic side with the display. For example, you can show how the use of color, shapes, and graphics can be used to draw attention to important parts of the display.

- ☐ If you allow your child to use web sites for research; verify the site is "correct" and then let them use the research found there. *Remember:*
  - Anyone can create a web site; this does not mean its information is correct!
  - Make sure the web site is run by a large, recognized group such as a college or organization.
  - DOT "org", "gov" or "edu" are generally trustworthy for accuracy of content.

- ☐ What is an acceptable STEM Expo project?
  - Something that answers a question to which they do not know the answer
  - Something they can figure out through experimentation or design
  - Something they can change somehow, add another variable, and then predict the outcome.
    That's an experiment!

- ☐ What is NOT an acceptable science fair project?
  - Reproducing results found on the web is *not* an experiment; it's a reproduction.
  - A demonstration is not an experiment (i.e., volcano).

STEM Project Proposal Form (page 1 of 2)

Student Name: _____ Entry Type: _____
(Examples: Experiment, Research, Engineering Design
Teacher's Name: _____ See descriptions below)

Grade: _____ Room #: _____

The question I plan to investigate in my experiment, research or engineering design project is: Examples of entry type question formats: • **Experiment**: *How does _____ (manipulated variable) affect _____ (responding variable)?* • **Research**: *Why do bears hibernate? How are fractals mathematical?* • **Engineering Design:** *How can I design/redesign _____ to make it solve a problem/work better?*
Question:

Entry Type Descriptions:

- **EXPERIMENT** – Dive into the world of science by investigating your own scientific question! You will conduct an experiment to find the answer to your question/problem, using the steps of the inquiry process (asking a question, doing preliminary research, making a prediction, planning and conducting an experiment, and analyzing results).

- **RESEARCH PROJECT** - Have you ever had an interesting science question that you didn't know the answer to? Do you love to read informational texts to learn new information and enjoy teaching what you've learned to others? Now you can do both at the same time!! Someone has already found the answer to your question/problem, and you will look for their answer/solution by reading books, talking to experts, and gathering information from other sources such as schools and public libraries. Your display board will have drawings, photographs, charts, graphs, dioramas, etc. Examples: How does a solar cell work? How is music mathematical? How do clouds form?

- **ENGINEERING DESIGN** - Everyone is an engineer! You will use science, math, and creativity to dream up or redesign an object or a process to solve a real life problem. Using **The Engineering Design Process** will take you through all the necessary steps: asking a question, imagining or brainstorming possible solutions, planning, creating, testing, and redesigning the chosen solution to make it even better.

STEM Project Proposal Form (page 2 of 2)

Project Checklist

Is your experiment, research or engineering design project safe to perform?	Yes / No
Do you have all the materials and tools you need for your project, or will you be able to get them quickly and for under a few dollars?	Yes / No
Do you have enough time to do your experiment, research or engineering design project before the report and board is due?	Yes / No
(For a "3"): Can you find at least two sources of written information on this topic?	Yes / No

Please check the box below and sign your name.

☐ **I have agreed to my child's STEM project choice and can provide the material and support to complete this assignment.**

Parent Signature_____ **Date**_____

** This part to be completed by the teacher!!

TO: Student Name

_____

Everett Innovation Expo
Project Approval Form

Your STEM Project has been approved! It looks like you are on the right track to answer your question (problem). Good luck finding out the answer and have fun!

The type of project you have chosen is: EXPERIMENT RESEARCH ENGINEERING DESIGN

Reminder: Your completed project is due on _____.

Teacher Signature: _____

Experimental Projects (Middle School)

Rubric for Everett Innovation Expo

	Attempted - 2 point	Proficient - 3 points	Advanced Proficient - 4 points
Problem	• States the problem as a question that cannot be tested in an experiment, **or** • Does not state the problem as a question	• States problem as a question that can be tested	• States problem as a unique, original question that can be tested • States changed and measured variables in the question
Preliminary Research	• Cites only one source • Research doesn't connect to the problem • Research not written in student's own words	• Cites two or more sources from one or more types of resources (e.g., text, magazines, approved internet sites, or interviews) • Research connects to the problem • Written in student's own words	• Cites two or more sources • Different types of sources are cited • The student clearly connects the research to their problem in their own words
Prediction	• Makes a prediction that does not connect to the stated problem	• Makes a prediction that connects to the stated problem	• Makes a prediction that connects to the stated problem and connects to the research
Materials & Procedure	• Materials list is missing or incomplete • Procedure is missing one or more of the following: ○ steps to do the experiment ○ one changed or measured variable ○ how often measurements should be taken and recorded	• Major materials are listed • Procedure includes: ○ relevant steps to do the experiment ○ one changed variable ○ one measured variable ○ how often measurements should be taken and recorded	• All relevant materials are listed • Procedure includes: ○ logical and relevant steps to do the experiment ○ one changed variable ○ one measured variable ○ how often measurements should be taken and recorded
Results	• Only performed one trial of experiment • Data are missing or incomplete	• Performed more than one trial of experiment • Data is organized in a data table	• Performed experiment several times • Data is organized in a clearly labeled data table with appropriate measurement units, identifying the changed and measured variables
Conclusions	• Answers the experimental question • Includes little **supporting** data • Does not explain how these data **support** your conclusion	• Answers the experimental question • Includes **supporting** data from the data table • Explains how these data **support** your conclusion	• Answers the experimental question • Includes relevant **supporting high and low** data from data table • Clearly explains how data **support** your conclusion
Visual Display	• Project is not easy to read • Display is missing one or some of the following parts: **Problem, Research, Prediction, Materials, Procedure, Results, Conclusion, Visual Display**	• Project is easy to read • Display is organized and includes all of the following parts: **Problem, Research, Prediction, Materials, Procedure, Results, Conclusion, Visual Display**	• Project is easy to read and organized neatly • Information is written with correct grammar, spelling and punctuation • Display includes all parts listed in "Proficient" and includes pictures, visuals, data with appropriate measurement units and/or models that support the research in an inventive/creative way
Presentation	• Presentation to judges is incomplete or doesn't answer judges' questions	• Presentation to judges is complete and answers some of the judges' questions • Answers to judges' questions are backed up with facts	• Presentation of project to judges is complete and provides clear answer to all of the judges' questions • Answers to judges' questions are sequenced logically, using appropriate facts

Research Projects (Middle School)

Rubric for Everett Innovation Expo

	Attempted - 2 points	Proficient - 3 points	Advanced Proficient - 4 points
Guiding Question	• The guiding question is vague • There is no apparent connection to a scientific concept • Addresses an issue to which the student already knows the answer	• States the problem as a question • Shows a connection to a scientific concept	• States the Problem as a question • Addresses a connection to a scientific concept • Question applies to a current world problem or issue
Prediction	• No prediction made **or** prediction doesn't connect to the question • Prediction appears to be completed after the research is done	• Prediction connects to the question and is made before the research is done • Prediction is made using text features **or** prior knowledge	• Prediction connects to the question and is made before the research is done • Prediction is made using both text features **and** prior knowledge
Research	• Only one quality source is used • Research is incomplete • Little or no connection to the question or prediction • Not written in the student's own words	• Two or more quality sources are used • One supporting quote is used • Research demonstrates a connection to the guiding question • Written in student's own words	• Four or more quality sources are used • Two or more supporting quotes are used • Research demonstrates a clear, in-depth connection to the guiding question • Research states how this affects the environment and/or people • Written in student's own words
Conclusions	• Conclusion does not answer the question, or does not refer back to the hypothesis, or contradicts the evidence found in the research	• Conclusion answers the question • States if the prediction was supported or rejected • Quotes evidence from research • Explains the connection between the evidence and the conclusive statement	• Conclusion answers all aspects of the question, • States if the prediction was supported or rejected • Quotes evidence from research • Explains the connection between the evidence and the conclusive statement
Visual Display	• Project has limited eye appeal/is not easily readable at approximately 2 feet distance • Project has limited organization, or contains confusing visuals, or contains major language or spelling errors	• Project is appealing and readable at from 2 feet away • Organized and clear • Uses understandable visuals and/or models • Contains few language and spelling errors	• Project is appealing, neat, and readable from 2 feet away • Well organized and clear • Makes striking use of inventive or amusing visuals and/or models • Flawless language and spelling
Presentation	• Presentation to judges is incomplete or doesn't answer judges' questions	• Presentation of project to judges is complete and answer some of the judges' questions	• Presentation of project to judges is complete and provides clear answer to all of the judges' questions
Sources	• Sources at the end of the written report are listed by title only, or represent an incomplete list	• Two or more sources are cited with most of the information given, i.e., name, title, web address, date	• Four or more sources are cited correctly with complete information

Engineering Design Projects (Middle School)

Rubric for Everett Innovation Expo

	Attempted - 2 points	Proficient - 3 points	Advanced Proficient - 4 points
Ask	• States the problem as a statement, instead of a question • Describes one thing learned about the topic from informational sources (such as books, videos, interviews) that helped find possible solutions	• States the problem in the form of a question • Describes 2-3 things learned about the topic from informational sources (such as books, videos, interviews) that helped find possible solutions	• States the problem in the form of a question • Describes 4 or more things learned about the topic from informational sources (such as books, videos, interviews) that helped find possible solutions
Imagine	• Lists one or two solutions to the problem • Includes no solution descriptions	• Lists at least three practical solutions to the problem. • Includes a description of each solution	• Lists three or more practical, creative solutions to the problem • Includes a clear, detailed description of each solution
Plan	• Limited or missing description of how your chosen solution will work • Unlabeled or missing diagram of your solution • Materials list is missing or incomplete	• Includes a description of how your chosen solution will work • Includes a labeled diagram of your solution • Major materials are listed for you solution	• Includes a detailed description of how your chosen solution will work • Includes a detailed, labeled diagram of your solution • All relevant materials are listed for your solution
Create	• Limited explanation of how solution was built • Performs an incomplete test of the solution • Missing description of successes and challenges (troubles) during testing	• Explains how solution built • Perform a test of your solution • Includes description of successes and challenges (troubles) during testing	• Clearly explains how solution was built • Performs a test of your solution with multiple trials • Includes detailed description of successes and challenges (troubles) during testing
Improve	• Limited explanation of how solution was redesigned to work better • Incomplete retest of solution • Limited or missing conclusion to explain how your redesigned solution solved the problem • Missing explanation of how what you learned applies to the real world	• Explains how solution was redesigned to work better • Retests solution • Writes a conclusion to explain how your redesigned solution solved the problem • Some explanation of how what you learned applies to the real world	• Explains in detail how solution was redesigned to work better • Retests solution • Writes a detailed conclusion with supporting data to explain how your redesigned solution solved the problem • Clearly explains how what you learned applies to the real world
Visual Display	• Project is not easy to read • Display is missing one or some of the following parts: **Ask, Imagine, Plan, Create, Improve**	• Project is easy to read • Display is organized and includes all of the following parts: **Ask, Imagine, Plan, Create, Improve**	• Project is easy to read • Display is organized and includes all of the following parts: **Ask, Imagine, Plan, Create, Improve** • Information is written with correct grammar, spelling and punctuation
Presentation	• Presentation of project to judges is incomplete or doesn't answer judges' questions	• Presentation of project to judges is complete and answer some of the judges' questions	• Presentation of project to judges is complete and provides clear answer to all of the judges' questions

Innovation Expo Project Ideas

These questions are provided as examples of topics you focus on for your project or how you could format your own question. You may come up with your own idea as long as it safe, you have the materials and you can measure the results. All proposals must be approved by your teacher.

Research Questions:

Why do plants need water and sunlight to stay alive?

How do caterpillars change into butterflies?

Why does erosion happen faster along bends in a river or stream?

How are fractals mathematical?

How is music mathematical?

Experiment Questions:

How does the amount of salt in water affect how quickly it boils?

How does the amount of fat in ice cream affect how fast it completely melts?

How does the amount of salt in water affect the amount of time until the top freezes over?

How does the size of a parachute affect the time it takes to fall to the ground?

How does the temperature of a cup of water affect the time it takes a sugar cube to fully dissolve in it?

How does changing the shape of a wing affect how far a paper airplane will fly?

Engineering Design Questions:

How can I design/redesign _____ to make it work better?

How can we redesign packaging to keep fruit fresh for a longer period of time?

How can we design a bridge to be safer and stronger?

How can we redesign a cooler so that it keeps its contents colder for a longer period of time?

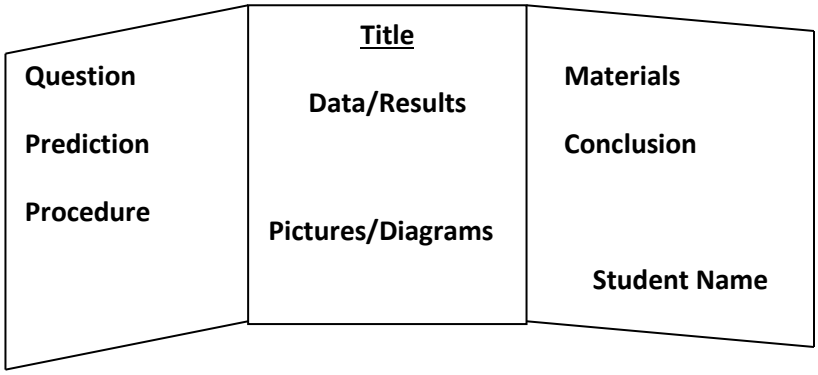
How can we redesign a container so that it protects its contents from the impact of being dropped?

How can we redesign product packaging to hold the most product with the least amount of packaging?

<u>Experiment</u> Presentation Board Guidelines

Your Project Must Be Displayed on a Tri-fold Board (dimensions 36” x 48”) and Include:

☐	Title	☐	Procedure
☐	Question	☐	Data (Pictures, Charts, Graphs, etc.)
☐	Prediction	☐	Conclusion
☐	Materials	☐	Your First and Last Name (neatly, in bottom right flap



Above poster layout is a <u>suggestion</u> rather than a strict template.

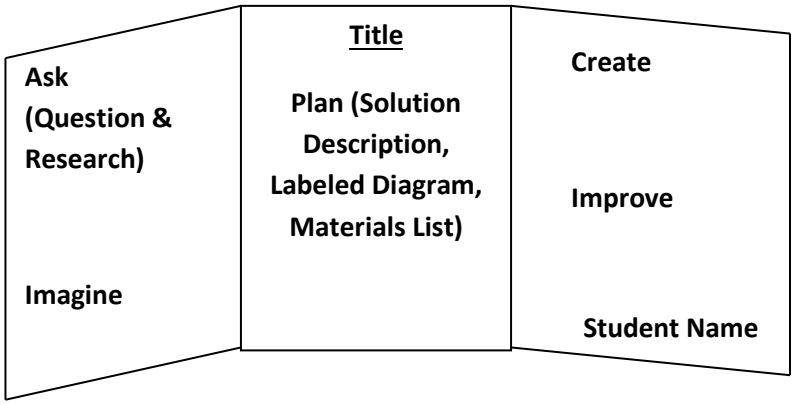
Also to consider:

- ☐ Are the sections on your display board organized so that they are easy to follow?
- ☐ Does the title catch people's attention? Can it be read from across the room?
- ☐ Did you use pictures and diagrams to effectively show your information?
- ☐ Did you proofread your display board?
- ☐ Did you use boarders around your headings?

<u>Engineering Design</u> Presentation Board Guidelines

Your Project Must Be Displayed on a Tri-fold Board (dimensions 36” x 48”) and Include:

☐	Title	☐	Create
☐	Ask	☐	Improve
☐	Imagine	☐	Your First and Last Name (neatly, in bottom right flap
☐	Plan		



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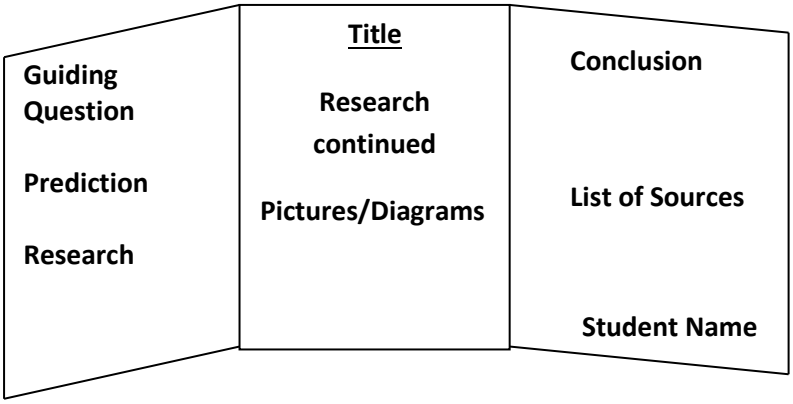
<u>Research</u> Presentation Board Guidelines

Your Project Must Be Displayed on a Tri-fold Board (dimensions 36” x 48”) and Include:

☐	Title	☐	Pictures/Diagrams
☐	Guiding Question	☐	Conclusion
☐	Prediction	☐	List of Sources
☐	Research	☐	Your First and Last Name (neatly, in bottom right flap



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