

Regional Elementary Science and Engineering Fair

Virtual Edition

The fair is designed to encourage the natural curiosity of all students through the exploration of the scientific method and by exploring and finding an answer to a question or observation through an experiment (investigation), research, or challenge project.

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Five-County Elementary Science and Engineering Fair

April 28, 2021

Virtual Platform

Grade

Students in Grade 4-6 enrolled in Region 5 public or private school.

Categories

Experiment
Research
Challenge – New Category

Advancement Eligibility

Experiment – Three Finalists
Research – One Champion
Challenge – Three Finalists

Cost

\$5/entry

Important Dates

Jan-Mar District Fair
Mar 11 Judge Submission Due
April 1 Student Champion Registration
April 28 Five-County Elementary Science and Engineering Fair

Competition Times

April 28, 2021
10am Judging Begins
2pm Placement Announced

Location

District Hosted and facilitated by local schools
Regional Virtual - Sourcewell

Awards

Certificates for all Regional participants. 1st – 4th Place and Honorable Mention Ribbons for each category for all grade levels presented during ceremony.

The Regional Science and Engineering Fair is designed to encourage the natural curiosity of all students through the exploration of the Scientific Method and to explore and find an answer to a question or observation – through an Experiment (Investigation), Challenge or Research.

Qualifying Students

Students in grades 4-6 are eligible to participate in your district Science and Engineering Fair. Three Champions in Experiment or Challenge; One overall champion for Research in each grade may advance to the Five-County Elementary Science and Engineering Fair. Each district fair looks slightly different to determine their champions. Typically, a grade-level competition is held with the champion advancing to the school competition; from there the top competitors compete in the regional virtual competition.

Challenge Categories

A new category has been added to inspire our students with an engineering spark! Each challenge has been aligned with the MN State Science Standards as indicated in the Scenario provided.

Grade 4 – Cardboard Furniture

Grade 5 – Bottle Biome

Grade 6 – Chain Reaction

Judges

Each coordinator is responsible for providing two judges to judge at the fair. Judges' names should be sent to Katie by February 25, 2021. Please reach out if you need assistance.

Virtual Platform

Each student board will be a Google Slide with links to their project information. Students will be given a template to start from and may design as they desire. They will be judged on the presentation of the slide. There is no project board for the virtual competition.

The Science and Engineering Fair is a chance to increase awareness and enjoyment of science and acquire a better understanding of the Scientific Process through independent learning. We look forward to seeing you at the Fair.

For more information, please contact
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Regional Elementary Science and Engineering Fair

Rules and Regulations

Eligibility

Students in fourth, fifth, and sixth grade

Categories

Research, Experiment, or Challenge

School qualifications

One Research exhibit for each grade level

Three Challenge exhibits for each grade level

Three Experiment exhibits for each grade level.

Virtual Platform

Each student will be required to complete their project and present to Judges through a Google Slide. This slide will replace the presentation board. Students will be asked to provide an Overview Key for judging. Each Key Icon will link to their information associated with each judging category. See examples: Exhibit Slide Key; Research, Experiment or Challenge.

Judging

Each school is required to provide two judges. These judges must be different from the judges at your local science fair. Three judges will judge each display in his/her category and grade level.

Scores will be determined by a combination of all three judge score sheets for each student. Conclusion scores will break any ties.

Grand prize, first, second, and third place ribbons will be awarded for each grade and category. Honorable mention ribbons will be awarded at all levels and in each category to qualifying students.

Exhibit Regulations

1. Students must use Google Slide as presentation board.
2. Students must submit Google Slide with a link – this link must be open to “Anyone with Link” access.
3. Poisons, drugs, and open flames are not permitted as research material.
4. Student name must not be embedded in Presentation Slide.

NEW Virtual Board

Each student will create one slide that will represent their Science Project. This will be replacing the traditional “Board”. This platform will allow students to be as simple or creative as they desire. A portion of their score will be on their Virtual Display Board; however, a majority of the score will be in the project content. Have fun!!

1. Introduction [Video](#). A walk through of the Virtual Board with tips and tricks for the students.
2. [Sample Board](#) – Google Slides
3. Student Template – [Click Here](#). Please note that the link will force you to make a copy so you’ll need to click on ‘make copy’ before you can edit the slides.

Research Category

Judging Rubric

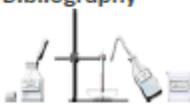
Regional Elementary Science and Engineering Fair

Component	5-4	3-2	1-0	Score
Question	Wrote a clear, creative, and interesting scientific question to research. The question makes sense and can be answered through research.	Wrote clear but simple scientific question to research. The question makes sense and can be answered through research.	The question does not make sense or cannot be answered through research.	
Research	The first paragraph is intriguing. The topic is evident. All facts presented in content paragraphs are accurate. The report is well organized. The entire report relates to the topic. A concluding paragraph is evident and clearly answers the question.	The first paragraph is not intriguing. The topic is mixed. Most facts presented in content paragraphs are accurate. The report is somewhat organized. The report information is not entirely related to the topic. A concluding paragraph is evident but not clear.	No attempt to catch the reader's attention. The topic is not evident. There are several factual errors in content paragraphs. The report is random and not organized. The report information is not related to the topic. Conclusion does not answer the question.	
Bibliography	Included at least five sources, listed sources in the correct format, and had a variety.	Included at least three sources and listed sources in the correct format.	Failed to include more than two sources, and a lot of the information was missing or incorrect.	
Conclusion	Results and conclusions show a clear and accurate understanding of knowledge gained from conducting the research. The conclusion shows thought and effort and answers the question.	Results and conclusions show somewhat of a clear and accurate understanding of knowledge gained from conducting the research. The conclusion answers the question.	Results and conclusions are unclear and show an inaccurate understanding of knowledge gained from conducting the research.	
Presentation	The display slide is complete, nicely written or typed, and shows effort and creativity. Pictures are displayed.	The display slide is mostly complete, nicely written or typed, and shows some effort and creativity.	The display slide is incomplete, hard to read, and shows little effort and creativity.	
Mechanics	All mechanics are correct — spelling, grammar, punctuation, capitalization.	There are a few mechanical errors — spelling, grammar, punctuation, capitalization.	There are many mechanical errors — spelling, grammar, punctuation, capitalization.	
			Total Score	

Research Category

Exhibit Slide Key

Regional Elementary Science and Engineering Fair

<h2>Research</h2> <p>Display is visually appealing and well organized. Board is free of spelling and grammar errors.</p>			
<p>Question</p>  <p>Project has a clear question to answer</p>	<p>Visuals</p>  <p>Appealing and well organized, relate to the topic, and aid in the understanding of the project.</p>	<p>Illustrations</p> 	<p>Bibliography</p>  <p>List all resources in bibliographic format</p> <p>Sixth-grade students should have a variety and at least six.</p> <p>Example: Internet, pamphlets, magazines, videos, personal interview, etc.</p>
<p>Report</p>  <p>Content relates directly to question</p>	<p>Pictures</p> 		<p>Conclusion</p>  <p>Summarizes research findings and relates them directly to the question.</p>

Experiment Category

Judging Rubric

Regional Elementary Science and Engineering Fair

Component	5-4	3-2	1-0	Score
Question	Wrote a clear, creative, and interesting scientific question and can be answered through experimentation. Variables are used in the question.	The question is simple and clear and can be answered through experimentation. Some variables are used in the question.	The question does not make sense OR cannot be answered through experimentation. No variables used in the question.	
Procedure/List of Materials	Step-by-step procedures were followed; they are logical and clearly written. Included a detailed materials list.	Step-by-step procedures were followed. Some improvements were needed to develop the project. Included a materials list.	Procedures were unclear and not listed step by step. Did not include a materials list, or list was incomplete.	
Analyze the results	Data tables and graphs are accurately labeled and drawn, and information is correct.	Data tables and graphs are somewhat accurately labeled and drawn. However, there may be information missing.	Data table and graph contain errors in labels, drawing and/or information.	
Conclusion	Results and conclusions show a clear and accurate understanding of the knowledge gained from conducting the experiment. The paragraphs show thought and effort.	Results and conclusions show somewhat of a clear and accurate understanding of knowledge gained from conducting the experiment. The paragraphs show some thought and effort.	Results and conclusions are unclear and show an inaccurate understanding of the knowledge gained from conducting the experiment. The paragraphs show little thought and effort.	
Presentation	The display slide is complete, nicely written or typed, and shows effort and creativity. Pictures are displayed. Presentation was well planned and organized.	The display slide is mostly complete, nicely written or typed, and shows some effort and creativity. Pictures are displayed. The presentation was somewhat organized and planned.	The display slide is incomplete, hard to read, and shows little effort and creativity. Few or no pictures are displayed. The presentation was disorganized.	
Mechanics	All mechanics are correct — spelling, grammar, punctuation, capitalization.	There are a few mechanical errors — spelling, grammar, punctuation, capitalization.	There are many mechanical errors — spelling, grammar, punctuation, capitalization.	
			Total Score	

Experiment Category

Exhibit Board Layout

Regional Elementary Science and Engineering Fair

Experiment

Display is visually appealing and well organized.
Board is free of spelling and grammar errors.

Question 

Project has a clear problem to investigate.

Data (Graphs) 

Trial One

Include captions on all graphs and pictures.

Data (Graphs) 

Trial Two

Include captions on all graphs and pictures.

Procedure

Steps are easy to follow, concise, and accurate. The method to the problem is appropriate.



Hypothesis 

A prediction is made that could answer the question.

Includes:

- Independent Variable
- Dependent Variable
- Control Variable

Materials 

A clear and complete list is given

Conclusion 

Restate the hypothesis, findings, and all relevant information. The conclusion must clearly relate to the question.

Include written information that explains the results of your experiment



Challenge Category

Judging Rubric

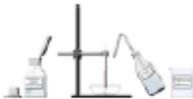
Regional Elementary Science and Engineering Fair

Component	5-4	3-2	1-0	Score
Title/Challenge	Clear/well-written - includes name of engineered product - includes description of challenge (can be from scenario)	Lacks 1+ of the criteria of a 5	Lacks 2+ of the criteria of a 5	
Research	Multiple topics researched - broke into parts and researched several Multiple sources used - variety of sites, books, and magazines	Lacks 1+ of the criteria of a 5	Lacks 2+ of the criteria of a 5	
Brainstorm/Plan	Multiple brainstorm - broke challenge into parts and demonstrated brainstorm Depth and breadth of thought -generated many, thorough ideas Quality of thought - logical connections made	Lacks 1+ of the criteria of a 5	Lacks 2+ of the criteria of a 5	
Original Design	Includes 1+ design drawing - top and/or side views Designs are clear and easy to follow - useful art or a visual plan	Lacks 1+ of the criteria of a 5	Lacks 2+ of the criteria of a 5	
Build	Finished/able to be tested Attention to detail - did the little things well	Lacks 1+ of the criteria of a 5	Lacks 2+ of the criteria of a 5	
Test/Improve	Multiple tests - broke challenge or product into parts and tested several parts several times - includes test results Improvements/modifications - improvements made based on testing make sense - improvements included	Lacks 1+ of the criteria of a 5	Lacks 2+ of the criteria of a 5	
Presentation	The display slide is complete - nicely written or typed - shows effort and creativity - includes images	The display slide is mostly complete - nicely written or typed - shows some effort and creativity	The display slide is incomplete - hard to read - shows little effort or creativity	
Mechanics Spelling, grammar, punctuation, capitalization	All mechanics are correct.	There are few mechanical errors.	There are many mechanical errors.	
			Total Score	

Challenge Category

Exhibit Slide Key

Regional Elementary Science and Engineering Fair

<h3>Challenge</h3> <p>Display is visually appealing and well organized. Board is free of spelling and grammar errors.</p>							
Research Multiple topics and resources sited 	Brainstorm/Plan Multiple brainstorm 						
Visuals Drawing 	Build Photo or drawing 						
Test and Modify <table border="1" style="width: 100%;"><thead><tr><th><u>Test #</u></th><th><u>Result/Observation</u></th><th><u>Changes made</u></th></tr></thead><tbody><tr><td> </td><td> </td><td> </td></tr></tbody></table> 		<u>Test #</u>	<u>Result/Observation</u>	<u>Changes made</u>			
<u>Test #</u>	<u>Result/Observation</u>	<u>Changes made</u>					

Engineering Design Challenges

Science and Engineering Fair

Grade 4 – Cardboard Furniture

Standards

4.1.2.1.1

4.1.2.2.1

4.1.2.2.2

4.1.2.2.3

Packing Comfort

There is a United States government agency called the Environmental Protection Agency (EPA) that seeks to protect our natural world. Part of its work is to gather information. To fix a problem, you need to understand the problem. In 2013, the EPA (epa.gov) found each person in the United States produced an average 5.9 pounds of trash each day (think about how many people live the U.S. and do the math)! Of the 5.9 pounds, about 1.5 pounds is recycled and about 4.4 pounds goes into landfills.

With some information on the problem, we can switch to solutions. It sure would help the trash situation if we could find ways to decrease the amount of trash we produce and find ways to reuse and repurpose the trash we produce. Conversations on this have spun into furniture waste (couches, chairs, tables, etc.). More information gathered by the EPA (epa.gov) found that about 9.8 million pounds of furniture are thrown away each year, worked out to be 1 pound out of every 20 pounds thrown.

What if our homes could be filled with comfortable and useable furniture? Better yet, what if this furniture could be made from recyclable materials? Still better, what if we could make plans so people could make this furniture at home, saving pollution from shipping and moving furniture? What if we told you this is possible and could be happening right now?

The answer... (wait for it) ...cardboard!

Cardboard is remarkably strong, cheap (usually free), and easy to find. This idea is growing in popularity, so much in fact that schools are partnering with Sourcewell to include it in this year's Regional Science Fair! The big idea is to create (research, design, test, improve) a piece of furniture using nothing but cardboard and adhesives (tape and glue) that could serve as a model for future furniture that could be made, bought, and sold, leading to a cleaner world for future generations.

Researching cardboard and furniture is a starting place that will lead to good brainstorm, design drawings, and first and final furniture models. The challenge is offered.

Do you have what it takes to be the next engineer who could help improve our trash problem? The competition exists for fourth graders only. The choice is yours...

Check out the Science Fair rubric to guide you on this journey.

Engineering Design Challenges

Science and Engineering Fair

Grade 5 – Bottle Biome

Standards

5.4.1.1.1

5.4.2.1.1

5.4.2.1.1

5.4.4.1.1

Mars Mission

Many of you have probably heard of NASA, the National Aeronautics and Space Administration. Its work has pushed our minds and our world further outward. The first trip to the moon carrying a human happened in 1969. Since then, knowledge and technology have improved. This has grown our imaginations and challenged thinkers to not only figure out how to go further but do more while there. NASA has sent four robotic vehicles to Mars and has a cool introduction to the rovers meant for young learners ([nasa.gov](https://www.nasa.gov)). Much fascination, mind-wandering, and far-fetched ideas happened surrounding the idea of space exploration. So have much possibility, serious research, planning, and testing.

Before important breakthroughs come impossible ideas. An “impossible idea” in recent years has been the idea of a human colony living on Mars. Innovative figures such as Elon Musk and people at Space X have pushed the boundaries of this idea so much now that in many people’s minds, it is possible. From a belief in an idea comes work toward making it happen. The work has begun.

Part of this work is overcoming the problem of food in space. Our food centers on plants and animals. Plants and animals are living things that have needs to live. It is a big problem but a solvable one. There are connections in nature, meaning living things work together and often get what they need from each other. For example, animals get oxygen and food from plants. There are many more examples and research that needs to be done, but a few things are agreed upon. Space is big and keeping a gas (such as oxygen) in one place requires a sealed environment (like a balloon, bag, or plastic bottle). Because balloons and bags easily get holes/pop, most energy is going into plastic bottle sealed environments.

With possibility in our imaginations, sealed-environment research has come to our region. Schools are partnering with Sourcewell to include this in this year’s Science Fair in a new engineering category only for fifth graders. Do you have what it takes to create a closed/sealed environment that includes at least one plant and animal? It sounds easy at first until it dawns on you that the plants and animals need to survive the trip to Mars. The trip takes about seven months with current technologies, depending on where Mars and Earth are at in their rotations around the sun. A few things to know: food on Mars is a future problem, technologies will improve, and we are in the early research stages and looking for ideas that show promise that can be tested more (and at larger scale) in the future.

That said, your challenge is to create a sealed environment made from 2-liter bottle(s) that can support the lives of one or more plants and animals for two weeks without being opened. To begin you will need to brainstorm and

research plants and animals in your area and what they each need to survive. This will help you find the “recipe” for life in the sealed environment. What will need to be placed inside that can support the other things?

From this research will come ideas that can be designed and drawn before taking shape in bottle form. Testing and modifications will need to happen as few first designs work as intended. The challenge is set. The choice is yours. Good luck, young engineers!

Engineering Design Challenges

Science and Engineering Fair

Grade 6 – Chain Reaction

Standards

6.2.2.1.1

6.2.2.1.2

6.2.2.2.1

6.2.2.2.2

6.2.2.2.3

6.2.3.2.1

6.2.3.2.2

So, in 1839...

Most sixth graders are 11 or 12 years old. According to publicdomainreview.org the “selfie” is almost 200 years old! ([First Selfie](#)) Surprised? A little information will help. The first light photograph taken of oneself happened in 1839 by Robert Cornelius, an amateur chemist who loved photography. Since then, this type of memory-capturing tool has become far easier and much more common. Although numbers vary due to difficulty to measure, some studies say we take almost 100 million selfies a day.

Although the selfie is oddly old and the modern selfie arguably overdone, taking photographs from an arm’s length is not going away anytime soon. This leads some to believe that the selfie needs a makeover. Not just any makeover, one fit for internet fame. An idea that could go viral, like an internet challenge.

Generations of people are coming together around this pop culture moment in time. A chance to improve an old popular classic is not an opportunity to be missed. In fact, schools are partnering with Sourcewell to make it part of this year’s Science Fair! Adults will offer support and opportunity, and young engineers will bring the innovation and model. One support in place is a starting point where you can apply your creative engineering design, testing, and modification skills. The start point is retro. Since selfies have become so easy and with the current trend toward old school, the idea of “take a picture the hard way” was born.

It is best to start by defining “hard way” and making the challenge simple enough to gather internet fame. Take a selfie in five or more steps using everyday items found in and around your home, garages, junk drawers, and storage areas. The steps must happen in a chain reaction, meaning each step is started by the step before it. More clarity still – you may only touch your creation in the first step. All subsequent steps must happen because of the previous steps. Five steps are the minimum. Challenge yourself to internet stardom, by designing, building, testing, and modifying your chain-reaction selfie process.

You will need to begin with brainstorming and researching which device you will use and all of the ways it can be activated to take pictures. Since the device cannot be touched by humans, it must be activated by another source. But what are all the ways/things that could be used to take a picture on a modern device (without breaking it obviously)? Backwards design could be your key to selfie success. Figure out how to activate the device and plan backward through your steps to the beginning.

Do you have the next selfie revolution ready to jump from your brain and be tested into reality? The challenge is set. Take a picture of yourselves the hard way (five or more steps that happen automatically) using household items. Although no bonus points will be awarded, holding the sign “#So1839” is recommended. Go forth and engineer your way to the next internet sensation.