

## Utah County 4-H Virtual STEM Fair

Accepting submissions through February 15, 2022.

Youth ages 5-18

Winners & Prizes Announced March 1, 2022

Youth complete an age/grade appropriate science experiment or develop an innovation using the appropriate scientific or design methods. Additionally, youth may demonstrate a scientific principle and explain how/why the principle works.

Youth may submit to only **ONE** category.

### Process:

- Maintain an electronic record of your experiment or design process via a science journal
- Create a presentation about your experiment or innovation.
- Create a video of your presenting your experiment or innovation.
- Submit your video via the registration prior to submitting
- Submit your science journal via the registration prior to submitting

### Project Categories:

- *Science Project*: investigates the effects of changes or answers a question.
- *Engineering/Innovation Project*: solves a need or problem; includes measures of success.
- *Demonstration Project*: shows how something works or a scientific principle

### Age/Grade Categories:

- Ages 5-7/Grades K-2
- Ages 8-10/Grades 3-5
- Ages 11-13/Grades 6-8
- Ages 14-18/Grades 9-12

### Video Submission Length:

- Ages 5-7/Grades K-2                      Submit a 1 - 2-minute video explaining your submission
- Ages 8-10/Grades 3-5                      Submit a 2 - 3-minute video explaining your submission
- Ages 11-13/Grades 6-8                      Submit a 3 - 4-minute video explaining your submission
- Ages 14-18/Grades 9-12                      Submit a video no more than 5 minutes explaining your submission

### 4-H membership Requirement:

You do not need to be a 4-H member to participate. The Utah County 4-H Virtual STEM Fair is open to all Utah County residents between the ages of 8-18. Youth from public, private, and homeschool settings are welcome and encouraged to participate.

### Prizes:

All participants will receive a certificate and t-shirt. Category winners, first – third place, will win an additional prize valued between \$50-\$100.

### Judging:

Judging will take place upon the close of submissions. Judges will be selected from the 4-H community or local business members dedicated to the promotion of STEM experiences for youth. Judges will utilize an assessment rubric to evaluate pre-recorded presentations in each category.

Judging rubrics follow a 4-point scale of advanced, proficient, competent, and developing. Judges select the most appropriate area for each of the assessed areas resulting a total score.

### **Video Submission:**

Videos can be created using a variety of formats. This may include a video of the presenter with their display board and support items – these might me the experiment items, innovation prototype, etc. Additionally, videos may a recorded presentation with attached voice over to the file. It is strongly suggested that PowerPoint show be saved as a video file. Details on how to complete this process are available here: <https://support.microsoft.com/en-us/office/save-a-presentation-as-a-video%E2%80%8B-in-powerpoint-ba919059-523d-40a8-b99c-08d18996c09d>

Videos may also be made in video creation software using moving and still images along with voice over.

All information in the presentation should address your topic, your chosen process (experiment, innovation, or demonstration). Use the included judging rubrics as you prepare your presentations.

All submissions regardless of type or age should include the following:

- A display of your project using the scientific process or design process with appropriate explanations for each step. See the examples provided.
- Materials used in your experiment, innovation, or demonstration
- Your STEM Fair journal detailing your experiment, innovation, or demonstration preparation

### **STEM Fair Journal:**

The STEM Fair Journal should be a record of your experiment, innovation, or demonstration process. See the included template as an example. Youth may use the included template or create their own electronic journal for submission.

### **Video & Journal Submission:**

Completed presentations and journals can be submitted through February 15, 2022 via this link: <https://forms.gle/EKa2XnupPVoMiPif9>

Submission will be accepted until 11:59pm, February 15, 2022. Any submission time stamped after that time will not be accepted.

## Experiments

4 Advanced	3 Proficient	2 Competent	1 Developing
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Scientific Method				
Question	Question is sophisticated for age/grade and can be answered through the scientific method.	Question is well developed and can be answered with the application of the scientific method.	Question is partially developed, lacks variable to effectively apply the scientific method.	Question is broad, lends itself to investigation rather than scientific method; more appropriate as a report or demonstration.
Hypothesis	Thoroughly developed, testable and clearly addresses the question.	Sufficiently developed, testable, and addresses the question.	Partially developed, limited testability, connected to the question.	Lacks development, flawed, not testable or connected to the question.
Materials	Complete list details how others could replicate the results with exact measurements.	List is complete, replication may be limited based on information provided.	List is partially completed, fails to provide measurement information, replication may be difficult.	Incomplete list, unable to replicate the project as written due to missing information.
Procedure	Well thought-out, easy to follow sequence of steps using scientific method language that is clear and correct.	Sequence is accurate for the scientific methods, easy to follow; mostly use scientific language correctly.	Somewhat difficult to follow due to missing information in the sequence, uses some scientific language.	Difficult to follow the scientific sequence; fails to use or incorrectly uses scientific language.
Results	Data is clear, directly related to the hypothesis/question.	Data is reasonably clear and demonstrates a connection to the hypothesis/question.	Data is limited and shows some relationships to the hypothesis/question.	Data is missing or unrelated to the hypothesis/question.
Conclusion	A logical conclusion that is drawn from the collect data, answers the hypothesis/question or raises a new hypothesis/question. Has a real-world application.	A logical conclusion is drawn from the data collected. Conclusion may be slightly flawed, fail to raise new questions, or has limited real-world applications.	A reasonable conclusion is made from the collected data. Conclusion may be flawed or have little real-world application.	A conclusion is drawn, however fails to related to the data collected or hypothesis/question. There is no real-world application.
Presentation				
Speaking	Speaking voice is strong, clear, and easily understood.  Speaker conveys confidence in talking about experiment.  Excellent eye contact with audience.	Speaking voice is easily understood.  Speaker is able to convey information about experiment.  Good eye contact with audience.	Speech is halting and hard to understand.  Speaker appears unsure of material presented.  Limited or sporadic eye contact with audience.	Student speaks unclearly and/or reads directly off board.  Speaker does not make eye contact with audience.
Written Components	Displays a high level of understanding of the scientific topic/concept within experiment.  Scientific projections from the experiment can be made.	Displays a moderate level of subject knowledge from research and the process of completing the experiment.  Scientific projections from the experiment can be made	Displays a fair level of subject knowledge from research and the process of completing the experiment.  Scientific projections from the experiment can be made.	Displays a low level of subject knowledge from research and the process of completing the experiment.  No scientific projections from the experiment can be made.

Display	Board is neat, attractive and creative.  Graphs and charts are properly labeled.  Spelling and grammar are correct.	Board is neat and attractive.  Graphs and charts are mostly labeled.  Spelling and grammar are mostly correct.	Board is neat.  Graphs and charts have been attempted.  Spelling and grammar are somewhat correct.	Board is poorly done with no evidence of effort.  Graphs and charts are missing.  Spelling and grammar is lacking.
Journal				
	Journal is complete, information to support project scope and development is clear and understandable.	Journal is sufficiently complete, missing some information to support project scope and development.	Journal is mostly complete, missing information to support project scope and development.	Journal is missing.
	Project is unique or original, novel approaches or thinking were used to test the hypothesis/question that were appropriately above age/grade expectations.	Project demonstrates a strong attempt at a unique or novel approach to testing the hypothesis/question appropriately above age/grade expectations.	Project is not particularly unique in its approaches or thinking, but demonstrates age-appropriate thinking and hypothesis testing.	Project is not unique or creative for age or grade expectations and fails to consider novel approaches to testing the hypothesis/question.
Independence				
	Project is appropriate for age/grade, evident the youth completed the project with little to no adult intervention (as appropriate for safety); recognizes adult support/contributions.	Project is sufficiently appropriate of age/grade, evidence indicates project was completed by youth with limited adult intervention; recognizes support contributors.	Project is somewhat age/grade appropriate and provides some evidence the youth was highly involved in the project, does not recognize adult contributions.	Project evidence does not support age/grade appropriateness or the involvement of the youth in completing the project, fails to recognize adult contributions.

Judges Notes:

Engineering/Innovation

4 Advanced	3 Proficient	2 Competent	1 Developing
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Research Problem				
Research & Problem Explanation	Description of research is clear and concise including previous attempts to resolve the problem.  Description of WHY the problem is important or needs addressed (e.g., real-world applications, connection to youth interests, lack of current solutions, etc.)	Description of research is sufficiently complete, lacks mention of previous solutions or elaborate on why a solution is needed.  Description of WHY the problem is important or needs addressed is present, but not well developed.	Description of research is partially complete, lacks mention of previous solutions or elaborate on why a solution is needed.  Description of WHY the problem is important or needs addressed is somewhat present, but only somewhat developed.	Description indicates little to no research was completed, no mention of existing solutions.  Description of WHY the problem is important is irrelevant or no solution is needed. Youth does not demonstrate why they chose the design problem.
Design Problem	Description of the problem or need is complete, including who/what it impacts and why.	Description of the problem or need is sufficiently complete. It lacks some information such as who /what it impacts or why.	Description of the problem or need is partially complete. It lacks some information such as who /what it impacts or why.	Student not able to articulate the problem or need. No mention of the impacts of this problem/need.
Design Plan & Materials	Blueprint, sketch or design image is neat, to scale, labeled correctly, includes measurements and units.	Blueprint/sketch is neat, labeled, includes measurement and units but is not drawn to scale.	Blueprint/sketch is neat, labeled, includes lacks some measurements and units but is not drawn to scale.	Blueprint/sketch is missing or is incomplete (not neat/missing measurements, labels, units).
Prototype	Prototype is well constructed based on the blueprint/sketch. And, student engineer can fully explain how the materials were used to construct the prototype.	Prototype is constructed and sufficiently follows the blueprint/sketch. Student engineer cannot clearly explain how the materials were used to construct the prototype.	Prototype is constructed and partially follows the blueprint/sketch. Student engineer cannot clearly explain how the materials were used to construct the prototype.	Prototype is missing or this step was skipped.
Testing, Data & Discussion	Appropriateness, effectiveness, efficiency, and durability are tested under different conditions.  Data is summarized in tables, charts, diagrams, and/or graphs AND is labeled correctly (including units). All calculations are correct  Explanation includes how the data was collected and how it informed changes made to the prototype.	Effectiveness, efficiency, and durability are tested, but not under different conditions.  Data is sufficiently complete with visual representations. Calculations are inaccurate.  Explanation is sufficiently complete. It includes how data was collected but not how this collected data was used to enhance the design.	Effectiveness, efficiency, and durability are tested, but not under different conditions.  Data is partially complete with some visual representations. Calculations are inaccurate.  Explanation is partially complete. It includes how data was collected but not how this collected data was used to enhance the design.	Minimal or no testing was done to test prototypes.  Minimal data collection and presentation of data is not accurate.  Calculations are incomplete and/or inaccurate.  Explanation does not discuss data collection methods, uses of data, or limitations of the design
Conclusion	Conclusion demonstrated a well-thought-out explanation of the design limitations.	Conclusions demonstrated a sufficiently thought-out explanation, although some elements are not clearly understood.	Conclusions demonstrated a partially thought-out explanation, although many elements are not clearly understood.	Conclusion does not demonstrate an explanation of the design process.

Presentation				
Speaking	Speaking voice is strong, clear, and easily understood.  Speaker conveys confidence in talking about experiment.  Excellent eye contact with audience.	Speaking voice is easily understood.  Speaker is able to convey information about experiment.  Good eye contact with audience.	Speech is halting and hard to understand.  Speaker appears unsure of material presented.  Limited or sporadic eye contact with audience.	Student speaks unclearly and/or reads directly off board.  Speaker does not make eye contact with audience.
Written Components	Displays a high level of understanding of the topic/concept.	Displays a moderate level of subject knowledge from research and understanding of the topic/concept.	Displays a fair level of subject knowledge from research and understanding of the topic/concept.	Displays a low level of subject knowledge from research and understanding of the topic/concept.
Display	Board is neat, attractive and creative.  Graphs and charts are properly labeled.  Spelling and grammar are correct.	Board is neat and attractive.  Graphs and charts are mostly labeled.  Spelling and grammar are mostly correct.	Board is neat.  Graphs and charts have been attempted.  Spelling and grammar are somewhat correct.	Board is poorly done with no evidence of effort.  Graphs and charts are missing.  Spelling and grammar is lacking.
Journal				
	Journal is complete, information to support project scope and development is clear and understandable	Journal is sufficiently complete, missing some information to support project scope and development	Journal is mostly complete, missing information to support project scope and development	Journal is missing.
Creativity				
	Project is unique or original, novel approaches or thinking were used to test the hypothesis/question that were appropriately above age/grade expectations	Project demonstrates a strong attempt at a unique or novel approach to testing the hypothesis/question appropriately above age/grade expectations	Project is not particularly unique in its approaches or thinking, but demonstrates age-appropriate thinking and hypothesis testing	Project is not unique or creative for age or grade expectations and fails to consider novel approaches to testing the hypothesis/question
Independence				
	Project is appropriate for age/grade, evident the youth completed the project with little to no adult intervention (as appropriate for safety); recognizes adult support/contribution	Project is sufficiently appropriate of age/grade, evidence indicates project was completed by youth with limited adult intervention; recognizes support contributors	Project is somewhat age/grade appropriate and provides some evidence the youth was highly involved in the project, does not recognize adult contributions	Project evidence does not support age/grade appropriateness or the involvement of the youth in completing the project, fails to recognize adult contributions

Judges Notes:

## Demonstration

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Demonstration				
Scientific Principle	Principle is accurately demonstrated.	Principle is sufficiently accurately demonstrated.	Principle is fairly accurately demonstrated	Principle is not accurately demonstrated
Scientific Content	Demonstration is relevant to material discussed in class. Shows a complete understanding of topic.	Demonstration is relevant to material discussed in class, but student does not show an complete understanding of topic.	Demonstration has little relevance to classroom discussions and material. student shows limited understanding of topic.	Demonstration is unrelated to anything discussed in class. Student shows no knowledge of topic.
Organization & Performance	All materials present and easily assessable. Demonstration runs smoothly.  Performed demonstration procedures are listed in clear steps. Each step is numbered.	Have all materials present and mostly organized so the demonstration can run smoothly. Minor problems that do not hinder the overall effectiveness of the demonstration.  Performed procedures are listed in a logical order, but steps are not numbered and/or are not clear.	Have all materials present, but not organized in a way that the demonstration can run smoothly.  Performed procedures are listed but are not in a logical order or are difficult to follow	Did not bring all materials to complete the demonstration.  Performed procedures do not accurately match the provided procedures of the demonstration.
Interest/Excitement	Demonstration was very interesting and captured the excitement of all those viewing the presentation.	Demonstration was quite interesting and excited most viewers.	Demonstration was only slightly interesting and was exciting to only a few viewers.	Demonstration was not interesting and lacked excitement.
Professionalism/Safety	Demonstration is carried out with full attention to relevant safety procedures. The set-up, experiment, and teardown posed no safety threat to any individual	Demonstration is generally carried out with attention to relevant safety procedures. The setup, experiment, and tear-down posed no safety threat to any individual, but one safety procedure needs to be reviewed	Demonstration is carried out with some attention to relevant safety procedures. The set-up, experiment, and teardown posed no safety threat to any individual, but several safety procedures need to be reviewed.	Safety procedures were ignored and/or some aspect of the experiment posed a threat to the safety
Conclusions	Demonstration conclusion are very clear, easily understood and interesting; illustrating what was learned from the demonstration.	Demonstration conclusion are present and clear as to what was learned from the demonstration.	Demonstration conclusion are present but are not clear as to what was learned from the demonstration.	No conclusion was included OR shows little effort and reflection.

Presentation				
Speaking	Speaking voice is strong, clear, and easily understood.  Speaker conveys confidence in talking about experiment.  Excellent eye contact with audience.	Speaking voice is easily understood.  Speaker is able to convey information about experiment.  Good eye contact with audience.	Speech is halting and hard to understand.  Speaker appears unsure of material presented.  Limited or sporadic eye contact with audience.	Student speaks unclearly and/or reads directly off board.  Speaker does not make eye contact with audience.

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