

# STEAM FAIR

## JANUARY 9, 2020

### 6:00 – 7:30 PM

Dear Parents and Guardians,

During the next few weeks your child will be designing a STEAM project that uses the scientific method to solve a problem. We hope you agree that the educational benefits are numerous, as students develop skills in writing, oral presentation, creative thinking, and problem solving. This project can be done as a family, with a partner, or alone!

This packet includes a list of ideas for possible projects as well as guidelines for completing a project. Your child's project may be one of the following: scientific investigation, invention, art and design, or reverse engineering. Please go through this packet and help your child select a project that will be interesting to your child and will be appropriate in terms of difficulty and resources available.

We ask that you encourage your child and monitor his/her progress along the way. Your support is key to a successful project, guiding your child whenever and wherever you can, as your child wrestles with problems and tries to solve them.

Developing a STEAM investigation will provide students the opportunity to use knowledge and skills just as scientist and engineers do in the real world. This project is designed for students to communicate information correctly, write clearly, collect and interpret data, use evidence to justify their thinking, manage time, and ask "WHY" leading to the development of an experiment or designing of a solution/innovation.

While we recognize that students might need some assistance in developing their ideas and supervision as they do their experiments, 95% of the work is to be done by the students. This packet is provided to help students and parents understand the process students are to follow in preparation for the STEAM Fair. It is up to the student to decide what to study. You can help by motivating your child and listening to his or her ideas. However, it is critical that you remember it is up to your child to design and execute the entire project. Expect your child to spend time brainstorming, researching, planning, experimenting, analyzing data, writing a report, and constructing a display. Remember this project is a learning experience for your child!

Please let us know if your child needs additional support to complete this project. Look for a Sign Up Genius coming home soon for times where teachers will be available to help with this project at school. Please let me know if you have any questions at 720-424-9444 or [Margaret\\_cypress@dpsk12.org](mailto:Margaret_cypress@dpsk12.org).

Sincerely,  
Bradley International Staff

# Scientific Inquiry

**Definition:** Scientific Inquiry is the basic experimentation category and covers scientific methodology, research, hypothesis, experiment design, data collection and analysis.

**Requirements:** A successful Scientific Inquiry entry must have the following:

- Scientific method must be utilized
- Ask a testable question
- Make a hypothesis about the outcome based on the research or your own knowledge
- Design the investigation
- Conduct the investigation
- Collect Data
- Make sense of the data and draw a conclusion

**Project must include:**

1). A tri-fold display board highlighting the scientific method used and including the following:

- Name of project, your name, grade and teacher name
- Written and/or visual scientific methodology, research, hypothesis, experiment design, data collection, and analysis

2). Visual aids or hands on item(s) to promote understanding

## Scientific Process Projects

MATERIALS	TITLE		RESULTS & INTERPRETATION
	QUESTION	HYPOTHESIS	
	PICTURES		
PICTURES			GRAPHS
DATA	BACKGROUND RESEARCH	PROCEDURES	CONCLUSION

# Inventions

**Definition:** An Invention is a new device, creation, or process originated after study and experimentation.

**Requirements:** A successful Invention must have the following:

- The Invention addresses a real world problem or need
- The Invention offers functionality that solves the problem efficiently

**Project must include:**

1). Tri-fold display board that includes:

- Title of the Invention, your name, grade and teacher name
- A description of the problem the invention solves
- Labeled illustration showing two viewpoints of proposed invention
- Drawings or descriptive text clearly describing construction process and materials
- Function of each part is identified and completely described
- (Optional) A 'mock-up' or prototype, well designed and constructed for all or part of the invention

2). Visual aids or hands on item(s) to promote understanding

3.) Inventor's log that includes the following:

- Written statement of the purpose of the invention and the problem it solves.
- List of materials used.
- List of all the steps taken to complete the invention
- Description of the problems encountered and including drawings or photographs of attempts that failed
- Written statement proving originality. (Students should also describe what they did to ensure that their invention does not already exist)

**Examples in this category:**

- <https://www.youtube.com/watch?v=rSvMbK0x6cA>
- <http://www.slideshare.net/cmillica/examples-of-invention-convention>
- <https://www.khanacademy.org/partner-content/metropolitan-museum/extravagant-inventions/v/rolltop-desk>
- <http://lemelson.mit.edu>

Sample Display Board for Engineering Process Projects

	TITLE		
MATERIALS	PROBLEM	PROPOSED SOLUTION	RESULTS & INTERPRETATION
PICTURES	PICTURES		GRAPHS
DATA/LOG BOOK	BACKGROUND RESEARCH	DESIGN	CONCLUSION

# Reverse Engineering

**Definition:** Reverse engineering is the process of discovering the technological principles of a device, object, or system through analysis of its structure, function, and operation. It often involves taking something (e.g., a mechanical device or electronic component - a toaster or smartphone) apart and analyzing its workings in detail to be used in maintenance.

**Requirements:** A successful Reverse Engineering entry must have the following:

- Locate and acquire two (if possible) similar mechanical or electrical products (ie; toasters) that contain several major components, made from a variety of materials
- The product is a real world item whose operation is not generally well known
- Project scope is reasonable and allows for disassembly to adequate levels

**Project must include:**

1). A tri-fold display board highlighting the requirements listed below:

- Name of machine to be reverse engineered, your name, grade and teacher name
- Operation of assembled unit is explained
- Disassemble one product, then mount and label all components (or photos of parts), adequately describing the function of each part
- Layout of parts vs. assembled unit is organized, clear and promotes understanding of location and purpose
- Written description explaining operation and functionality of all components - can include illustrations and/or images
- The project clearly shows sequence of operation or cause and effect within the product
- (Optional) Research history of product/invention

2). Visual aids or hands on item(s) to promote understanding

Some questions to guide your thinking:

- Does this appliance come apart into two or more pieces?
- What might some of these parts do?
- Would the appliance work without the part?
- What holds the parts together?
- Do some of the parts come apart into even smaller pieces?
- What tools did you use to get the pieces apart?

**Examples in this category:**

- Khan Academy Discoveries and Projects: [www.khanacademy.org](http://www.khanacademy.org) (search reverse engineering)
- <http://craftknife.blogspot.com/2012/10/let-your-kids-dismantle-your-old.html>

# Art/Design

**Definition:** An Art & Design project is a functional item or model made out of recycled materials. If you have another idea that you feel would fit in this category, please feel free to write it up and submit it for evaluation.

Requirements: A successful Art/Design project must be one of the following:

- A functional item made out of recycled materials (ie. a tie made out of pennies)
- A scale model of something that can be scientifically explained (ie. a model of an atom made from cotton balls and wire)

**Project must include:**

A tri-fold display board highlighting the requirements listed below:

- Name of your Art/Design, your name, grade and teacher name
- Drawings or descriptive text clearly describing construction process
- Written description (see requirements below):

For a functional item, the description must include: materials used; tools used; how item would be used and description of intended audience / user of the item; inspiration; process and revisions

For a model, the description must include: materials used, tools used, how the item is used, the science behind the structure and use of the item; inspiration; process and revisions

**Project examples:**

<https://www.youtube.com/watch?v=67CW6Yi0LmQ>

[https://www.youtube.com/watch?v=b-Oocwv\\_HUU](https://www.youtube.com/watch?v=b-Oocwv_HUU)

<https://www.youtube.com/watch?v=LBQdlaeaLgA>

<https://pbskids.org/designsquad/build/>

## Sample Display Board for Art/Design Functional Item

Tools Used	Title Name, Grade, Teacher	Drawings or descriptive text clearly describing construction process
Materials Used	Detailed Description of Functional Item	
Process and Revisions	Intended Audience	
	Inspiration	Suggestions for future revisions
	How Will Item Be Used	

# STEAM Fair Evaluation Rubric

## *REVERSE ENGINEERING*



Scientist \_\_\_\_\_

Project Title \_\_\_\_\_

\_\_\_\_\_ Project has all requirements met as outlined in the guidelines

- \_\_\_\_\_ Locate and acquire two (if possible) similar mechanical or electrical products (ie; toasters) that contain several major components, made from a variety of materials
- \_\_\_\_\_ The product is a real world item whose operation is not generally well known
- \_\_\_\_\_ Project scope is reasonable and allows for disassembly to adequate levels
- \_\_\_\_\_ Operation of assembled unit is explained
- \_\_\_\_\_ Disassemble one product, then mount and label all components, adequately describing function of each part
- \_\_\_\_\_ Layout of parts vs. assembled unit is organized, clear and promotes understanding of location and purpose
- \_\_\_\_\_ Written description explaining operation and functionality of all components - can include illustrations and/or images
- \_\_\_\_\_ Identify if there was an alternate way of disassembling. If yes, describe it.
- \_\_\_\_\_ The project clearly shows sequence of operation or cause and effect within the product

\_\_\_\_\_ Project has a clear title and labels to help make parts clear

\_\_\_\_\_ Information shows depth of knowledge and understanding of the topic in detail

\_\_\_\_\_ Visual display board is clearly written and organized and promotes understanding

\_\_\_\_\_ Project uses correct conventions (capitalization, usage, punctuation, and spelling)

\_\_\_\_\_ Overall project is neat (careful cutting, gluing and layout)

# STEAM Fair Evaluation Rubric

## SCIENTIFIC INQUIRY



Scientist \_\_\_\_\_

Project Title \_\_\_\_\_

\_\_\_\_\_ Project has all requirements met as outlined in the guidelines

\_\_\_\_\_ Scientific method must be utilized

\_\_\_\_\_ Ask a testable question

\_\_\_\_\_ Make a hypothesis about the outcome based on the research or their own knowledge

\_\_\_\_\_ Design the investigation

\_\_\_\_\_ Conduct the investigation

\_\_\_\_\_ Collect Data

\_\_\_\_\_ Make sense of the data and draw a conclusion

\_\_\_\_\_ Revisions and solutions (either implemented or potential) identified

\_\_\_\_\_ Display board must attractively address all elements of scientific method, must include visuals

\_\_\_\_\_ Project has a clear title and labels to help make parts clear

\_\_\_\_\_ Information shows depth of knowledge and understanding of the topic in detail

\_\_\_\_\_ Visual display board is clearly written and organized and promotes understanding,

\_\_\_\_\_ Project uses correct conventions (capitalization, usage, punctuation, and spelling)

\_\_\_\_\_ Overall project is neat (careful cutting, gluing and layout)

# STEAM Fair Evaluation Rubric

## INVENTION



Scientist \_\_\_\_\_

Project Title \_\_\_\_\_

\_\_\_\_\_ Project has all requirements met as outlined in the guidelines

\_\_\_\_\_ The Invention addresses a real world problem or need

\_\_\_\_\_ The Invention offers functionality that solves the problem efficiently

\_\_\_\_\_ Labeled illustration showing two viewpoints of proposed invention

\_\_\_\_\_ Drawings or descriptive text clearly describes construction process

\_\_\_\_\_ Function of each part is identified and completely described

\_\_\_\_\_ Revisions and solutions (either implemented or potential) identified

\_\_\_\_\_ Log discusses how the invention would be used; how it would be beneficial; and description of intended audience/user

\_\_\_\_\_ Project has a clear title and labels to help make parts clear

\_\_\_\_\_ Information shows depth of knowledge and understanding of the topic in detail

\_\_\_\_\_ Visual display board is clearly written and organized and promotes understanding,

\_\_\_\_\_ Project uses correct conventions (capitalization, usage, punctuation, and spelling)

\_\_\_\_\_ Overall project is neat (careful cutting, gluing and layout)



# STEAM Fair Evaluation Rubric

## *Art and Design*



Scientist \_\_\_\_\_

Project Title \_\_\_\_\_

\_\_\_\_\_ Project has all requirements met as outlined in the guidelines

\_\_\_\_\_ The Project is a functional item or is a model of something about which science can be explained

\_\_\_\_\_ The Project is made out of recycled materials

\_\_\_\_\_ Drawings or descriptive text clearly describing construction process

\_\_\_\_\_ Function of each part is identified and completely described

Written portion detailing:

\_\_\_\_\_ **For functional item:** materials used; tools used; how item would be used; description of intended audience / user of the item; inspiration; process and revisions

\_\_\_\_\_ **For model:** Details show/describe materials used, tools used, how item is used, science behind the structure and use of the item; inspiration; process and revisions

\_\_\_\_\_ Project has a clear title and labels to help make parts clear

\_\_\_\_\_ Information shows depth of knowledge and understanding of the topic in detail

\_\_\_\_\_ Visual display board is clearly written and organized and promotes understanding,

\_\_\_\_\_ Project uses correct conventions (capitalization, usage, punctuation, and spelling)

\_\_\_\_\_ Overall project is neat (careful cutting, gluing and layout)