STEAM Project

What: Science STEAM Project
Due: 1/21/22
Details: Packet will be sent home in Friday Folders and will also be emailed to families.

During the next few weeks, your child will be designing a STEAM (Science, Technology, Engineering, Art, or Mathematics) project to present to our class at our STEAM Fair. This project can be done as a family, with a partner from our classroom (if you are comfortable), or alone. We do expect each child to complete a project. This is not an optional activity.

Developing a STEAM investigation will provide students the opportunity to use knowledge and skills just as scientists, designers, 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, ask why, and look for solutions and innovations to problems.

We ask that you encourage your child and monitor his/her progress along the way. Your support is key to a successful project. That being said, it is important that 95% of the work be done by the student. Expect your child to spend time brainstorming, researching, planning, executing the project, writing a report, and constructing a display.

Your child received a packet that 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: a scientific investigation, an invention, an art and design project, or a reverse engineering project. Please go through the packet and help your child select a project that is exciting and interesting to them and will be appropriate in terms of difficulty and resources available to you.

We are so excited to see what your child chooses to explore! Feel free to reach out with any questions!

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

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

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?

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
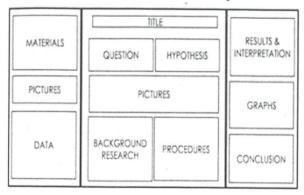
For a model, the description must include: materials used, tools used, how the item is used, the science behind the structure and use of the item; inspiration; process and revisions
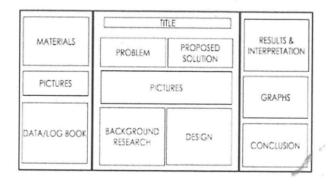
Project examples:
https://www.youtube.com/watch?v=67CW6Yi0LmQ
https://www.youtube.com/watch?v=b-Oocwv_HUU
https://www.youtube.com/watch?v=LBQdlaeaLgA
https://pbskids.org/designsquad/build/

Scientific Process Projects

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

Sample Display Board for Engineering Process Projects

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

Sample Display Board for Art/Design Functional Item

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

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

Art and Design

Scientist _____

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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)

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

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)