2024 – 2025

Science Fair

Resources, Required Forms, and Planning Guides

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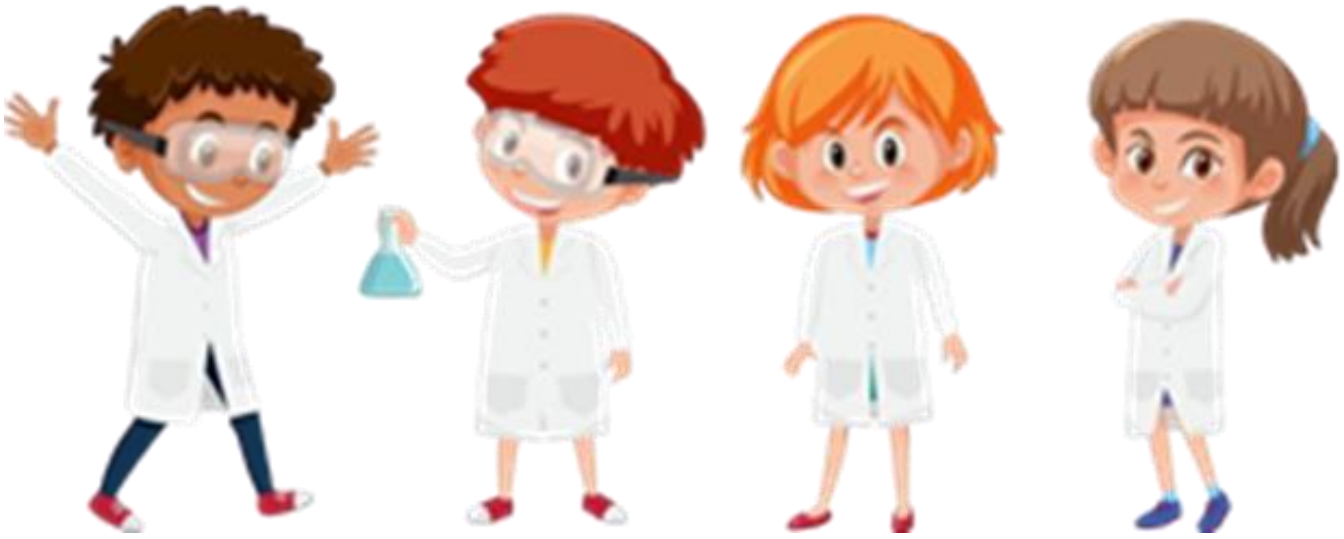


Types of Projects

1. **SCIENTIFIC INVESTIGATION**: In this type of experimental project, you ask a question in the form of a *problem statement*, construct a *hypothesis*, test your hypothesis using an *experiment*, and draw *conclusions* from your experiment. It involves using **the scientific method.**

- **Experiment:** In this kind of investigation, your purpose is to change something (test or independent/manipulated variable) and record the outcome of this change (outcome or dependent/responding variable). EXAMPLE: Which material, aluminum foil or plastic wrap, will insulate cold water better?

- **Experiment with a Control Group**: This kind of investigation involves a more complex investigation designed to test the effects of a single condition or factor on a system. For example, you might have a group of plants as an experimental group and another group of the same type of plants as a control group. This experiment's test or independent variable is the amount of chemical fertilizer added only to the experimental plant group. No fertilizer would be added to the control group. Both the control and experimental groups have the same constants (the normal conditions), such as the amount of water and the sunlight. The outcome or dependent variable is the difference observed in the growth of the plants.

2. **ENGINEERING/INVENTION**: In this type of project, you either create a new project or reengineer a current project. THESE PROJECTS ***DO NOT USE THE SCIENTIFIC METHOD*.** These projects must fit into the following categories:

- **Engineering**: Projects can ***redesign*** technological devices which are useful to the global society within an engineering-related field, such as electricity, mechanical, chemical, aeronautical, and geological.

- **Inventions**: Projects that use design and engineering processes to find a ***new*** practical solution to a problem that exists.

Science Fair Rules

- Only individual projects are allowed.
- Only two types of projects may be entered into the District Fair: *a scientific investigation or an engineering/invention project*.
- Projects must fit in one of the eight (8) science fair project categories listed in this resource packet.
- **No mold**, **algae, fungi, or bacterial growth/testing projects are allowed**.
- **No use of vertebrate animals is allowed except for observational projects**.
- **No use of prescription drugs, or harmful, or illegal substances is allowed.** Grocery items (i.e., baking soda, vinegar, salt, lemon juice, etc.) are appropriate.
- **No human subjects can be used to test** (i.e., taste test, poking, pain reaction, sniffing, painting fingernails, chewing gum, etc.)
- Any projects that promote violence, weapons, or instill fear in the public, the exhibitor, or other exhibitors and the use of fire are **PROHIBITED**.
- Project display boards must follow the safety rules listed in this resource packet.
- ***Projects must be approved by the classroom teacher/school-level science fair committee before it is submitted to the MDCPS Science Fair. Students should complete and submit the Project Proposal form to their teacher/school-level committee.***

ELEMENTARY SCIENCE, MATHEMATICS, ENGINEERING, AND INVENTION FAIR
RUBRIC FOR JUDGING INVESTIGATION PROJECTS

1. Abstract & Bibliography: To what degree do the abstract and bibliography describe the project and support the research?	0 = No Abstract/No documentation of research 1 = Poorly written and one documentation 2 = Poorly written and two documentations of research 3 = Well-written but does not describe all components of the project 4 = Well-written and completely describes the project
2. Problem Statement: To what degree is the problem statement new and/or different for a student at this grade level, and how well is it written?	0 = No Problem Statement 1 = Incomplete Problem Statement 2 = Poorly written or not in a question form 3 = Complete a well-written Problem Statement in question form 4 = Above expectations – detailed, well-written in question form
3. Hypothesis: To what degree is this a testable prediction? Is it written in an **"If…then…"** statement?	0 = No hypothesis 1 = Incomplete hypothesis 2 = Complete hypothesis, but not completely testable 3 = Hypothesis is well-written and testable 4 = Hypothesis is above expectations – detailed, well-written, testable
4. Procedures: - Numbered step by step - Sentences begin with verbs - Quantities to measure are listed in metric units	0 = No overall procedural plan to confirm the hypothesis 1 = Partial procedural plan to confirm the hypothesis 2 = Sufficient procedural plan to confirm the hypothesis 3 = Well-written plan, numbered step-by-step, sentences beginning with verbs 4 = Well-written as above and detailed, including repeatability and specified measurements of materials used in the experiment
5. Variables: -Test (independent/manipulated) -Outcome (dependent/responding) -Control (if applicable) -Constants	0 = No variables or constants are recognized 1 = Some variables or some constants are recognized 2 = All variables are recognized, but not all constants and controls (if applicable) or vice versa 3 = All variables & constants, and controls (if applicable) are recognized 4 = All variables & constants, and controls (if applicable) are clearly and appropriately recognized
6. Materials and Equipment: Were the items - listed in column form? - specifically named? - listed in metric units?	0 = No materials identified or used 1 = Materials not specifically identified and/or used properly 2 = Materials specifically identified but used improperly 3 = Materials specifically identified in column form and used properly 4 = Materials specifically identified in column form & metric units used properly
7. Results: To what degree have the results been interpreted?	0 = No written narrative interpretation of data 1 = Partial written narrative interpretation of data 2 = Correct written narrative interpretation of data 3 = Comprehensive narrative interpretation of data, including averaging 4 = Comprehensive and significant interpretation of data above expectations
8. Conclusion: To what degree are the conclusions recognized and interpreted? Including: - the purpose of the investigation - the hypothesis supported/not supported - the major findings	0 = No problem statement or interpretation of data support for hypothesis identified. 1 = Incomplete problem statement or interpretation of data support for the hypothesis 2 = Correct/complete conclusion/interpretation of data support for the hypothesis 3 = Well-written conclusion/interpretation of data support for the hypothesis 4 = Well-written conclusion/interpretation of data support for the hypothesis with major findings and possible explanations for them
9. Application: To what degree are the applications recognized and interpreted? Including: -Improvements to the investigation - Use of the findings - New question(s) to be investigated	0 = No recommendations, applications, or new questions recognized 1 = Incomplete or vague recommendations, applications, or new question recognized 2 = Apparent recommendations, applications, or new questions recognized 3 = Recommendations, applications, and new questions clearly recognized 4 = Significant well-written recommendations, applications, and new questions recognized
10. Final Project/ Display Attributes: - free standing - correct grammar/ spelling - clear and legible - attractive visual display	0 = Unsatisfactory quality of display - more than three attributes are missing 1 = Poor quality of display - only two or three attributes are missing 2 = Average quality- only one attribute missing with minor errors and of fair quality 3 = Good quality – all attributes present and with few if any minor errors 4 = Superior display – all attributes present and of exemplary quality
11. Video Presentation: -How clear, well-prepared, and organized is the presentation? -How complete is the student's understanding of the experimental work?	0 = Poor presentation; cannot answer questions 1 = Poor presentation; partially answers questions 2 = Fair presentation; adequately answers most questions 3 = Good presentation; precisely answers most questions 4 = Exemplary presentation and knowledge; precisely answers all questions

ELEMENTARY SCIENCE, MATHEMATICS, ENGINEERING, AND INVENTION FAIR
RUBRIC FOR JUDGING ENGINEERING/INVENTION PROJECTS

1. Abstract & Bibliography: To what degree do the abstract and bibliography describe the project and support the research?	0 = No Abstract/No documentation of research 1 = Poorly written and one documentation 2 = Poorly written and two documentations of research 3 = Well-written but does not describe all components of the project 4 = Well-written and completely describes the project
2. Problem: Does the project identify a problem and address a problem or a need?	0 = No problem to solve or no need for the project 1 = Poor project or little need for it 2 = Unoriginal project, questionable need 3 = Shows insight and addresses a problem or need 4 = Original, unique project that addresses or solves a real problem
3. Experimental Design: Does the design/model of the project have the functionality and practicality to address or solve the problem?	0 = No design or model to address or solve the problem 1 = Poor quality design, not functional or practical 2 = Average quality design, functional but not practical 3 = Sufficient quality, functional, practical design 4 = Exemplary quality, very functional, practical design
4. Experimental Procedures: How complete are the sequential steps of the procedures?	0 = Steps in the design of the project are not listed or are not clear 1 = Steps in the design of the project are listed but are incomplete or vague 2 = Steps in the design of the project are clear but hard to follow 3 = Steps in the design of the project are clear and complete 4 = Steps in the design of the project are clear, complete, and easy to follow
5. Materials/Equipment: How were the items utilized appropriately or in new ways?	0 = No materials/equipment identified/used 1 = Materials not appropriately identified and/or used unsafely 2 = Materials appropriately identified and used safely 3 = Materials carefully identified and used above expectations 4 = Materials carefully identified, used above expectations, and costs kept down
6. Scientific Process: How well has this experimenter done the research and provided evidence to show that no similar project/invention exists?	0 = No documentation of research 1 = Very little documentation of research 2 = Sufficiently documentation of research 3 = Carefully documented, but limited research 4 = Carefully documented with extensive research
7. Data Presentation: Are there labeled diagrams or data tables representing the project?	0 = No labeled diagram(s) or data tables 1 = Partially labeled diagrams or data tables 2 = Unclear or messy labeled diagram(s) or data tables 3 = Sufficiently labeled diagram(s) or data tables 4 = Exemplarily labeled diagram(s) or data tables
8. Data Analysis: What problems were encountered in the development of the project? What additions could be made to this project to make it better?	0 = No improvements/additions to the invention were attempted 1 = Limited improvements/additions to the invention were attempted 2 = Some improvements/additions to the invention were attempted 3 = Very good improvements/additions to the invention were made during its development 4 = Excellent improvements/additions to the invention were made during its development
9. Outcomes: Can the function of the project be easily identified? How well does the project/invention meet the need for which it was created?	0 = The function of the project is not easily identified, and it does not meet the need 1 = The function of the project can be identified, but the need is not met 2 = The function of the project can be identified, and the need is partially met 3 = The function of the project is very good, and the need is met 4 = The function of the project is exemplary, and the need is completely met
10. Project Design Construction: How well is this project designed and constructed?	0 = Poorly designed and constructed 1 = Poorly designed or poorly constructed 2 = Adequate design and constructed 3 = Good design and constructed 4 = Well designed and constructed, shows attention to detail
11. Final Project/ Visual Display: How well is the project displayed, constructed, and organized? Are spelling and sentence structure correct?	0 = Unsatisfactory quality of display - more than three attributes are missing 1 = Poor quality of display - only two or three attributes are missing 2 = Average quality- only one attribute missing with minor errors and of fair quality 3 = Good quality – all attributes present and with few if any minor errors 4 = Superior display – all attributes present and of exemplary quality
12. Video Presentation: How clear, well-prepared, and organized is the presentation? How complete is the student's understanding of the invention?	0 = Poor presentation; cannot answer questions 1 = Poor presentation; partially answers questions 2 = Fair presentation; adequately answers most questions 3 = Good presentation; precisely answers most questions 4 = Exemplary presentation and knowledge; precisely answers all questions

Science Fair Categories

All great science projects begin with great questions. However, before starting on a great question, pick a subject or topic you like!

Botany: Projects that use subjects such as plants (seed plants or spore-producing), agriculture, conservation, and forestry. Live plants can be used for the project but cannot be displayed. **Experiments testing for algae, bacteria, mold, or fungi are NOT allowed.**

Chemistry: Projects that examine chemical reactions, the chemistry of living things, photosynthesis, solubility, heat capacity, etc. **The experiments should not use prescription drugs or dangerous or illegal substances**.

Earth and Space Science: These are projects investigating principles of geology (for example, weathering and erosion), geography, astronomy, meteorology, and related fields.

Engineering: Projects can ***redesign*** technological devices which are useful to the global society within an engineering-related field, such as electricity, mechanical, chemical, aeronautical, and geological.

Environmental Science: Projects that deal with global change and Earth-related issues, such as water, air, climate, waste and pollution, green living, human health, ecosystems, and related fields. **Experiments testing for algae, bacteria, mold, or fungi are NOT allowed.**

Inventions: Projects that use design and engineering processes to find a ***new*** practical solution to a problem that exists.

Mathematics: Projects are developed to demonstrate any theory or principle of mathematics.

Physical Science: Projects that study the nature and properties of nonliving matter, energy, and/or force and motion.

NOW IT'S YOUR TURN! DUE DATE: _____

Write down your favorite Science Fair Category from page 7 and what it is you want to learn more about:

My favorite category was _____.

I want to complete an experiment involving _____

_____

_____

_____

_____.

Helpful Websites for Investigations and Engineering and Invention Projects:

- http://science.dadeschools.net/
- http://www.sciencebob.com/sciencefair/index.php
- http://www.sciencebuddies.org
- http://sciencepage.org/scifair.htm
- http://www.ipl.org/div/kidspace/projectguide/
- www.howstuffworks.com
- http://all-science-fair-projects.com/
- Invention Ideas for School Projects That Make You Stand Out From the Rest (nevadainventors.org)
- Invention Education: 27 lessons where students are the inventors! - PBS NewsHour Classroom
- https://nevadainventors.org/invention-ideas-for-school-projects/

25 Kid-Tested STEM Projects Made With Simple Materials - Instructables

Science Fair School Contract and Proposal Form

STUDENT'S NAME: _____ TEACHER'S NAME: _____

Investigation *or* Engineering/Invention Idea:

Science Fair Project Question Checklist	
✓ Can you find at least 3 sources of information on the subject?	Yes / No
✓ Can you design a "fair test" to answer your investigation question or solve your problem?	Yes / No
✓ Did you read the science fair rules? Is your experiment/ engineering/invention safe to perform?	Yes / No
✓ Will you be able to obtain all the materials and equipment you need for your ✓ science fair project quickly and at a very low cost?	Yes / No
✓ Do you have enough time to complete your experiment/ engineering/invention and repeat it at least 2 more times before the school science fair?	Yes / No

I have discussed the project problem statement/engineering/invention idea and the checklist with my parent(s), and I am willing to commit to following through on this project. I further understand that failure to comply with the rules outlined in this guide will affect my final project grade.

_____

Student's Name and Signature **Date**

I have discussed the project problem statement/engineering/invention idea and the checklist with my child, and I believe he or she can follow through with this project. I further understand that failure to comply with the rules outlined in this guide will affect his/her final project grade.

_____

Parent's Name and Signature **Date**

I have read the proposed Science Fair Project for the above-named student and have approved his/her proposal.

_____

Teacher's Name and Signature **Date**

MIAMI-DADE COUNTY PUBLIC SCHOOLS

SAFETY-APPROVAL FORM

Elementary Science, Mathematics, Engineering, and Invention Fair

STUDENT'S NAME: _____
(Last Name) (First Name)

SCHOOL: _____ **MAIL CODE:** _____

PROJECT/ENGINEERING/INVENTION TITLE: _____

HYPOTHESIS/ INTENT OF ENGINEERING/INVENTION PROJECT:

_____

_____

PROCEDURE

(Steps to test the hypothesis or build the invention; this section may be submitted as a computer printout.)

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

MATERIALS USED TO TEST THE HYPOTHESIS OR BUILD THE INVENTION

(Include quantities)

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

I am aware that my child is doing/has done a Science Fair Project or is producing/has produced an invention. My child had supervision during the development of the project or the invention.

Parent's Name _____

Parent's Signature: _____ Date: _____

I have read the proposed Science Fair Project for the above-named student and have approved his/her proposal as safe. To the best of my knowledge, the student followed the rules of the Elementary Science, Mathematics, Engineering, and Invention Fair and was supervised during the development of the project or the invention.

Teacher's Name: _____

Teacher's Signature: _____ Date: _____

Emergency Contact Information for Students Participating in Science Fair Expo

In case of an accident or emergency on the day of the event:

Name of Student:

Name of Parent/Guardian:

Parent/Guardian's Cell Phone:

Parent/Guardian's Home Phone:

Parent/Guardian's Work Phone:

If Parent/Guardian cannot be reached, please contact:

Relationship:

Phone Number:

Name of School Science Coordinator Cell Phone:

School Science Coordinator Cell Phone:

Chaperone responsible for student during the event (if different from above):

Chaperone Cell Phone: Emergency Phone:

Miami Dade College North Campus Security/Emergency:

305-237-1100

Clear Form

MIAMI-DADE COUNTY PUBLIC SCHOOLS
MEDIA RELEASE PARENTAL CONSENT FORM

(Date)

Dear Parent:

Please be advised that during the year your child may be photographed, videotaped, or interviewed at various school sponsored events. With your consent, the photograph, video or interview may be reproduced and released for use in the media, i.e., newspapers, brochures, videos, television, the internet, and Miami-Dade County Public Schools websites and social media platforms such as Facebook, Twitter, etc.

Please indicate your preference below.

(Student's Name) (Student's ID)

☐ Yes. My child's photograph/video/interview **may** be reproduced and released for use in the media.

☐ No. My child's photograph/video/interview **may not** be reproduced and released for use in the media.

(Signature) (Date)

Return this signed form to:

CONTACT PERSON:

SCHOOL NAME:

SCHOOL TELEPHONE:

FM-7489E Rev. (08-19)

ESCUELAS PÚBLICAS DEL CONDADO MIAMI-DADE
FORMULARIO DE CONSENTIMIENTO PATERNO A LOS MEDIOS DE COMUNICACIÓN

(Fecha)

Estimado/a padre/madre o tutor/a:

Por la presente le advertimos que durante el curso escolar, posiblemente a su niño/a se le tome una fotografía, se le haga una grabación de video o se le entreviste en diversos eventos auspiciados por la escuela. Con su consentimiento, se podrá reproducir y publicar la fotografía, vídeo o entrevista para ser entregada a los medios de comunicación, p. ej., periódicos, folletos, videos, televisión, o para su uso a través de la internet y de las páginas web de las Escuelas Públicas del Condado Miami-Dade y en plataformas de medios sociales como *Facebook, Twitter,* etc.

Por favor, indique su preferencia a continuación.

(Nombre del estudiante) (Número de identificación del estudiante)

☐ Sí. La fotografía/video/entrevista de mi hijo/hija **puede** ser reproducida y publicada para ser utilizada por los medios de comunicación.

☐ No. La fotografía/video/entrevista de mi hijo/hija **no puede** ser reproducida ni publicada para ser utilizada por los medios de comunicación.

(Firma) (Fecha)

Devuelva este formulario a:

PERSONA DE CONTACTO:

NOMBRE DE LA ESCUELA:

TELÉFONO DE LA ESCUELA:

FM-7489S Rev. (08-19)

LEKÒL LETA MIAMI-DADE COUNTY
FÒM KONSANTMAN PARAN POU PIBLIKASYON NAN MEDYA

_____
(Dat)

Chè Paran:

Silvouplè n ap avize w, pandan ane a nou kapab pran foto pitit ou a, anrejistre li nan videyo, oubyen fè entèvyou avèk li nan divès evènman lekòl la ap patwone. Si ou bay konsantman ou, nou ka repwodui oubyen pibliye foto, videyo oubyen entèvyou yo nan medya tankou, jounal, bwochi, videyo, televizyon, Entènèt, ak sit Entènèt Lekòl Leta Miami-Dade County ak platfòm medya sosyal tankou Facebook, Twitter, eks.

Silvouplè chwazi preferans ou anba a.

_____ _____
(Non Elèv la) (Nimewo Idantifikasyon Elèv la)

☐ Wi. Nou **ka** repwodui e pibliye foto/videyo/entèvyou pitit mwen an pou itilize yo nan medya.

☐ Non. Nou **pa dwe** repwodui e pibliye foto/videyo/entèvyou pitit mwen an pou itilize yo nan medya.

_____ _____
(Siyati) (Dat)

Siyen fòm sa a e retounen li bay:

MOUN POU W KONTAKTE: _____

NON LEKÒL LA: _____

TELEFÒN LEKÒL LA: _____

FM-7489H Rev. (08-19)

STUDENT INVESTIGATION PROJECTS PLANNING GUIDE

Student Investigation Project Guide

Step 1 – Think of what you would like to explore and write your Problem Statement.

Write a question or identify a problem within that topic. Here are some examples of Problem Statement questions:

What is the effect of _____ on _____?

EXAMPLES:	the amount of sunlight	the production of seeds in tomatoes
	temperature	seed germination
	lubricants	the time it takes a toy car to go down a ramp

How does the _____ affect _____?

EXAMPLES:	type of liquid	seed germination
	material of a surface	the adhesion of tape
	type of liquid	the growth of plants

Which/What _____ (verb) _____?

EXAMPLES:	stain remover	(cleans)	a ketchup stain from cotton
	brand of battery	(powers)	a flashlight the longest
	type of plastic wrap	(prevents)	the most evaporation

NOW IT'S YOUR TURN!

DUE DATE: _____

Create your ***Problem Statement*** using either the "Effect Question," the "How does Affect Question," or the "Which/What and Verb Question."

Step 2 – Research Your Topic and Form a Hypothesis

Now that you have chosen a topic you are interested in, it is time to **research**! Read about your topic. Use magazine articles and books from the library. Search for information from the internet. You will need this information to write your **bibliography** *(see page 23)*. Please take note of any new science words you learn and use them when you write about your project.

NOW IT'S YOUR TURN! DUE DATE: _____

Write down the problem and create a ***hypothesis*** based on what you have researched.

Problem Statement: _____

What to Research: My project is about this topic: _____

Sample topics could be magnetism, electricity, buoyancy, absorbency, plant growth, simple machines, or other scientific topics related to your problem. If you have problems finding out the topic, ask your teacher or an adult for help.

Books I found in the library on my topic are:

Title: **Author:**

_____

_____

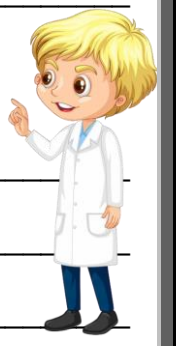
_____

Internet sites that I found on my topic are:

_____

_____

People I talked to about my topic are *(only with parental supervision and approval)*:



_____

_____

_____

Some important points and words that I learned about my topic are:

_____

_____

_____

Next, it is time to PREDICT what you think will happen if you test your problem. This type of "EDUCATED GUESS" or PREDICTION is what real scientists call a **HYPOTHESIS**. So how do you begin? Well, just answer this very simple question: ***What do you think will happen?***

Write your hypothesis in the form of an If…….then…..statement.

Example Problem Statement: When wet, which brand of paper towels can hold the most pennies?

Example Hypothesis:

If Brand X paper towel is wet with 10 mL of water, **then** it will hold more pennies than Brand Y and Brand Z paper towels **because** it is made with a stronger fabric and is double-plied.

If the same Hot Wheels car is sent down 3 tracks, one covered with sand paper, one covered with aluminum foil and one covered with plastic wrap, **then** the car will roll faster down the ramp covered with plastic wrap **because** there will be less friction on the ramp with plastic wrap than the ramps covered with sand paper and aluminum foil.

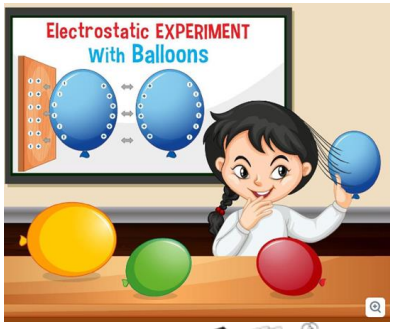
This hypothesis not only predicts what will happen in the experiment but also shows that the "Scientist" used research to back up his prediction.

Hypothesis: If _____ **(cause), then**

_____ **(the**

effect) because _____

(the reason you believe this to be true).



Step 3 – Test your hypothesis by performing your experiment.

First, gather up your **MATERIALS**. What will you need to perform your experiment? Ask an adult to help you get the items you need. Take pictures or draw pictures of your materials.

NOW IT'S YOUR TURN! DUE DATE: _____

MATERIALS:

1)	6)
2)	7)
3)	8)
4)	9.
5)	10.

Second, write your **PROCEDURES.** A procedure is a list of steps that you did to perform an experiment. Make sure to list the steps in numerical order. Start each sentence with an action verb: mix, stir, get, measure, etc. Include quantities, or amounts, that you will measure using metric units. Take pictures of yourself doing the steps ***but do not include your face in any of the pictures.***

PROCEDURES:

1)
2)
3)
4)
5)
6)
7)
8)

Third, identify your **VARIABLES**. The ***independent variable*** is any factor that can change in an experiment. The independent variable is the factor you are testing. The results of the test that you do are called the ***dependent variables***. The dependent variable is what happens as a result of your test. The ***controlled variables*** are the variables that will be the same for each trial. Use a ***control group*** if applicable in your experiment. A control group is a group that does not receive the experimental variable. Both it and the experimental group have what is usually considered normal conditions, i.e., room temperature, normal amount of water, and normal amount of sunlight (constants). A control group helps you ensure that what YOU DO in your experiment affects the test results.

Example Variables using the car and ramp example from the Hypothesis section:
Independent Variables: The independent variables include the ramp coverings of sandpaper, aluminum foil, and plastic wrap.
Dependent Variable: The dependent variable is the time is takes for the Hot Wheels car to roll down the ramps.
Controlled Variables: The controlled variables include ramp height, ramp length, and the Hot Wheels car.
(Control Group: There is no control group for this experiment, so it does not need to be listed.)

VARIABLES:

Independent Variable:	
Dependent Variables:	
Controlled Variables:	
Control Group (if needed):	

Fourth, TEST, TEST, TEST. Follow your procedures step-by-step. Your results should be consistent to be a good experiment. You must perform the experiment ***at least three times*** to test it properly. Do not forget to take pictures of the science project being done and the results.

Gravitational Force

Fifth, collect your **DATA.** Record the results of the experiment every time you test it. Be sure to organize by using charts, graphs, or other organizers to easily read the results and look for patterns.

DATA TABLE:

Trial 1:	Trial 2:	Trial 3:

GRAPH DRAWING SPACE:

Step 4 – Draw Conclusions

NOW IT'S YOUR TURN! DUE DATE: _____

Answer the following questions to summarize what you have learned from the experiment to complete the ***Conclusion*** section:

What was the purpose of the investigation?	
Was your hypothesis supported by the data? Indicate evidence and reasoning that supports your conclusion; this is called Conclusion Evidence Reasoning (CER).	
What were the major findings?	
What are the possible reasons for the results?	

Step 5 – Applications

NOW IT'S YOUR TURN! DUE DATE: _____

Answer the following questions to complete the ***Application*** section:

How can you use the findings from this investigation in your day-to-day life?	
How can the investigation be improved?	
What new question(s) has your experiment led you to ask that could be tested in a new investigation?	

Step 6 – Abstract and Bibliography *(Due with online registration & submission packet).*

The **abstract** is a complete summary of the investigation and ***must consist of three to five paragraphs with a total of approximately 250 words*** that includes the following:

- Describe your purpose and hypothesis. Briefly describe your procedure and the materials you used.
- Describe and explain your results and state if your hypothesis was supported or not by the results. Suggest a reason why it was or was not supported.
- Explain your conclusion and application(s).

It is important to cite your sources for a science fair project. Put your **bibliography** of at least 3 different sources on the same page listed in alphabetical order. Please visit the website https://www.grammarly.com/citations for help with APA-style citations. Below are some examples of how to cite books, online videos, and websites:

Here is an example for a book or magazine: Kenney, K. L. (2016). *The Science of Race Cars Studying Force and Motion*. ABDO Publishing.
Here is an example of an online video: [Kids Academy]. (2019, October 31). *Force and Motion for Kids - Ramps* [Video]. YouTube. youtu.be/y6VjHcOX8_o
Here is an example of a Website: Ducksters. (2023). Physics for Kids: Friction. *Ducksters*. Retrieved from https://www.ducksters.com/science/friction.php

Complete the Project Abstract/Bibliography form and submit it to the teacher for final approval ***BEFORE* working on the PowerPoint and science fair board.**

Elementary Science, Mathematics, Engineering, And Invention Fair

Investigation Project Abstract / Bibliography

Student's Name: _____

Project Title: _____

Abstract

Be sure to include the following information in the abstract of your project:

1. The purpose of the project: Why did you choose to do this project, or how did you get the idea?

2. State briefly your hypothesis (what you thought would happen). Also, describe how you conducted your project (your materials and procedures).

3. What happened? Tell the results of your experiment.

4. What was the conclusion? Was your hypothesis supported?

5. What are the applications of your project? How can others use the information you learned?

6. How could your project be improved if you were to repeat it? If you were to continue your project, what would you do?

Bibliography in APA Format

There should be at least three (3) references. *Please see page 23 for more information and examples.*

Elementary Science, Mathematics, Engineering, And Invention Fair

Investigation Project Abstract / Bibliography

SAMPLE

Student's Name: Jordan Web

Project Title: Wrap It Up!

Abstract

The purpose of this project is to determine if increasing the number of wraps around an electromagnet will increase the magnet's strength. It is hypothesized that increasing the number of wraps around the nail will increase the strength of the electromagnet.

Wire, a nail, a D battery, and a battery holder were the materials used to build an electromagnet. The wire was cut 90 cm long so that 10, 20, and 30 wraps could be wrapped around the nail. An electromagnet with 10 wraps was used to pick up paper clips three times. Then using the same steps, the electromagnet was built using 20 wraps of wire, tested three times, and then tested with 30 wraps. The number of paper clips collected was recorded in a data table for all the trials.

Results showed that in all three trials, the average number of paper clips picked up by the electromagnet increased as the number of wraps increased from 10 wraps to 20 wraps to 30 wraps. The hypothesis was correct.

This experiment shows that the number of wire wraps on an electromagnet affects its strength. In real life, if a stronger electromagnet is needed to separate metal from nonmetal objects, its strength can increase by increasing the number of wraps.

The project may have been improved and had better data if a new battery had been used for each trial.

Bibliography

Brain, M., & Pollette, C. (2021, September 7). *How Electromagnets Work*. HowStuffWorks. Retrieved July 7, 2023, from science.howstuffworks.com/electromagnetic-propulsion.htm

Britannica, T. Editors of Encyclopaedia (2023, March 25). electromagnet. Encyclopedia Britannica. https://www.britannica.com/science/electromagnet

Van Vleet, C. (2022). *Electricity : Circuits, Static, And Electromagnets with Hands-On Science for Kids*. Nomad Press.

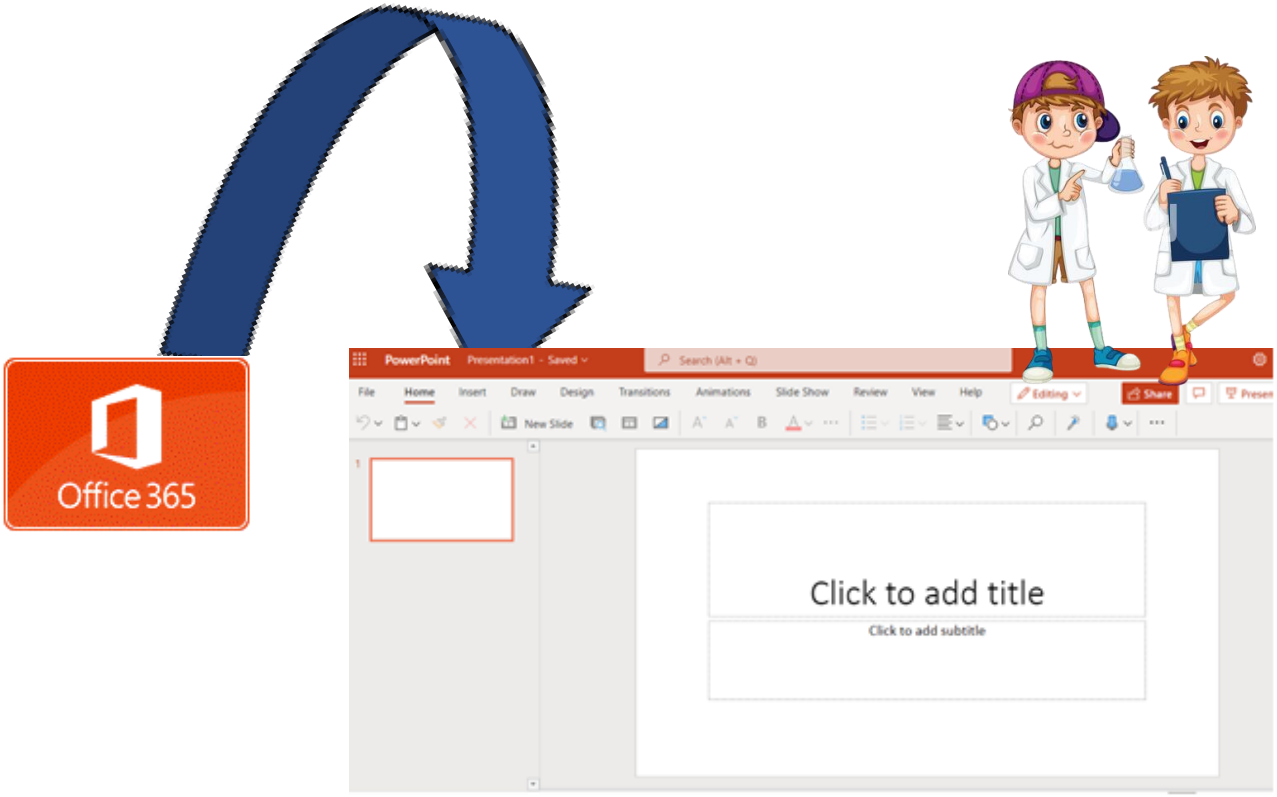
Project Display with PowerPoint

BEFORE a science fair board is created for the District Science Fair, a PowerPoint display of the project must be created.

Your school may choose to have the students create both a PowerPoint and a display board for ***a school-wide Science Fair***. Please note that projects selected at the school site for submission to the District Science Fair must be in PowerPoint form. These selected projects will be judged virtually before the actual in-person District Science Fair. ***Only students selected to display their projects at the District Science Fair will be required to submit a physical board.***

NOW IT'S YOUR TURN! DUE DATE: _____

- Use Microsoft PowerPoint to create your digital project display. This method is best to assist with assembling the physical board display.
- You can access Office 365 – PowerPoint application via the student portal.
- For more information, please visit the Science Department's website at https://science.dadeschools.net.



Investigation Project Exhibit and Safety Display Guide

- Keep the exhibit neat, uncluttered, and to the point.
- All posters, charts, etc., must be attached to the science fair board.
- No part of an exhibit may be attached to walls or tables.
- The science fair board must be self-supporting (FREE STANDING).
- Be sure to make everything sturdy so it can be safely transported. Fasten/glue everything well.
- The science fair board displays your project. Use attractive lettering and designs.
- Use one-color printing to avoid confusion.
- Spell correctly. Your name and school name should go on the back of the board.
- The main points should be large and simple. Details must be clear and legible from three feet away.
- The **abstract and bibliography** must be placed on the board's lower left-hand corner (as you face the board).

EXHIBIT SPACE: Maximum size is Width: (side to side) 92 cm (36 in) Depth: (front to back) 76 cm (30 in) Height: Table Exhibit 92 cm (36 in)

Elementary Safety Display Guide:

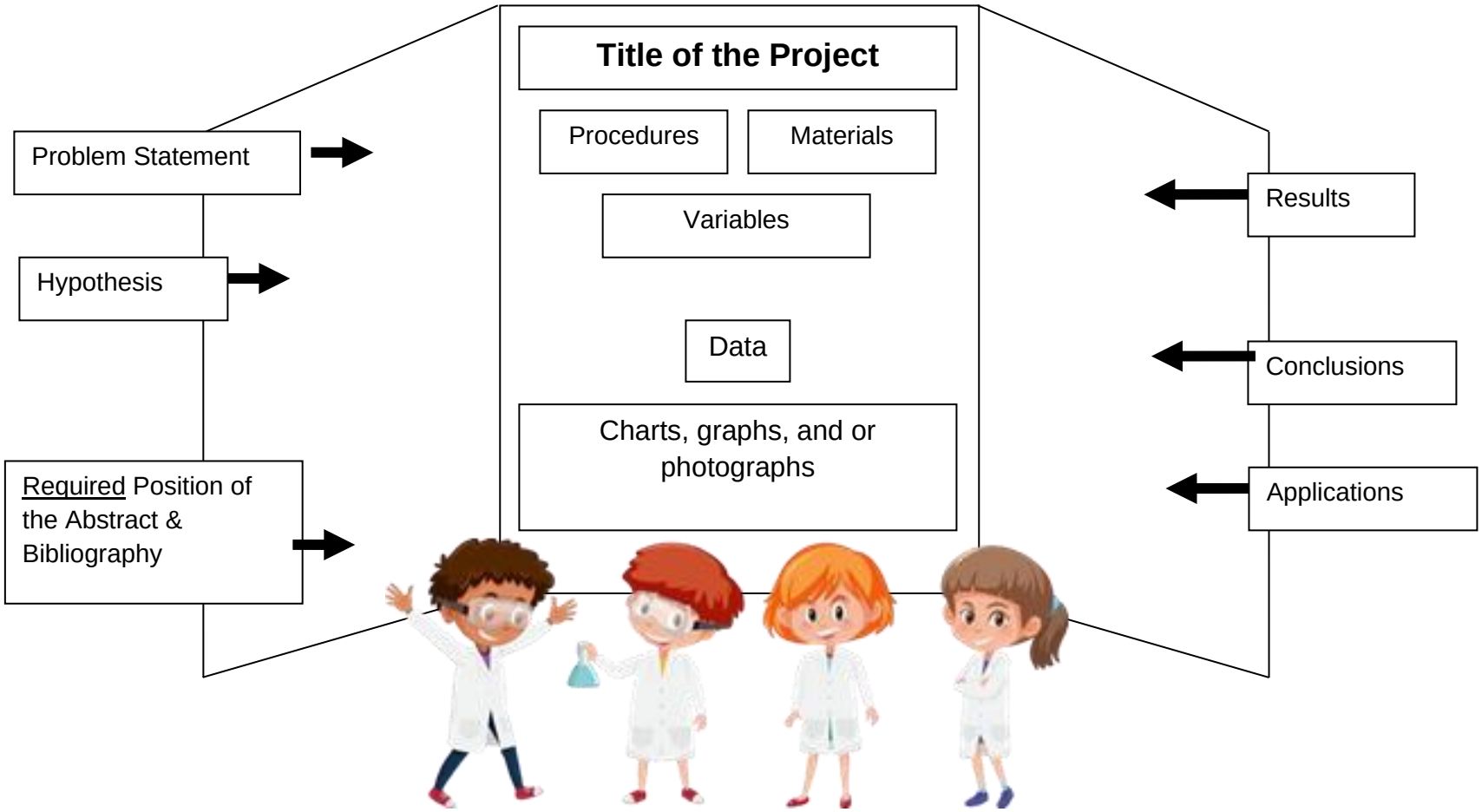
- Anything hazardous to the public, the exhibitor, or other exhibitors is **PROHIBITED**.
- Nothing sharp or pointed should be attached to the board.
- **No** plants may be displayed, (**Reminder: No fungi, mold, algae, or bacteria were allowed to be part of the experiment.**)
- No chemicals of any kind may be displayed. **No** prescription drugs or dangerous and illegal substances were allowed as part of the experiment.
- No flammable substances may be displayed.

An alternative solution to displaying any of the above items ***allowed*** as part of the project is to take photographs of the substances used or use a digital camera and create large pictures with a computer printer for display on your board. ***No people's faces or identifying parts (like the school name on a shirt) may be displayed in photos.***

The classroom teacher or the school's Science Fair Committee will inspect all projects for adherence to Science Fair Safety Rules. Failure to follow these rules will be grounds for disqualification from the school and/or District Science Fair.

Elementary Science, Mathematics, Engineering, and Invention Fair

Board Set-up for an Investigation Project



A physical board may be required for your school's Science Fair. For judging for the District Science Fair, a PowerPoint is required. A physical board is only needed if your project is selected for display.

Science Fair Investigation Student Checklist

Student's Name: _____ Homeroom Class: _____

Working Plan	Timeline Due Date	Parent's Signature & Date	Teacher's Signature & Date
1. Share letter & packet with parents. • Select a category. • Return the Science Fair School Project and Proposal form. • Set up a Lab Notebook, if required.			
2. Identify the Problem Statement *Step 1*.			
3. Complete topic research *Step 2*. • Cite three or more Resources. • Form a Hypothesis.			
4. Design an Experiment *Step 3.* • List and Collect Materials. • Write Procedures. • Identify Variables/Control.			
5. Perform Experiment *Step 3.* • Collect Data. • Take pictures. • Create a graph.			
6. Analyze Data *Steps 4 & 5.* • Write Conclusion • Write Application.			
7. Write the Abstract & Bibliography *Step 6.*			
8. Complete the Science Fair PowerPoint **(mandatory for submission to District Science Fair).**			
9. **If required by the school or selected for the MDCPS Science Fair Expo**, complete the Science Board Display.			
10. Turn in Science Fair Project.			

ENGINEERING AND INVENTION PROJECTS PLANNING GUIDE

Student Engineering and Invention Project Guide

These projects follow the *Engineering Method* and **NOT** the *Scientific Method*. They must fit into the following categories:

3. **Engineering**: Projects can ***redesign*** technological devices which are useful to the global society within an engineering-related field, such as electricity, mechanical, chemical, aeronautical, and geological.
4. **Inventions**: Projects that use design and engineering processes to find a ***new*** practical solution to a problem that exists or improve a current solution.

Engineers and inventors are encouraged to use recycled materials. The cost of the invention should not exceed $25.

The Invention Process: How do you use creative problem-solving to go from a problem to an invention idea or improve a current solution?
Creative problem-solving is a process for finding workable solutions to problems or making improvements. However, finding the right problem to solve or product to improve is often the most difficult part of the process.

Step 1 - Getting Ideas:

Your idea for an invention will come from something you or someone you know needs. There are several ways to find ideas for inventions. One way is to ask if there is anything they may need. Another method is brainstorming. For example, think about an object such as a water bottle. Take ten minutes to list everything you can think of that can be improved with that water bottle. Next, find a way to make improvements. Your ideas for improving the bottle can be a big step toward inventing a new or improved product. Review the list and eliminate all the impossible solutions and those that already exist. Reasons for eliminating a solution include lack of knowledge, insufficient technical ability, and lack of necessary materials. Keep in mind that your invention does not have to be a product. Instead, it can be a new process for doing something.

NOW IT'S YOUR TURN! DUE DATE: _____

Brainstorm ideas about an object you may want to invent or improve.

Step 2 - Find a Problem or a Product to Improve:

Focus on problems you may have noticed during your daily life, such as squeezing out all the toothpaste from a tube or keeping your shoelaces tied.

NOW IT'S YOUR TURN! **DUE DATE: _____**

What problem would you like to find a solution for, or how could you improve an invention that already exists?

Step 3 - Consider the Situation or Opportunity:

What do you already know? Research the product online or visit stores *with an adult* to see if the product already exists. It is important to think of an original idea or to think of a new way something can be used or improved.

NOW IT'S YOUR TURN! **DUE DATE: _____**

What information did you find out about what you would like to invent or improve?

Step 4 - Research and Planning:

Before an invention can be successful or a product improved, you must plan. Your plan should include all the steps you can think of, from beginning to end. When writing your plan, ask yourself these questions:

- What can I read that will help me with my invention or improvement? Who can I talk to about solving problems and planning my design?
- What materials will I need to build my prototype? How can I control the cost of using recycled materials?
- What steps should I follow? How can I test my prototype? How much time should I allow for each step? How much time will I need to redesign and test my product?

You may need to change your plans along the way. Sometimes a plan will not work as well as you first thought, so think of other ways it may work!

NOW IT'S YOUR TURN! DUE DATE: _____

What to Research: My engineering/invention project is about this topic: _____

Sample topic 1 could be a device that cleans gutters without having to climb up a ladder, a plastic product that holds a book while you eat, a rake that allows you to pick up leaves without bending over, a robot that distributes and collects student papers, or a device to holds objects for people who use crutches. If you have problems finding the topic, ask your teacher or an adult to help you.

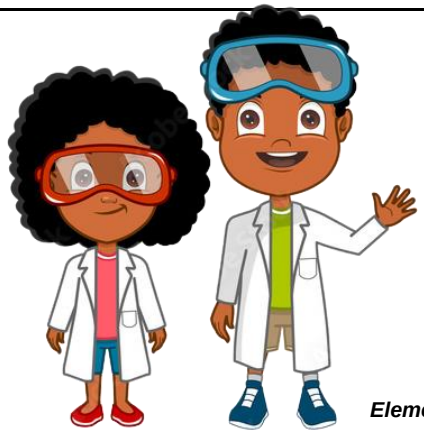
Books I found in the library on my topic are:

Title: **Author:**

Internet sites that I found on my topic are:

People I talked to about my topic are *(only with parental supervision and approval)*:

Some important points I learned about my topic are:



Step 5 – Design and Build Your Prototype:

First, draw your design and label the parts. Then, gather your materials to build your prototype. Make sure to list the steps in your procedure!

NOW IT'S YOUR TURN!

DUE DATE: _____

Draw and label your design.

MATERIALS:

1)	6)
2)	7)
3)	8)
4)	9)
5)	10)

PROCEDURES:

1)
2)
3)
4)
5)
6)
7)
8)

Step 6 – Test Your Prototype, Collect Data and Results:

DATA TABLE:

Trial 1:	Trial 2:	Trial 3:

Step 7 – Redesign, Functions, Applications, and Name

Redesign:

NOW IT'S YOUR TURN! DUE DATE: _____

Answer the following questions to think about what you have learned from your invention and how it can be improved to complete the ***Redesign*** section:

Did your invention help to solve the problem you wanted to solve?	
What problems did you discover with your invention?	
What could you re-engineer to improve your design?	

Function:

NOW IT'S YOUR TURN! DUE DATE: _____

Answer the following questions to think of the function of your invention to complete the ***Function*** section:

What is the function of your invention?	
How will your invention solve the problem?	
Are there other uses for your invention?	

Applications:

NOW IT'S YOUR TURN! DUE DATE: _____

Answer the following questions to complete the ***Application*** section:

How can you use the findings from this invention in your day-to-day life?	
How can the invention be improved?	
What new question(s) has your invention led you to re-engineer your invention?	

Naming the Invention:

Develop a name for your product using the following guide:

- Do not make your product's name too similar to others that exist.
- Do not make your brand name too descriptive. You want your name to be a unique eye-catcher.
- Be creative!

NOW IT'S YOUR TURN! DUE DATE: _____

What name did you give your invention?

Step 8 – Abstract and Bibliography *(Due with online registration and with submission packet).*

The **abstract** is a complete summary of the investigation and ***must consist of three to five paragraphs with a total of approximately 250 words*** that includes the following:

- A written statement of the purpose of the invention and the problem it solves.
- A list of materials used.
- A list of all the steps taken to complete the invention.
- A description of the problems encountered.

It is important to cite your sources for a science fair project. Put your **bibliography** of at least 3 different sources on the same page listed in alphabetical order. Please visit the website https://www.grammarly.com/citations for help with APA-style citations. Below are some examples of how to cite books, online videos, and websites:

> **Here is an example for a book or magazine:** Kenney, K. L. (2016). *The Science of Race Cars Studying Force and Motion*. ABDO Publishing.
> **Here is an example of an online video:** [Kids Academy]. (2019, October 31). *Force and Motion for Kids - Ramps* [Video]. YouTube. youtu.be/y6VjHcOX8_o
> **Here is an example of a Website:** Ducksters. (2023). Physics for Kids: Friction. *Ducksters*. Retrieved from https://www.ducksters.com/science/friction.php

Complete the Project Abstract/Bibliography form and submit it to the teacher for final approval ***BEFORE* working on the PowerPoint and science fair board.**

Elementary Science, Mathematics, Engineering, And Invention Fair

Engineering/Invention Abstract / Bibliography Form

Student's Name:_____

Engineering/Invention Title:_____

Abstract

Bibliography

Elementary Science, Mathematics, Engineering, And Invention Fair

Engineering/Invention Abstract / Bibliography

Student's Name: Raquel Rodriguez

Invention Title: Ear Mutts

Abstract

The purpose of this invention is to construct a device that will protect dogs from "swimmer's ear."

It was determined that dogs, like humans, get swimmer's ear, which can be very harmful to them. Swimmer's ear may cause ear infections and more. It was hypothesized that a device could be constructed which would easily fit into the dogs' ear canal, which is approximately 4-5 mm wide, to keep them dry when the dog swims.

The device was constructed from an adjustable plastic headpiece, which was part of an ordinary pair of earmuffs. Then a veterinarian was consulted to determine what material could be used to put in a dog's ear that would be painless and harmless to the dog when inserted or removed. A type of earplug was used. It was attached to the earmuff device and tried on a plastic model of a dog's head. The results showed that the prototype worked well after the third redesign because water continued to enter the "ear canals" of the plastic models.

This invention helps dogs and their owners because the dogs are protected from acquiring swimmers' ear infections. It will allow the dogs to have fun in the water without their owners worrying about swimmers' ear.

Bibliography

Dr. Jyl. (2012, August 23). *Avoiding Swimmer's Ear for Your Dogs -- Ask a Vet with Dr. Jyl Rubin* [Video]. YouTube. https://www.youtube.com/watch?v=P03WCaRa0Xk

Lotz, K. N. (n.d.). *"Swimmer's Ear" in Dogs: What You NEED To Know*. I Heart Dogs. https://iheartdogs.com/swimmers-ear-in-dogs-what-you-need-to-know/

Nguyen, D. (n.d.). *Top 10 Dog Earplugs for Swimming*. My Sleeping Dog. Retrieved July 7, 2023, from https://mysleepingdog.com/top-10-dog-earplugs-for-swimming/

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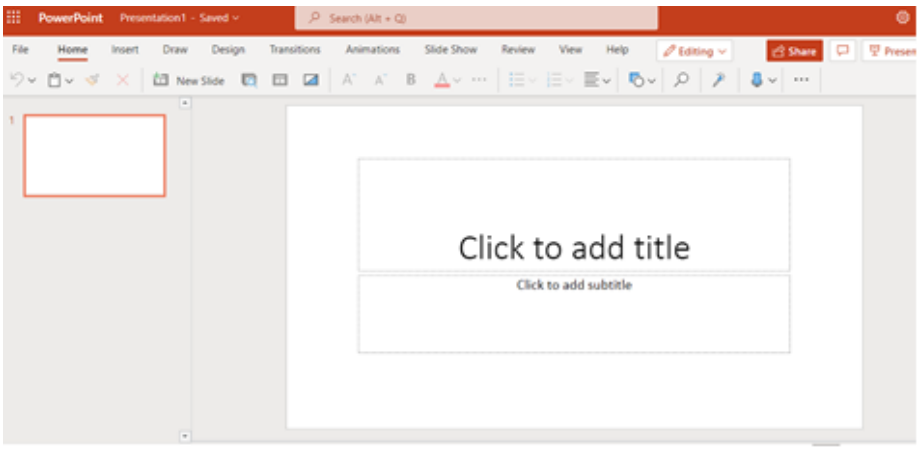

Engineering and Invention Project Exhibit
And Safety Display Guide

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- The science fair board must be self-supporting (FREE STANDING).
- Be sure to make everything sturdy so it can be safely transported. **Fasten everything well**!
- The science fair board displays your project. Use attractive lettering.
- Use one-color printing to avoid confusion.
- Spell correctly. Your name and school name should go on the back of the board.
- The main points should be large and simple. Details must be clear and legible from three feet away.
- The **abstract and bibliography** must be placed on the board's lower left-hand corner (as you face the board).

EXHIBIT SPACE: Maximum size is Width: (side to side) 92 cm (36 in) Depth: (front to back) 76 cm (30 in) Height: (from table) 92 cm (36 in).

Table display space is limited to the area in the front of your display board. A working ***model*** should represent engineering and invention projects too large for display.

Elementary Safety Display Guide:

- Anything hazardous to the public, the exhibitor, or other exhibitors is **PROHIBITED**.
- Nothing sharp or pointed should be attached to the board.
- **No** plants may be displayed, (**Reminder: No fungi, mold, algae, or bacteria were allowed to be part of the project.**)
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Elementary Science, Mathematics, Engineering, and Invention Fair
Board Set-up for an Engineering and Invention Project

Name of the Project

Steps in Designing the Invention; including problems

Labeled Diagram of the Invention

Pictures of the model or the device in use

Problem/Need

Materials/Equipment

Required Position of the Abstract/Bibliography Form

Redesign

Function

Applications

A model of the invention must not exceed a maximum of 92 cm (36 in.) height 92 cm (36 in.) width, and 76 cm (30 in.) depth

A physical board may be required for your school's Science Fair. For judging for the District Science Fair, a PowerPoint is required. A physical board is only needed if your project is selected for display.

Science Fair Engineering and Invention Student Checklist

Student's Name: _____ Homeroom Class: _____

Working Plan	Timeline Due Date	Parent's Signature & Date	Teacher's Signature & Date
1. Share letter & packet with parents. • Select a category. • Return the Science Fair Schools and Proposal form. • Set up a Lab Notebook, if required.			
2. Select a topic for engineering/invention. Complete *Steps 1 & 2*.			
3. Research your topic. Complete your *Steps 3 & 4*.			
4. Design Your Prototype *Step 5.* • Draw and label your design. • List and collect materials. • Write Procedures.			
5. Build and Test Your Prototype *Step 6.* • Collect Data. • Take pictures. • Write test results. • Create a graph.			
6. Analyze Results *Step 7*. • Write Redesign. • Write Function.			
7. Analyze Results *Step 7.* • Write Applications. • Name Your Product.			
8. Write the Abstract & Bibliography *Step 8.*			
9. Complete the Science Fair PowerPoint **(mandatory for submission to District Science Fair).**			
10**. If required by the school or selected for the MDCPS Science Fair Expo**, complete the Science Board Display.			
11. Turn in Science Fair Project.			

Meet the Science Family

Mr. Cristian Carranza

Administrative Director

Dr. Aileen Vega

District Director

Mr. Nestor Marcia

District Supervisor

Ms. Noreyda Casanas

Curriculum Support Specialist

Ms. Yusimi O'Steen

Curriculum Support Specialist

Ms. Kathy Scott

Curriculum Support Specialist