

STEM Fair

Handbook

2016 - 2017



Dear Morehead Family,

As you know, science, technology, engineering and mathematics are basic skills expected by employers. As Twenty-First Century citizens, these students will also have to make some of the toughest decisions of any generation, based on their understanding of emerging science and technology.

STEM fairs involve students in the practice of science and engineering, requiring them to apply those skills to a topic of interest to them.

At Morehead STEM Academy, all third- through eighth-grade students are expected to complete a STEM Fair Project. This project will be a major portion of their second quarter science grade. It is the expectation that each student work independently on their STEM Fair project. The bulk of the work will be completed at home. However, there will be workshop times designated by your child’s teacher which will allow them to give some attention to their project during school. Teachers will communicate important benchmark dates, provide feedback through informal and formal grading as well as help facilitate the scientific process. In this packet, you will find a list of benchmark dates for completing the project. These benchmarks will serve as a way for your child’s teacher to give feedback on the progress of the STEM Fair project. When benchmarks are not met, you will be notified.

Once all STEM Fair projects are turned in on ***January 6, 2017***, students will present their projects to their classes. Over the next week, the best projects from each grade level will be chosen by Morehead STEM Academy’s teachers and staff members. On ***January 19, 2017***, we hold our school STEM fair where community partners will decide the school-wide winners. These winners will go on to the Regional Science Fair at UNCC in February.

**Please read through the entirety of the handbook with your child.** There are helpful hints, guidelines, and explanations included. Your support will make a difference in whether this is an educational and fun experience, or a stressful experience. As your child works through his/her project, I encourage you to provide guidance on skills that he/she may not have mastered, such as organizing, researching or typing. However, it is important that your child is challenged and stretched throughout the course of this project and that the

project is reflective of an elementary/middle school students’ work. This is how we become better learners and better thinkers.

Please also visit Morehead’s school website for links to many Science Fair resources, including sites that can help you brainstorm a topic! Thank you for your time and support throughout this process! We are looking forward to a successful STEM Fair Night in January!

Project Benchmarks

Each piece of your project must be turned into your teacher on the date specified. The teachers will discuss and give feedback to students to help make every child’s project even better.

Each of these benchmarks will count toward your grade. Projects are required at Morehead STEM Academy. Letters will be sent home with students when a benchmark is missed.

|  |  |  |
| --- | --- | --- |
| Date | Benchmark | Completed(Teacher Signature) |
| **10/19/16****Informal** | Present your Topic Choice and Testable Question to your teacher.At this time you should also have your log book to write these in and your teacher will initial if they are appropriate. | Topic Choice:Testable Question: |
| **11/9/16****Informal** | Turn in a written rough draft copy of your research report and keep the original copy in your log book.  |  |
| **11/16/16****Informal** | Project **Proposal** Due***(See template and rubric included)*** |  |
| **12/16/16****Formal** | Project **Report** Due***(See attached “help sheet” and rubric)*** |  |
| **1/6/17****Formal** | **STEM PROJECTS DUE**This includes reports, logbook, display board  |  |
| **1/6/17****Informal** | Class Presentation DUE |  |

**The STEM Fair will be held on Thursday, January 19, 2017.**

**Step 1: Start a Logbook**

Steps to Success

To kick off your project like a true scientist, start a logbook. A logbook can be a composition or a small spiral notebook. ***A complete logbook is necessary to earning an A and advancing to Regional and State Science Fairs!*** As you work through your project, you should have ***dated entries in your logbook***. For example, on page one of your logbook, put today’s date and record that you have read your Science Fair Handbook! Any time you do something related to your project, record the date and what you did (be specific) in your log book.

Your logbook MUST include the following:

• Evidence of where you chose your topic and question with your teacher’s signature of approval

• Research notes

• Rough draft(s) of your research report

• A bibliography or list of at least 3 resources

• Observations and data as you completed investigations

• Rough drafts of charts and graphs

• Your conclusions

• Ideas for future studies

Your logbook should be in its original format when you turn it in with your project in January. Do not erase or tear out any work. Everything you put in your logbook will show the scientific process that you were through to answer your questions. These are the types of things that judges love to see and the things that they will look very closely at when selecting top projects.

**Step 2: Choose a General Topic to Study: Your topic must be grade level appropriate!** Your topic can be (and SHOULD be) anything that interests you. This is the start of the brainstorming process, so USE YOUR LOGBOOK! For example, sugar crystals and bubble gum are not middle school appropriate.

**Step 3: Research and Learn about Your Topic**

Before you develop your project plan or ask your testable question, you will want to do some research on your topic. Throughout your research, you will find yourself asking questions about how things work or what certain things depend on. Researching will lead you to your testable question.

Find books, informational magazines and news articles, and Internet websites to help you learn information about a topic. You could also ask an expert on your topic for information. If you are doing your project on dogs, what better person to get information from than a veterinarian? ***You will need at least three sources of information. Middle School Students are required to include a works cited page to document their sources.***

Use your logbook to record what you have learned. You can record your information any way that makes sense to you, but here is one idea you might try:

Divide your paper into two columns and label them like this.

New Facts I’ve Learned

1.

2.

3.

Questions I Have…

1.

2.

3.

As you read through your resources, record the information in the first column. After you have read, record any new questions you now have. One of these questions may become your testable question!

Remember to keep track of your resources! You will need them for your reports. Record the following for each of your resources

Books: title, author, page numbers, publisher, publication date

Magazines: magazine title, volume number, title of the article, and page numbers

Encyclopedia: name and volume

Interview with an Expert: name, title, business

Internet: website address (remember that Google is a search engine, NOT a web address)

**Step 4: Research (minimum 3 paragraphs)**

This is your chance to show what you have learned about the topic that you have chosen. This is what people will read before looking at your project – it is your chance to teach everyone something new! Combine all of the information that you learned into a ***minimum of 3 paragraphs***. Be sure not to just copy and paste information, your research should be in your own words! Copy and pasted work will receive a 0!

***Use your logbook to write your rough draft*** and have an adult help you make corrections.

Your research may not include all of the information you learned, but it should highlight the important things about your topic. **Your FINAL DRAFT should include:**

* complete sentences
* good grammar and correct spelling
* 12 Times New Roman or Arial font
* Double Spaced
* Use regular margins

**Step 5: Ask a TESTABLE Question**: Your teacher will help make sure your topic and question is grade level appropriate.

1. Look at your research and the new questions that you have.
2. Choose one question that you would like to answer. Your question should be something you are going to enjoy answering. Remember, if your topic isn’t interesting to you then you’re going to have a hard time making it interesting to others!!
3. Your question has to be one that you can perform an experiment with.

**Step 6: Design Your Investigation Using the Project Proposal**

Tell us how you’re going to find the answer to your question. What investigation will you do to find your answer? Use the following guidelines to help you design an investigation….

* Your procedures need to be written clearly. Anyone should be able to read your directions and repeat exactly what you did. This means including specific amounts, times and types of materials.
* Prove your answer MORE THAN ONCE. In order for their work to be valid, scientists must perform their investigation THREE TIMES. The project doesn’t have to work the way you predicted, but it must work three times or not work three times.
* Keep materials the same throughout the investigation, unless your variable is one of your materials.
* Make sure you’ve collected all data. Record data in your logbook as well as creating tables, graphs and charts for your project board.

***Remember:*** Your teacher can help you to create an investigation that correctly follows the scientific method!

**Step 7: Double-Check Your Plan against the Rubric**

Use your rubric to make sure that you’ve included all pieces of the investigation that will be scored. Do this before you actually begin your investigation so that you can be sure that you are meeting all requirements.

**Step 8: Begin Writing Your Project Report**

Begin writing your report so that you are not rushing to complete it at the end. These parts of your report can be completed now.

 **Title Page:** Include the title of your project, your name, class, grade level and date
**Testable Question:** State the question you are trying to answer. Your question has to be one that you can
 perform an experiment with.
**Hypothesis:** What is your prediction for the outcome of your investigation? Tell what you think will happen and why you think it will happen. Write your hypothesis using this format:

 “If happens, then will be the result because”
 **Purpose:** State the reason that you are doing this investigation and why it’s important to you. ***(elementary
 1 paragraph, middle 2 paragraph minimum)***

**Research *(3 paragraphs minimum, 1 paragraph per source):*** If your research is not already typed, begin doing this now. Explain all facts and important details from at ***least 3 of the sources*** you used to research your topic. Separate the paragraphs by the source. Include what the article, magazine, or website stated and explain what new information you learned. Put all new information into your OWN words to avoid plagiarism. Middle school students should include each source on your works cited document.
**References *(middle school students must do a works cited page in MLA format):*** What books, magazines, newspapers, Internet sites and other resources did you use to learn about your topic? You can use the following websites to help you create your Works Cited page: [www.citationmachine.net](http://www.citationmachine.net), [www.easybib.com](http://www.easybib.com), [www.bibme.org](http://www.bibme.org).
**Materials:** List all materials that you used to conduct your experiment. Be specific and include the measurements, if possible. (Ex: ½ cup of soil or 3” string)

 **Procedure:** List step-by-step what someone else would need to do to repeat your investigation. Number and explain each step. This should ***not be in paragraph form.***

**Step 9: Conduct Your Investigation**

**OBSERVATIONS *(1 paragraph required for elementary and 2 paragraphs required for middle.)***

The most important thing to remember during this part of the process is to keep very detailed records in your logbook. Write down everything you see, every measurement you take, and what questions you are asking. Do not forget to write the date beside everything you write down!

Things to Remember:

* Take photos or draw pictures for your notes and display board. Do not take pictures of yourself – just the materials you are working with!
* Use your logbook to record and date every measurement, observation, and question while you are

 experimenting. If you don’t do this as you are working, you will forget all of that valuable data.

* Create charts and graphs to make your data easy to read.
* Complete at least three trials.
* When measuring, make sure you are using **metric units (centimeters, meters, etc)**

 **Step 10: RESULTS and DATA**

Data should be represented visually in a chart, graph, or table. All charts, graphs, or tables should have a title, and include labels for all variables. You also ***must include at least one paragraph explaining your data in words.***

**Step 11: Draw Your Conclusions: At least 2 paragraphs**

Your conclusion sums up your findings. Write the rough draft in your logbook before writing a final draft.

 Your conclusion should tell your reader:

 What happened in your investigations (your results)

 Whether your results supported your hypothesis. If they didn’t, that is okay. This is your chance to tell why the results were different than you expected.

 What you learned by doing this investigation and who this information might be helpful to

 What NEW questions and wonderings you had while completing the investigation

 What worked and what didn’t work
**Future Studies:** Explain what you might want to investigate next if you were to continue experimenting on this topic. What new questions do you have based on what you learned?

 **Acknowledgements:** Thank your parents, teacher or any other adults who helped you with your project.

 ***This needs to be in paragraph form, not bulleted.***

**Step 12: Finish Writing Your Project Report**

Once you’ve collected all data, you can complete your report. Here are the final pieces of your report.

  **Observations *(see step 9)*:** What did you see, smell, feel, and hear? What measurements did you record? Use the information from your logbooks. State facts only in this section – no opinions!

 **Results/Data:** This is represented by using graphs, charts, and t tables and at least one paragraph
 explaining your data in words.

 **Conclusions:** In at least 2 neatly written paragraphs, address all items listed in Step 11

 **The Abstract:** This is a four-part one-page summary of your project. This page should include the following four things:

1. The purpose of your experiment

2. A brief description of your procedures

3. A summary of the data you collected

4. Explain how your project turned out (your conclusions)

**Step 13: Design Your Display Board**

Your display is the first thing that people will notice about your project. The board will tell your classmates and the judges what you investigated and what your results were. Include the same sections as your report, but don’t include as much information. Refer to the “STEM Fair Project Display Board” rubric for how to organize your board. Make sure everything is typed, neat, colorful, and organized.

Your display should be a free-standing project board, no poster boards will be accepted. Use coloring and lettering that will stand out.

 Your original logbook, report and any materials will be displayed in front of your board.

**Step 14: Prepare for Your Presentation and Interview**

Practice explaining your project to your parents, siblings, and friends. **Focus on your abstract!** You do not want to be reading off of your board when you are presenting to your teacher and classmates. Here are some questions that you might be asked:

 What was the purpose of your project?

 How did you get interested in your project?

 Why did you choose to do your project the way you did?

 Why do you think your results turned out the way they did?

 What problems did you encounter?

 If you were to continue investigating, what would you test next?

**Student Name:**

**Project Proposal \_\_\_\_\_\_ /100 points**

Your Proposal must be approved by **November 16th!**

|  |  |
| --- | --- |
| **TOPIC** / 5pts  |  |
| **Research SOURCE 1:**  /10pts per source | **Fact 1:****Fact 2:****Fact 3:**  |
| **Research SOURCE 2:**  /10pts per source | **Fact 1:****Fact 2:****Fact 3:**  |
| **Research SOURCE 3:**  /10pts per source | **Fact 1:****Fact 2:****Fact 3:**  |
| **Testable Question** /10 pts |  |
| **Hypothesis** /15 pts total*(Must be written as If, then statement)* |  |
| **Materials** /10 pts total*(detailed list 5pts/ measurements 5pts)* | 1. 9. 2. 10.3. 11.4. 12.5. 13.6. 14. 7. 15. 8. 16. |
| **Procedure**  /30 ptsTell us how you’re going to find the answer to your question. What investigation will you do to find your answer? Your procedures need to be written clearly. Anyone should be able to read your directions and repeat ***exactly*** what you did. *\*\*16 spaces are provided, however you may have more or less steps in your experiment and that is okay as long as every step has been included and is clearly written.\*\** |

|  |
| --- |
| Step 1. |
| Step 2. |
| Step 3. |
| Step 4. |
| Step 5. |
| Step 6. |
| Step 7. |
| Step 8. |
| Step 9. |
| Step 10. |
| Step 11. |
| Step 12. |
| Step 13. |
| Step 14. |
| Step 15. |
| Step 16. |

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**Project Report HELP!**
All steps should be completed and put together as one report. This should be neat, and old pages you have turned into your teacher should not be a part of this!

1. **Title Page:** think of a title that stands out. Often times very cutesy. Examples: Let there be light, Antacid Attack, Nuts about Nuts, Dare deviled eggs, etc. Include your title, name, grade level, and teacher.
2. **Testable question:** Your question has to be one that you can perform an experiment with.
3. **Hypothesis:** If this, then……….
4. **Purpose:** This is where you write about why you chose this project ***(elementary 1 paragraph, middle 2 paragraph minimum)***
5. **Research Paragraphs (3 paragraph minimum, 1 per source)**

Explain all findings, facts, and important details from at least 3 of the sources you used to research your topic. Separate paragraphs by source. Include what the article, magazine, or website stated and explain what new information you learned. Put all new information into your own words to avoid plagiarism. ***Middle school students must include each source on a bibliography/works cited document.***  This document should be separate from the research paragraphs.

1. **Materials:** List every material you used to make the project. (Include exact measurements in metric units!)

**Example:**

* 10 mL of distilled water
* 10 mL of tap water
* 10 mL of purified water
* 3 pipettes
* 1 graduated cylinder
1. **Procedure:** List every step of your experiment, be specific!
2. **Observations** (at least 2 paragraphs for middle school): What all did you observe while doing the experiment? This should be detailed so that someone reading it will be able to understand what was happening.
3. **Results/ Data:** This is represented in the form of graphs, charts, or tables. Also, include at least one paragraph explaining your data (chart, table, graph) in words.
4. **Conclusions( at least 2 paragraphs):** Your conclusion should tell your reader:

**Paragraph 1:**

* What happened in your investigations (your results)
* Whether your results supported your hypothesis. If they didn’t, that is okay. This is your chance to tell why the results were different than you expected.
* What you learned by doing this investigation and who this information might be helpful to
* What NEW questions and wonderings you had while completing the investigation
* What worked and what didn’t work

**Paragraph 2: Future Studies and Acknowledgements:** Based on the results of your experiment, what questions do you have. And what might you want to investigate next based on your findings? For example: Because all three of my plants grew, maybe next time I try just watering the plants with different sodas to see which one will grow the best. **Acknowledgements:** This is where you thank anyone that helped you with your project.

1. **Abstract:** This is a separate four-part one-page summary of your project. This page should include the following four things:
2. The purpose of your experiment
3. A brief description of your procedures
4. A summary of the data you collected
5. Explain how your project turned out (your conclusions)

**STEM Fair Project Report: Due 12/16/16**

Morehead STEM Academy

|  |  |
| --- | --- |
| 1. Title Page *(Include title of project, your name, class, grade level, and date)*
 | /5 |
| 1. Testable Question
 | /5 |
| 1. Hypothesis

*( In the form of a “If, then statement”)* | /10 |
| 1. Purpose

*(State the reason that you are doing this investigation.)****elementary= at least 1 paragraph/middle= at least 2 paragraphs*** | /10 |
| 1. Research

*(minimum 3 paragraphs per source, middle school students must include a “works cited” page)* | /10 |
| 1. Materials*(List ALL materials including specific measurements and amounts. Measurements should be in metric units.)*
 | /5 |
| 1. Procedures

*(List step-by step directions on how to reproduce your experiment.)* | /10 |
| 1. Observations

*(at least 2 paragraphs for middle school)* | /10 |
| 1. Data and Results

*(must include a LABELED chart, table or graph and at least 1 paragraph explaining your data in words)* | /10 |
| 1. Conclusion

*(must be at least 2 paragraphs including your results, new information you learned, future studies, and acknowledgements)* | /10 |
| 1. Abstract

*(must be at least one separate page including your purpose, brief description of procedures, summary of data, and your conculsion)* | /15 |
|  | **Total:**  |

 **STEM FAIR PROJECT**

 **DISPLAY BOARD**

\_\_\_\_/ 100 points

|  |  |  |
| --- | --- | --- |
| **HYPOTHESIS**/10pts**MATERIALS**/10pts**PROCEDURES**/10pts | **CREATIVE TITLE**/10pts**DATA*****Pictures, photos, tables, and graphs***/10pts**VARIABLES*****Control, dependent and independent***/10pts | **RESULTS**/10pts**CONCLUSION**/10pts**Abstract or Any Additional Information**/20pts |

Morehead STEM Academy