PS 11 Science Fair

*This packet provides details on milestones/schedules and project details for the **3rd & 4th Grade science fair participants**. Please refer to **Science Fair FAQ** on the PS11 Science website for additional information.*

3rd Grade Science Fair

March 27, 2018 at 9:15AM – 10:00AM

4th Grade Science Fair

March 28, 2018 at 9:15AM – 10:00AM

CONTACT INFORMATION

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Science Fair Committee *PS11sciencefair@gmail.com*

Table of Contents

3rd & 4th Grade Science Fair Milestones	***Dates****
Meeting for parents/guardians of interested 3rd-4th grade science fair participants. Participation in the Science Fair isn't mandatory, but highly encouraged! We will review science fair logistics and answer questions. *PS11 students may be dropped off in the cafeteria.*	8:00AM Friday, Oct. 13, 2017
Participating teams MUST sign-up by sending an email to PS11ScienceFair@gmail.com and include the following information in the email (only one email per team). ***student names and classroom numbers*** ***parent names and email addresses*** ***Students who don't sign up for the science fair by [xxx] will not be able to participate in the science fair in March.*** *2(min) – 4(max) students per team. Team members must be in the same grade (different classrooms are OK). Mentored/led by an adult family member, all teams will work at home.* *Contact PS11 Science Fair Committee if your child needs a partner. We can help!*	Monday, Nov. 6, 2017
On loose-leaf paper, please write down two or three possible topics your group may be interested in exploring, each in the form of a question with a short description! ➢ *The **simpler** & **more specific** the question, the easier it will be to test.* ➢ *Only one submission per team; include names/classrooms of all team members.* ➢ ***Submit your topics to Mr. Roylance in the science class.***	Monday, Nov. 20, 2017
*Student submissions will be reviewed & feedback will be provided to parents by email. All topics will be finalized the week of **Dec. 4, 2017.***	
Project Proposal Due: See template and sample in this packet. ***Submit your proposals to Mr. Roylance in science class.***	Week of Dec. 18, 2017
Research and materials completion date	Monday, Jan. 8, 2018
Hypothesis Testing and data collection completion date	Week of Feb 12, 2018
Begin work on conclusions and written report	
Written Reports due	**March 5, 2018**

Begin work on poster boards	
Poster boards due	**Week of March 19, 2018**

*** These are tentative dates are subject to change. Students will be working in class on their projects and families will receive regular updates.**

SCIENCE FAIR PROJECT IDEAS

(some sample questions students have posed in past years)

- Which kind of paper has the fastest capillary action?
- How do different surfaces affect friction?
- How does adding coils of wire to an electromagnet increase its strength?
- What packing material is the best to use when boxing an (specific) item to be shipped?
- Which type of soil can hold/retain the most water?
- In what conditions do salt crystals grow best?
- What material is the best insulator for keeping your drink cold?
- What product is the best cleaning agent for stain removal?
- What variables affect plant growth?
- How can the strengths of magnets be compared?
- What causes static electricity?
- How can the densities of different liquids/matter be compared?
- Do antibacterial soaps really work to kill bacteria?
- What is the best way to prevent an egg from breaking when dropped from 3 meters?

Questions can be about nearly anything in the world you are curious about! It is important to make them **simple & specific** to make them easier to test by experiment and the experimental test results easier to clearly understand and interpret.

Here is a critique of a series of questions about plant growth:

- **What variables affect plant growth?**

This question is too broad because too many possible factors (light, temperature, water, soil, pests, etc) may affect growth; and "Plant growth/health" is also vague, as it may be defined by many parameters (seed germination, rate of plant elongation, final plant height, number/size of leaves, production of flowers/seeds?). Too many variables; both in terms of what experimental conditions could be responsible for affecting plant growth & uncertainty in how "plant growth" will be

assessed.

- **What factors affect seed germination?**

This is an improvement upon the question above. Here, it is clear how plant growth is going to be measured; specifically, as the time (# of days) when seeds first begin to sprout after planting. This is a well-defined output which can be easily measured.

- **Does the pH of soil affect the rate of seed germinations?**

This is the best question of the bunch because it is very precise about both **(1)** what SINGLE factor (variable) is being manipulated in the experiment---the pH (acidity/alkalinity) of the soil and **(2)** what aspect of plant growth is being measured as an output---the time of seed germination.

Follow the **scientific method** when writing your Science Fair Project. This method includes:

1. **Title**

2. **Abstract:** Brief summary of your project (5 to 10 sentences).

3. **Question:** Write a question related to a topic that you selected to learn about and explore (e.g. how does soil types affect plant growth?)

4. **Research:** Collect information to help answer your questions; use books, magazines, interviews, the internet. Remember the writer's skills used to write about non-fiction. Quote when necessary, but use your own language.

5. **Hypothesis:** Write what you think might be the answer to your question and why (provide a reason for your answer). "I think _____ will be the outcome of my experiment because _____" (e.g. I think plants will grow best in dark soils because this type of soil is rich in minerals that are necessary for the growth of the plants.)

6. **Procedure:**

    a. List of Materials
    b. Step-by-Step Directions
        i. What did you do? How did you do it?
        ii. Follow the rules of science safety.
        iii. Number the steps, like a "How to …"

7. **Results:** Write your results. Use logs, charts, graphs, diagrams, pictures. Be clear. Always give facts about the observations, not opinions.

8. **Conclusion**: What you learned; how or what you would do differently and why. Think about your hypothesis as you think about writing it. Give examples.

PROPOSAL

I propose the following for my Science Fair Project.

Project Title: _____

Question: (what do I want answered)

_____

_____

Hypothesis: (what I think will be the **answer** to my question and the reason **why**)

_____

_____

_____

Procedure: (How will I test my hypothesis)

_____

_____

_____

(a) List of Materials Needed:

_____
_____
_____

(b) Step-by-Step Directions (number each step) (How to…)
This should be simple and clear enough for someone else to follow and perform your experiment!

1. _____
2. _____
3. _____
4. _____

_____

_____

_____

_____

_____

_____

This is the investigation I would like to do for my Science Fair Project.

Recording Evidence:
If you are observing changes over time, you will need to keep a log. You will write down everything you do, observe, and think during your investigation. Your daily log will become part of your Science Fair Project display. Note that the log is a place to record what happens on a daily basis. (Please add more line for extra students.)

_____ _____
Student Name/Signature Date

_____ _____
Student Name/Signature Date

SAMPLE PROPOSAL

SAMPLE SCIENCE FAIR PROPOSAL
This sample proposal outlines what we'd like to see in a proposal for a science fair project. As in this example, great science experiments often arise from very simple questions surrounding everyday stuff or phenomena without any need for fancy or complicated materials. All you need is a simple question and an idea for how you might try to answer it with tools you have available to you. No need to build a rocket ship or a talking robot that doesn't even ask or answer a question!

Student names/Class-Grade/Parent Helper
Project Title: Winging It: Wing size & Flight
Question: Does the size of wings affect how far a paper airplane will fly?
Hypothesis: The larger the size/area of the airplane wings, the farther a paper plane will fly because air pushing up on the wings provides the force to lift an aircraft.
Procedure:
Materials: several identical sheets of printer paper (size), meter tape
Independent Variable: size of the paper airplane wings

Experimental design:
- We will fold several (5) paper airplanes from identical sheets of paper, changing the fold to vary the size of t wing area/span
- Since there are three students in our group who may throw slightly differently, each student will throw/fly ea of the 5 different airplane 5 times. So, it total, each airplane will be thrown 15 times (5x by each of 3 student and flight distance recorded.
- Flight distances will be measured and recorded in metric units.

Data collection:
- All (15) distance results for each airplane will be recorded and averaged for a final result.
- Wing area of each (5) experimental aircraft will be measured/calculated.
- Other observations/descriptions of flight behavior of each airplane will be recorded.
- Environmental conditions will also be noted (e.g. windiness)

Results:
We will construct a graph showing wing area vs. experimental flight distance (average).

SCIENCE FAIR PROJECT WRITTEN REPORT CHECKLIST

Your Science Fair Project must follow this order:

- ✓ **Cover Sheet (Title Page)**
  - Title of the Project
  - First and Last Name of all Students on the Team
  - Class Number and Teacher
  - Date

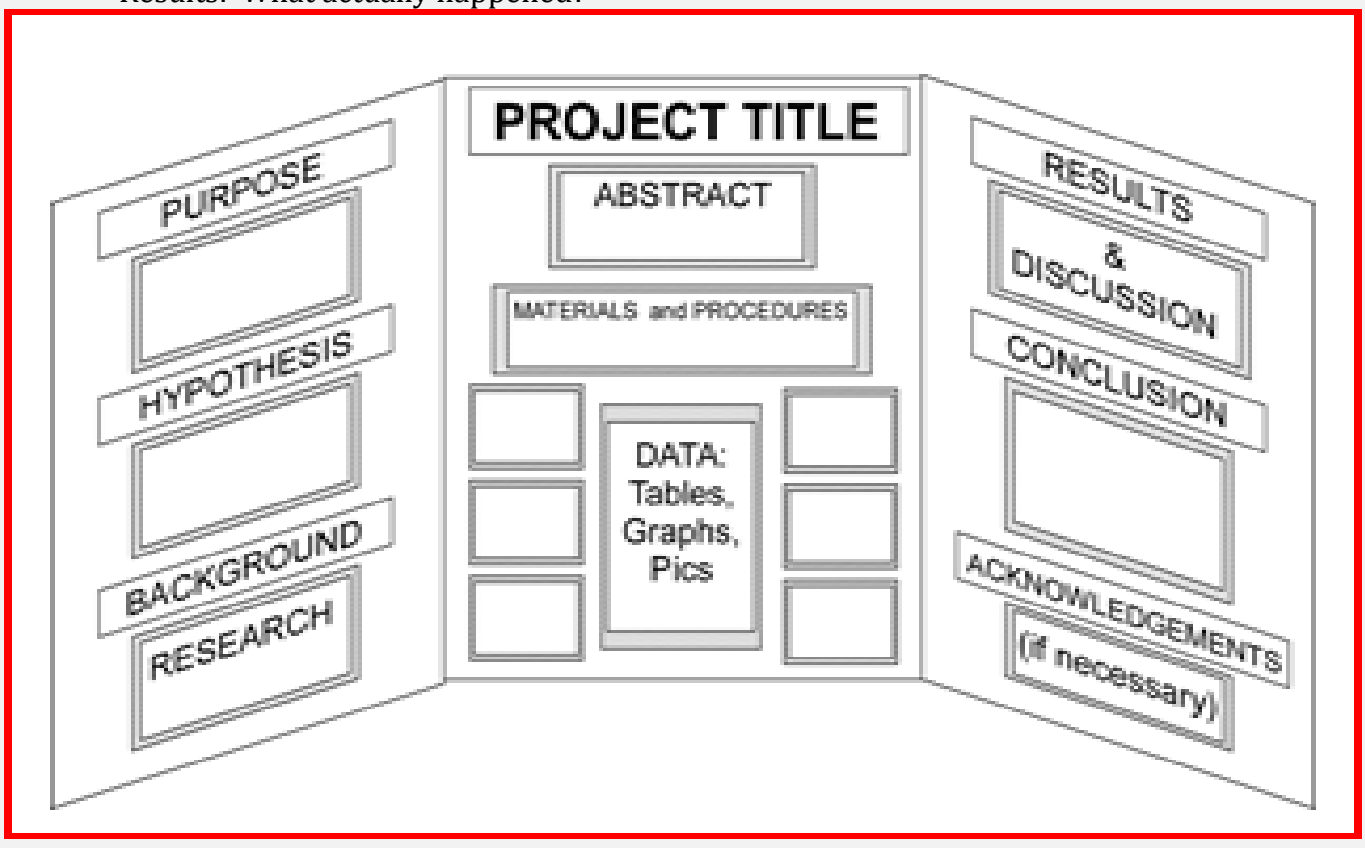
- ✓ **Table of Contents**
- ✓ **Abstract**
- ✓ **Question**
- ✓ **Research**
- ✓ **Hypothesis**
- ✓ **Procedure**
  - Materials
  - Step-by-Step Directions
- ✓ **Results**
- ✓ **Conclusion**
  - What did you learn?
  - Describe the controlled variables and independent variables of your project.
  - What is the evidence that supports your hypothesis?
  - If you were to do your project over, what modifications would you make? Please describe and explain why.
  - End your conclusion with a question related to your project. The question should reflect what you wonder about now.

  Remember: Use evidence supported by your results, not your opinion

- ✓ **Bibliography**

Sample DISPLAY BOARD

- Name of Scientists (place student names on the back of the display board)
- Project Title
- Statement of the Problem or Purpose: What does the team want to find out?
- Hypothesis: The hypothesis tells us what scientists think will happen and why in the experiment (the prediction and the reason).
    - For example, "if _____ changes, then _____ will be the result."
    - Or maybe it's just something the scientists want to find out: "How will changing _____ affect _____?"
    - Because: If the team is making a prediction, what is the reasoning behind the prediction?
- Procedure (crucial): What are the steps your team will take to test the hypothesis? List each step. These are the steps that you will display on your table at the Science Fair.
- Results: What actually happened?



- The Display Board is made of thick poster board.
- Label each main section on separate pieces of paper, tag-board, or other materials.
- Do not use lined paper for your poster board.

➢ Scientist names should be on the front and the back of the display board.

BIBLIOGRAPHY

Cite each resource you use in your research. Place the list of resources at the end of your report.

For books include:

- Author (Last and First Name), Title, Place where published, Publisher, Year of publication.
- E.g. Osborne, Mary, Tales from the Odyssey, United States, Disney, 2010.

For a website:

- Name of Site: Date of last update. Author (if available). Date you viewed the site. Site URL.
- E.g. sciencebuddies; June 2014; sciencebuddies.org

For conversation or an interview:

- Name of the person (Last and First Name), Conversation or Interview, Date.
- E.g. Smith, John, In-person Interview, September 27, 2014.

RESOURCES

Internet Resources:

Discovery Education, Science Fair Central
https://school.discoveryeducation.com/sciencefaircentral/

Kids' Science Challenge, How to do a Science Fair Project:
http://www.kidsciencechallenge.com/year-four/teachers_projects.php

PBS Dragonfly TV, Science Fair
http://pbskids.org/dragonflytv/scifair/

Internet Public Library for Kids, Science Fair:
http://www.ipl.org/div/projectguide/

Science Buddies, Science Project Resource Page:
http://www.sciencebuddies.org/science-fair-projects/project_guide_index.shtml

Science Fair Project Ideas – Education.com
www.education.com/science-fair

Hundreds of Science Fair Projects for Students
www.all-science-fair-projects.com

Science Fair Projects, Ideas, and Experiments
www.sciencefairadventure.com

Science Fair Paper Rubric 2018 (reference only**)

**3rd & 4th Grade Students ARE NOT Graded

	4	3	2	1
Question	*The question is creative, answerable, and relates to a scientific concept. *There is a testable variable.	*The question is answerable. *There is a testable variable	*The question and/or variable is partially developed. The connection between the two may be unclear.	*There is no real question and/or variable. It is unclear what is being tested by experiment. Instead of having a testable question, it is more a "maker project"
Hypothesis	*The hypothesis is fully developed with scientific thinking. *The hypothesis incorporates scientific principles in the explanation.	*The hypothesis is fully developed with scientific thinking	*The hypothesis is partially developed, though some of the thinking might be vague or unclear	*The hypothesis does not include thinking or there are major scientific flaws in the thinking
Procedure	*The procedure is a clear set of steps that can easily be replicated by others. *Diagrams/illustrations are included when necessary. *The procedure includes precise measurements *The procedure is written in the student's own words.	*The procedure is a clear set of steps that can be replicated by others. *The procedure includes mostly precise measurements. *The procedure is written in the student's own words	*The procedure is mostly complete, though steps may be missing or unclear. *There is a lack of clear measurements *Parts of the procedure are not in the student's own words	*The procedure is not written in the student's own words or *The procedure is very unclear and unable to be followed by others.
Results/Data	*Results are complete and are clear and organized. They are presented in more than one way (table and graph, table and diagram… that are well labeled) * Analysis shows an understanding of experimental objective * Experiment is repeated multiple times/multiple samples observed & numerical results averaged in analysis. * Metric units used for numerical measurements	*Results are complete and clearly organized and labeled. * Experiment is repeated multiple times/multiple samples observed *Some thoughtful analysis/relating to original hypothesis	*Results are partially complete or confusing to understand	*Most of the results are missing. Results cannot be understood.
Conclusion	*The conclusion is fully developed (by including applications to real life) and clearly addresses the original question/hypothesis. *Students discuss what they learned, changed in process & next steps for their research and/or new questions. *Conclusion addresses possible problems with procedure and other interpretations of results/data when applicable.	*The conclusion is developed (with applications to real life) and addresses the question/hypothesis. *There is some discussion of next steps.	*The conclusion is partially developed/weakly related to question/hypothesis *Next steps or connections to real life may be very weak or missing	*There is no conclusion present.
Editing/Format	*The paper is free from mistakes in spelling and grammar. *There is an effort to present information clearly and/or creatively.	*The paper is mostly free from mistakes in spelling and grammar	*There are several spelling mistakes and grammatical errors that interfere with meaning	*Many spelling and grammatical mistakes render the paper very hard to understand.