Dear Roosevelt Elementary parents,

This is your child's **Science Fair** packet. This packet gives you the dates and helpful information to guide you through the Science Fair process. Please assist your child in establishing a safe spot to keep all of his/her science fair papers, materials, ect. All entries made in the logbook **must be made in blue pen!**

In 4th – 6th grade, student Science Fair projects are mandatory. All projects will be placed on display during the school science fair and will be judged. Projects must be completed accurately and follow the county guidelines to receive an award. The top 15 projects from our 4th – 6th grade students will move on to compete in the district science fair.

Thank you for your commitment to quality education. We look forward to a successful science fair this year!

Sincerely,

Mr. David Comoletti

Monday October 16 "Research Plan and Approval Form" and Question Due	Think of a question you want answered and that you are interested in. Do some preliminary research. After you complete some research, decide what your independent variable will be. Develop a question to test your independent variable. **We will fill in your "Research and Approval Form" in class after your question is approved by your teacher.** Be sure to keep track of your sources to complete your research and complete your bibliography.
Friday November 3 Research, Hypothesis Materials List and Bibliography due.	Your research will help guide your hypothesis. List **ALL** the materials you will need to complete your experiment. As you research, record your sources to complete your bibliography.
Friday November 17 Procedures and Data Chart Outline due	List the step by step(numbered) to compete your experiment. Be specific and use details. Make sure your experiment can be replicated by another scientist. The data chart outline should indicate the type of chart or graph you will use and outline the variables and placement.

Friday November 17 – Monday January 1 Conduct your experiment and collect your data	Conduct your experiment, record observations and data in your logbook (blue pen)
Friday January 8 Completed data charts, graphs, results and conclusion are due.	Present your completed graphs and charts as well as your conclusion.
Friday January 12 Science Fair board due.	Bring in your Science Fair board and logbook completed.
Monday January 15 – Friday January 19	In class oral presentations.
Wednesday January 17	Roosevelt Elementary Science Fair set up.
Thursday January 18	Roosevelt Elementary Science Fair judging.
Thursday January 18	Roosevelt Elementary Science Fair awards night. 6:00 pm (you will be made aware if you should come out)

1. **<u>Set up your Table of Contents in your logbook and list project ideas in your logbook.</u>**

***** Do not put your name in your logbook. *****

From now on, everything you do related to your project should be written in your **Daily Log** section of your logbook. This section is much like a diary or journal and should have dated entries thorough your entire project. When recording information in your logbook, **always use a blue pen.** It is acceptable to make your data table on the computer and then print it out and glue into your logbook. Then you must use blue ink to fill in the data boxes.

When writing in ink, please note how mistakes are handled: Draw one horizontal line through the mistake and keep going. No white out is allowed.

- List your question ideas in your Daily Log, however, do not add write your actual question in your logbook until it is approved.

Sometimes, the most difficult part of the project is thinking of ideas. Keep your eyes open, be observant and curious. Your own observations may lead to an original and unique project. Other ways to find project ideas include science websites, looking through science books, magazines and encyclopedias. Talking at home, with teachers, librarians, health care workers, engineers, and of course any other scientists may also give you some good ideas.

The most important thing is to choose a topic that interests you and that you will enjoy learning more about. Do not do a project that that you already know the outcome. Keep it exciting!

PROJECT CLASSIFICATIONS

(There are some new categories.)

● **Animal Sciences** - This category addresses the study of all aspects of animals and animal life, animal life cycles, and animal interactions with one another or with their environment. This includes all aspects of human physiology but excludes all human behavioral projects.

● **Chemistry** - Studies exploring the science of the composition, structure, properties, and reactions of matter not involving biochemical systems are included in the Chemistry category.

● **Earth and Environmental Sciences** - This category focuses on Earth and the environment. It also includes meteorology and climate sciences.

● **Human Behavioral Sciences** - This category addresses studies of human thought processes, emotions, learning, decision-making, and behavior.

● **Microbiology** - The microbiology category covers the study of microorganisms, including bacteria, fungi, prokaryotes, and simple eukaryotes, as well as antimicrobial substances.

● **Physics and Astronomy** - Physics is the science of matter and energy and of the interactions between the two. Astronomy is the study of anything in the universe beyond the Earth. This category would also include studies of electricity, heat energy, forces and motion, magnetism, renewable energy structures (wind or hydroelectric turbine, photovoltaic cell, etc.) and/or processes, including energy production and efficiency.

● **Plant Sciences** - This category includes any project dealing with plants and how they live. Engineering Division

● **Engineering Mechanics** - This category focuses on the engineering that involves movement or structures.

● **Environmental Engineering** - This category deals with engineering or developing processes and tools to solve environmental problems. This is different from Environmental Sciences, as science deals with why and how events are occurring in the environment, while engineering deals with developing solutions to problems in the environment. Mathematics and Computer Science Division

● **Coding** - This category focuses on the study or development of software, information processes or methodologies to demonstrate, analyze, or control a process/solution.

● **Mathematics** - This category addresses studies of the measurement, properties, and relationships of quantities and sets using numbers and symbols. This includes the study of numbers, geometry, probability and statistics.

● **Robotics and Intelligent Machines** - For this category, projects use machine intelligence to complete a task or reduce the reliance on human intervention.

Important

- *When using animals, please note: a **Qualified Scientist Form and Designated Supervisor Form is required** to ensure humane treatment of animals/insects. Projects involving invertebrates (e.g. worms, daphnia, fruit flies, snails, insects, etc.) must have a clear purpose that has scientific significance. Intentionally harming them without a scientific purpose must not occur.*

- *Projects involving non-human vertebrates (including embryos, eggs, tadpoles, and other early life cycle stages of vertebrates) are held to a higher standard than projects testing invertebrates. Vertebrates must be treated humanely, and if a project could cause pain or distress to the vertebrate the student will need to design a new question and procedure.*
- *A project with a* ***mortality rate of 0% or greater in any vertebrate group or subgroup is not permitted even if the deaths were unintentional or accidental.***
- *In some cases, students may choose to use human subjects for their experiments. However, when an experiment could cause more than minimal risks to the human subject, the subjects (and their parents) must be informed of, and consent to, the testing procedures before any experimentation begins. In these cases, the use of the* ***Qualified Scientist Form, Designated Supervisor Form, and Informed Consent Form*** *is required to ensure the safety of the human subjects. Forms are available from your teacher.*
- *Fishing experiments are off limits due to the injury of the animal with the hook.*
- *Testing involving firearms, knives, or other items considered weapons in a school setting (e.g., a paintball gun, bb gun, etc.) is not permitted.*
- *Testing involving controlled substances, prescriptions drugs, alcohol, and tobacco is not allowed.*
- *Microbial experimentation is potentially dangerous and must be done only with expert and careful supervision.* ***Samples MUST NOT*** *be collected, isolated, and/or cultured from the environment as they are potentially pathogenic. This includes, but is not limited to, projects involving blood, growing mold, and culturing swabs from the environment. Instead, all microbial samples/organisms MUST be obtained from a science supplier/company and are limited to Biosafety Level 1 (BSL-1). The (****BSL-1) Checklist MUST*** *be used to guide safe practices such as sealing Petri dishes, proper disposal, etc. A* ***Qualified Scientist Form and a Designated Supervisor Form*** *are required to ensure the student's and others' safety.*
- *Don't forget to include bibliography information in your logbook.*

2. Look at your project ideas and form a question.

Your project must involve testing and be stated in a question. The following are three examples of properly worded problems:

*"**What happens to the growth of lima beans when earthworms are added to the soil?"***

"How does the lung capacity of smokers compare to that of nonsmokers?"

"Lefties vs. Righties: do they view optical illusions differently?"

You should consider the following when creating your question:

- *Can you set up a testing situation?*
- *Is the experiment safe:*
- *Can you collect measurable results?*
- *Can you conduct repeated trials or a have a large group of test subjects?*
- *Can you afford the costs involved?*
- *Do you have enough time to conduct the trials?*
- *Will the answers to your question provide us with useful knowledge?*
- *If using humans, animals, or hazardous substances, will you be able to get the necessary forms completed? [Designated Supervisor and Qualified Scientist Forms]*

Write your question in the Question section of your logbook. Remember most projects will fit into one of these two forms:

"What is the effect of _____ on_____?"

"How does_____affect_____?"

3. Conduct research

You need to research the topics related to your project. If you are not sure of what to research, you can ask your teacher for help, but don't ask at the last minute. Here are some examples:

(If you are testing the growth rate of plants, you may want to research: how plants grow, what is needed to measure the plants, what is in the soil you are using)

(If you are testing detergents, you may want to research: the chemicals that are in the detergents.)

You shouldn't get all your research from just one source. You should have at least three different sources (internet, books, interviews, encyclopedias)

When researching, print, closely reads, and highlight information that pertains to your question. ***Then record your findings in a bulleted list or summary in our Daily Log section of your logbook****. Keep your printed research in your Science Fair folder. Eventually, you will put your printed research into a 3-ring binder or pronged folder with our Summary and optional bibliography.*

Writing a bibliography is optional for 4th grade students. If you choose to write a bibliography, write the information about your sources in our logbook at the same time and place where your put the research information. This way you won't forget to do it. Your typed bibliography will go into your 3-ring binder.

Getting information from a "live" source, such as a doctor, scientist, or specialist in the filed is very helpful. Be sure to include a record in your logbook of who you interviewed, where they were interviewed, the questions you asked, and the expert answers.

If you need help writing your bibliography, these websites are an excellent resource: www.bibme.org and www.easybib.com

4. Form and Write Your Hypothesis

(plural form is "hypotheses")

Now that you have done some research, you are ready to form a hypothesis. Remember that a hypothesis is an educated guess, or prediction, that attempts to answer your problem.

Don't make any "wild" guesses. An educated guess means that it is based on research that you have done, an experience that you have had, or related information that you have heard about.

The purpose of your experiment is to test your hypothesis is to see if it is right. Here are some helpful hints:

A hypothesis is written as an If_____, then_____statement.

For example: If I increase the temperature in the greenhouse, then the seeds will germinate faster. It should say "I think…."

***Try to make more than one hypothesis**. Make a hypothesis for your control group and one for each experimental group.*

If_____, then_____

Because_____.

Write your hypothesis in the Hypothesis section of your logbook.

5. *List your Materials and Variables*

Materials: *Your list should include everything you need to conduct your experiment. Use METRIC UNITS and be specific. For example, don't list "cup"; list "1 clear plastic cup, 250 mL capacity".*

****Write your materials list in the Materials section of your logbook.****

Variables: *Scientists use the variables to describe the conditions of an experiment. A variable can be something that is changed, something that is not changed, or something that shows change.* ***YOU SHOULD HAVE ONLY ONE MANIPULATED (INDEPENDENT) VARIABLE.***

An **independent variable** *is the condition that you will change because you want to see what will happened as a result of the change.*

A **dependent variable** *is the condition that changes as a result of what you manipulated. You don't change it. It changes by itself as a result of your actions.*

The ***controlled variables*** *are all of the conditions that you will keep the same throughout all of the testing.*

Here is an example:

Question: Which fertilizer will have the greatest effect on the growth rate of radish plants?

The manipulated variable is the fertilizer. You will use several different types. The responding variable is the growth rate of the radish plants. The controlled variables are all of the things that will stay the same: the place you keep the plants, the type of plants, the type of soil, the type of container, the amount of water you use, etc.

Write your variables in the Daily Log section of your logbook similar to this:

Independent: _____

Dependent: _____

Controlled: _____

6. *Write Your Procedure*

*Decide the procedure that you will follow to test your hypothesis. The procedure should clearly explain the steps to be followed including timing and specific amounts (**IN METRIC UNITS**). These steps will need to be followed in order to find the answer to your question. Think about the necessary safety precautions you will need to take. A good procedure is VERY DETAILED-like a good recipe. This makes it easy for other scientists to duplicate your experiment so they can verify your results.*

Write your detailed procedure in the Procedure section of your logbook.

7. *Create a Data Chart Outline*

Create a sketch of a data chart in the Data section of your logbook.

*You will use this data chart to record your data while you are conducting your experiment. For now, your data chart will be blank. Your data chart should include columns and rows to show your variables, multiple trials, and what you are measuring (**IN METRIC UNITS**). You may choose to create this chart on a computer, print it, and glue it into your logbook. You will fill in your data in blue ink later while conducting your experiment.*

8. Conduct your Experiment and create your Graph(s)

*Follow your procedure carefully to ensure fair, scientific testing. While testing, record all data in **blue ink** directly into the data chart in the data section of your logbook. Don't write measurements on a piece of paper and then copy them into your logbook—this can lead to errors. Be accurate and exact as you observe, measure (**IN METRIC UNITS**), describe, count, or photograph. As you conduct the experiment, make observations, such as changes in color. Record these observations in Data section of your logbook. Work safely. **REMEMBER TO TAKE PICTURES!** You will only be allowed to put pictures on your board. You will not be allowed to attach testing supplies to your board, nor will you be allowed to put them on the display table.*

The results will be more convincing and valid if you repeat the experiment several times (trials). An experiment must be repeated many times and yield consistent results in order to draw valid conclusions.

For example: If you are testing which brand of paper towel is most absorbent, you should try each paper towel several times, not just once or twice.

*After you collect your data in your data chart, use the chart to create a graph. The graph should be in color to make it easier to read. **You can print your graph and glue in into our logbook or draw it yourself. The graph on your final project board should be computer generated.** A great website to use is: https://nces.ed.gov/nceskids/createagraph/*

9. Interpret your Results

For the results you need to tell about your data in word form. Explain in detail what our pictures, graphs, data charts, and table are showing. If possible, examine your results mathematically using percentages, mean, median, range, and modes.

Write about your results in the Results section of your logbook.

10. Write your Conclusion

Look at the data and observations your recorded in your logbook. What did you learn? What changes occurred? Were there any patterns? Does your data and observations support your hypothesis or not? Your conclusion can be written in one or two paragraphs.

Part 1. If your data and observations did NOT support your hypothesis, why do you think it did not? What would you do differently the next time you did this experiment? Use this language: "My hypothesis was supported…." Or "My hypothesis was not supported…"

Part 2. Do not worry about "negative" results, or results that came out differently what you expected. Just explain why you think you got these results. If your results turned out just as you expected, use the date to explain why.

Write your conclusion in the Conclusion section of your logbook.

11. Write Your Bibliography

Your bibliography can be computer based and printed them glued into your logbook.

12.Assembling Your Science Fair Board

DO NOT PUT YOUR NAME ON THE BOARD ANYWHERE!

These important things must go on your board: The exact positioning is not critically important; it just helps us check the projects quickly to see that everything is on the board. If you have to juggle pieces around a little to make them fit, don't worry about that.

The data charts and graphs that go on the board are a final product and should be made on a computer, with the data accurately transferred from your logbook.

IMPORTANT: YOUR PRINTED RESEARCH, BIBLIOGRAPHY WILL BE INCLUDED IN YOUR LOGBOOK.

These things will help you do your board:

- *Plan ahead. Placing typed papers on construction paper creates a matting that will make them look neater and easier to read.*

- *Be neat. Headings can be printed using the computer or made neatly with stencils. The board must fold flat, but foam letters are allowed. You cannot have any objects of any kind connected to the board.*
- *Plan on taking pictures. You ARE allowed to be in the pictures.*
- *You cannot have any type of display in front of your board. The only thing allowed to be on the table is your logbook and your 3-ring binder.*
- *Avoid putting anything handwritten on the board.*
- *Proofread carefully. Have several people read all your documents and help you fix any spelling or grammar errors.*

13. Present Your Project

You will be presenting in class. Your teacher will have you present your project to the class and ask questions. Practice what you will say at home, perhaps with parents of siblings as your audience.

***Be prepared to be an expert on your topic. Make eye contact with your audience. Stand tall and take pride in your project. Be ready to answer all questions. Constructive criticism will be offered by your teacher and classmates. Don't take offense. It's meant to help you. If you need to fix anything, you still have time**.*