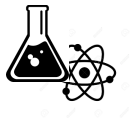
WESTLAKE SCIENCE FAIR 

Thursday, February 9, 2023

The Westlake Science Fair gives Westlake students an opportunity to learn more about a topic they are interested in, gain valuable skills on the scientific process, develop creativity, organizational, critical thinking skills, and so much more! This packet will help guide you & your child through the process.

WHO CAN PARTICIPATE? ALL Westlake students! 4th grade students are required.

WHO SUPERVISES? This is an at-home project supervised by a mentor. Each student needs a mentor to help them through the organizational components of the project. Mentors are an essential part of the science fair project and work as a **guide** from start to end.

✷ **Note to mentors:** Your role is to help students translate their interests into a scientific experience. You will help students navigate the steps of this process. Resources and examples to help you through this process can be found online at: http://www.supportwestlake.org/science-fair.html

MARK YOUR CALENDAR

Before you get started. Get organized!
http://www.supportwestlake.org/science-fair.html

Date	Event
Tuesday, Dec. 20th thru Thursday, Jan. 12	Registration form due **(online preferred!)** http://www.supportwestlake.org/science-fair.html
Wed, Feb. 8th	Set up your Project in the MUR after school (12:15-1:15)
Thursday, Feb. 9th	**WESTLAKE SCIENCE FAIR** 8am-12pm judging, 6:30-8pm Open to Families
Friday, Feb. 10th	Classroom science fair viewing. Pick up your poster board from the MUR at the *end* of the day
Sat, March 11th	County Science Fair

SCIENCE FAIR WORKBOOK

Let's Get Started!

This guide will lead you through the steps to a successful project. Remember you need to write down all your ideas and progress in your **blue notebook**. The 📖 icon will remind you to make a new **notebook entry** with a Title and Date. Consider using the sentence frames provided. Use the ☑checkboxes to mark your progress.

SECTION A: FORM YOUR IDEAS

STEP 1: Find a Mentor

Due date: _____

A mentor should be …

- ➢ Someone comfortable guiding your scientific thinking
- ➢ Willing to talk with you multiple times over the course of the project
- ➢ Someone who will keep you on track, organized and help you access the online resources at http://www.supportwestlake.org/science-fair.html

My mentor is _____

Judges might ask you:

- *Who helped you with your project?*
- *In what parts of the project was their help most useful?*

✋*STOP! Make sure you have a Mentor before you continue.* ✋

STEP 2: Choose a question or topic based on your personal interests

Due date: _____

IMPORTANT RULES: Special project approval is required BEFORE STARTING if you are studying people, vertebrates (animals with bones), handling human or animal tissues or fluids, microorganisms, rDNA, chemicals (cleaning agents, solvents, organic chemicals) hazardous equipment (UV light, rockets), or controlled substances (anything that the student cannot legally purchase).
MENTORS: Email westlake.sciencefair@gmail.com with the potentially unsafe category from the above list and provide a short explanation of how you, as the Mentor, will provide a safe experience for your student and/or others while conducting this experiment.

A project idea should be …

- ➢ *Most importantly, something you find interesting.*
- ➢ Something you can directly investigate or explore, which could be either a
  - question that can be answered with an **experiment** OR …

- problem that requires an **engineered solution**

➢ Something based on components that can be measured clearly, such as time, weight, distance, height, volume, things you can count, etc.

📖 **Notebook entry:** *Topics of Interest*

- ☐ Make a list of topics that you find interesting to you
  - 3-5 topics I am interested in are _____.
- ☐ Talk to your mentor about possible ideas to pursue based on this list.
  - The topic I am most interested in is _____ because _____.

📖 **Notebook entry:** *Questions OR Engineering Problem*

- ☐ Brainstorm questions you have.
- ☐ Choose a question that you can answer with an experiment or design
  - Think: Can I measure it? Can I get the materials?
  - Sketching out your ideas might help!
  - *How does _____ affect _____?* (experiments)
  - *How might (idea I could engineer) help solve (problem or challenge)?*

My question/ engineering problem is:

_____

_____

💡*Your initial question may change as you go through the research process!* 💡

Judges might ask you:

- *How did you come up with the idea for your project?*
- *What questions did you have about your topic that you needed to answer?*
- *What did you do to make sure this project was going to work for you?*

STEP 3: Build understanding by asking QUESTIONS & doing RESEARCH

Due date: _____

Before you begin your project, you will need to learn more about your topic. This could be done through playing with your ideas and materials, talking with people/experts or learning more through research.

📖 **Notebook entry:** *Research & Explorations*

- ☐ Write down what you already know about your topic. (Personal stories, things you've seen, watched or read). These are your *prior experiences.*
- ☐ With the support of your mentor, gather information about your topic.
  - Play around with your ideas to learn more and see if there are surprises
  - Have conversations with people or experts in your field

- Do research with books, videos, or websites
- Write down important questions you have about your topic

☐ Keep a list of the resources you used in your research.

💡*As you learn more, revise your original question if needed!*💡

Judges might ask you:

- *What prior experiences did you have with these ideas?*
- *What ideas did you learn while doing your research?*
- *What resources were most useful for you in your research?*

STEP 4: Write a Hypothesis that includes an explanation

Due date: _____

A hypothesis is a prediction of what you think will happen based on your experiences & research. It includes an explanation based on logical thinking. Your hypothesis does not have to be correct. Use your own ideas and explain them!

📖 **Notebook entry: *Hypothesis***

☐ In a few sentences what do you think will happen and explain *why*? Your explanation should be based on the understanding you built during your research and experience.
- *If _____ then _____ because _____.*

☐ Draw and label a picture that highlights the important ideas in your hypothesis.

See examples at http://www.supportwestlake.org/science-fair.html

Judges might ask you:

- *What did you think was going to happen before you did your tests or went through your engineering process? Why?*

STEP 5: Plan your experiment or your engineering design challenge.

Due date: _____

Now that you know more about your topic. It's time to make a plan that describes how you will carry out your project. What materials will you need to gather? For experimenters, how will you perform your test? Plan to include a control group and have enough trials/repetitions to make sure your results aren't based on randomness. You might need to repeat your test a lot of times! For engineers, make a list of the criteria your design must meet in order to be a success. Plan on going through many **design cycles** as you improve your project. *NOTE: This step will be part of what you submit to the science fair committee when you register so everyone knows you're on the right track.*

📖 **Notebook entry:** *Methods/Procedures (EXPERIMENTS ONLY)*

- ☐ Use words, annotated drawings and/or lists to explain each step of what you are going to do.
- ☐ Explain how you'll make sure only *a single variable is changing* during your tests. If more than one thing is changing, you won't be able to explain what happened.
    - Depending on the experiment, include a group in your tests that you don't do anything to. This will be the controlled reference point to see if your variable actually has an effect.
- ☐ Write down what measurements you will take and what tools you'll use.
- ☐ Plan on repeating the experiment a number of times so you can be confident the results weren't due to randomness. This will be at least 3 times but possibly more.

See examples at http://www.supportwestlake.org/science-fair.html

📖 **Notebook entry:** *Solution Criteria **(ENGINEERS ONLY)***

- ☐ Explain the scope of your engineering design project.
    - Define the problem: Explain the situation you're trying to solve.
    - Name your solution: Write your idea for a solution to that problem.
    - List criteria/ benchmarks of success: At least 3 things that you will use to measure the success of your solution during the design process.
    - List constraints/ limits: Any restrictions or limits that your design process must meet
    - Name measurable outcomes: Measurements you will take while evaluating your design solution.

See examples at http://www.supportwestlake.org/science-fair.html

📖 **Notebook entry:** *Materials (for experiments and engineers)*

- ☐ List the materials you will need for your project.
- ☐ Collect your materials. Talk with your mentor if you need to purchase anything.

Judges might ask:

- *How did you design your investigation or experiment?*
- *What steps did you take to ensure someone else doing the same experiment could get the same data/ results?*
- *What were some of the variables involved in your project?*
- *For engineers, how did you come up with your criteria for success?*

SECTION B: CONDUCT YOUR TEST

STEP 6: Conduct the experiment or engineering design cycles.
Due date: _____

📖 **Notebook entry:** *Design Cycles* ***(ENGINEERS ONLY - see form at end of packet)***

- ☐ Plan on repeating multiple design cycles using this general flow:
  - State goal of test, predict outcome, test idea, write observations, make conclusions to explain your observations, set new goal.
  - Draw pictures, take photos
  - If applicable, make a display of your data (graph, chart) to help you visualize and communicate the results.

📖 **Notebook entry:** *Data and Results* ***(EXPERIMENTS ONLY)***

- ☐ Create a data table to record your data. Remember to include the unit of measurement.
- ☐ Record any other observations.
  - *I notice* _____.
- ☐ Draw pictures, take photos.
- ☐ Make a display of your data (graph, chart) to help you visualize the results.
- ☐ Repeat your trials many times. Calculate an average.

Judges might ask you:

- *What challenges came up when you were doing your tests or engineering cycles?*
- *For engineers, how many design cycles did you do (tested, modified, re-designed)?*
- *For engineers, did you build a prototype? What did you learn from it?*
- *Did you do any calculations during your project?*

SECTION C: EXPLAIN YOUR RESULTS

STEP 7: Interpret the results. *Due date:* _____
Construct an explanation of your results based on your research and understanding of science. How have your ideas changed based on what happened?

📖 **Notebook entry:** *Conclusion*

- ☐ Explain what happened and **why**.
  - Was the *If* _____ *then* _____ hypothesis supported or not supported?
  - Does the explanation (*because* portion) of your hypothesis seem valid?
  - Did your engineering solution meet the design criteria? Why or why not?
  - If you are unsure, discuss with your mentor or do more research.
  - Use words or drawings to describe your thinking. Refer to the science you learned through your research.

📖 **Notebook entry:** *Reflections*

- ☐ What went well with your tests? Do you think your results are valid?
- ☐ What challenges did you have? Were there mistakes/ errors?
- ☐ List new questions about your topic based on your results.
    - *I wonder _____.*
- ☐ What needs more research/ experimentation to deepen your understanding?
    - *I'd like to know _____.*
    - *If I had more time I would _____.*

Judges might ask you:

- *How would you explain your results?*
- *Could the source of your results be based on random chance? Why or why not?*
- *What surprised you about the results of your work? Did the results match your predictions?*
- *Did the results change your way of thinking about the situation? How so?*
- *What new questions did you have after you collected your data?*
- *Would it be valuable to collect more data? Why or why not?*

SECTION D: SHARE YOUR PROJECT

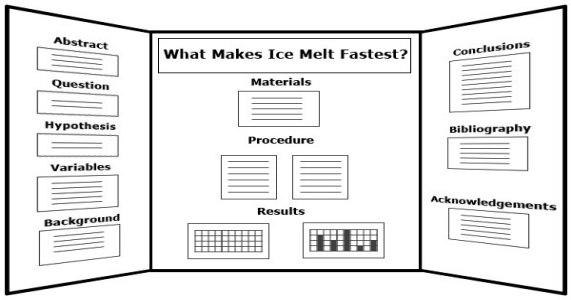
STEP 8: Design a Poster Board Presentation *Due date: _____*

Design a poster board to tell the story of your project. Use your creativity and have fun making your board! Projects may be typed or handwritten, all writing must be NEAT and LEGIBLE. There is no one way to make a poster board, but be sure to include the sections listed below.

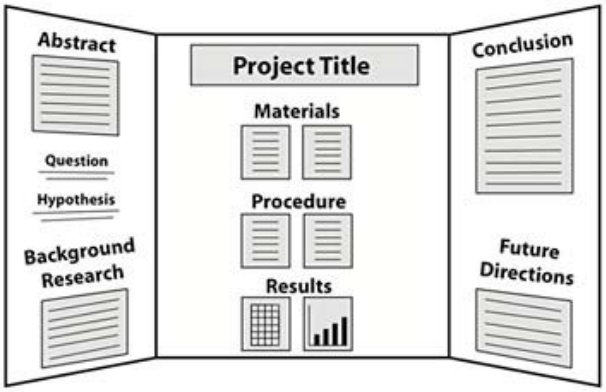
- ☐ Pick up a poster board from the MUR on **Tuesday, Jan. 17th**
- ☐ Neatly write or type your:
    - Question
    - Problem & Solution (engineering only)
    - Purpose
    - Background Research
    - Hypothesis
    - Methods (experiments only)
    - Design Criteria & Constraints (engineering only)
    - Materials
    - Results (Data Tables, Charts, Graphs that include captions)
    - Summary of Design Cycles (engineering only)
    - Conclusion
    - Acknowledgements

- ☐ Think of a title for your project
- ☐ Make sure titles, subtitles and text are large enough to read
- ☐ Arrange all parts on your poster board - make sure they fit before gluing down!
- ☐ Remember to bring your blue notebook!
- ☐ Include props or samples (if possible) so people can interact with your project. Electricity will not be provided. You will have 1x2 feet of table space in front of your display.

EXAMPLE BOARDS:



www.sciencebuddies.org



Judges might ask you:

- *What was one of the highlights of your project?*
- *What was a challenge you faced?*
- *If you repeated your tests, is there anything you would do differently?*
- *If you decided to work more on this idea, what would you do next?*

STEP 9: Practice your Presentation *Due date: _____*

Have your mentor and other adults ask you questions about your project. Go back through this packet and check out some of the questions judges might ask you to help you prepare.

STEP 10: Acknowledge your helpers

📖 Notebook entry: *Acknowledgments*

Congratulations, this is the last entry in your notebook! Write a few sentences about who helped you and how they helped you.

Judges might ask you:

- *Who helped you on your project?*
- *Which parts of your project did you receive help with?*

WESTLAKE SCIENCE FAIR ENTRY FORM

ALL STUDENTS WHO PARTICIPATE MUST REGISTER BY
Tuesday, Dec 20th-Thursday, Jan 12

Poster boards will be provided after school on Tuesday, Jan 17th to all registered students.

Register online at
http://www.supportwestlake.org/science-fair.html

Or return this form to the office ***(help us save time & register online!)***

Student Name: _____

Grade: _____ Teacher: _____ Room #: _____

Project title: _____

Question: _____

Hypothesis: _____

Short explanation of your experiment: _____

_____

_____

_____

Project partners: _____ Room: _____

(if any) _____ Room: _____

Are you studying people, vertebrates (animals with bones), handling human or animal tissues or fluids, microorganisms, rDNA, chemicals (cleaning agents, solvents, organic chemicals) hazardous equipment (UV light, rockets), or controlled substances (anything that the student cannot legally purchase)?

Yes / No

If yes, please email westlake.sciencefair@gmail.com with the potentially unsafe category from the above list and provide a short explanation of how you, as the Mentor, will provide a safe experience for your student and/or others while conducting this experiment.

Mentor name: _____

Mentor contact information (phone and/or email): _____

Parent/Guardian signature: _____

Questions? Contact: westlake.sciencefair@gmail.com
More resources at: http://www.supportwestlake.org/science-fair.html

ENGINEERING DESIGN CYCLE NOTE TAKING FORM

(From Step 6 - For Engineering Projects Only)

Date & Location	
Current Goal or Task I'm trying to …	
Prediction I predict …	
Observations I noticed … I wonder …?	
Conclusion I think … Maybe … Perhaps … It seems like …	
Adjustments I'm going to try …	