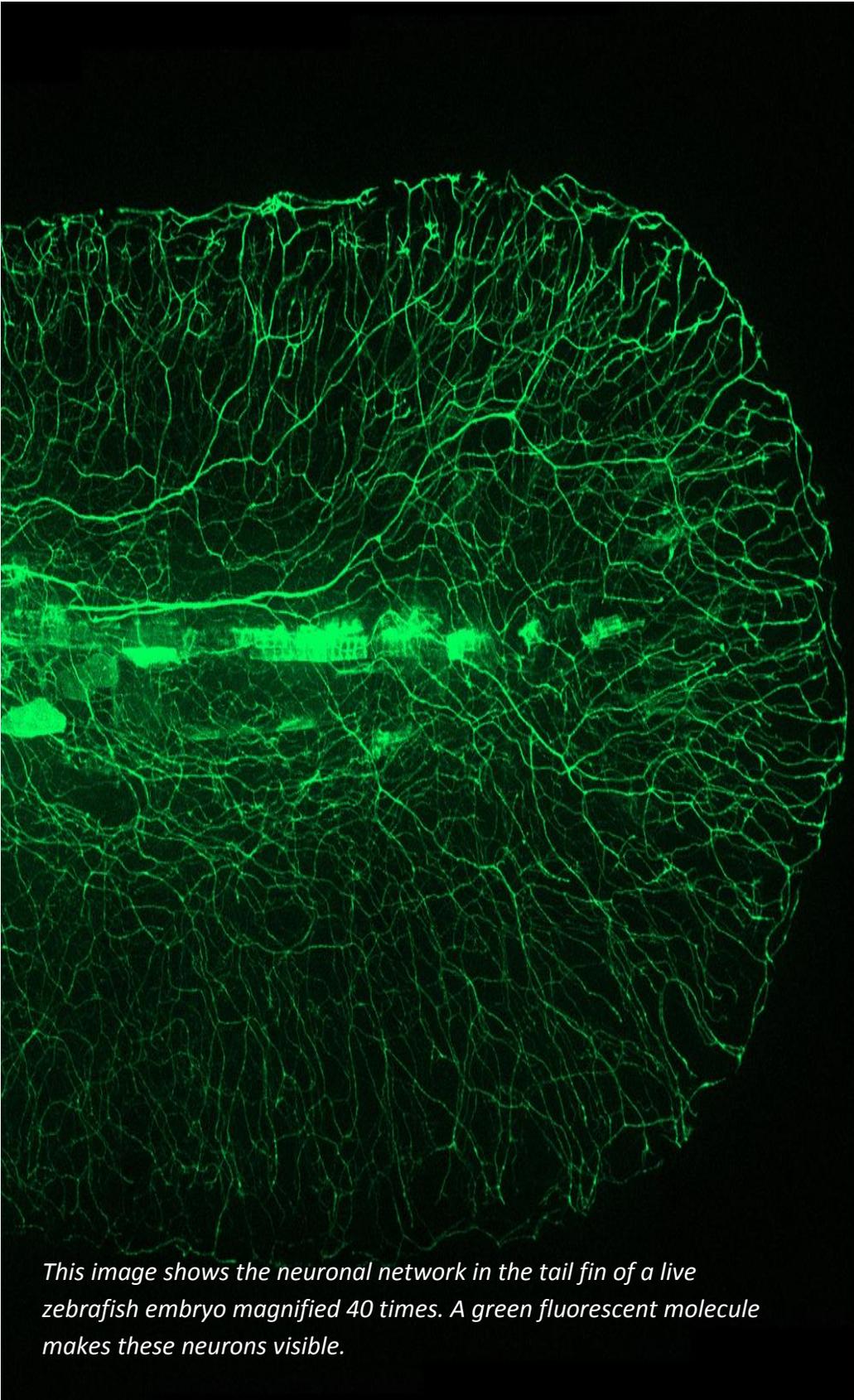


# got science?

Central School  
Science Fair  
Planning Guide  
2015



*This image shows the neuronal network in the tail fin of a live zebrafish embryo magnified 40 times. A green fluorescent molecule makes these neurons visible.*

# WELCOME

We are so happy you decided to join us for the Central School Science Fair occurring on Thursday, November 12<sup>th</sup>. You will have a blast!

## IMPORTANT THINGS TO KNOW BEFORE YOU GET STARTED:

- Participation in this non-competitive Science Fair is optional and open to all students (K-5).
- Students, working individually or in pairs, will conduct their own experiments at home using the 5 steps of the Scientific Method.
- Go to the PTO website (<http://www.centralptonews.org/category/science-fair/>) to complete the online registration form no later than Friday, October 23rd to be eligible to participate in the Fair.



## GETTING STARTED

First thing to do is to learn some basics about different types of science projects. For example, sometimes a science project is a model, while other science projects are experiments. Models (or displays) show how something works, but they don't really test anything. Examples of models/displays are projects like "Types of Dinosaurs" or "Baking Soda & Vinegar Volcano."

Even though you can learn a lot from building a model or researching for a display, we recommend that you do an Experiment!!! Why? Well, they are fun, they are VERY interesting and most of all, they take you through the SCIENTIFIC METHOD, which is the real way scientists do research. You can tell you are doing an experiment if you are testing something several times and changing a variable to see what happens. Examples of experiments include "The Effect of Detergent on the Growth of Plants" or "What Type of Shoes Are Best for Playing Soccer." Just follow the instructions in this Planning Guide and you will be a real scientist in no time! This planning guide will:

1. Take you through the steps of the Scientific Method (everything you need to know to get through your experiment!)
2. Help you come up with your Science Fair topic. **NOTE: You must have your topic and title on the registration form. You can register online at <http://www.centralptonews.org/category/science-fair/> NO LATER THAN Friday, October 23rd.**
3. Explain what you need to do to prepare your actual display for the Science Fair.

Have fun, be safe, and contact your Science Fair Committee at [jhepker@prescottmed.com](mailto:jhepker@prescottmed.com) if you have any questions at all. We are here for you!

# THE SCIENTIFIC METHOD

Get ready to have some fun young scientists! Follow the 5 simple steps below and you will have completed an experiment using the Scientific Method.

Use the Scientific Method Worksheet at the end of this document to record your progress through each step OR use your own paper that can be pasted to the board for your display. **Your final display should have at least 5 sections corresponding to the 5 steps of the Scientific Method (Question, Hypothesis, Experiment, Results, Conclusion).**

## QUESTION

### Step 1. Ask a question

What interests you? Do you have a question about something? What can you test? The question can be a simple one such as, "What kind of paper makes the best paper airplane?"

To give you an idea of what we mean, take a look at the types of questions below:

#### The "Effect" Question:

What is the effect of \_\_\_\_\_ on \_\_\_\_\_?

sunlight	the growth of plants
temperature	the size of a balloon
oil	a ramp

#### The "How Does" Question:

How does the \_\_\_\_\_ affect \_\_\_\_\_?

color of light	the growth of plants
humidity	the growth of fungi
color of a material	its absorption of heat

#### The "Which/What" Question

Which/What \_\_\_\_\_ (verb) \_\_\_\_\_?

paper towel	(is) most absorbent
foods	(do) meal worms prefer
peanut butter	(tastes) the best

## Now it's your turn:

Create your Science Fair question. If it helps, try using one of the approaches above: "Effect Question", the "How does" Question" or the "Which/What" Question." If you need some extra help coming up with an idea, have an adult help you check out the online resources below, ask the librarian at the local library, or email your Science Fair Committee at [jhepker@prescottmed.com](mailto:jhepker@prescottmed.com). Once you've decided what your question will be, record it on the Scientific Method Worksheet (included at the end of this packet) or on a piece of paper of your own. **You will also use this to come up with a title for your presentation, which must be included in the required registration form due Friday, October 23rd.**

*Recommended Online resources\*:*

[www.sciencebuddies.org](http://www.sciencebuddies.org)

<http://school.discoveryeducation.com/sciencefaircentral>

\*Note to parents: these online resources are provided as a guide, but we encourage you to have your child use his/her own curiosity or interests as the motivation for the question. Do not worry that the question or resulting experiment does not seem sophisticated enough. The best type of question for an elementary school Science Fair, even if it seems simple, is one for which your child is yearning to have the answer!

## HYPOTHESIS

### Step 2. Develop your hypothesis

You have asked a question. Can you PREDICT what you think will happen if you test your problem? This type of “SMART GUESS” is what scientists call A HYPOTHESIS.

The first step in developing a hypothesis is getting informed, so start by:

- **Reading!** READ about your topic. READ encyclopedias. READ magazine articles and books from the library. READ articles from the internet but be sure to let an adult know what websites you will be visiting and have them help you with the search. Keep track of all the books and articles you read. You’ll need that list for later.
- **Discussing!** Talk about it with your parents. Talk about it with your teachers. Talk about it with experts like Veterinarians, Doctors, Weathermen or others who work with the things you are studying. Sometimes websites will give you e-mail addresses to experts who can answer questions.... But, do not write to anyone on the internet without letting an adult supervise it. (\*hint: you can also take pictures of yourself interviewing people for use on your display)

To give you an idea of what we mean, see the example below:

**Example Problem:** Which Paper Towel is more absorbent?

**Example Hypothesis:** I think Brand X will be more absorbent because it’s a more popular brand, it is thicker and the people I interviewed said that the more expensive brands would work better.

This hypothesis not only predicts what will happen in the experiment, but also shows that the “Scientist” used research to back up his/her idea about what would happen. Keep in mind though you still need to do the experiment even if you think you will know what will happen!

### Now it’s your turn:

Record what you think the answer to your question will be. There is no right or wrong answer here—you will have to wait and see what happens during your experiment! Record your hypothesis on the Scientific Method Worksheet (also, you can use this space to note what research you did to lead you to this hypothesis).

## EXPERIMENT

### Step 3. Design your experiment

How would you answer your question above? Designing an experiment is really cool because you get to use your imagination to come up with a test for your problem, and most of all, you get to prove (or disprove) your Hypothesis.

First determine what your steps you will take and what variables you will change. The variables are any factors that can change in an experiment. Remember that when you are testing, you should only change one variable at a time in order to get accurate results.

To give you an idea of what we mean, see the example below:

Let's say you were testing the effect that water has on plant growth. In this case, the only variable you would change from plant to plant would be the amount of water it received. All the plants you test should be in the same conditions (under controlled variables: same type of dirt, same type of plant, same type of location, same amount of sunlight, etc).

Knowing what your variables are is very important because if you don't know them you won't be able to collect your data or interpret your results!

### Now it's your turn:

Write the steps of your experiment down in a way that someone else could read it and repeat your experiment on their own later. You will also need to make a list of the materials and supplies you will need. If you need help with this step, your Science Fair committee will be available to meet with you during after school mentoring sessions on October 7th and 14th. Record the methods you use on the Scientific Method Worksheet.



## RESULTS

### Step 4. Collect data

Now we are ready for the really good stuff—actually performing the experiment! Gather your materials and perform your experiment as you have planned it.

Thing to keep in mind:

- Safety first! Make sure you have an adult to help you before you get started, never eat or drink during an experiment and always keep your work area clean, wear protective goggles if doing any experiment that could lead to an eye injury, and always wash your hands after doing the experiment.
- If possible, do the experiment multiple times (or have multiple tests) to make sure your results are consistent (and therefore more reliable). Thinking about the plant example above, this would mean having 2 or 3 plants for each condition and confirming that results with the SAME conditions were generally consistent.
- Write down or record the results of the experiment every time you test it. No picking only the data you like!! All data can tell a story, even if it's not the story you are expecting!
- Think about presenting your data not only with photographs and written summaries but with tables or graphs as well. To make sure you use the right kind of graph for your data, keep this in mind:
  - **Pie graphs** are good to use if you are showing percentages of groups. Remember that you can't have more than 100% and all the pieces need to add up to 100%. This type of graph is great if you are doing surveys.
  - **Bar graphs** are good to use if you are comparing amounts of things because the bars show those amounts in an easy to read way. This way you will be able to tell your results at a glance. Usually the bars go up and down. The x axis (or horizontal axis) is where you label what is being measured, (like plant A, B, C and D) and the y axis (or vertical axis) is labeled to show the unit being measured (in our example, it would be centimeters that the plant grew).
  - **Line graphs** are good to use if you are showing how changes occurred in your experiments over time.

### Now it's your turn:

Be sure to record all of your observations along the way on the Scientific Method Worksheet or your own paper and take plenty of photographs along the way. If you make any graphs or tables, include them on your display board!

## CONCLUSION

### Step 5. Draw a conclusion

You are almost done! The last step is to check your hypothesis against your results.

What to ask yourself:

What did the data tell you? Was your hypothesis correct? Why is this important to know? What other questions did your observations raise? How else could you test those? What would or could you have done differently in your experiment? **What did you learn??**

### Now it's your turn:

Record your conclusion on the Scientific Method Worksheet or on your own paper. You should specifically state whether your hypothesis was proven or disproven but also provide some additional input on your experiment using the questions above as a guide.

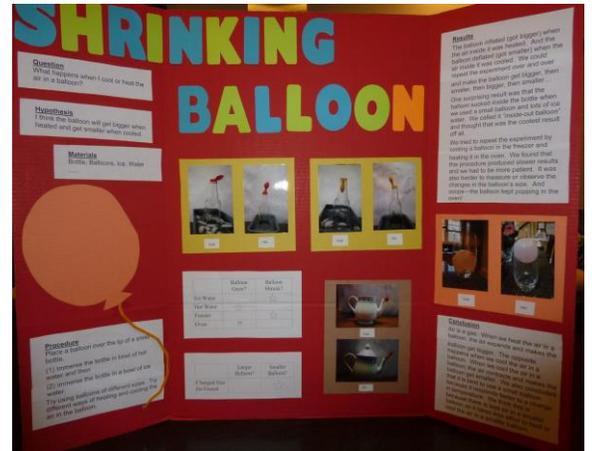
CONGRATS SCIENTIST! You have completed the Scientific Method. Go to the next section to see how to prepare your display board.



# PUTTING IT ALL TOGETHER

## HOW TO PREPARE YOUR DISPLAY AND OTHER IMPORTANT INFO

- Rules you need to follow for the Science Fair Display:
  - **No** animals can be on display (this includes bugs, fish, etc) unless approved by the Science Fair committee—only photographs are allowed.
  - **No** chemicals or liquids in open containers, unless approved by Science Fair Committee (eg, water or soapy water is okay, but liquid nitrogen would not be).
  - No foul-smelling or allergy-provoking substances (eg, mold) in open containers.
  - There will not be access to running water or electricity during your presentation.
- Display boards: Feel free to use materials you have at home or **for your convenience, the PTO will be providing display boards to all those registered. \*NOTE: the online registration form is due by Friday, October 23<sup>rd</sup>.** Display board pickup will occur after school and information about the pickup will be sent via feedblitz as the date approaches.
- Preparing the display:
  - You can simply attach your Scientific Method worksheet to the display board along with any additional items needed for the presentation (e.g., extra sheets where you've recorded your observations, photographs, or a list of references you used for research).
  - Some students prefer to separate out the 5 steps of the Scientific Method throughout their display (instead of just using the worksheet). Have fun with this and feel free to get creative with color and paper.
  - Make sure your display is neat, organized and easy to read.



- Don't forget to include your title across the top of the display AND include your name, grade and teacher on the display board.
- You will present a brief summary of your findings to a member of the Science Fair Committee. This presentation should not exceed 5 minutes. Don't be nervous—remember there are no wrong answers! You just need to communicate your findings. K-2 will be reviewed first, followed by grades 3-5.
- The fair will be held from 6 to 8pm on Thursday, November 12th in the Hauser cafeteria and gym. You are responsible for taking down your display after the fair and disposing of it properly.

## IMPORTANT DATES

Date	Time	What and Where
Wednesday, October 7 <sup>th</sup> and Wednesday, October 14 <sup>th</sup>	3:10 to 4:30pm	After School Mentoring: Science Fair Volunteers will be available in the library to review and discuss ideas for projects
Friday, October 23 <sup>rd</sup>	Friendly reminder	Online registration form due. You must be registered by this date to participate in the Fair.
Friday, October 30 <sup>th</sup>	Friendly reminder	Are you on track with your experiments? The fair is only a couple of weeks out.
Thursday, November 12 <sup>th</sup>	6:00 to 8:00pm Set up begins at 5:30; Review begins at 6:00pm	SCIENCE FAIR NIGHT! HAVE FUN!

QUESTIONS? Contact us at [jhepker@prescottmed.com](mailto:jhepker@prescottmed.com)

Let our budding scientists take the lead and HAVE FUN! See you at the Fair.



Name: \_\_\_\_\_

Date: \_\_\_\_\_

# The Scientific Method

Complete the five steps. Record your information in the spaces provided.

1. Ask a question.

2. Come up with a hypothesis.

3. Do an experiment.  
Tell what you did here.

4. Record your data.

5. Draw a conclusion.

