FGES NIGHT AT THE MUSEUM

GRADES 4-5 HISTORICAL INVESTIGATION GUIDELINES

Your Historical Investigation will allow you to explore an important question in United States history.

Choosing Your Topic

Choosing a topic for your project can be half the battle! Flip through social studies books from the library. With your parents, browse the internet or watch history documentaries on TV. Talk to older adults about events they have lived through.

These websites are a good place to start:

American Experience from PBS -- http://www.pbs.org/wgbh/americanexperience/
MPT's Exploring Maryland's Roots -- http://mdroots.thinkport.org/
Social Studies from Kids.gov -- http://kids.usa.gov/social-studies/
Social Studies for Kids -- http://www.socialstudiesforkids.com/
Interactive Sites for Education: Social Studies -- http://interactivesites.weebly.com/social-studies.html
Smithsonian National Museum of American History -- http://americanhistory.si.edu/kids
Library of Congress -- http://www.loc.gov/families/
Maryland Historical Society – http://www.mdhs.org/digital-images
Maryland State Archives Kids Page -- http://www.mdkidspage.org/
Digital History: http://www.digitalhistory.uh.edu/

Because there are so many ideas online and in books, please be sure your project meets these two important criteria:

1) Must answer a question
2) The question must be answered by using several primary sources of information (see below).

Historical Inquiry Method

Students completing a Historical Investigation will conduct primary and secondary source research to draw conclusions about an important question about United States or Maryland History from ancient times to the present.

Primary sources are eyewitness, or first-hand, accounts of something from the past. The person who created the primary source actually experienced the event for him or herself. Primary sources include diaries, letters, autobiographies, photographs, census records, artifacts (objects from the time), oral histories, sound clips, videos of actual events, etc.

Secondary sources are created when a historian does research using primary sources to draw conclusions about something that happened long ago. Since the historian wasn't there at the time to experience the event for him or herself, he or she examines the evidence left by people who were there. Often, the primary sources don't exactly agree about what happened, so the historian must carefully consider each account and see where most of the accounts agree.

PROCESS

1. **Choose your question:** What question about the past will you answer with your research? You can ask a question about any topic in U.S. or World History.

    a. The best questions do not have a "correct" answer; you should be able to answer it in many different ways depending on the evidence you find.

    b. If your question has a "yes" or "no" answer (like the first "good" question below), be sure to explain why that is your answer.

    c. Also, your question should be very specific so that it is not too big to answer with a project like this.

    d. EXAMPLES:
        - GOOD QUESTION: Were the patriots right to declare independence from Great Britain? Why or why not? / BAD QUESTION: What country did the Americans fight during the American Revolution? *(only one correct answer)*
        - GOOD QUESTION: How was school 100 years ago different from being a child today? / BAD QUESTION: Did children have recess at school 100 years ago? *(can be answered yes or no)*
        - GOOD QUESTION: Why did the pharaohs build the pyramids in ancient Egypt? / BAD QUESTION: How big were the pyramids in ancient Egypt? *(does not allow for your opinion)*
        - GOOD QUESTION: How did Captain John Smith increase Europeans' knowledge of the Chesapeake Bay? / BAD QUESTION: How did the explorers discover America? *(question is too big)*

2. **Do secondary source research:** Read books, magazine articles, and reliable websites to gather information from historians about your question. Learn what was going on in the world during the time period you are studying. What do historians say about your question? Try to find several secondary sources about your topic. Be sure to properly cite each source you use in your bibliography.

3. **Do primary source research:** Now find eyewitness accounts that can help you understand your question. What were people at the time saying about your topic? Try to find several primary sources.

   a. Try to find primary sources that present differing points of view about your subject.

   b. Think about how reliable each source is. In other words, how much you should trust each source? Is there any reason why an author might not tell the whole truth or might be inaccurate in his/her account?

   c. FOR EXAMPLE, if you are trying to determine whether the patriots were right to declare independence from Great Britain, you might look at some writings from the British Parliament giving their opinions about why they needed to tax the colonists, newspaper articles about the patriots' complaints against Great Britain, and some sketches showing famous events like the Boston Massacre. When reading the writings from Parliament, you might ask whether they have any reason to view the events in the colonies in a certain way. You might ask whether the colonists might have hidden reasons for their actions.

4. **Compare/contrast the primary sources:** After historians have analyzed, or looked closely at, each primary source, they compare and contrast them to see where they agree and disagree. The more agreement there is among several sources, the more a historian can be confident they can know what really happened long ago. When sources disagree, try to figure out why they might differ and which sources might be most reliable, or trustworthy.

5. **Draw your conclusion, supported by the evidence:** After you have compared the sources, put together what you have learned to answer your project question. It is very important that you be able to support your conclusion with evidence from the primary sources. In other words, you must be able to provide specific details from the primary sources to help you "prove" that your conclusion is correct.

Where do you find primary sources?

Primary sources are easier to find than you think! The library has some books that are collections of primary sources on different topics. Local museums and historical societies have MANY primary sources, and the staffs are usually happy to help students find what they need! And the internet is a great place to find primary sources, esp. the following websites:

- Library of Congress: www.loc.gov
- National Archives: www.nara.gov
- Historical Statistics of the United States: http://www2.census.gov/prod2/statcomp/documents/HistoricalStatisticsoftheUnitedStates1789-1945.pdf
- Internet Archive: https://archive.org/index.php
- Digital History: http://www.digitalhistory.uh.edu/

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GRADES 4-5 SCIENTIFIC EXPERIMENT GUIDELINES

Exploring science using the scientific method

The scientific method is a way to ask and answer scientific questions by making observations and doing experiments. The steps are listed below.

1. Make an observation: Look around you. What are you curious about? Is there something you'd like to learn more about in nature/science?

2. Do background research: To provide guidance and information about your topic, you should consult books, magazines, videos, interviews, or trusted internet sites. Learn more about your topic. Some websites that may help:

    - BrainPop: https://www.brainpop.com/
    - Interactive Sites for Education: http://interactivesites.weebly.com/science.html
    - Great Websites for Kids: http://gws.ala.org/category/sciences
    - Science News for Students: https://www.sciencenewsforstudents.org/
    - BBC Bitesize Science: https://www.bbc.co.uk/education/subjects/z6svr82
    - National Geographic Kids: https://kids.nationalgeographic.com/
    - Science Buddies: https://www.sciencebuddies.org/

3. Ask a question: Now that you know a little bit about your area of interest, ask a question. What is the purpose of your project? What is it you want to know about your topic?

4. Construct a hypothesis: A hypothesis is a statement that tells what you think will happen before you conduct an experiment. It doesn't matter whether your hypothesis turns out to be right or wrong. The purpose of the experiment is to learn!

5. Test your hypothesis by doing an experiment: Now that you have an idea as to what you think will happen, see if you are right (test your hypothesis) and design an experiment. The first thing you need to figure out is what you are measuring (this is called your dependent variable). Also, you want to make sure that your experiment is a "fair test" or "controlled experiment." This means that you change only one factor (called the independent variable) during the experiment. All other conditions need to be kept the same throughout the experiment (constant). Before you start, think of what steps you will perform as a part of your test. These are your methods. Be sure to list all the things you will need to perform the experiment (your materials) and collect the materials before you start. You will need to know all of these for the presentation. It is best to run an

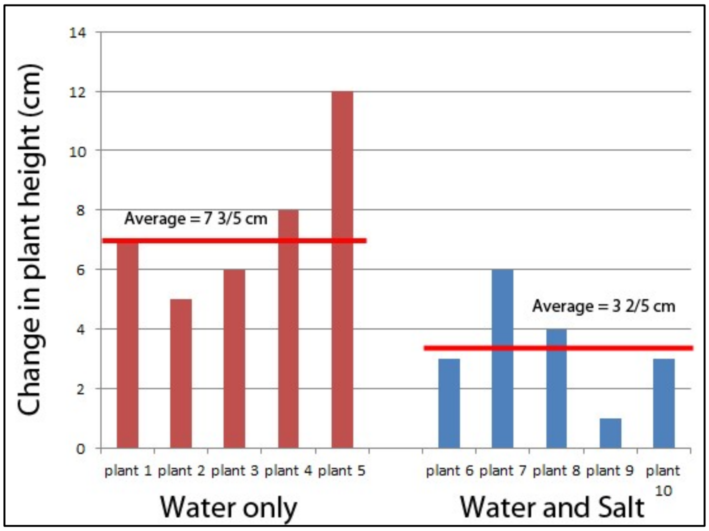
experiment several times; consider repeating it at least 3 times, if possible, to be sure that your results are not due to chance or errors.

6. Analyze your data: When you perform your experiment, you should collect data through observations and measurements to answer your question. Put these in a chart so someone else can see what you have done and so you can draw a conclusion. Remember to properly label your chart. What does your data say? Does it support or refute your hypothesis?

7. Conclusion: Draw a conclusion based on your data. A conclusion is a restatement of your hypothesis explaining whether it was right or wrong. Do your results support your hypothesis? If not, it does not mean your project failed. Remember, in science, the questions are more important than the answers! If it did fail, and you think it should have worked, tell why you think it didn't work (perhaps another variable was present you didn't know about, or your instruments were not working like you thought they were). Did you make any mistakes? What would you do differently next time?

8. Communicate your results: Here, you get to put everything together in a poster or presentation so everyone knows what you did and how you did it. Each of the sections above is part of the presentation.

Example experiment: Plant growth and salt. This simple experiment will give examples of all the concepts mentioned above. You have learned that plants use the minerals and nutrients in the soil, in addition to the carbon dioxide in the air, to grow. You wonder what minerals would make a plant grow taller. You are curious, so you look in books and discover there are many different things that can make plants grow (this is your background research). You decide to try salt, a mineral found in your home, to see if it would also make the plants grow taller. Your question is: Will giving my plants salt make them grow taller than plants without salt? You think that adding salt to the soil will make the plant grow taller (this is your hypothesis, typically stated as 'Salt will make the plants grow taller'). Your experiment has two groups, marigolds that receive only water and marigolds that receive salt water. The independent variable here is the salt in the water. The constants are the marigolds, the potting soil, the amount of sunlight, and the amount of water given to the plants each day. This is a 'fair test' because you are only changing one thing – the amount of salt in the water. You are measuring the height of the plants, so this is your dependent variable. You come up with your list of materials (the number of marigolds in each group, the amount of potting soil each gets, the pots for planting, the amount of water the plants receive, and the amount of salt added to the water for the experiment), and you write down what you did (these are your methods). For example you could write, 'I planted the plants on Saturday and left them outside for the experiment. I measured the plants the first day. I gave them 100 ml of water every day when I got home from school for 2 weeks. I measured how tall each plant was at the end of 2 weeks.' You want to do a really good job with your experiment so you make sure each group has 5 plants in it (this is your replication). The data you are collecting is plant height (this should be a metric measurement). You will measure them at the beginning of the experiment and at the end to get the change in height (for example, if the plant was 30 cm on day 1 and 33 cm on day 14, then the change in height is 3 cm (33-30 = 3)). You do this for every plant and make a chart. You use this chart to make a graph of your <u>results</u> (since you learned how to do averages, you add this to the graph too). You look at your data and notice that the plants that got salt water didn't grow as well (and the average is much lower). In this case your <u>conclusion</u> is that salt did not make the plants grow taller, so your hypothesis is incorrect. That's OK, because not every hypothesis is correct and you know you did a good job because the experiment was a 'fair test' - it was the salt that made the plants grow poorly!



<u>Important Guidelines for Parents:</u>

1. Safety of our young scientists and their helpers is of utmost importance. Please do not design experiments that require the use of firearms, explosives (including fireworks), harmful pathogens (e.g. mold, bacteria, or viruses), dangerous chemicals or experiments, or experiments that harm animals. Experiments may involve animals, potential allergens, open flames, liquids and chemicals, but these may not be brought to school and <u>must be supervised by adults at home</u>. Please use pictures instead for your presentation. Whatever your project involves, the child and adult must be familiar with the materials and use the correct safety precautions so no one gets injured.

2. Parental involvement is highly encouraged, and may even be required for more sensitive or potentially hazardous parts of the experiment, but the student should carry out as much of the project as possible. Any parts not conducted by the student should be noted in the methods section. Most projects will have parts that the parent helps with. Parents are encouraged to help the child choose and set up the experiment, as well.

3. Remember to plan appropriately and allow enough time to do a good job. It's OK to be done early. One weekend is probably not long enough to conduct a series of experiments or to create and test an invention.

Most importantly, this is supposed to be fun! Do not stress out, and do not worry about an experiment not working. Remember, real science is messy, and things don't often "work" for professional scientists! Please stress to your children that just because something didn’t work the way that they expected, it doesn’t mean that they failed. The only failure is not trying.

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GRADES 4-5 INVENTION GUIDELINES

Creating an invention using the engineering design process

The engineering design process is a series of steps that engineers follow to come up with a solution to a problem. Many times the solution involves designing a product (like a machine or computer code) that meets certain criteria and/or accomplishes a certain task.

1. Define the problem: Inventions are made to meet a need or make something easier. What is your need, or what are you trying to make easier? What is the purpose of your invention?

2. Background research: How is the thing you want to improve currently done? How will your invention make this thing easier/ faster/ better? Consult books, magazines, videos, interviews, or trusted internet sites if necessary. Some websites that may help:

    - BrainPop: https://www.brainpop.com/
    - Interactive Sites for Education: http://interactivesites.weebly.com/science.html
    - Great Websites for Kids: http://gws.ala.org/category/sciences
    - Science News for Students: https://www.sciencenewsforstudents.org/
    - BBC Bitesize Science: https://www.bbc.co.uk/education/subjects/z6svr82
    - National Geographic Kids: https://kids.nationalgeographic.com/
    - Science Buddies: https://www.sciencebuddies.org/

3. Specify your requirements: What do you want your invention to do, and how will you know if it does it? What will make your invention "successful?" To test whether the invention is "successful," you will need to document the process with and without your invention. You may need to develop a model to make testing easier. A model is a set of conditions used to represent the process you are trying to test.

4. Brainstorm solutions and chose the best one: Put on your thinking cap, and think about several ways you might be able to make your invention. It's always good to discuss these with someone else, such as a parent, and together you can choose a solution you think will work.

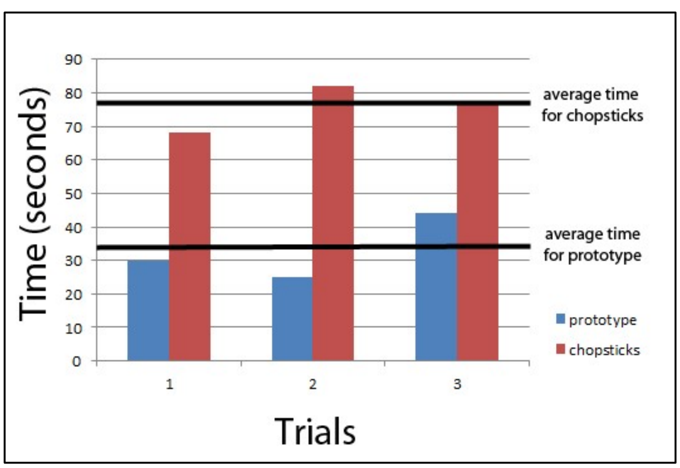
5. Develop a prototype: A prototype is the first invention you make and see if it accomplishes what you want it to do. Rarely do first prototypes work, but they do help you design a better prototype that will. You may need to make several prototypes before you get the invention to work.

6. Design, testing, and evaluation: It's time to try your invention out! Inventions usually go through many phases of development. You will probably try one thing, and if it

doesn't work, you will improve the design or come up with a completely different design. Be sure to document all the materials you used and a step by step procedure to build and use the invention. Collect data, and create a chart or graph to see how well the invention performs. Compare your invention (the new way of doing things) to your baseline (the old way of doing things without your invention). Also, make sure your comparison between the 'old' way and your 'new' way is a fair test, meaning the only thing you change in the process is the invention.

7. Conclusion: Draw a conclusion based on your data. Did your invention improve the process? If not, it does not mean your invention failed. You simply learned one way not to do it!

Example invention: Chopsticks for your little sister. This example will show how to use the engineering design process to create your invention. Your family loves to eat with chopsticks. Your little sister is too young to eat with regular chopsticks and becomes frustrated when she tries and disrupts dinner (the problem). You want to make a set she can use easily, so she can eat with chopsticks too. You know that regular chopsticks are too difficult to control and are too thin for her to pick up food (this is your background research). So, you want to invent something that she can easily use to pick up food, so she'll be happy at dinner. To make this easy to test, you decide that instead of food pieces, which are irregular in shape, you will use a rubber bouncy ball, and instead of moving the ball from a plate to you sister's mouth, you will move the ball from one plate to another (this is a model). For the invention to be successful, you decide that it should make moving the ball from one plate to the other faster than if your sister were to use regular chopsticks (this is your requirement – an increase in speed). You and your parents think about several ideas on how to allow your little sister to eat with chopsticks, from designing a robot to use the chopsticks to feed your sister to fitting rubber bands to her fingers to attach the chopsticks so she doesn't drop them. In the end you come up with the idea of attaching tongue depressors to a cloths pin to make a child friendly version of chopsticks (this is brainstorming). You build a prototype of your invention by gluing 2 tongue depressors onto a wooden clothes pin. It seems to work great, but you realize that the tongue depressors you used are too big to comfortably fit in your sister's mouth. So you develop another prototype using Popsicle sticks which are not as wide (this is prototype development). To test the prototype, you set 2 plates 6 inches apart and put 3 rubber balls on one plate. Then you time your sister to see how long it takes to move the 3 balls to the other plate with regular chopsticks and the prototype you developed (this is the testing phase). You know you have set up a 'fair test' because the only difference between the two conditions is the thing you use to move the rubber balls (i.e. the



chop sticks or the prototype). She repeats the process three times and you graph the time it takes to move the balls (this is the evaluation). Your data shows that your invention is a success! Your sister can move the rubber balls much quicker with the invention than with regular chopsticks because the average time is less (this is your conclusion). All you have left to do is name your invention and present it to your classmates!

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