*Booklet for Background Research in ISP Tutor*

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| **Name:** |  | **Date:** |  |

**Purpose of this lesson:** Research has found that middle school-aged students often pick topics and research questions that are either too hard or too easy, and so they don’t learn as much as they could from their science project. This lesson will help you learn how to pick a good research topic and question for your experiment-based science project. This lesson will also help you learn how to identify the information you need to understand for your project. Doing this will help you to be more thorough when you do background research and probably learn more.

Let’s get started!

On the Home & Help page: <https://go.isptutor.org/brm/home> ...

Follow **STEP 1** and click on the link for the lesson on selecting a good research question. There is audio, so make sure you can hear it.

* **What are some good ideas for choosing a research question that is good for you?**

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**STEP 2:** Go back to the Home & Help page and follow the directions for STEP 2. This will take you a lesson in which you will pick your research question. This also has audio. (Click on the blank screen, then “Start” to begin.)

Try to apply what you learned in STEP 1 when picking a research area, topic, and question. Make sure to think carefully about your selections.

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| * **What area of science did you choose to test and why?** |
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| * **What topic did you choose to test and why?** |
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| * **What variable did you choose to test (your independent variable) and why?** |
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| * **Your Research Question:** |  |

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| * **What is the outcome/dependent variable?** |  |

Read **STEP 3** on the Home & Help webpage (<https://go.isptutor.org/brm/home/>). Follow the directions given there.

* **Use the space below to take notes of the “Plan Your Research” video:**

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**STEP 4: PLAN YOUR RESEARCH.**

**Phase #1:** First, make a list of the basic concepts or questions you have that are related to your experiment that you need to learn about or make sure you really understand. These basic concepts include things like:

* The substances or other materials in the experiment (e.g., salt, water, yarn) involved in physical or chemical reactions; make sure you understand what these substances or materials are made of.
* Any terms used in the animation describing the experiment (e.g., “saturation point”).
* The independent variable and dependent variable of your research question.

**After listing the concepts/questions (1), write your initial understanding, before you do research to find out (2). Don’t complete the last column just yet.** When you’re done listing the concepts & your initial understanding, go to the next page.

**(1) Concept/Question: (2) My initial understanding: (3) Understanding from research: Do in STEP 6**

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| *Example: What is salt?* |  | *Salt is crystal substance. I think it’s made of Na and Cl atoms.* |  | *Salt IS a crystal; its molecules form a repeating pattern. Its molecules are NaCl (sodium & chlorine).* |
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|  |  |  |  | When you’re done, go to page 7, Phase #2… |

**Phase #2: Describe processes that lead to the outcome of the experiment.**

Now that you have listed the concepts or materials involved in the experiment, we’ll think about the things that are happening in this experiment—or what causes the outcome.

**So now, think about:** What happens or what is changing during the experiment? Write these down below. *For example, in the crystal growth experiment, one change is “salt dissolves in the water.” In the ramps experiment, one change is “the ball accelerates down the ramp” or “the ball starts to roll.”*

You can re-watch the video animation for your experiment in STEP 4 on the Home & Help page (<https://go.isptutor.org/brm/home/>) if you want.

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| **Change 1:** |  |
| **Change 2:** |  |
| **Change 3:** |  |
| **Change 4:** |  |

*The final change should be related to your dependent variable. Note: You can add more changes if you’d like.*

Read **STEP 5** on the Home & Help webpage (<https://go.isptutor.org/brm/home/>). Follow the directions given there.

**STEP 5: HELP DOING BACKGROUND RESEARCH**

* **Use the space below to take notes of the “Background Research Lesson”:**

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When you’re done, go to the Home & Help webpage (<https://go.isptutor.org/brm/home/>).

Read the directions for HOW TO USE THIS WEBSITE TO FIND INFORMATION.

**STEP 6: NOW, DO YOUR RESEARCH!**

**Phase #1:**

Once you understand how to use this site to find information, look up the words that you listed on page 5 of this booklet. Type (or write) the definitions in the last column (yellow-highlighted).

When you’re done, go to Phase #2, below…

**Phase #2:**

**Instructions for the next pages:** For each change, try to explain in detail what is happening. If relevant for your experiment, try to explain what the atoms or molecules are doing. Also try to figure out and explain why this happens while doing your research. What *causes* each change?

**For each change, also think about how the variable you’re testing may affect that part of the process (it might or it might not).**

After you have explained all of the changes you listed above, you will write your hypothesis for your research question.

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| **Change 1:** |  |

**Q1**. List the names of **units** and/or search terms you used to find information (so that you can find this information later if you need to):

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| --- | --- | --- | --- | --- |
| 1) |  |  | 2) |  |
| 3) |  |  | 4) |  |

**Q2.** Why and how does this change happen?

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**Q3.** Use the space below to draw what happens for this change (or you can use a page in a notebook to draw this). You will add other changes to this drawing. This will help you summarize everything you are learning.

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| **Change 2:** |  |

**Q1**. List the names of **units** and/or search terms you used to find information (so that you can find this information later if you need to):

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| --- | --- | --- | --- | --- |
| 1) |  |  | 2) |  |
| 3) |  |  | 4) |  |

**Q2.** Why and how does this change happen? Also, think about whether—and if so, how—previous changes may affect this change.

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**Q3.** Use the space in the page above (under Q3) to add a drawing of what happens in Change 2.

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| **Change 3:** |  |

**Q1**. List the names of **units** and/or search terms you used to find information (so that you can find this information later if you need to):

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| --- | --- | --- | --- | --- |
| 1) |  |  | 2) |  |
| 3) |  |  | 4) |  |

**Q2.** Why and how does this change happen? Also, think about whether—and if so, how—previous changes may affect this change.

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**Q3.** Use the space in page 5 to add a drawing of what happens in Change 3:

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| **Change 4**: |  |

**Q1.** List the names of **units** and/or search terms you used to find information (so that you can find this information later if you need to):

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| --- | --- | --- | --- | --- |
| 1) |  |  | 2) |  |
| 3) |  |  | 4) |  |

**Q2.** Why and how does this change happen? Also, think about whether—and if so, how—previous changes may affect this change.

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**Q3.** Use the space in page 5 to add what happens in Change 4.

**Q4.** Is this Change related to Change 1, Change 2, or Change 3? If so, describe how below:

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**At this point, you should have a good understanding of what happens in your experiment.**

**But make sure to check with your teacher to make sure you didn’t miss anything and do have an accurate understanding of these concepts.**

* **Based on your research, state your hypothesis, or explanation of the answer to your research question for how the independent variable affects the dependent variable:**

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