

Be a Scientist: Weekly Discussion Points & Goals

Week 1	<i>Science Mentor Introductions, Meet the Students, & Define Scientific Question of Interest</i> Check-in question: If you choose a science superpower (i.e. microscopic vision!), what would it be? Group Discussion: (1) What is a testable, scientific question? How to brainstorm? ▪ How does ___ affect ___? ▪ Independent vs. dependent variables ▪ Controls & replicates ○ What are some of the criteria of a good scientific question? ▪ Must be testable ▪ Must be able to quantify the results ▪ Must be changing (as best as possible) only one variable ▪ Must be something you don't know the answer to ○ What are some of the constraints? ▪ Time frame (2 class sessions) ▪ Availability of materials ▪ No surveys ▪ Something that can be done in class ○ Explore individual student interests ▪ See if they already have an idea of what they'd like to study GOALS: • Get to know your group of students – their names and their interests (scientific or otherwise) • Each student defines a great, testable scientific question ***Report any projects that involve hazardous chemicals, live animals, or difficult to obtain materials***
Week 2	<i>Refine Question, Develop Hypothesis, Experimental Design, & Materials List</i> Check in Question: What is your scientific question? If you do NOT have one yet, what are you thinking of doing? Group Discussion: (1) What is a hypothesis? (there's a definition in the packet) ○ "If _____, then _____" ▪ i.e. "If I compare how long it takes for different size ice cubes to melt, then I expect the larger ice cubes will take longer to melt" (2) What is your experimental design – how will you specifically test your question? ○ Controls ○ Replicates/Samples ○ Constraints ▪ Time ▪ Materials ▪ Measurable ○ Changing one variable while keeping everything else same (3) Materials ○ Students must be clear and specific about what they need to run their experiment! GOAL: Each student <u>MUST</u> have a testable question & a complete list of materials & equipment needed ***Materials: We need to get list of materials and equipment for each student***



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Week 3	<i>Procedure, Begin Experiment, & Gathering Data</i> Check-in Question: What is your hypothesis, or what is your experimental design? Group Discussion: (1) What is an experimental procedure? How do you design one? ○ Must be very detailed and clear ▪ Numbered steps ▪ Should contain amounts of materials being used, how much time something is done for, etc. ▪ If you gave it to another person, that person should be able to do the experiment using the procedure (2) What is a data table? What will yours look like? ○ A way to record & organize information collected during an experiment ▪ Label rows & columns ▪ Make sure to include your units of measurement! (3) Starting your experiment: gather materials, set up experiment, record data GOAL: Each student should have completed their procedure, constructed a data table, and hopefully started on their experiment.
Week 4	<i>Running and Completing Experiments</i> Check-in Question: Any data/cool observations to share? What do you need to get started today? Group Discussion: (1) What do you need to start (or continue) running your experiments? ○ Reiterate: record observations and measurements! GOAL: Each student should be finished gathering data for experiments by the end of today
Week 5	<i>Data Analysis, Interpretation, & Graphing</i> Check-in question: What data did you gather over the last two weeks? Does it support your hypothesis? Group Discussion: (1) How do scientists analyze and present their data? ○ Data analysis: Graphing data ▪ Choosing the right type of graph ▪ Make sure to include a title, straight lines, label axes, & make it colorful (2) Interpretations & Conclusions ○ Part 1: Summary of results ○ Part 2: Accepting or rejecting hypothesis GOAL: Each student should have a clearly labeled graph of their data & start summarizing their results
Week 6	<i>Student Experiment Conclusions & Science Mentor Discussions</i> Check-in question: What was one success and one challenge of this project? Group Discussion: (1) What are some reflections on your experiment and the process? ○ What did you learn? ○ What would you change? ○ Next questions to be asked? GOAL: Each student must have a completed packet & experienced the scientific process from start to finish!