

## How to Use Science Probes

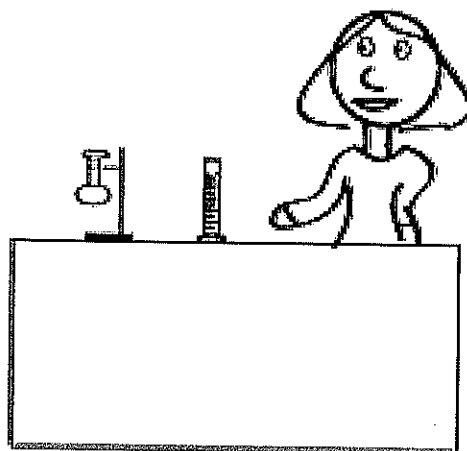
Research has established that it is important to identify students' misconceptions about natural phenomena and scientific concepts and use the information about students' thinking to design instruction that will facilitate their learning in science. Using the Science Probes in this book will help you achieve this result.

Science Probes are valuable assessment tools before and throughout instruction. Probes are designed to identify common misconceptions, as well as enhance metacognition for students by making them more aware of their existing ideas. Probes can be used before teaching a chapter to make you aware of concepts that may be stumbling blocks for students and to initiate student thinking and discussion about the concepts they will study. Probes also can be used to monitor student learning throughout the course of instruction to determine if students have corrected their understandings of natural phenomena and scientific concepts, and to assess their increasing grasp of the topics. But remember—in order for Science Probes to be considered formative assessments, it is not enough to merely find out what students are thinking. You must use the students' responses to inform instructional decisions.

Name \_\_\_\_\_ Date \_\_\_\_\_



## The Scientific Method



Rita claims that scientists conduct scientific investigations using the scientific method. She says that even though there are many different kinds of investigations, scientists follow the same series of steps.

Do you agree or disagree with Rita? \_\_\_\_\_ Explain your reasoning.

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## Teacher Notes

The best answer is disagree. Science is methodical, but the methods, including the steps scientists use, differ depending on investigation. For example, some investigations are experiments that involve testing a hypothesis by carefully identifying and controlling variables. Many investigations begin with questions and hypotheses; yet in others, hypotheses come later. For example, when Charles Darwin began to investigate species diversity, he did not have a hypothesis in mind. Some scientists, such as astronomers and field biologists, use observational methods rather than experimental methods.

The big idea is that science happens in many different ways and there is no one method or series of steps that all scientists follow. The question and context determine the method. However, many students who encounter the scientific method incorrectly infer that there is a set series of steps that is always followed when conducting scientific investigations. The responses to this probe will help you determine whether your students hold this common misconception. If so, explicitly point out the areas in the chapter, such as in Figure 2, that describe “possible steps” and “steps that might be used.” Share examples of ways different investigations are conducted and provide opportunities for students to conduct investigations in a variety of ways.