



## HANDOUT 1 | Teacher Questions: Some Examples

1. Where do you think worms are most likely to be found? Why do you think so?
2. What makes a complete circuit?
3. How might you make water evaporate most quickly?
4. What questions do you have now?
5. How might you find out whether these materials are good insulators?
6. What would happen if you moved the plants over here?
7. What food do the sow bugs prefer? What evidence do you have?

## HANDOUT 2 | Purposes of Teacher Questions at Each Stage of Inquiry

Stage	Purposes of Questions	Examples
Engage	<ul style="list-style-type: none"><li>• To elicit students' personal experiences and ideas and to raise questions about the new topic</li><li>• To widen students' range of observations</li><li>• To encourage their wonderings and speculations</li><li>• To focus thinking on specific science content</li></ul>	<ul style="list-style-type: none"><li>• Think of a liquid. What are some properties of that liquid?</li><li>• What do you think might happen to the water if . . . ? What makes you think that?</li><li>• How does this connect to something you have experienced?</li><li>• I wonder if you could speed up the process?</li><li>• As you were drawing the crayfish, what were some things you wondered about or questions you had?</li></ul>
Design and Conduct Investigations	<ul style="list-style-type: none"><li>• To check that students understand<ul style="list-style-type: none"><li>– the investigation question</li><li>– the investigation plan</li><li>– how and what to record</li></ul></li><li>• To ask students to<ul style="list-style-type: none"><li>– predict and include reasoning</li><li>– plan their investigation</li><li>– decide the best way to represent their findings</li><li>– critically observe the phenomenon</li><li>– analyze data (look for patterns and evidence that can be used to make claims and test predictions)</li><li>– reflect on their ideas</li></ul></li></ul>	<ul style="list-style-type: none"><li>• What are you trying to find out?</li><li>• What do you predict will happen when . . . ? Why do you think so?</li><li>• What steps do you plan to take?</li><li>• What will you measure?</li><li>• What do you notice?</li><li>• What information do you need to include in your chart?</li><li>• When you look at the graph, what pattern, if any, can you see?</li><li>• What might you do to help you figure out what's going on?</li><li>• What claims do you think are supported by this evidence?</li></ul>

(continues)

Stage	Purposes of Questions	Examples
Draw Conclusions	<ul style="list-style-type: none"> <li>• To ask students to               <ul style="list-style-type: none"> <li>– decide what claims can be supported by the evidence (data) they have collected</li> <li>– use evidence to support the reasoning behind the claims</li> <li>– offer possible explanations</li> <li>– summarize their findings</li> <li>– raise new questions</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• As you look over your observations in your notebook, what patterns can you find?</li> <li>• What is the evidence that supports your claim?</li> <li>• How has your thinking changed?</li> <li>• What ideas do you have to explain your findings?</li> <li>• If you were going to summarize all of your findings in a sentence or two, what would you say?</li> </ul>
Communicate	<ul style="list-style-type: none"> <li>• To help students identify               <ul style="list-style-type: none"> <li>– what they want to tell about their work</li> <li>– their audience</li> <li>– the style or form of their presentation (article, poster, letter, etc.)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• What do you want people to know about your study of . . . ?</li> <li>• Whom do you want your audience to be?</li> <li>• Will you make a poster, write an article or poem, or do something else?</li> </ul>

## HANDOUT 3 | Characteristics of Productive and Unproductive Questions

*A good question is the first step towards an answer; is a problem to which there is a solution. A good question is a stimulating question, which is an invitation to a closer look, a new experiment or a fresh exercise. . . . I would like to call such questions “productive” questions, because they stimulate productive activity.*

—Jos Elstgeest, “The Right Question at the Right Time”

### Productive Questions

- support the purpose of a particular stage of inquiry
- relate to the science content
- are equitable—refer to common experiences so all students can participate
- are open—are neither too broad or unfocused nor too narrow and specific and invite multiple perspectives
- are person centered—encourage the ideas of all students
- motivate students to take next steps in their learning
- promote activity, thinking, and reasoning

### Unproductive Questions

- can be answered with yes or no; have answers that are right or wrong
- ask only for knowledge of vocabulary or repetition of facts from a resource, for example, a book or a teacher
- are tangential or unrelated to the purpose of the stage of inquiry or the science content
- ask for students to reason about something they have not yet experienced