

## QUESTIONS AND THE LEARNING CYCLE

Consider the possible purposes for asking questions during different phases of learning.

**Invitation phase:** Use questions to help generate interest, help students become curious and focus on observation and details in nature, and help students connect past experiences to new observations and topics.

- Have you ever seen...?
- What did you observe?
- Did you notice...?

**Exploration phase:** Use questions to encourage students to explore new organisms, environments, processes, and events in nature—guide students to engage in productive investigations.

- What happened when...?
- What did you discover?
- What do you think will happen if...?
- What questions do you have about...?
- What could we do to find out?

**Concept Invention phase:** Use questions to help students synthesize new understandings and make sense of investigations—help students classify, categorize, quantify or order their observations—help students use evidence from investigations to make explanations—help students draw conclusions, and make connections.

- What did you notice? What questions do you have? What are some possible explanations for that?
- What did you find out about...?
- How is this the same or different from...? Can you compare this to something else?
- What do you think is the explanation for...?
- Can you explain what makes you think that? What is your evidence?
- What might another explanation be?

**Application phase:** Use broad questions to encourage reasoning and analysis—involve students in authentic problem-solving situations and critical thinking—help students to generalize their knowledge and test their hypotheses.

- What do you now know about the characteristics of...?
- What other factors do you think might be involved?
- Can you find a way to...?
- What does it remind you of?
- How can we use what we found out to solve a problem?
- How could you be more sure about...?

**Reflection phase:** Use questions to encourage students to think back on what they have done and how they have made sense of what they have explored.

- What surprised you?
- How did you arrive at your solution or conclusion?
- Did you change any of your initial thinking?
- What caused you to see things differently?
- How did you figure out...?

