

## Questions are the Answer

from *The Science Teacher*, January 1996 by John E. Penick, Linda W. Crow, Ronald J. Bonnsetter

**Answer questions with questions:** Often students know more than they think. So, before just answering their questions, probe what they know with additional questions. Below are some examples that may be helpful.

**History:** *We begin with history because these questions relate to the students' experience... students can almost always talk about what they have done...*

What did you do?

What happened?

What happened next?

What did you do first?

In what order did you...?

What procedure did you use?

What color/temperature/weight/size was it?

What made you think of doing that?

**Relationships:** *Seeking relationships and patterns is an essential process of science...*

How does this compare to...(other outcomes, procedures/experiments)?

If \_\_\_\_\_ happened, what happened to \_\_\_\_\_?

Where have you seen something like this before?

In talking to other students, who else got similar results?

What order does that usually follow?

What seems to be a common element in all your findings?

Where/When/How do you usually find these?

**Application:** *Applying knowledge is generally acknowledged to be a true test of understanding, as well as the surest way to truly know something...*

How could you use this?

What problems could this solve?

Where can we find examples of this in the real world?

If you wanted to do \_\_\_\_\_, how would this idea/knowledge/finding/experiment help?

What machine could you build that would do this?

**Speculation:** *Here students must go beyond the data and information given, abstracting to new and unusual situations...after a student makes an assertion, a teacher might ask a speculation question, such as...*

What if you...changed/eliminated/added/mixed/waited?

What would it take to prove that?

If you wanted to prevent that from happening, what would you do?

If that's true, then...

What might be inside that black box?

**Explanation:** *Communicating an idea, process, or theory to clarify both the nature of the phenomenon and how it occurs...*

How does that work?

What causes that to happen?

How would \_\_\_\_\_ cause \_\_\_\_\_?

How would you change your explanation if I changed this part of the apparatus?

How would it affect your explanation if I \_\_\_\_\_?

How does your explanation fit this other phenomenon?