Developing Mathematical Thinking with Effective Questions

To promote problem solving, ask…
- What information do you have? What do you need to find out?
- What strategies are you going to use?
- Will you do it mentally? With pencil and paper? Using a number line?
- What tools will you need? Will a calculator help?
- What do you think the answer or result will be?

To promote problem solving, ask…
- How would you describe the problem in your own words?
- What facts do you have?
- What do you know that is not stated in the problem?
- How did you tackle similar problems?
- Could you try it with simpler numbers? Fewer numbers? Using a number line? What about putting things in order?
- Would it help to create a diagram? Make a table? Draw a picture?
- Can you guess and check?
- If you compared your work with anyone else’s, what did they try?

To make connections among ideas and applications, ask…
- How does this relate to…?
- What ideas that we have learned were useful in solving this problem?
- What uses of mathematics did you find in the newspaper last night?
- Can you give me an example of…?

To encourage reflection, ask…
- How did you get your answer?
- Does your answer seem reasonable? Why or why not?
- Can you describe your method to us? Can you explain why it works?
- What if you had started with… rather than…?
- What if you could only use…?
- What have you learned or found out today?
- Did you use or learn any new words today? What did they mean?
- What are the key points or big ideas in this lesson?

Do you want to develop additional mathematical thinking strategies for your teaching practice?
Visit [www.pbs.org/teacherline](http://www.pbs.org/teacherline) to view our Mathematics professional development options.
Developing Mathematical Thinking with Effective Questions

To help students build confidence and rely on their own understanding, ask…
- Why is that true? How did you reach that conclusion?
- Does that make sense?
- Can you make a model to show that?

To help students learn to reason mathematically, ask…
- Is that true for all cases? Explain.
- Can you think of a counterexample?
- How would you prove that?
- What assumptions are you making?

To check student progress, ask…
- Can you explain what you have done so far? What else is there to do?
- Why did you decide to use this method?
- Can you think of another method that might have worked?
- Is there a more efficient strategy?
- What do you notice when…?
- Why did you decide to organize your results like that?
- Do you think this would work with other numbers?
- Have you thought of all the possibilities? How can you be sure?

To help students collectively make sense of mathematics, ask…
- What do you think about what ____ said?
- Do you agree? Why or why not?
- Does anyone have the same answer but a different way to explain it?
- Do you understand what ____ is saying?
- Can you convince the rest of us that your answer makes sense?

To encourage conjecturing, ask…
- What would happen if…? What if not?
- Do you see a pattern? Can you explain the pattern?
- Can you predict the next one? What about the last one?
- What decision do you think he/she should make?

The contents of this card were developed under a grant from the U.S. Department of Education. However, the contents do not necessarily represent the policy of the U.S. Department of Education, and you should not assume endorsement by the federal government.