

## Developing Mathematical Thinking with Effective Questions

<ul style="list-style-type: none"> <li>To promote problem solving, ask...</li> </ul>	<ul style="list-style-type: none"> <li>What do you need to find out? What information do you have?</li> <li>What strategies are you going to use?</li> <li>Will you do it mentally? With pencil and paper? Using a number line? <i>etc.</i></li> <li>Will a calculator help?</li> <li>What do you think the answer or result will be?</li> </ul>
<ul style="list-style-type: none"> <li>To help when students get stuck, ask...</li> </ul>	<ul style="list-style-type: none"> <li>How would you describe the problem in your own words?</li> <li>What facts do you have? What do you know that is not stated in the problem?</li> <li>How did you tackle similar problems?</li> <li>Could you try it with simpler numbers? Fewer numbers? Using a number line?</li> <li>What about putting things in order?</li> <li>Would it help to create a diagram? Make a table? Draw a picture?</li> <li>Can you guess and check?</li> <li>Have you compared your work with anyone else? What did other members of your group try?</li> </ul>
<ul style="list-style-type: none"> <li>To check student progress, ask...</li> </ul>	<ul style="list-style-type: none"> <li>Can you explain what you have done so far? What else is there to do?</li> <li>Why did you decide to use this method?</li> <li>Can you think of another method that might have worked?</li> <li>Is there a more efficient strategy?</li> <li>What do you notice when...?</li> <li>Why did you decide to organize your results like that?</li> <li>Do you think this would work with other numbers?</li> <li>Have you thought of all the possibilities? How can you be sure?</li> </ul>
<ul style="list-style-type: none"> <li>To help students build confidence and rely on their own understanding, ask...</li> </ul>	<ul style="list-style-type: none"> <li>Why is that true?</li> <li>How did you reach that conclusion?</li> <li>Does that make sense?</li> <li>Can you make a model to show that?</li> </ul>
<ul style="list-style-type: none"> <li>To help students learn to reason mathematically, ask...</li> </ul>	<ul style="list-style-type: none"> <li>Is that true for all cases? Explain.</li> <li>Can you think of a counterexample?</li> <li>How would you prove that?</li> <li>What assumptions are you making?</li> </ul>
<ul style="list-style-type: none"> <li>To encourage reflection, ask...</li> </ul>	<ul style="list-style-type: none"> <li>How did you figure it out?</li> <li>How did you think about it?</li> <li>Does your answer seem reasonable? Why or why not?</li> <li>Can you describe your method to us all? Can you explain why it works?</li> <li>What if you had started with... rather than...?</li> <li>What if you could only use...?</li> <li>What have you learned or found out today?</li> <li>What are the key points or big ideas in this lesson?</li> </ul>
<ul style="list-style-type: none"> <li>To encourage conjecturing, ask...</li> </ul>	<ul style="list-style-type: none"> <li>What would happen if...? What if not?</li> <li>Do you see a pattern? Can you explain the pattern?</li> <li>What are some possibilities here?</li> <li>Can you predict the next one? What about the last one?</li> </ul>
<ul style="list-style-type: none"> <li>To help students collectively make sense of mathematics, ask...</li> </ul>	<ul style="list-style-type: none"> <li>Who would like to share their thinking?</li> <li>Who used this strategy to solve it?</li> <li>What do you think about what _____ said? Do you agree? Why or why not?</li> <li>Does anyone have the same answer but a different way to explain it?</li> <li>Do you understand what _____ is saying?</li> <li>Can you convince the rest of us that your answer makes sense?</li> </ul>
<ul style="list-style-type: none"> <li>To make connections among ideas and applications, ask...</li> </ul>	<ul style="list-style-type: none"> <li>How does this relate to...?</li> <li>What ideas that we have learned before were useful in solving this problem?</li> <li>What uses of mathematics did you find in the newspaper last night?</li> <li>Can you give me an example of...?</li> </ul>
<ul style="list-style-type: none"> <li>What other questions would you add to this list?</li> </ul>	

Modified from PBS TeacherLine