

Developing Mathematical Thinking with Effective Questions

<ul style="list-style-type: none"> • To promote problem solving, ask... 	<ul style="list-style-type: none"> • What do you need to find out? What information do you have? • What strategies are you going to use? • Will you do it mentally? With pencil and paper? Using a number line? • Will a calculator help? • What do you think the answer or result will be?
<ul style="list-style-type: none"> • To help when students get stuck, ask... 	<ul style="list-style-type: none"> • 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? • Have you compared your work with anyone else? What did other members of your group try?
<ul style="list-style-type: none"> • To check student progress, ask... 	<ul style="list-style-type: none"> • 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?
<ul style="list-style-type: none"> • To help students build confidence and rely on their own understanding, ask... 	<ul style="list-style-type: none"> • Why is that true? • How did you reach that conclusion? • Does that make sense? • Can you make a model to show that?
<ul style="list-style-type: none"> • To help students learn to reason mathematically, ask... 	<ul style="list-style-type: none"> • Is that true for all cases? Explain. • Can you think of a counterexample? • How would you prove that? • What assumptions are you making?
<ul style="list-style-type: none"> • To encourage reflection, ask... 	<ul style="list-style-type: none"> • How did you figure it out? • How did you think about it? • Does your answer seem reasonable? Why or why not? • Can you describe your method to us all? 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? • What are the key points or big ideas in this lesson?
<ul style="list-style-type: none"> • To encourage conjecturing, ask... 	<ul style="list-style-type: none"> • What would happen if...? What if not? • Do you see a pattern? Can you explain the pattern? • What are some possibilities here? • Can you predict the next one? What about the last one?
<ul style="list-style-type: none"> • To help students collectively make sense of mathematics, ask... 	<ul style="list-style-type: none"> • Who would like to share their thinking? • Who used this strategy to solve it? • 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?
<ul style="list-style-type: none"> • To make connections among ideas and applications, ask... 	<ul style="list-style-type: none"> • How does this relate to...? • What ideas that we have learned before 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...?
<ul style="list-style-type: none"> • What other questions would you add to this list? 	