Appendix D
Quality Assurance Guide
This Quality Assurance Guide is designed to help teachers (and students) evaluate the products that are developed in response to model-eliciting activities with the following characteristics:
(a) the goal is to develop a conceptual tool, (b) the client who needs the tool is clearly identified, (c) the client's purposes are known, and (d) the tool must be sharable with other people and must be useful in situations where the data are different than those specified in the problem.

Performance Level	How useful is the product?	What might the client say?	What questions should be asked?
Requires Redirection	The product is on the wrong track. Working longer or harder won't work. The students may require some additional feedback from the teacher.	*"Start over. This won't work. Think about it differently. Use different ideas or procedures."*	To assess students' work, put yourself in the role of the client. To do this, it's necessary to be clear about answers to the following questions. 1. Who is the client? 2. What conceptual tool does the client need? 3. What does the client need to be able to do with the tool?
Requires Major Extensions or Refinements	The product is a good start toward meeting the client's needs, but a lot more work is needed to respond to all of the issues.	*"You're on the right track, but this still needs a lot more work before it'll be in a form that's useful."*	Then, the quality of students' work can be determined by focusing on the question – *How useful is the tool for the purposes of the client?*
Requires Only Minor Editing	The product is nearly ready to be used. It still needs a few small modifications, additions, or refinements.	*"Hmmm, this is close to what I need. You just need to add or change a few small things."*	To assess usefulness, and to identify strengths and weaknesses of different results that students produce, it would be helpful to consider the following questions. 1. What information, relationships, and patterns does the tool take into account? 2. Were appropriate ideas and procedures chosen for dealing with this information?
Useful for this Specific Data Given	No changes will be needed to meets the immediate needs of the client.	*"Ahhh, this will work well as it is. I won't even need to do any editing."*	3. Were any technical errors made in using the preceding ideas and procedures? But, the central question is - *Does the product meet the client's needs?*
Sharable or Reusable	The tool not only works for the immediate situation, but it also would be easy for others to modify and use it in similar situations.	*"Excellent, this tool will be easy for me to modify or use in other similar situations – when the data are slightly different."*	The product should make it clear that: • The students went beyond producing a tool that they themselves could use to also produce a tool that others could use – by including needed explanations, and by making it as simple, clear, and well organized as possible. • The students went beyond thinking with the tool to also think about it – by identifying underlying assumptions (so that others know when the tool might need to be modified for use in similar situations). • The students went beyond blind thinking to also think about their thinking – by recognizing strength and weaknesses of their approach compared with other possible alternatives.

This guide is the fourth of four tools that are useful for making sense of students' work related to model-eliciting activities. The first tool is an **"Observation Sheet"** that can be used to observe the processes that students' thinking goes through to develop final responses. The second tool is a **"Ways of Thinking Sheet"** that can be used to sort out strengths and weaknesses of the alternative results that students produce. The third tool is a **"Self Reflection Sheet"** that helps students reflect about roles they may have played during problem solution, feelings, and attitudes that may have influenced performance.