1.4 Peer-Assisted Reflection

Experts have reflective understanding, persist in solving difficult problems, and work well with others. Peer-Assisted Reflection (PAR) is a specialized activity that will help you develop these skills. Developing reflective understanding requires working with others, getting feedback, and being exposed to new ways of thinking about things. Here are some guidelines to help you get the most out of the activity.

1.4.1 Reading Peer’s Solutions

Be critical of others’ solutions. Ultimately, you’re developing skills to apply to your own work as well.

- Try to understand the solution based only on what is written (without thinking of your own solution). Note any gaps in logic you have to fill in yourself. Tell your partner; these need to be revised.
- Was the solution justified? What evidence would you need to be sure the solution is correct?
- Note any calculational or procedural errors you find. Don’t just gloss over calculations, but work them out in your head to see if your partner’s work makes sense.
- Finally, compare your partner’s solution to your own. Did you get the same result? If you used different approaches, were they consistent or did your solutions contradict one another? The more you connect the two solutions the more you will deepen your understanding.

1.4.2 Peer Conferencing

A few simple guidelines will help you have more meaningful conversations with your partner.

- Be critical, but kind. Your job is to help your partner improve their work as much as possible.
- Focus on the mathematical aspects of the solution to the problem and how they were communicated.
- Ask questions. Encourage your partner to ask questions. Discussing ideas will help you learn.
- Demand meaningful feedback. If your partner only says “everything looks good” you learn nothing.
- Practice revisions to your explanations (verbally) before writing them. This is a unique opportunity to get instant feedback on your communication. Use it!
- If both you and your partner are unsure about the solution, try to figure it out together. Talk through your reasoning, where it got you, and where it got you stuck.
- When you’re done, begin discussing the extension questions.

1.4.3 Meaningful Feedback

Use the self-reflection questions as a guide for areas you might give feedback to your partner on.

- Be specific. Saying “your explanation was unclear” is not nearly as useful as saying why it was unclear (e.g., “you used the term asymptote incorrectly.”) If you say why you think something, your partner can evaluate your feedback, regardless of your confidence.
- Be constructive. As much as possible, don’t just say that something needs to be improved, but suggest how it could be improved (e.g., “asymptotes can be touched by the function; you know you have an asymptote because you have a certain limit”).
- Try to help your partner learn. If the solution seems to indicate misunderstanding of a concept, spend time talking about that concept until both you and your partner are clear on it. Explaining and discussing concepts with your partner will help you understand them better.
1.4.4 Not Very Meaningful Feedback

Here are a number of examples of feedback that are not very helpful for you partner (explanations why in italics). Please refrain from offering these types of feedback.

Approach:

• Everything looked good. (*Even the best solutions can be improved. Put more effort into thinking how your partner could do so.*)

• Your solution was explained well. (*This feedback not only doesn’t say what about it was explained well, but it also doesn’t help your partner improve.*)

• Your solution could use a little bit more explanation. (*Tell your partner exactly what needs more explanation and try to suggest how they could improve their explanation. Remember, simply adding *more isn’t always better.*)

• Your explanations were a little unclear. (*You need to tell your partner what exactly was unclear, and try to suggest how they could improve it. Try focusing on what you couldn’t understand or where you got lost.*)

• Show a little bit more work. (*Tell your partner exactly where you got confused. You need to be more specific with your feedback.*)

Justification & Meaning:

• I found an error in part (e). (*Tell your partner what the error was and why it was incorrect.*)

• Your answer to part (a) needs improvement. (*Tell your partner what was wrong and how to improve it.*)

• I think your solution is wrong. (*Tell your partner what the error was and why it was incorrect.*)

• Be sure to finish the problem. (*Your partner probably didn’t finish the problem because they didn’t know how to. Instead of telling them the obvious, try to help them figure it out.*)

• Everything looks good. (*What evidence do you have for saying this?*)
1.5 Strategies for Facilitating Peer-Conferences

Sometimes it may feel like you don’t know what to say or how to get better feedback from your peer conferences. If your partner simply says “it looks good” it does nothing to help you improve. PAR is a unique opportunity to get feedback and talk about the mathematics in a problem, so make sure that you take advantage of it!

Here are some suggestions for things you might say or ask in order to have a more productive conversation. One key strategy is asking questions about specific aspects of your solution or your partner’s solution. Here are some suggestions:

- I was struggling with how to communicate X, do you have any suggestions?
- Would it be all right if I practiced my explanation with you before I revise my solution?
- Did you check all of my calculations, and did you find any errors?
- I noticed that we did the problem differently. Can we look together and make sure our solution’s are consistent?
- I was unsure about (concept X, or how to do X). Can we talk more about it?
- In your solution I notice that you did X. Can you explain why?

1.6 Darts

We will play “darts” each week after turning in the PAR problem. You will be given 3 explanations. One is the “bullseye” (correct explanation), one is “on the board” (a mostly correct idea that is communicated poorly or has a minor error), and one is “off the mark” (incorrect). Your task is to classify each of the explanations; state what about the the “on the board” solution needs to be improved, and why the “off mark” solution is incorrect. This task will help us improve our communication skills as well as deepen our understanding of mathematical concepts.