

Appendix A: Interview Questions

A. Individual Student Interview Questions

Set up: This is a chance for me to get to know you better as a person and as a math learner. I will ask you to talk about yourself and your math learning a bit. The more you share, the more helpful it is to help me understand your perspective.

1. Can you please tell me a little bit about your background as a learner and as a mathematics learner?
2. What kind of a math thinker are you?
3. What kind of a math student are you?
4. So far, what's it like to be a student in this mathematics class?
5. How, if at all, is this mathematics class the same or different from your previous classes?
 - a. What do you think about that (those differences?)
 - b. How do you know when you learn something really well in mathematics?
6. How do you know that you're doing well in this class?
7. Think of a moment when a classmate learned something really well this year; what did that look like?
8. Think of a small group you've worked with so far this year. What was it like to be a member of that group?
9. Think of another small group that you worked with that was really different. What was different about that group?
 - a. Go through the groups so far this year and ask student to talk about them.
10. What are the benefits, if any, to being a learner in this classroom?
 - a. Any other benefits?
11. What are the challenges, if any, to being a learner in this classroom?
 - a. Any other challenges?
12. Add follow up probing questions about groupwork.
 - a. What do you think about groupwork?
 - b. Do groups need leaders?
13. What does it take to be a leader of a group?
14. What commonalities, if any, have you noticed across all of your groups?
15. Have you presented in the front of class? What would have to happen for you to feel comfortable doing that?
16. Have you talked with other students outside your group? Why did you do that?
17. Can you tell me what it would look like if this were your favorite class?
18. What would this class look like if it were your least favorite class?
19. What else do you think I should know about learning mathematics in this classroom?
20. In thinking about our interview, is there anything else you would like to add?
21. If I have questions about what you said, may I ask you about them in the email you gave me?
22. Would you be willing to participate in a group interview at some point with other students in this class? With the teacher?

Probing Questions

1. Tell me more about that.
2. What do you mean by that?
3. What do you think about that?
4. Let's go back to... Tell me more about that.
5. Something you said was really interesting... "" Can you say more about that?

B. Second Interviews

1. Prompts with own letter: Remember the intro letters we did at the beginning of the year? Read a section. What would you say to your teacher to introduce yourself as a learner of math now?
 - a. Follow up with groups they have had since the last interview. What was/is it like to be a member of those groups?
2. What commonalities, if any, have you noticed across all of your groups?
3. Think of a time when you had to give an answer, either in your small group, or going up in front of the room, when you were chosen randomly but you didn't know the answer? How did that make you feel?
 - a. *Modification: Have you had to go up to the front this year? What was that like?*
 - b. *What would it take for you to feel comfortable going up to the front?*
4. What do you think about groupwork?
5. What's the thing that you think you learned the best this year/semester? How did you know that was the thing that you learned the best?
6. Last time I asked what would this class be like if it were your favorite. Anything you want to add to that? Okay, so what would this class be like if it were your least favorite?
7. Have you ever been randomly called on to present, either in front of the class or in your small group when Ms. Martin shuffled your papers?
 - a. What was that experience like for you?
 - b. Was there another time?
8. Do you feel like being wrong is an important part of math?
9. Have you ever asked a question during class to a person outside of your group?
 - a. Why did you do that?
10. Prompts with own student work:
11. Prompts with own video clip(s):
12. There may be a time in 2nd semester when I'd like to contact you as I'm writing up what I've learned from you. I won't be visiting your classroom very often during second semester, so if you'd be okay with it, it might be nice to meet up with you at a coffee shop or a library to ask some follow-up questions. If that's okay, is there an email address or cell phone where I could reach you?

C. Group Interviews

Thank you so much for coming. This is a really important opportunity for me to hear about your point of view right now- because you are the experts on learning math right now—not me and not your teacher or any other teacher. All of us can get better at teaching math to you guys if we hear more from your perspective. Please feel like this is a conversation. You can talk to each other; you don't have to talk to me, though I will ask you questions.

Let everyone have a turn to speak. If you notice you've been speaking a lot, let someone else be the first to answer the next question. This also needs to be a safe space to say your opinion. It's actually really interesting when you have a different viewpoint on something, and so if I revoice something back to you and you think I said it wrong, please correct me. Or if a classmate says, "that's not how I see that thing..." then please feel like you can disagree and share your thinking. And it's okay to use names, but we all must be respectful.

So because this is a place where we need to be able to have different viewpoints, we also need to agree that this conversation should kinda be kept in this room, in this community, and to not have it be blasting all over. So things that we say here need to be kept between us. Is that okay with everyone? So please feel comfortable to have your own opinion and please respect the opinion of others.

We're going to learn a lot from everyone today so thank you so much for coming.

1. What's it like to be a student in this class?
2. What are the benefits to being a student in this class?
3. What are the challenges to being a student in this class?
4. Can you think of an example where a classmate got a concept really well, & talk about that?
 - a. Does anyone have a different perspective on that example?
 - b. Does anyone have anything to add to that example?
5. Can someone think of a new example where a different classmate got a concept really well?
6. How do students show they understand something well in this class?
7. What are your classmates good at in this class?
8. When it comes to this class, what do you think you are good at?
9. What do you think of when you think of someone being 'smart' in math?
 - a. How is that related to this classroom?
10. Is it important to be good at the ways you're good at and the ways your classmates are good at math?
11. I've been with your class all year, so I know that you're all good at math. You might remember when I said in my intro letter that I believe all students are good at math whether they know it yet or not? Well now I've been here and seen how you all are good at math.
12. But what's really interesting is how you guys know that each other is good at math. So is there anyone here that you think is good at math but they don't know how they're good? Can you say more about that?
13. Have you ever been randomly called on to present, either in front of the whole class, or in a shuffle quiz in your group?
 - a. What was that like for you?
14. Some teachers say that mistakes are helpful to your learning. Why do you think that is?
15. There's a lot of research right now that says that groupwork is the way to learn math. Certainly that's part of the reason that your teacher is choosing to use it and why teachers at your school are using it. But you still have the right and responsibility to have your own opinion about it. So it would be really helpful to hear about it in your own words. What do you think are the benefits and challenges to groupwork?
16. Last week Thursday, Ms. Martin said that she is starting to know when students are going to groups and are acting as leaders and are going to make their group members smarter.
 - a. Do you remember that?
 - b. Did she say anything else I'm forgetting?
 - c. What did you think about this idea?
17. When do you feel comfortable asking your group members questions? Why?
18. How do you think working in groups impacts your math learning?
19. What do you think about group tests?
20. How, if at all, does working in groups impact your math learning?
21. Let's say you have the same teacher, same students, and you're still learning in groups. What would it look like if this class were your least favorite class?
22. What have you learned about yourself as a math learner, if anything, from the process of doing these interviews?
23. What else do you think I need to know about what it's like to be a learner in this math class?
24. Anything else you want to share today?
25. Any questions for me as we finish?

Appendix B: The Garden Border Problem

The Garden Border

Kiara is planning to make a garden. She wants the garden to be a square, and she wants a tile border along the inside boundary of the garden. Here is some other key information:

- The tiles she wants to use are each 1 foot by 1 foot.
- She only wants to use whole tiles in the border.
- The border can only be one tile wide or it will take up too much space.
- She is getting space in a local park for this project. She doesn't know how big the area will be so she needs to plan for anything.

The Task: Help Kiara figure out what happens to the number of tiles you need based on the dimensions of the garden.

Part 1:

- Draw at least 4 sample gardens. How many tiles are needed for the borders of these gardens?
- How many tiles would the border of a 100 foot by 100 foot garden have?
- Find a rule or equation for figuring out the number of tiles in the boundary of **any** square garden.

Part 2:

Although you have found at least one rule for figuring out the number of tiles in any garden, Kiara is an eccentric mathematician and insists that you figure out the number of tiles in the border of a garden by using several **different** rules. Create a diagram for *each* rule to show how you know it will calculate the number of tiles needed for any side length on the garden.

Part 3:

Organize a stand-alone summary page that explains your work. On a new sheet of paper, show your rules and use diagrams, tables or color coding to show how you know each rule works. You do not need to include your original examples unless they are helpful for showing how the rules work.

Here are some things to keep in mind about your summary page:

- All work should fit onto one side of a blank page
- Include a unique title
- Plan the layout so that your information is organized
- Make sure it is easy to read
- Include a diagram that shows how the rule works for the situation
- There are many correct answers to this problem so make sure another group can understand how your rules work even if they have a completely different rule.

We will do a silent presentation of each group's work. You will have a short time to look at each group's summary page and they will look at yours.

Exit Ticket

1. Write 2 math questions/comments about another group's work.
2. Describe a good and bad thing about how your group worked together on this problem.