

## Episode 32 - A Conversation Between Shannon, Kyli, & Kelli

Shannon: Good, it's doing stuff. Right in the middle, boom!

Kelli: OK, cool, woo!

Shannon: Hi, we're doing math recording, it's awesome.

My name's Shannon.

Kyli: I'm Kyli.

Kelli: I'm Kelli.

Kyli: What a trio!

Kelli: Yes, we are the three Musketeers from Calc 2.

Kyli: Yeah.

Shannon: Yeah, 2. Well, and we were all in one together, too.

Kyli: Yeah, but we didn't interact at all in that class.

[Laughing.]

Because it was like forced groups.

Kelli: Yeah, it was a little awkward. It wasn't super awkward, but it kind of was.

It was kind of like "OK, show yourself into groups!" And you have to introduce yourself to the people at the table.

Shannon: Yeah and then the people in my group dropped and I was by myself!

Kelli: Aww! Yeah, I was noticing that!

Shannon: It's OK, I guess it worked, sort of. I got a B, it's over now.

And now here we are! It's a good day, I'm so happy to have finals are over!

[Laughing.]

I just thought of that! That we're done and we're free.

Kyli: I'm very happy. I lost a lot of sleep studying for all my finals.

Shannon: Have you slept yet, well no, you finish today.

Kyli: Yeah, so no, I haven't slept [laughing.]

Shannon: Take a nap after this.

Kyli: I'm so tired. Honestly, as I was driving home from our study thing I was like closing my eyes. It was OK because no one was on the highway. So tired.

Shannon: So I think the real question is buh-dum-tch! Oh I should make a song! I meant to, I was trying to think of one earlier. I was thinking about how to record something on my phone like [singing] "math, math, math, math . . . calculus!" and layering in like "algebra . . . linear . . . proofs!" But I couldn't make that work on my phone. We could have a whole intro.

Kyli: If you're ever a math teacher, that's how you should introduce your class, just sneak it in.

Shannon: [Singing] "Math, math, math, y'all ready? Math!"

They would not be ready. I don't know that the student version of me would be ready.

Kelli: I hope you make that. That would be amazing.

Shannon: I'll try later, I'll see if we can make it happen.

Let's see. Next term, what are you doing?

Kyli: Math 253 which is calculus 3.

Shannon: Calc 3. I am too, but online.

Kyli: Which is definitely different.

Shannon: Very different.

Kyli: Good luck with that.

Do you have any concerns?

Shannon: Yeah, a few. Online classes are tricky because it doesn't have that collaborative group atmosphere which we have so lovingly fostered for our studying. It will be interesting not having that and figuring out . . . I mean, yeah, CON academy is there, and the internet, which we already use anyway, but it's not the same as asking "Hey, what did you get?" and comparing processes and having someone to go through your math with you.

Kyli: And it's also easier to compare stuff face to face.

Shannon: And sometimes you find that missing negative or that positive two doesn't equal 2.

[Laughing.]

I have definitely busted out a calculator in a test before, just to make sure  $4 \times 3$  still equals 12!

Kelli: If I have a calculator, I'm definitely plugging in everything I can, just to make sure.

Kyli: It's just double checking.  $(1/5) + (1/5)$  is *not*  $(1/10)$ .

[Laughing.]

Shannon: So those little things. Checking things myself will be tricky.

But I look forward to popping in to see Damian and random studying.

[Laughing.]

Kyli: You're taking a different class.

Kelli: Yeah, I'm augmanaut. I'm going into 261 which is linear algebra with Damian.

Shannon: Bad ass.

Kyli: I have no idea what that class is going to entail.

Kelli: Me neither.

Kyli: I mean, it's linear so graphs are going to be a thing. That's cool.

Kelli: I think it's mainly going to be systems of equations.

Kyli: Oh, fun fact: I was never properly taught that. Even though it's not a complicated thing, like systems of equations. I remember seeing it on the board in elementary school, but it was just on the board. There was no explanation of that.

Kelli: Weird.

Kyli: Still, when it pops up, I'm like "I *know* what that is, I'm just 100% on how to work with this."

Shannon: I plan on taking linear after Calc 3 but I might end up doing the rest of this math degree online which will be very interesting.

Are you doing anything long term? With this run of college, what is your plan? You think you're doing engineering.

Kyli: Yes.

Kelli: Yes, and I'm studying computer science right now.

Shannon: Awesome, awesome.

Any plans on the application of either? Or just interest in the field in general?

Kyli: Yeah, I'm starting with civil engineering because I think construction of buildings in particular is really interesting. Ports, too.

Shannon: Well we are here in "Portland!"

[Laughing.]

Kyli: That's true! And the efficiency of that and how it works. I also want to challenge myself and be able to apply my math that I've learn more to things like building. I think architecture engineering is interesting.

So I'm starting with that, I don't think mechanical engineering or chemical is in my future. Chemistry is my enemy. But if any other field or . . . what's the word . . . like any others stem off of engineering . . . like if a different field of engineering catches my eye then yeah.

Kelli: I am also studying sociology on the side of computer science. I kind of want to do something that's a mix. I enjoy helping people. If I found something that mixes sociology and computer science.

Shannon: Absolutely. I have a friend who works for biohazard which is a video game company and he just got a masters in anthropology human systems or something so he analyzing the types of people who play the types of games that they are putting out so they can better gear those games towards those people.

Kelli: Oh wow!

Kyli: That's so cool!

Shannon: It's a really interesting way. I never thought that science would be used in that way in gaming. But there are all these weird little subsets so I'm sure there are a lot of application for psychology or sociology in computer science.

Kelli: Yeah. Actually what drew me to it social science was my

anthropology class senior year. It was a dual credit class through West View. They still offer it which is awesome. I just really enjoyed the class because it was completely different from anything else. My instructor was really good, too.

Kyli: That makes all the difference.

Shannon: Absolutely. For example, the first time I was introduced to geometry I had an awful teacher who looked like a toad.

Kyli: Same. My teacher looked like a toad. But he was amazing. He dressed up as a squirrel for Halloween one year. I didn't see it but I heard it was incredible.

[Laughing.]

Shannon: Having a challenging instructor can make trying to get to the material difficult. You want to get it but you can't because the way it's being presented is just . . . poor. It can be helpful to have good instructors.

Kyli: Favorite math class?

Shannon: Ever? Ooh. Most of the time I would say algebra 2 because I really like algebra and I was really good at it at the time.

Kyli: Not any more! [Joke/joking.]

Shannon: Well it's been a long time, so . . . I took algebra 2 my sophomore year of highschool. It was great, I was super good at it. My teacher at the time was like, "Shannon, do you want to teach?" and I was like "sure." So I kind of did and she would just grade things.

The year after I wasn't as good at pre-calc because I had an awful teacher! And so I got a C in that class and I was like "Eff math!" I didn't quit math after that.

After that I'd say this class. Calc 2 was pretty awesome. We had a good group, our lectures were kind of fun.

Kyli: Definitely.

Shannon: Hats off to you, Damian, not just because you're the one recording this. [Laughing.]

PCC teachers have been great. Whoever I had for math 151 wasn't too great, though.

Kyli: What class was that?

Shannon: Oh I mean 111. The first part of pre-calc. It's OK.

Kelli: I'd say Calc 1 from last term was my favorite. I really liked Amy. It was my first time with the collaborative experience with math. Before college, I would just study on my own. It was really nice to piggy back off of other people. I was in a group with Andrew, who dropped, and Hayley.

Shannon: Yeah, you were in a good group.

I really liked calc 1. It was the cumulation of a lot of concepts that you touch on in algebra 2 and trig and pre-calc and then calculus starts to mold it all together. This is where all the weird little segments of math that I've done over the years come together to this.

Kyli: My favorite math class . . . well, I am in highschool so I have two categories: pre-PCC, and this. So pre-PCC, my favorite was algebra 2 because my best friend sat next to me all year.

[Laughing.]

So she'd be talking to me and I'd be paying attention and I did really well in that class!

Here, I think in terms of classroom, probably this class was really fun. Pre-calc was really fun with Jessica. I liked the flipped classroom.

Shannon: That's what I was kinda nice. That's sort of what I was doing with this class, using the videos and Damian's lectures in tandem. I sort of had two different room modes.

Kelli: That's really cool. I've never experienced the flipped classroom,

what is it?

Kyli: It's really nice. I had it for 111 and 112. Our professors would make videos of them doing the lecture notes and examples and you would do that at home then you would do an assignment.

Shannon: Yeah, you would do a shortened assignment. The pre-class assignment then you would come to class--

Kyli: Oh no, you would do the homework in class!

Shannon: Yeah, you would basically do a lab portion at home then start homework in class. You would hopefully finish it in class so you could check with people and have that collaborative experience. If you didn't finish it, you would finish it at home.

It made it so you could have 2 hours of calculus in class rather than 3. You did the lecture at home. Hopefully you could bring whatever questions you had to class.

Kelli: Oh OK! That's kind of interesting.

Kyli: We would do group problems and such and then do the homework. I would typically be able to finish in about an hour since the teacher was right there and I could ask any questions.

Shannon: I think we had a TA in that class. For 112.

Kyli: I don't think so.

[Laughing.]

Shannon: Yeah, the flipped classes are cool so you can do the lecture at home and you can use the class time for any questions you already know you have instead of having lecture, working through lab and then realizing what questions you have. It gives you time to find those questions you have for yourself.

Kyli: And typically those questions are harder . . . I forgot what I was going to say . . . that's upsetting.



Kelli: It'll come to you.

[Laughing.]

Shannon: Math, math, math, math!

Kyli: Oh we played a lot of Jeopardy math 112! It was so fun!

Shannon: Yeah! She made it so fun! She had like "linear equations" or "parabollas." She had all these ridiculous categories.

Kyli: "Transformations for 400!"

Shannon: People would ask to buy an irrational number. It was just ridiculous and so fun.

Kelli: That sounds so fun! That was with Jessica? I wish I met her.

Shannon: She's around today.

Kyli: Yeah, I liked that class a lot. It was quick. We got in there and we knew what to do.

Shannon: It was a nice structure.

Kyli: Sometimes in lecture all the information is coming at you and if it's a difficult section, by the time you get to doing lab problems, you're exhausted. Doing it at home you can take breaks.

Kelli: That is true.

Shannon: That's why I don't do labs at SunLabs. I just can't do it. "Andrew, what did you do this weekend? Damian, tell me about your wife." My brain just melts. I need time to digest and get some more glucose into my grey matter. I need a snack! I have an alarm in my phone to remind me to feed myself. So I don't forget.

Kelli: I need to feed myself!

Shannon: Exactly! And sometimes you can get into this mode of "just one more chapter!" and you forget to feed yourself. It would be really late and you wouldn't want to eat that late. So recurring alarms are helpful.

Systems. Of equations.

Kyli: Exatly!

Shannon: I heart math.

Have you guys experienced in your math careers so far, in your many years, any negative feedback or trouble in pursuing the path that you are pursuing?

For example, while you ponder. I'm coming back for a second degree. When I was doing school the first time, there were still, and I'm sure there still are, but I think it's lessened, but there was a lot of push back like "what are you going to do with a math career? Why are you pursuing math to such a high degree?" I mad it to Calc 3 and I experienced push back from that. It didn't really phase me, I kept doing what I was doing, it just seemed odd. Maybe it had to do with me being a girl, but it was just odd.

Kelli: I feel this is with anything that you pursue. "Why are you doing this?" Everyone thinks you need to make a living on what you want to do, but how are you going to make a living off of your degree, whatever it is?

There's so much pressure as soon as you enter highschool, you need to start thinking about college. Why do I need to focus on college? It's far away!

Kyli: I'm a senior and I have no idea what I want to do.

Shannon: To be completely honest, you don't need to know. Just keep--

Kyli: A goal is not necessarily to be an engineer, But an engineering degree, I've heard a lot about it and I took a one credit introductory course online this term. Getting an engineering degree can be applied to a lot. It's still an option to get into the engineering field if you have one.

If you have a degree in writing, I'm sure it's harder to get into engineering at

first at least. So I can learn a lot of things that I can apply to other areas if I want to. Business, or wherever life takes me.

Shannon: Absolutely. Same with computer science. There's just so much versatility.

Keep continuing education until you figure out where you want to be. You don't have to know day one. You don't Just absorb everything, take in as much as you can because all of that knowledge will serve you in whatever you do. Even if you change fields. You might start somewhere and change.

Kyli: I was considering majoring in math or a science degree but I did an internship over the summer at an engineering school. One of the graduate students and I would talk about what I want to do and she said more engineering courses would be transferable to a math degree rather than the other way around. I decided to start with that and I like math.

Shannon: You need a lot of math for engineering.

Kyli: All the numbers!

[Laughing.]

So back to your question about push back, whenever I tell people what math class I'm in people ask "really? Why?" I ask myself the same thing when I'm really tired doing homework.

[Laughing.]

Shannon: Oh my god, like 35 questions deep! I love it when homework is like "do all questions 1-63, odd."

[Laughing.]

Kyli: Right! And I'd rather do this than write an essay. Which is my reason. I've taken math every term that I've been here. And I don't need it. I don't need it to graduate highschool. I've been accumulating my elective credits through my math classes.

Shannon: Are you taking the next one for college credit?

Kyli: I get dual credit. My next class I'll just be continuing. Might as well keep it in my brain over the summer before starting university.

Shannon: And then . . . Proofs!

[Laughing.]

Kyli: My least favorite thing about math was geometry and proofs! So nit picky! That was the one section that everyone failed.

Shannon: Same.

Kyli: I remember it was chapter 3. We had this option to substitute a one page assignment to replace a low scored assignment and I chose the proof grade. My proof grade was terrible!

Shannon: I didn't have that option in highschool and my proofs brought my happy A grade down to a C.

Kelli: Whoa!

Shannon: It was always trapezoids and triangles.

Kelli: And trying to prove all the angles. "Prove that this angle is 45 degrees." I don't know! Use a protractor! I never learned to use a protractor properly. I never really needed it for geometry. I mean, I learned how to use it but it was so long ago.

Shannon: If you take physics, you'll need to use a protractor. Maybe in linear? Either 3 or linear. There's lots of graphing. I see people building 3D cones. It's one of those classes.

Kyli: I'm ready with my construction paper!

[Laughing.]

Shannon: Sometimes when I'm at another campus I'll see a math group building a cone and talking about the volume of things and there's the one

person who didn't bring their part. [Laughing.] Then it turns into a bunch of very serious math people trying to get ready for finals and Tim over here doesn't have his part!

[Laughing.]

It's funny to watch people freak out. So some class you have to build. Maybe it's optional. How do you best represent your graph physically?

Kelli: With my protractor.

[Laughing.]

Shannon: Or with a compass!

I had something else . . . on a total random tangent, I love it when doctor or dentist offices put things on the ceiling. Whenever I look at any ceiling I think "someone should put something up there."

Kelli: My dentist has that.

Shannon: Exactly, it's great. I'm from LA and I knew a dentist and they had flat screen TVs on the ceilings so kids could watch whatever.

Kelli: Wow! That's so cool!

Shannon: It was a very expensive office but very smart.

Kyli: [Whispers] Math, math, math.

Shannon: Right?

Kyli: And the Spanish version, matematicas! Aye yayay!

Shannon: With the big Spanish guitar! It has a special name.

Kyli: Remember we saw the mariachi? So cute!

Shannon: Speaking of mariachi, even though that's Mexico, it made me think of the satellite in Puerto Rico. It's the biggest one in the world and

it's the only one that sends and receives radio waves into space and it's how they determine if there are planets in orbit around stars and where they're located. It's all via radio frequencies.

Kelli: That's so cool.

Shannon: Random mariachi tangent, but it's huge! So cool!

Kyli: Arecibo, I think sounds right. I was at OMSI and learned that we know more about space than we do about the ocean. Isn't that insane?

Kelli: Only like 5% of the ocean has been discovered.

Shannon: On Netflix there's a show called One Strange Rock. It has Will Smith and 8 astronauts talking about their observations from the space station and about earth. All the footage from the space station, you forget how much water there is.

Will Smith and all this astronauts. The footage from the space station is really trippy. You forget how much water the planet is covered in. They even talk about it, too, they forget how much water there is. I'm not surprised, maybe the statistic is 6% now, but we've explored so little of the ocean. It's weird.

What if the giant squids are baby Kraken and way down in the trench is a Kraken?

Kyli: Whoa! I like this theory!

Shannon: We don't know! We haven't been down there! Every time we explore down there it's a tiny pin of a sub trying to see everything!

Kyli: It's always interesting in National Geographic you see these giant glow in the dark squid and you see it and it's just whoooa.

Shannon: We don't know what the frick is down there. The blue whale is 100 feet long and supposedly the largest animal on the planet . . . that we know of! It's so deep.

[Laughing.]

Kyli: This is off topic, but ave you seen the movie about the giant shark?

Shannon: Megaladon?

Kyli: Yeah. That idea terrifies me.

Shannon: Right? It's craziness. There's so much down there. Have you seen the most recent Godzilla movie?

Kyli: No.

Shannon: You should. It's actually really good. I took some teenagers that I was ironically baby sitting.

[Laughing.]

They were 14 and 16 at the time. That's why I say ironically.

Kyli: When you were an assistant?

Shannon: Yeah. Their parents couldn't trust them. Which was true. They wanted to see Godzilla so we did and it's actually good.

Is the Stuart book here? I was going to bring up something from it.

Kelli: I don't think so. Does someone have it with them?

Kyli: Wait, it's right there.

Shannon: It's the instructor book. I'm hoping it has something . . . nope, it's just in the student version.

Kelli: What are you looking for?

Shannon: In the Stuart calculus book there's a part that talks about how part of calculus was discovered in regards to how light hits water and the refraction off of water doplets creates rainbows.

Kyli: Oh wow! That's cool, but how people figured that out is even more

amazing to me.

Shannon: Exactly! So my first degree was in design, a bachelors of fine arts. Not just arts, but fine arts! [Laughing.] We made a lot of art. I'm good at making art with light. I learned the effect of light on people and the other applications of it. Now, coming back to school and right in the middle of my math book there's this description of light and rainbow and the math that goes into it and it all came full circle for me.

I wanted to show that to you.

Kyli: I listened to some podcasts, coincidently. [Laughing.] But one was talking about incredible people in history, like Albert Einstein, and it blows my mind how much he was able to put into words. The theory of relativity and black holes. They were talking about Issac Newton and said "he created calculus! It's amazing!" It made me think of that guy in Russia who solved that million dollar equation. It's an incredible story and the guy who made the thing he was proving and his story and how he just came up with it! It's just crazy what people can create.

I don't know, maybe I'm one of those people.

[Laughing.]

Shannon: You absolutely could be. There's an interesting theory in a book about "the other Einstein" about Einstein's wife. They met in college in the same math class.

Kyli: What a story! That's goals!

Shannon: There's a soft theory that she may have been the one to think of the original idea for the theory of relativity. You can look up on Snopes or whatever that all the money for the specific Nobel Prize for that theory went to her even after they were divorced. Maybe she did more work on that than we think and that people credited her for.

Kyli: All the things he did. He would have think sessions when he would just think.

Shannon: It's amazing. It wouldn't be surprising if many of the things he



came up with were collaborative and that's why he came up with so many things.

Kelli: Yeah, you have to think "just how many things can one person come up with just by themselves?"

Shannon: Newton. He was a special case. He said women were a distraction, he built himself a cabin and played with prisms and found so many things. There's something to that too. Taking time away from society, you don't have to build a cabin and play with prisms. I mean, you can!

Kyli: Calculus has done so much! Without it, I don't know!

Shannon: We wouldn't be in space without it!

Kyli: We need a new form of math to figure out those giant squid.

Shannon: I don't know if we need a new form of math, we need to work with our math and materials better. Maybe it is applied mathematics which is engineering! See, engineer something!

Kyli: I want to. I love it.

Kelli: Anyway, going back to the why of that, that reminds me of In Figures. One of my favorite movies.

Shannon: Yes! I learned that a lot of the original coders who worked on the shuttle were women and their work got a man's name put on their work. Yeah. Female coders.

Kyli: Females are great. [Laughing.] To be an astronaut you need a PhD and very physically fit. There was a female astronaut who has been to space multiple times and she has 5 kids. That's a rolemodel! That's a female figure!

Shannon: That's fierce. The gal in One Strange Rock, I can't remember her name. She's been up there for the longest time, something like 665 days, almost two years. Not all at once, but still.

Kyli: Didn't she spend the most time up there consecutively as well?

Shannon: Yeah, I think so. One of the trips was to see the effects of long term space flight if we go to Mars or stuff like that.

Kyli: She was a human experiment.

Shannon: A lot of the astronauts are in the ISS. That's why they send the people there for so long. Scott Kelly has a great book called Endurance. He was up there for a year. They look at what happens do your body without gravity. They find that your bones will break down 5-8% every 6 months without gravity.

Keli: Because you don't use your bones!

Shannon: Yeah. That's why they suggest that elderly people lift weight to combat that loss of bone density and osteoporosis.

Kyli: They work out a lot up there.

Shannon: They do and it's not the same. They have things that hold them down but it's not gravity. They're trying to engineer it better.

Kyli: That's why I'm here.

[Laughing.]

Shannon: Exactly! There's so much math and science that goes into figuring out how to get our fragile little bodies to other planets and into the ocean. We're so squishy and so not protected.

So yeah, other things to think about and ponder.

[Laughing.]

Like Winnie the Pooh.

Kelli: Aww, that's my favorite character. He's the best.

Shannon: The original book is phenomenal.

Kelli: My stocking is Pooh. My family all has Disney stockings and I'm Pooh. My dad is Eeyore, my mom is Minnie.

Kyli: We went to Disneyland and we did go on the Winnie the Pooh ride. We took pictures with Rabbit.

Shannon: Fun fact: Disneyland never shuts down. They kick people out, but they keep working. Landscaping and stuff. I've known people who have worked for Disneyland and they talk about it. There's always people there.

It's magical! It's the happiest place on earth! You know there's more than one, right?

Kyli: Yeah. My friend is going to the Tokyo one.

Shannon: There's Tokyo Disney and Disney Sea. Like there's Disneyland and California Adventure right next to each other. There's Tokyo Disney and Disney Sea. It's like a water park. It's wonderful.

Kyli: There's two water parks in Orlando. I've been to that one.

Kelli: I've been like ten times.

Kyli: To Disneyland?

Kelli: Disney World. My brother is like 10 years older than me so my parents took him to Disney and I was adopted 10 years later so they started taking the kids.

Kyli: Amazing. Also, I love your Canada hoodie. Oh Victoria! There you go! I feel represented. Half Canadian. That's why I'm going to school up there. Tuition is less. Even with the conversions.

Shannon: Sure. Dual citizenship and passports and everything. Badass. Isn't their's red?

Kyli: Yeah, like a maroon.

Shannon: I think China is also red. I traveled a handful in Asia. I was just thinking of other passports.

Kyli: I love to travel. I've never been to Asia.

Shannon: Absolutely go. Like I mentioned the other day, try to find study abroad programs. I think PCC had some seminars. You can look on their websites.

Kyli: Well I won't be here next year. I would have done some of the study abroad with PCC but . . .

Shannon: I was thinking you could do some over the summer before going to Canada. Same to you, Kelli.

Kelli: I'm doing study abroad in Spain. I'll be doing film studies. It'll be really cool.

Shannon: Will you try to go to the Cannes Film Festival since you'll be so close?

Kelli: Maybe. I'm not sure.

Shannon: It'd be fun if you could. International film festivals are fun. There's so much stuff. They're more focused on the art rather than the people. Here in America we're so focused on the celebrities, which can be great, but sometimes you miss the art if you're focused on the people.

Kelli: That is so true.

Shannon: I love Chinese action movies. Totally random. They're phenomenal.

Kyli: I've seen bits and pieces of Chinese shows, scripted shows.

Shannon: They're great. Japanese shows are great, Japanese comedy is hilarious! We have shows like Wipeout and things and their all from Japanese shows. Ours are OK, but theirs are so much better!

[Laughing.]

They're so enthusiastic! They super want to be there! "Everything is fine!" Thumbs up, peace sign, and they run right into a wall. "It's good, I'm going to do it one more time!" It's so great!

[Laughing.]

Kelli: You have black vans today, not white.

Kyli: These are my laceup ones. I have slip ons and lace ups. Wait, I have 4 pairs. One pair isn't white any more, and I have a maroon pair.

Shannon: Do you wear them when you go to Canada?

Kyli: No. I brought them with me. They match my passport!

I have insoles in them because two weeks ago I couldn't walk. I just woke up and the balls of my feet hurt so bad I couldn't walk. My parents got me insoles.

Shannon: Walking is important.

Kyli: I agree. I'm now even more grateful for my feet. You know when you're sick and I can't breathe through your nose and you realize how ungrateful you are because when you can breathe out of your nose it's the best thing ever and when you can't it's so much worse!

Shannon: You realize how grateful you are for all the micro systems in your body that keep you alive and filter out the atmosphere.

Kyli: You don't notice until it's gone. Anyway. What goes through my head.

What else?

Shannon: I don't know. That might be it.

I don't want to learn proportions, percentages, fractions, rates, probability. It's some weird handout. [Reading from a flyer.] It doesn't look good.

Kyli: I have a question about math. What was your experience with your peers and math? Most of my peers hate math and they want to finish it as soon as possible. But I'm very enthusiastic about it and they think I'm weird. No, I like math!

Shannon: You might be weird as far as the "normal highschool teenager" is concerned.

Kyli: That is true. I'm not just weird because I like math.

Shannon: No. I think you're fine.

Kyli: This is a happy environment. A safe environment. Thank you for not making fun of me.

Shannon: You're totally good.

Kyli: The attitude I've found in math class versus other class is that no one pays attention. No one cares.

Shannon: I was just watching a TedTalk about this, about people's attitudes in the U.S. in regards to math and learning math. Our parents and generations before all said math was hard and super rough. So we've already got this preconceived notion that it's going to be rough rather than "math is the coolest shit ever! You're going to love it!" There just isn't that enthusiasm. In eastern countries, there is. They learn math better, they don't have as negative an outlook on it and a lot of time they pursue it further.

I had the same experience that you did. A lot of my peers were very resistant to it. We all got tested a lot for our education level. They divided us up into groups like kids that needed assistance, the normal kids, honors, and AP. I was always in the honors and AP groups and we all kind of wanted to be there, otherwise we wouldn't have tried so hard. That wasn't until the end of highschool. For a while we were still in classes with people who were like "why am I here?" That was challenging. You have half the class who don't want to be there and they drag down everyone, even the teacher.

Kyli: That's why I came to PCC because that was my highschool. There

were other things that made me leave, but that was one of them. The majority of people here have a degree or a goal. Some other students just want general credits to move on. Maybe they're not particularly invested in a certain class, but they still want to be there. They still have a goal in mind.

Kelli: I think it's similar to me. I feel like how our highschool class was scored was on a scale of 1-4. You get a 1 in a learning target, which is low. You fail the class.

Kyli: That's just an American school critique. It's not the best grading.

Kelli: The grading was tough. Even if you felt like you knew the stuff, you'd still get 2's and 3's on the test. Even if you understood it, if you missed a tiny part, you don't get a 4.

Shannon: We're so focused on test scores rather than cognitive process or the problem solving skills and interpersonal skills. The stuff that actually pushes science and math forward. Rather, it's "what did you get on that one test?" Oh, you got a 73, so we can't trust you any more.

Kelli: That was really discouraging. I knew the stuff so why did I get a low score? I got a B in my AP Calc class. Then I came here and got a good grade in my Calc class. So I did understand the stuff in my pre-calc.

Shannon: Yeah. And the different instructions, too. A different way to look at math.

Kyli: Something came to mind as we were talking about this. I took a reading class.

[Laughing.]

We read a book called Outliers by Malcom Gladwell.

Kelli: That sounds so familiar!

Kyli: He's written a lot of books exploring different topics. This book talked about success. People who are successful, how much was luck, what was involved. Where they were born, what family, what gender, plus

luck, plus skill. How all of that fed in to them being successful. One thing he shared was about math. Just speaking English, compared to knowing Chinese, it just makes sense with the number system. It's easier to comprehend division in Chinese rather than in English. I found that really interesting. Especially since math isn't as liked in America compared to Eastern countries whose language caters more to numbers.

Shannon: To a more numerical structure rather than the English habberdashery. British English is better than American English as far as structure goes. There have been studies that show that what language you learn ultimately influences how you react to things, how you learn, how you think about things. English is so confusing, they're finding that the brain spends so much time trying to figure out what people actually mean because everything has like 50 meanings. Rather than German, for example, there's one word for one thing. There's zero confusion.

Kyli: 60% of English comes from German.

Kelli: That's why English is so hard to learn. Everything has a double meaning. The grammar itself is really weird at times. It's because we borrowed from German and Latin and Greek.

Kyli: That's why I like math!

[Laughing.]

There's words involved, but the more advanced you go . . . If I put  $4+2$  down, everyone in the world would be like "6."

Shannon: Some people would need a calculator.

[Laughing.]

Hold on! Let me check. It's still 6.

Kyli: Languages are so cool. I'm happy that my first language is English.

Shannon: You are slowly becoming bilingual, because you're learning Spanish. You're conversational. Do you find yourself thinking about math in Spanish? Do you think about numbers in Spanish?



Kyli: I've never had to think about math in Spanish. Even in conversations, that's not usually a topic. So I don't have an answer.

Shannon: I'm just curious.

Kelli: I took Spanish up until college. I still think about some things in Spanish just to keep it up. I really enjoyed it. I took it since 6th grade. That was the last year they offered it for 6th graders.

Shannon: That's a long time!

Kelli: That's kind of why I want to do a study abroad program. I wanted to go to Spain and do the film study program and practice Spanish.

Shannon: I think it'll be really cool. It'll be really nice to be submersive in a language you're trying to work on.

Random story about that, my friend got a minor in Spanish. She had been taking Spanish all through highschool. Now she's married to her husband and they own a condo in Mazatlán. So it totally works out.

Kelli: That is so cool!

Shannon: It's all worked out. Definitely work on your languages, they can totally be beneficial if nothing else for vacation.

Kyli: Spanish is a useful one. There are like 600 million people in Latin America.

[Laughing.]

Thank you, geography of Latin America class!

Kelli: The United States is becoming more and more bilingual with Spanish. Learning Spanish is useful in the United States. Most Americans know something. Count to ten. Say hello.

Shannon: I can count to a hundred. So I can count to 199 because I don't know what 200 is.

Kyli: Doscientos.

Shannon: Oh! Well now I can count to 299.

Kelli: The Spanish number system just repeats itself.

Kyli: In English, you have ten, then eleven, but like Korean or Chinese you have one-ten. That's why math is easier.

Shannon: Even in Spanish "one" and "once" are close.

Kyli: It's not just random.

Shannon: "Two" and "twelve!" They both start with "t."

Kyli: Like twenty two is two-ten, too.

Shannon: Which makes more sense. Who are you waving at?

Kyli: Damian.

[Laughing.]

Which is weird because he's going to be listening to this later!

[Laughing.]

Shannon: I hope he waves to himself when he's editing.

[Laughing.]

I hope Brittany is like "who are you waving at?" "Oh, myself."

[Laughing.]

Good stuff. Other languages I think make a difference in how you learn math and learn in general. And the flexibility of having thought.

Kyli: I wish the U.S. took learning languages more seriously. That's the

other class that other students don't care because it's a requirement.

Kelli: Right. You need the two years. Some people will just take the two years and not remember anything from it.

Kyli: Exactly. But in Asian countries, learning English is really important.

Shannon: At least in Japan, you learn English all the way to highschool and then it's optional after that.

Kyli: Languages are typically just taught in middle or highschool here.

Shannon: I love all the people who put their kids in bilingual schools. The neuroplasticity of children is insane and they can totally handle it. The parents in the 80's saying that kids can learn two languages at the same time and it's so not true! My parents had the option to put me into a bilingual program in preschool but they didn't. I would have been so much cooler by now.

Kyli: Well you're at a max level of cool. You would have broken through something.

Shannon: I could be in that condo in Mazatlán. Because I would have known Spanish.

[Laughing.]

Kyli: Seriously! There you go!

Shannon: I think language is under focused here in the U.S. Math, too. Teaching. Just education in general.

Kyli: U.S. is ranked 16th in the world for education?

Shannon: I think it's lower.

Kyli: I think it's top 20.

Shannon: I think it's 18. I think we're 16th in the world for internet speed.

Kyli: Where's #1?

Shannon: Korea.

Kelli: Oh wow. OK.

Shannon: They have everything really fast. They also have more cell phones than people.

Kyli: There are more chickens in the world than people. Fun fact!

Shannon: More cell phones in Korea than there are people to use them.

Kyli: Over 52 million then. I took world regional geography last term!

[Laughing.]

Kelli: So back to teaching. Someone I knew tried teaching. They were a substitute in the Beaverton school district. It all fell apart. The parents were too involved, you really can't do anything with the kids if they're misbehaving. So it was time to go, the busses were lining up and this kid was having a tantrum. So this person picked them up, cradled like a baby and the real teacher saw and was like yeah, that's fine. But he got yelled at by the principal. What did he even do?

Kyli: I have a similar story. I volunteered at a Spanish immersion school last year. It was the holidays and the teacher wanted to bring in Santa. They were learning about all different kinds of holidays, but the teacher wanted to bring in Santa to give the kids gifts that she had. She emailed all the parents in her class. A parent from another class complained so she couldn't do it.

Kyli: They were learning about lots of religious holidays but they couldn't have Santa. Sensitivity! Rude!

Kelli: So if they're teaching at a 5th grade level and a girl says they touched them inappropriately, they're off to jail. No questions. Because it's student versus teacher. He really has a sour spot for it. He doesn't like to talk about it any more.

Kyli: He's not a teacher any more?

Kelli: No. He would have been a great teacher, he really loves little kids. It's unfortunate.

Shannon: It just takes one. One unfortunate circumstance, or parent, or whatever. It's just the one and then you can't ride this rollercoaster or have this job. It's just unfortunate.

There's a raptor on the side of that cabinet.

Kelli: Where?

[Laughing.]

Shannon: There. I don't know why it's there.

Kyli: I think it's a math joke. "Distractor over . . ." Oh I don't know.

Kelli: I'll read it. "Distraptor over timeraptor"

Shannon: Velociraptor.

Kyli: Oh distance over time. Oh wow. Gosh dang it!

[Laughing.]

Math jokes make me mad sometimes! It's so bad! But it's funny!

Kelli: I used to have this calendar with all these bad dad jokes and it was great.

Shannon: Dad jokes are great!

Kyli: Unless your real dad is telling them. At least for mine. If someone else does it, it's funny, but if it's your dad it's like "please leave!"

Shannon: Like if you're over at a friend's house and their dad is cracking jokes it's great and you laugh and your friend just stares.

Kelli: "Don't encourage him!"

[Laughing.]

Shannon: I bet there are some great dad math jokes.

Oh I think I have one!

OK so someone made a meme. It's a math meme. "When your mother calls you by your full name" and it shows a square that says " $a^2+2ab+b^2$ " and the child is the  $(a+b)^2$  and it's like oh no! Because it's the parent function!

Kyli: I hate that.

[Laughing.]

Shannon: Speaking of parent functions and systems of equations.

[Laughing.]

Kelli: That's great.

Kyli: I get really happy when my mom calls me by my full name. I like to annoy her and piss her off so she's like "Kyli Lawrence! Stop!" And I'm like "mom I love you!" And she's like "you are testing me!" Maybe just a little.

Shannon: All it's all from love. Do you have siblings?

Kyli: I have an older brother. He's the favorite.

Kelli: How much older?

Kyli: 23 months.

Kelli: That's right. My brother is 10 years older than me.

Shannon: Is he also the favorite?

Kelli: I mean yes and no. I don't know. We're so far apart we're like two different generations.

Kyli: Does he also live in Beaverton?

Kelli: No, he lives in Texas. He's a sales rep for a medical supply company. He recently bought his first house. That's pretty cool. He's not married.

Shannon: Big living!

Kyli: Do you have siblings?

Shannon: No. I'm an only child. Which just adds to my desire to not have children.

Kelli: Really?

Shannon: Yeah. It's not for me. It's not for John. We've been asked many times if we're sure and we're still sure.

Kelli: But you're such a mom!

Shannon: I think care of friends. I work for a friend who is ridiculously successful and can't manage her own calendar and schedule her flights so I do assistant type stuff for her but I also check in and ask if she's drinking water. Just to make sure! Someone needs to! I enjoy doing that for people but small people aren't my thing. They're just so messy and noisy and dirty and fragile.

Kelli: They're so adorable when they don't want something which is all the time.

Kyli: When they're sleeping. So precious and then they wake up!

Shannon: And then you fart and their awake and it's like nooooo! It's just the screaming and you don't know what to do! And that continues for like 5 years.

Kyli: And then they get sassy and you have to call them by their full name!

Shannon: Toddlers are funny but they go through fits. Preteens are hilarious. They are sassy!

Kyli: Being 11-14 was one of the most difficult things in my life so far. Oh my god, I'm existing! You just become self aware. It blew my mind. And then I got really sad.

Shannon: The world is crappy. That's also the time when elementary schools merge into middle schools so all of a sudden you're dealing with more people. You're figuring out classes and your peers and where you fit in. It's a lot of mesh. Clusterfuck. That's the right word.

[Laughing.]

So I'm not going to do babies.

Kyli: It's not necessary. Live your life!

Shannon: We might get a dog.

Kelli: What kind of dog?

Shannon: We don't know. I've always had golden retrievers. Where we're moving to will have a back yard.

Kyli: I totally want to visit you.

Shannon: You totally can! We're not that far. I mean, we're far but we're not a whole state away.

John and I joke that the drive from Portland to Eugene and two hours but the drive from San Diego to LA in California is two hours time wise but it's half the mileage as Portland to Eugene. It's always two hours! Unless you leave at midnight and then you can get there in just under an hour but that never happens.

John and I moving there we know that it's always two hours so it's fine. Whenever you're around, stop by. Feel free. I almost brought them with me.



Kyli: Aww!

Shannon: They didn't want to get in the bag. They're great!

I think that might be good for math?

Kyli: Yeah.

Shannon: High fives?

Kyli: High five!

[Laughing.]

Shannon: Yay math! [Singing] Math, math, math, math, calculus!

Kyli: Proofs!

Shannon: Excellent!