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ELIZABETH Hey guys. So, these are our special guest lecturers for today. These are sixth graders from
CHOE: [INAUDIBLE]. Do you guys want to go ahead and find a table to sit at? [INAUDIBLE] And everyone will rotate. [INAUDIBLE]

AUDIENCE: Hi. Music matters. It really does. Are you a musician?

GUEST SPEAKER: Yep.

AUDIENCE: What do you play?

GUEST SPEAKER: I play the snare drum, the bass drum, the tambourine, pretty much all the percussion instruments.

AUDIENCE: The triangle.

GUEST SPEAKER: Triangle.

AUDIENCE: That's really cool.

ELIZABETH All right, guys so, before we get started, the way this is going to work is we'll give you five
CHOE: minutes at each station with your consultants. And during this five minutes-- this is for the MIT students-- go ahead and introduce yourselves. Tell them what you study, maybe what year you are, what you're interested in. And then, if you feel comfortable showing them the video pitch that you made last night--

[LOUD RUMBLING]

PROFESSOR: We have this to deal with, so just know that's out of our control. And we're really sorry. They're doing some construction over there, and it's going to be a little noisy. Sorry.

ELIZABETH So go ahead and show them your pitch if you're comfortable with it. If not, you can just tell
CHOE: them your idea. And then workshop some of the backup ideas that you thought about last

night. And the Cummings Middle School students know exactly what criteria you're looking for, right? So you can use the rubrics that we gave you. And at the end of the five minutes, we're going to have the MIT students rotate. So Nathan, you'll go to the back. Paul, you'll scoot here. Everyone will just shift that way. Does that make sense to everyone? We'll try it out for the first time. And if anyone has any questions, you can always come talk to one of the instructors. OK?

PROFESSOR: Does anyone have any questions about how this is going to work before we get started, or what your job is? Does anyone have a question about that, either? Your job, it's a very important job. You're critics, right? All right, then it looks like everyone knows what to do.

ELIZABETH
CHOE: So, I will go ahead and start the timer for the first five minutes. And if at any point you have a question about what you're doing or just a clarification thing, you can come find one of us. Have fun.

AUDIENCE: So, introduction, I study computer science. Anyone know what that is? It's kind of like programming kind of stuff. And so, the kind of stuff I like to do is I make games. So this is kind of like [INAUDIBLE]. It's kind of like Fruit Ninja. Have you ever heard of Fruit Ninja? Except, because snowing today, you'd slash the snowflakes. It's kind of the same, but this time you get a lot of combos. And if you slash the red one, you lose time and lose points. And you eventually lose the game. That's the kinds of things I do.

GUEST SPEAKER: Did you make that?

AUDIENCE: Yeah. I made that.

GUEST SPEAKER: Oh. I didn't--

GUEST SPEAKER: I've got Fruit Ninja on my phone.

AUDIENCE: It's kind of like Fruit Ninja except don't slash the red snowflakes. And it's OK if the snowflakes fall off. Oh, and the blue ones give you these mega explosions.

GUEST SPEAKER: Oh. That's so cool.

AUDIENCE: Yeah. So I have this idea. It's just, without programming, how can you make computer games? That's what I was thinking of off my head. What do you think of that?

GUEST SPEAKER: I don't know.

AUDIENCE: Do you play games a lot on your phone?

GUEST SPEAKER: Yeah.

GUEST SPEAKER: Oh yeah.

AUDIENCE: What's your favorite?

GUEST SPEAKER: I like a lot of them. Plus social media.

AUDIENCE: Ah, social media.

GUEST SPEAKER: Yeah, that kind of thing.

GUEST SPEAKER: I don't really have a favorite.

AUDIENCE: Oh, I see.

GUEST SPEAKER: I play Madden Mobile and Clash of Clans.

AUDIENCE: Ah, Clash of Clans. Yes. Totally addictive. Yeah, so it'll probably be about, like, how can you come up ideas to make games? Because, honestly, the people who are trying to make games, I'm probably not as smart as any one of them.

GUEST SPEAKER: Yeah.

AUDIENCE: Because you play the games. You know what people like to play. And it's not me, it's you. You know what you like to play. So if you could make the games that people of all ages could play, that would be great, great right? Yeah. OK, well, just another curious-cat question. Do you know what a hacker is?

GUEST SPEAKER: What?

AUDIENCE: No? Hacker?

GUEST SPEAKER: Oh, hacker?

AUDIENCE: Yeah, hacker.

GUEST SPEAKER: Oh, yeah. Someone who has to invade the firewall thingy. Or get through the security bars.

AUDIENCE: Yeah. Would you want to know about what is a hacker and what they do?

GUEST SPEAKER: No, I don't want to.

AUDIENCE: No. OK. Then let's just scrap that. How about a curious question. Everyone knows Google, right?

GUEST SPEAKER: Yeah.

AUDIENCE: But what do they do?

GUEST SPEAKER: Search engine?

AUDIENCE: OK, yeah. And then, what does that make them? How are they so important in our lives?

GUEST SPEAKER: Well, because, when we do our homework, we kind of look up on Google a lot. Like to [INAUDIBLE] stuff. Like history.

AUDIENCE: OK. Cool, cool.

GUEST SPEAKER: Helpful. Very helpful

AUDIENCE: Yeah, OK. You can also ask Siri on your phone or something, like your little button. I'm actually not from the US, I'm actually from a little country in Asia called Singapore. So I'm just curious. Do you all study programming at your age? Like any kinds?

GUEST SPEAKER: No.

AUDIENCE: Oh, OK. Me, neither. I have never studied programming until I came to university.

GUEST SPEAKER: Yeah.

PROFESSOR: So what do you think programmers do?

GUEST SPEAKER: They create things?

GUEST SPEAKER: Yeah, they help build games and code and stuff.

AUDIENCE: If you were to be curious about a programmer or what can he do, what would interest you, games? What else? Anything else? I pretty much just play games. I can't call on mine, because it's an iPod. I don't have an iPhone. I only have an iPod.

AUDIENCE: Yeah.

ELIZABETH All right, you have two more minutes with your consultants before we move tables.

CHOE:

AUDIENCE: So out of the random ideas I threw at you, which one would you be interested in in a possible video?

GUEST SPEAKER: Football games, pretty much.

AUDIENCE: Football games. OK.

GUEST SPEAKER: I'd say, yeah.

GUEST SPEAKER: I don't know. I think something that has to do with. What's the nearest thing you have in your mind that always nags you about computers, I guess?

GUEST SPEAKER: It slow sometimes.

GUEST SPEAKER: It takes too long.

AUDIENCE: It's too slow.

GUEST SPEAKER: Yeah, too slow.

GUEST SPEAKER: Like, even when you have Wi-Fi in range and you're near the router, it's always really slow.

AUDIENCE: Oh, OK.

GUEST SPEAKER: Oh yeah, and Wi-Fi. When I'm in my car, I can't play on the antenna and stuff. I can play games that don't need antenna. I don't like Wi-Fi. They should have built-in Wi-Fi on everything. So that would be cool.

AUDIENCE: OK. You know Pixar. You like the movies?

GUEST SPEAKER: Yeah.

AUDIENCE: I love *The Incredibles* But that's really old, but I still love it. And have you ever wondered how they do it? It kind of looks different from the normal--

GUEST SPEAKER: Yeah.

AUDIENCE: Yeah, so they actually use some computer software to do it. It's called 3D animation, like three-dimensional. Is that interesting?

GUEST SPEAKER: Yeah, I would be interested in that.

AUDIENCE: Yeah, like how do you draw, but on the computers?

GUEST SPEAKER: Yeah, like do they have to draw all the little pictures of every movement?

AUDIENCE: Ah, that's the key. No, actually the answer's no.

GUEST SPEAKER: Oh, I thought they did.

AUDIENCE: It's pretty cool, right? What they do is they make a teddy bear in the computer, or some kind of 3D image of it.

GUEST SPEAKER: Yeah.

AUDIENCE: And they put bones in. Just like how you put bones in humans that he was programming, you put logical bones. And then you can shift the bones, and they're like puppets, you know?

GUEST SPEAKER: Yeah.

GUEST SPEAKER: Yeah. This is kind of like what they do all the time.

ELIZABETH All right, guys, let's go ahead and shift over.

CHOE:

AUDIENCE: OK, so which one of the ideas--

GUEST SPEAKER: I like the last one.

AUDIENCE: The last one.

GUEST SPEAKER: Yeah.

GUEST SPEAKER: Yeah.

GUEST SPEAKER: Yes.

AUDIENCE: The last one the most? All right. Thank you, guys, you're so amazing. OK.

NATHAN: What are your names?

RONALD: I'm Ronald.

RONALD: And I'm Michael.

SARI: I'm going to sit in with you guys, too. My name's Sari.

RONALD: Hi.

SARI: Hi.

NATHAN: I'm Nathan. I study something that's a mix of chemical engineering and geology.

RONALD: Geology?

NATHAN: Mhm. I'm a second year. I have two ideas. It looks like my main idea has been scrapped at this point, but I'll still mention it to you in case one of you is fervently interested in it. I was interested in possibly doing something on how and why fruit decomposes. But I guess my backup idea is a bit more interesting to most people, which is how you can tell if there is magma lava under a surface and how you can detect and map it. And then you might be able to say oh is this place in this scope having some sort of eruption at some point or not. So I have to work on the hook. But I don't know. I wanna hear from listeners.

SARI: Which one of those ideas do you think is more interesting?

MICHAEL: What was the first one?

NATHAN: How and why food rots and decomposes.

MICHAEL: I would probably do the lava stuff.

NATHAN: Yeah.

MICHAEL: It's more cool.

NATHAN: Yeah.

RONALD: You could save lives.

NATHAN: Yeah. So I don't know exactly what to say about that.

SARI: What would you be expecting? If you wanted to watch a video about lava, what would you want to be?

RONALD: A diagram of the Earth, probably.

NATHAN: OK.

MICHAEL: And have the lithosphere and asthenosphere and the layers. And then having probably, like you said how you can detect if there's lava under a surface, probably having a place that already does have lava under the surface. And like showing the magma chamber, and then stuff.

SARI: It sounds like you guys have already done a unit on volcanoes pretty recently. Is there any questions that you still have after that that you might want to have answered? Like, really cool facts about volcanoes, or things like that? I know it's kind of a hard question to answer.

Or the coolest part of the it unit that you remember?

RONALD: How it looks. I've seen videos of volcanoes erupting at night, and that was pretty.

MICHAEL: The question I have-- there's some volcanoes that are big but they have small eruptions, and then they do a big one. And then there's other volcanoes that just have huge eruptions every time they go. Why would some volcanoes have big eruptions and some have small, small and then a big eruption?

NATHAN: All right, so, here's what I would say. Of the volcanoes that can have smaller eruptions, it's actually based a lot on what the makeup of the lava from the volcano is. I don't know if you covered the difference between andesitic and [INAUDIBLE] volcanoes. Basically, glass is made of something called silicon, silicate. It's an element, and volcanoes that have a lot more silica in it tend to be a little less dense. And ones that have lower content are a lot heavier, the magma. And so, as you might expect, the ones that are heavier, when they erupt, it doesn't just shoot out everywhere. It just kind of bubbles over the side and it's more viscous and it flows slowly. And so those ones often will be the ones, like the big mountains that kind of spread out this way a lot.

MICHAEL: Sort of like a shield volcano?

NATHAN: Yeah. Those are the shield volcanoes. And so the lava type causes it to have a lot more

smaller eruptions, because it takes a lot and build up of fresh air if you want to have a big eruption from that. Whereas, when you have a higher silica content, which means it weighs less, it's going to explode more. And it's going to have more violent eruptions. And there's other factors as well, like water content. And at what depth the magma chamber underneath the volcano is.

RONALD: Yeah. Another question. Let me see.

MICHAEL: If you don't have one, I have one.

RONALD: All right.

ELIZABETH All right, guys, let's rotate one more time.

CHOE:

MICHAEL: The amount of-- which one was dormant for a long time and then blew it's top and it was crazy?

NATHAN: Mount Saint Helens?

MICHAEL: Yes.

RONALD: Yeah.

MICHAEL: If volcanoes are dormant for a longer period, when they erupt, will they have a violenter eruption than ones that are dormant shorter? I can't actually answer that question. I know what causes volcanoes to go more dormant, what might make them not dormant. But I can't really say if that would effect it.

AUDIENCE: One thing about math that you have really enjoyed or really hated. Or two things. So we'll start. Go left to right.

BRIAN: Wait, what did you say again?

AUDIENCE: So name, favorite subject, and things about math that you you have really loved or really hated.

BRIAN: OK. My name is Brian. My favorite subject is gym. And I hate math, because it's boring.

AUDIENCE: OK. Actually, I guess it's a kind of new direction, but a lot of people are actually studying the

math of sports. So they go out and do really weird things with sports, like throwing basketballs at, like, places where you shoot an arrow, and they do math with it. So that's kind of a connection, gym and math getting closer together.

MATT: My name's Matt. I like math. You hear that, Brian? And what was the third thing that I have to say?

AUDIENCE: Some things that you really enjoyed it about it.

MATT: I enjoy solving variables and equations and graphing things. That's good.

AUDIENCE: You're ready for high school.

MATT: Burn.

JOHN: My name is John, and my favorite subject is--

MATT: History.

JOHN: History. And I personally do not like math.

MATT: Hi, guys.

JOHN: What? If I had to say what I like about it, I'm really into fractions, kind of. I just like the idea.

AUDIENCE: OK. Do you know what about the idea? I've never heard anybody say I like the idea of fractions, so that's really interesting to me.

JOHN: Like, things like this table being broken up into thousands of pieces. I don't know.

AUDIENCE: Now, really wacky things that mathematicians do later on is that they don't just break the table into a thousand pieces. That's too easy. They break it into an infinite number of pieces. And then they see what they can do with that. And, kind of related to that, mathematicians have proved that you can take a ball. You know, just volume one. One-gallon ball. And you can cut it in such a way that you can make two one-gallon balls. So you can make two out of one using math.

JOHN: That's cool.

AUDIENCE: So that's some other idea.

MATT: You like math now, boys?

AUDIENCE: I mean, if you think about it, math people do really cool things. There was a study once where they analyzed the language of King George and Kanye West. And they compared them. And this was an actual study, like they put time into it. So I thought that was pretty cool. But anyway, that's not what my pitch is about. And I'll just say it real quick.

Not going to show the video, because the sound is terrible. What I want to talk about in this video is just the question of is math real and true? Because what mathematicians learned in the 20th century, there was a young man named Kurt Godel who proved that--

ELIZABETH
CHOE: One more minute, guys, before we need to switch again.

AUDIENCE: --you can never prove if math is true or not. So the arithmetic we learned in school, we think it's true, because it's worked, but it may not be. There's no way to say for sure.

MATT: Wait, is Kurt Colonel the guy who made Kentucky Fried Chicken? No, it's Kurt Godel.

MATT: Oh.

AUDIENCE: I mean, I think it would be really cool if he did math and Kentucky Fried Chicken. That would be the best.

MATT: On Family Guy, he went to Kentucky to get chicken. And he's like, is whatever his name is that sounded like what you said. And he's like no, he's dead. And he's like the something. It was so funny.

AUDIENCE: I'll have to look and see now. Did any mathematicians open fast food chains? That's probably an interesting question. I don't think anyone's asked it before. But, that said, any thoughts on the idea? I'll get a thumbs up, thumbs down, or thumbs middle.

ELIZABETH
CHOE: Rotate.

AUDIENCE: All right. Thanks, guys. It was nice meeting you and enjoy playing or not playing.

AUDIENCE: I want an aha moment, a eureka.

PROFESSOR: I think you want to get away from instruction and more of concept. Right? So see if you can

think of a little narrower focus than in these big, big, big concepts. And that might help you with your next group.

GUEST SPEAKER: So some of them are pretty similar, like the robots?

PROFESSOR: Yeah. So we're teaching them. They're scientists, and we're teaching them how to make-- have you ever looked on cool videos? Have you seen Charlie the Unicorn, or you've seen--

GUEST SPEAKER: Oh, I've seen Charlie the Unicorn.

PROFESSOR: Charlie the Unicorn. Or maybe you've seen-- I used to work with kids your age, and they loved that one. It was about this little snail, Marcel the Shell. Have you seen that one? No?

Well, you see these little YouTube videos, and everyone's like, oh, that's cool. You've got to watch that too.

GUEST SPEAKER: Oh, like the 21 kid?

PROFESSOR: Which one?

GUEST SPEAKER: The 21 kid that says 21. Everybody in America says 21 now.

PROFESSOR: Oh really? Is that the it one you have to watch? 21?

GUEST SPEAKER: It's a Vine.

GUEST SPEAKER: And then they make it into a video. Or there's a series of shows on YouTube called ASDF. It's about this little stick figure.

PROFESSOR: Right, so you guys see them, and then you're like hey friend, you've got to see this too. And then you get everyone watch it, right? We're trying to make those really cool, short videos about science topics. Right? And so we're going to make them free, so that it also teaches people something while it's also cool and fun. And so what he's trying to figure out is what in his world of computer science would be cool enough that you'd be, like hey friend, you've got to check this out. It's really awesome.

GUEST SPEAKER: I think the hacker one would be good for people out age.

PROFESSOR: To understand how someone hacked your account?

GUEST SPEAKER: Yeah, but then you don't want kids to hack people.

PROFESSOR: Well, that's the fear, right? You don't want to end up giving kids instructions on how to hack, because I don't think the government or anyone else would probably like that. But that's a fear, right? It's just making sure that we're not actually giving instructional videos on how to destroy other people's credit cards.

GUEST SPEAKER: Google might be good.

GUEST SPEAKER: Because then you could just hack this ATM and get all the money.

PROFESSOR: How to protect yourself, like make sure your money's safe would be interesting to you?

GUEST SPEAKER: Like how to protect yourself from hackers, how to protect yourself.

PROFESSOR: How to protect yourself, instead of destroying someone else's something?

AUDIENCE: Yeah.

MATT: Yeah.

PROFESSOR: That's a nice way of turning it around.

GUEST SPEAKER: I have a question. So say if someone lost their wallet, and they had their credit card in there, and it can access to the bank. If someone found it, and the person to access, do they end up giving them the money?

PROFESSOR: Sometimes, and that's why credit cards are really good at-- do you know anything about this in your work, or no?

AUDIENCE: Credit cards?

PROFESSOR: Protecting credit card identity and all that?

GUEST SPEAKER: But don't they have your picture or something, so they know it's you?

AUDIENCE: But online, it's really easy to use another person's credit card if you know all the information.

PROFESSOR: I get called often from my bank saying, did you make this purchase, or did someone else? But that's an interesting thing for people who do a lot of shopping online. How do you protect yourself?

GUEST SPEAKER: If somebody else took your money, would you get that back or no?

PROFESSOR: That's why, if you catch it quickly with your bank, sometimes they can quickly stop it before it ends up getting charged. to you. But that's an interesting idea. How, if you're buying stuff on the internet, what's actually happening to protect yourself? What if someone did catch the person, and the person already used all the money, and you can't return it after that, did the bank end up giving their money to the person?

PROFESSOR: Do you ever wonder what happens when you type in the credit card number, and how the money actually gets where it needs to go?

GUEST SPEAKER: Oh, they track them down?

PROFESSOR: Have you ever wondered about how that happens? No, not really? You just care about getting your package in the mail?

GUEST SPEAKER: Does the ATM make its own money, or do they put it in?

PROFESSOR: Do they just put the money in there? Every country's different, but at least here, there is a central office that makes money. And then they just distribute it into different places. The ATM doesn't make the money. That's a good question. But, an interesting thing for you to think you think about is what within these topics more specifically? Because the hacking is a cool topic, but you're right It's a dangerous one. And we'd want to make sure we had the right angle, so that we're not accidentally giving sixth graders the tools to be able to hack into whatever account, right? That would be scary.

GUEST SPEAKER: Google might be a good one.

PROFESSOR: Google? Could be, right? How does Google actually work? How does it find your result? Like, if you want to learn how zebras have stripes, how does it actually give you an answer?

GUEST SPEAKER: Or how does something spread, like a virus? That's a cool idea, too. Something to think about. Keep thinking. You're on it. Good, good, good.

AUDIENCE: Virus.

ANDREA: And you are?

ANAMA: Anama.

ANDREA: Those are some really cool names.

GIANNA: Thank you.

ANDREA: And?

GIANNA: Gianna.

ANDREA: Gianna.

PROFESSOR: So, we're going to have to move a little quickly, because we've got two teams to talk about, so-

-

AUDIENCE: You can go first.

AUDIENCE: All right, introduction first. I'm a first year here at MIT. I like to study math, physics, and education. I've said it too much. And I'm going to just pitch the idea right away. Normally, I would ask you guys what you like. But the question that I would like to discuss in the video is whether math is actually real and true. And the thing is that mathematicians have proved that they can never prove that. So we can never know for sure if math is true. Even arithmetic, you know, it's worked for us so well. Two plus two is always four, it seems. But that may not be true. I guess that's kind of the question I wanted to address. And out of that it also comes, you know, can machines be smarter than humans? And can robots overtake the world? Just things like that, so any thoughts?

PROFESSOR: So those were three topics, right?

AUDIENCE: So that was one topic. All those questions kind of come out of that.

PROFESSOR: Those are big questions.

GIANNA: Are we supposed to say something?

PROFESSOR: What do you guys respond? Do you think any of those ideas that she mentioned are things that you would be like, hey friend, this is really cool. You've got to check out this video.

ANAMA: Mhm.

GIANNA: Yeah.

PROFESSOR: Which one?

ANAMA: The robot thing.

PROFESSOR: Would robots take over the world?

AUDIENCE: They're all related, you know?

GIANNA: I like the one that's like, is it true? Like, four plus four is eight. Is that true?

AUDIENCE: So, I'll tell you a secret. Even though we cannot tell that math is true, that's sad, that also means that robots cannot overtake the world. In case you were wondering.

GIANNA: It's still possible.

AUDIENCE: It's not possible.

ANAMA: I changed my answer. I'm changing it to math.

PROFESSOR: The math one? But you'll get to the math one through the robots one.

GIANNA: You know the answer?

AUDIENCE: Yeah.

PROFESSOR: Right? So do you have any other ideas, or was this the big ideas?

AUDIENCE: That was the big one.

PROFESSOR: So you think if she talks about the idea of could robots overtake the world, and through that she answers some of the questions about math being true or not true, that would be really cool?

GIANNA: Yeah.

ANAMA: I don't think robots could take over the world.

PROFESSOR: You don't think so?

AUDIENCE: They couldn't.

GIANNA: Wait, what about that weird robot with the face that's creepy?

ANAMA: I mean, you can smash them and they can break down.

GIANNA: But what if they try to smash you?

AUDIENCE: So, eventually we'll be smarter. Because that's kind of what a mathematician proved, is that a machine can never be as smart or do as many things that we can do.

PROFESSOR: I like the could robots take over the world idea with all this other stuff connected to it. I think that's a cool idea.

ANAMA: Do you know the show Lab Rats?

AUDIENCE: No, I don't. Well, there's these three humans who are also a robot thing. And they have all kinds of powers, because there was this guy that wanted to make them evil and take over the world.

GIANNA: They don't want Disney Channel.

ANAMA: It's not Disney Channel, it's [INAUDIBLE]. And then this person stole them to make them become heroes. But what if someone that invents a robot gives them all kinds of--

PROFESSOR: Powers?

ANAMA: Yeah, like a laser.

PROFESSOR: That's what she was saying, that robots can be really, really smart.

AUDIENCE: But not as smart as us. So I guess, eventually, we'll win if robots did decide to break down on us.

PROFESSOR: I want to make sure Andrea gets some time, so let's hear your ideas.

GIANNA: Do you guys have any tissues?

PROFESSOR: I'll go get you some. You keep going. OK?

AUDIENCE: I'm sorry about that.

ANAMA: That's OK.

ANDREA: So, I already know the answer for you. Are you going to have to have braces someday? Do

you know?

ANAMA: No. They're cool. They look cool.

ANDREA: You want them?

GIANNA: No.

ANAMA: Kind of.

GIANNA: No you don't. No you don't.

ANDREA: So how long have you had your braces?

GIANNA: Beginning of fifth grade.

ANDREA: So you've had them a while?

GIANNA: Yeah.

ANAMA: I don't even know if I want braces. Because you can't eat gum or anything like that.

GIANNA: Let me see your teeth. You need braces.

ANAMA: No, I don't.

GIANNA: Yes, you do.

ANDREA: So are you curious about what they do to your teeth?

GIANNA: Just make them straight, I guess.

ANDREA: Do you know how they do that?

ANAMA: Yeah, they put them together.

GIANNA: But I have two teeth up here.

ANDREA: And they pulled them down, right?

GIANNA: Yeah.

ANAMA: You had two teeth that were flipped up?

GIANNA: I had a palate expander, too.

PROFESSOR: Tissue.

GIANNA: And it made me talk like that, and I couldn't talk for a while. And it widened my jaw. I had to key it every night. It kind of hurt. You don't want braces.

PROFESSOR: What was it? I'm sorry, I missed it. What was your idea?

ANDREA: To talk about braces, basically what they're doing to your teeth.

PROFESSOR: Oh, that's cool.

ANAMA: Are they bad for your teeth also?

ANDREA: Are they bad for your teeth? That's a good question.

PROFESSOR: And why don't more teeth move back?

ANDREA: Why do my teeth move, and what happens when stuff gets in. I just got my braces off in October.

PROFESSOR: Good for you.

ANDREA: Yeah.

GIANNA: My dad has instructed me to get them changed every month, but it's been like three months.

PROFESSOR: So what's actually going on with your braces? That's a cool, very age-relevant relevant topic.

ANAMA: But instead of getting braces, can't you get that plastic thing?

ANDREA: Yeah, the aligners.

GIANNA: Do you have to wear a retainer? I

ANDREA: Have to wear a retainer.

PROFESSOR: I know one of my friends who had them, still wears this retainer.

ANAMA: Do you have to wear it every day?

GIANNA: If you don't wear it, they can get crooked again.

ANAMA: Every day for the rest of your life?

PROFESSOR: I am proof of that, actually.

ANAMA: For the rest of your life?

PROFESSOR: That if you don't wear your retainer, your teeth do go back.

GIANNA: Do you have to wear it in school?

ELIZABETH I had braces twice.

CHOE:

PROFESSOR: See?

ELIZABETH I still wear retainers at night.

CHOE:

PROFESSOR: And they give kids braces so young, now. You can be in third grade and have braces, whereas, when I was a kid, you didn't get them until high school.

ANAMA: Third grade?

PROFESSOR: Yeah. I've seen lots of little kids with braces. And you're like, your teeth are so little and you--

ANAMA: You have to wear retainers for the rest of your life.

PROFESSOR: For a while.

GIANNA: What about that thing that goes--

PROFESSOR: The headgear?

ANDREA: The headgear.

ANAMA: Oh, did you have to wear like that? That's so gross.

ANDREA: Willy Wonka?

ANAMA: It looks weird.

ANDREA: *Charlie and the Chocolate Factory*, where he wears [INAUDIBLE].

ANAMA: It makes you talk weird, too.

PROFESSOR: We're actually really good on time.

ELIZABETH OK, everybody, it's time to stop what you're doing.

CHOE:

PROFESSOR: I heard some amazing conversations. And you sixth-graders asked fantastic questions. We're just wrapping up. I'd love to hear from a couple groups of students, the sixth-graders. What were some of the best ideas that you heard all day, that you're like, I can't wait for the video to come out. I really want to watch it. And maybe hear any ideas that you're really excited about. Yeah?

AUDIENCE: The navy one.

PROFESSOR: The navy one? What about it? What did he--

AUDIENCE: With the torpedoes.

PROFESSOR: Torpedo. Interesting.

AUDIENCE: [INAUDIBLE]

PROFESSOR: The idea of watching things blow up is exciting to you? Yes. What else?

AUDIENCE: I liked the idea with the robot and [INAUDIBLE] talk and Wi-Fi and stuff and you can play with it and run around with it. I'd like to have seen it move.

PROFESSOR: So you're excited about learning more about robotics and how they work?

AUDIENCE: Yeah.

PROFESSOR: Anyone else have one?

ELIZABETH Gianna?

CHOE:

PROFESSOR: Yeah.

GIANNA: I have three.

PROFESSOR: Pick one. Pick your best.

GIANNA: I like the braces.

PROFESSOR: So you have braces, understanding what braces do to your teeth and how they work. That's cool, if you've got braces, so that would be interesting.

AUDIENCE: Someone said something about volcanoes.

PROFESSOR: The volcanoes, understanding if there's a volcano underneath your house. That was a cool idea. Is there lava under my house, right? Yikes. Sixth grade, any advice to our MIT students before they take your good feedback and turn them into videos? Anything you want to make sure that they know to do or not to do as they take your good ideas and over the next month develop them into actual movies?

AUDIENCE: Use picture ideas instead of talking to them, like show examples so they can memorize it.

PROFESSOR: So we talked about that, MIT students, yesterday, the idea of showing, don't telling, which I'm sure you guys talk about in your writing a lot, right? Showing, don't telling. Cool.

AUDIENCE: Don't ask too many questions, like when we watch one video and it asks a ton of questions. And we didn't really understand it.

PROFESSOR: You mean asking the audience question?

AUDIENCE: Yeah, like saying, what does this do? What does this do? If they're just saying one thing and then show it.

PROFESSOR: So asking your audience too many questions is annoying.

AUDIENCE: Yeah.

PROFESSOR: You first, and then you.

AUDIENCE: Be original.

PROFESSOR: Be original, so try and have a new idea. And what else?

AUDIENCE: While you explain how things work, try and make some jokes while you do it, so your audience

laughs at it and they understand what you're talking about.

PROFESSOR: Awesome. Last one.

AUDIENCE: Don't use a monotonous pitch.

PROFESSOR: Awesome. Change your voice around and make it more interesting. MIT students, I'm curious from you what was valuable that you got from the sixth-graders today, to give them some feedback about this experience. Did anyone get really good feedback?

AUDIENCE: Yeah, well, I found that-- and I should have realized this-- is that having robots stomping around and destroying a city is way more fun than showing old people doing math.

PROFESSOR: Robots are more than old people doing math. Huh.

AUDIENCE: I, too, learned that my tastes are different, that lava and volcanoes are a lot more interesting than food decomposing.

PROFESSOR: He wanted to show food rotting, and everyone thought that was not as fun as volcanoes exploding. Any other thing from the MIT students that you found helpful? Yeah.

AUDIENCE: I was kind of-- it helped me to know how much people in sixth grade know about some of the really complicated subjects that we're using, learning here.

PROFESSOR: Awesome. We had to do a conversation about sinking and floating and how do boats even work. It was awesome. Well, we can't thank you sixth-graders enough for coming here today. So helpful. Thank you.

[APPLAUSE]

And then, we'll be in touch with you guys to let you know how we get our ideas developed.

**ELIZABETH
CHOE:** And the videos that you guys made with me last month are almost finished. Carrie is almost finished with them today. So I will send those over to your teachers and you can watch them some time this week.

PROFESSOR: Any directions from teachers before they leave the room? And coming up next?

AUDIENCE: Nope, just make one long single line so I can count before you leave the building. And then I'll count you on the bus again.

PROFESSOR: Check for jackets and all of those things. But have a safe trip back home.

AUDIENCE: Did you say thank you?

AUDIENCE: Thank you.

AUDIENCE: Thank you so much.