Teacher: That's why I stay up until 3 o'clock.

Yesterday, we talked about the proton/neutron ... table. You can tell lots and lots of different things about it, right? We were able to draw the model of the atom, correct? Why would we have to do a model of an atom?

“student”.

Student: So, we know what it looks like, so we can do that.

Teacher: So, we know what it looks like, so we can do that?

Student: Yeah.

Teacher: Why can't I just look at it, so I know what it is, what it looks like?

[inaudible 00:00:46]

How come I can't just say, "Oh, yeah, look, there's the atom. I got it. I know what it looks like because I can see it. Bam!"

Student: You gotta look at these, I don't know [inaudible 00:00:57]

Teacher: You have to look at the block thing? The elements?

Student: The elements.

Teacher: Okay, but why do I have to draw a model of it? Why can't I just look at it?

“student”?

Student: It's easier to remember what it looks like.

Teacher: It's easier to remember what it looks like? Okay. Have any of us ever seen an atom?

Class: No.

Teacher: Why?

Student 3: Because they're really small.

Teacher: Because they're really, really tiny, right? Because you can't see them, we have to do models of them. Can you think of something that's really ginormous that has a smaller model of it because it's easier to look at it, maybe?

Student 4: Something that's bigger?

Teacher: Like what?

Student 4: A person.

Teacher: A person? But, I can see you. I can see what you look like.

Student 4: A really tall building?

Teacher: A really tall building. Sometimes we have really tall buildings, and they make smaller models of it, so you can get a better idea of what it looks like.

Student 5: The world.

Teacher: The world. Exactly, because [00:02:00] we can't really see our world. We can't, like, let me go back in space and, "Oh, there's our world!," right? What do we do, in order to see the world? What's the model of the world that we use?

Student 6: A globe.

Teacher: A globe. When we have something really tiny, like an atom, we have to make a bigger model of it, but when you have something ginormous, like the world, we have to use a smaller model of it.

Here's what we're going to do today. You're the three ...

... necessarily so great. If we have, where's the not-so-great one? This one kind of works. You guys are going to be designing your own atom. Now, what made this one not as great as it could be?

Student: The electrons are bigger than the protons and neutrons.

Teacher: Electrons are bigger than the protons and neutrons. What's wrong with that?

Student: The electrons are 1/2,000 of a ...

Teacher: The electrons are actually 1/2,000 of an amu. Which one of these particles is supposed to be one amu?

“student”.

Student: The proton.

Teacher: The proton. Can you even tell by looking at this which one is a proton?

Student: I think the green one.

Teacher: Well, either the red or the green. We're not sure. The green, maybe?

Class: Yeah.

Teacher: Why would you think the green?

"student".

Student: Because the purple looks a little big, and the green looks a little big, and the red looks a lot.

Teacher: Okay. What else?

Student: Because there's more reds than there is greens.

Teacher: Okay. It looks like there's more red than green?

Student: Yeah.

Teacher: I guess we could sit there and count it. This is supposed to be chlorine. There's supposed to be 17 protons and 18 neutrons.

Student: The red is the proton.

Teacher: Because you counted them, and there's 17 of them?

Student: I don't know.

Teacher: "student"?

Student: I think it's because usually there's more neutrons [00:04:00] than protons.

Teacher: Usually there's more neutrons than protons, right? There's usually the same amount or a little bit more. How do we figure out the neutrons again? You guys remember? How do we do neutrons? Let's say, I'm going to do yellow for my protons because yellow's awesome. That's going to be my protons ... The first thing you guys need to do is you need to give everyone a job: "I'll do the protons!" "I'll do the neutrons!" "No, I'll do the electrons!" Then, just make them. Now, you actually have two plates here. You can use one plate just to store your electrons ...

After you guys get your particles made, I'll give you an element, and you have to make it.

Student 13: What if we don't have enough particles?

Teacher: You should have enough particles from this Play-Doh. Definitely. As long as your protons aren't this big. Don't make your protons so ginormous that you don't have enough Play-Doh. Questions?

[crosstalk 00:05:02]

Okay, so, if this is a proton, that's a neutron? [00:06:00]

[crosstalk 00:06:02]

Student 13: What are you doing, “student”?

Student: I'm making [crosstalk 00:07:07]. She just said, just make as much as you can, and then, she said ... [crosstalk 00:07:16]

Student 15: Protons are the yellow ones.

Teacher: Why are the pink ones a little bit bigger? [crosstalk 00:07:29] Keep going because, right now, you only have four protons. The only atom you can make is ...

What are those? Those are protons. She's asking if those are too big. Are they okay compared to our electrons? Yeah? Okay. So, those are what? [00:08:00] Those are protons. Those are electrons. Those are neutrons. Now, what can you tell me about the [crosstalk 00:08:06]

Student 15: A little over one.

Teacher: It's a little over one. What does that mean when you compare that one to that one? How should it look?

Student: I think that one should be the neutron because that one's bigger.

Teacher: Okay. Your neutrons, now, are a little bigger than the pink ones. Those became protons, and those became electrons. Why does he have to change it?

Student 17: Because they're not big enough.

Teacher: Because neutrons are bigger than the protons. That proton next to you looks a little tiny compared to the other one. Not this one. Look at that compared to those. Yeah, put it down.

Looks like you guys have enough to get started.

[crosstalk 00:09:11]

Done?

Student: Nope.

Teacher: Come on. Got it?

Four neutrons.

Manu?

Manu: It's in family one.

Teacher: It's in family one. Families are this way ...

It has two energy levels. Good. How come it had to go to two energy levels?

Student 20: Because there was three protons in the first energy level, and it can only hold two. [00:10:00]

Teacher: Okay. The first energy level can only hold two electrons, so we had to go to a second level. We still got more from that one little box.

Student: Yeah, yeah, yeah.

Teacher: Really?

Student: Yes.

Teacher: “student”?

Student: It's not man-made.

Teacher: Okay, all hands started going down.

“student”.

Student: It's a gas.

Teacher: I thought we said, it's a solid?

Class: It's a solid.

Student: Oh, I'm looking at hydrogen.

Teacher: Yeah, it's the one right underneath it.

“student”?

Student: Not radioactive.

Teacher: Not radioactive.

Student: It's also left of the zig-zag line.

Teacher: It's on the left of the zig-zag line, which makes it a metal.

Student 22: It's not happy.

Teacher: It's not happy. Why is it not happy?

Student 22: Because the second energy level's not cool.

Teacher: Okay, the second energy level ... It's second energy level is not ...

Student 23: One extra.

Teacher: Are you sure? Nitrogen has seven, two and five.

Student 23: I'm thinking.

Teacher: Okay, you think about that, and get back to us.

Student 23: I got it.

Teacher: What?

Student 23: It's seven [inaudible 00:11:14].

Teacher: Oh, I see what you're saying, but there's only five on the outside for him to give. Would he give five away?

Student 23: Just stick together.

Teacher: Oh, so, maybe, they'll share?

Student 23: Yeah.

Teacher: Okay. Possibly.

Do not destroy your Play-Doh because you're going to need to make a new one. Aluminum.

Class: Aluminum.

Teacher: Aluminum. Make aluminum. [crosstalk 00:11:49]

[00:12:00] You need to make aluminum. Dallas, how many electrons do you need? How many electrons do you need? It's 13. [crosstalk 00:12:26]

Student 24: It's not filled in.

Teacher: The outer shell's not filled in, so what does it want to do?

Student 24: Mix with another element.

Teacher: And how is it going to do that? How's it going to mix? What's it going to do, probably?

Student 24: Share, or give away.

Teacher: Good. It's either going to share or give away that electron.

What I need you to do is I need you to take - tomorrow - I'm going to give you one atom, and you're going to make the ones I showed you, but a better model of it, not the junk one, like I showed you from the other tracks.

You need to take ...