TEACHER: See what she wrote on the board? Does that work with what you know?

STUDENT: Um…yes. Let me copy that one. Okay, so this and this are the same because if the side um, I mean yeah, side, side...can we prove that this and this are the same length?

TEACHER: Does that say side, side, side or does it say something else?

STUDENT: Oh, side angle…

STUDENT: Yes, side angle because look right there.

STUDENT: Yes and you can prove for all four of them. So...

TEACHER: Are all four of them congruent triangles?

STUDENT: Yeah because side angle side and this and side angle side for this; and these two are the exact same.

TEACHER: But do all those match up?

STUDENT: No, not these ones…this one and this one. This one and that one would be.

STUDENT: Why wouldn't this work then?

STUDENT: Ah, even if it did work, it would be different from this one because it's two different ones.

STUDENT: But what are you trying to say exactly? Are you saying that I have these marked congruent because I didn't change it yet?

TEACHER: So when you say side angle side, what does that mean? I mean, I know that you go side angle side but what does that mean?

STUDENT: Ah, it means that if you have whatever a set of…

TEACHER: You have two triangles.

STUDENT: It proves congruency.

TEACHER: It proves what?

STUDENT: It proves congruency.

TEACHER: Of the whole triangle, how does that match up? When we say side angle side, what are we saying?

STUDENT: When you have side angle side that proves the triangle looks like this. It's just going to be like this always if it has the same side angle side. And if this is side angle side also, that proves that…

TEACHER: It has side angle side also…I mean, every triangle - two different triangles – this triangle and this triangle. This triangle has a side, an angle, and a side; and this triangle has a side, an angle, and a side. Does that mean these two are congruent?

STUDENT: What I meant by that…I didn't say this but what I meant was that they have the same angle and the same side and I…

TEACHER: Okay, so my question is, does this triangle here...you said that this and this are the same but do they all have the parts that are exactly the same?

STUDENT: No. This angle is bigger than this one.

STUDENT: I know. I'm not talking about these two though.

STUDENT: Oh, I thought you were.

STUDENT: No, I'm talking about this and this.

STUDENT: Oh okay, that's what I thought. No. I thought at first...

TEACHER: I thought I heard at one time that all four were congruent.

STUDENT: Oh, no.

STUDENT: That's what I thought you said too.

STUDENT: No, that's not what I was trying to prove. It's just that I think you guys are getting confused because I had a congruency mark of one for all four sides.

TEACHER: So are they all one for all four sides?

STUDENT: No, I was just doing that…I didn't change it yet; I'll change it right now. Okay.

TEACHER: Are all four of those sides of that parallelogram equal?

STUDENT: No.

TEACHER: Then why did you mark them?

STUDENT: You marked it right there.

STUDENT: I did three, three and four, four.

CATHY HUMPHREYS: You could measure that for sure – that's true. And if you measured, you'd have um, an example of exactly one particular parallelogram. What you're trying to do is

show that no matter what angle it is, if it fits those criteria, if it fits those three criteria then it's a parallelogram. So what else do you know about parallel lines? What else besides…

STUDENT: They don't intersect?

CATHY HUMPHREYS: So have you heard about...remember the transversal things and those angles?

STUDENT: Yes.

CATHY HUMPHREYS: Okay, so would you refresh your memories about that because if you know what you need to show for parallel lines, you can kind of work backwards form there. Alright?

STUDENT: Are you sure this is right? So it would be…

STUDENT: I'm going to a get scratch paper.

STUDENT: Transversal is when the lines are parallel right?

STUDENT: Yeah.

STUDENT: So it's like this right? So...and then you have a line that intersects right?

STUDENT: Or there.

STUDENT: It would be right here right…so let me get it that way because then we could definitely get the transversal itself– the opposite interior angles are congruent and alternate angles are congruent; and the corresponding angles are congruent and then the alternate interior angles. You know what this rough sketch doesn't have to look great right? So does this angle equal this angle? And this angle would be equal to this angle right? From this we get that a measurement of both pairs of opposite sides are parallel and the opposite sides are parallel and the opposite angles are parallel. Yeah, so we have that the opposite angles are equal and that the opposite sides are parallel or equal. Well, they have to be. They kind of have to be because the distance between this and the distance between this would be the same. The distance can only be the same because these angles are the same. Right? These angles are the same so this is equal and this is equal. So we've got two and there's one left. The measurements of both pairs are equal – both pairs are equal and the opposite sides, wait. Okay, so both pairs of opposite sides are parallel and equal and the opposite angles are equal. We've got the angle pairs down but I don't know if we have the opposite sides right. How can we prove that…can we prove it using the transversal? The transversal is normally what you use to prove angles right? So what, how do we prove the...

STUDENT: The angles.

STUDENT: We did prove the angles with the alternating interior angle conjecture.

STUDENT: But we can't prove the sides.

STUDENT: Wait, what if we had an isosceles triangle? Remember the SAS like this? If the angles are congruent...

STUDENT: But we have side, side, and side.

STUDENT: Oh, that makes sense. So the same thing right? And this triangle – you have angle – these angles right?

STUDENT: So two we have...

STUDENT: I know, I know. So...and then SSS...no it wouldn't be SSS. It would be...

STUDENT: It would be AAA.

STUDENT: No. Remember when we had that one problem? It was like a large triangle and the triangle was cut into...it was like these guys – like this right and it was kind of like this – it was like this I think. Remember that? What was the conjecture of that proof? Didn't this solve this?

STUDENT: Is it the same thing?

STUDENT: It is the same thing. What is it?

STUDENT: It was SSS because they gave you the information and you had to mark it here.

STUDENT: And the only things we have are angles. We have two set of angles and AAA doesn't work.

STUDENT: Wait, we do have sides?

STUDENT: Why?

STUDENT: This one is congruent to this one and this one is congruent to this one. That's the midpoint of this diagonal and this is the midpoint of that diagonal.

STUDENT: Oh yeah, that's cool!

STUDENT: So now we have sides we need.

STUDENT: Oh, so now we have ASA, ASA, and ASA. So it proves that this is equal to this, which means that this is equal to this.