CATHY HUMPHREYS: So then let's go back here. I'm going to - the next step then is to prove what we are going to do. So we have to prove it's a parallelogram. Now on your tests we had a little trouble with proving. Um, on the test questions I used the word "show" and a lot of people just marked the marks on the figure, but did not go through a logical sequence of steps to show beyond a shadow of a doubt that the proof was true. So before we even start our prove though – what are we going to need to prove to show that it's a parallelogram? So what is a parallelogram? You have your definition sheets um, some of you do. What would be the definition of a parallelogram? What is? Okay, Drew?

STUDENT: A quadrilateral is two pairs of parallel lines.

CATHY HUMPHREYS: Okay, I don't think everyone could hear you, could you say it...even though you have a loud voice, I think some people didn't hear.

STUDENT: A quadrilateral is two pairs of parallel lines.

CATHY HUMPHREYS: Okay, that is enough for it to be a parallelogram. A quadrilateral with two pairs of parallel, oops, one "r" and then two "l's" – and Drew I'm going to use the sides instead of the word lines, okay. Alright, okay. So that's what we have to show. So how would we do that? Alright, so what I'm...I actually thought that was kind of a rhetorical question because what I want to do is I want to try to sketch this. So I'm going to sketch diagonals that are different lengths and they don't intersect at right angles; and they bisect each other. Okay, let's try to do this. So there is one length, there's another length – they're different alright and then I am going to…so did I meet all the criteria? What's the matter? Oh, thanks. Did I meet all the criteria? Yes, they intersect at their midpoints, so I have to show that. So this is going to be the same as that and that's going to be the same as that; they are different lengths and they are not perpendicular. Okay, so now I'm going to draw in my parallelogram. Okay, now with your groups I want you to see…um, do you have enough scratch paper or something to work on? Um, I don't need to collect this but what I'd like you to do right now is see in your group how would you make– it could be a paragraph style or two columns, but see if you could make a proof that those three things will guarantee a parallelogram. Okay, go.

CATHY HUMPHREYS: There was nowhere on this diagram that I showed that the diagonals were not perpendicular. How might I do that? How could I mark it on a diagram so that I would know that they were not all right angles? Okay Carmel, how?

STUDENT: By marking the two large angles with one hash mark and the other two too.

CATHY HUMPHREYS: Okay, okay. Like that? And then I could mark the other ones with that? Good, that is – that'll show that these two are congruent but they are different from those two. Excellent! And you know what, him pointing that out to me was really important because that shows you the level of detail that you have to have; you have to be careful that you don't forget

any of these things. So you have three things that you have to show. Alright, back to work now and see if you can do that.

STUDENT: And then if these two are congruent then these two are congruent because look side, wait.

STUDENT: You could also say…

STUDENT: Let's use a little piece of paper.

STUDENT: If these two are congruent then it would be like side, side to side.

STUDENT: Yeah but these two aren't congruent. It's like look, it's this, this, and this; and these are congruent and then these are congruent, you know? See, so if this is congruent to this then it's side angle– side angle right? And then if you start from here it's side angle side. So these two triangles – this triangle right here and this triangle right here are congruent. So if these two triangles are congruent then this is also side angle side and then side angle side. So if this triangle is congruent to this triangle and this triangle is congruent to this triangle then it's congruent; and the angles are congruent and if the angles are congruent…wait, did I just…we just proved that this triangle is congruent to this triangle and this triangle is congruent to this triangle. So what does that prove...how does that prove it's a parallelogram? We just proved that the insides are congruent. How do we prove that they have two sets of opposite– two sets of parallel lines/sides?

STUDENT: Well, aren't the alternate interior angles congruent?

STUDENT: Oh! Oh Yeah! Like see, this is the transversal right here and oh, okay. Wait, let's try writing a proof somewhere. Is it...are they...look, let's say this is the transversal right here, this diagonal right is the transversal.

STUDENT: But we don't know what these angles are.

STUDENT: But we know that we can prove the triangles are congruent right? So if this triangle is congruent to this triangle then all the angles inside the triangle are going to be congruent. So the alternate interior angles are congruent also. So then if the alternate interior angles are congruent then you have parallel sides – parallel lines.

STUDENT: So the same thing for this side.

STUDENT: Exactly, exactly. So there, there we go. Now we just need to write a proof.

STUDENT: How do we write it?

STUDENT: Okay, you write it. No, no. Say, let's name the triangles…triangle A, B, C and D.

STUDENT: So if triangle A is congruent to triangle B by side angle side conjecture then triangle C is congruent to triangle D through side angle side.

STUDENT: And then say if the triangles are congruent, all angles within the triangle are congruent.

STUDENT: So if all triangles are congruent then...

STUDENT: Try CPCPT.

STUDENT: What's CPCPT?

STUDENT: Congruent triangles are congruent.

STUDENT: Okay, so if CPCPT – all angles of triangle C are congruent to triangle D, and all angles of triangle A are congruent to triangle B. And then say that…

STUDENT: Should we give this one a name or something so they know which one is…

STUDENT: Look, angle one and angle two. So since angle one and angle two are congruent to each other – so say if all angles of a triangle are congruent then triangle...then angle one is congruent to angle two. If all angles of triangle C are congruent to triangle D then angle one is congruent to angle two.

STUDENT: What did you write there?

STUDENT: They have to be two different lengths because if they're the same length then it will be a rectangle or a square. Is that what we are supposed to do?

STUDENT: Yeah.

STUDENT: Then we are done.