Session Three
Conceptualizing and Representing Linear Relationships

Transcript: Polygon Problem First Lesson
Why is it Plus 2?

[$4\frac{1}{2}$ minutes]

19:42 Cindy: If I wanted to represent that in a generalized way for any number of triangles, how could I show that—how could I algebraically show this rule that I believe we have stated in words . . .

19:53 Cindy: Um . . . actually these are two different rules, aren't they? This one says we add one more—this one is saying there's an increase of two.

20:01 Cindy: Where is this pattern actually showing up on our chart? Casey?

20:05 Casey: In the perimeter.

20:06 Cindy: Yeah, we see that these are increasing by one, aren't they? OK—so if we could generalize this to a rule, what might that rule be?

20:16 Cindy: For . . . and I'm talking about this here—for any number of triangles that we put in a row . . . how could we find the perimeter very easily? Kristen?

20:25 Kristen: The how many triangles plus two would equal the perimeter.

20:30 Cindy: So if we said—say that again please.

20:32 Kristen: The triangles . . .

20:33 Cindy: So let's call it *T*?

20:34 Kristen: Yeah. Plus two equals perimeter.

20:38	**Cindy:**	Equals the perimeter. Equals the perimeter. This is our rule. Is there anyone that doesn't see where we got that rule from?
20:46	**Cindy:**	Because I have a question . . . and here's my question is—every time I added a triangle I was adding three edges, three sides.
20:53	**Cindy:**	So how come the rule is that we're only saying *T* plus two? That doesn't make any sense.
21:20	**Cindy:**	Am I the only one with that question? I mean that just—that seems to puzzle me. Nick?
21:05	**Nick:**	Because when you add, uh, two on and only one side is showing in your perimeter.
21:13	**Cindy:**	I'm not sure what you mean.
21:16	**Nick:**	Well, like see, uh . . . it gets closed off for the perimeter and that doesn't count there.
21:21	**Cindy:**	It gets closed off for the perimeter. What's getting closed off? Maybe if you'd come . . .
21:25	**Nick:**	The sides, the two sides.
21:27	**Cindy:**	Like here and here?
21:29	**Nick:**	No—the two . . . on one triangle the two sides get closed off.
21:33	**Cindy:**	The two sides where?
21:34	**Nick:**	In between.
21:36	**Nick:**	On the triangle.
21:37	**Cindy:**	This is the triangle.
21:38	**Nick:**	Yeah.
21:40	**Cindy:**	So this side and this side?
21:42	**Nick:**	Yeah.
21:44	**Cindy:**	And what about them?
21:45	**Cindy:**	So why doesn't this one count?
21:48	**Nick:**	Because it's not a perimeter because it's become . . . it became one big triangle.

21:52 Cindy: Oh, so these are being shared here—these edges are being shared as we add on?

21:56 Nick: Yes.

21:57 Cindy: Okay. So where is this plus two coming from then? Is that what you're saying—it's from this side plus this side?

22:04 Cindy: So the number of triangles plus two are these edges here? Chris what do you want to say?

22:08 Chris: I think that it's because you still have the top and the bottom sides.

22:13 Cindy: Can you come and show us?

22:19 Chris: You already have the bottom and the top sides and then you have to add two for the ends . . . is why you add two for the ends.

22:26 Cindy: Ah.

22:27 Cindy: OK. So you're saying the number of triangles is really our bottoms and our tops and then the plus two are your two ends each time so they're staying constant.

22:34 Chris: Yeah.

22:35 Cindy: Nick, what do you think about that?

22:37 Cindy: So is the plus two these two edges or these two edges or are both of those really the same thing? Just think about that for now.

22:45 Cindy: We're going to take this a little further. Lindsey, I'm sorry.

22:49 Lindsey: Shouldn't it be two plus four since there's two edges and each edge has two? So it's the amount of triangles plus four and that would be the answer?

22:57 Cindy: So you're wondering if this is *t* plus four . . . so the number of triangles plus four? And you're asking plus four because . . . say that again—I'm not quite sure . . .

23:06 Lindsey: Because there's two ends and each end has two showing.

23:09	**Cindy:**	So you're saying this end plus this end plus this end plus this end? How come it's not plus four because there's four ends? Can someone answer that?
23:19	**Cindy:**	Chris?
23:20	**Chris:**	Because it's—if you do it with cubes . . . it's the same idea and they're straight and then you have ends on each end.
23:28	**Cindy:**	Are you saying cubes or squares?
23:30	**Chris:**	Squares.
23:30	**Cindy:**	OK. Well . . . it's like I planted him here. I could pay you to ask that question here, Chris, because that's exactly where we're going to go.
23:40	**Cindy:**	Now, Lindsey, I'm going to leave you with that question but we're going to come back to it later . . . so that you have a good answer for it but this is where we're going to go with this.
23:46	**Cindy:**	So we play around with the triangles a little bit and we're pretty comfortable with the rule—we should probably try this rule. If we have one triangle and we add two—a perimeter of?
23:55	**Students:**	Three.
23:56	**Cindy:**	And two triangles plus two gives us a perimeter of?
23:58	**Students:**	Four.
23:59	**Cindy:**	And so on. So we're pretty comfortable with that.
24:01	**Cindy:**	Lindsey wants us to kind of think about why isn't it plus four. At your tables what you're going to play around with for the next—let's say ten minutes . . .
24:10	**Cindy:**	Uh, what would the perimeter be if we lined up one hundred squares in a row—one hundred pentagons in a row—one hundred hexagons in a row?