

## Module 1: Logic and Reasoning

### Topic 2 Content: Translating Verbal Arguments Into Symbolic Form Transcript

Hey, guys. Welcome to Geometry. This topic is going to focus on translating verbal statements into symbolic form. Again, your logic and your reasoning skills are going to come in handy here as we work our way through this lesson. Are you ready to get started? Let's go.

Just to warm you up on what I mean by *translation*, I'm going to take you to something that a lot of us are probably familiar with: text message lingo, or the shortcuts we use when texting one another.

*LOL*. I think I probably use that twenty times a day. What does it actually stand for if you want to translate it into a statement? What does it mean? "laugh out loud."

*BRB*. When you see that, what does that mean? I don't use that too much, but I've seen it a time or two. That's "be right back."

*SMH*. I remember the first time I saw that, I had to look it up because I wasn't quite sure what it meant. It means "shaking my head." That's what it stands for. Let's get that written out: "shaking my head." You usually send that little shortcut when you see something and you're just like, "hmm, I don't know about that." We use this text message lingo—a lot of us do—so that we don't have to write out completely what we want to say, just as a shortcut.

In geometry, we actually do something similar to that; we use symbols as a shortcut to longer things that we want to say. To be familiar with how to use the shortcut lingo, in geometry there are some symbols that you have to be familiar with. We talked about the arrow  $\rightarrow$ , which we learned with conditional statements. It means "implies," or that you have an if-then statement.

Another symbol that we dealt with regarding conditional statements is the tilde, or the "squiggle" because it's funner to say. When you see that, it means that you've negated a statement, or you throw *not* into the statement if it wasn't already there.

These three dots that look like they form the vertices of a triangle, they actually mean "therefore." When you see that symbol, it represents "therefore." It's typically followed by another phrase, like "therefore. . ."

This symbol here, it's known as the carrot, funny enough, and it stands for "and." When you see this symbol in a statement in geometry, it represents the word "and," which in geometry means a conjunction or an intersection of things. So that symbol "and" means you're intersecting some things.

This symbol, which looks like a  $V$  or the upside-down carrot, represents "or." That's the word it stands for in a statement in geometry. Its meaning here is disjunction or the union, just bringing everything together. Upside-down carrot: That represents "or" in geometry.

Let's actually practice translating some statements. You see here in this example, I've given you that:  $p$  represents "Angle A is acute,"  $q$  represents "Angle A measures 90 degrees," and  $r$  represents "Angle A is a right angle."

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And I've given you a statement here.

If Angle  $A$  is acute, then Angle  $A$  does not measure 90 degrees.

What we're going to do is use those symbols that we just reviewed. I hope you maybe wrote those down so you can keep track of what they were. We're going to translate these verbal statements, or these verbal arguments, into symbolic form.

Let me get my pen out so I can translate here. The first thing I noticed—and you can attack these a few different ways—but the first thing I noticed is that this is an if-then statement. Because it starts with *if* and I see *then*, I know that I'm going to have an arrow in here because we know when we have the arrow, we have an if-then statement. Let's see what else we have going on in this statement.

"Angle  $A$  is acute. . ." Looking up at our phrases here—"Angle  $A$  is acute"—well that's  $p$ . You see that  $p$  represents "Angle  $A$  is acute."

We see here, "Angle  $A$  does not measure 90 degrees." I noticed  $q$  is "Angle  $A$  measures 90 degrees," and we throw *not* into the mix. Remember when you throw *not* in there, or when you give the opposite of a phrase, it's the negation symbol that you need. This isn't just  $q$ , this is the opposite or the negation of  $q$ . So if I wanted to translate this verbal argument symbolically, it would be represented just like this.

Let's try another one together to make sure you get the hang of this. We're going to stick with our same phrases here. I think this time I'll switch to that blue color. Maybe not, I'll stick to black, I don't want you to think that the blue represents  $p$  here. You've got:

Angle  $A$  is not acute and Angle  $A$  is not a right angle.

The first thing that jumped out at me was *and*; that's the word right in the middle there. I remember *and* is my carrot—that was my conjunction—so I'm going to go and throw that in there first, that these phrases are joined together by the carrot, by *and*.

I see it begins with "Angle  $A$  is not acute." So Angle  $A$  is not acute—well,  $p$  is "Angle  $A$  is acute," and that's the opposite of  $p$ . I'm going to need the negation symbol and then  $p$ .

We finish out with "Angle  $A$  is not a right angle." As you all see here—"r: Angle  $A$  is a right angle"—I'm going to need the opposite of that. I'm going to need the negation symbol and then  $r$ , and there you go. You've translated that verbal argument into symbolic form. It's the opposite of  $p$ , or squiggle  $p$ , our *and* symbol, and then the negation of  $r$ .

Let's keep going. It's time for you to try one on your own. I'm going to give you a verbal argument. It's actually going to be three lines long. It's a whole argument. I want you to use the phrases that I've given you and use what you've just learned about those symbols, and I want you to translate it into symbolic form. Make sure you press pause and take a few minutes to get that taken care of.

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Let's see how you did here. I'll go ahead and switch to the blue; I just want it to stand out a little bit amongst this black text. I see here: "If Angle A measures 90 degrees." I see we're missing a couple of degree symbols here. The math teacher in me has to fix that. "If Angle A measures 90 degrees, then Angle A is a right angle." What I first noticed is that this is an if-then statement. I'm going to go ahead and start out by putting the arrow here. It begins with "Angle A measures 90 degrees," and I look, and that's  $q$ . It ends with "Angle A is a right angle," and that's  $r$ .

I see our second statement here: "Angle A is not a right angle." Well, I look: " $r$ : Angle A is a right angle," so that's the opposite of  $r$ ; that's the negation of  $r$ . "Therefore. . ."—remember *therefore*, those three dots? "Therefore, Angle A does not measure 90 degrees." I look up here: " $q$ : Angle A does measure 90 degrees." This is the opposite of  $q$ . To translate that verbal argument, you would need these three lines of symbols. Good job on that.

You've reached the end of this topic on translating verbal arguments to symbolic form. I hope you got a good understanding of how to use those symbols to make the necessary translations that you need to do. Bye.