

Module 4: Symmetry and Transformations

Topic 1 Content: Translations Transcript

Hi, guys. Welcome to geometry. This topic's going to focus on translations. Now, you touched on translations a little in middle school so it's probably going to be familiar to you, but what we're going to do now is use them on a coordinate plane. You ready to get started? Let's go. Okay. A translation is one of many types of transformations which just means that you're changing or transforming a figure in some way. Now, a translation specifically means to slide a figure. Its size and its shape remain the same.

In geometry, we call that isomorphic when a figure does that, when the size of it doesn't change, the shape of it doesn't change but maybe its position is actually what changes, which is what a translation is. We call the original location the pre-image, wherever the figure started and after you've performed the transformation, we call the ending location the image. Just to review because I know you've touched on translations before, that's what a translation is. It's just a slide. Now, what we're going to do now in geometry is perform translations on the coordinate plane.

Here we're asked to graph the image of triangle ABC for this translation. We're given a rule here. What this is telling us, how we interpret this rule is for every vertex, every coordinate x, y , we're going to move x 4 units and we're going to move y 1 unit. Now, the plus sign, what that means, as you know, the x -coordinate runs left to right. When I have plus when I'm adding for my x -coordinate, that means I'm moving to the right. If I've been subtracting for my x -coordinates, I would have been moving to the left. Then for the y , so you know the y -axis runs up and down, right? If I am subtracting for my y -coordinates, I'm moving down, and if I'm adding, I'm moving up.

For this problem, what we're being asked to do is to take each vertex, all of our vertices, and move those 4 units to the right and 1 unit down. You might actually want to write that down just to help you keep it straight. What I'm going to do here is I'm going to write that little note to myself right here in red that I need to take every point and move it 4 right, 1 down. Now we're just going to move each vertex and then we're going to graph the image, okay? In theory, we've moved every point when we've done that. Let's put that ... I'll go ahead and put that in red also so it stands out.

I'm going to take A 4 to the right, 1 down. 1, 2, 3, 4. 1 down. Here's the new location of A . So that you know it's the new location, that that's your image, we use the notation prime, which looks like a little apostrophe, so I know that's the starting position of A . This is the ending position of A . A prime, that's how we say that. Now, we'll take B 4 to the right, 1 down. 1, 2, 3, 4. 1 down. Here's B prime. Then same with C . 1, 2, 3, 4. 1 down. Here's C prime. Now I'm going to freehand this so I'll just get it as straight as I can.

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There is the image of triangle ABC under that translation. You see how we interpreted the rule? We made little notes to our self and then we just performed the operation, all right. How about you give it a shot? Go ahead and get that graph paper out or press pause if you need to make a note of where all your new vertices are and see how you work your way through this one. Press play when you're ready to check your answer. Let's see how you did here. The first thing I'm going to do is interpret this rule so x minus 3, y plus 2, so that means 3 left. I hope you have room right here. 3 left, and y plus 2. That's 2 up. Let's take each point, move it 3 left, 2 up.

Let's start with the D . 1, 2, 3. 1, 2. Here's D prime. Okay, now E . 1, 2, 3. 1, 2. There's E prime. Then F . 1, 2, 3. 1, 2, and there's F prime. Then I'll just freehand this, making it as straight as I can and there you go.

You can see it visually, how it did slide from one position to another, but using the correct vocabulary, in geometry, we call that a translation. Triangle DEF was translated 3 units to the left, 2 units up. Okay, take a look at this one. Here we've already had the translation occur. We're being asked to find the rule. We have to actually figure out: How did this figure translate?

Now, what you want to do here is first, you want to be able to differentiate your pre-image from your image, so the original figure from where it ended up. Remember, the image always has the little apostrophes, right, that prime notation. I see on the figure to the right, this has those apostrophes, it has the primes so this is my image. This is where I landed. That means that this figure on the left, this is where I started. Now, what you want to do is just pick 1 of the points because they all move the same way. Just pick 1 point and follow it to where it landed. Let's see. Let's make sure I've got that in red ink. I just want it to stand out for you. Here it looks like ...

I'm going to follow C . C moved 1, 2, 3, 4, 5, 6 so it moved 6 units right. Okay, let's get back there. 1, 2, 3, 4, 5, 6 right and then it moved 2 up. 1, 2. Now what I need to do is translate those words into actually writing that rule algebraically. Let's get some more space here. Let's scroll down a little. All righty. There we go. Every coordinate, so x , y . We said that every point moved 6 units to the right, so remember, moving to the right, you're adding to x , so x plus 6. Then every coordinate also, every point moved 2 up, so y plus 2, okay, and you've got it. You wrote the rule.

All right, how about you try one? Go ahead and press pause. Take a few minutes. Work your way through this one and when you're ready to check your work, go ahead and press play. Let's see how you did here. Remember the first thing you want to do is differentiate your

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Topic 1 Content: Translations Transcript

pre-image from your image. I see this is the figure with the prime notation, those apostrophes, so this is the image. This is where I landed. This is my pre-image. This is where I started. Now I'll just pick a point to follow. This time, I'll follow M . M moved 1, 2, 3 left. I'll just make a note of that. 3 left. 1, 2, 3.

Then it moved 1, 2, 3, 3 down. 3 down. Now I need to write this, these words algebraically so I can show you the rule. All righty. For every point x, y , move 3 left, so remember, moving to the left, that's subtracting from x , so x minus 3, and I move 3 down, so remember, moving down, that's subtracting from y , so y minus 3. You've got it. You've written the rule. All right. Great job, guys. You've reached the conclusion of this lesson on translations. I hope you saw how your prior knowledge made its way into geometry, but this time those translations were on a coordinate plane. Bye.