Module 11: Constructions

Topic 2 Content. Constructing a Line Parallel to a Given Line through a Point Not on the Line Transcript

Hi guys. Welcome to Geometry. In this topic you're going to focus on how to use the compass and the straightedge to construct a line parallel to a given line and through a point not on the line.

Now your knowledge of angle relationships is going to come in handy for you during this topic. If you're ready to get started, let's go.

Okay. Here you've been given a line and you see we have point A that's not on the line. Now, what we're going to do is we're going to see how to use the compass and the straightedge to construct a line that's parallel to this line and that also passes through point A. And it's going to be angle relationships that really help us see why this is true. Okay?

All right. The first thing you're going to want to do is you're going to want to take your compass and you're going to want to sketch a line, or draw a line that passes through point A and that also passes through your given line, okay?

And I'm going to slant mine just a bit. You don't have to slant yours, but a lot of times with these kind of constructions you'll see the line is slightly slanted. And when we finish I think you'll see why. Okay, so I've got that line and I'm going to go ahead and darken that point of intersection.

Now, what I'm going to do is I'm going to take my compass, I'm going to line up the center of that small circle right at the end with that point of intersection right there at the bottom, and I'm going to make sure ... I'm going to set my compass width really to whatever I want, just make sure that when you envision yourself drawing that arc that we're going to draw, that it's wide enough to pass through that line that we just drew and that line we were given, okay? But at the same time, you're going to want to make sure that arc is below that given point, okay?

I've got my compass width set at a pretty good length, pretty good width. I'm going to swing it up and then I'm going to arc with the right hand. Notice I intersected the line that I drew and the given line and I'll go up to the point I was given, I'll swing that up again and I'll arc. Okay?

Now, notice that, if you can see here, my arc almost miss my line and sometimes when you're working on the constructions that may happen, so what I'm going to do, I'm just going to trace over a little more to darken that arc just a little bit, and I'm going to take my straightedge and I'm going to extend my line just a bit. And it's fine to do that when you're working on the constructions, because as you know, if this is a line that extends to infinity, so this is still true, so let's extend that just a bit. Okay.

Now I'm going to darken that point of intersection between my arc and my line. Now, notice when we drew this arc, that we created an angle right down here at the bottom. And what I'm going to do, is I'm going to create an angle congruent to this angle at the bottom, right here at the top. Okay?

And let me show you what I mean by that. I'm going to take my compass, I'm going to line it up right over that point where this arc intersects that line and I'm going to set the compass width to the width of that angle, okay? So the width of my compass is set to the width of this angle. Now I'm going to go up hereto this point of intersection, hold my compass steady right there and I'll arc. All right?

Notice our arcs intersected right there. I'm going to take my straightedge, line it up as perfectly as I can so I can get it as accurate as I can make it and I'm going to draw a line that passes through point A and passes through that point of intersection. And there you go. So what you've got here is you have a line that's parallel to your given line and that passes through point A. And the reason that we know that this is true ... I'm going to switch colors for a second here ... is when we made sure to construct this angle up at the top that's congruent to this angle here, down at the bottom, we guaranteed that we had corresponding angles that were congruent.

Just to roughly sketch this figure, we dealt with it a lot of times throughout the course. We guaranteed that we had corresponding angles that were congruent, so that we would know that we had lines that were parallel. And that's what guarantees that this construction is true. When you force your corresponding angles to be congruent, you have two lines that are parallel and that initial line that we drew, that was our transversal. All right?

Okay, good job working through these steps to justify that and working through the steps to actually complete that construction.

All right guys. We've reached the conclusion of this topic on how to use a compass and a straightedge to construct a line parallel to a given line that passes through a point not on the line.

I hope you saw how your knowledge of angle relationships helped you get through this topic. Bye.