

Teaching Mathematics with Technology (TMT)

Video Transcript - Construction Protocol

Opening Webcam

Hello, and welcome to the fourth week of the **Teaching Mathematics with Technology** course. In this video, we will learn about construction protocol in Geogebra. I will open a Geogebra file that I have constructed, on my Ubuntu GNU/Linux system.

Geogebra construction

Here you can see a parallelogram. I have constructed this parallelogram using *sliders*, *textbox*, and an *input bar*. Sometimes, when you see a Geogebra file, you might have this question- I wish I knew the steps for constructing this Geogebra file so that I could also follow and try to do the same thing, and thereby learn how to construct. Well, the good news for you is Geogebra stores the steps for construction within the file itself, and so every file of Geogebra has a secret of how it can be constructed. To unravel the secret, you need to click on *view* and select *construction protocol*; to repeat, go to the *menu bar*, click on *view* - within *view* you have this option called *construction protocol*.

When you click it, Geogebra opens a construction protocol which is nothing but the series of steps that are used for constructing this particular Geogebra sketch. You can see that this construction protocol has the steps numbered 1, 2, 3, 4, 5... shows the entire sequence of steps. In this particular file, there are 38 steps, so in the bottom, you can see 38 by 38. So this bottom panel if you see is very much like a music player, you can go to the first song of the entire sequence. So here you have a blank Geogebra screen which is the first step being done, which is *constructing a text box* which is a heading for the Geogebra file and I can go step by step by clicking on next, next step, pretty much like listening to the next song in the next track, in the series in the playlist. You can click on the last to go to the last step in which you will see the entire Geogebra file constructed, or again you can go back to the first step anytime you want to play the series of steps again and again.

So this way you will be able to get the series of steps that are required for constructing the sketch. Let me show a few steps- so the first step is already shown on the screen which is *creating a text box* and the *value* is also given on the column under the column *value construction of a parallelogram (sliders text box input bar)*. When I click on *play*, it shows the next step which is creating a slider. The construction protocol says this is a *slider* of type number, *the name of the slider* is *side1* and the *value* is 24. When I click on next it's showing me the next slider called *side2*, which is also a number slider with a value of 15. Then I have constructed an angle slider and the angle value- the *slider value* is 110. Then I have selected *point A* and constructed a segment of a

given length, where the value of the length is coming from the slider. This way if I keep on clicking next, next, next I can see that the Geogebra file is being constructed step by step.

I have also opened Algebra view so you can see the same steps; the construction steps are also reflected in the Algebra view as well. Now you may want to not advance this step by step yourself manually, you may want to play it automatically, somewhat like the auto playlist of a music player. That option is also available, let me go back to the beginning- I have clicked on the first left extreme box which is helping me get to the first step and I can see that there is something called *play* here. I will increase it a bit so that I can see the screen more. It's also giving me the *interval* for playing the Geogebra file and here I have got two, which is two seconds; two seconds is reasonable. So if I click on *play*, Geogebra will automatically play step after step over the construction with a two-second gap in between; and I just need to sit and look at the construction steps being played. And this will help me to get an idea of how the file has been constructed and how the Geogebra sketch has been constructed.

I can also use it to demo the steps of construction to students so that they can get an idea of it. I can also *export* this entire construction protocol as a *web page*. So I'm going to pause. So to do that you need to go on top of the construction protocol. If you see the third left icon from the top, if you click on it, it will export the entire construction protocol. You have to give the *title* of the page as well as the *author name*, then when we click on *export* it will create a *HTML file*. This *html file* will give me the steps of construction and I can print it out and actually use it for constructing as well. So, in this way, the construction protocol helps me to understand the steps of constructing any Geogebra file.

Closing Webcam

In this video, we explored how to use the construction protocol to understand the steps used to create a Geogebra file. We can also construct a Geogebra file and play the construction protocol in our classroom to demonstrate the lesson to our students. Do download Geogebra files from <https://Geogebra.org> and use the construction protocol to study how they have been created.