

## “Fun with Flags” Webinar

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### Video Transcript

Welcome everybody to Friday night "Fun With Flags". Thanks so much for spending some time together to learn about geogebra for geometry and graphing. My name is Kelly Remijan. I am a PD and curriculum specialist with the Illinois Math and Science Academy.

And this is a little webinar that's going to be 19 minutes or less to give you some information that will help you to learn about geogebra and to hopefully to have a chance later on to explore and always you can follow up with me at the end of this presentation or we could do one-on-one Zoom meetings also following this presentation.

This webinar is being recorded and the recording will be available online by Tuesday. So just some housekeeping issues that we have again the webinar is being recorded and we have all the participants muted with their video turned off, so we can focus on the presentation, but if you have questions please type those in the chat box and I will make sure I address those questions following a presentation. If you do not get all of your questions answered, please feel free to contact me by email or you can also set up a one-on-one Zoom session with me or one of my teammates from the Illinois Math and Science Academy Center for Teaching and Learning. All of the PDFs, there will be a PDF for the directions of this presentation as well that will be shared with you in the chat. I'll provide you with links that you can access. The Illinois Math and Science Academy is a publicly-funded. Illinois institution. The Center for Teaching and Learning provides outreach to educators across Illinois and beyond. So this is one of the activities that we are doing with webinars throughout April and we will be doing May as well.

So in this webinar, you're going to discover how geogebra can be used in geometry specifically we're looking at areas through the use of flags and we will also be looking at how we can use geogebra when an algebra with writing linear equations and graphing those lines as well. So, I'm going to show you some examples. We will do an overview. You will learn how to insert images, how to find area, how to graph, and also then be encouraged to do some exploring on geogebra of your own. So, flags are a great way to incorporate other subjects into math class. And there's all kinds of different flags that you can try on your own. You can have students explore, but we're going to be focusing on this this flag here and so you can ask students if they know what country this flag represents and if they don't, they could go and research that and then determine what what country it is. Once that flag is determined there's lots of flags online, that they could use to use geogebra. But for us, we're all going to use the same example as flags that are online come in different sizes. And so for this particular example, we're going to use a flag that we could get from Britannica.com. And I'm going to go through with you kind of the steps that you would take that you could do in a Zoom session with your students, that you could video chat with Screencast-O-Matic and you could send to your students through a link or you can have your students explore the program and and have them explore different flags and replicate after watching your videowhat activity we're going to be doing here first with area.

So, And I always recommend saving an image which is temporary to the desktop. And once we've done that, you can also follow along here tonight if you hit escape on your keyboard that will minimize your screen and you can always pull up another screen if you like, but again I will give you instructions on how to do everything if you just want to simply watch and also you will have the video later as well so you have both types of resources to refer to So you can go to [geogebra.org](https://www.geogebra.org) and this is a dynamic software that it spans grade levels that you could do. The activity we're doing today could be done in 3rd grade all the way up to geometry in high school. And then I'm also going to show you another activity that primarily focuses on eighth grade and ninth grade pre-algebra and algebra classes. So once you go to [geogebra](https://www.geogebra.org), you're simply going to go to working to go to geometry in [geogebra](https://www.geogebra.org) has lots of different apps that you can use. But we're going to focus on the geometry app. So what I'm going to do is I'm going to give you I'm going to show you an example of me working with a third grade student via Zoom and this is a video that was recorded within zoom and it's saved as an .mp4. And so I insert this into my PowerPoint and I'm going to show you this to give you an idea of how to work with students when we are working with students online. Here we go.

Are you there? Yes. Can you share your screen with me? Yes. Right here, Awesome! All right, now that we're at [geogebra.org](https://www.geogebra.org), under "more apps:", you're going to see "geometry" and I want you to click that. Awesome! Awesome! Now on the left side of your screen, you see like a blue or purple bar. Go ahead and click the word "more". And you're going to scroll all the way down to where it says "media". And you are going to click "image". And we're going to choose the file that we had saved earlier. So go ahead and click that. And you're going to find the file you saved. Go ahead and click that and "open". Excellent! And hit "okay". Fantastic! Now we're going to put this flag on a grid. Also has a coordinate point. You're going to click that "settings" button again which looks like a wheel. You're going to click "show axes". Excellent! Now, we're going to click that settings wheel one more time. And you'll see under "show axes", it says "show grid". Again, click that "show grid". You're going to click "major gridlines". Awesome! Awesome! Awesome! Now, we want to move this flag so it's in this upper right quadrant so I want you to click the flag and move it over so that it's bounded by this vertical line on the sides. Is the dot supposed to be in the line? Just like that. Perfect. Awesome! Awesome! Now, before we go any further, I want to change the view of our our grid. I want you to click the open screen and I want you to click and drag to the left. And then bring it down. Excellent! Now go ahead and click point B. Point right here on the right bottom part of the flag. There's a I Now I want you to if you can right-click little point. You're going to click it and you're going to drag it until that points on the 12. Excellent! So now our flag which is a rectangle is 8 tall and it's 12 wide. Now I want you to if you can right-click, that flag. Oops! Left click that flag. And you are going to see a teardrop. Go ahead and click that teardrop. And we want to toggle that little circle there so that it becomes. If we do that we can't see it. So this is a transparent button. It makes our flag a little lighter. How about we make it a 40? Fantastic! How do we find the area of this rectangle? Do we go to this calculator?  $8 \times 12 \times 12$ . And we can figure that out using our multiplication skills, but we're going to use the computer to check and see if our calculation is correct. In a population would give us 96. So go back to where you were. All right. I want Oops! Go back. So, we're on this little icon. Cover over this icon for me up here. Just hover over it. All right. So this is a "tools" icon and I want you to move your your cursor over the word "polygon". Click that polygon. Excellent! Now, I want you to take your cursor and click this point by a. Then move it over and click the point by b. And up. To the other vertex of this rectangle. Excellent! And then to the other vertex of the rectangle. And

then down to point a. Fantastic! Now, the computer will tell us what the area of this rectangle is. On the left side of your screen again, over here where that purple bar. I want you to move up so you can see where it says "measure". See where it says "measure" and I want you to click "area". Now, click your flag. Excellent! So this is what we calculated by doing it by hand.

So we could do this process if we wanted to find the area of the triangle or the area of the parallelogram. We can always find the area of any polygon. So this gives you an example of working with the student one-on-one. You can work with Zoom sessions with small groups. You could do this with other flags and as I mentioned other polygons. You can have students explore their flags of other countries that interest them. Now that we've looked at area with geometry now we'll take this flag and extended it into algebra specifically with graphing linear equations. And I'm going to show you a little video here of me walking through students at least process. [video] Geogebra with geometry specifically with area. We can next look at how we can use geogebra with graphing. Focusing on algebra. Before we get started we're going to undo this polygon that we created. And to do that, we're simply going to use this move tool on your basic tools. I'm going to click it. And then I'm going to click Point d. Going to... trash it. Delete it. Click C. Deleted as well. I'm going to keep points A and B. So, what I have is my original flag. Which I created as an 8 X 12, an enlargement of that flag. I'm going to click this open screen. And I'm going to I can move that screen around as long as I'm clicking the screen. And I'm going to take this flag. I'm going to click the flag and I'm going to move it two spaces to the left. And also then going to move it this place two spaces down. Here you could talk about the domain of the flag being from -2 to 10 or the range being negative 2 to 6. We can use this concept of a flag to help students practice writing the equations of lines based on a visual. In this case, equations that make up a flag. So, to do that we're going to go over to the blue strip blue or purple strip. You see here. We're going to click this picture that looks like a calculator and when you hover over it it says this is an algebra calculator for algebra. So, we click that calculator. And I'm going to write the equation for the vertical line which is  $x$  equals negative 2. And you can see that it shows up right at the edge of my flag. The right side of this flag would be  $x$  equals positive 10. And next I can do the upper and lower edges of my flag. The upper boundary being  $y$  equals 6. I'm just using the keyboard. I'm just finding the  $y$  in the numbers on the keyboard. However, we can use a keyboard within geogebra by clicking this image down in the lower left corner which gives you a keyboard specific for geogebra. And I can type in my numbers or my variables and other symbols using that keyboard. If I don't need it I'm just going to exit out. So, for my lower boundary of my flag, the side on the bottom that's going to be  $y$  equals. -2. And for this example, we're not worrying anything about restrictions on these lines making a line segment. It's a good practice tool to have students create the equations for these lines and then they can test and see if those equations are, in fact, correct. Next, we're going to do our upper oblique line, which has a  $y$ -intercept of 0 and a slope of 1. So I'm going to do  $y$  equals  $X$ .  $X + 0$ , or just  $Y$  equals  $X$ . And then I'm going to do my next oblique line, which if I follow it down, I can see that it would eventually cross the  $y$ -axis at 0 negative four. We have  $y$  equals  $x - 4$ . Again, this tool is a great way to incorporate flags. Also using technology specific to geogebra and bringing in the idea of flags, which makes students more globally aware. We can connect the lesson to history or geography or social issues. [end of video]

So again this is a great example you could talk about functions, lines that are functions, lines that are not the equations, about a vertical line. You'll see that geogebra says that their equations the lines that are functions have these function notation letters in front. If you have questions, I want to make sure you

have a chance to ask those. Again, you have some time here to see what kind of questions people have. I'm looking here I. I just a comment privately from a person so I appreciate those comments as well.

I'm looking to see if anybody has questions. As people are thinking about that, just some ideas for later. You could have students work with other flags. You can have them explore. One question has come up in the past from from a teacher was how can we rotate or how can we reflect this flag? You can pose those questions to your students and have them figure that out. How do we graph shaded regions? Geogebra does so much and there's a lot more that we can do with the concept of a flag. If you have questions later, again you can email me. If you play around with geogebra on your own, please share those discoveries or share those things that you've done via Twitter, and you'll see my Twitter handle. That's available for you as well.

A question came up, which is a fantastic question, says what happens if they're equation is incorrect? Fantastic question. If their equation isn't right, then they'll see as soon as, we'll see it immediately that their line doesn't match up on the graph and so that requires them to re-evaluate and to enter in a different equation and basically they can keep changing that equation until they get the right equation that matches the flag. That's fantastic.

Another question came up with. Can you play curves in addition to lines? Yes! Geogebra is awesome! You can do conic section. You can do think about flags with Japan. Japan has a circle, so you can have students write equations for a circle. You could also get into inequalities, so we just focus on linear equations, but there's so much more more that we could do. Within my PDF, you'll see other sources that you can refer to as well as some other notes. There's other webinars coming up on Monday. I have my teammates doing various webinars that you can take a look at. And there is the link there in my notes that you can refer to to access all of the different webinars coming up.

Again, talking about "Ask a Specialist". We really want to help all of our teachers throughout the state of Illinois and beyond. If you have questions, please feel free to email me. I hope these 19 minutes were beneficial to you. If you have a chance, please feel free to provide feedback using the hyperlink the link to the post webinar survey. Thank you so much for attending. I hope to hear from you via email, Twitter, or through our one-on-one "Ask a Specialist". Have a wonderful night.