

"Travel the World Thru Flags: Desmos, Equations, and Inequalities"
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Video Transcript:

Thanks so much for joining us for "Travel the World Through Flags: Desmos, Equations and Inequalities." My name is Kelly Remijan and I am a PD and curriculum specialist with the Illinois Mathematics and Science Academy also known as IMSA.

A few housekeeping issues before we get started this evening. This webinar will be recorded and we ask that all participants be muted with their video turned off. If you have any questions at any time, please feel free to type those questions in the chatbox and I will address those questions at the end of the presentation.

If you have more questions or need help after the webinar, please feel free to email me and we can meet one-on-one through a Zoom help session or you can also make an appointment with IMSA's "Ask a Specialist" expert, an

initiative that we have where you can sign up at the link that is provided on the screen. You also have access to a PDF of this presentation and a recording of this webinar will also be available online as well.

IMSA, or the Illinois Math and Science Academy, is a publicly-funded institution in Illinois where the Center for Teaching and Learning conducts outreach to teachers across Illinois and beyond.

In this webinar, you will discover how equations and inequalities, specifically their graphs, can be used to create flags in Desmos.

Desmos is a free online graphing program, and we'll walk you through the steps here on how to insert, resize, and share an image, specifically an image of that of a flag, learn how to graph equations and inequalities, and you'll learn how to restrict domain and range.

As a math teacher myself, I have developed different activity-based problems within my algebra classes that had revolved around flags. So what you see here is an activity involving three problems that pertain to three different countries within Africa. And you will have access to this handout to download if you like to utilize this with your students immediately right after this webinar. The link that you'll see is provided and you can access that and download it and share it with your

students.

But, in this particular activity, what I will be showing you here is how you can actually create flags with Desmos and then how students can use those flags to test their own graphing skills or they can also create their own.

flags,

flags for other countries, or just flags that they are creating maybe for their for their own city or a flag for their school.

So to create a flag in Desmos or to utilize a flag in Desmos, you're simply going to go to Desmos.com and start graphing.

Now you can actually work through this

webinar with me or, because you have access to this webinar later, you can simply sit back and watch and later on, then you can

play this webinar, pause it at different points in time, and then work through this webinar trying Desmos

for yourself at your own pace.

So, once you find a flag that that you like,

What I recommend that you do is save it and then you're going to be able to

go to Desmos and you're going to add that image to a coordinate plane.

Because all flags have different aspect ratios, you can change the width and height, to make it appropriate to your flag.

Here, I'm going to change my flag so that it is consistent with its two to three aspect ratio, which in this case, is the flag for the Republic of the Congo.

And it's 12 by 18 here.

You can then share this flag by clicking "Share Flag" and you can copy the link that is created through Desmos. And then once you have that link, you can insert it into a handout or you could email it to a student especially if you are teaching remotely.

Now, once students analyze that flag, they can develop the equations that will model or recreate that flag.

So for this particular flag, students can identify the upper and lower portions of the flag, which are horizontal lines.

Y equals 6 and y equals -6.

They can do the left and right vertical lines that make up the flag. $X = -9$ and $x = 9$. And they can also do the oblique lines

identifying the y -intercept as well as the slope.

Finding out then that would be $Y = x$

+ 3.

Noticing that the other oblique line is parallel to it having the same slope of a different

Y intercept.

Now once students make the lines, you can take this a step further. And this is where Desmos I think is awesome because you can then restrict the domain or range for your different, in this case, lines. So to do...

To restrict the domain and range all you're going to need to do is identify those restrictions for $y = 6$. I it's restricted between

an X value of -9 and an X value of 9.

And those restrictions can just be entered in in set notation or with braces.

As X is between -9 and 9. Or $y = -6$.

The restrictions are going to be the same.

So I can just copy and paste.

And then for my vertical lines, this time my

range is going to be restricted. I no longer wanted to go from -infinity to +infinity, I wanted to be restricted from a y value of -6 to a y value +6.

And the other vertical line will have those the same restrictions for y .

Now for our oblique lines,

we can restrict either the domain or the range and, in this case, I'm going to restrict my x values

so that my x values are going to be for this oblique line,

going to be between a -9

and...

$+3$.

And again, to restrict, I just put those restrictions

within braces or within set notation.

For my other oblique line, I'm going to restrict my x 's,

so that it goes between -3

and $+9$.

So that changes my line.

from having a $-\infty$ to a $+\infty$ domain

to the domain that's going to create a line segment.

Now besides looking at the flag for the Republic of the Congo,

we can move on to another flag. And this time having students create the flag

being given certain inequalities.

And then once they make the graph, they can then identify the country that this flag represents. They can answer various questions about that country and then they can replicate that flag using Desmos.

So, following those instructions, our flag that's created looks something like this and this is representing

the flag for the country of Nigeria.

Using Desmos, we're going to graph it.

And for inequalities at the bottom left corner of Desmos, you're going to see a keyboard symbol. And that's where you can access the various symbols that may not be on a standard keyboard.

Here we have X is less than or equal to -2

as well as X is greater than or equal to 2 . When we can change the color from purple

to green by simply clicking the color, holding it, and it's going to give you six different options to choose from, making it green.

We also need to...

restrict our domain and our range for these vertical bars.

Now this particular flag has a domain of -6 to 6 so that's what I'm going to restrict

my flag B

and

that same domain will apply to the other green vertical bar within the flag.

But because these current bars have a range of negative infinity to positive infinity, I have to restrict it to match the graph that I'm trying to replicate. And so the range is going to go from -3 to $+3$ and again I can always copy and paste to save time entering all those restrictions. to make this flag look more complete, I'm going to add a top segment to the flag

as well as a bottom segment

as being horizontal lines with certain

restrictions on X . Again, by restricting the domain,

and again once again changing the color.

And this then allows me to replicate the flag of Nigeria.

One more country focusing on within Africa would be giving students this flag. They would have to write the compound inequality making up the black region as well as the inequalities making up the blue region. They would discover that this is the country of Botswana.

And then they could have answered other questions about countries that

surround this landlocked country.

and lastly, replicating.

So, this time they would enter in those

inequalities along again with restricting my domain as well as the range.

Now, traveling beyond Africa, we could have students replicate the flag of Trinidad and Tobago in the Caribbean.

So...

to do that,

we would find a flag. Again I go to Britannica and you can save it and you could enter that.

Enter that flag as an image

It will paste it into your coordinate plane. You can change the width and height to reflect its aspect ratio. And then you can come up with the inequalities as well as the restrictions on the domain and range to replicate that flag. Now once you make those inequalities and you replicate the flag, your newly created flag is sitting on top of the image that you inserted into Desmos

So to show your flag in relation to the original flag, you can simply click

and move the original flag off of your created flag. And you have now two identical flags which look like one has been translated above the other.

And then you can simply click

and delete that original flag so that you will see your

replicated flag. Replicated flags will always be a lighter color than the original flag.

Graphing beyond lines, we can move into circles to replicate the flag of Bangladesh in Southeast Asia.

What I found was a resource here that talks about the flag

math for the flag of

Bangladesh. And then using this information, I came up with various equations.

A vertical and horizontal line as well as the equation of a circle.

Entering those into Desmos, along with the restrictions, you'll see what I have created here. But I also want to shade within that circle and so I'm using now circles,

not a circle equation, but a circle inequality that's going to shade everything inside of that circle. And then I want to shade everything outside of that circle that's going to be contained with the domain

and range of our flag.

Besides lines and circles, we also can deal with absolute value graphs or "V" graphs.

And so this is just an example of me replicating the flag of Palestine.

Another flag dealing with absolute values would be that of replicating the flag of Israel. And so I found the flag of Israel inserted into Desmos and then I came up with the various equations making up

the lines surrounding the flag as well as the inequalities creating the blue.

regions here of the flag.

Now, what I really like about Desmos is that students can enter in equations or inequalities, and they immediately, it will see if those

are correct. In this case my V graph here is not matching the star within the flag and so I need to change this inequality from y equals the absolute value of X to either moving it up or moving it down. So in this case I'm moving it down so I have a -2 .

It's still not right. It looks like it's it's going to be

something between 1 and 2. And so I could try different values. And it comes out to be closer to 1.7.

Now the width of this V is a little bit too wide, so students then can try different numbers. And in this case 1.85 in front of the absolute value of x matches

the symbol inside of that flag more accurately.

We're also going to need to restrict this V so that it will stop here and then we're going to have to replicate the other part of this flag as well.

Now once you're all done, you can simply click that flag and move it and now you can see my newly created flag in comparison to the original flag.

And then I can delete the original flag so that my

newly created flag stands alone.

This definitely requires students to do more thinking and more analyzing. And it takes up and takes it up a notch because they're having to

look at what

the domain and range should be so that you actually will have at the end, a flag that looks like what that flag should look.

Students can research the flags of other countries. They can research flags of states, flags of cities, or they could create their own flags. Maybe they want to recommend a new flag for their city and so they can design one using different equations or inequalities.

Students have the opportunity to use technology and the opportunity to use their creativity.

If you have question, please feel free to share those questions now in the chatbox.

And if you have questions later, or need help later, please feel free to email me to set up a time to meet one-on-one via Zoom or you can make an appointment

with another specialist to meet one-on-one via zoom and IMSA's "Ask a Specialist"

e-teaching resource that's available at the provided link.

A .pdf of this presentation can be found now by the link that's being shared within the chatbox. And this webinar recording, .pdf and transcript will be posted online in just a few days. You can check that out.

We also would appreciate you taking some time to complete a short online survey for us because we do appreciate your feedback and like to get teachers' input for future

webinars as well.

Some additional resources. Earlier I had shown you a handout that I created in regards to what country is it in Africa. You have access to that handout which can be download.

As well as other resources here that you may want to take take a look at.

We do have some upcoming 19-minute webinars, so please take a look at those if they are our interest to you.

If you don't have any questions now please feel free to email me as I said earlier. You can email me. You could also contact me via Twitter or you can reach

me or any of my teammates from the Center for Teaching and Learning at IMSA's website: educator development, specificallye-teaching resources.

Thank you so much for attending. I hope you have a wonderful evening.