Using Mathematics and Technology To Explore World, State and City Flags

Live Webinar for Teachers Teaching with Technologies
March 21, 2023

Ken Collins, Mathematics Teacher Emeritus
Charlotte Latin School, Charlotte, North Carolina
kencollins3.14@gmail.com

Ron Lancaster, Associate Professor Emeritus
Ontario Institute for Studies in Education of the University of Toronto
ron2718@nas.net

Agenda:
Welcome & Introductions

Viewing flags through a **mathematical lens**

Presenters will demonstrate how to develop **mathematical models** for flags and **present images** of these flags on a TI-84 or TI-Nspire

Time for participants to choose a flag and make a **plan** for developing a mathematical model for the flag.

Next steps - **Having students design a new flag** for their school or home town.

Resources

Webinar drawing

Expected Outcomes

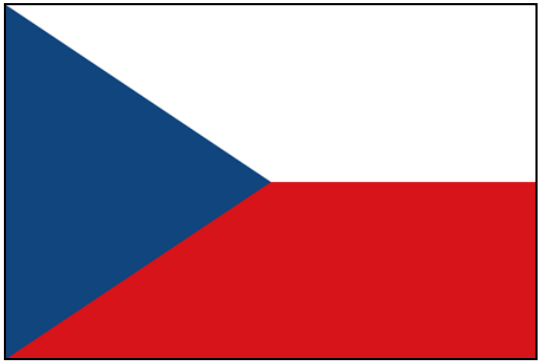
I can help students view national, state/provincial and municipal flags through a mathematical lens.

I can show students how to develop mathematical models for flags.

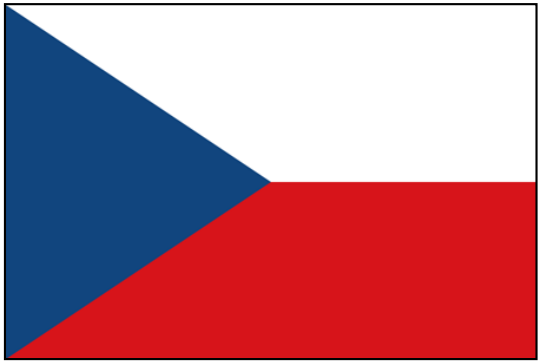
I can help students to use the TI-84 and TI-Nspire to create dynamic models of flags using coding.

I can become more aware of the resources and professional organizations to learn more about flags

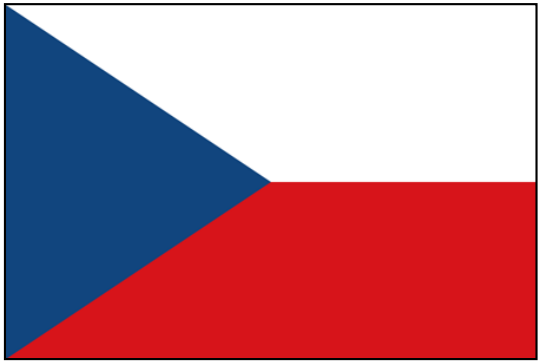
Quiz: Identify each of the following flags.



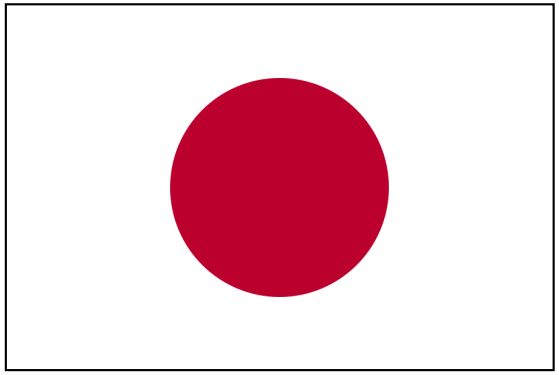
National Flags of Czech Republic, Seychelles, Guyana and Isle of Man

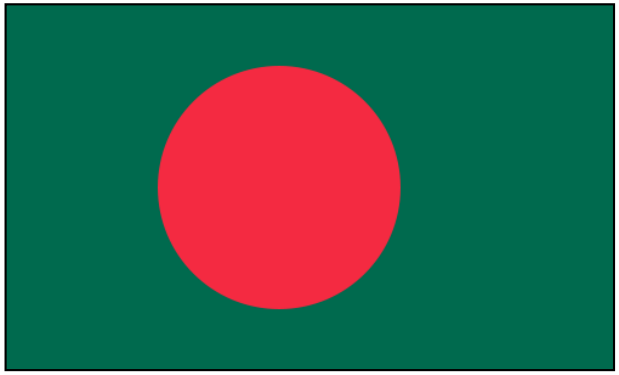


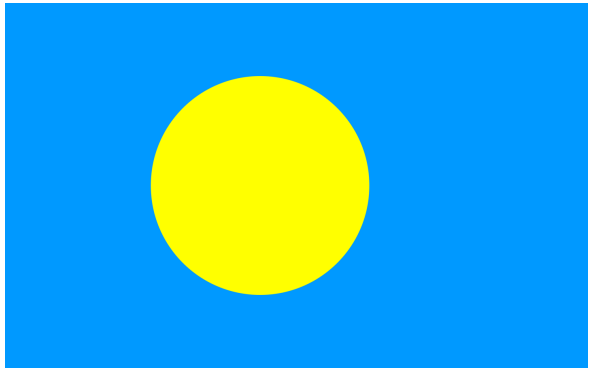
In the chat, post questions you could assign to your students related to these flags.



In the chat, post questions you could assign to your students related to the flags of Japan, Bangladesh and Palau.







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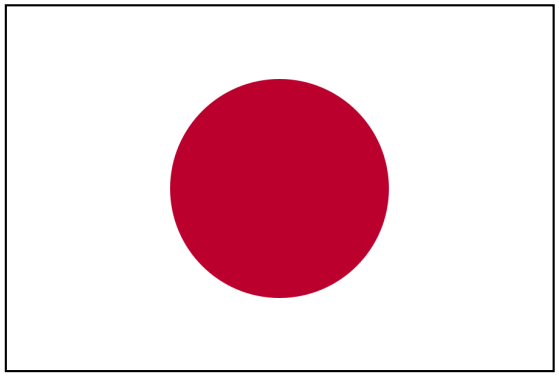
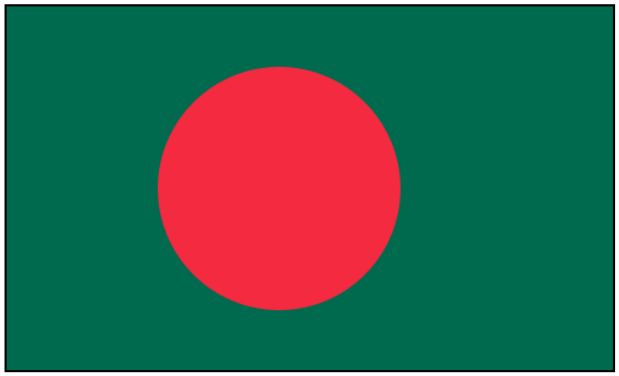
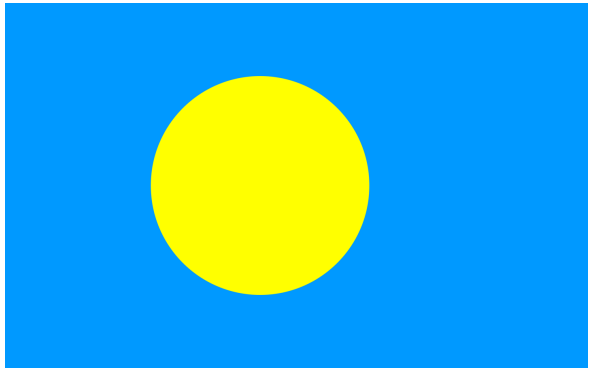




The aspect ratio of the flag is 3:5.

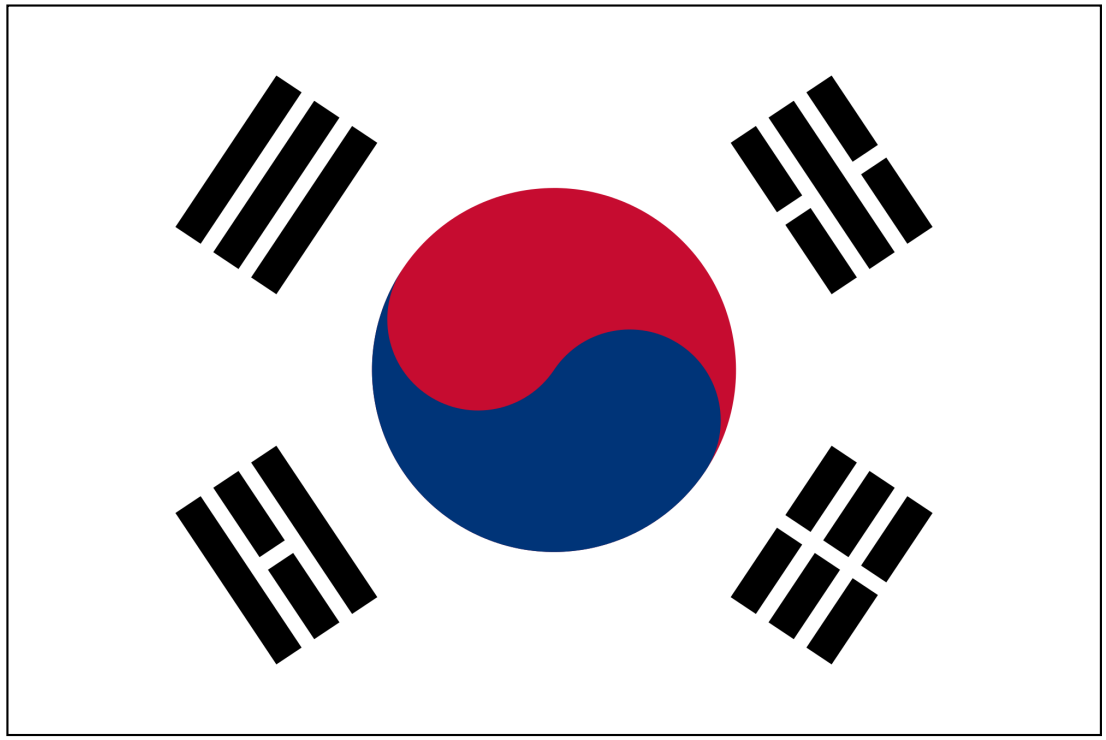
The radius of the circle is one-fifth of the length of the flag. The centre is the intersection point of the perpendicular drawn from the nine-twentieth part of the length of the flag, and the horizontal line drawn through the middle of its width.



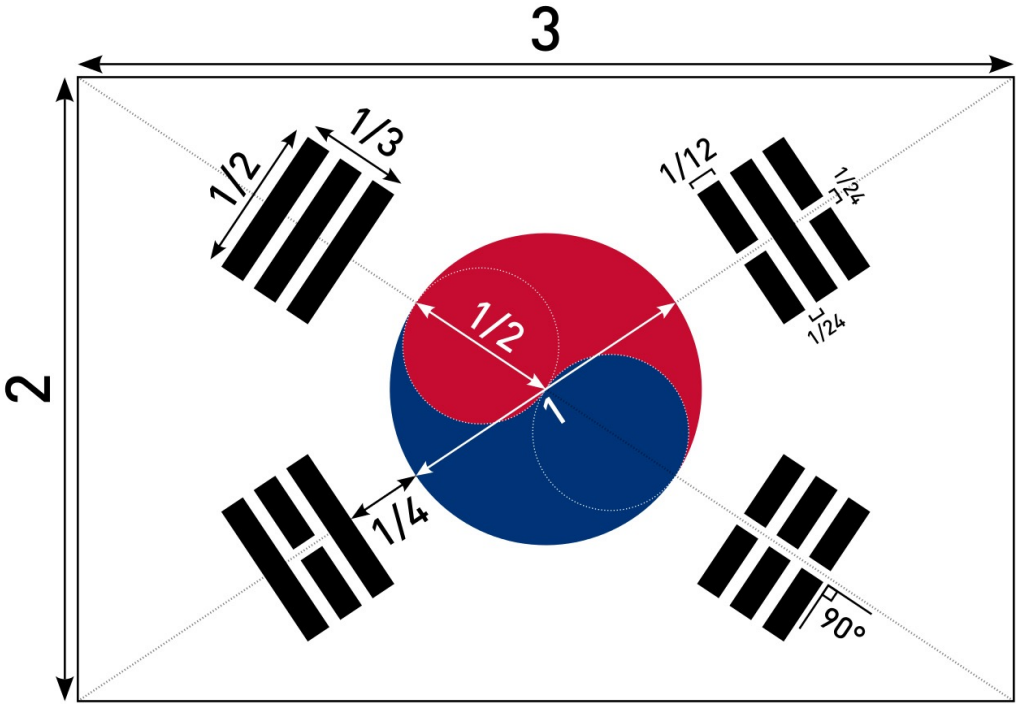
The aspect ratio of the flag is 5:8.

The moon's diameter is 3/5 of the flag's height, its center is placed on the middle of the flag's height and the 7/10 part of the flag's height from the hoist side

In the chat, post questions you could assign to your students related to the flag of South Korea.



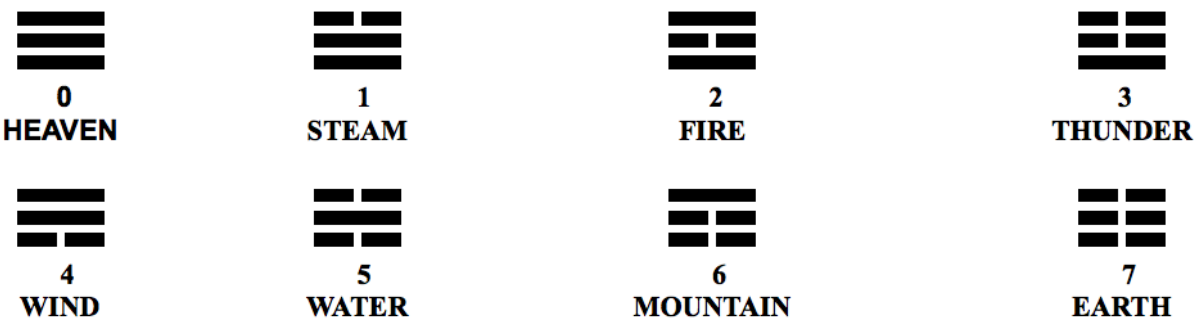
In the chat, post questions you could assign to your students related to the flag of South Korea.



Binary Numbers and the South Korean Flag
http://britton.disted.camosun.bc.ca/jbbinflag.htm

The flag of South Korea exhibits *anti-symmetry*, or symmetry with a property reversal. The circular symbol in the center, called the *yin-yang*, represents opposing forces in the universe. It is anti-symmetrical because of the red/blue interchange. The eight markings, called *trigrams* or *Pa-kua symbols*, are opposites of one another diagonally. Broken lines are unbroken and vice versa.

If you replace each unbroken line in the trigrams by 0 and each broken line by 1, you will see that the symbols represent numbers in the binary (base two) number system. The symbols and their meanings appear below. The binary numbers are read from bottom to top.



List of countries by **proportions** of national flags
https://en.wikipedia.org/wiki/List_of_countries_by_proportions_of_national_flags

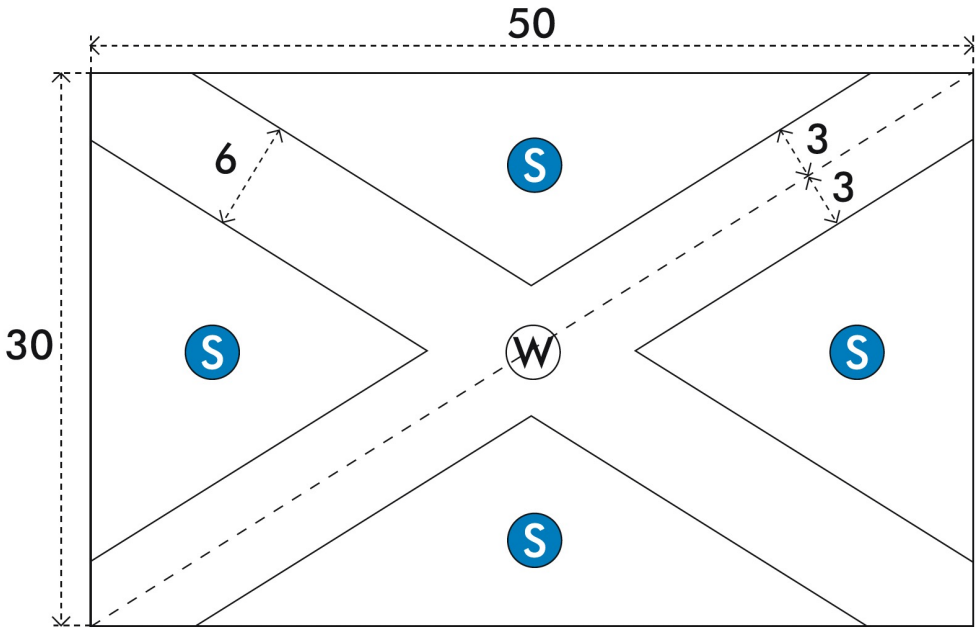
	Czech Republic	2:3 (1.5)
	Dem. Rep. of the Congo	3:4 (1.333)
	Denmark	28:37 (1.321)
	Djibouti	2:3 (1.5)
	Dominica	1:2 (2)
	Dominican Republic	2:3 (1.5)
	Donetsk People's Republic	2:3 (1.5)
	Ecuador	2:3 (1.5)
	Egypt	2:3 (1.5)
	El Salvador	189:335 (1.772)

	Myanmar	2:3 (1.5)
	Nagorno-Karabakh	1:2 (2)
	Namibia	2:3 (1.5)
	Nauru	1:2 (2)
	Nepal	0.820
	Netherlands	2:3 (1.5)
	New Caledonia (France)	1:2 (2)
	New Zealand	1:2 (2)
	Nicaragua	3:5 (1.667)
	Niger	6:7 (1.167)
	Nigeria	1:2 (2)

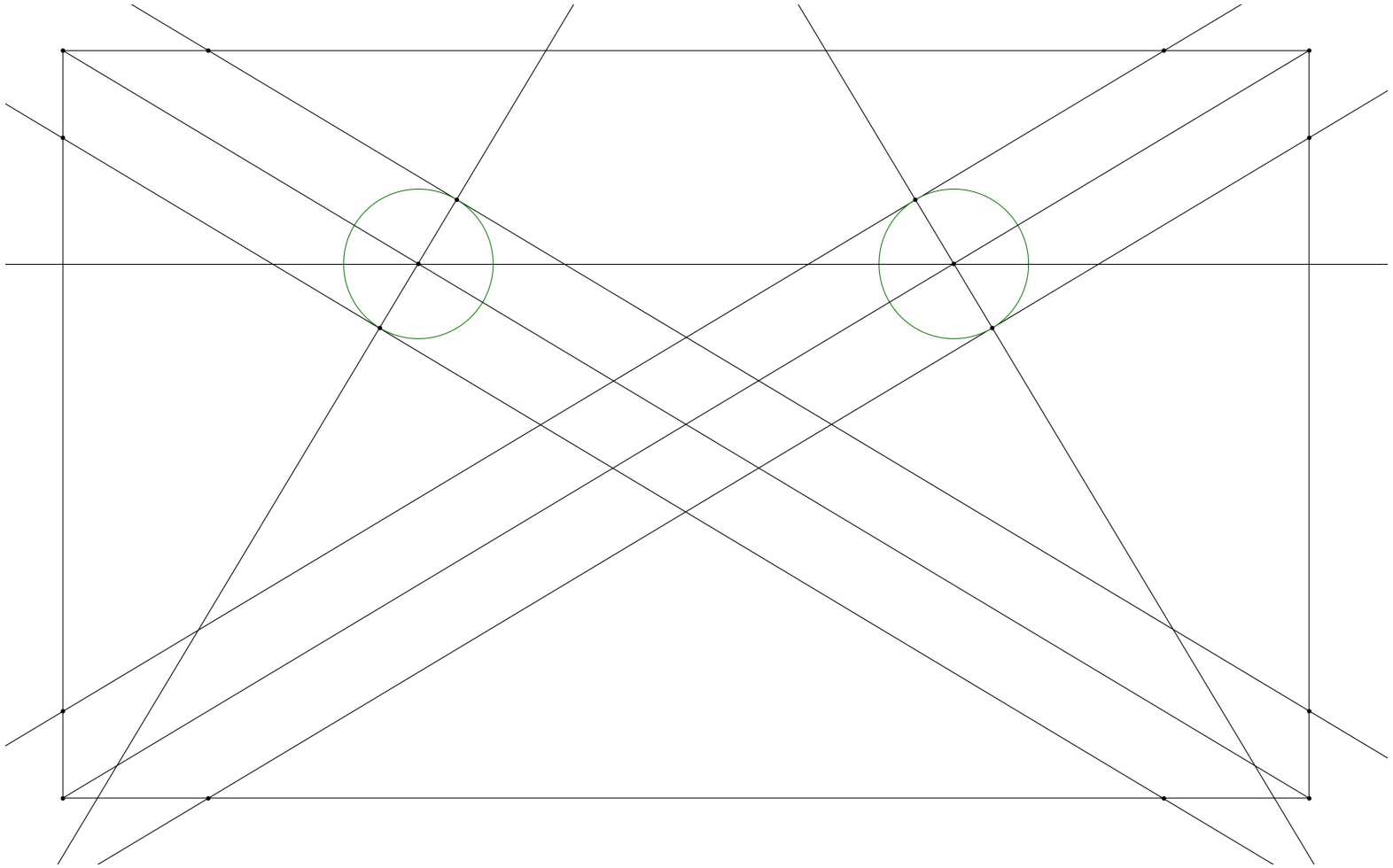
Developing a mathematical model of the national flag of Scotland and using coding to display an image of the flag on a TI-84 (Ron Lancaster)

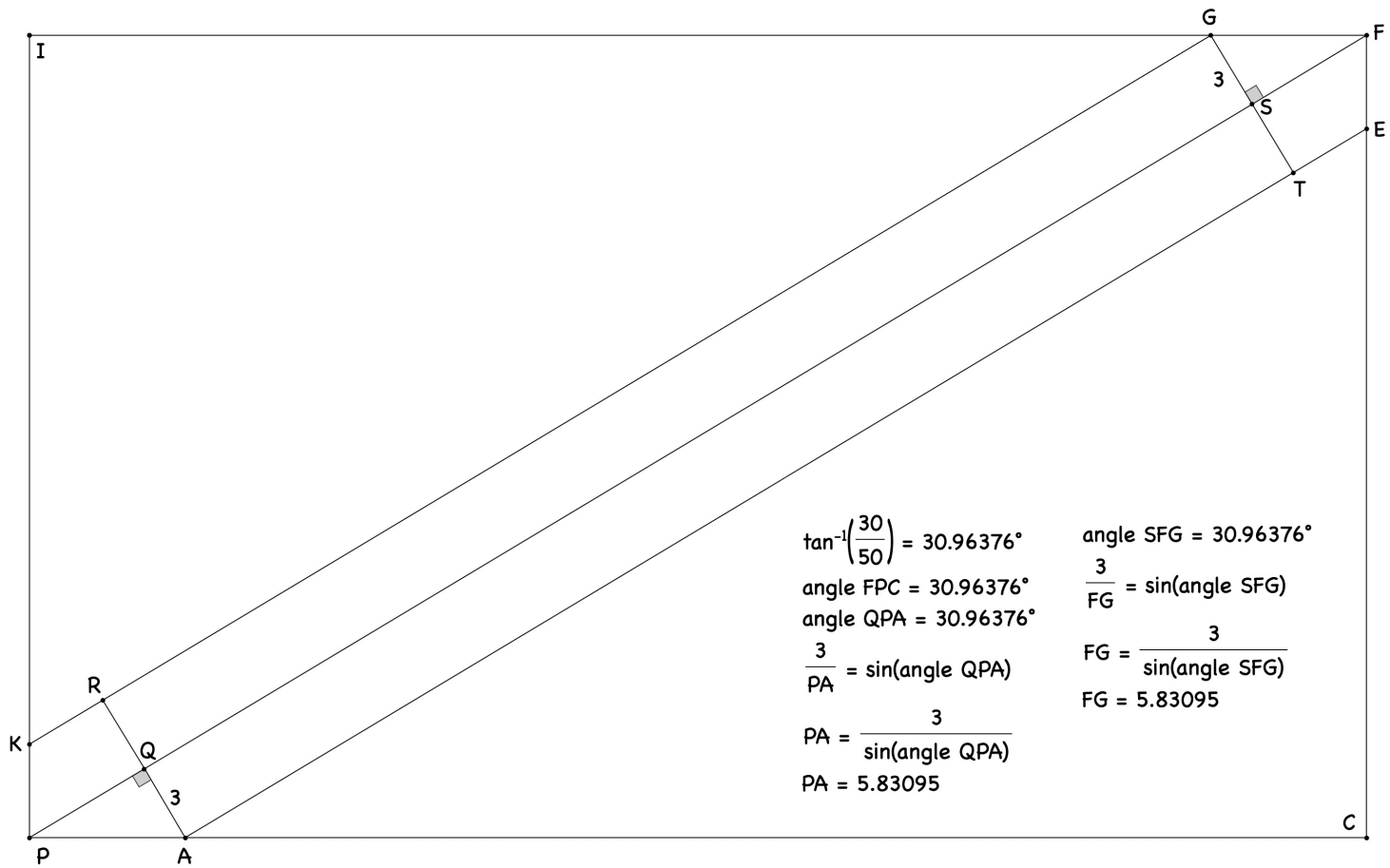
Advice for students about how to get started.
Do some research about the design of the flag, find the specifications, make a plan for developing the mathematical model.

Developing a mathematical model of the national flag of Scotland and using coding to display an image of the flag on a TI-84.



www.flaginstitute.org/wp/uk-flags/british-flag-protocol/#index30





$$\tan^{-1}\left(\frac{30}{50}\right) = 30.96376^\circ$$

angle FPC = 30.96376°

angle QPA = 30.96376°

$$\frac{3}{PA} = \sin(\text{angle QPA})$$

$$PA = \frac{3}{\sin(\text{angle QPA})}$$

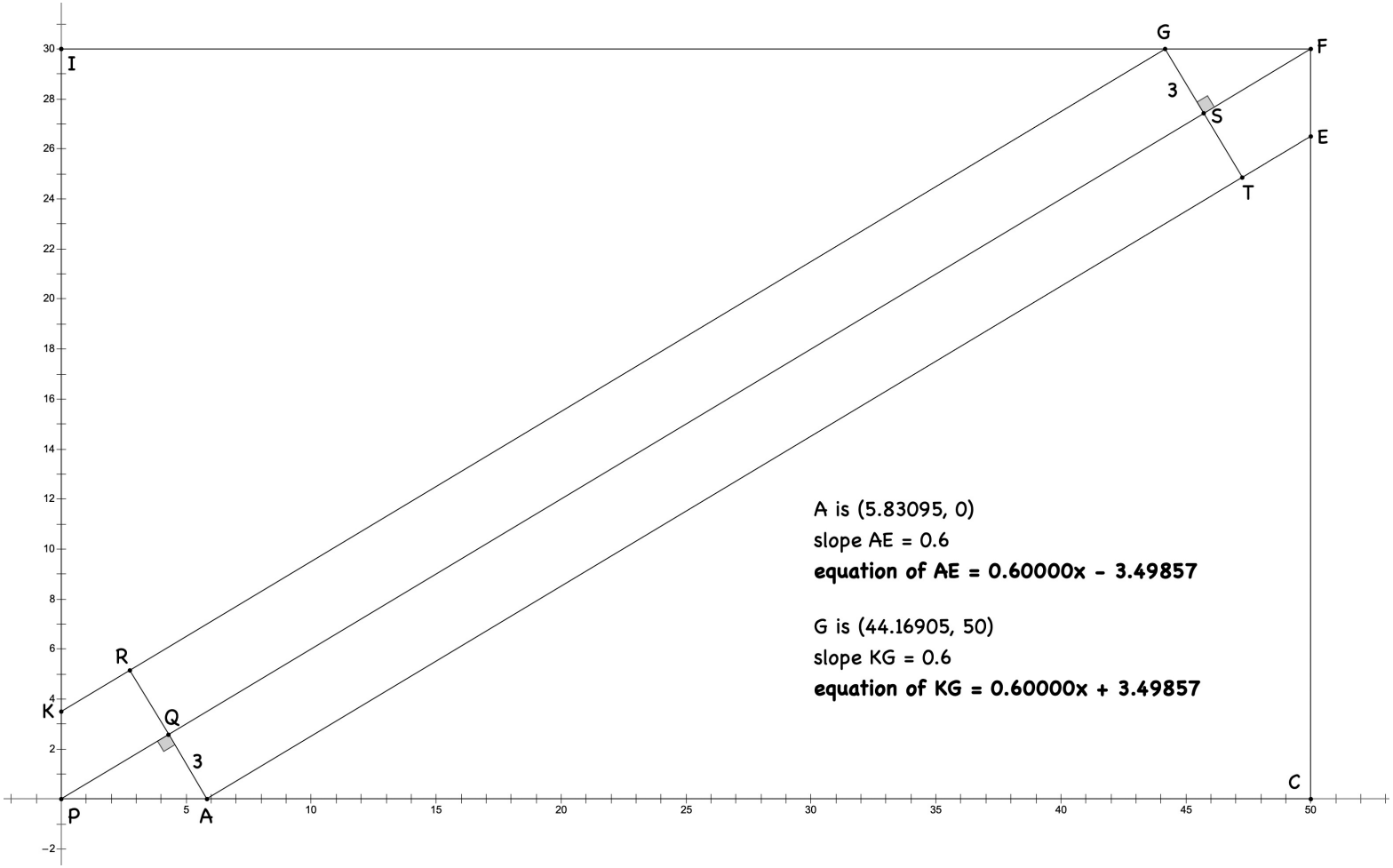
PA = 5.83095

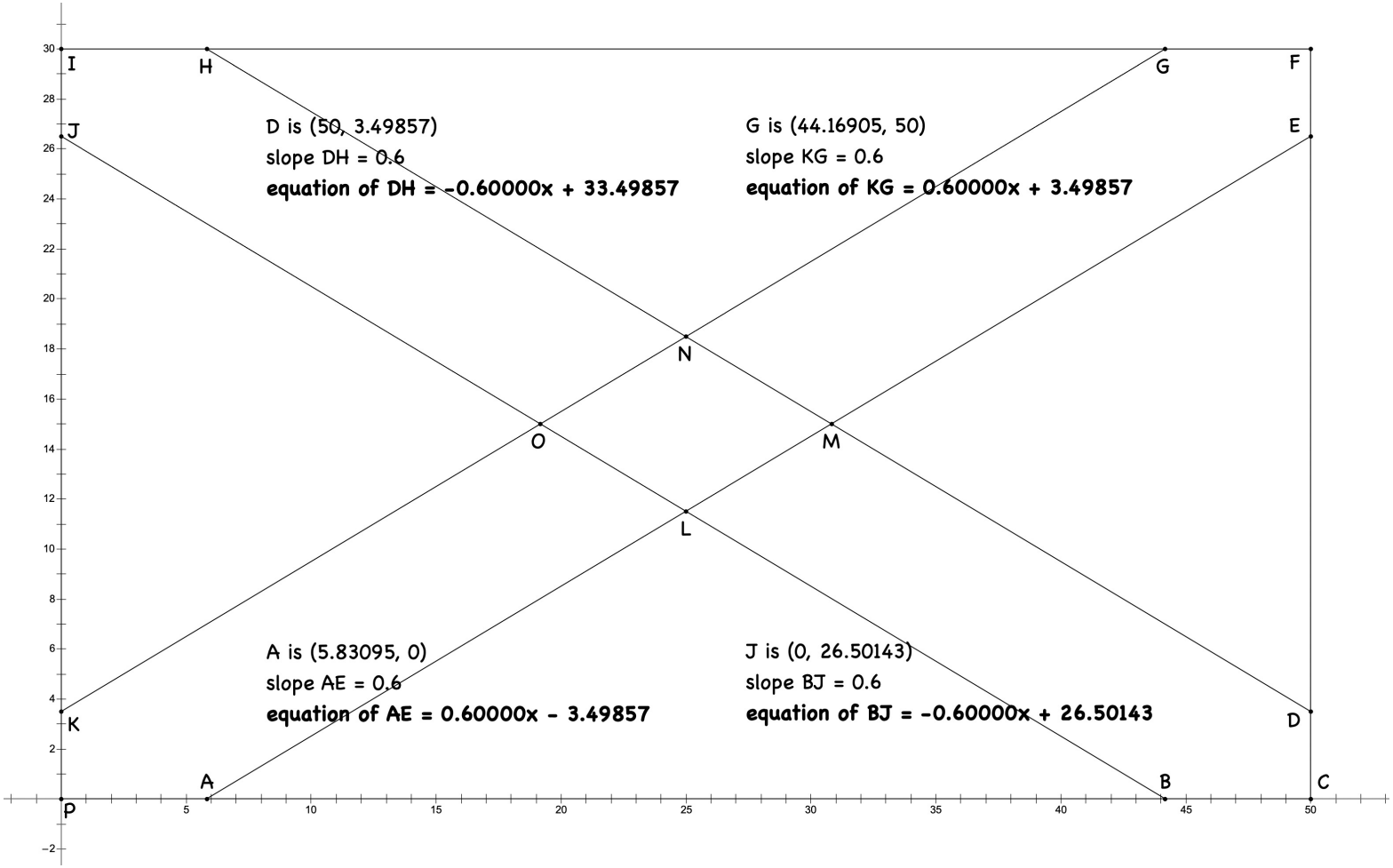
angle SFG = 30.96376°

$$\frac{3}{FG} = \sin(\text{angle SFG})$$

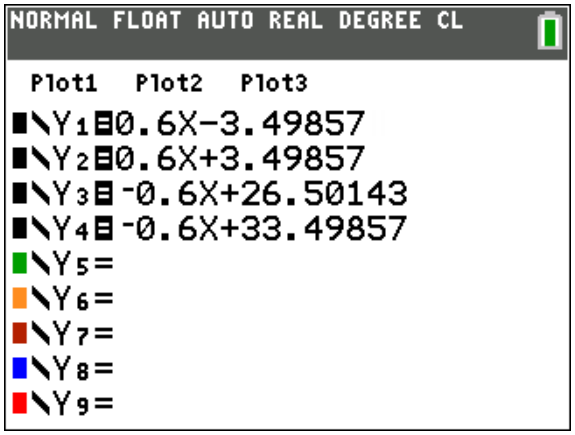
$$FG = \frac{3}{\sin(\text{angle SFG})}$$

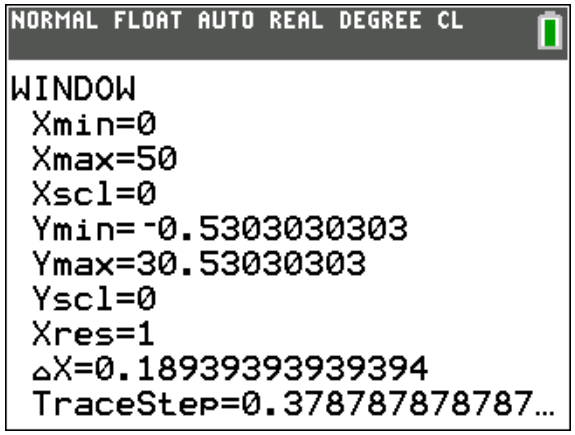
FG = 5.83095

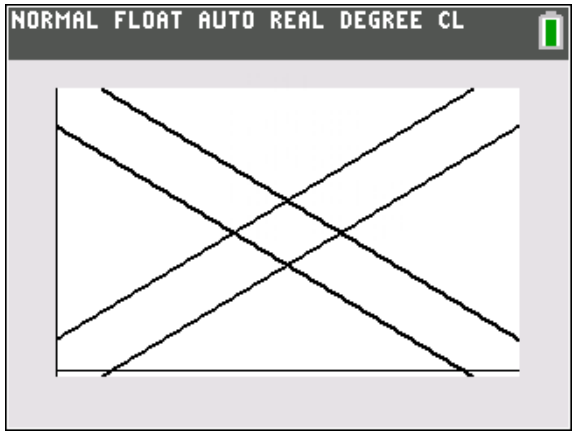

G
F
I
3
S
E
T
R
K
Q
3
C
P
A
A is (5.83095, 0)
slope AE = 0.6
equation of AE = 0.60000x - 3.49857
G is (44.16905, 50)
slope KG = 0.6
equation of KG = 0.60000x + 3.49857


I
H
G
F
J
E
D is (50, 3.49857)
slope DH = 0.6
equation of DH = -0.60000x + 33.49857
G is (44.16905, 50)
slope KG = 0.6
equation of KG = 0.60000x + 3.49857
N
O
M
L
A is (5.83095, 0)
slope AE = 0.6
equation of AE = 0.60000x - 3.49857
J is (0, 26.50143)
slope BJ = 0.6
equation of BJ = -0.60000x + 26.50143
K
D
A
B
C
P

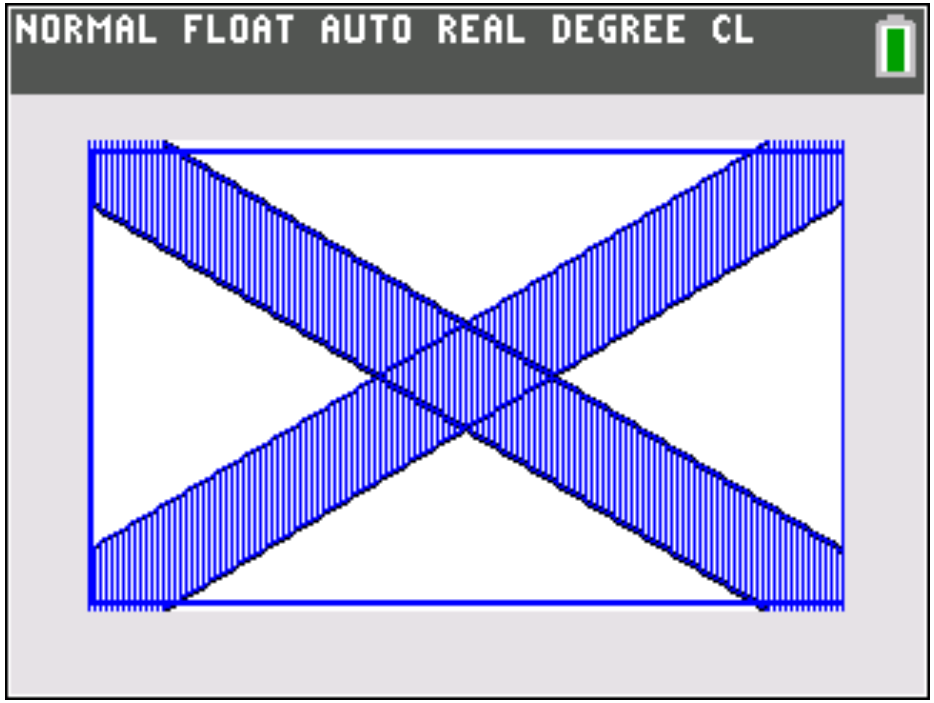
Using the equation editor to display an image of the flag on a TI-84.





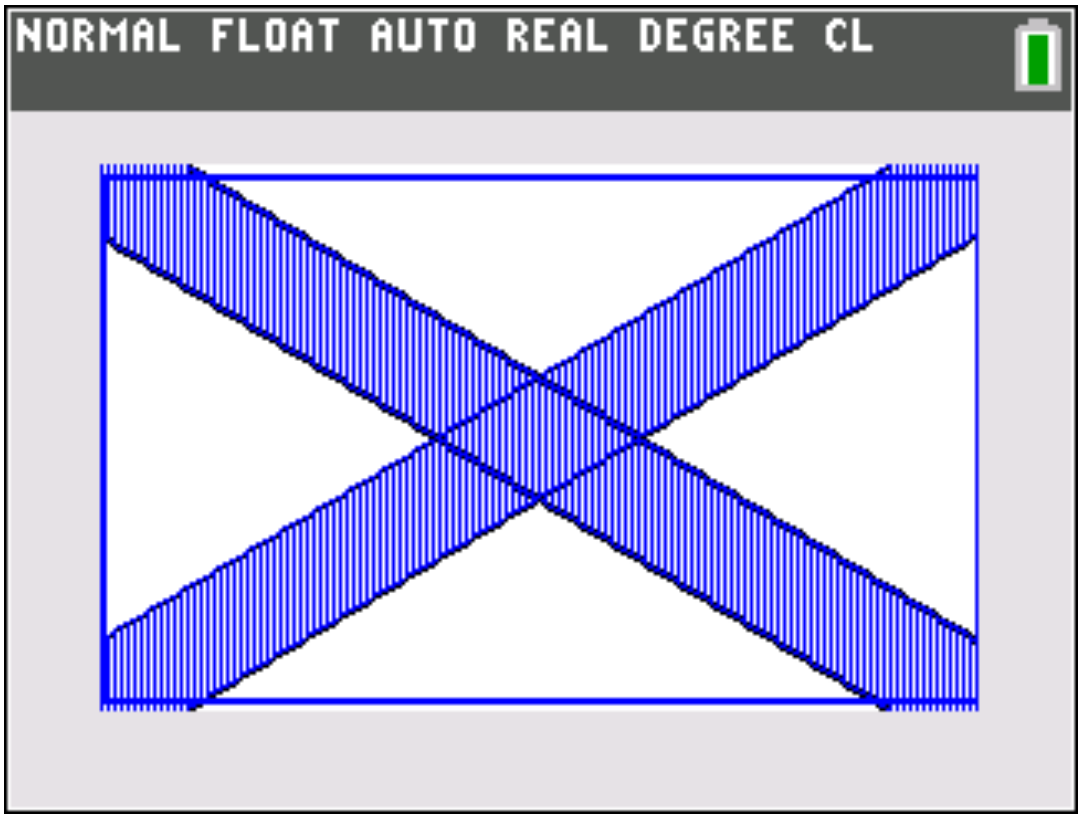


Using coding to display an image of the flag on a TI-84 and making adjustments when mistakes arise.




```
AxesOff
ClrHome
ClrDraw
PlotsOff
ClrAllLists
FnOff
0→Xmin
50→Xmax
0→Xscl
0→Ymin
30→Ymax
0→Yscl
ZSquare

"0.6X-3.49857"→Y1
"0.6X+3.49857"→Y2
"-0.6X+26.50143"→Y3
"-0.6X+33.49857"→Y4

DispGraph

Line(0,0,50,0)
Line(50,0,50,30)
Line(50,30,0,30)
Line(0,30,0,0)

Shade(Y1,Y2,0,50)
Shade(Y3,Y4,0,50)
```

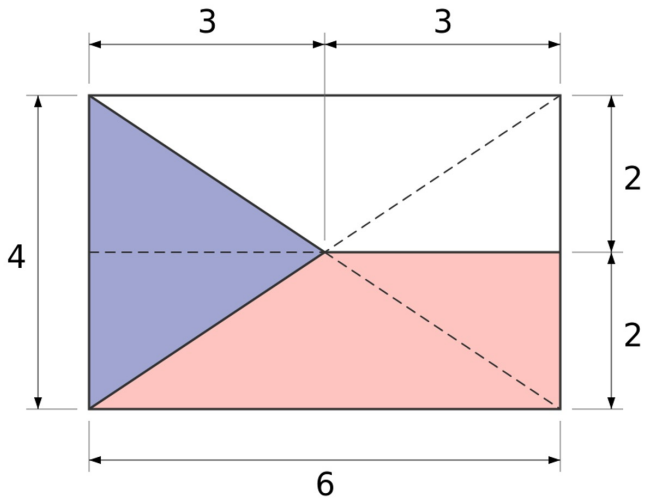
Using coding to display an image of the flag on a TI-84 and making adjustments when mistakes arise.



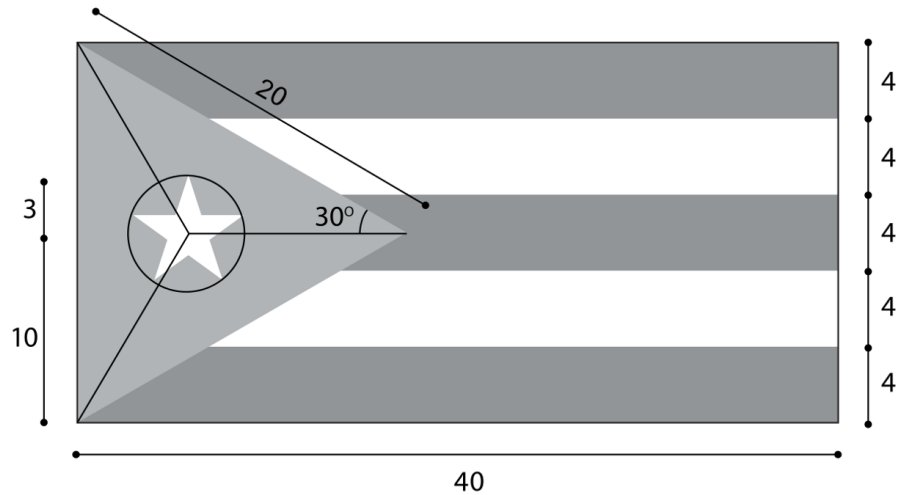
Developing a mathematical model of the national flag of China and using coding to display an image of the flag on a TI-Nspire (Ken Collins).

Choose a flag and make a plan for developing a mathematical model for it.

Czech Republic

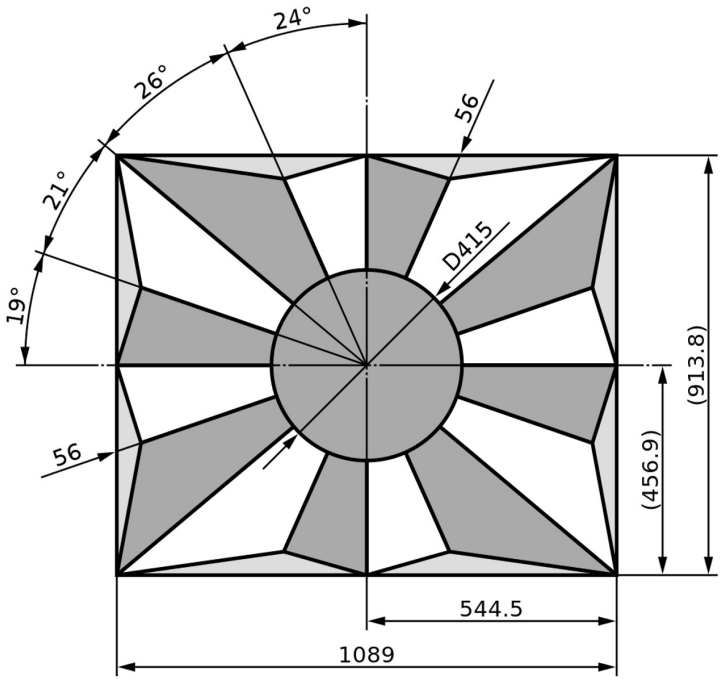


Cuba

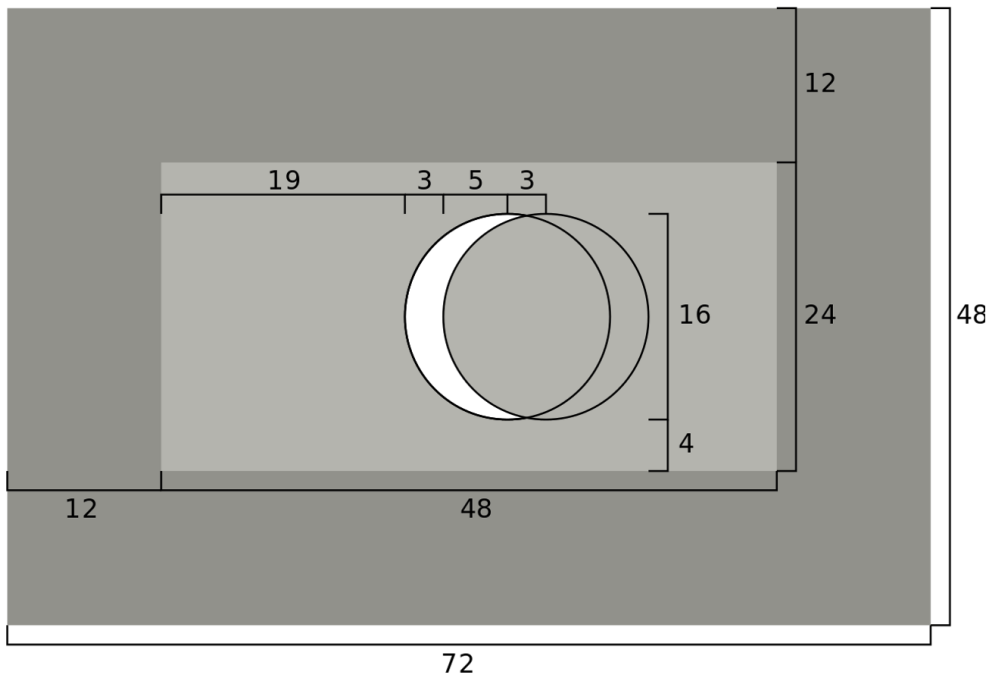


Choose a flag and make a plan for developing a mathematical model for it.

Japan Self Defense Forces

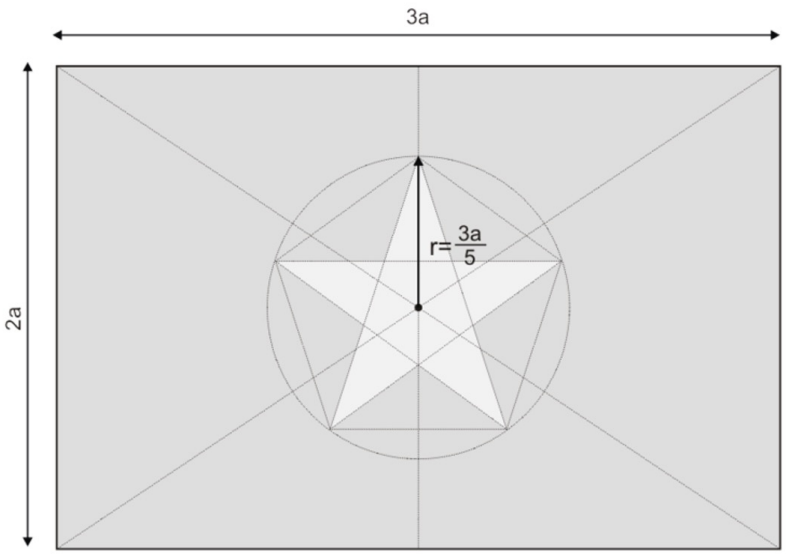


Maldives

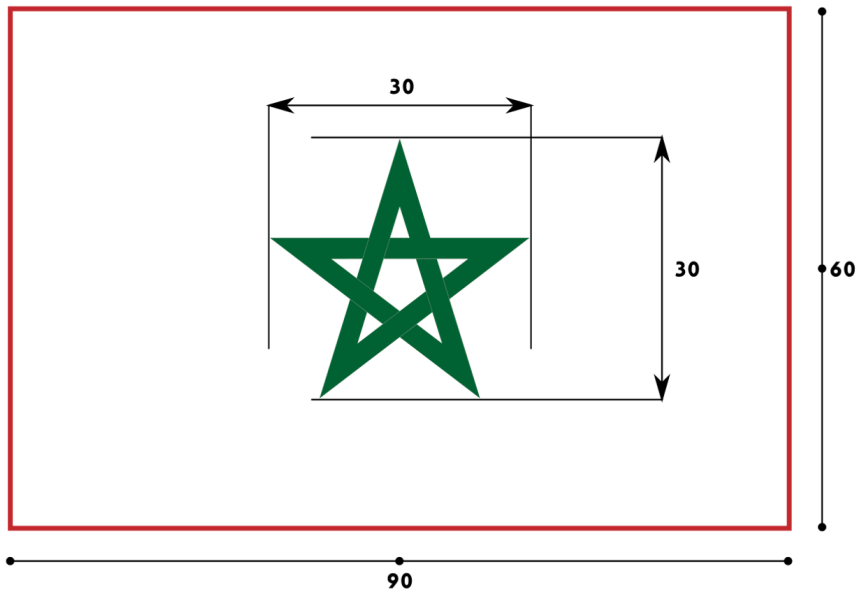


Choose a flag and make a plan for developing a mathematical model for it.

Vietnam



Morocco



Next steps - Having students design a new flag for their school or home town.

Students' flag for city adopted unanimously by Euclid City Council

By Chad Felton cfelton@news-herald.com, September 24, 2018

Ordinance No. **126-2018**

By - Mayor Holzheimer Gail

An ordinance adopting an official flag of the City of Euclid.

WHEREAS, Evan Botzki, a senior student at Euclid High School, and Harrison McCreight, a senior student at Villa Angela-St. Joseph High School, have submitted to Euclid City Council a design of a flag and suggested that the same be adopted as the official flag of the City of Euclid; and

WHEREAS, after due consideration, this Council is of the opinion that the designation of an official City flag will promote the patriotic observance of official days and add dignity to ceremonies, and is of the opinion that an official City flag should be adopted.

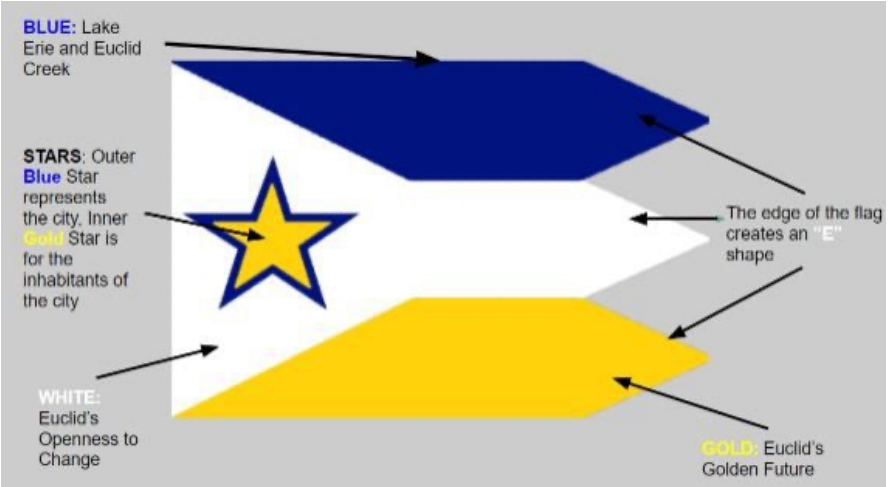
NOW, THEREFORE, be it ordained by the Council of the City of Euclid, State of Ohio:

Section 1: That the flag, the design and colors of which are shown in Exhibit "A" attached hereto and made a part of this ordinance, is hereby adopted and designated as the official flag of the City of Euclid and whenever and wherever used may be so designated.

Section 2: That the Mayor be, and she is hereby authorized, empowered, and directed to order a number of said flags for use in official ceremonies and a flag to be placed in the Council chamber.

Section 3: That it is found and determined that all formal actions of this Council concerning and relating to the adoption of this ordinance were adopted in an open meeting of this Council, and that all deliberations of this Council and any of its committees that resulted in such formal action, were in meetings open to the public, in compliance with all legal requirements, including Section 121.22 of the Ohio Revised Code.

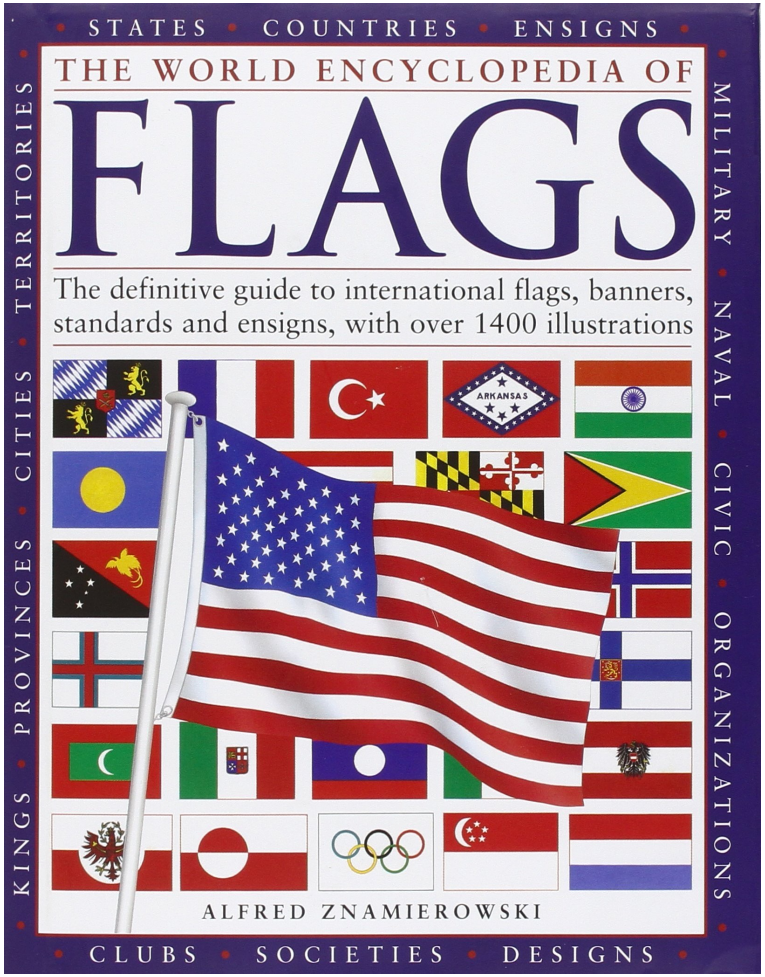
Section 4: That this ordinance shall be in full force and effect from and after the earliest period allowed by law.


BLUE: Lake Erie and Euclid Creek
STARS: Outer Blue Star represents the city, Inner Gold Star is for the inhabitants of the city
The edge of the flag creates an "E" shape
WHITE: Euclid's Openness to Change
GOLD: Euclid's Golden Future

RESOURCES

Professional organization:
North American Vexillological Association
nava.org

Join NAVA today. For $40 a year you will receive a **gold** mine of material that you can use in your classroom.


STATES • COUNTRIES • ENSIGNS
THE WORLD ENCYCLOPEDIA OF
FLAGS
The definitive guide to international flags, banners, standards and ensigns, with over 1400 illustrations
ARKANSAS
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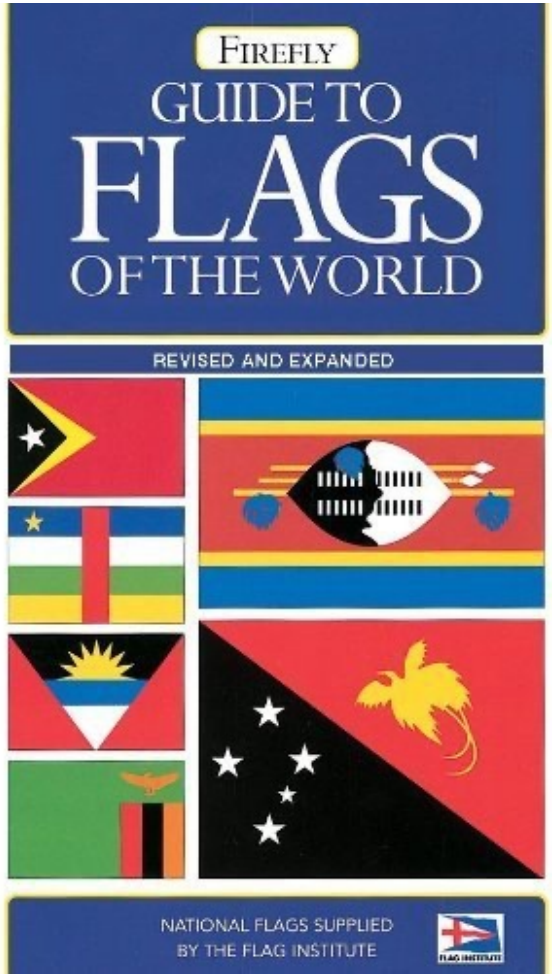
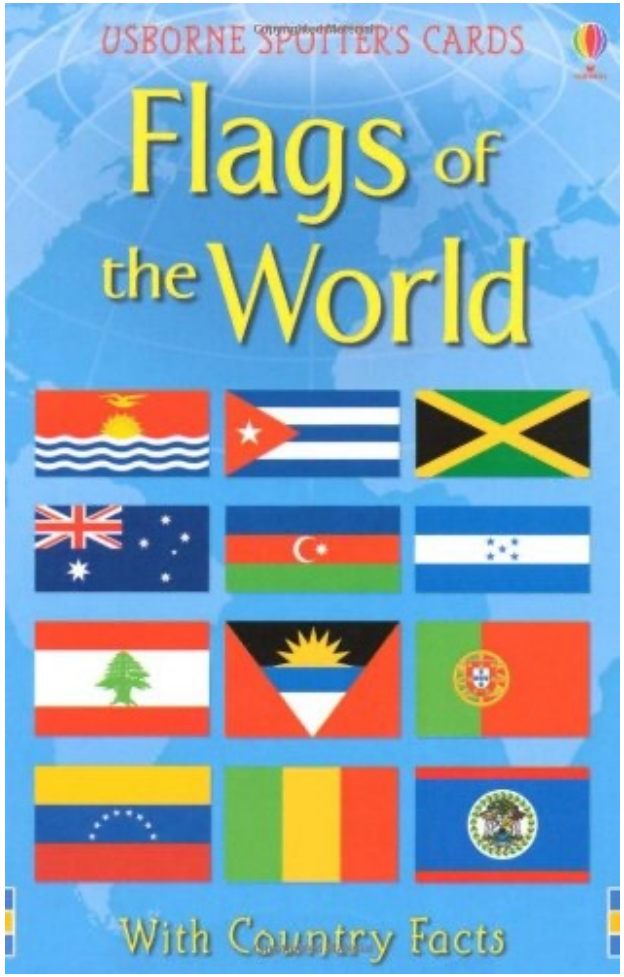
FLAGS
OF THE
WORLD
SYLVIE BEDNAR


FIREFLY
GUIDE TO
FLAGS
OF THE WORLD
REVISED AND EXPANDED
NATIONAL FLAGS SUPPLIED
BY THE FLAG INSTITUTE


USBORNE SPOTTER'S CARDS
Flags of
the World
With Country Facts

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Ken Collins
kencollins3.14@gmail.com

Ron Lancaster
ron2718@nas.net