

Culturally Responsive Pedagogical practices with adapted activity inspired by *Hey Google, Who's a Mathematician?*



Cynthia Sanchez Tapia^a , Ha Nguyen^a , Eryn Maher^b & Alessandra Pantano^c

^aCalifornia State University, Dominguez Hills (CSUDH)

^bGeorgia Southern University

^cUniversity of California, Irvine



MAA MATHFEST Conference

August 2024 – Indianapolis, IN

This work was supported by UCLinks, CAPP and NSF (NSF grant 2229061)





2

Who's a Mathematician?

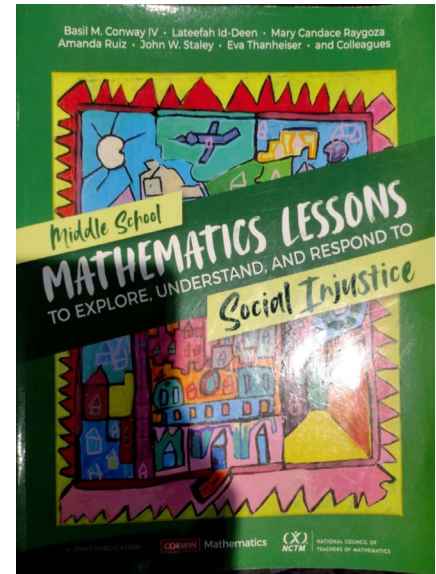
Meeting Number Two

Dos



Hey **Google**, who is
a mathematician?

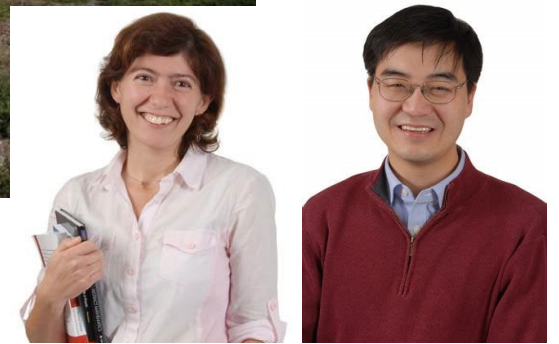
from



Math CEO Program

Math ematics Community Educational Outreach Program

- Started at UC Irvine in 2014
- **Math CEO purpose:** offer high quality math enrichment program to students from low-income families.



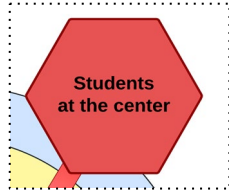
Drs. Pantano and Sheng - Started the Math CEO program at UCI in 2014.



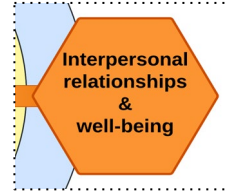
- **CSUDH Math CEO** started last year (Spring 2023).

Math CEO curriculum

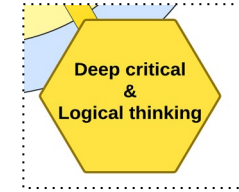
DESIRED OUTCOMES OF MATH CEO ACTIVITIES



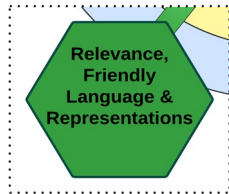
Students are active participants in their own learning



Students practice socio-emotional skills, collaborate, and build positive relationships



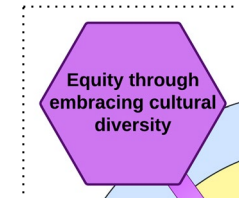
Students engage in deep mathematical thinking and are encouraged to meet high academic standards



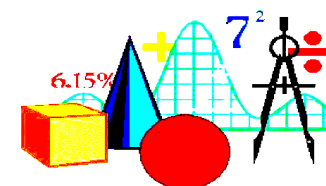
Students find activities relevant and engaging. They can solve the task & show their strengths in multiple ways



Students engage in social justice discussions about fairness and (lack of) privilege and representation



Students grow in their cultural awareness, and value equity

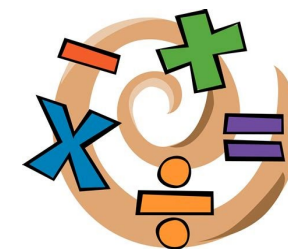


2

Dos

Who's a Mathematician?

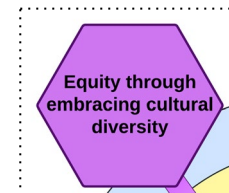
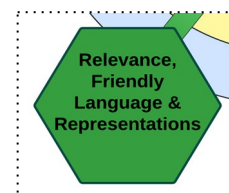
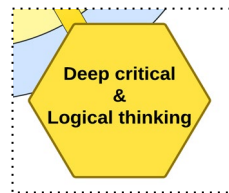
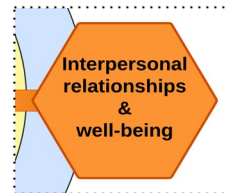
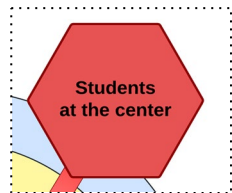
Meeting Number 2



“Who’s a Mathematician?” Lesson Goals

MATH GOALS

- ❖ Analyze proportional relationships and use them to solve real-world and mathematical problems.
- ❖ Understand ratio, proportion and percentage concept to solve problems.
- ❖ Compare their findings to data from their own school community and draw pie charts and fill out tables.



SOCIAL JUSTICE GOALS

- ❖ Recognize stereotypes and relate to people as individuals rather than representatives of groups.
- ❖ Recognize unfairness on the individual level (e.g., biased speech or ideas) and injustice at the institutional or systemic level (e.g., discrimination).
- ❖ Express empathy when people are excluded or mistreated because of their identities and concern when they themselves experience bias.
- ❖ Recognize their own responsibility to stand up to exclusion, prejudice and injustice.

Creating a Mathematician:

Each of us will create a mathematician. Think about what your mathematician looks like. Include as many characteristics as you can to describe this personage. Fill out the table on the right, then draw a picture.

Icebreaker questions:

- Who knows a Mathematician?
- What is a Mathematician?

Activity : Students and mentors are going to create the profile of a mathematician . Fill in the table first, then draw a picture . (Do not show your picture until you are finished) .

Mentor : Encourage your students to think of various features of their mathematician, possibly including hobbies, accessories or clothing. Once the pictures are ready to hang on the wall, ask your students who/what was their inspiration.

TABLE 1: YOUR MATHEMATICIAN

Your mathematician's name:	
Your mathematician's pronouns:	
Where was your mathematician born?	
Where does your mathematician work? (What do they do?)	
Your mathematician's hobbies:	
Your mathematician's favorite accessories:	

Creating a Mathematician:

Each of us will create a mathematician.

KEY: Go back in time and try to answer how you thought a mathematician should look like when you were at middle school.

Think about how your mathematician looks like. Include as many characteristics as you can to describe this personage. Fill out the table on the right.

TABLE 1: YOUR MATHEMATICIAN

Your mathematician's name:	
Your mathematician's pronouns:	
Where was your mathematician born?	
Where does your mathematician work? (What do they do?)	
Your mathematician's hobbies:	
Your mathematician's favorite accessories:	

Lets check-in to prepare for the "*Who is a Mathematician?*" activity.

Go to

www.menti.com

Enter the code

6459 2130

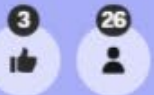
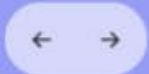
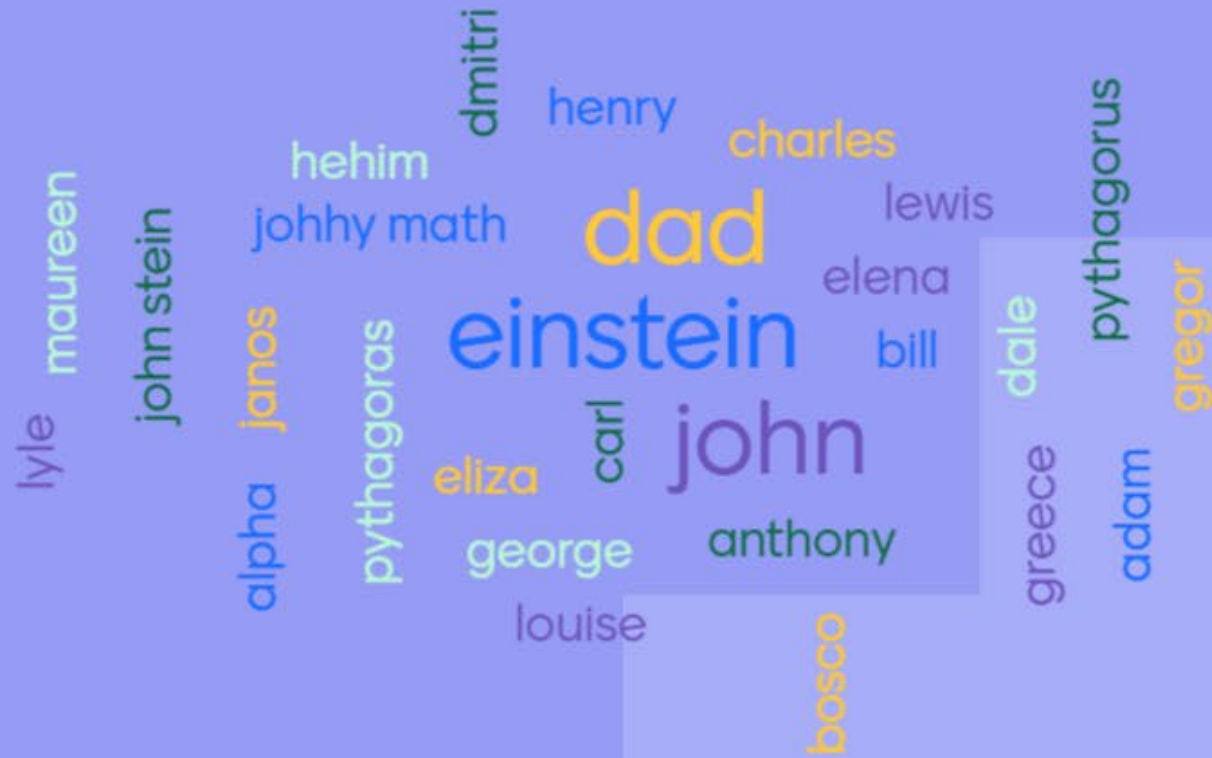


Or use QR code



Your mathematician's name:

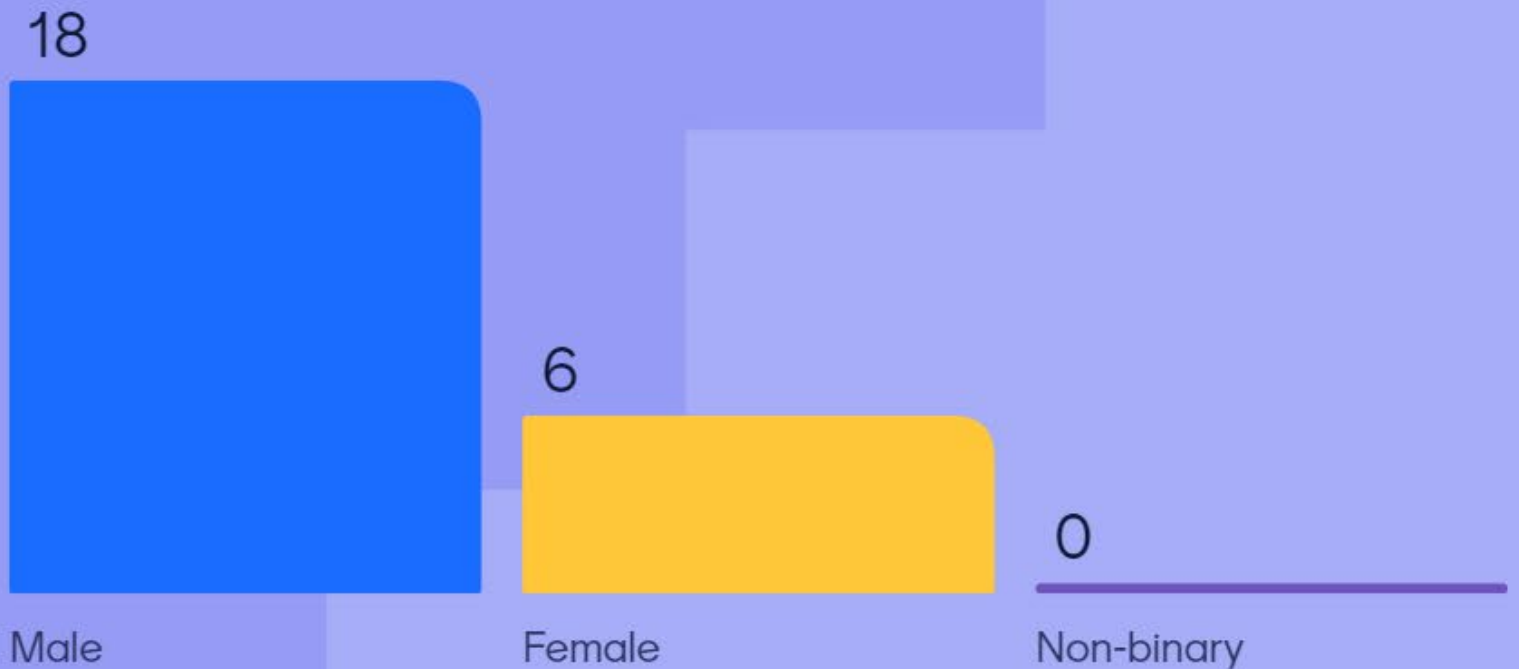
34 responses





PRE-LECTURE CHECK-IN

According to the name and pronouns you chose. Your mathematician is:





Where was your Mathematician born?

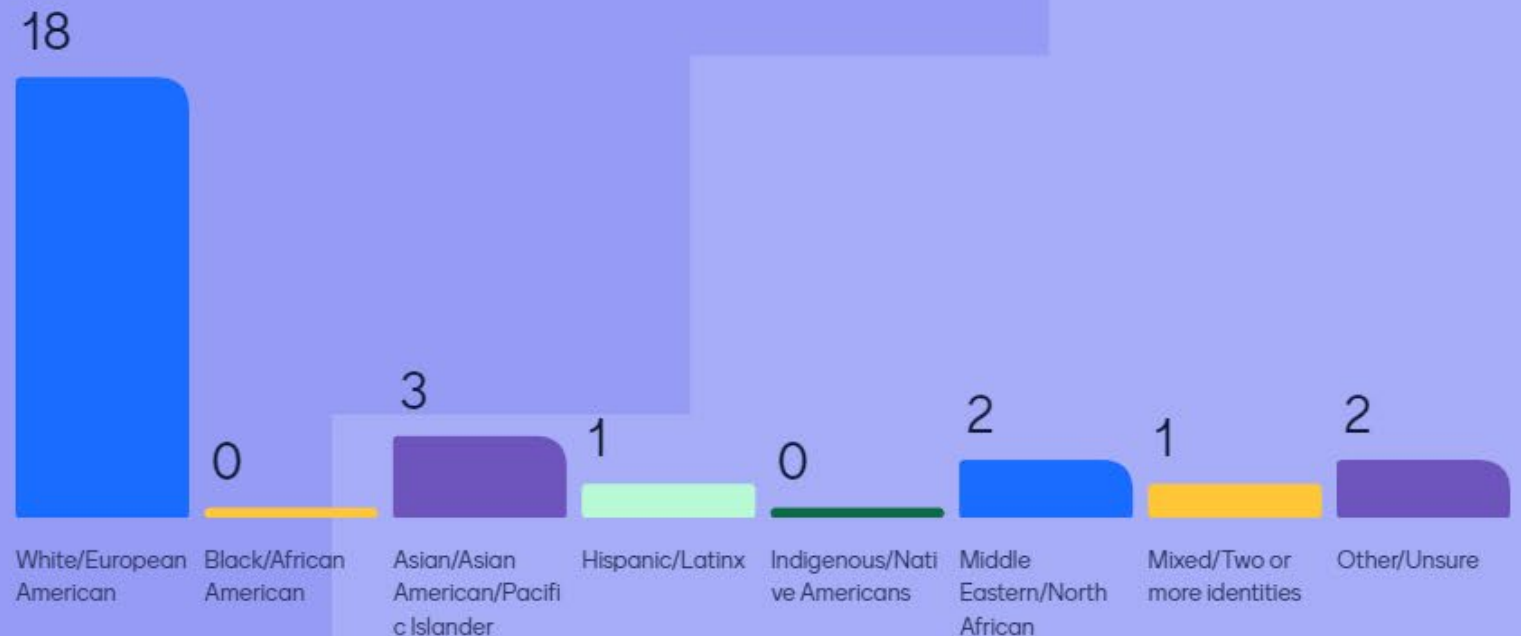
30 responses

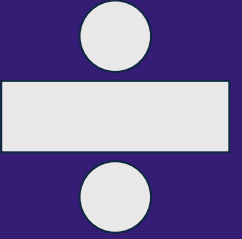
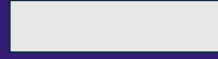




PRE-LECTURE CHECK-IN

Choose the closest ethnicity of your mathematician (according to what you imagined and where she/he/their was born)

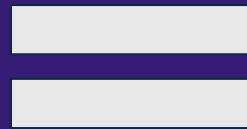




Mathematicians

According to middle school students participating at Math CEO

(only a few images are shown)



Creating a Mathematician:

Each of us will create a mathematician. Think about how your mathematician looks like. Include as many characteristics as you can to describe this personage. Fill out the table on the right, then draw a picture.

TABLE 1: YOUR MATHEMATICIAN	
Your mathematician's name:	Magical Unicorn
Your mathematician's pronouns:	Her/She
Where was your mathematician born?	Mississippi
Where does your mathematician work? (What do they do?)	They work at a school (high school)
Your mathematician's hobbies:	Eating, Drawing, running, playing guitar
Your mathematician's favorite accessories:	Rings

Miss Unicorn

Student Workbook

Creating a Mathematician:

Each of us will create a mathematician. Think about how your mathematician looks like. Include as many characteristics as you can to describe this personage. Fill out the table on the right, then draw a picture.

TABLE 1: YOUR MATHEMATICIAN	
Your mathematician's name:	Maya Carson
Your mathematician's pronouns:	She/Her
Where was your mathematician born?	Michigan
Where does your mathematician work? (What do they do?)	data analysis
Your mathematician's hobbies:	reading, playing cards, listening to music, going walks
Your mathematician's favorite accessories:	Jewelry, Handbags, Handwriting

Student Workbook

Creating a Mathematician:

Each of us will create a mathematician. Think about how your mathematician looks like. Include as many characteristics as you can to describe this personage. Fill out the table on the right, then draw a picture.

TABLE 1: YOUR MATHEMATICIAN	
Your mathematician's name:	Mathew
Your mathematician's pronouns:	he
Where was your mathematician born?	in a hospital
Where does your mathematician work? (What do they do?)	in a school, teach math
Your mathematician's hobbies:	Teaching math
Your mathematician's favorite accessories:	calculator, ruler

Student Workbook

Creating a Mathematician:

Each of us will create a mathematician. Think about how your mathematician looks like. Include as many characteristics as you can to describe this personage. Fill out the table on the right, then draw a picture.

TABLE 1: YOUR MATHEMATICIAN	
Your mathematician's name:	Nelson
Your mathematician's pronouns:	he/him
Where was your mathematician born?	Vancouver
Where does your mathematician work? (What do they do?)	tax collector
Your mathematician's hobbies:	solving puzzles, god watching shows
Your mathematician's favorite accessories:	sunglasses, neck tie, pen, water bottle

Student Workbook

Creating a Mathematician:

Each of us will create a mathematician. Think about how your mathematician looks like. Include as many characteristics as you can to describe this personage. Fill out the table on the right, then draw a picture.

TABLE 1: YOUR MATHEMATICIAN	
Your mathematician's name:	eric guy
Your mathematician's pronouns:	he/him
Where was your mathematician born?	LA
Where does your mathematician work? (What do they do?)	sciences/biologic
Your mathematician's hobbies:	drawing, music
Your mathematician's favorite accessories:	goggles, jewelry

Student Workbook

Creating a Mathematician:

Each of us will create a mathematician. Think about how your mathematician looks like. Include as many characteristics as you can to describe this personage. Fill out the table on the right, then draw a picture.

TABLE 1: YOUR MATHEMATICIAN	
Your mathematician's name:	Dr. Mathematician
Your mathematician's pronouns:	he/him
Where was your mathematician born?	Ohio
Where does your mathematician work? (What do they do?)	They work in Ohio, mostly solving complex math problems
Your mathematician's hobbies:	Art, Violin, Math
Your mathematician's favorite accessories:	His glasses, calculator

Student Workbook

Creating a Mathematician:

Each of us will create a mathematician. Think about how your mathematician looks like. Include as many characteristics as you can to describe this personage. Fill out the table on the right, then draw a picture.

TABLE 1: YOUR MATHEMATICIAN	
Your mathematician's name:	Elena
Your mathematician's pronouns:	she/her
Where was your mathematician born?	America
Where does your mathematician work? (What do they do?)	Engineering (Electrical)
Your mathematician's hobbies:	Embroidery, reading, music, crocheting
Your mathematician's favorite accessories:	2 pens & a pencil

Student Workbook

Creating a Mathematician:

Each of us will create a mathematician. Think about how your mathematician looks like. Include as many characteristics as you can to describe this personage. Fill out the table on the right, then draw a picture.

TABLE 1: YOUR MATHEMATICIAN	
Your mathematician's name:	Evelyn
Your mathematician's pronouns:	she
Where was your mathematician born?	California
Where does your mathematician work? (What do they do?)	CS/IT
Your mathematician's hobbies:	Reading
Your mathematician's favorite accessories:	sapphire earrings

Student Workbook

Creating a Mathematician:

Each of us will create a mathematician. Think about how your mathematician looks like. Include as many characteristics as you can to describe this personage. Fill out the table on the right, then draw a picture.

TABLE 1: YOUR MATHEMATICIAN	
Your mathematician's name:	Aapeli
Your mathematician's pronouns:	He/Him
Where was your mathematician born?	Finland, Northern Europe.
Where does your mathematician work? (What do they do?)	Seven eleven like the rest of us
Your mathematician's hobbies:	Tennis, Writing, Reading
Your mathematician's favorite accessories:	his party hat

Student Workbook

Creating a Mathematician:

Each of us will create a mathematician. Think about how your mathematician looks like. Include as many characteristics as you can to describe this personage. Fill out the table on the right, then draw a picture.

TABLE 1: YOUR MATHEMATICIAN	
Your mathematician's name:	Mr. Wang
Your mathematician's pronouns:	Mr./He
Where was your mathematician born?	Dongguan
Where does your mathematician work? (What do they do?)	Advocates
Your mathematician's hobbies:	describing items
Your mathematician's favorite accessories:	Shan pan fold counter

Student Workbook

Creating a Mathematician:

Each of us will create a mathematician. Think about how your mathematician looks like. Include as many characteristics as you can to describe this personage. Fill out the table on the right, then draw a picture.

TABLE 1: YOUR MATHEMATICIAN	
Your mathematician's name:	Kaylyn
Your mathematician's pronouns:	She/Her
Where was your mathematician born?	1996
Where does your mathematician work? (What do they do?)	Math teacher (9th grade) artist
Your mathematician's hobbies:	She loves calc, she loves cooking, she loves traveling
Your mathematician's favorite accessories:	Pretty glasses, Turtleneck, Little Hair Band/Hair Tie

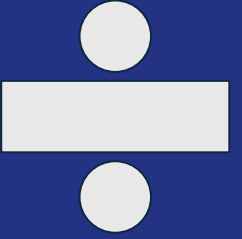
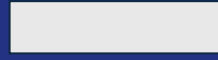
Student Workbook

Creating a Mathematician:

Each of us will create a mathematician. Think about how your mathematician looks like. Include as many characteristics as you can to describe this personage. Fill out the table on the right, then draw a picture.

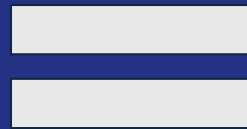
TABLE 1: YOUR MATHEMATICIAN	
Your mathematician's name:	Yakovlev with Dick the third
Your mathematician's pronouns:	He/Him
Where was your mathematician born?	Germany
Where does your mathematician work? (What do they do?)	A colleague
Your mathematician's hobbies:	Math, sleeping, sculpting
Your mathematician's favorite accessories:	glasses

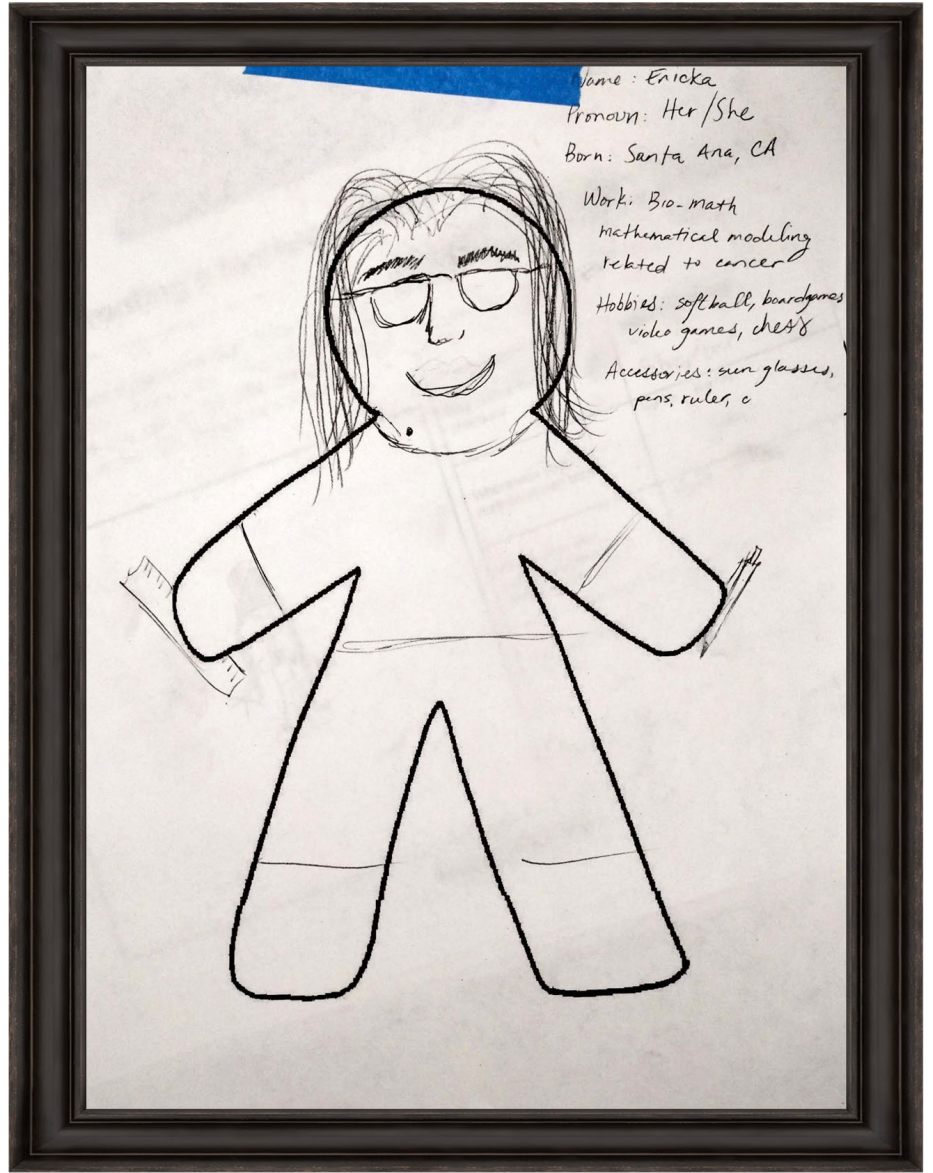
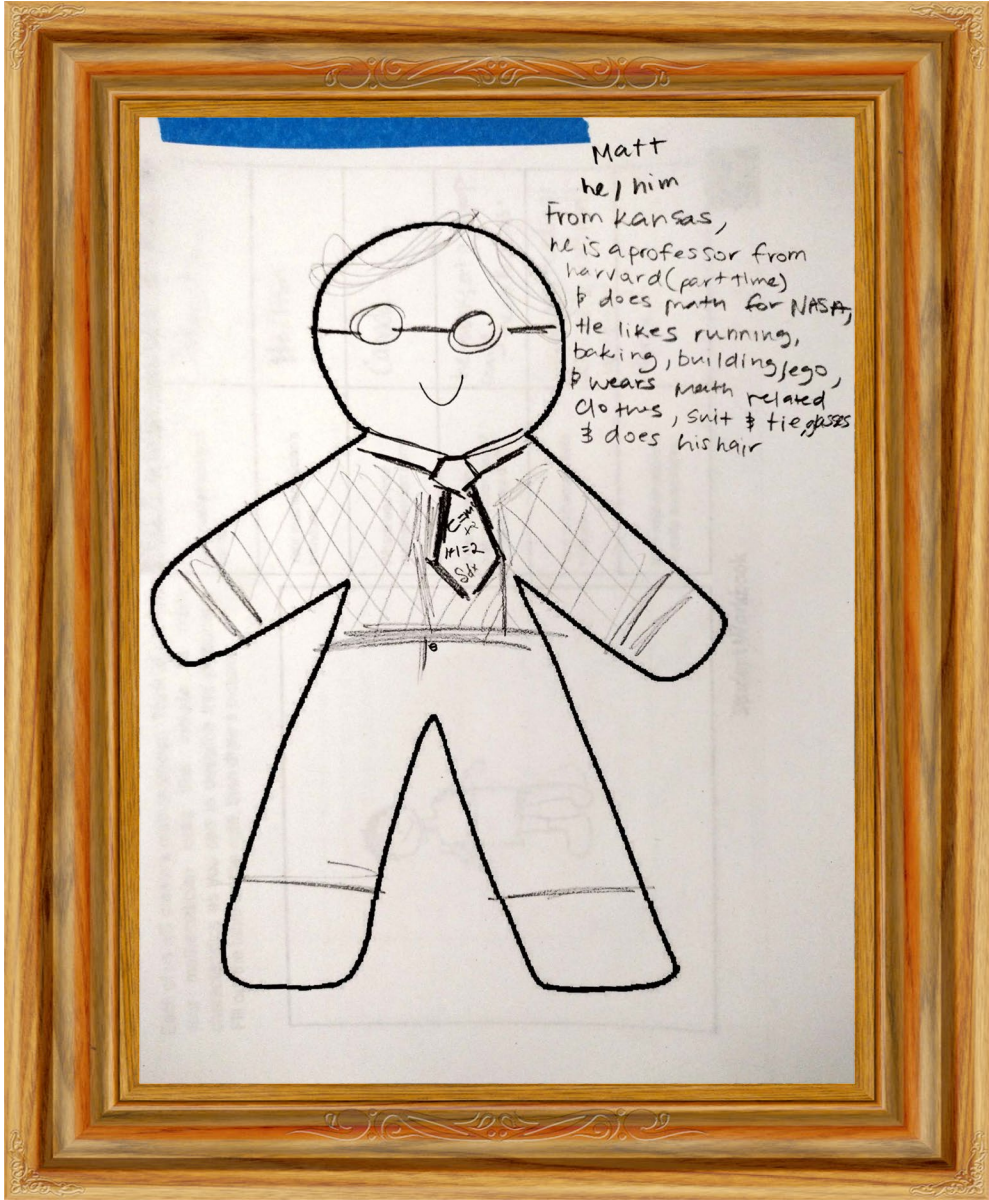
Student Workbook



Mathematicians

According to mentors participating at Math CEO







at **CSUDH** Math CEO

TABLE 2: OUR MATHEMATICIANS

OUR MATHEMATICIAN:		GENDER			TOTAL (by ethnicity or race) (D)	RATIO (ethnicity/race versus total) (E)	PERCENT (ethnicity/race versus total) (F)
		Male (A)	Female (B)	Non-binary (C)			
ETHNICITY	White/European American	10	0	1	11	1.1 : 4	27.5 %
	Black/African American	0	1	0	1	1 : 40	2.5 %
	Asian/Asian American/Pacific Islander	3	1	0	4	1 : 10	10 %
	Hispanic/Latinx	2	1	0	3	3 : 40	7.5 %
	Indigenous/Native Americans	0	0	0	0	0 : 40	0 %
	Middle Eastern/North African	0	0	0	0	0 : 40	0 %
	Mixed/Two or more identities	9	7	0	16	4 : 10	40 %
	Other/Unsure	3	2	0	5	1 : 8	12.5 %
(T) TOTAL (by gender)		27	12	1	40		
RATIO (gender versus total)		2.7 : 4	3 : 10	1 : 40			
PERCENT (gender versus total)		67.5 %	30 %	2.5 %			

This cell is the total number of our mathematicians. To find its value just add all the cells above it. What happens if you add the cells to the left of this cell?

CSUDH

&

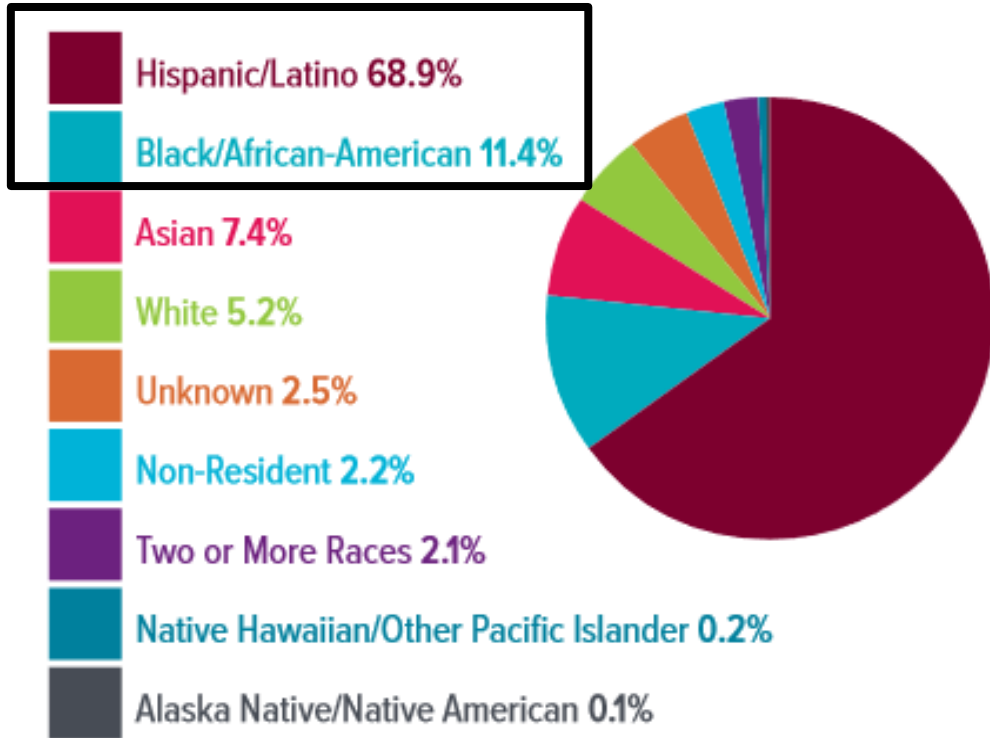
Peary Middle School



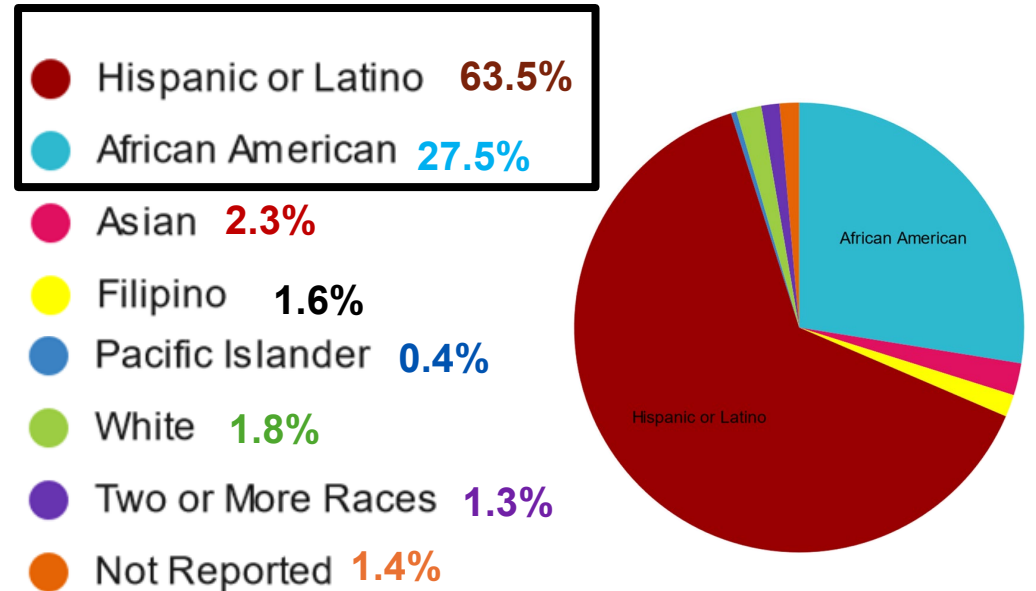
DEMOGRAPHICS

CSUDH Demographics (Possible Math CEO Mentors)

STUDENT POPULATION



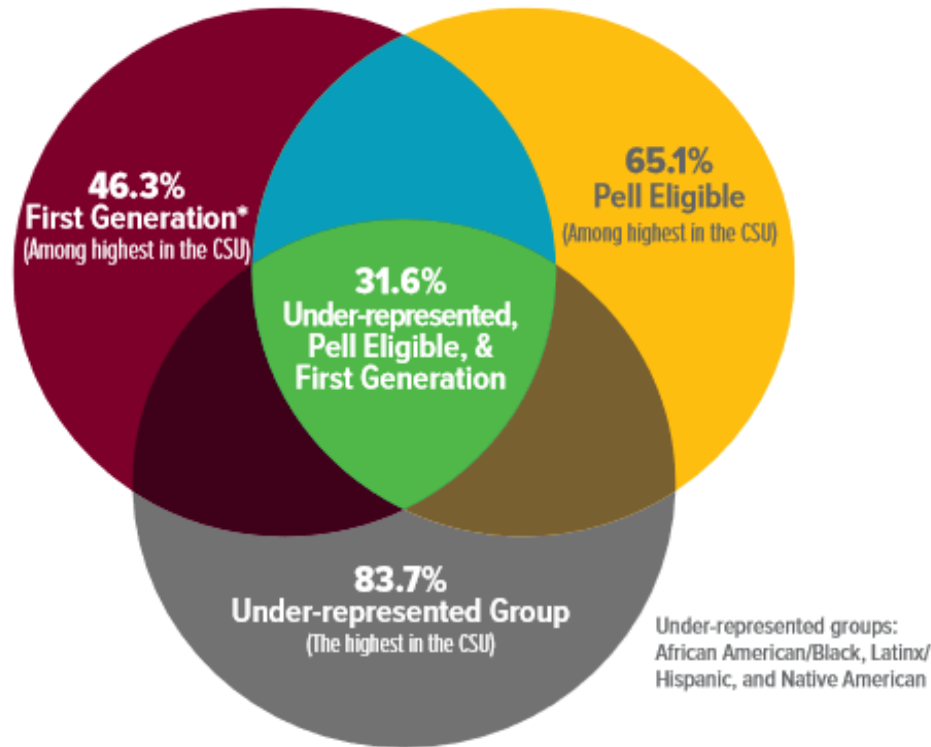
Peary Middle School Demographics (Possible Math CEO students)



Why CSUDH?

CSUDH Demographics (Possible Math CEO Mentors)

UNDERGRADUATE POPULATION



69% of students' parents have little or no college (The highest in the CSU)

19% first to attend college

Peary Middle School Demographics (Possible Math CEO students)

90.8%

Socioeconomically disadvantaged

Let's compare!

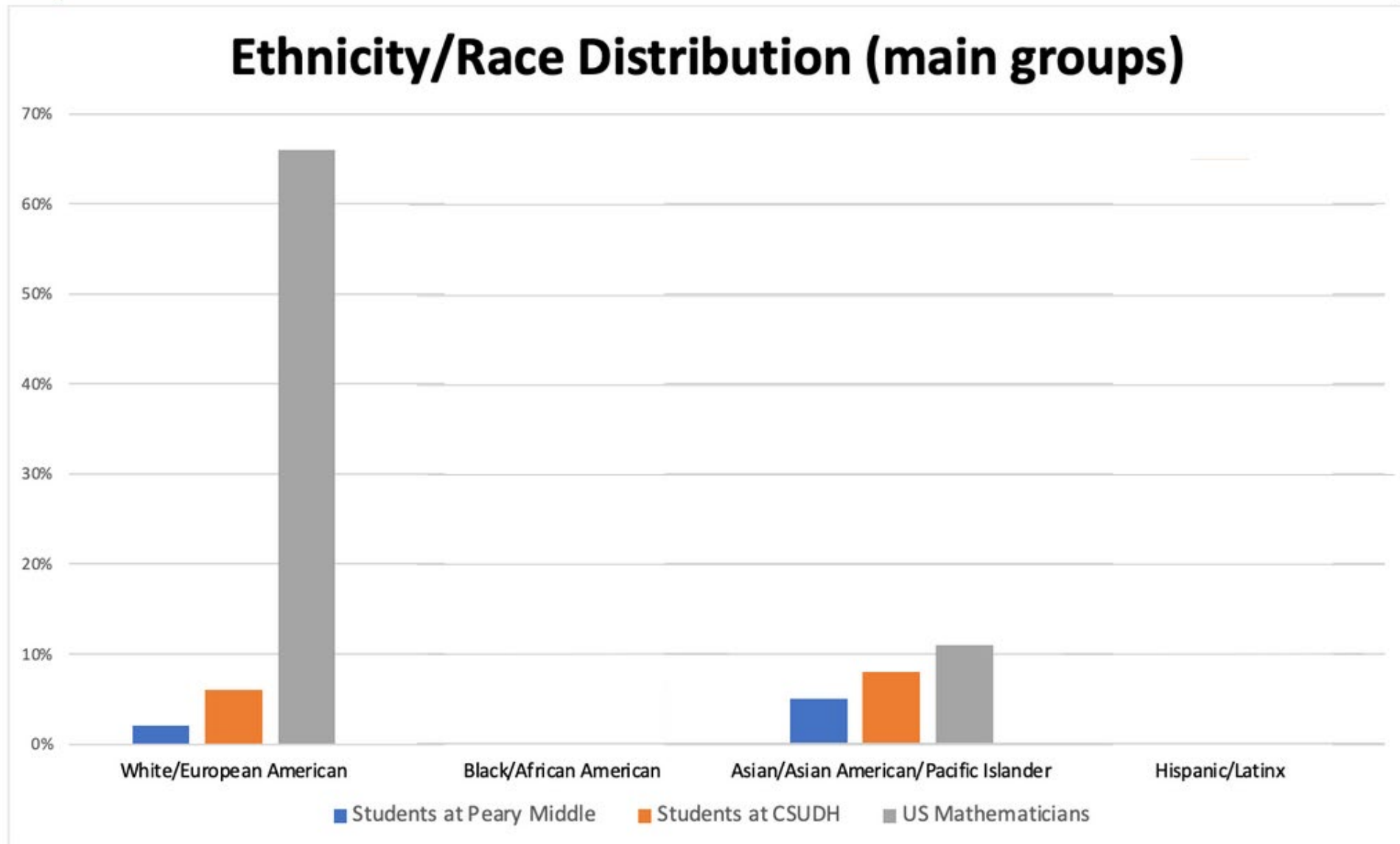
Copy the data from Table 2, column D and cells T -A and T -B, into the empty column of Table 3.

Compare the various ethnic and gender distributions. **What do you notice? What do you wonder?**

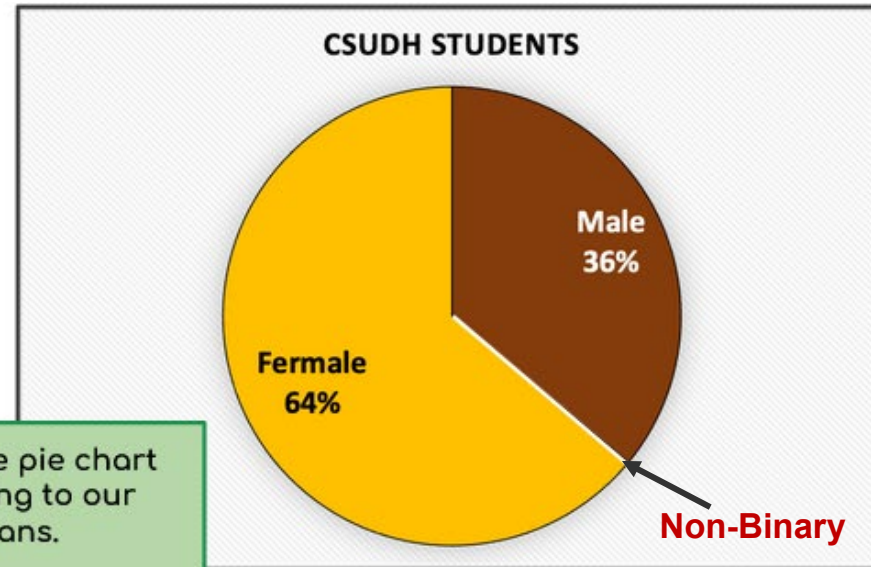
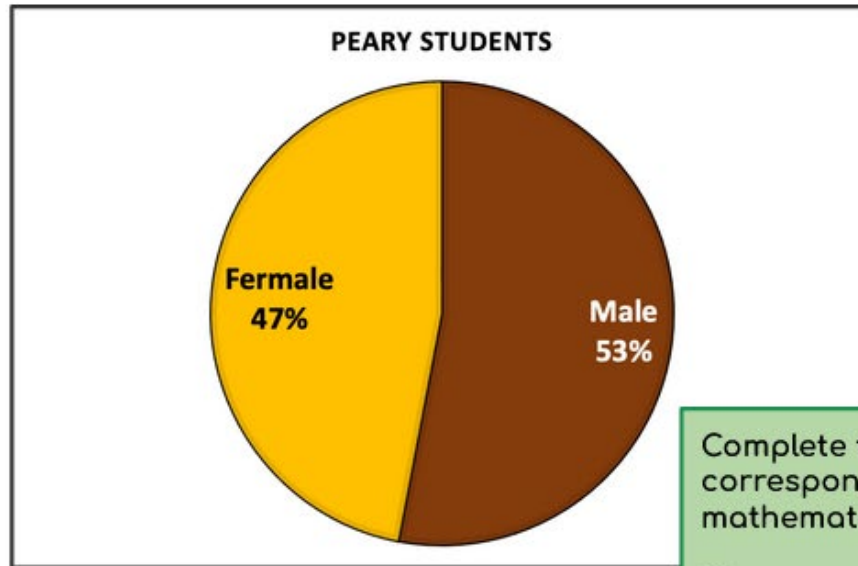
Which number is the biggest. In other words, which percentage actually represents the biggest number of people. Note: there are about 35K mathematicians in the world.

Table 3. MAIN RACE/ETHNICITY GROUPS COMPARISON					
		STUDENTS		MATHEMATICIANS	
		Peary Middle	CSUDH	In our views	In the U.S.
RACE/ ETHNICITY	White/European American	2%	6%	30%	66%
	Black/African American	26%	11%	2.5%	7%
	Asian/Asian American/Pacific Islander	5%	8%	10%	11%
	Hispanic/Latinx	64%	65%	5%	10%
	Indigenous/Native Americans	–	0.1%	0%	0.3%
GENDER	Male	53%	36%	67.5%	71%
	Female	47%	64%	30%	29%
	Non-Binary	?	0.2%	2.5%	?

Complete this bar diagram by drawing the columns corresponding to our Mathematician. What do you notice? What do you wonder?

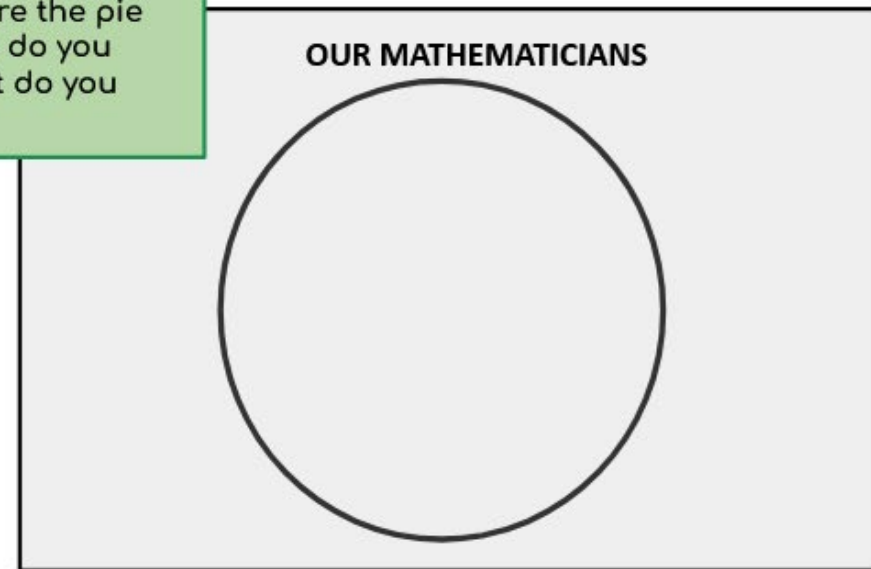
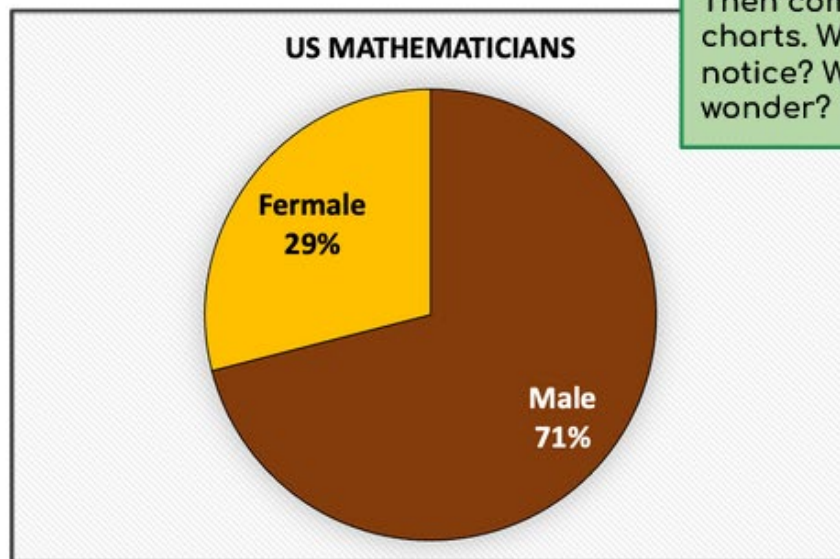


GENDER DISTRIBUTION (MAIN GROUPS)



Complete the pie chart corresponding to our mathematicians.

Then compare the pie charts. What do you notice? What do you wonder?



How many friends?

Paola, Devanté and Javi are counting the number of friends from different ethnicities that they, as a group, have.

For example, Paola has 3 Asian friends, Devanté has 1 Asian friend and Javi has none. Then, as a group, they have a total of 4 Asian friends.

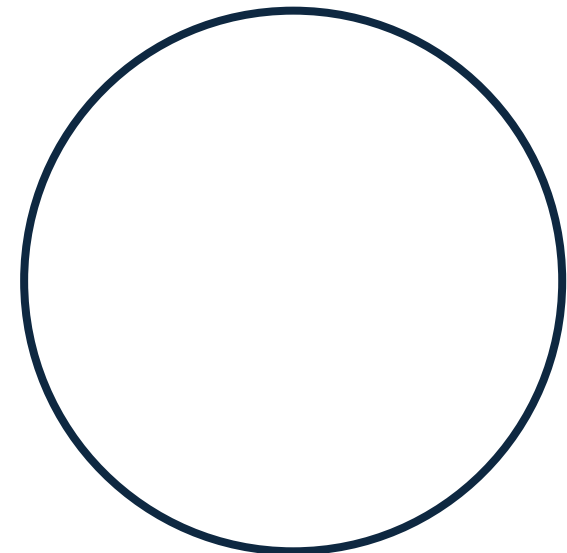
Let's count the number of friends we all have.

1. Work with your group and discover how many friends from different ethnicities you have as a group. Fill out the table on the right.

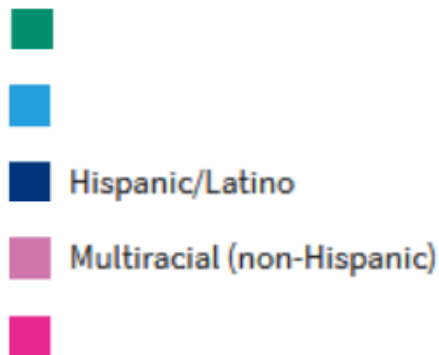
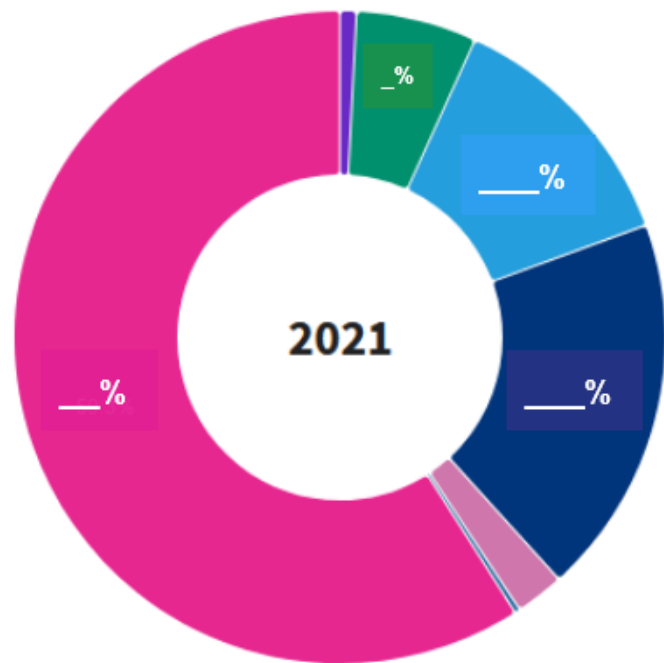
Pro Tip: *If you aren't sure, look at one of your social media accounts and count the first 10 who have responded to (commented, liked, etc.) your posts.*

2. Use the calculated Percentage of Friends in Table 4 to construct a pie chart. The pie pieces will visually compare ratios of ethnic groups.
3. Discuss what you notice or wonder about the friends you have as a group. Be prepared to share 1 thing that you learned.

Ethnic Group	Number of Friends	Percentage of Friends
White		
Asian		
Black		
Hispanic/Latino		
Total:		



Racial and ethnic makeup of the US



Game: Complete the table/pie chart solving the following puzzle:

- H** = % of Latino/Hispanic population in the U.S.
- A** = % of **A**sian (non-Hispanic) population in the U.S.
- B** = % of **B**lack (non-Hispanic) population in the U.S.
- W** = % of **W**hite (non-Hispanic) population in the U.S.
- O** = % of all **o**ther population in the U.S.

We know the following

1. $H + A + B + W + O = 100\%$
2. $H + A + B + W = 96.7\%$
3. $O + W = 65.2\%$
4. $W + B = 71.9\%$
5. $A + B = 18.5\%$
6. $A + H = 24.8\%$



(a) What are the values of

$H = \underline{\hspace{2cm}}$, $A = \underline{\hspace{2cm}}$, $B = \underline{\hspace{2cm}}$,

$W = \underline{\hspace{2cm}}$ and $O = \underline{\hspace{2cm}}?$

(a) With the help of your answer in part (a) complete all the missing information in the pie chart that is on the left.

Write a letter to share your chart & what you've learned

Options: Choose one of the following audience to write a letter to:

- 1) the next Math CEO cohort,
- 2) your teachers,
- 3) your parents, or
- 4) college students (including your mentors in this Math CEO program) who may hesitate in having a mathematics career because of who they are/where they come from.
- 5) Other (propose one!)

Summary of findings & reflections on representation, belonging in math communities, and seeing themselves as mathematicians? or being good doing math?

Dear _____ ,

“Who’s a Mathematician?” Dimensions

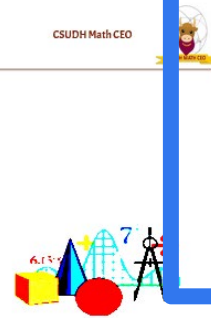
Students are active participants in their own learning

Students engage in social justice discussions about fairness and (lack of) privilege and representation

Students engage in deep mathematical thinking and are encouraged to meet high academic standards

Students grow in their cultural awareness, and value equity

1
One



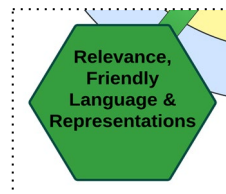
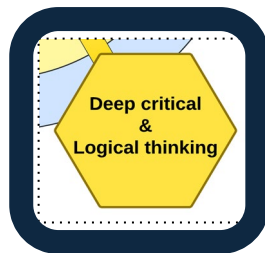
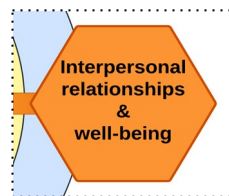
Who’s a Mathematician?

Meeting Number One



Mentor Workbook

1



This work was supported by



THANK YOU!



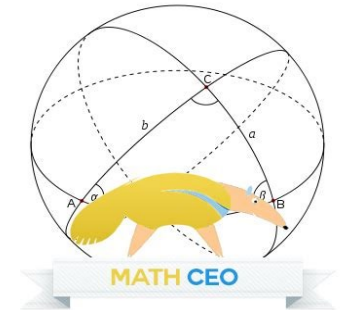
California Academic Partnership Program



Founded under grant
2229061.



University-Community Links



UCI Math CEO



1
One



Who's a Mathematician?

Meeting Number One



Use this QR code if you would like to access this booklet:

