Apportioning US Representatives
1 - Introduction

Warm-up: What is apportionment?

If you want to divide 8 feet of string equally among 3 people, then each one should receive ……………… feet of string.
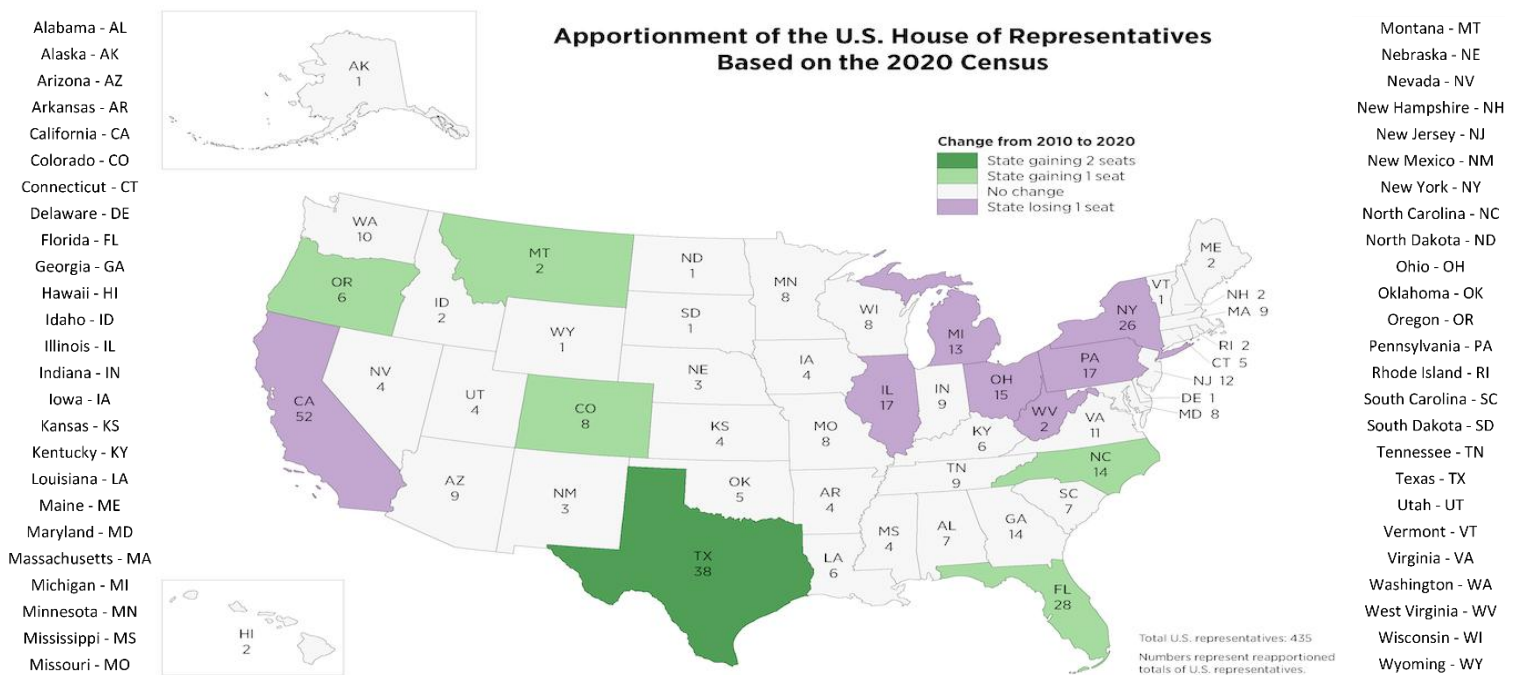
If you want to divide 8 dollars equally among 3 people, then …………………………………… …… ……

But what if instead of dividing feet or dollars, you want to divide animals? Or books? Or persons seating in the House of Representatives of the U.S. Congress?

The apportionment problem requires that we assign an **integral number of objects** to each recipient.

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Alabama - AL
Alaska - AK
Arizona - AZ
Arkansas - AR
California - CA
Colorado - CO
Connecticut - CT
Delaware - DE
Florida - FL
Georgia - GA
Hawaii - HI
Idaho - ID
Illinois - IL
Indiana - IN
Iowa - IA
Kansas - KS
Kentucky - KY
Louisiana - LA
Maine - ME
Maryland - MD
Massachusetts - MA
Michigan - MI
Minnesota - MN
Mississippi - MS
Missouri - MO

Montana - MT
Nebraska - NE
Nevada - NV
New Hampshire - NH
New Jersey - NJ
New Mexico - NM
New York - NY
North Carolina - NC
North Dakota - ND
Ohio - OH
Oklahoma - OK
Oregon - OR
Pennsylvania - PA
Rhode Island - RI
South Carolina - SC
South Dakota - SD
Tennessee - TN
Texas - TX
Utah - UT
Vermont - VT
Virginia - VA
Washington - WA
West Virginia - WV
Wisconsin - WI
Wyoming - WY

Apportionment of the U.S. House of Representatives Based on the 2020 Census

Change from 2010 to 2020
- State gaining 2 seats
- State gaining 1 seat
- No change
- State losing 1 seat

Total U.S. representatives: 435
Numbers represent reapportioned totals of U.S. representatives.

1) From the data in the map, list all the states that have at least 10 representatives in the current Congress:

…… …… …… …… …… ……

2) Circle those who have gained a seat, and underline those who have lost a seat.

What does the Constitution say?

United States Constitution (1787), Article 1, Section 2, Clause 3:

> *Representatives and direct Taxes shall be apportioned among the several States which may be included within this Union, according to their respective Numbers, which shall be determined by adding to the whole Number of free Persons, including those bound to Service for a Term of Years, and excluding Indians not taxed, three fifths of all other Persons. The actual Enumeration shall be made within three Years after the first Meeting of the Congress of the United States, and within every subsequent Term of ten Years, in such Manner as they shall by Law direct. The Number of Representatives shall not exceed one for every thirty Thousand, but each State shall have at Least one Representative.*

3) A bit of historical context: according to the Constitution, who should be included in or excluded from the count of inhabitants, and who are the other persons that only count for 3/5 of a regular person?

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4) A new census to count the population of each state must be done every …… years.

5) What are the three constraints written in the Constitution on the number of representatives?

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6) In the first census of 1790, the total number of free persons was 3,199,355. But the total apportionment population was 3,615,922.
How many slaves were counted in 1790 ?

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7) Taking that 3,615,922 number into account, what was the maximum number of representatives allowed by the Constitution in 1790?

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You try!

The following table shows the apportionment population for each of the 15 states that were part of the union in 1790 (listed roughly by their geographic location from north to south). Given that there can be at most "one representative per 30,000 persons," what ideas do you have about how to allocate 120 representatives among these states?

Try to come up with a method, to explain how it works, why it is fair, and if there are some difficulties.

State	Population	Number of representatives
Vermont (VT)	85,533	
New Hampshire (NH)	141,822	
Massachusetts (MA)	470,327	
Rhode Island (RI)	68,446	
Connecticut (CT)	236,841	
New York (NY)	331,589	
New Jersey (NJ)	179,570	
Pennsylvania (PA)	437,879	
Delaware (DE)	55,540	
Maryland (MD)	278,514	
Virginia (VA)	630,560	
Kentucky (KY)	68,705	
North Carolina (NC)	353,523	
South Carolina (SC)	206,236	
Georgia (GA)	70,835	
Total	**3,615,920**	

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