

## **How to Calculate the Apportionment Among States if House Membership Were Two, Three or Four Times as Large as the Existing Number of Representatives.**

Challenging the constitutionality of the House of Representatives is serious business. However, the analysis which supports the allegation is not complicated. Multiplying, dividing, and rounding are all that's required. The steps are spelled out so interested citizens can easily replicate the calculations using a separate spreadsheet for each hypothetical.

### **Step 1**

"Table 1. Apportionment Population and Number of Representatives by State: 2020 Census" (<https://www.census.gov/data/tables/2020/dec/2020-apportionment-data.html>) can be downloaded as an Excel spreadsheet.

- Column A: STATE
- Column B: APPORTIONMENT POPULATION (APRIL 1, 2020)
- Column C: NUMBER OF APPORTIONED REPRESENTATIVES BASED ON 2020 CENSUS
- Column D: CHANGE FROM 2010 CENSUS APPORTIONMENT

### **Step 2**

Delete Column C and Column D as well as Rows 1,2 & 3 and the footnotes.

### **Step3**

Now empty Column C: To produce each state's fraction of the total population, divide Column B by 331,108,434 (TOTAL APPORTIONMENT POPULATION on row 55)

### **Step 4**

Now empty Column D: To determine each state's hypothetical number of representatives, multiply Column C times the hypothetical total number of representatives:

- Double the House: 870 representatives
- Triple the House: 1,305 representatives
- Quadruple the House: 1,740 representatives

### **Step 5**

Column E: Since representatives are measured in whole numbers, in this column round the numbers in Column D. Recommend using the Excel round function, but can be done manually.

### **Step 6**

Column F: Underlying the numbers in Column E are formulas. To change the formulas to integers, copy all the numbers in the Column E and paste them into Column F using the Paste Values option.

### **Step 7**

Column G: To calculate the average district size for each state, divide the number of representatives (Column F) into the state's population ( Column B). The district size is the number of constituents per representative. To conform to the Constitution, the number should be roughly equal for each state.

### **Step 8**

Select Columns A through G for all 50 states and sort based on the value in Column G. This makes it easier to see the degree to which district sizes vary from state to state. Excel has a sort function. Manual sorting is, of course, possible, but not recommended

The spreadsheets on the following pages:

- The official 2020 Census apportionment
- Calculations for hypothetical 870 member House, double the current size
- Calculations for hypothetical 1,305 member House, triple the current size
- Calculations for hypothetical 1,740 member House, quadruple the current size

To test the calculations without recomputing them, take your own state and walk it through the steps. Compare your results with the relevant spreadsheets.

Table 1. APPORTIONMENT POPULATION AND NUMBER OF REPRESENTATIVES BY STATE: 2020 CENSUS

STATE	APPORTIONMENT POPULATION (APRIL 1, 2020)	NUMBER OF APPORTIONED REPRESENTATIVES BASED ON 2020 CENSUS <sup>2</sup>	CHANGE FROM 2010 CENSUS APPORTIONMENT
Alabama	5,030,053	7	0
Alaska	736,081	1	0
Arizona	7,158,923	9	0
Arkansas	3,013,756	4	0
California	39,576,757	52	-1
Colorado	5,782,171	8	1
Connecticut	3,608,298	5	0
Delaware	990,837	1	0
Florida	21,570,527	28	1
Georgia	10,725,274	14	0
Hawaii	1,460,137	2	0
Idaho	1,841,377	2	0
Illinois	12,822,739	17	-1
Indiana	6,790,280	9	0
Iowa	3,192,406	4	0
Kansas	2,940,865	4	0
Kentucky	4,509,342	6	0
Louisiana	4,661,468	6	0
Maine	1,363,582	2	0
Maryland	6,185,278	8	0
Massachusetts	7,033,469	9	0
Michigan	10,084,442	13	-1
Minnesota	5,709,752	8	0
Mississippi	2,963,914	4	0
Missouri	6,160,281	8	0
Montana	1,085,407	2	1
Nebraska	1,963,333	3	0
Nevada	3,108,462	4	0
New Hampshire	1,379,089	2	0
New Jersey	9,294,493	12	0
New Mexico	2,120,220	3	0
New York	20,215,751	26	-1
North Carolina	10,453,948	14	1
North Dakota	779,702	1	0
Ohio	11,808,848	15	-1
Oklahoma	3,963,516	5	0
Oregon	4,241,500	6	1
Pennsylvania	13,011,844	17	-1
Rhode Island	1,098,163	2	0
South Carolina	5,124,712	7	0
South Dakota	887,770	1	0
Tennessee	6,916,897	9	0
Texas	29,183,290	38	2
Utah	3,275,252	4	0
Vermont	643,503	1	0
Virginia	8,654,542	11	0
Washington	7,715,946	10	0
West Virginia	1,795,045	2	-1
Wisconsin	5,897,473	8	0
Wyoming	577,719	1	0
TOTAL APPORTIONMENT POPULATION <sup>1</sup>	331,108,434	435	

<sup>1</sup> Includes the resident population for the 50 states, as ascertained by the Twenty-Fourth Decennial Census under Title 13, United States Code, and counts of U.S. military and federal civilian employees living overseas (and their dependents living with them overseas) allocated to their home state, as reported by the employing federal agencies. The apportionment population excludes the population of the District of Columbia. The counts of overseas personnel (and dependents) are used for apportionment purposes only.

<sup>2</sup> The U.S. Census Bureau prepared these calculations using the existing size of the U.S. House of Representatives (435 members) and the Method of Equal Proportions, as provided for in Title 2, United States Code, Sections 2a and 2b.

## Hypothetical Apportionment for 870 Representatives

STATE	APPORTIONMENT NT POPULATION (APRIL 1, 2020)	FRACTION OF TOTAL POPULATION	870 REPS ALLOCATED BASED ON POPULATION	ALLOCATION ROUNDED TO WHOLE NUMBER	CONVERT FORMULA TO INTEGER	STATE'S AVERAGE DISTRICT SIZE
Wyoming	577,719	0.001744803	1.517978639	2	2	288,860
Vermont	643,503	0.001943481	1.6908286	2	2	321,752
Delaware	990,837	0.002992485	2.603461892	3	3	330,279
Maine	1,363,582	0.004118234	3.582863552	4	4	340,896
New Hampshire	1,379,089	0.004165068	3.623608784	4	4	344,772
New Mexico	2,120,220	0.006403401	5.570958667	6	6	353,370
West Virginia	1,795,045	0.005421321	4.71654899	5	5	359,009
Montana	1,085,407	0.003278101	2.851948163	3	3	361,802
Utah	3,275,252	0.009891781	8.605849164	9	9	363,917
Hawaii	1,460,137	0.004409845	3.836565486	4	4	365,034
Rhode Island	1,098,163	0.003316626	2.885465038	3	3	366,054
Kansas	2,940,865	0.008881879	7.727234607	8	8	367,608
Alaska	736,081	0.002223081	1.934080815	2	2	368,041
Idaho	1,841,377	0.005561251	4.838288082	5	5	368,275
Mississippi	2,963,914	0.00895149	7.787796731	8	8	370,489
Kentucky	4,509,342	0.013618928	11.84846756	12	12	375,779
Virginia	8,654,542	0.02613809	22.74013817	23	23	376,284
Arkansas	3,013,756	0.009102021	7.918758481	8	8	376,720
Arizona	7,158,923	0.021621083	18.81034238	19	19	376,785
Illinois	12,822,739	0.038726706	33.69223428	34	34	377,139
Indiana	6,790,280	0.020507723	17.84171889	18	18	377,238
Florida	21,570,527	0.065146414	56.67737986	57	57	378,430
Texas	29,183,290	0.088138166	76.6802041	77	77	379,004
California	39,576,757	0.119528085	103.9894338	104	104	380,546
Minnesota	5,709,752	0.017244357	15.00259048	15	15	380,650
Ohio	11,808,848	0.035664594	31.02819713	31	31	380,931
New York	20,215,751	0.061054775	53.11765441	53	53	381,429
Pennsylvania	13,011,844	0.039297833	34.18911486	34	34	382,701
Georgia	10,725,274	0.032392029	28.18106524	28	28	383,046
Tennessee	6,916,897	0.020890126	18.17440987	18	18	384,272
Missouri	6,160,281	0.018605026	16.18637256	16	16	385,018
Colorado	5,782,171	0.017463074	15.19287416	15	15	385,478
Oregon	4,241,500	0.012810003	11.14470252	11	11	385,591
Washington	7,715,946	0.023303381	20.2739415	20	20	385,797
Maryland	6,185,278	0.018680521	16.25205313	16	16	386,580
Alabama	5,030,053	0.015191558	13.21665551	13	13	386,927
North Carolina	10,453,948	0.031572581	27.46814586	27	27	387,183
New Jersey	9,294,493	0.028070843	24.42163376	24	24	387,271
Michigan	10,084,442	0.030456615	26.49725479	26	26	387,863
Louisiana	4,661,468	0.014078373	12.24818441	12	12	388,456
Nevada	3,108,462	0.009388048	8.167602097	8	8	388,558
North Dakota	779,702	0.002354824	2.048696651	2	2	389,851
Massachusetts	7,033,469	0.021242192	18.48070723	18	18	390,748
Nebraska	1,963,333	0.005929577	5.158732109	5	5	392,667
Wisconsin	5,897,473	0.017811304	15.49583455	15	15	393,165
South Carolina	5,124,712	0.015477443	13.46537564	13	13	394,209
Oklahoma	3,963,516	0.011970447	10.41428899	10	10	396,352
Iowa	3,192,406	0.009641573	8.388168149	8	8	399,051
Connecticut	3,608,298	0.010897632	9.480940193	9	9	400,922
South Dakota	887,770	0.002681206	2.33264943	2	2	443,885
TOTAL	331,108,434	1	870	869	869	

## Hypothetical Apportionment for 1,305 Representatives

STATE	APPORTIONMENT POPULATION (APRIL 1, 2020)	FRACTION OF TOTAL POPULATION	1305 REPS ALLOCATED BASED ON POPULATION	ALLOCATION ROUNDED TO WHOLE NUMBER	CONVERT FORMULA TO INTEGER	STATE'S AVERAGE DISTRICT SIZE
Vermont	643,503	0.001943481	2.5362429	3	3	214,501
Hawaii	1,460,137	0.004409845	5.754848229	6	6	243,356
Kansas	2,940,865	0.008881879	11.59085191	12	12	245,072
Alaska	736,081	0.002223081	2.901121223	3	3	245,360
Nebraska	1,963,333	0.005929577	7.738098163	8	8	245,417
Iowa	3,192,406	0.009641573	12.582252222	13	13	245,570
Mississippi	2,963,914	0.00895149	11.6816951	12	12	246,993
Delaware	990,837	0.002992485	3.905192838	4	4	247,709
Oklahoma	3,963,516	0.011970447	15.62143349	16	16	247,720
Minnesota	5,709,752	0.017244357	22.50388572	23	23	248,250
Oregon	4,241,500	0.012810003	16.71705379	17	17	249,500
Kentucky	4,509,342	0.013618928	17.77270134	18	18	250,519
Arkansas	3,013,756	0.009102021	11.87813772	12	12	251,146
Massachusetts	7,033,469	0.021242192	27.72106084	28	28	251,195
New Jersey	9,294,493	0.028070843	36.63245064	37	37	251,203
Ohio	11,808,848	0.035664594	46.54229569	47	47	251,252
Colorado	5,782,171	0.017463074	22.78931124	23	23	251,399
Illinois	12,822,739	0.038726706	50.53835142	51	51	251,426
Indiana	6,790,280	0.020507723	26.76257833	27	27	251,492
Alabama	5,030,053	0.015191558	19.82498327	20	20	251,503
Utah	3,275,252	0.009891781	12.90877375	13	13	251,942
Michigan	10,084,442	0.030456615	39.74588219	40	40	252,111
New York	20,215,751	0.061054775	79.67648162	80	80	252,697
California	39,576,757	0.119528085	155.9841508	156	156	253,697
Texas	29,183,290	0.088138166	115.0203062	115	115	253,768
Florida	21,570,527	0.065146414	85.0160698	85	85	253,771
Virginia	8,654,542	0.02613809	34.11020726	34	34	254,545
North Carolina	10,453,948	0.031572581	41.20221879	41	41	254,974
Pennsylvania	13,011,844	0.039297833	51.28367228	51	51	255,134
Georgia	10,725,274	0.032392029	42.27159786	42	42	255,364
Arizona	7,158,923	0.021621083	28.21551358	28	28	255,676
Tennessee	6,916,897	0.020890126	27.2616148	27	27	256,181
South Carolina	5,124,712	0.015477443	20.19806345	20	20	256,236
Wisconsin	5,897,473	0.017811304	23.24375182	23	23	256,412
West Virginia	1,795,045	0.005421321	7.074823485	7	7	256,435
Missouri	6,160,281	0.018605026	24.27955884	24	24	256,678
Washington	7,715,946	0.023303381	30.41091225	30	30	257,198
Maryland	6,185,278	0.018680521	24.37807969	24	24	257,720
Connecticut	3,608,298	0.010897632	14.22141029	14	14	257,736
Louisiana	4,661,468	0.014078373	18.37227662	18	18	258,970
Nevada	3,108,462	0.009388048	12.25140315	12	12	259,039
North Dakota	779,702	0.002354824	3.073044977	3	3	259,901
Idaho	1,841,377	0.005561251	7.257432123	7	7	263,054
New Mexico	2,120,220	0.006403401	8.356438	8	8	265,028
Montana	1,085,407	0.003278101	4.277922244	4	4	271,352
Maine	1,363,582	0.004118234	5.374295328	5	5	272,716
Rhode Island	1,098,163	0.003316626	4.328197557	4	4	274,541
New Hampshire	1,379,089	0.004165068	5.435413176	5	5	275,818
Wyoming	577,719	0.001744803	2.276967958	2	2	288,860
South Dakota	887,770	0.002681206	3.498974146	3	3	295,923
TOTAL APPORTIONMENT	331,108,434	1	1305	1305	1305	

# Hypothetical Apportionment for 1,740 Representatives

STATE	APPORTIONMENT POPULATION (APRIL 1, 2020)	FRACTION OF TOTAL POPULATION	1,740 REPS ALLOCATED BASED ON POPULATION	ALLOCATION ROUNDED TO WHOLE NUMBER	CONVERT FORMULA TO INTEGER	STATE'S AVERAGE DISTRICT SIZE
South Dakota	887,770	0.002681206	4.665298861	5	5	177,554
Montana	1,085,407	0.003278101	5.703896325	6	6	180,901
Hawaii	1,460,137	0.004409845	7.673130972	8	8	182,517
Rhode Island	1,098,163	0.003316626	5.770930075	6	6	183,027
Alaska	736,081	0.002223081	3.868161631	4	4	184,020
Idaho	1,841,377	0.005561251	9.676576164	10	10	184,138
Mississippi	2,963,914	0.00895149	15.57559346	16	16	185,245
Maryland	6,185,278	0.018680521	32.50410625	33	33	187,433
Iowa	3,192,406	0.009641573	16.7763363	17	17	187,789
Kentucky	4,509,342	0.013618928	23.69693513	24	24	187,889
Washington	7,715,946	0.023303381	40.54788299	41	41	188,194
Arkansas	3,013,756	0.009102021	15.83751696	16	16	188,360
Arizona	7,158,923	0.021621083	37.62068477	38	38	188,393
Indiana	6,790,280	0.020507723	35.68343777	36	36	188,619
Oklahoma	3,963,516	0.011970447	20.82857799	21	21	188,739
New Jersey	9,294,493	0.028070843	48.84326752	49	49	189,684
South Carolina	5,124,712	0.015477443	26.93075127	27	27	189,804
Connecticut	3,608,298	0.010897632	18.96188039	19	19	189,910
North Carolina	10,453,948	0.031572581	54.93629172	55	55	190,072
Massachusetts	7,033,469	0.021242192	36.96141446	37	37	190,094
Wisconsin	5,897,473	0.017811304	30.99166909	31	31	190,241
Michigan	10,084,442	0.030456615	52.99450959	53	53	190,272
California	39,576,757	0.119528085	207.9788677	208	208	190,273
Minnesota	5,709,752	0.017244357	30.00518096	30	30	190,325
Ohio	11,808,848	0.035664594	62.05639425	62	62	190,465
New York	20,215,751	0.061054775	106.2353088	106	106	190,715
Texas	29,183,290	0.088138166	153.3604082	153	153	190,740
Florida	21,570,527	0.065146414	113.3547597	113	113	190,890
Pennsylvania	13,011,844	0.039297833	68.37822971	68	68	191,351
Illinois	12,822,739	0.038726706	67.38446856	67	67	191,384
Georgia	10,725,274	0.032392029	56.36213048	56	56	191,523
Tennessee	6,916,897	0.020890126	36.34881973	36	36	192,136
Virginia	8,654,542	0.02613809	45.48027635	45	45	192,323
Missouri	6,160,281	0.018605026	32.37274512	32	32	192,509
Wyoming	577,719	0.001744803	3.035957278	3	3	192,573
Utah	3,275,252	0.009891781	17.21169833	17	17	192,662
Colorado	5,782,171	0.017463074	30.38574831	30	30	192,739
New Mexico	2,120,220	0.006403401	11.14191733	11	11	192,747
Oregon	4,241,500	0.012810003	22.28940505	22	22	192,795
Alabama	5,030,053	0.015191558	26.43331103	26	26	193,464
Louisiana	4,661,468	0.014078373	24.49636882	24	24	194,228
Nevada	3,108,462	0.009388048	16.33520419	16	16	194,279
Maine	1,363,582	0.004118234	7.165727104	7	7	194,797
North Dakota	779,702	0.002354824	4.097393303	4	4	194,926
Kansas	2,940,865	0.008881879	15.45446921	15	15	196,058
Nebraska	1,963,333	0.005929577	10.31746422	10	10	196,333
New Hampshire	1,379,089	0.004165068	7.247217569	7	7	197,013
Delaware	990,837	0.002992485	5.206923784	5	5	198,167
West Virginia	1,795,045	0.005421321	9.43309798	9	9	199,449
Vermont	643,503	0.001943481	3.381657201	3	3	214,501
TOTAL APPORTIONMI	331,108,434	1	1740	1737	1737	