Math, Economics

Below are some tables comparing state populations with annual Carbon Dioxide emissions. Have your students complete the exercises and answer the questions at the bottom.

Table 1: Sorted by Population, Higest to Lowest

State	Total Population	Land Area (square miles)	Population Density (per square mile)	Residential Annual CO_2 Emissions (metric tons)	Per Capita CO2 Emissions (metric tons)
California	33,871,648	155,959.34	217.2	27,520,000.00	0.81247892
Texas	20,851,820	261,797.12	79.6	13,020,000.00	0.624405927
New York	18,976,457	47,213.79	401.9	39,060,000.00	2.058339974
Florida	15,982,378	53,926.82	296.4	1,980,000.00	0.123886445
Illinois	12,419,293	55,583.58	223.4	26,710,000.00	2.150686033
Pennsylvania	12,281,054	44,816.61	274	25,550,000.00	2.080440327
Ohio	11,353,140	40,948.38	277.3	21,880,000.00	1.927220135
Michigan	9,938,444	56,803.82	175	24,010,000.00	2.415871136
New Jersey	8,414,350	7,417.34	1,134.40	16,910,000.00	2.009662065
Georgia	8,186,453	57,906.14	141.4	8,740,000.00	1.067617441
North Carolina	8,049,313	48,710.88	165.2	7,260,000.00	0.901940327
Virginia	7,078,515	39,594.07	178.8	8,230,000.00	1.162673244
Massachusetts	6,349,097	7,840.02	809.8	15,420,000.00	2.428691828
Indiana	6,080,485	35,866.90	169.5	10,490,000.00	1.725191329
Washington	5,894,121	66,544.06	88.6	5,180,000.00	0.878841815
Tennessee	5,689,283	41,217.12	138	4,790,000.00	0.841933861
Missouri	5,595,211	68,885.93	81.2	7,740,000.00	1.383325848
Wisconsin	5,363,675	54,310.10	98.8	10,040,000.00	1.871850923
Maryland	5,296,486	9,773.82	541.9	7,170,000.00	1.353727736
Arizona	5,130,632	113,634.57	45.2	2,140,000.00	0.41710261
Minnesota	4,919,479	79,610.08	61.8	9,170,000.00	1.864018527
Louisiana	4,468,976	43,561.85	102.6	3,320,000.00	0.742899492
Alabama	4,447,100	50,744.00	87.6	3,770,000.00	0.847743473
Colorado	4,301,261	103,717.53	41.5	6,830,000.00	1.58790643
Kentucky	4,041,769	39,728.18	101.7	4,580,000.00	1.133167185
South Carolina	4,012,012	30,109.47	133.2	2,510,000.00	0.625621259
Oklahoma	3,450,654	68,667.06	50.3	4,180,000.00	1.21136457
Oregon	3,421,399	95,996.79	35.6	2,740,000.00	0.800841995
Connecticut	3,405,565	4,844.80	702.9	8,600,000.00	2.525278478
Iowa	2,926,324	55,869.36	52.4	5,410,000.00	1.84873582
Mississippi	2,844,658	46,906.96	60.6	2,410,000.00	0.847202019
Kansas	2,688,418	81,814.88	32.9	4,360,000.00	1.621771614
Arkansas	2,673,400	52,068.17	51.3	2,900,000.00	1.084760979
Utah	2,233,169	82,143.65	27.2	3,270,000.00	1.46428685

Nevada	1,998,257	109,825.99	18.2	1,840,000.00	0.920802479
New Mexico	1,819,046	121,355.53	15	2,310,000.00	1.269896418
West Virginia	1,808,344	24,077.73	75.1	2,370,000.00	1.310591348
Nebraska	1,711,263	76,872.41	22.3	2,700,000.00	1.577782024
Idaho	1,293,953	82,747.21	15.6	1,540,000.00	1.19015142
Maine	1,274,923	30,861.55	41.3	3,920,000.00	3.074695491
New Hampshire	1,235,786	8,968.10	137.8	2,910,000.00	2.354776636
Hawaii	1,211,537	6,422.62	188.6	130,000.00	0.107301717
Rhode Island	1,048,319	1,044.93	1,003.20	2,500,000.00	2.384770285
Montana	902,195	145,552.43	6.2	1,370,000.00	1.518518724
Delaware	783,600	1,953.56	401.1	1,220,000.00	1.556916794
South Dakota	754,844	75,884.64	9.9	1,200,000.00	1.589732448
North Dakota	642,200	68,975.93	9.3	1,260,000.00	1.962005606
Alaska	626,932	571,951.26	1.1	1,510,000.00	2.408554676
Vermont	608,827	9,249.56	65.8	1,620,000.00	2.660854397
District of Columbia	572,059	61.4	9,316.40	930,000.00	1.625706439
Wyoming	493,782	97,100.40	5.1	830,000.00	1.680903719

Table 2: Sorted by Residential Annual Emissions, Highest to Lowest

State	Total Population	Land Area (square miles)	Population Density (per square mile)	Residential Annual CO_2 Emissions (metric tons)	Per Capita CO2 Emissions (metric tons)
New York	18,976,457	47,213.79	401.9	39,060,000.00	2.058339974
California	33,871,648	155,959.34	217.2	27,520,000.00	0.81247892
Illinois	12,419,293	55,583.58	223.4	26,710,000.00	2.150686033
Pennsylvania	12,281,054	44,816.61	274	25,550,000.00	2.080440327
Michigan	9,938,444	56,803.82	175	24,010,000.00	2.415871136
Ohio	11,353,140	40,948.38	277.3	21,880,000.00	1.927220135
New Jersey	8,414,350	7,417.34	1,134.40	16,910,000.00	2.009662065
Massachusetts	6,349,097	7,840.02	809.8	15,420,000.00	2.428691828
Texas	20,851,820	261,797.12	79.6	13,020,000.00	0.624405927
Indiana	6,080,485	35,866.90	169.5	10,490,000.00	1.725191329
Wisconsin	5,363,675	54,310.10	98.8	10,040,000.00	1.871850923
Minnesota	4,919,479	79,610.08	61.8	9,170,000.00	1.864018527
Georgia	8,186,453	57,906.14	141.4	8,740,000.00	1.067617441
Connecticut	3,405,565	4,844.80	702.9	8,600,000.00	2.525278478
Virginia	7,078,515	39,594.07	178.8	8,230,000.00	1.162673244
Missouri	5,595,211	68,885.93	81.2	7,740,000.00	1.383325848
North Carolina	8,049,313	48,710.88	165.2	7,260,000.00	0.901940327
Maryland	5,296,486	9,773.82	541.9	7,170,000.00	1.353727736
Colorado	4,301,261	103,717.53	41.5	6,830,000.00	1.58790643
Iowa	2,926,324	55,869.36	52.4	5,410,000.00	1.84873582

Washington	5,894,121	66,544.06	88.6	5,180,000.00	0.878841815
Tennessee	5,689,283	41,217.12	138	4,790,000.00	0.841933861
Kentucky	4,041,769	39,728.18	101.7	4,580,000.00	1.133167185
Kansas	2,688,418	81,814.88	32.9	4,360,000.00	1.621771614
Oklahoma	3,450,654	68,667.06	50.3	4,180,000.00	1.21136457
Maine	1,274,923	30,861.55	41.3	3,920,000.00	3.074695491
Alabama	4,447,100	50,744.00	87.6	3,770,000.00	0.847743473
Louisiana	4,468,976	43,561.85	102.6	3,320,000.00	0.742899492
Utah	2,233,169	82,143.65	27.2	3,270,000.00	1.46428685
New Hampshire	1,235,786	8,968.10	137.8	2,910,000.00	2.354776636
Arkansas	2,673,400	52,068.17	51.3	2,900,000.00	1.084760979
Oregon	3,421,399	95,996.79	35.6	2,740,000.00	0.800841995
Nebraska	1,711,263	76,872.41	22.3	2,700,000.00	1.577782024
South Carolina	4,012,012	30,109.47	133.2	2,510,000.00	0.625621259
Rhode Island	1,048,319	1,044.93	1,003.20	2,500,000.00	2.384770285
Mississippi	2,844,658	46,906.96	60.6	2,410,000.00	0.847202019
West Virginia	1,808,344	24,077.73	75.1	2,370,000.00	1.310591348
New Mexico	1,819,046	121,355.53	15	2,310,000.00	1.269896418
Arizona	5,130,632	113,634.57	45.2	2,140,000.00	0.41710261
Florida	15,982,378	53,926.82	296.4	1,980,000.00	0.123886445
Nevada	1,998,257	109,825.99	18.2	1,840,000.00	0.920802479
Vermont	608,827	9,249.56	65.8	1,620,000.00	2.660854397
Idaho	1,293,953	82,747.21	15.6	1,540,000.00	1.19015142
Alaska	626,932	571,951.26	1.1	1,510,000.00	2.408554676
Montana	902,195	145,552.43	6.2	1,370,000.00	1.518518724
North Dakota	642,200	68,975.93	9.3	1,260,000.00	1.962005606
Delaware	783,600	1,953.56	401.1	1,220,000.00	1.556916794
South Dakota	754,844	75,884.64	9.9	1,200,000.00	1.589732448
District of Columbia	572,059	61.4	9,316.40	930,000.00	1.625706439
Wyoming	493,782	97,100.40	5.1	830,000.00	1.680903719
Hawaii	1,211,537	6,422.62	188.6	130,000.00	0.107301717

Questions:

1. Divide each table above in half. For each table find the average per capita carbon dioxide emissions for the top half and the bottom half. What numbers do you get? Do you see a difference between the first table and the second?

2. Compare the top and bottom halfs of both tables. Why do you think states with higher populations would have lower per capita emissions? *Teachers may wish to emphasize that states with higher populations tend to have more people living in cities, which increases density and decreases energy use.*

3. Look at table 1. The states from California to New Jersey hold roughly half of the US population. Compare the average per capita carbon dioxide emissions of these nine states with the other 42 (including Washington, DC). Which number is higher? Why do you think the people in these nine states emit more carbon dioxide than the people in the other 42? *Teachers may wish to emphasize that a higher percentage of these nine states have comparably colder winters than the other 42, which forces higher heating bills and greater energy demands. Have your class discuss other possible reasons.*

4. How much carbon dioxide does your state emit per person? Is it higher or lower than the national average? What can you do to help reduce it?

Data from:
http://yosemite.epa.gov/OAR/globalwarming.nsf/UniqueKeyLookup/RAMR6E9KSV/$File/CO2FFC_2001.pdf, **and**
http://factfinder.census.gov/servlet/GCTTable?_bm=n&_lang=en&mt_name=DEC_2000_SF1_U_GCTPH1R_US9S&format=US-9S&_box_head_nbr=GCT-PH1-R&ds_name=DEC_2000_SF1_U&geo_id=01000US