Counting United States Populations and Areas

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ABSTRACT. Teachers are always seeking situations in which mathematics can be connected to real world data. The populations and areas of the states of the United States can be used as a setting for these connections.

Table I is a listing of the population, area (square miles), and "density" (population ÷ area) for each of the 50 states. For this article, Washington, D.C. and the overseas United States territories were not included.

The population and area data were found in The World Almanac and Book of Facts 2002, published by World Almanac Books; the density was computed from the other data.

Table 1

State	Population	Area (square miles)	Density
Alabama	4,447,100	50,744	88
Alaska	626,932	571,951	1.1
Arizona	5,130,632	113,635	45
Arkansas	2,673,400	52,068	51
California	33,871,648	155,959	217
Colorado	4,301,261	103,718	41
Connecticut	3,405,565	4,845	703
Delaware	783,600	1,954	401
Florida	15,982,378	53,927	296
Georgia	8,186,453	57,906	141
Hawaii	1,211,537	6,423	189
Idaho	1,293,953	82,747	16
Illinois	12,419,293	55,584	223
Indiana	6,080,485	35,867	170

Table 1

(continued)

State	Population	Area (square miles)	Density
Iowa	2,926,324	55,869	52
Kansas	2,688,418	81,815	33
Kentucky	4,041,769	39,728	102
Louisiana	4,468,976	43,562	103
Maine	1,274,923	30,862	41
Maryland	5,296,486	9,774	542
Massachusetts	6,349,097	7,840	810
Michigan	9,938,444	56,804	175
Minnesota	4,919,479	79,610	62
Mississippi	2,844,652	46,907	61
Missouri	5,595,211	68,886	81
Montana	902,195	145,552	6
Nebraska	1,711,263	76,872	22
Nevada	1,998,257	109,826	18
New Hampshire	1,235,786	8,968	138
New Jersey	8,414,350	7,417	1134
New Mexico	1,819,046	121,356	15
New York	18,976,457	47,214	402
North Carolina	8,049,313	48,711	165
North Dakota	642,200	68,976	9
Ohio	11,353,140	40,048	283
Oklahoma	3,450,654	68,667	50
Oregon	3,421,399	95,997	36
Pennsylvania	12,281,054	44,817	274
Rhode Island	1,048,319	1,045	1038
South Carolina	4,012,012	30,110	133
South Dakota	754,844	75,885	10
Tennessee	5,689,283	41,217	138
Texas	20,851,820	261,797	80
Utah	2,233,169	82,144	27
Vermont	608,827	9,250	66
Virginia	7,078,515	39,594	179
Washington	5,894,121	66,544	89
West Virginia	1,808,344	24,078	75
Wisconsin	5,363,675	54,310	99
Wyoming	493,782	97,100	5
Total	280,849,841	3,536,480	

Questions for Students Based Upon the Data of Table I.

(1) Rank order the 50 states by population.
  - (a) Find the mean and median of the states' populations. What does the inequality of these two measures tell us about the skewness of the data?
    (Mean = 5,616,997; median = 4,026,890.5; skewed to the right.)
  - (b) What is the smallest number of states needed to account for one-half of the United States' population of 280,849,841? (Nine states: California, Texas, New York, Florida, Illinois, Pennsylvania, Ohio, Michigan, and New Jersey.)
  - (c) Fill in the blank with the largest possible number: California has a larger population than the combined total of the __ smallest states. (The sum of the populations of the 21 smallest states is 31,579,771; this is just less than California's population of 33,871,648.)
  - (d) Re-do part c for the top two states - California and Texas. (The smallest 27 states are needed.)
  - (e) If California were subdivided into two states. C_1 and C_2, so that the population of C_1 was one person larger than that of Texas, what would be the rank position of C_2 in the 50-state list? (It would be
  - (f) fifth, between Florida and Illinois.)
  - (g) If California were divided into two states of almost equal population, where would they rank? (C_1 and C_2 would be approximately tied for fourth place, between New York and Florida.)
  - (h) If California were divided into *three* states of almost equal population, where would they rank? (C_1, C_2, and C_3 would be approximately tied for eighth place, between Ohio and Michigan.)

(2) Rank order the 50 states by area.
  - (a) Find the mean and median of the 50 states' areas. What does the inequality of the two measures say about the skewness of data?
    (Mean = 70,729.6; median = 54,118.5; skewed to the right.)
  - (b) What is the smallest number of states needed to account for one-half of the United State's total area of 3,536,480 square miles? (Ten states are needed: Alaska, Texas, California, Montana, New Mexico, Arizona, Nevada, Colorado, Wyoming, Oregon.)

   (c) Fill in the blank with the largest possible number:
       Alaska has a larger area than the combined areas
       of the ___ smallest states. (The sum of the areas of
       the 22 smallest states is 570,231 square miles, just
       less than the area of Alaska, which is 571,951 square
       miles.)
   (d) Redo part c for the top two states in area; these
       are Alaska and Texas. (The smallest 26 states are
       needed.)
   (e) If Alaska were divided into two states with equal
       area, where would they rank? (They would be tied
       for first; the original area of Alaska is more than
       twice that of Texas.)
   (f) If Alaska were divided into three states with equal
       area, where would they rank? (They would be tied
       for second place, between Texas and California.)
(3) Rank order the 50 states by density.
   (a) Find the total population and area of the three most
       densely populated states. (New Jersey, Rhode Is-
       land, and Massachusetts have a total population of
       15,811,766 and a total area of 16,302 square miles.)
   (b) What is the density of the three-state group?
       $(15,811,766 \div 16,302 = 970.)$
   (c) If the entire United States were as densely populated
       as this three-state group, what would be the United
       States population?
       $\frac{15,811,766}{16,302} = \frac{x}{3,536,480}$; $x \approx 3,430,000,000$. This is
       about half the population of the entire world.
   (d) If the United States were as densely populated as
       its three least densely populated states (Montana,
       Wyoming, and Alaska), what would be the United
       States' population?
       (Total population = 2,022,909, total area = 814,603
       square miles; hence,
       $\frac{2,022,909}{814,603} = \frac{x}{3,536,480}$; $x \approx 8,780,000$. This is just
       larger than the population of New Jersey alone.)

Challenges For The Reader and His/Her Students:

(1) Perform the same analysis for:
    (a) States and their counties.
    (b) Other countries and their subdivisions.
    (c) The entire world subdivided into individual countries.
(2) Find other situations in which data can be manipulated and characterized.

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