



## Problem of the Week

### Problem B and Solution

#### How Dense is This?

### Problem

In honour of Canada 150, let's explore how much space it has. In terms of its land area, 9 156 521 km<sup>2</sup>, Canada is the fourth largest country in the world. Russia, China, and the U.S.A. have greater land area, but Canada's population is significantly less.

a) Find the area and population\* of the following countries. Add three of your own choices to the table.

Country	Land Area	Population	Persons per km <sup>2</sup>
Canada	9 156 521 km <sup>2</sup>	36.63 million	≈ 4.0 persons/km <sup>2</sup>
Russia	16 292 614 km <sup>2</sup>	143.38 million	≈ 8.8 persons/km <sup>2</sup>
Japan	364 503 km <sup>2</sup>	126.05 million	≈ 345.8 persons/km <sup>2</sup>
Ukraine	578 945 km <sup>2</sup>	44.41 million	≈ 76.7 persons/km <sup>2</sup>
India	2 973 450 km <sup>2</sup>	1 342.51 million	≈ 451.5 persons/km <sup>2</sup>
Finland	304 466 km <sup>2</sup>	5.54 million	≈ 18.2 persons/km <sup>2</sup>
Brazil	8 349 534 km <sup>2</sup>	211.24 million	≈ 25.3 persons/km <sup>2</sup>
Sudan	1 764 281 km <sup>2</sup>	42.17 million	≈ 23.9 persons/km <sup>2</sup>
Germany	348 621 km <sup>2</sup>	80.64 million	≈ 231.3 persons/km <sup>2</sup>
China	9 386 293 km <sup>2</sup>	1 388.23 million	≈ 147.9 persons/km <sup>2</sup>
U. S. A.	9 144 930 km <sup>2</sup>	326.47 million	≈ 35.7 persons/km <sup>2</sup>

b) Which countries have the least, and greatest, population density? In each of these two countries, how many square km of land area are there for each person?

c) The city of Mumbai in India has an area of 603.4 km<sup>2</sup>, and a population of 21.69 million. How many square **metres** of land area are there for each person in Mumbai?

d) How many square **metres** of classroom space are there for each person in your classroom?

### Solution

a) The completed table plus optional countries is shown above, along with the calculated population densities. (\*Note that answers will vary, depending on the source of data on land area and population.)

b) Canada has the least population density, 4.0 persons per km<sup>2</sup>; India has the greatest, 408.4 persons per km<sup>2</sup>. There are  $9\,156\,521 \div 36\,630\,000 \approx 0.249973$  km<sup>2</sup> of land area per person in Canada. There are  $2\,973\,450 \div 1\,342\,510\,000 \approx 0.00221484$  km<sup>2</sup> of land area per person in India, less than 1% of Canada's space per person.

c) There are  $603\,400\,000 \div 21\,690\,000 \approx 27.8$  m<sup>2</sup> (or 0.0000278 km<sup>2</sup>) of land area per person in Mumbai. Thus Mumbai is much more densely populated than India as a whole.

d) Taking an average classroom as 10 m by 7 m, or 70 m<sup>2</sup>, with 25 persons, the space per person is  $70 \div 25 = 2.8$  m<sup>2</sup>. (Your classroom may differ in both size and/or numbers.)

