Material World –
How Does the USA Compare?
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WR teacher training 2004–2005/Website/Lessons/Material World—How Does the USA Compare? Written by Susan Green, Cedar Falls, Iowa.

- **Grade level:**
  Middle School, High School

- **Subject areas:**
  Math, Social Studies

- **Instructional strategies** (from *Classroom Instruction That Works—Research-Based Strategies for Increasing Student Achievement* by Robert J. Marzano):
  - Identifying similarities and differences
  - Nonlinguistic representations
  - Homework and practice
  - Cooperative learning

- **Estimated duration:**
  Preparation time: 30 minutes (This includes contacting your AEA Media Specialist four weeks prior to your unit to arrange inter-library loan for multiple copies of *Material World: A Global Family Portrait*, by Peter Menzel.)
  Activity time: 3 to 5 class periods, depending on the students' skill level and how much time is spent on discussion.

- **Setting:**
  Classroom with students working in pairs.

- **Skills:**
  - Graphing, comparing similarities and differences, discussing, researching.

- **Vocabulary:**
  - Per capita, affluence

**Summary**
Through the process of making bar and circle graphs, the students will develop an understanding of how the United States compares to other countries with respect to per capita income, commercial energy use, mean years of school, urban vs. rural living and the percent of household expenditures spent on food.

**Objectives**
The students will read, process and interpret statistical profiles from 30 different countries. This will include:
- Making bar graphs to compare the per capita income.
- Making bar graphs to compare the commercial energy use per capita.
- Making double bar graphs to compare mean years of school, female vs. male.
- Making circle graphs to compare urban vs. rural living.
- Making circle graphs to compare the percentage of household expenditures spent on food.
Materials:
- A Material World book for each pair of students.
- Graph paper.
- Straight edge.
- Sheets of circles. (See Attachment A.)

Background
Material World is an attempt by Peter Menzel "to capture, through photos and statistics, both the common humanity of the peoples inhabiting our earth and the great differences in material goods and circumstances that make rich and poor societies" (Material World: A Global Family Portrait, p. 7).

Procedure
The Activity
The following activity is intended to be an in-class "guided practice" activity.

Distribute the Material World books to each pair of students. Allow the students to have five minutes to look through the book before starting the activity. Begin by having the students compare the photos of the family from the United States with the family from Bhutan.

Guided Practice
For each country:
- Look up the country's statistic being studied (pages 248-249).
- Compare that country's statistic to the U.S.A.'s statistic.
- Look up the country's population on the chart.
- Find the location of the country on the world map (pages 4-5).
- Look at the photos and read about the country.
- Process the statistic.

1) Make a bar graph comparing the per capita income of these countries. Round the incomes to the nearest thousand before graphing.

<table>
<thead>
<tr>
<th>Country</th>
<th>Per Capita Income (Nearest Thousand)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bosnia</td>
<td>$2,490</td>
</tr>
<tr>
<td>U.S.</td>
<td>$22,356</td>
</tr>
<tr>
<td>Vietnam</td>
<td>$215</td>
</tr>
<tr>
<td>Spain</td>
<td>$12,482</td>
</tr>
</tbody>
</table>

Per Capita Income

![Bar graph showing per capita income comparison between Bosnia, U.S., Vietnam, and Spain.](image-url)
2) Make a bar graph comparing the commercial energy use per capita of these countries. Round your numbers to the nearest 500 before graphing.

- Bosnia--2,296
- US--7,681
- Vietnam--100
- Spain--2,229

![Commercial Energy Use per Capita](chart1.png)

3) Make a double bar graph comparing the mean years of school, female vs. male.

- Albania--5 / 7
- US--12.4 / 12.2
- Thailand--3.3 / 4.3
- Mali--0.1 / 0.5

![Comparing Mean Years of School, Female vs. Male](chart2.png)

4) Develop “number sense” with your students when making circle graphs. Stress to the students that their work needs to be neat as they will be referring back to these circles quite often.

   a. Practice dividing your circles by \(\frac{1}{2}\)'s, \(\frac{1}{3}\)'s, \(\frac{1}{4}\)'s, \(\frac{1}{5}\)'s, \(\frac{1}{6}\)'s, \(\frac{1}{8}\)'s, \(\frac{1}{10}\)'s, & \(\frac{1}{12}\)'s.
b. Change each fraction into a percent. Ex. 1/5 = 20%, 4/5 = 80%

c. Shade each fraction using 2 colors

d. Review with the students that the fractions in a circle graph always add up to 1 and the percent in a circle graph always add up to 100%.
5) Round the percents to a fraction then make colored circle graphs showing the population in urban/rural areas %. Title each graph and create a color key.

Mongolia--61 / 39 (round to thirds)  US--76 / 24 (round to fourths)
Iceland--92 / 8 (round to 10ths)  S. Africa--51 / 49 (round to halves)

![Graphs showing population distribution in Mongolia, U.S.A., Iceland, and S. Africa.](image-url)
6) Round the percents to a fraction then make colored circle graphs showing the *Household Expenditure on Food* (%). Title each graph and create a color key.

- Argentina—35 (round to thirds)
- US—13 (round to sixths)
- Israel—21 (round to fifths)
- W. Samoa—59 (round to fifths)

Assessment
Give Homework Problems, Attachment B.
Give the Test, Attachment C.

Extensions
1) Do more practice problems in each of the above statistical profile areas.

2) Interpret and graph other columns of the statistical profile areas.

3) Make a scatter plot comparing per capita income versus per capita energy use.


Resources
Attachment B

Material World Homework Problems

1) Make a bar graph comparing the *per capita income* of these countries. Round the numbers to the nearest thousand before graphing.
   - Iraq--$1940
   - Uzbekistan--$978
   - US--$22,356
   - Japan--$26,824
   - Russia--$3469

2) Make a bar graph comparing the *commercial energy use per capita* of these countries. Round your numbers to the nearest 500 before graphing.
   - Italy--2,756
   - India--337
   - US--7,681
   - Guatemala--171
   - Cuba--1,102

3) Make a double bar graph comparing the *mean years of school, female vs. male*.
   - Germany--10.6 / 11.7
   - U.K.--11.6 / 11.4
   - US--12.4 / 12.2
   - Haiti--1.3 / 2
   - Bhutan--0.1 / 0.3

4) Round the percents to a fraction then make circle graphs showing the *population in urban/rural areas %*. Title each graph and create a color key.
   - US--76 / 24 (round to fourths)
   - Bosnia--34 / 66 (round to thirds)
   - Guatemala--42 / 58 (round to 10ths)
   - Italy--71 / 29 (round to 10ths)

5) Round the percents to a fraction then make circle graphs showing the *household expenditure on food %*. Title each graph and create a color key.
   - US--13 (round to eighths)
   - Bosnia--27 (round to fourths)
   - S. Africa--34 (round to thirds)
   - India--52 (round to halves)
Attachment B

Material World Homework Problems Answer Key

1) Make a bar graph comparing the per capita income of these countries. Round the numbers to the nearest thousand before graphing.

- Iraq—$2000
- Japan—$27,000
- Uzbekistan—$1000
- Russia—$3000
- US—$22,000

![Per Capita Income Graph]

2) Make a bar graph comparing the commercial energy use per capita of these countries. Round your numbers to the nearest 500 before graphing.

- Italy—3000
- Guatemala—0
- India—500
- Cuba—1000
- US—7,500

![Commercial Energy Use Graph]
3) Make a double bar graph comparing the mean years of school, female vs. male.

- Germany--10.6 / 11.7
- Haiti--1.3 / 2
- U.K.--11.6 / 11.4
- Bhutan--0.1 / 0.3
- US--12.4 / 12.2

4) Round the percents to a fraction then make circle graphs showing the population in urban/rural areas %. Title each graph and create a color key.

- US--76 / 24
- Bosnia--34 / 66
- Guatemala--42 / 58
- Italy--71 / 29
5) Round the percents to a fraction then make circle graphs showing the *household expenditure on food %*. Title each graph and create a color key.

US—13  
S. Africa—34  
Bosnia—27  
India—52

- **U.S.A.**  
  approx. 1/8 & 7/8

- **Bosnia**  
  approx. 1/4 & 3/4

- **S. Africa**  
  approx. 1/3 & 2/3

- **India**  
  approx. 1/2 & 1/2
1) Make a bar graph comparing the *per capita income* of these countries. Round the incomes to the nearest thousand before graphing.

<table>
<thead>
<tr>
<th>Country</th>
<th>Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Italy</td>
<td>$18,588</td>
</tr>
<tr>
<td>Thailand</td>
<td>$ 1,697</td>
</tr>
<tr>
<td>Argentina</td>
<td>$ 3,966</td>
</tr>
</tbody>
</table>

2) Make a bar graph comparing the *commercial energy use per capita* of these countries. Round the numbers to the nearest 500 before graphing.

<table>
<thead>
<tr>
<th>Country</th>
<th>Energy Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>3,552</td>
</tr>
<tr>
<td>Kuwait</td>
<td>6,414</td>
</tr>
<tr>
<td>Mexico</td>
<td>1,383</td>
</tr>
</tbody>
</table>
3) Make a double bar graph comparing the mean years of school, female vs. male.

<table>
<thead>
<tr>
<th>Country</th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>Israel</td>
<td>9</td>
<td>10.9</td>
</tr>
<tr>
<td>Brazil</td>
<td>3.8</td>
<td>4</td>
</tr>
</tbody>
</table>

4) Round the percents to a fraction then make circle graphs showing the population in urban/rural areas (%). Title each graph and create a color key.

<table>
<thead>
<tr>
<th>Country</th>
<th>Urban</th>
<th>Rural</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vietnam</td>
<td>21</td>
<td>79</td>
</tr>
<tr>
<td>Cuba</td>
<td>76</td>
<td>24</td>
</tr>
</tbody>
</table>

5) Round the percents to a fraction then make circle graphs showing the household expenditure on food %. Title each graph and create a color key.

<table>
<thead>
<tr>
<th>Country</th>
<th>Expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.K.</td>
<td>12</td>
</tr>
<tr>
<td>Bosnia</td>
<td>27</td>
</tr>
</tbody>
</table>
1) Make a bar graph comparing the *per capita income* of these countries. Round the incomes to the nearest thousand before graphing.

- Italy: $19,000
- Thailand: $2,000
- Argentina: $4,000

![Per Capita Income Graph](image)

2) Make a bar graph comparing the *commercial energy use per capita* of these countries. Round the numbers to the nearest 500 before graphing.

- Japan: 3,500 kg
- Kuwait: 6,500 kg
- Mexico: 1,500 kg

![Commercial Energy Use per Capita Graph](image)
3) Make a double bar graph comparing the mean years of school, female vs. male.

<table>
<thead>
<tr>
<th>Country</th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>Israel</td>
<td>9 / 10.9</td>
<td>Brazil</td>
</tr>
</tbody>
</table>

4) Round the percents to a fraction then make circle graphs showing the population in urban/rural areas (%). Title each graph and create a color key.

<table>
<thead>
<tr>
<th>Country</th>
<th>Urban</th>
<th>Rural</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vietnam</td>
<td>approx. 1/5 &amp; 4/5</td>
<td>approx. 3/4 &amp; 1/4</td>
</tr>
<tr>
<td>Cuba</td>
<td>approx. 3/4 &amp; 1/4</td>
<td>approx. 3/4 &amp; 1/4</td>
</tr>
</tbody>
</table>

5) Round the percents to a fraction then make circle graphs showing the household expenditure on food %. Title each graph and create a color key.

<table>
<thead>
<tr>
<th>Country</th>
<th>Food</th>
<th>Non-food</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.K.</td>
<td>approx. 1/8 &amp; 7/8</td>
<td>approx. 1/3 &amp; 2/3</td>
</tr>
<tr>
<td>Brazil</td>
<td>approx. 1/3 &amp; 2/3</td>
<td>approx. 1/3 &amp; 2/3</td>
</tr>
</tbody>
</table>