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| GLOBAL STATISTICS | | Student Goals Statistics are important for students to use appropriately and understand how to calculate the concepts of mean, median, mode and range when preparing for the GED test. |
| Outcome <i>(lesson objective)</i> Students will select appropriate data to determine the mean, median, mode and range of a set of data. | | Time Frame 2-3 hours |
| Standard <i>Use Math to Solve Problems and Communicate</i> | | NRS EFL 3-6 |
| COPS Understand, interpret, and work with pictures, numbers, and symbolic information. | Activity Addresses Components of Performance Students will work with numbers as they calculate various statistics. Students will understand the statistical mean, median, and mode. | |
| Apply knowledge of mathematical concepts and procedures to figure out how to answer a question, solve a problem, make a prediction, or carry out a task that has a mathematical dimension. | Students will calculate the mean, median, mode and range for data on literacy rates and life expectancy within each geographic region of the world. | |
| Define and select data to be used in solving the problem. | Students will use a chart of country data to select the data for their region. | |
| Determine the degree of precision required by the situation. | Students will determine the place value to round their answer. | |
| Solve problem using appropriate quantitative procedures and verify that the results are reasonable. | Students will compare the mean, median and mode for the data to determine the best statistic to use for different purposes. | |
| Communicate results using a variety of mathematical representations, including graphs, chart, tables, and algebraic models. | Students will construct graphs and tables to display their results and write a paragraph to summarize their results. | |
| Materials <i>World/Country Data Handout</i> calculators, graph paper world maps - optional | | |
| Learner Prior Knowledge Basic knowledge of using a calculator and knowledge of the concepts of mean, median, mode and range. | | |
| <p>Instructional Activities</p> <p>Step 1 - Teacher will distribute <i>World/Country Data Handout</i>. Discuss the meaning of each type of data on the handout (region, area, population, life expectancy, and literacy rate). Next review/introduce the group to the meaning of the statistical terms necessary for the lesson: mean (average) [is the sum of the numbers (data) divided by the number of numbers in the set], median [value closest to the middle of the numbers in a set], mode [the number that occurs most often in the set. If no number occurs more often than any other, there is no mode] and range [the difference between the greatest and least values. The range is a measure of the spread of data values].</p> <p>TEACHER NOTE All of these concepts should be introduced by first questioning students about their current knowledge. Expand their ideas to include a formal definition and equation where appropriate. Pass out index cards for students to record math vocabulary and definitions/equations/notes.</p> <p>Step 2 - Select a geographic region (e.g., "Pacific Islands") and model for the students how to calculate the mean, median, mode and range of the data set (literacy rates in countries in the Pacific Island region). Ask students to help locate the appropriate data in the table and to help calculate each statistic. Allow for questions during and after the examples to insure student understanding.</p> <p>Step 3 – Divide students into pairs and assign each group a geographic region. More than 1 pair can be assigned to a region. Each pair of students will use the data set for their region to calculate the mean, median, mode and range of the literacy rate.</p> <p>TEACHER NOTE Calculators should be available for use during this lesson. If possible, have world maps available so students can look up the location of the countries in their regions of the world.</p> | | |

Step 4 - Next, students will share their data with the other groups so all pairs will have all data. Pairs assigned the same region should compare answers to check for accuracy. Before sharing data, discuss with students how they could determine the number of columns and rows necessary for a chart containing all the data. The students will construct a chart to record the data from all pairs on each region. Students will compare the values for each statistical representation (mean, median, mode and range) and discuss with their partners the possible reasons for differences in the data results. Each pair of students will evaluate the statistical representations and decide which statistic best reflects the data and why they think so.

Step 5 - Students will use the statistical representation they feel best reflects the data to construct a graph to compare the literacy rates between the regions. Students will write a paragraph explaining the rationale of their choice of representation. The students will also hypothesize about the results for particular regions.

Step 6 - As a culminating activity to document competency, the students will work alone to calculate the mean, median, mode and range for **life expectancy** in a world region. Students will share their data with their classmates and construct a chart of the data. Finally each student will graph the results of the data in all regions for one statistical representation (i.e., mean, median, or mode). Finally, each student will write a paragraph explaining his or her results.

SOCIAL STUDIES EXTENSION Students can look for current events articles for the countries in the various regions of the world. If possible provide maps so students can locate the countries in their region.

Assessment/Evidence *(based on outcome)*

Charts listing statistical data on world regions

Graph comparing literacy rates

Paragraphs explaining the graphs and the results

Final Assessment: Chart, Graph and Paragraph on World Life Expectancies

Teacher Reflection/Lesson Evaluation

The data on the countries of the world found in the handout provides lots of practice in data analysis. Most students will find it enlightening to see the number of countries in the world.

Next Steps

Students could use the data on the countries to determine the population density of each country. The data could be used to rank the countries in order. Life expectancy and literacy rate of the countries in a region could be plotted to locate where the data clusters occur.

Technology Integration

Purposeful/Transparent

The student will gain practice calculating mean, median, mode and range and an understanding of the pros and cons of each statistic.

Contextual

The lesson uses data on countries of the world from various regions that we read about in the news regularly. Life expectancies and literacy rates are relevant statistics in today's world.

Building Expertise

This exercise builds on a student's basic knowledge of average.

World/Country Data Handout

| Country | Region | Area (sq. miles) | Population | Life Expectancy | Literacy Rate |
|--------------------------|-----------------|-------------------------|-------------------|------------------------|----------------------|
| Afghanistan | Asia | 251,737 | 29,928,987 | 42.5 | 36% |
| Albania | Europe | 11,100 | 3,563,112 | 77.1 | 87% |
| Algeria | Africa | 919,590 | 32,531,853 | 72.7 | 70% |
| Andorra | Europe | 181 | 70,549 | 83.5 | 100% |
| Angola | Africa | 481,350 | 11,190,786 | 36.8 | 42% |
| Antigua & Barbuda | North America | 171 | 68,722 | 71.6 | 89% |
| Argentina | South America | 1,068,296 | 39,537,943 | 75.7 | 96% |
| Armenia | Asia | 11,500 | 2,982,904 | 71.2 | 99% |
| Australia | Pacific Islands | 2,967,893 | 20,090,437 | 80.3 | 100% |
| Austria | Europe | 32,375 | 8,184,691 | 78.9 | 98% |
| Azerbaijan | Asia | 33,400 | 7,911,974 | 63.2 | 97% |
| Bahamas | North America | 5,380 | 301,790 | 65.6 | 96% |
| Bahrain | Asia | 257 | 688,345 | 74 | 89% |
| Bangladesh | Asia | 55,598 | 144,319,628 | 61.7 | 43% |
| Barbados | North America | 166 | 279,254 | 71.6 | 97% |
| Belarus | Europe | 80,154 | 10,300,483 | 68.6 | 100% |
| Belgium | Europe | 11,781 | 10,364,388 | 78.4 | 98% |
| Belize | Central America | 8,865 | 279,457 | 67.4 | 94% |
| Benin | Africa | 43,483 | 7,460,025 | 50.8 | 41% |
| Bhutan | Asia | 18,147 | 2,232,291 | 54 | 42% |
| Bolivia | South America | 424,162 | 8,857,870 | 65.1 | 87% |
| Bosnia | Europe | 19,741 | 4,025,476 | 72.6 | NA |
| Botswana | Africa | 231,800 | 1,640,115 | 34.2 | 80% |
| Brazil | South America | 3,286,470 | 186,112,794 | 71.4 | 86% |
| Brunei | Asia | 2,228 | 372,361 | 74.5 | 92% |
| Bulgaria | Europe | 48,822 | 7,450,349 | 71.8 | 99% |
| Burkina Faso | Africa | 1005,870 | 13,925,313 | 44.2 | 27% |
| Burundi | Africa | 10,745 | 6,370,609 | 43.4 | 52% |
| Cambodia | Asia | 69,900 | 13,907,069 | 58.4 | 70% |
| Cameroon | Africa | 183,567 | 16,380,005 | 48 | 79% |
| Canada | North America | 3,851,788 | 32,805,041 | 80 | 97% |
| Cape Verde | Africa | 1,557 | 418,224 | 70.1 | 77% |
| Central African Republic | Africa | 240,534 | 3,799,897 | 41.4 | 51% |
| Chad | Africa | 495,752 | 9,826,419 | 48.2 | 48% |

| Country | Region | Area (sq. miles) | Population | Life Expectancy | Literacy Rate |
|--------------------|-----------------|-------------------------|-------------------|------------------------|----------------------|
| Chile | South America | 292,258 | 15,980,912 | 76.4 | 96% |
| China | Asia | 3,705,386 | 1,306,313,812 | 72 | 86% |
| Columbia | South America | 439,733 | 42,954,279 | 71.4 | 93% |
| Comoros | Africa | 838 | 671,247 | 61.6 | 57% |
| Congo | Africa | 905,562 | 60,085,004 | 49.1 | 66% |
| Costa Rica | Central America | 19,730 | 4,016,173 | 76.6 | 96% |
| Côte d'Ivoire | Africa | 124,502 | 17,298,040 | 48.4 | 51% |
| Croatia | Europe | 21,829 | 4,495,904 | 74.1 | 99% |
| Cuba | North America | 42,803 | 11,346,670 | 77 | 97% |
| Cyprus | Middle East | 3,572 | 780,133 | 77.5 | 98% |
| Czech Republic | Europe | 30,450 | 10,241,138 | 75.8 | 100% |
| Denmark | Europe | 16,639 | 5,432,335 | 77.4 | 100% |
| Djibouti | Africa | 8,800 | 476,703 | 43.1 | 68% |
| Dominica | North America | 290 | 69,029 | 74.4 | 94% |
| Dominican Republic | North America | 18,815 | 8,950,034 | 67.6 | 85% |
| East Timor | Asia | 290 | 69,029 | 74.4 | 94% |
| Ecuador | South America | 109,483 | 8,950,034 | 76 | 93% |
| Germany | Europe | 137,846 | 82,431,390 | 78.5 | 99% |
| Ghana | Africa | 92,456 | 21,029,853 | 56.3 | 75% |
| Greece | Europe | 50,942 | 10,668,354 | 78.5 | 98% |
| Grenada | North America | 133 | 89,502 | 64.5 | 90% |
| Guatemala | Central America | 42,042 | 14,655,189 | 65.2 | 71% |
| Guinea | Africa | 94,925 | 9,467,866 | 49.7 | 36% |
| Guinea-Bissau | Africa | 13,946 | 1,416,027 | 47 | 42% |
| Guyana | South America | 83,000 | 765,283 | 65.1 | 99% |
| Haiti | North America | 10,714 | 8,121,622 | 52.6 | 53% |
| Honduras | Central America | 43,278 | 6,975,204 | 66.2 | 76% |
| Hungary | Europe | 35,919 | 10,006,835 | 72.2 | 99% |
| Iceland | Europe | 39,768 | 296,737 | 80.2 | 100% |
| India | Asia | 1,269,338 | 1,080,264,388 | 64 | 60% |
| Indonesia | Asia | 741,096 | 241,973,879 | 69.3 | 89% |
| Iran | Middle East | 636,293 | 68,017,860 | 69.7 | 79% |
| Iraq | Middle East | 168,753 | 26,074,906 | 68.3 | 40% |
| Ireland | Europe | 27,136 | 4,015,676 | 77.4 | 98% |
| Israel | Middle East | 8,020 | 6,276,883 | 79.2 | 95% |
| Italy | Europe | 116,305 | 58,103,033 | 79.5 | 99% |

| Country | Region | Area (sq. miles) | Population | Life Expectancy | Literacy Rate |
|------------------|-----------------|-------------------------|-------------------|------------------------|----------------------|
| Jamaica | North America | 4,244 | 2,731,832 | 76.1 | 88% |
| Japan | Asia | 145,882 | 58,103,033 | 79.5 | 99% |
| Jordan | Middle East | 34,445 | 5,759,732 | 78.1 | 91% |
| Kazakhstan | Asia | 1,049,150 | 15,185,844 | 66.1 | 98% |
| Kenya | Africa | 224,960 | 33,829,590 | 47.2 | 85% |
| Kiribati | Pacific Islands | 313 | 103,092 | 61.3 | NA |
| Korea, North | Asia | 46,540 | 22,912,177 | 71.1 | 99% |
| Korea, South | Asia | 38,023 | 48,422,644 | 75.6 | 98% |
| Kuwait | Middle East | 6,880 | 2,335,648 | 76.8 | 84% |
| Kyrgyzstan | Asia | 76,641 | 5,146,281 | 67.8 | 97% |
| Laos | Asia | 91,429 | 6,217,141 | 54.7 | 53% |
| Latvia | Europe | 24,938 | 2,290,237 | 70.9 | 100% |
| Lebanon | Middle East | 4,015 | 3,826,018 | 72.3 | 87% |
| Lesotho | Africa | 11,720 | 1,867,035 | 36.8 | 85% |
| Liberia | Africa | 43,000 | 3,482,211 | 47.9 | 58% |
| Libya | Africa | 679,358 | 5,765,563 | 76.3 | 83% |
| Liechtenstein | Europe | 62 | 33,717 | 79.4 | 100% |
| Lithuania | Europe | 25,174 | 3,596,617 | 73.5 | 100% |
| Luxembourg | Europe | 999 | 468,571 | 78.6 | 100% |
| Macedonia | Europe | 9,781 | 2,045,262 | 73.5 | NA |
| Madagascar | Africa | 226,660 | 18,040,341 | 56.5 | 69% |
| Malawi | Africa | 45,745 | 12,158,924 | 37.5 | 63% |
| Malaysia | Asia | 127,316 | 23,953,136 | 72 | 89% |
| Maldives | Asia | 116 | 349,106 | 63.7 | 97% |
| Mali | Africa | 478,764 | 12,291,529 | 45.3 | 46% |
| Malta | Europe | 122 | 398,534 | 78.7 | 93% |
| Marshall Islands | Pacific Islands | 70 | 59,071 | 69.7 | 94% |
| Mauritania | Africa | 397,953 | 3,086,859 | 52.3 | 42% |
| Mauritius | Africa | 788 | 1,230,602 | 72.1 | 86% |
| Mexico | North America | 761,600 | 106,202,903 | 74.9 | 92% |
| Micronesia | Pacific Islands | 271 | 108,105 | 69.4 | 89% |
| Moldova | Europe | 13,067 | 4,455,421 | 65 | 99% |
| Monaco | Europe | 0.75 | 32,409 | 79.4 | 99% |
| Mongolia | Asia | 604,250 | 2,791,272 | 64.2 | 99% |
| Morocco | Africa | 172,413 | 32,725,847 | 70.3 | 52% |
| Mozambique | Africa | 309,494 | 19,406,703 | 40.9 | 48% |
| Myanmar(Burma) | Asia | 261,969 | 42,909,464 | 56 | 83% |

| Country | Region | Area (sq. miles) | Population | Life Expectancy | Literacy Rate |
|--------------------------|-----------------|-------------------------|-------------------|------------------------|----------------------|
| Namibia | Africa | 318,694 | 2,030,692 | 44.8 | 84% |
| Nauru | Pacific Islands | 8.2 | 13,048 | 62.3 | NA |
| Nepal | Asia | 54,363 | 27,676,547 | 59.4 | 45% |
| The Netherlands | Europe | 16,036 | 16,407,491 | 78.7 | 99% |
| New Zealand | Pacific Islands | 103,737 | 4,035,461 | 78.5 | 99% |
| Nicaragua | Central America | 49,998 | 5,465,100 | 70 | 68% |
| Niger | Africa | 489,189 | 11,665,937 | 42.2 | 18% |
| Nigeria | Africa | 356,700 | 128,771,988 | 46.5 | 68% |
| Norway | Europe | 125,181 | 4,593,041 | 79.2 | 100% |
| Oman | Middle East | 82,030 | 3,001,583 | 72.8 | 76% |
| Pakistan | Asia | 310,400 | 162,419,946 | 62.6 | 46% |
| Palau | Pacific Islands | 177 | 20,303 | 69.8 | 92% |
| Panama | Central America | 30,193 | 3,039,150 | 72.1 | 93% |
| Papua New Guinea | Pacific Islands | 178,703 | 5,545,268 | 64.6 | 66% |
| Paraguay | South America | 157,046 | 6,347,884 | 74.6 | 94% |
| Peru | South America | 496,223 | 27,925,628 | 69.2 | 91% |
| The Philippines | Asia | 115,830 | 87,857,473 | 69.6 | 96% |
| Poland | Europe | 120,727 | 38,635,144 | 74.2 | 100% |
| Portugal | Europe | 35,672 | 10,566,212 | 77.3 | 93% |
| Qatar | Middle East | 4,416 | 863,051 | 73.4 | 83% |
| Romania | Europe | 91,700 | 22,329,977 | 71.1 | 98% |
| Russia | Europe & Asia | 6,592,735 | 143,420,309 | 66.8 | 100% |
| Rwanda | Africa | 10,169 | 8,440,820 | 46.6 | 70% |
| Saint Kitts & Nevis | North America | 101 | 38,958 | 71.9 | 97% |
| Saint Lucia | North America | 239 | 166,312 | 73.3 | 67% |
| Saint Vincent&Grenadines | North America | 150 | 117,534 | 73.3 | 96% |
| Samoa | Pacific Islands | 1,104 | 177,287 | 70.4 | 100% |
| San Marino | Europe | 24 | 28,880 | 81.5 | 96% |
| São Tomé | Africa | 386 | 187,410 | 66.6 | 79% |
| Saudi Arabia | Middle East | 756,981 | 26,417,599 | 75.2 | 79% |
| Senegal | Africa | 75,749 | 11,126,832 | 56.6 | 40% |
| Serbia & Montenegro | Europe | 39,517 | 10,829,175 | 74.4 | 93% |
| Syeychelles | Africa | 176 | 81,188 | 71.5 | 58% |
| Sierra Leone | Africa | 27,699 | 6,017,643 | 42.7 | 31% |
| Singapore | Asia | 267 | 4,425,720 | 81.5 | 93% |
| Slovakia | Europe | 18,859 | 5,431,363 | 74.2 | NA |
| Slovenia | Europe | 7,820 | 2,011,070 | 75.9 | 100% |

| Country | Region | Area (sq. miles) | Population | Life Expectancy | Literacy Rate |
|----------------------|-----------------|-------------------------|-------------------|------------------------|----------------------|
| Solomon Islands | Pacific Islands | 10,985 | 538,032 | 72.4 | NA |
| Somalia | Africa | 246,199 | 8,591,629 | 47.7 | 38% |
| South Africa | Africa | 471,008 | 44,344,136 | 44.1 | 86% |
| Spain | Europe | 194,896 | 40,341,462 | 79.4 | 98% |
| Sri Lanka | Asia | 25,332 | 20,064,776 | 72.9 | 92% |
| Sudan | Africa | 967,493 | 40,187,486 | 58.1 | 61% |
| Suriname | South America | 63,039 | 438,144 | 69.1 | 93% |
| Swaziland | Africa | 6,704 | 1,173,900 | 37.5 | 82% |
| Sweden | Europe | 173,731 | 9,001,774 | 80.3 | 99% |
| Switzerland | Europe | 15,942 | 7,489,370 | 80.3 | 99% |
| Syria | Middle East | 71,498 | 18,448,752 | 69.7 | 77% |
| Taiwan | Asia | 13,892 | 22,894,384 | 77.1 | 86% |
| Tajikistan | Asia | 55,251 | 7,163,506 | 64.5 | 99% |
| Tanzania | Africa | 364,898 | 36,766,356 | 44.9 | 78% |
| Thailand | Asia | 198,455 | 65,444,371 | 71.4 | 96% |
| Togo | Africa | 21,925 | 5,681,519 | 53 | 61% |
| Tonga | Pacific Islands | 290 | 112,422 | 69.2 | 99% |
| Trinidad & Tobago | North America | 1,980 | 1,088,644 | 69.3 | 99% |
| Tunisia | Africa | 63,170 | 10,074,951 | 74.7 | 74% |
| Turkey | Europe and Asia | 301,388 | 69,660,559 | 72.1 | 87% |
| Turkmenistan | Asia | 188,455 | 4,952,081 | 61.3 | 98% |
| Tuvalu | Pacific Islands | 10 | 11,636 | 67.7 | NA |
| Uganda | Africa | 91,135 | 27,269,482 | 50.4 | 70% |
| Ukraine | Europe | 233,089 | 47,425,336 | 66.7 | 100% |
| United Arab Emirates | Middle East | 32,000 | 2,563,212 | 75 | 78% |
| United Kingdom | Europe | 94,525 | 60,441,457 | 78.3 | 99% |
| Uruguay | South America | 68,040 | 3,415,920 | 75.9 | 98% |
| Uzbekistan | Asia | 172,741 | 26,851,195 | 64.1 | 99% |
| Vanuatu | Pacific Islands | 5,700 | 205,754 | 62.1 | 53% |
| Vatican City | Europe | 0.17 | 890 | NA | 100% |
| Venezuela | South America | 352,143 | 25,375,281 | 74.1 | 93% |
| Vietnam | Asia | 127,243 | 83,535,576 | 70.4 | 94% |
| Yemen | Middle East | 203,850 | 20,727,063 | 61.4 | 50% |
| Zambia | Africa | 290,584 | 11,261,795 | 39.4 | 81% |
| Zimbabwe | Africa | 150,803 | 12,746,990 | 37.8 | 91% |