CRITICAL THINKING

African Pen Pals

CRITICAL THINKING

- Overview
- Unit Goals
- Grade Level Indicators
- Time Needed
- Materials Needed
- Prepare to Learn
- Activities

COMPARE MATRIX
STATISTICS
PIE GRAPH

www.woub.org/africanpenpals
OVERVIEW

Valid judgments are based on facts, not just opinion. Through critical viewing and data collection in a systematic process of thinking, students can develop more accurate ways to analyze a situation, an event, or even a way of life.

Students will compare the cultures of both of the African Pen Pals from the same country and at least one Pen Pal from a different country. There are two episodes from Egypt, South Africa, Nigeria, Tanzania, and Kenya. Each country profiles a boy and a girl. Students will also complete statistical research to help them make inferences about one African country and its culture.

Throughout this unit, help students become more thoughtful thinkers about similarities and differences based on sound observations and data. Help students to:

• Make valid inferences from a body of data.
• Recognize that observation is the basis for inference.
• Recognize that two people may make two different inferences from the same observation.
• Separate observations that support inferences from those that do not provide support.
• State several possible inferences from a group of related observations (divergent thinking).
• State one possible inference from a group of related observations (convergent thinking)
• Deduce that inferences may need to be changed on the basis of additional observations.
• Make inferences from a series of observations that indicate frequency.
• Recognize limitations of inferences.

UNIT GOALS

By the conclusion of the unit, students will be able to:

• Infer the value African Pen Pal’s place on elements of their culture.
• Decide if the African Pen Pal’s more highly value the material or the non-material elements of their cultures.
• Write a persuasive essay explaining the inferences they have drawn and supporting their opinions with evidence.
• Translate statistical information into charts and graphs.
• Use statistical data to help prove or disprove a hypothesis.

GRADE LEVEL INDICATORS

LANGUAGE ARTS

• Demonstrate active listening strategies.
• Draw logical inferences from presentations and visual media.
• Produce informal writings for various purposes.
• Write persuasive compositions.
MATHEMATICS
• Round numbers to a given place value.
• Describe what it means to find a specific percent of a number, using real-life examples.
• Develop and analyze algorithms for computing with fractions and decimals, and demonstrate fluency in their use.
• Read, construct, and interpret graphs.
• Make logical inferences from statistical data.
• Construct convincing arguments based on analysis of data and interpretation of graphs.

WORK AND FAMILY LIFE
• Communicate effectively
• Evaluate societal conditions affecting personal, family and community well-being.

TIME FRAME:

Preparing to Learn: 5 minutes

Activities
• 1 .......... 10 minutes (Directions: Culture Matrix & Viewing)
• 2 .......... 15 to 30 minutes per episode (View 1st episode)
• 3 .......... 15 to 30 minutes per episode (View 2nd episode)
• 4 .......... 15 to 30 minutes per episode (View 3rd episode)
• 5 .......... 25 to 40 minutes (Make Inferences)

Prepare to Learn: Statistics 10 to 20 minutes
• 6a & 6b ..... 60 minutes to several days
(Working with Data and Statistical Analysis)

MATERIALS

African Pen Pal DVDs—Three Episodes:
• Show both episodes from one country and a third episode from a different country
• You may use work with previously viewed episodes
• DVD player and TV – or computer with DVD player and presentation system
• Handout: Country Comparison Matrix
• Paper and pencil or pen

Data Source(s):
• CIA World Factbook statistics downloaded in the spring of 2004 for the African Pen Pal countries and the United States are located in the Appendix.
• OR, for more up to date information, the Internet, recent almanacs or other data sources of your choice.

Some method of creating graphs and charts:
• Graph paper, rulers, compasses, and protractors
• OR computer(s) with chart and graph generating software such as Microsoft Office Excel, Appleworks’ and Open Offices’ spreadsheet modules, etc.
Optional Materials:
- Calculators
  (Note: All computers have calculator applications)
- Handouts:
  - Statistical Analysis
  - Create a Pie Chart from Statistical Data” (The handout shows students how to make a pie graph with a compass and protractor).

**PREPARE TO LEARN:**

Explain to the students that each of the five countries in the African Pen Pal series profiles one boy and one girl. Solicit predictions about whether they expect to see more similarities between the two boys (or two girls) from two different countries or between the boy and the girl from the same country.

Remind the students that when we meet someone new, we usually make some inferences and form generalizations about the person. Ask the students if they have ever made a judgment about someone they just met and then later, as they got to know the person, discovered that their original judgment was wrong. Remind them that critical, focused listening and viewing skills can assist in developing objective inferences. More than one observation can help us confirm ideas but cannot necessarily prove something to be true.

Select three African Pen Pals episodes for your students to view. Use the African Pen Pal Synopses to help you make your selection. You may choose to watch episodes that your students have already seen. You will probably want to view only the Pen Pal’s day (about 15 minutes each). You may, however, choose to watch entire episodes (about 25 minutes each) including the “wrap-around” – the producer’s commentary section following the Pen Pal’s day. Preview the episodes before using them with your students. Some episodes have more mature content.

**ACTIVITIES**

1. **Making Inferences Based on Observation**

   Give each student a copy of the “Country Comparison Matrix.” For each country, students are to list the name and age of the African Pen Pal. You may also wish to ask the students to decide if the Pen Pal lives in the a rural area or an urban area. The producers of the series chose one urban and one rural location for each of the five countries.

   Check to see if the students understand the categories on the left of the handout. Take time to discuss any categories about which they have questions.

2. **View the first episode**

   Note: You may wish to use an episode that the students viewed in a previous unit and fill in the Country Comparison Matrix for that episode using information already gathered by the students.
For each category on the left of the handout, students may make brief notes under the column marked “Notes” as they watch the episode. Spelling should not be a concern. Abbreviations and shortened words should be encouraged as long as the student can remember for what the abbreviations stand. Examples:

- “home ec teach” could be written to stand for home economics teacher,
- “3b 2g” could stand for 3 boys and 2 girls in the family,
- “soc” for soccer,
- xtnd fam for extended family and so on.

Remind them to use their critical, focused listening and viewing skills. The student will use the column marked “Value” to infer the value of that item to the Pen Pal. For example, if the Pen Pal spends all or most of his/her leisure time talking about playing soccer and swimming, going to soccer games, and watching sports on TV, a student might infer that the Pen Pal values sports very highly. Agree on a rating system or rating scale. The value ratings could be the numbers from 1 to 5 with 5 used to show items that are most highly valued by the Pen Pal. If there is not enough information in the episode for a student to make any inferences about the value a Pen Pal places on a category, have the student write N/A instead of using the rating scale. More than one item could receive the same value rating.

Following the viewing, allow time for comments and discussion. Allow students to modify their ratings of what the Pen Pal values if their classmates comments provide them with new insights. Check to see that the students have understood the directions and have completed the matrix for the first African Pen Pal.

3 View the second episode from the same country. Complete the matrix for that episode. Allow time for comments, discussion and modifications of opinions.

4 View the third episode from a different country. Complete the matrix for that episode. Allow time for comments, discussion and modifications of opinions.

5 Analyze Observations and Make Inferences

Share the following Steps in the Process of Inductive Thinking with the students.

- Focus on specific pieces of information. Try not to assume anything as you make your observations.
- Look for patterns or connections in the information you have identified.
- Make a general statement (inference) that explains the patterns or connections you have observed.
- Make more observations to see if your inference holds up; if it does not, reword the inference and write a new inference based on the new information.

Have the students respond in writing to the following questions.

1 What inferences can you make about whether each Pen Pal places more value on the material objects of his/her culture or on the non-material elements of his/her culture? Cite evidence from the episodes to support your conclusions.

2 Are there more similarities between the two Pen Pals from the same country or between the two boys (or two girls) from different countries? Cite evidence from the episodes to support your conclusions.
Can you make any generalizations about the way of life of the children who live in more rural (country) areas versus those who live in urban areas? (You may need to clarify understanding of urban and rural.)

Are there things that the three Pen Pals all seem to value highly? What are they? Cite evidence to support your inferences.

Did you record any new words and can you determine their meaning? In which category did you note the word?

Do you feel that any of your conclusions (inferences) would hold true for all ten of the African Pen Pals? Do you feel they would also hold true for young people from the entire African continent? Would they also hold true all for young people from all over the world? Explain why/how you have come to that belief.

Sample inferences:

**SCHOOL: ACADEMICS AND PARENTAL EXPECTATIONS:**
All the African Pen Pals highly value education therefore I infer that all people in their countries also value education very highly.

**ENVIRONMENT/SURROUNDINGS:**
Some African Pen Pals don’t have running water inside their homes. Rosemary (Nigeria) goes to the local stream to get water to use at home. Zandile (South Africa) must go outside to get water and heat it on a stove before she takes a bath in a small plastic bowl. I have never seen or heard of anyone in my hometown that has to do these things. Therefore I infer that it is harder to have indoor plumbing in some African countries than it is in my hometown.

**FAMILY AND FAMILY ACTIVITIES:**
None of the African Pen Pals are the only children in the family. All of them have brothers and/or sisters. Therefore I infer that all parents in these countries value families with more than one child.

**PERSONAL AND/OR FAMILY CONCERNS:**
Zandile’s mother (South Africa) was burned by her father; Grace’s teacher (Kenya) talks about parents who have problems with drinking; Warda’s father (Tanzania) left home one day and has not returned. I know that these kinds of things also happen in the United States therefore I infer that people in these countries have family problems similar to the problems we have in the United States.

**RELIGION:**
The African Pen Pals go to either Christian or Muslim churches and/or to schools where religion is a part of instruction. (Exceptions: Moses follows the ways of the Maasai in Kenya although the episode does not call Maasai beliefs a religion. Christopher’s episode, South Africa, makes no mention of religion.)

- I infer that there is no separation between church and state in these African countries.
- Or – I infer that all the schools in these African countries are church schools.
- Or – I infer that people in these African countries are more religious than are Americans.
STATISTICAL ANALYSIS
SUPPORTING INFERENCE WITH DATA

PREPARE FOR LEARNING

Understanding peoples and their cultures is a complex issue. To deepen the students’ thinking, and to help them become more objective and critical thinkers, have the students investigate statistical data or known facts.

Make sure that the students have a good working definition of statistics and analysis. Ask: “What is a statistic? How is a statistic derived? Do you ever analyze statistics?” Two examples of the use of statistics in everyday life are listed below to help students understand how statistics are derived and how we use statistics.

EXAMPLE 1

Batting Average: Ask sports fans in the class to explain the importance of statistics in sports. For example, a student may explain that Batter A has a batting average of 348 (.348) and Batter B bats 212 (.212). S/he can easily tell that Batter A is better than Batter B.

Explain (or have a student explain) that a batting average is figured by taking the number of hits a batter has made and dividing that number by the number of times the batter was at bat. Unless the batter hit the ball every single time s/he was at bat, the answer will be a fraction – less than 1 whole.

• Batter A may have hit the ball safely 48 times during the 138 times he was at bat.
• 48 divided by 138 equals the decimal fraction 0.3478261.
• When one rounds 0.3478261 to the nearest thousandth, Batter A’s batting average is 0.348 which is sometimes read as 348 (without the decimal) in baseball statistics.

Ask the students if they can express the batting average as a percent. (.348 would be 35%. .212 would be 21%) Batter A hits the ball safely 35% of the time. Batter B hits safely 21% of the time.

EXAMPLE 2

Grades: Ask the students to explain the importance of statistics in their grades. For example, a student might explain that to receive an A on his grade report, s/he must attain a percentage of at least 91%. When a student sees both an A and a D on his/her grade report, the student immediately knows in which class s/he excelled.

Explain, or have a student explain that grades are usually figured by dividing the total number of points earned by the total number of points possible. Unless the student earned every single point that it was possible to earn, the answer will be a fraction - less than one. The resulting answer is compared to a predetermined list or grading scale and a letter grade is assigned.

• The student may have earned 991 points out the 1089 points possible.
• 991 divided by 1089 equals the decimal fraction 0.9100092
• When one rounds 0.9100092 to the nearest hundredth, the average for the class is 0.91.
• The decimal fraction 0.91 is converted to the percentage 91%.
• The teacher assigns a grade of A (or A-) since the school grading scale states that averages between 90% - 100% will be given the grade A.

Point out to the students that a grade of D could also be given to a student who earned 991 points – if the possible number of points was 1500. 991/1500 = 0.6606667 (0.66 or 67%) and the grading scale states that 60% to 69% = D.
Analyze Real Life Data and Support Inferences
(Two Separate Options are Available)

The students will look at statistical data to see if the data can help them prove or disprove an inference they have created.

- Have each student select one of the African countries from which they have viewed African Pen Pal episodes: Kenya, Egypt, Nigeria, Tanzania, or South Africa. Students may work independently or in groups of two.

**OPTION 1**

**6A Limited Data**

The two-page handout “Statistical Analysis” is based on a predetermined, limited range of data which concentrates on the following topics:

- Population – total compared to U.S., breakdown by age
- Life expectancy
- Literacy
- Occupations
- Income or purchasing power
- Unemployment
- Land use – amount of land used to grow crops
- Religion
- Poverty

Give the students the handout “Statistical Analysis” and have them compete the worksheet. Students may work independently or in groups of two. They may use any of the following methods:

- Graph paper, pencil, compass, ruler and protractor. If needed, elicit the help of math teachers. By the seventh and eight grade, students should be able to determine the type of chart or graph that best depicts varying types of data and they should be able to create charts all of the basic types of graphs as well as more sophisticated graphs.
- Chart and graph generating software such as Microsoft Excel; Microsoft Works’, Appleworks’ or Open Office’s spreadsheet modules.

An answer key based on CIA World Factbook data available at the creation of this instructor’s guide can be found at the end of this unit.

**6B Deductive Thinking:**

Working with the Country Comparison Matrix and the Statistical Analysis graphs/charts, have the students answer evaluative and synthesizing questions (orally or in writing) such as:

- Do you see any connections between the statistics you investigated and the observations you recorded on the matrix? What are the connections?
- Can you make any inferences about the Pen Pals or their culture based on your observations, the statistics, and the connections you identified?
- Can you prove or disprove any of your inferences using the statistical data?
- Does the analysis of the statistical data change your opinion about the values you assigned to any of the topics on the matrix?
- Does the analysis of the statistical data help you to understand the value an African Pen Pal places on any of the topics from the matrix?

See the Appendix for statistics for the United States and the five African Pen Pal countries. The statistics were downloaded in Spring 2004 from the CIA World Factbook website.

Web Site: http://www.cia.gov/cia/publications/factbook/
• Are you able to make any general statements about the similarities or differences between the African Pen Pal countries and the United States? Share your general statements with the class.

Ask the students what questions have come to mind for which they have found no answers in either the viewing of the Pen Pal episodes of from completing the statistical analysis. Have the students use their questions to generate ideas for further research. These ideas may be used in the next unit.

**OPTION 2**

**6A Students are not limited to a predetermined set of data**

Students will refer to the conclusions and inferences they generated in Activity #5 of this unit. Their goal will be to validate their inferences with supporting statistics they find and analyze.

**6B Analytical thinking**

Have the students search for data that may support their inferences. Comparing statistics for the African countries to the related data from the United States can help the students better understand the statistics.

Sources of information on the Internet include the **CIA World Factbook**, the **Human Development Report and Earth Trends**. Both the **Human Development Report and Earth Trends** web sites provide only downloadable Adobe Acrobat Reader (.pdf) files. Students may also use up to date encyclopedias or almanacs or find other sources. You may print out pertinent information for the students if they do not have ready access to sources.

Ask students to select the data, and to convert the data into graphical interpretations such as charts and graphs. They may use any of the following methods:

• Graph paper, pencil, compass, ruler and protractor. Elicit the help of math teachers. By the seventh and eight grade, students should be able to determine the type of chart or graph that best depicts varying types of data and they should be able to create charts all of the basic types of graphs as well as more sophisticated graphs.

• Chart generating software such as Microsoft Excel, Appleworks’ spreadsheet module, or Open Offices’ spreadsheet module.

Have the students decide what data s/he has analyzed tends to prove (or disprove) his or her inferences and which do not. Some students may find no data to support their inferences. In cases where no data supported the inferences(s) ask the students to write new inferences base on the new information s/he has learned.

Each student will write a brief persuasive essay explaining his/her inference(s) and using statistical evidence to persuade others to believe as s/he believes.

Ask the students what questions have come to mind for which they have found no answers in either the viewing of the Pen Pal episodes of from completing the statistical analysis. Have the students use their questions to generate ideas for further research. These ideas may be used in the next unit.
<table>
<thead>
<tr>
<th>Pen Pal’s Name, Age, Country:</th>
<th>COUNTRY 1: BOY</th>
<th>COUNTRY 1: GIRL</th>
<th>COUNTRY 2: BOY</th>
<th>GIRL</th>
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<td>Notes:</td>
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<td>Material Resources</td>
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<td>Parent/Adult Occupations</td>
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<td>Pen Pal’s Plans for the Future</td>
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<td>Parental Expectations</td>
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<td>Family and Family Activities</td>
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<td>Friends and Friendship</td>
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<td>School: Extracurricular Activities</td>
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<td>Hobbies and Free Time Activities</td>
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<td>Music and/or Dance</td>
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<tr>
<td>Personal and/or Family Concerns</td>
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</table>
Choose one country.
Answer each of the following questions. Use the technology to which you have access: paper, pencil, graph paper, ruler, compass, and protractor or the computer.

1 What is the population of the country?
   a Write a decimal fraction - rounded to the nearest tenth and the matching percentage that compares the country’s population to that of the United States.
   b Example: Egypt: 74,718,797 United States: 290,342,554 or about 75 million compared to 290 million.
   c $\frac{75}{290} = .26$ or 26%. Egypt has roughly one quarter of the number of people that the United States has.

2 What is the life expectancy for all of the citizens of the country?
   a Men?
   b Women?
   c Compare those figures to life expectancy in the United States.
   d If there is a marked difference between the country and the United States, do further research and list possible reasons for the difference.

3 Create a pie graph that reflects the age breakdown for the country’s population by age. Create a second pie graph that reflects the same information for the United States.
   a Example: Kenya
      • 0-14 years: 41.3%
      • 15-64 years: 55.8%
      • 65 years and older: 2.9%

Kenya Population

http://www.cia.gov/cia/publications/factbook/
4 What is the literacy rate for the country?
   a For Females?
   b For Males?
   c Create a double bar graph comparing the country’s literacy rates to those of the United States.

5 How is the land used?
   a What percentage of the land is used for crops (arable and permanent)?
   b Is this percentage higher or lower than the percentage of arable land in the United States?
      How much higher or lower?

6 What is the purchasing power of the average citizen in the country?
   a Purchasing Power Parity/Per Capita Income?
   b How does that compare with the same information for the United States?

7 List all the occupations in which 10% or more of the work force/labor force are employed.
   Give the percentage for each.

8 What is the unemployment rate for the country? For the United States?

9 What percentage of the country is Christian (Protestant and Catholic combined)?
   a Is Muslim?
   b Is Jewish?
   c Follows traditional African or indigenous religions?

10 Make a graph (or graphs) of your choice about the poverty rate in the country you chose
    and in the United States.
   a Look back at the literacy rate for your country and the United States.
   b Is there any relationship between the poverty rates and the literacy rates?
      Write a statement about any relationship you see.
1 Population compared to the United States
   a Kenya: 0.11 or 11%
   b Egypt: 0.26 or 26%
   c Tanzania: 0.12 or 12%
   d Nigeria: 0.46 or 46%
   e South Africa: 0.15 or 15%
   f United States 1.00 or 100%

2 Life Expectancy
   a Kenya: All: 45 years, Men: 45 years, Women: 45 years
   b Egypt: All: 70 years, Men: 68 years, Women: 73 years
   c Tanzania: All: 45 years, Men: 43 years, Women: 46 years
   d Nigeria: All: 51 years, Men: 51 years, Women: 51 years
   e South Africa: All: 47 years, Men: 47 years, Women: 47 years
   f United States: All: 77 years, Men: 74 years, Women: 80 years

3 Age Breakdowns (a.k.a. Age Structure)
   a Kenya: 0 to 14: 41%, 15 to 64: 56%, 65+: 3%
   b Egypt: 0 to 14: 34%, 15 to 64: 62%, 65+: 4%
   c Tanzania: 0 to 14: 44%, 15 to 64: 53%, 65+: 3%
   d Nigeria: 0 to 14: 44%, 15 to 64: 54%, 65+: 3%
   e South Africa: 0 to 14: 30%, 15 to 64: 65%, 65+: 5%
   f United States: 0 to 14: 21%, 15 to 64: 67%, 65+: 13%

4. Literacy Rates:
   a Kenya: All: 85%, Men: 91%, Women: 80%
   b Egypt: All: 58%, Men: 68%, Women: 47%
   c Tanzania: All: 78%, Men: 86%, Women: 71%
   d Nigeria: All: 68%, Men: 76%, Women: 61%
   e South Africa: All: 86%, Men: 87%, Women: 86%
   f United States: All: 97%, Men: 97%, Women: 97%

5 Land Use:
   a Kenya: Total For Crops: 8% - 12% lower than the U.S.
   b Egypt: Total For Crops: 3% - 17% lower than the U.S.
   c Tanzania: Total For Crops: 5% - 15% lower than the U.S.
   d Nigeria: Total For Crops: 34% - 14% higher than the U.S.
   e South Africa: Total For Crops: 13% - 7% lower than the U.S.
   f United States: Total For Crops: 20%

6 Purchasing Power/Per Capita Income (2002 estimates)
   a Kenya: $1,020.00
   b Egypt: $4000.00
   c Tanzania: $600.00
   d Nigeria: $900.00
   e South Africa: $10,000.00
   f United States: $37,600.00
7 Occupations

a. Kenya: Agricultural: 75 to 80%
b. Egypt: Agricultural: 29%, Industry: 22%, Services: 49%
c. Tanzania: Agricultural: 80%, Industry & Services 20%
d. Nigeria: Agricultural: 70%, Industry: 10%, Services: 20%
e. South Africa: Agricultural: 30%, Industry: 25%, Services: 45%
f. United States: Managerial & professional: 31%, Technical, sales & administrative support: 29%, Services: 14%, Manufacturing, mining, transportation, & crafts: 24%

8 Unemployment Rates:

a. Kenya: 40%
b. Egypt: 12%
c. Tanzania: Not Available
d. Nigeria: 28%
e. South Africa: 37%
f. United States: 6%

9 Religious Breakdown:

a. Kenya: Christian: 78%, Indigenous beliefs: 10%, Muslim: 10%, Other: 2%
b. Egypt: Muslim: 94% Coptic Christian and Other 6%
c. Tanzania: Mainland: Christian – 30%, Muslim – 35% Indigenous 35%
Zanzibar: Muslim – more than 99%
d. Nigeria: Muslim: 50%, Christian: 40%, Indigenous beliefs: 10%
e. South Africa: Christian: 68%, Muslim: 2%, Hindu: 1.5%, Indigenous & Animists 28.5%
f. United States: Christian: 84%, Jewish: 2%, Other: 4%, None: 10%

10 Poverty Rates:

a. Kenya: 50%
b. Egypt: 22.9%
c. Tanzania: 36%
d. Nigeria: 60%
e. South Africa: 50%
f. United States: 12.7%

Students will probably say that in their African country there is more poverty and fewer people who can read than in the United States. Students may also note that fewer women than men can read in most of the five Pen Pal countries while in the United States the literacy rate is the same for males and females. (South Africa is nearly even at 87% for males and 86% for females.)

There is, however, no clear relationship between literacy and poverty levels in these five countries when they are compared to one another. Egypt has the lowest literacy rate (58%) but it also has the lowest poverty rate among the African Pen Pal countries. South Africa is in the reverse position. It has both a very high poverty rate and a high rate of literacy (87%). Tanzania (78%) has more people who cannot read than Kenya (85%) but it also has less poverty. Clearly something besides literacy influences the poverty levels in African countries.
CREATE A PIE GRAPH FROM STATISTICAL DATA

1 Translate percentages into degrees.


0 to 14 years old = 41.3%

1 • 41.3% = 0.413 (decimal equivalent for this percent)
2 • Round 0.413 to 0.41 (Round to the nearest tenth.)
3 • 360 (degrees in a circle) times .41 = 147.6 degrees  
   (You just found the fractional part of a whole.)
4 • Round 147.6 to 148 degrees (Round to the nearest whole number.)

15 to 65 years old – 55.8% (0.558 is rounded to 0.56 or 56%)

1 • 360 x 0.56 = 201.6 degrees
2 • Round 201.6 to 202 degrees

65 years old and older = 2.9% (0.029 is rounded to 0.03 or 3%)

1 • 360 x 0.03 = 10.8 degrees
2 • Round 10.8 to 11 degrees

2 Draw a circle with a compass and mark the exact center of the circle.

3 Draw a radius from the center of the circle to the outside edge of the circle.
4 Choose one of the answers you found in step 1.

5 148 degrees - the answer for 0 to 14 years of age - was used in this example.

6 Place the protractor on the radius so that the midpoint of the base line points to the center of the circle and the base line sits on the radius. Figure 3

7 Count around the top edge of the protractor until you have counted 148 degrees.

8 Make a mark at 148 degrees.
You may write the number, if you want to do so, but it is not required.

9 Reposition the protractor and draw a line to connect the center of the circle to the mark you made at 148 degrees. Figure 4
a You may extend the line outside the circle, but your pie graph will be neater if you stop at the edge of the circle.
b You may also erase the part of the line outside the circle.

10 Choose a 2nd answer you found in step 1.

11 11 degrees – the answer for 65 years of age or older – was used in this example.

12 Place the protractor on the first radius line you drew back in step 3 so that the midpoint of the base line points to the center of the circle and the base line sits on the radius. Figure 5

13 Count around the top edge of the protractor until you have counted 11 degrees.

14 Make a mark at 11 degrees.
You may write the number, if you want to do so, but it is not required.
15 Reposition the protractor and draw a line to connect the center of the circle to the mark you made at 11 degrees. Figure 6

a You may extend the line outside the circle, but your pie graph will be neater if you stop at the edge of the circle.

b You may also erase the part of the line outside the circle.

16 There is no need to draw the final section of the pie graph.
If the first two sections have been drawn accurately, the final section will already be the correct size. Figure 7

17 Label the finished pie chart.
You may place the labels on the outside of the chart and add color to the wedges.

18 Don’t forget to add a title to your pie chart.