

LESSON

7

Comparing Distributions

LEARNING OBJECTIVES

- Today I am: using three different graphs.
- So that I can: answer specific questions about the data.
- I'll know I have it when I can: decide which graph to use to get my questions answered.

Exploratory Challenge 1: Country Data

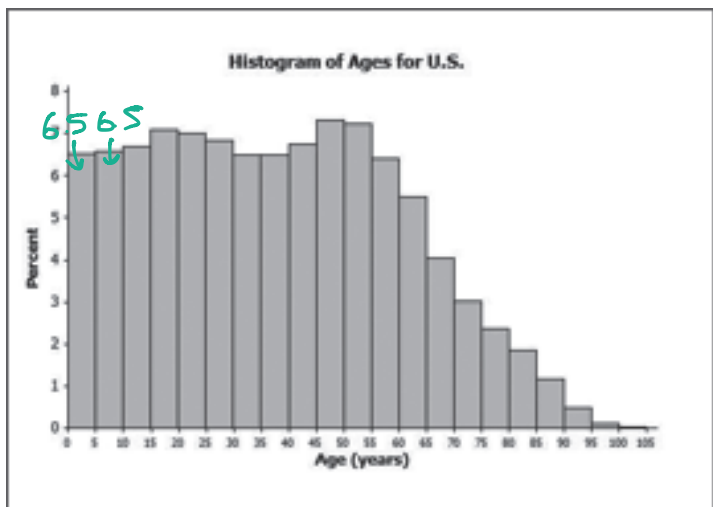
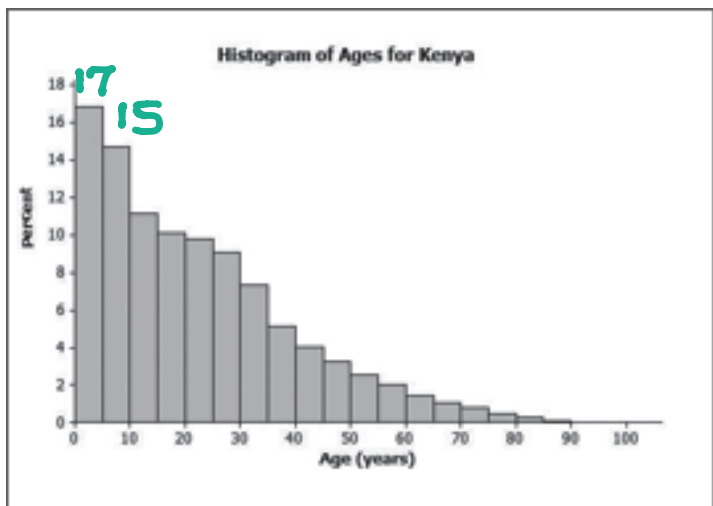
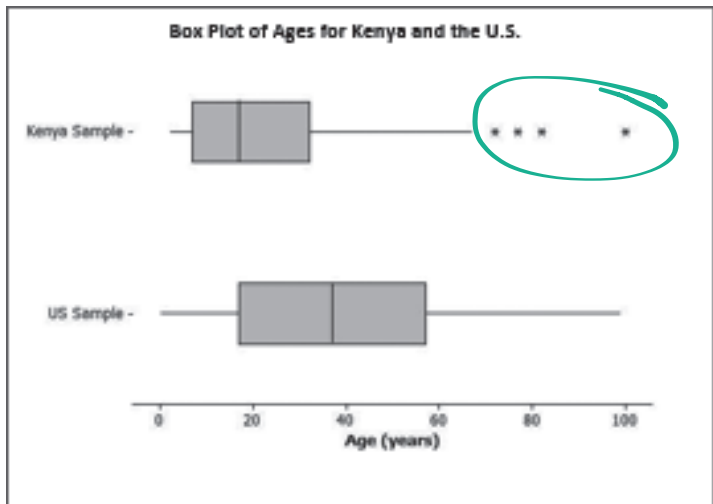
A science museum has a *Traveling Around the World* exhibit. Using 3D technology, participants can make a virtual tour of cities and towns around the world. Students at Waldo High School registered with the museum to participate in a virtual tour of Kenya, visiting the capital city of Nairobi and several small towns. Before they take the tour, however, their mathematics class decided to study Kenya using demographic data from 2010 provided by the United States Census Bureau. They also obtained data for the United States from 2010 to compare to data for Kenya. In both cases 200 people were sampled.



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Students in their class created different graphs using data from Kenya and from the U.S. Can you decide which graphs gives the answers to the questions?

You will need: Graphs handouts



1. A. How do the shapes of the two histograms differ?

- B. How do the shapes of the two box plots differ?

2. Use the graphs to determine the answer to each question and then tell which graph you used to find the answer. If no answer is possible from the information given, then write "not possible" in the answer column and leave the graph column blank.

Question	Answer	Graph Used
A. Approximately what percent of people in Kenya are between the ages of 0 and 10 years?	$0-5 \rightarrow 17\%$ $5-10 \rightarrow 15\%$ <hr style="width: 50px; margin-left: auto; margin-right: auto;"/> 32%	Histogram
B. Approximately what percent of people in the United States are between the ages of 0 and 10 years?	13%	Histogram
C. Approximately what percent of people in Kenya are 60 years or older?	5%	Histogram
D. Approximately what percent of people in the United States are 60 years or older?	20%	Histogram
E. The population of Kenya in 2010 was approximately 41 million people. What is the approximate number of people in Kenya between the ages of 0 and 10 years?	$\frac{32}{100} = \frac{x}{41}$ $x \approx 13,120,000$	Histogram

Question	Answer	Graph Used
<p>F. The population of the United States in 2010 was approximately 309 million people. What is the approximate number of people in the United States between the ages of 0 and 10 years?</p>	$\frac{13}{100} = \frac{x}{309}$ $x \approx 40,170,000$	<p>Histogram</p>
<p>G. The Waldo High School students started planning for their virtual visit of the neighborhoods in Nairobi and several towns in Kenya. Do you think they will see many teenagers? Will they see many senior citizens who are 70 or older?</p>	<p>Most likely teenagers</p>	<p>Box plots</p>
<p>H. Adrian, a senior at Waldo High School, stated that the United States has a lot of older people compared to Kenya. Would you agree? How would you describe the difference in the ages of people in these two countries?</p>	<p>Yes, U.S. has more % of older people</p>	<p>Box plots Histogram</p>
<p>I. Estimate the median age of a person in Kenya and the median age of a person in the United States.</p>	<p>Kenya ~ 18 U.S. ~ 38</p>	<p>Box plots</p>
<p>J. 25% of the people in the United States are younger than what age? How did you determine that age?</p>	<p>18 years Q1</p>	<p>Box plot</p>

Question	Answer	Graph Used
K. Approximately what percent of people in Kenya are younger than 18 years old?	50%	Box plot
L. Estimate the mean age of a person from Kenya.	Not possible	
M. The mean age of people in the United States is approximately 38 years. Estimate the percent of people in the United States who are younger than the mean age in the United States.	About 50%	Box plot
N. If the median age is used to describe a typical person in Kenya, what percent of people in Kenya are younger than the median age? Is the mean or median age a better description of a typical person in Kenya? Explain your answer.	50% Median is better because the data is right skewed	Box plot Histogram
O. What is the IQR of the ages in the sample from the United States? What is the IQR of the ages in the sample from Kenya? If the IQRs are used to compare countries, what does a smaller IQR indicate about a country? Use Kenya and the United States to explain your answer.	IQR U.S. $58 - 18 = 40$ Kenya $36 - 7 = 31$ 50% of the people have similar age	Box plot

Lesson Summary

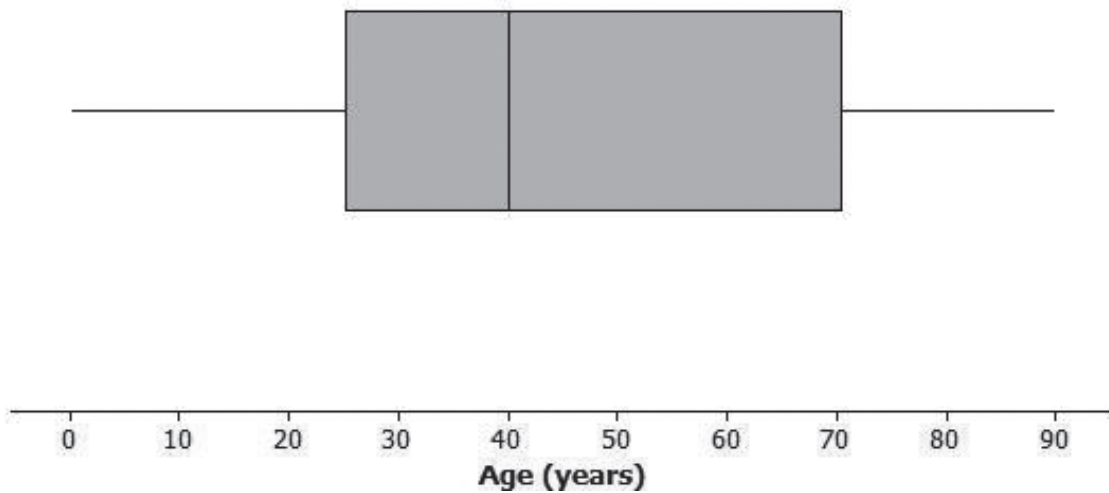
- Histograms show the general shape of a distribution.
- Box plots are created from the 5-number summary of a data set.
- A box plot identifies the median, minimum, and maximum values and the upper and lower quartiles.
- The interquartile range (IQR) describes how the data are spread around the median; it is the length of the interval that contains 50% of the data values.
- The median is used as a measure of the center when a distribution is skewed or contains outliers.

NAME: _____ PERIOD: _____ DATE: _____

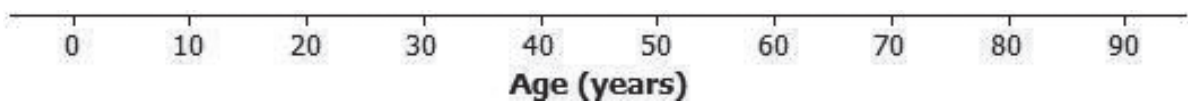
Homework Problem Set

The following box plot summarizes ages for a random sample from a made-up country named Math Country.

Boxplot of Ages for Sample From Math Country



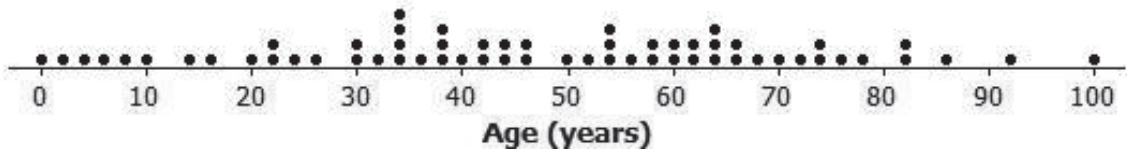
1. Make up your own sample of forty ages that could be represented by the box plot for Math Country. Use a dot plot to represent the ages of the forty people in Math Country.



2. Is the sample of forty ages represented in your dot plot of Math Country the only sample that could be represented by the box plot? Explain your answer.

3. The following is a dot plot of sixty ages from a random sample of people from Japan in 2010.

Draw a box plot over this dot plot.



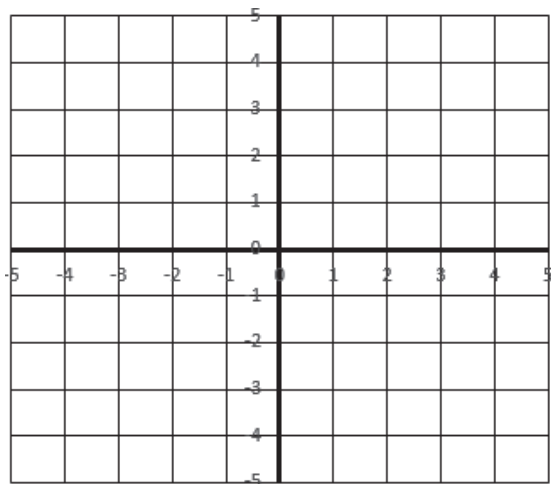
4. Based on your box plot, would the median age of people in Japan be closer to the median age of people in Kenya or the United States? Justify your answer.

5. What does the box plot of this sample from Japan indicate about the possible differences in the age distributions of people from Japan and Kenya?

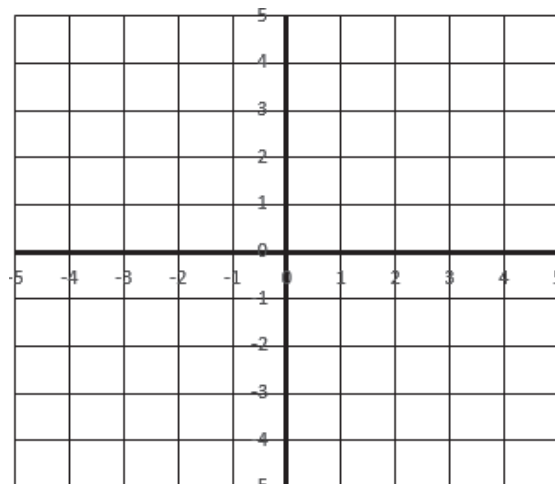
REVIEW—Slope and Graphing Lines

6. Draw the graph of the line given a point on the line and the slope of the line.

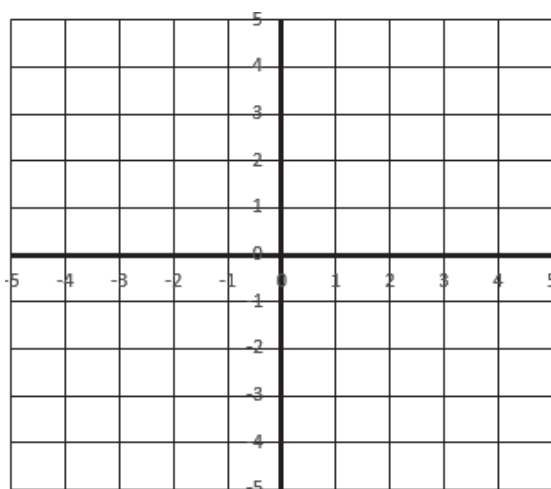
A. Slope = $\frac{2}{3}$ and point A (3, 1)



B. Slope = $-\frac{1}{4}$ and point B (0, -2)



C. Slope = 0 and point C (-2, 4)



D. Slope = 2 and point D (-3, -4)

