

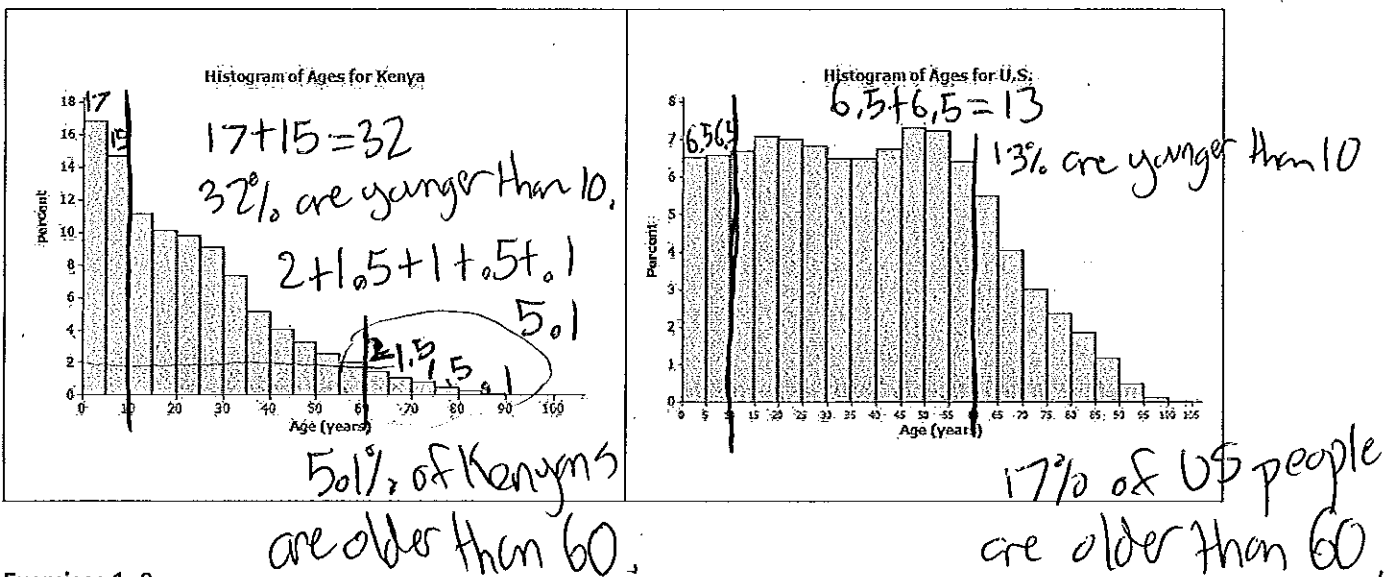
Lesson 8: Comparing Distributions

Classwork

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.

The following histograms represent the age distributions of the two countries.



Exercises 1-8

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

Kenya is more skewed to the right.

2. Approximately what percent of people in Kenya are between the ages of 0 and 10 years?

32%

3. Approximately what percent of people in the United States are between the ages of 0 and 10 years?

13%

4. Approximately what percent of people in Kenya are 60 years or older?

5%

5. Approximately what percent of people in the United States are 60 years or older?

17%

6. 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?

$$.32 \cdot 41 = 13.12 \text{ million}$$

7. 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?

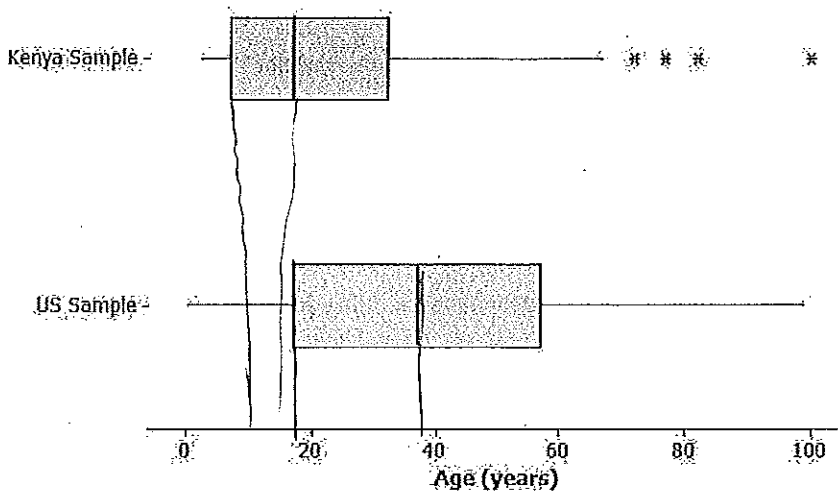
$$.13 \cdot 309 = 40.17 \text{ million}$$

8. 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? Explain your answer based on the histogram.

Yes, you will see many teenagers because the histogram is tall for young people.
No, you will not see many old people, because the data is skewed right.

Exploratory Challenge 2: Learning More About the Countries Using Box Plots and Histograms

A random sample of 200 people from Kenya in 2010 was discussed in previous lessons. A random sample of 200 people from the United States is also available for study. Box plots constructed using the ages of the people in these two samples are shown below.



Exercises 9–16

9. Adrian, a senior at Waldo High School, stated that the box plots indicate 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 based on the above box plots?

Yes. The box is further to the right

10. Estimate the median age of a person in Kenya and the median age of a person in the United States using the box plots.

$M_K = 18$

$M_{USA} = 38$

11. Using the box plot, 25% of the people in the United States are younger than what age? How did you determine that age?

≈ 19 . That's where the box starts

12. Using the box plot, approximately what percent of people in Kenya are younger than 18 years old?

25%

13. Could you have estimated the mean age of a person from Kenya using the box plot? Explain your answer.

Not really. I know the mean is skewed right, but I can't find it exactly.

14. The mean age of people the United States is approximately 38 years. Using the histogram, estimate the percent of people in the United States who are younger than the mean age in the United States.

About 50%

15. 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 skewed

16. 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.

$$IQR_K = 37 - 18 = 19$$

$$IQR_{USA} = 59 - 19 = 40$$

Big IQR means more spread/variability.