

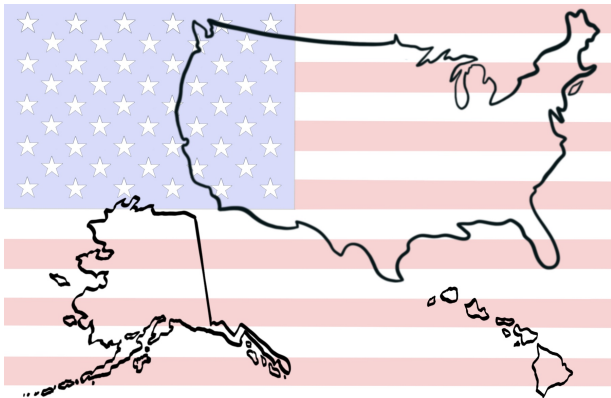
## Lesson 1

### The United States

#### A Lower Middle-Layered Country

Rectangle...square...trapezoid. Each of these words describes a shape that answers an important question in geometry. There are other examples in which shape is important in answering questions. For example, how would you describe the **shape** of a country? Why might studying the shape of a country be important? What questions are answered by understanding the shape of a country?

Let us start with United States. What is the shape of the United States? Most people would answer that question by sketching an outline of the United States as represented on a map. For example, the following sketch is an outline of the shape of United States that Kristin (a character in a data story you are about to read) found on a map. It is a unique shape. Although this shape is not described by words such as square or rectangle, the shape of the United States is important in answering questions about the country.



The geographical shape and placement of the United States in the world are important in understanding the United States' infrastructure, distances between important locations within the country, length of borders with other countries, coastal distances, and many other features.

There are other representations of the shape of a country that are also important to study. Kristin's story begins to reveal a different shape of the United States.

### **Kristin's Story – Chapter 1**

It was January 1, 2015. Kristin, a 36-year old female, lived in Milwaukee, Wisconsin. She worked 40 hours a week as a health care researcher for a community clinic. Most people involved in her research were 60 years old or older. She was responsible for obtaining basic data that included weight, height, blood pressure, heart rate, previous health concerns, vaccinations, diet and sleeping issues. She felt that the start of a new year was a good time to think about her own future.

Kristin's mother was 66 years old at the start of 2015 and in good health. She came into the clinic at least once a year and generally did not require any follow-up visits. During her most recent visit, she stated something that confused Kristin. "Based on the shape of our country, I will be entering a new layer of our country's population in the next decade, along with lots of other people." Kristin was puzzled. What did she mean?

Kristin felt she could sketch the shape of the United States. Her sketch would be the shape she visualized during her study of geography in high school or college. She realized that her mother was reflecting on the fact that she was growing older, but what does age have anything to do with our country's shape? What did she mean that she was entering a new "layer"?

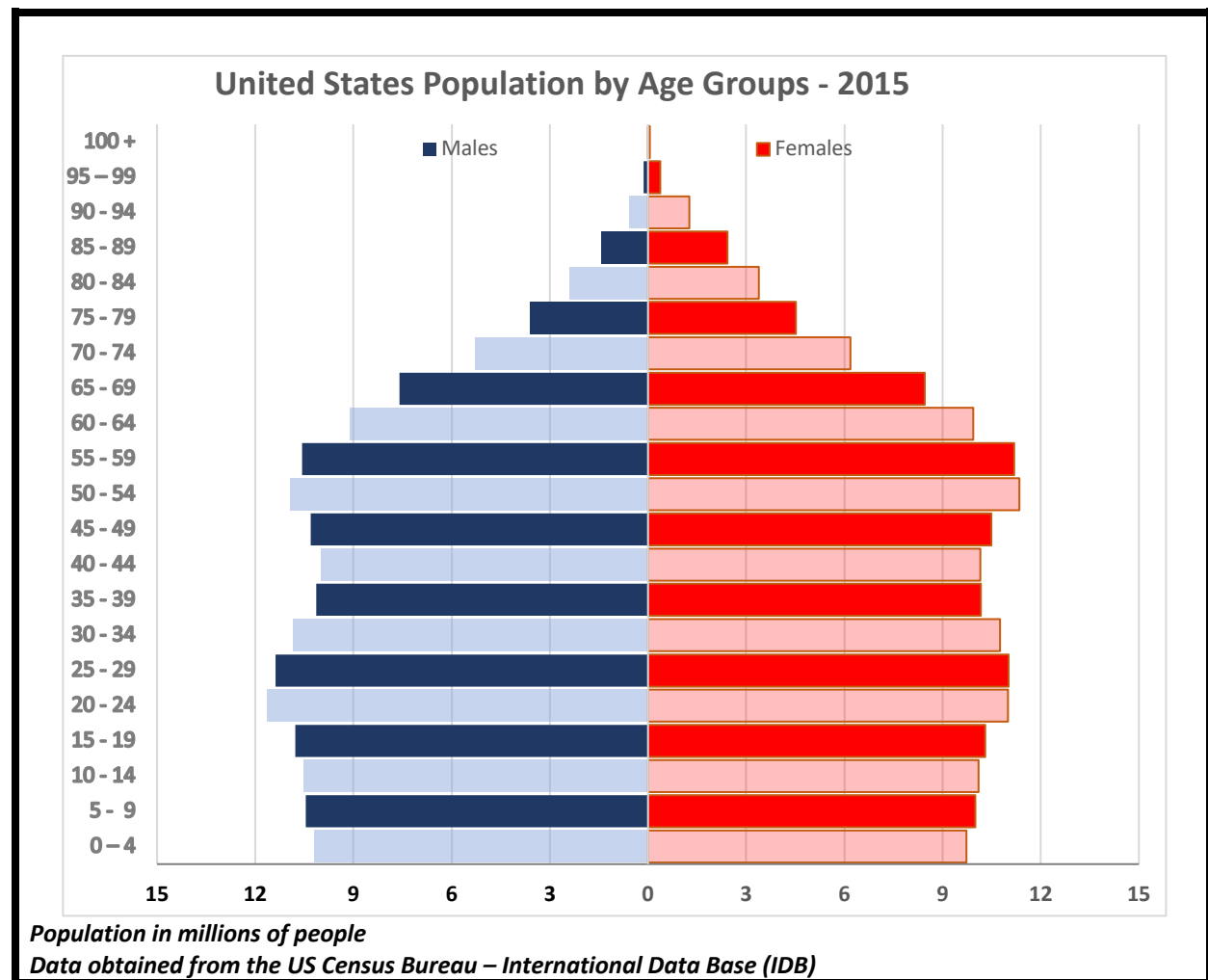
Shape suggested to Kristin something visual, like a square, a circle, or a triangle – something you studied in geometry. She thought again about her mother's comment. Kristin initially chalked up her mother's comment as something people say as they grow older. She found in her research, however, a **population pyramid graph** prepared by the United States Census Bureau. This graph had an interesting shape that might be used to explain her mother's comment. She did not, however, have an easy word (like square, rectangle, or circle) to describe this shape.

Kristin realized the graph is a summary of the ages of people in the United States. She wondered if the population pyramid graph's shape would explain why people her age were not as often highlighted by the media. In addition, Kristin and her friends did not particularly enjoy the latest shows offered on television or streaming services. She felt many of the popular movies seemed to either be something her parents (who were in their 60's and identified as Baby Boomers) or her 26-year old sister (who was identified as a Millennial) would enjoy. In her mid-thirties, Kristin and several of her friends were beginning to pursue leadership positions in government. But why did it seem the main issues addressed by the government were primarily issues involving her sister or her parents? Kristin looked closely at the population graph. The population pyramid graph prepared by the United States Census Bureau began sorting out some of her questions. Maybe the shape of this graph is another description of the shape of the United States?

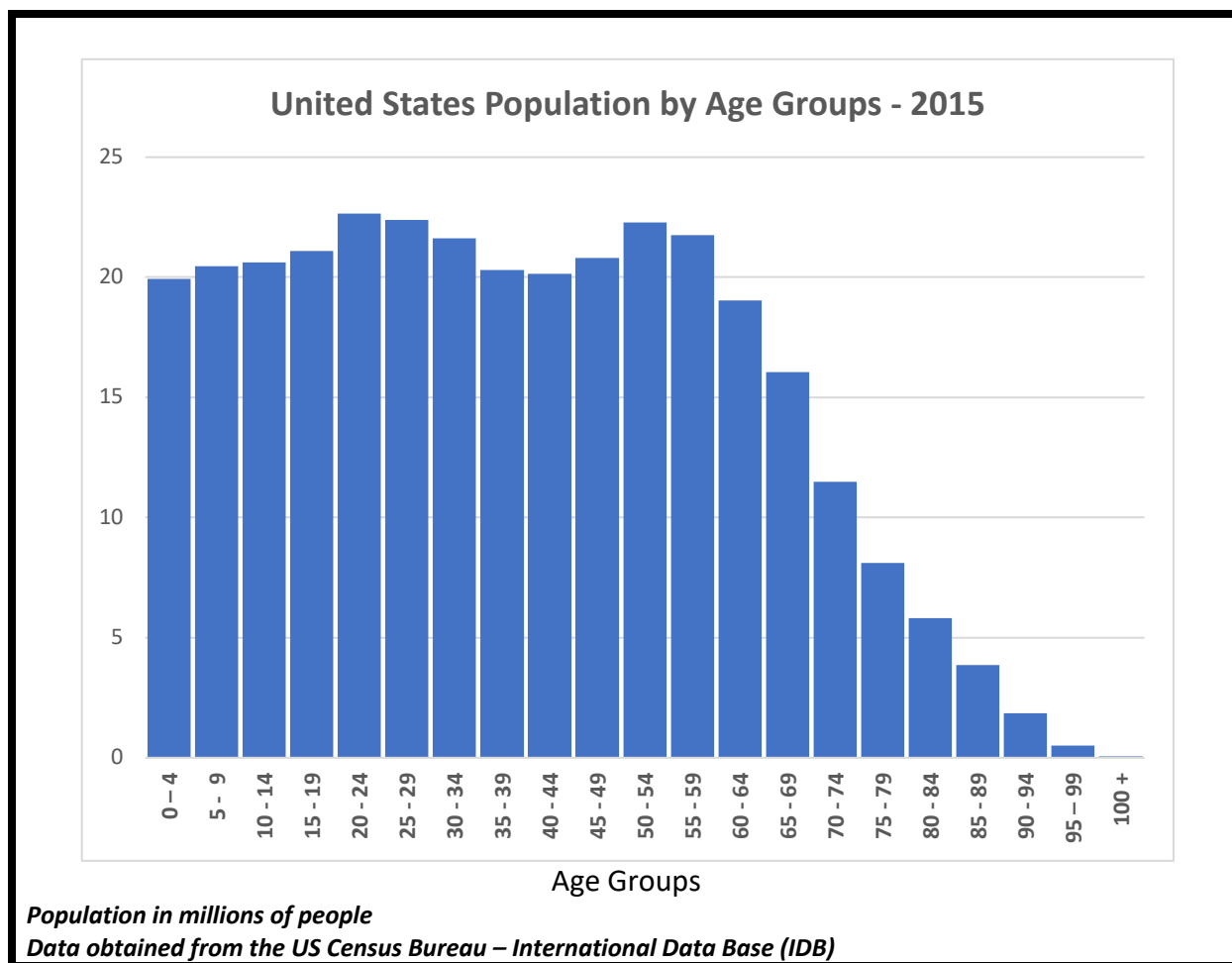
## Lesson 1 – Problems

Handout needed to complete the following problems: Handout 1: *United States – 2015*

The United States Census Bureau provides graphs of the age distributions of countries around the world. The following graph summarizes the population of the United States at the start of 2015 and is called a **population pyramid graph**. It is available at the United States Census Bureau's International Data Base (IDB) website (<https://www.census.gov/programs-surveys/international-programs/about/idb.html>).



Another type of graph, called a **histogram**, combines the counts of the females and males in each of the age groups. The histogram for the 2015 United States population is also a representation of the shape of a country.



Each of these graphs conveys important information about the United States. They provide visual representations of the *estimates* for the count of people in the designated age groups. The general shape of each graph summarizes important descriptions of the population of a country mentioned in Kristin's story.

Use **Handout 1: The United States – 2015** to answer the following problems. Derive your answers using the population pyramid graph, the histogram, or the table that is included with the handout.

1. What 5-year age group has more people (males and females) than any other age group?
2. In what age group was Kristin counted in the 2015 population pyramid graph or histogram? In what age group was Kristin's mother counted? In what age group was Kristin's younger sister counted?

3. What 5-year age group of just males has more counts of males than any other age group of males?
4. What 5-year age group of just females has more counts of females than any other age group of females?

A population distribution is defined by the following *layers*:

- The **bottom-layer** refers to the counts of people in the 0 to 24 years old age groups.
- The **lower middle-layer** refers to the counts of people in the 25 to 49 years old age groups.
- The **upper middle-layer** refers to the count of people in the 50 to 74 years old age groups.
- The **top layer** refers to the count of people in the 75 to 100+ years old age groups.

Based on the summary of layers, a country's shape is defined by the following terms:

- A country that has most of its people in the bottom-layer is identified as **Bottom-Layered Country**.
- A country that has most of its people in the lower middle-layer is identified as a **Lower Middle-Layered Country**.
- A country that has most of its people in the upper middle-layer is identified as an **Upper Middle-Layered Country**.
- A country that has most of its people counted in the top layer is identified as a **Top-Layered Country**.

5. Estimate what age group layer (bottom, lower middle, upper middle, top) you think will have the least number of people in the United States? Did you use the population pyramid graph, the histogram, or the table to make your estimate? Explain how you made your estimate using the graphs or table.
6. Estimate what age group layer you think will have the greatest number of people? Did you use the population pyramid graph, the histogram, or the table to make your estimate? Explain how you made your estimate using the graphs or table.

Identify on the **population pyramid graph** and the **histogram** where the above layers begin and end by age groups.

7. Kristin used the table included with Handout 1. She added up the count of people who were 0 – 4 years old, 5 – 9 years old, 10 – 14 years old, 15 – 19 years old, and 20 – 24 years old. The total count she obtained was 104,776,994 people. What is the percent of people 0 to 24 years old based on the estimates summarized by the table? Summarize your answer to the nearest tenth of a percent.
8. In a similar way, what is the percent of people 25 to 49 years old?
9. What is the percent of people 50 to 74 years old?
10. What is the percent of people 75 to 100+ years old?
11. Identify two different age groups in which the count of people in the first age group is approximately double the count of people in the second age group. (There are several examples to answer this problem.)
12. Kristin’s data story indicates that she felt disconnected from the more popular choices of movies and political views. Look at the age group that includes Kristin at the start of 2015. Why might people older or younger than Kristin have different interests than Kristin in movies or political views? Using the population estimates provided in **Handout 1**, why might the entertainment choices or political views of people older or younger than Kristin be reported in the news or social media more often?

13. For this problem, adjacent age groups are age groups next to each other. For example, 0 – 4 years old is adjacent to 5 – 9 years old. In a similar way, the 45 – 49 years old age group is adjacent to the 50 – 54 years old age group. The age group 45 – 49 years old is also adjacent to the 40 – 44 years old age group. Identify two adjacent age groups that have approximately the same count of people in each age group. (There is more than one answer to this problem.)
14. Estimate the count of teenagers (13 to 19 years old). Explain how you derived your estimate.
15. What is the estimated count and percent of people who are under 10 years old?
16. What is the estimated count and percent of people who are 65 years old or older in the United States?
17. Why is it important that the count and percent of people under 10 years old and the count and percent of people 65 years old or older are given special attention when analyzing a country's population?
18. "Old" and "young" are subjective descriptions that in many cases are defined by several factors other than age (for example, health status, or income status). For this unit, however, consider the definition of "young" as people less than 10 years old, and the definition of "old" as people who are 65 years old or older. What is the ratio of "old" to "young" using the above definitions of young and old? Derive a decimal from this ratio and interpret it by describing the approximate count of "old people" to the count of one "young person." Express your answer to the nearest whole number.

19. Kristin's data story indicated that she worked in the health care field. Do you think that working in the health care field was a major area of employment in 2015? Explain your answer by referring to the data.
20. The voting age in the United States is 18 years old or older. Derive an estimate of the number of potential voters in the United States at the start of 2015.
21. Identify the age groups in which the count of males is estimated to be more than the count of females.
22. Identify the age groups in which the count of females is estimated to be more than the count of males.
23. Identify an age group that has approximately the same count of males and females.
24. Similar to the way you estimated the ratio of old to young people in problem 18, estimate the ratio of females to males for the following age groups. Derive a decimal from the ratio and estimate the number of females to one male in that age group (round your answers to the nearest whole number):
- In the age group of 85 to 89 years, there are approximately \_\_\_\_\_ females to one male.
  - In the age group of 90 to 94 years, there are approximately \_\_\_\_\_ females to one male.
  - In the age group of 95 to 99 years, there are approximately \_\_\_\_\_ females to one male.
  - In the age group of 100+ years, there are approximately \_\_\_\_\_ females to one male.



25. Notice the changes in the ratio of females to males that you derived in problem 24 as the age groups grew older. Write a sentence or two that describes what is happening. Why might these changes be important for people interested in the health care of the population?
26. What questions would you like summarized for specific age groups? Answers to your questions would not necessarily be derived by the population graphs or table. Discuss with your class at least one of your questions and why you think the answer to your question is important.

Age group	Questions you would like summarized for this age group
<p>Example:</p> <p>0 – 4 years old</p>	<p>How many children 0 – 4 years old are in a pre-school program?</p> <p>(The answer to this question is important in determining whether or not our country has enough trained pre-school teachers.)</p> <p>How many children 0 – 4 years old can count to 20?</p> <p>(The answer to this question would help determine what skills need to be addressed or what skills can be used to extend learning opportunities.)</p>
15 – 19 years old	
35 – 39 years old	
An age group of your choice:	