Life Spans

The students in Mr. Moreno's classroom are studying the history of the United States. They learned that the United States changed rapidly during the 1900s. During this time, many people began working in factories instead of working on farms. Living conditions and sanitation improved for most people. At the same time, the discovery of antibiotics and other improvements in medical care changed the way doctors treat diseases.

The students wondered if these changes had any effect on the length of time people lived. Mr. Moreno suggested that they collect information on the life spans of people before these changes occurred and compare them with life spans of people after these changes occurred. The students decided to compare the life spans of a set of people who lived during the 1800s to the life spans of a set of people who lived more recently.

Brandon and David went to the library to collect data. Brandon looked for obituaries in old newspapers. He looked through many old newspapers from the year 1858 and found 25 death notices which listed the names of the people who died and their age at death. He wrote down the age of each person: 56 yr, 1 yr 3 mo, 54 yr, 9 mo, 27 yr, 42 yr, $2\frac{1}{2}$ mo, 5 yr, 38 yr, 34 yr, 79 yr, 59 yr, 76 yr, infant, 21 yr, 25 yr, 24 yr, 19 yr, 30 yr, 62 yr, 51 yr, 43 yr, 20 yr, 1 yr, and 5 yr.

David looked in more recent newspapers. He found 50 obituaries which gave the age at death. He wrote down these ages which were all given in years: 75, 88, 84, 79, 85, 86, 51, 77, 85, 88, 88, 71, 84, 85, 89, 92, 77, 97, 80, 60, 95, 62, 85, 64, 44, 74, 62, 87, 81, 73, 89, 15, 96, 84, 72, 89, 84, 90, 88, 50, 68, 72, 75, 63, 90, 65, 38, 77, 79, and 73. All the people in David's data set died in February of 2014.

Discuss

David and Brandon shared their data with the class.

1. Compare the two sets of life spans. What do you notice about the length of the life spans in the 1858 data and the length of the life spans in the 2014 data?

***Student Guide* - Page 380**

2. The students in Mr. Moreno's class found it difficult to compare the two sets of data as David and Brandon reported it. They decided to make two graphs to display the data. How can you set up the graphs to tell the story of the data?

Mr. Moreno suggested that the students **bin** their data. He explained that when you bin data, you look at how data falls within equal intervals. For example, if you measure the height of each person in the class, you can group the data into bins such as 120–129 centimeters tall, 130–139 centimeters tall, 140–149 centimeters tall, 150–159 centimeters tall, and 160–169 centimeters tall. The number of heights in each bin is recorded.

3. **A.** What intervals can you use to bin the life span data? Listing the ages on a separate sheet of paper may help you choose your bins.
   B. What are some reasons to bin data?
4. The students binned the data and recorded the number of life spans in each interval. They knew they had a different number of people in each data set.
   A. How many life spans are in the 1858 data?
   B. How many life spans are in the 2014 data?
   C. What strategies can the students use to compare the data in the two sets?
5. **A.** Organize the 1858 data into a data table. Use the tables on the *Life Spans Data Tables* page in the *Student Activity Book*. To tally the data, list the ages on a separate sheet of paper. Then check off each number as you tally.

1858 Life Spans

A Age (in years)	*N* Number of Deaths		Fraction of Deaths	
	Tallies	Number	Common Fraction	Decimal Fraction

   B. What fraction of the people that died, died in each age group? Write a common fraction and a decimal fraction in the data table.
6. Organize the 2014 data into a data table like you did in Question 5.

***Student Guide* - Page 381**

Student Guide

Life Spans (SG pp. 380–383)
Questions 1–22

1.* Answers will vary. See discussion in the lesson.

2.* Answers will vary. See discussion in the lesson.

3.* Suggested intervals are 0–9 yr, 10–19 yr, 20–29 yr, 30–39 yr, 40–49 yr, 50–59 yr, 60–69 yr, 70–79 yr.

4. **A.*** 25 life spans
   B.* 50 life spans
   C.* Represent each age as a fraction of deaths and compare the fractions as decimals or fractions.

5.* See the data table in Figure 2 in the lesson.

6.* See the data table in Figures 3 in the lesson.

***Answers and/or discussion are included in the lesson.**

7. In 1858 most of the deaths were in the 0–9 year old age range.
8. In 2014, most of the deaths were in the 80–89 year old age range.
9. More people died in the 50–59 year old age range.
10. More died in their 60s because .14 is greater than .12.
11. A.* The sum of all the common fractions is 1 or $\frac{50}{50}$.

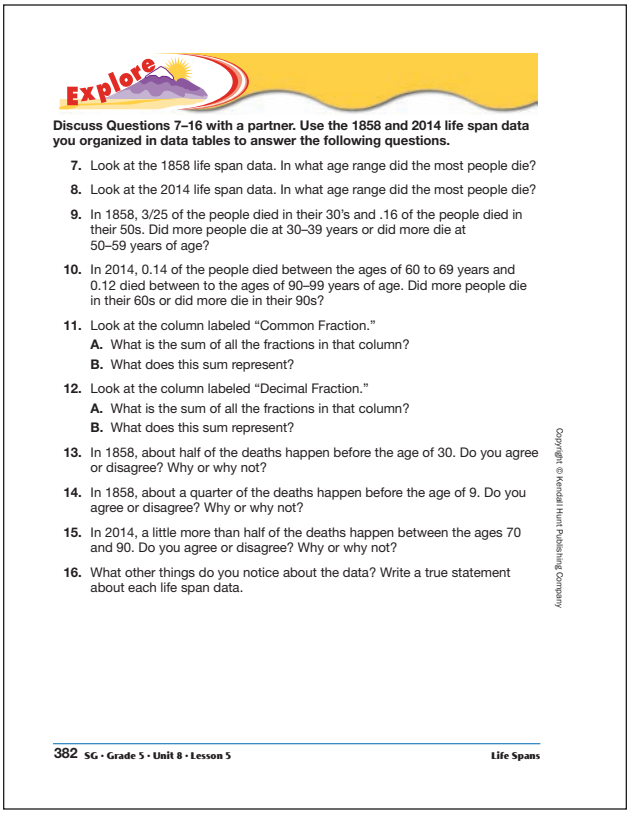
    B.* The one represents the entire data set that was surveyed.
12. A. The sum of all the decimal fractions is 1.

    B. The one represents the entire data set.
13. * agree; Possible response: I estimated .28 is about .30 and .30 + .20 = .50 which is also half.
14. * agree; possible response: I know .28 is about .25 and .25 is $\frac{25}{100} = \frac{1}{4}$.
15. * agree; possible response: The sum of .26 and .38 is little more than .50 or I know $\frac{32}{50}$ is little more than half because $\frac{25}{50}$ is half.
16. * See Figure 4 in the Lesson for sample statements.
17. * See the graphs in Figures 5 and 6 in the Lesson.
18. * Responses will vary. For the 1858 data: The tallest bar is at the beginning of the graph which tells us that many people in this data set died in childhood. All of the other bars are shorter and there are no bars after 80 years of age indicating that few people lived long lives.

    For the 2014 data: There isn't a bar in the first interval indicating there weren't any deaths during early childhood in this data set. There are no bars or very short bars between the ages of 10 and 50, so very few people died under the age of 50. The bars between the ages of 50 and 90 get larger as you move to the right on the graph. The tallest bars are between the ages of 70 and 90. These bars tell us that most people in the 2014 data set lived long lives.
19. A.* Answers will vary slightly. About 30 years.

    B.* 27 years old.
20. A.* Answers will vary slightly. About 80 years.

    B.* 79.5 years
21. * Answers will vary. See the discussion in the Lesson.
22. * Answers will vary. See the discussion in the Lesson.



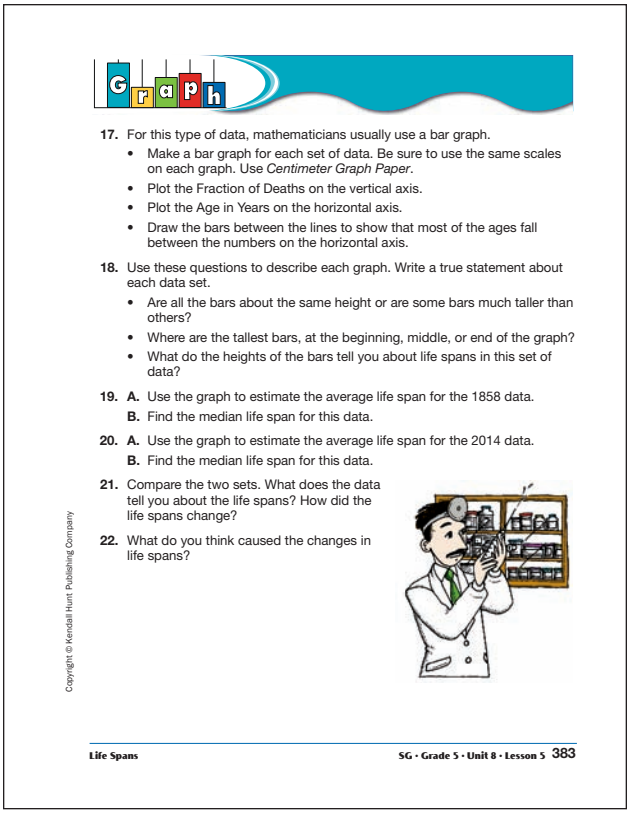
Explore

Discuss Questions 7–16 with a partner. Use the 1858 and 2014 life span data you organized in data tables to answer the following questions.

7. Look at the 1858 life span data. In what age range did the most people die?
8. Look at the 2014 life span data. In what age range did the most people die?
9. In 1858, 3/25 of the people died in their 30's and .16 of the people died in their 50s. Did more people die at 30–39 years or did more die at 50–59 years of age?
10. In 2014, 0.14 of the people died between the ages of 60 to 69 years and 0.12 died between to the ages of 90–99 years of age. Did more people die in their 60s or did more die in their 90s?
11. Look at the column labeled "Common Fraction."
    - **A.** What is the sum of all the fractions in that column?
    - **B.** What does this sum represent?
12. Look at the column labeled "Decimal Fraction."
    - **A.** What is the sum of all the fractions in that column?
    - **B.** What does this sum represent?
13. In 1858, about half of the deaths happen before the age of 30. Do you agree or disagree? Why or why not?
14. In 1858, about a quarter of the deaths happen before the age of 9. Do you agree or disagree? Why or why not?
15. In 2014, a little more than half of the deaths happen between the ages 70 and 90. Do you agree or disagree? Why or why not?
16. What other things do you notice about the data? Write a true statement about each life span data.

382 SG • Grade 5 • Unit 8 • Lesson 5 Life Spans

***Student Guide* - Page 382**



Graph

17. For this type of data, mathematicians usually use a bar graph.
    - Make a bar graph for each set of data. Be sure to use the same scales on each graph. Use *Centimeter Graph Paper*.
    - Plot the Fraction of Deaths on the vertical axis.
    - Plot the Age in Years on the horizontal axis.
    - Draw the bars between the lines to show that most of the ages fall between the numbers on the horizontal axis.
18. Use these questions to describe each graph. Write a true statement about each data set.
    - Are all the bars about the same height or are some bars much taller than others?
    - Where are the tallest bars, at the beginning, middle, or end of the graph?
    - What do the heights of the bars tell you about life spans in this set of data?
19. **A.** Use the graph to estimate the average life span for the 1858 data.
    B. Find the median life span for this data.
20. **A.** Use the graph to estimate the average life span for the 2014 data.
    B. Find the median life span for this data.
21. Compare the two sets. What does the data tell you about the life spans? How did the life spans change?
22. What do you think caused the changes in life spans?

Life Spans SG • Grade 5 • Unit 8 • Lesson 5 383

***Student Guide* - Page 383**

***Answers and/or discussion are included in the lesson.**