## Lesson 4.1.2

4-13. a. Answers will vary.

b. Histograms are likely to have a large spread and outliers.

4-14. a. Choices of typical words and means calculated will vary. Students are likely to decide that this is a better estimate. Justifications will vary.

b. It is likely that this histogram will have less spread than the previous one, although that will not always be the case.

c. Answers vary, although it is likely that the second histogram will show less spread than the first.

4-15. a. Each student will find a different mean.

b. It is likely that this histogram will have a center that is considerably lower than both of the previous two.

c. Answers vary, but it should become clear that random sampling produces unbiased results. The true mean length of the population of words is $4.7050 \approx 4.7$.

4-16. a. Students should decide that this sample is not particularly representative of all American voters.

b. Possible responses include: Voters who patronize this grocery store or chain, voters who do not work in the evenings, voters who live in Delilah's geographic region.

c. Possible responses include: Coming to the store on various days and at different times, trying other stores in the area, trying stores in other areas.

4-17. a. Possible responses: People who watch television, do not work in the mornings, and *most importantly*, feel strongly enough about the topic to call. This sample is likely to have extreme opinions.

b. Possible responses: People whose addresses are listed, people who live in a particular geographic region, people with land lines, people who feel strongly enough about the topic to mail in a response, people with time to respond.

c. Possible responses: Retirees and stay at home moms.

4-18. a and b

4-19. Keep a record of phone numbers where no one answered and attempt to contact them later. Have surveyors trained in interpreting the question so that respondents can answer. Have surveyors who speak other languages available to translate.

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4-20. Depending on the population, it is likely that it would be impossible to survey an SRS. However, students could come up with ways that their calculator might, at least theoretically, help them. One such way could be to assign every student in the school a number based on alphabetical ordering of students by name. Use the calculator's random number generator to select a random sample.

4-21. a. The question implies that the questioner holds this opinion, thus biasing results.

b. The question assumes that the respondent believes that the climate is changing and will think that one of the given factors is important, and that it is important to slow global climate change, biasing results.

c. The question implies that teacher salaries should be raised.

4-22. a. Are a majority of Americans in favor of replacing the Electoral College with a popular vote?

b. How many calories are in a MekDee's small order of fries?

c. What was the class average on the semester final exam?

d. What was the average score for high school students taking the state math proficiency examination last year?

4-23. a. $\frac{4}{6} \cdot \frac{3}{5} = \frac{2}{5} = 0.4$

b. $\frac{2}{6} \cdot \frac{1}{5} = \frac{1}{15} \approx 0.0667$

c. $\frac{4}{6} \cdot \frac{2}{5} = \frac{4}{15} \approx 0.2667$

d. $\frac{2}{5} \div (\frac{2}{5} + \frac{1}{15}) = \frac{6}{7} \approx 0.8571$

4-24. a. $p = 3.97v + 109.61$, where $p$ is power (watts) and $v$ is $VO_2$max (ml/kg/min).

b. 280 watts. The measurements are rounded to the nearest whole number.

c. 293 – 280 = 13 watts

d. $r = 0.52$. The linear association is positive and moderate

e. There is a moderate positive linear association between power and $VO_2$max, with no apparent outliers. An increase of one ml/kg/min in $VO_2$max is predicted to increase power by 3.97 watts. 26.7% of the variability in the power can be explained by a linear relationship with $VO_2$max.


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