Applications

1. a. Mean = 8.5; Median = 8.5. The mean and median are identical.

b. Mean = 8.5; Median = 8.5. The mean and median are identical.

c. Both sets of measures of center are identical; students can only say that Jarrod's and Pascal's performances appear to be the same.

2. a. Range = 3.6; MAD = 1.0.

b. Range = 1.8; MAD = 0.6.

c. Jarrod's scores vary more than Pascal's scores. Jarrod's range is twice Pascal's; whereas his MAD is $1\frac{2}{3}$ times Pascal's MAD. Jarrod's performance is less consistent than Pascal's, so we can say that Pascal performs better overall.

3. Each team collected a sum of $270. You cannot answer which team performed better since the totals are all the same.

4. a. mean = $45 (Teams 1, 2, and 3); mean = $54 (Team 4); median = $44 (Teams 1, 2, and 4); median = $40 (Team 3)

b. All but one team has the same mean. Team 4 only has 5 people instead of 6, so its mean will be different since each team raises the same total amount of money. Based on the similar means, you cannot answer which team performed better. All but one team has the same median, so you cannot use the median to answer which team performed better. Some students may note that the mean in Team 4 is highest, so it was the most successful.

5. a. Range = $20 (Teams 1 and 2), $85 (Team 3), $45 (Team 4). Two teams have the same range. Team 3 has a large range due to the extreme values (high and low). MAD = 6 (Team 1), 8 (Team 2), 20 (Team 3), 18 (Team 4). The MADs indicate that Teams 3 & 4 have the greatest variability (lack of consistency) amongst team members.

b. The different ranges do not answer the question of which team performed better. Team 1 has the smallest MAD, so it performed more successfully due to the consistency of its members.

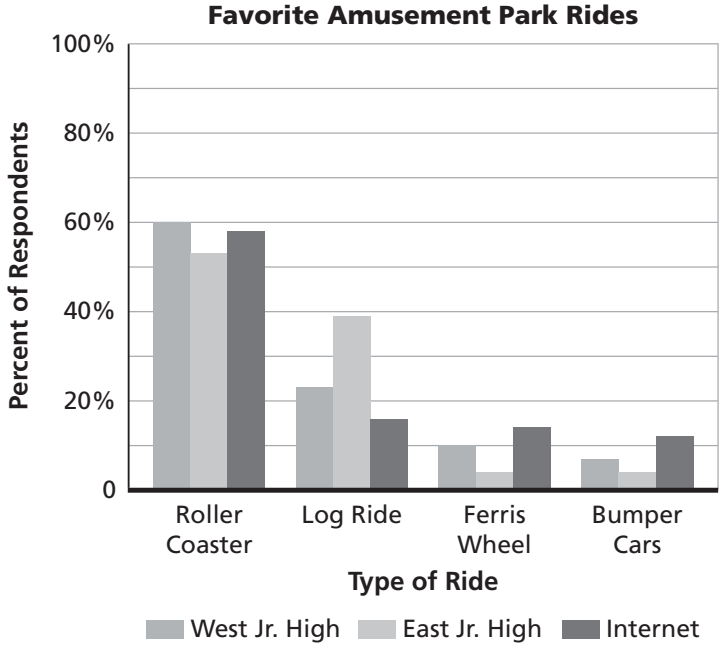
6. a. Team 1: 2 (33%)
Team 2: 2 (33%)
Team 3: 3 (50%)
Team 4: 2 (40%)

b. Team 1: 6 (100%)
Team 2: 6 (100%)
Team 3: 5 (83%)
Team 4: 5 (100%)

c. Team 1: 0 (0%)
Team 2: 0 (0%)
Team 3: 1 (17%)
Team 4: 0 (0%)
(See Figure 1, next page.)

7. Team 3 had one person whose money collected is greater than twice the MAD. This is not typical.

8. a. Students may draw a triple bar graph or three individual bar graphs. Students will need to use relative frequencies.



b. Possible answers: Students from East Jr. High do not prefer the Ferris Wheel as often as West Jr. High or the Internet Survey. Students from East Jr. High prefer the Log Ride more commonly

than the people from the Internet Survey. The West Jr. High students prefer the Roller Coaster more often than any other group.

9. For every one wood-frame roller coaster, there are about 18 steel-frame roller coasters.

10. North America has about 5.5 times as many roller coasters as South America.

11. Asia has about 2 times as many roller coasters as North America.

12. North America has 70% of all the wood-frame roller coasters in the world.

13. Possible answers: North America has about 3.5 times as many wood-frame coasters as Europe. Asia has 47% of all the steel-frame roller coasters in the world.

14. **a.** steel-frame: 15 coasters or 50%; wood-frame: 17 coasters or about 57%

b. steel-frame: 26 coasters or about 87%; wood-frame: 27 coasters or 90%

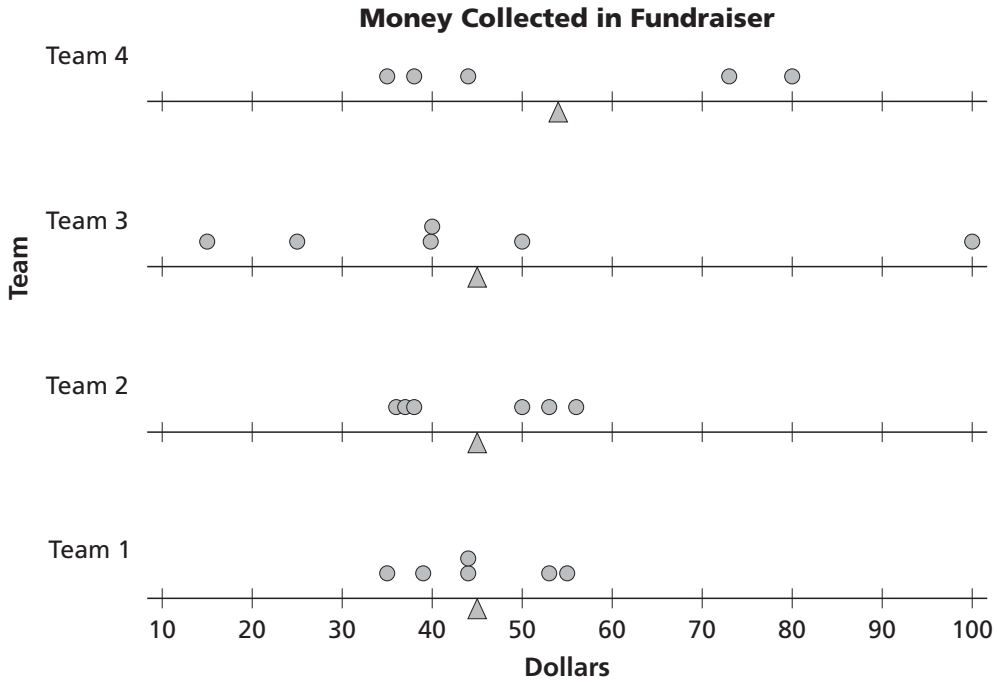
c. steel-frame: 4 coasters or about 13%; wood-frame: 3 coasters or 10%

15. **a.** Answers will vary. Possible statements: Roller coasters built in 1960 or later were taller and had greater maximum drops. You can see this by (1) comparing the means and medians and (2) by the general shift to the right in the distributions after 1959. It looks like the distributions of maximum heights and maximum drops are similar in shape and location. This probably means that there is a relationship here. The speeds of coasters built before 1960 are not as variable as those of coasters built after 1959; it looks like roller coasters were able to go faster (greater than 60 mph) after 1959.

b. Answers will vary. Sample size is addressed in Investigation 2, but it certainly is appropriate for students to note that the sample size of coasters build before 1950 is small. One question might be whether there are others that could be included. If students want to pursue this, they can visit the website that has the census table about kinds of coasters for more data.

16. B

Figure 1



Connections

17. J

18. C

19. J

20. C; $[(3 \times 90) + 86] \div 4 = 89$

21. **a.** Table 1: 9.1% (735 ÷ 8,114; students can also check by adding percents and subtracting total from 100%. This result will be 9.1%)
Table 2: 12.2% (968 ÷ 7,934; students can also check by adding percents and subtracting total from 100%. This result will be 12.2%)
Table 3, Boys: 41.1% (100% − 58.9%)
Table 3, Ages 5–12: 57.9% (100% − 42.1%)

b. (See Figure 2.)

c. Most children have lived in 1–3 apartments or houses (about 60%). The data peak at two apartments or houses (the mode) and then seem to taper off.

d. Use data from Table 1: 6% + 6.5% + 6.3% + 4.1% + 2.8% + 2.2% = 27.9% (you could also add all the counts and then divide the sum by 8,114).

e. Use data from Table 2: 20.7% have lived only in one home (taken directly from the question).

f. About $\frac{2}{5}$ of the boys have lived in the same city or town all their lives; 41.1% is close to 40%.

22. **a.** Wood-Frame Roller Coasters by Continent

b. Steel-Frame Roller Coasters by Continent

Sample explanation: There are no wood-frame roller coasters in Africa, so the graph in part (a) must show wood-frame coasters.

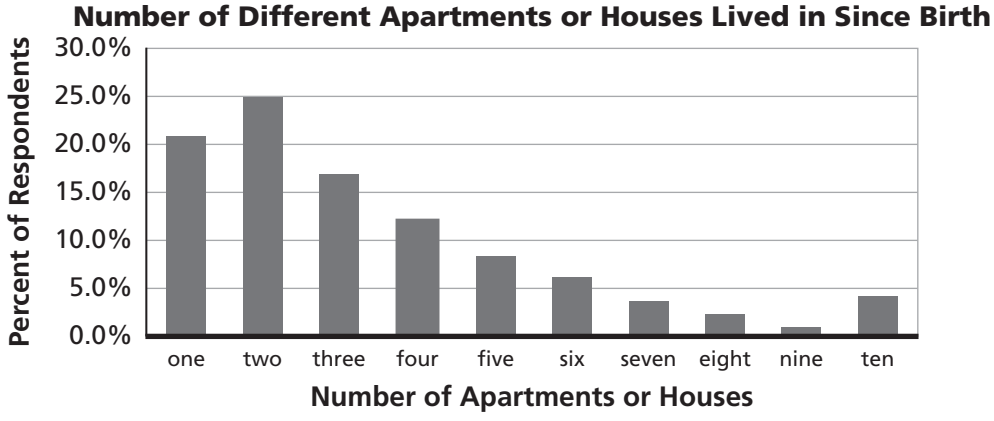
23. The shape appears to be clumped in two clusters, one from 0 g to 4 g and the other from 12 g to 15 g. The sugar per serving (g) has a range of 20 g (20 – 0).

24. Based on the shape, one can estimate that the mean and median are in the area of 10–12 grams of sugar; the halfway mark for the data is in this interval, and the mean and median are probably somewhat similar.

25. About one half of the cereals have serving sizes of 1 cup; only a few have larger serving sizes, and the rest have serving sizes of three-fourths cup, two-thirds cup, or one-half cup.

26. The mean is less than 1 cup and median is 1 cup serving size; the median has to be in this group at 1 cup, but there are more values below 1 that are a greater distance below 1 cup than the values above 1 cup, so the mean is less than 1 cup.

Figure 2



Extensions

27. A mean of 143.3 bpm corresponds to exercise heart rates, and a mean of 89.4 bpm corresponds to resting heart rates. This is because 143.3 is close to the median of the exercise heart rate data (143), and all values for resting heart rates are less than 143.3 bpm. Also, 89.4 bpm is close to the median for the resting heart rate data (86 bpm).

28. A MAD of 8.9 bpm corresponds to the resting heart rate data, and a MAD of 27.3 bpm corresponds to the exercise heart rate data. The exercise heart rate data has greater variability (as shown by the greater range and IQR seen in the box plots), so its MAD must be greater.

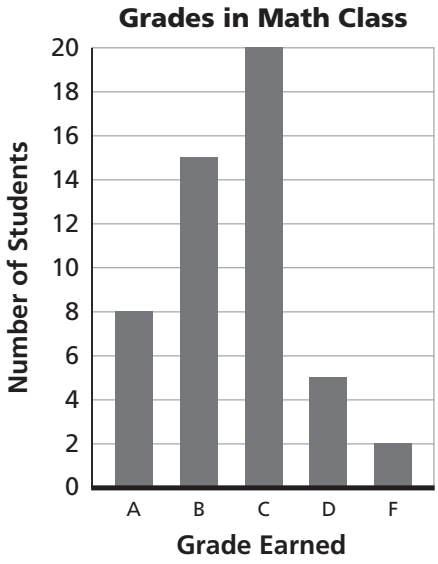
29. The exercise heart rates distribution has the larger MAD. You compare MADs of the resting and exercise heart rates in order to report which distribution appears to have the greatest spread.

30. A resting heart rate distribution would have an IQR of 15.5 bpm. An exercise heart rate distribution would have an IQR of 59.5 bpm. This is because the sample distributions shown indicate that the variability in exercise heart rates is greater than the variability in resting heart rates.

31. Exercise heart rates' distribution has the larger IQR. You compare the IQRs of the resting and exercise heart rates in order to report which distribution appears to have the greatest spread.

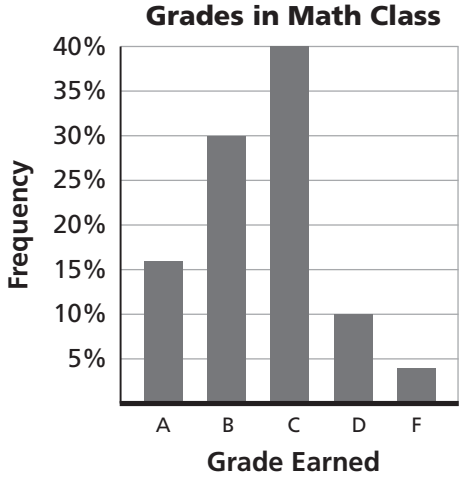
32. Answers will vary. For example: Almost all the resting pulse rates are less than 75% of the exercise pulse rates. OR The spread of the exercise pulse rates is more than there times the spread of the resting pulse rates.

33. a.



b. Relative frequencies: A (16%), B (30%), C (40%), D (10%), F (4%)

c.



d. The shapes as shown in each bar graph are the same.

e. You would report relative frequencies if you wanted to make a prediction about a group that may have a different number of students. The percent can be used to calculate the actual counts.