Topic 10: Misleading Data Displays

A graph can sometimes give a misleading picture of the data.

Problem 10.1

**A.** Use the bar graph below to answer parts (1) – (5).
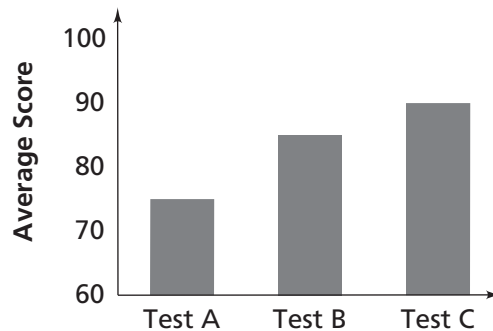
1. Which test has an average score that appears to be twice as high as Test A?
2. What is the actual difference between Tests A, B, and C?
3. What makes this graph misleading? How should it be corrected?
4. Make a table of tests and average scores.
5. Draw a new bar graph for the data that is not misleading.

B. Fernando's Grille wants to attract new customers. They hire Alan's Ads to help with the campaign. Alan and his staff pass out flyers one day each week for a month. Alan draws the graph to show the results of the flyer campaign.

1. What appears to happen as the number of flyers sent doubles?
2. What actually happens as the number of flyers sent doubles?
3. Why would Alan want to use this graph?
4. What should be changed to make the graph more accurately reflect the data?
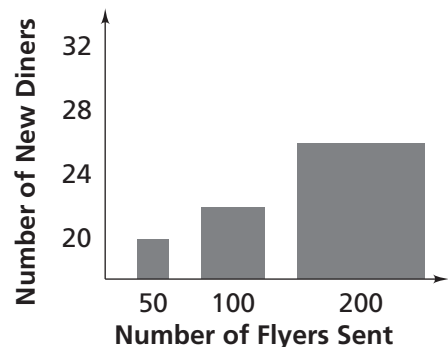
Exercises

1. Madison makes the graph below to show the number of text messages she sends during one week.
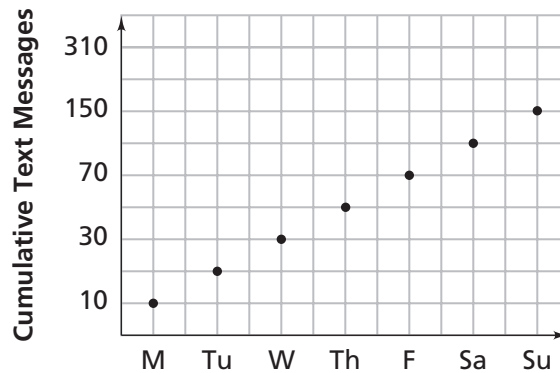
   a. Why is Madison's graph misleading?

   b. Why would Madison want to make her graph misleading?

   c. Make a table of days and cumulative number of text messages.

   d. Draw a new graph for the data that is not misleading.

2. Nicolo surveyed his classmates to determine what the new school color should be. The table shows the results.

Color	Number of Students
Blue	8
Green	7
Red	10

   a. How can Nicolo make it seem that blue is twice as popular as green?

   b. How can Nicolo make it seem that blue is four times as popular as green?

Topic 10: Misleading Data Displays

Mathematical Goals

- Explain how misleading representations affect interpretations and conclusions about data.

Guided Instruction

To introduce the topic, discuss the characteristics of a bar graph. Ask:

- *Why do you use a bar graph?* (to compare amounts)
- *Why is it easier to compare quantities with a bar graph than in a table?* (Bar graphs are visual and can be interpreted quickly.)
- *What is one of the first things you notice about a bar graph?* (the height of the bars)
- *When one bar represents an amount of 40 and the bar next to it represents an amount of 80, how do you expect to see this reflected in the graph?* (The bar of 80 should be twice as high as the bar of 40.)
- *If one bar is twice as wide as the next bar, what would you think about the data being presented?* (The wider bar has greater importance.)

Once you are satisfied that the students understand bar graphs, move onto the characteristics of a line graph. Ask:

- *Why do you use a line graph?* (to show changes over time)
- *Why is it easier to see changes over time with line graph than in a table?* (Line graphs are visual quickly show upward or downward trends.)

To summarize, ask:

- *How does the data compare in a graph that has been scaled properly with one that has not?* (The data is the same.)
- *Then why is it so important to scale properly?* (The impressions given by the properly-scaled and the improperly-scaled graphs are different.)
- *When would someone choose an inappropriate scale?* (to influence the person using the graph)

Answers to Topic 10
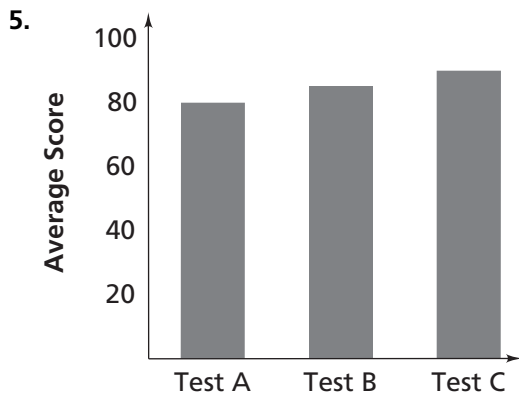
Problem 10.1

A. 1. Test C.

2. A to B: 10, A to C: 15, B to C: 5

3. The values on the y-axis begin at 60, with no indication that the values from 0 to 60 have been skipped.

4.

Test	Average Score
A	75
B	85
C	90

5.

B. 1. The number of new diners appears to quadruple.

2. The number of new diners increases by 2.

3. Alan wants to prove to Fernando's Grille that his flyer campaign is a attracting a lot of new diners.
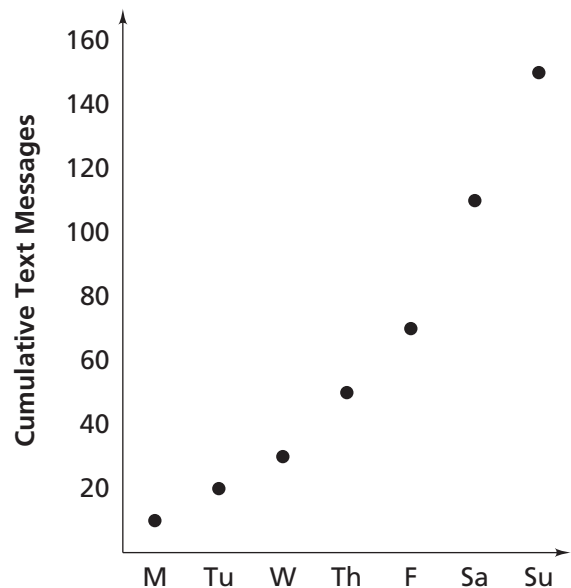
4. The scale on the y-axis needs to begin at 0, and the bars should be the same width.

Exercises

1. a. Madison's graph does not use a consistent scale on the y-axis.

b. Answers may vary. Sample: Madison wants to prove to her parents that the number of text messages is constant rather than increasing per day.

Day	Cumulative Text Messages
M	10
Tu	20
W	30
Th	50
F	70
Sa	110
Su	150

2. a. Nicolo could use a y-axis that begins at 6 and has increments of one vote.
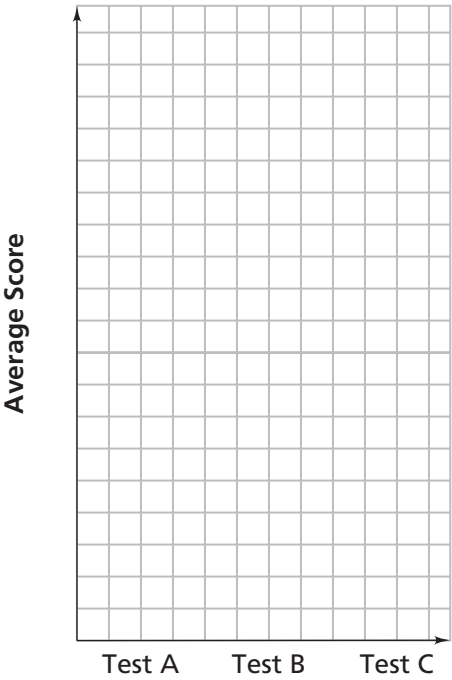
b. Nicolo could use one square unit for green, and then increase each dimension of the square to make four square units for blue.

Labsheet 10.1

A. 4.

Test	Average Score
A	
B	
C	

5.

Labsheet 10ACE Exercise 1

1. c.

Day	Cumulative Text Messages
Monday	
Tuesday	
Wednesday	
Thursday	
Friday	
Saturday	
Sunday	

d.

Cumulative Text Messages

M   Tu   W   Th   F   Sa   Su