Topic 6: Misleading Graphs

When making graphs, choose an appropriate scale divided into equal intervals that fit the data being presented. A scale that is too widespread or too narrow can give the reader a false visual impression. Graphs that use those techniques are **misleading graphs.**

Problem 6.1

A. Use the bar graph below to answer parts (1)–(6).

Little League Results

Number of Games Won vertical axis: 20, 22, 24, 26, 28, 30

Teams: Bears (22), Badgers (28), Tigers (24), Panthers (21)
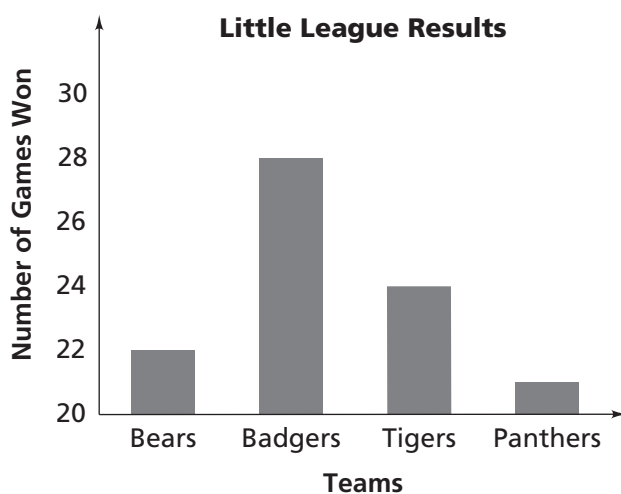
Teams

1. Which team appears to have won twice as many games as the Panthers have won?

2. Find the difference in the number of wins between the two teams of part (1).

3. What do you notice about the vertical scale of the bar graph?

4. Make a table of teams and wins.

5. Draw a bar graph from your table of values using a vertical scale starting at a zero.

6. Which graph better represents the data? Explain.

B. A **break symbol** is an insertion at the beginning of a scale to indicate that the scale does not begin at zero.

1. How does a break symbol help you draw a graph?

2. Can a graph with a break symbol be misleading?

C. Kevin states that a graph is misleading if the scale does not begin at zero. Do you agree or disagree? Explain.

Exercises

1. The bar graph shows the results of a survey taken at Brookfield Middle School.

Favorite Subject
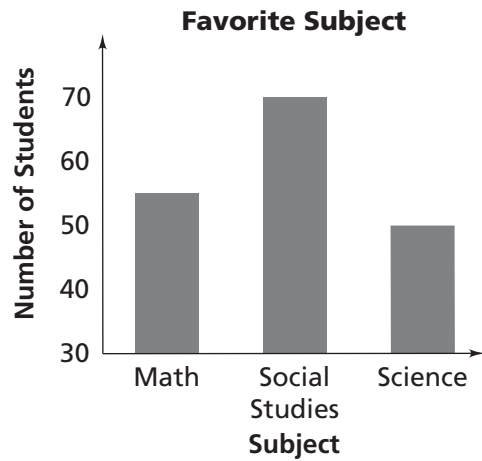
a. Which subject appears to be twice as popular as science?

b. How is the graph misleading?

c. How can you change the graph so that it is not misleading?

2. Use the table below to answer parts (a)–(d).

Company Growth Since Onset of TV Advertisement						
Month	Jan.	Feb.	Mar.	Apr.	May.	June.
Number of New Clients	35	38	40	42	43	44

a. Make a line graph giving the impression that there have been many new clients since the television ad first aired.

b. Make a line graph that indicates a small increase in the number of clients.

c. Which graph more fairly represents the data?

d. Why would someone want to exaggerate the number of new clients?

Topic 6: Misleading Graphs

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)
- *What information is placed on the horizontal axis?* (the categories)
- *What information is placed on the vertical axis?* (the amounts)
- *How would you describe the intervals on the vertical axis?* (The intervals are equal in quantity and in height.)
- *Why is it easier to compare quantities with a bar graph than in a table?* (Bar graphs are visual and can be interpreted quickly.)

Review the characteristics of a line graph. Ask:

- *Why do you use a line graph?* (to show changes over time)
- *What information is placed on the horizontal axis?* (measures of time)
- *What information is placed on the vertical axis?* (the amounts)
- *How would you describe the intervals on the vertical axis?* (The intervals are equal in quantity and in height.)
- *Why is it easier to see changes over time with a line graph than in a table?* (Line graphs are visual and quickly show upward or downward trends.)

Summarize by asking:

- *How does the data compare in a graph that has been scaled properly with one that has been scaled improperly?* (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 entirely different.)
- *When would someone choose an inappropriate scale?* (to influence the person using the graph)

You will find additional work on graphing data in the Grade 7 unit *Data Distributions*.

Vocabulary

- misleading graphs
- break symbol

Materials

- Labsheet 6.1
- Labsheet 6ACE Exercise 2

ACE Assignment Guide
for Topic 6
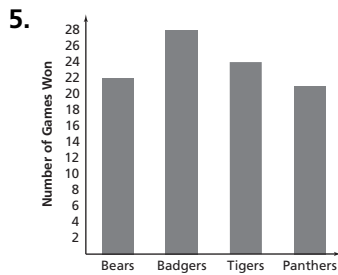
Core 1–2

Answers to Topic 6

Problem 6.1

A. 1. the Bears

   2. 1

   3. The scale goes from 20–30; it does not start at zero.

   4.

Team	Wins
Bears	22
Badgers	28
Tigers	24
Panthers	21

   5.

   6. The graph of part (5) better represents the data because the height of each bar is appropriate for its value. A visual comparison of the teams is accurate and not distorted.

B. 1. You can skip small numbers when the data represents large numbers.

   2. When there is a break in the graph, the area of the bars is not proportional to the values.

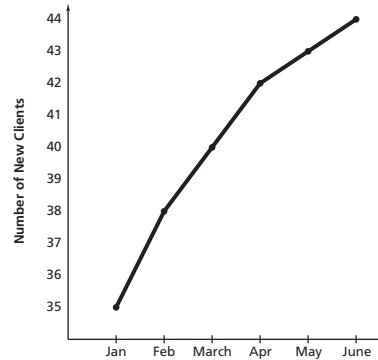**C.** Answers may vary. Sample: A graph is misleading when a scale does not begin at zero.

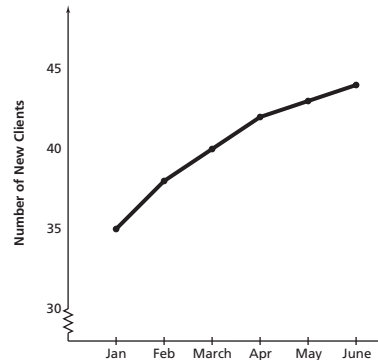### Exercises

1. a. social studies

   b. The vertical scale starts at 30.

   c. Change the vertical scale to start at zero.

2. a. Answers may vary. Sample:

   b. Answers may vary. Sample:

   c. the second graph

   d. Answers may vary. Sample: A salesman might want to show that he is doing a good job by showing a large increase in new clients.
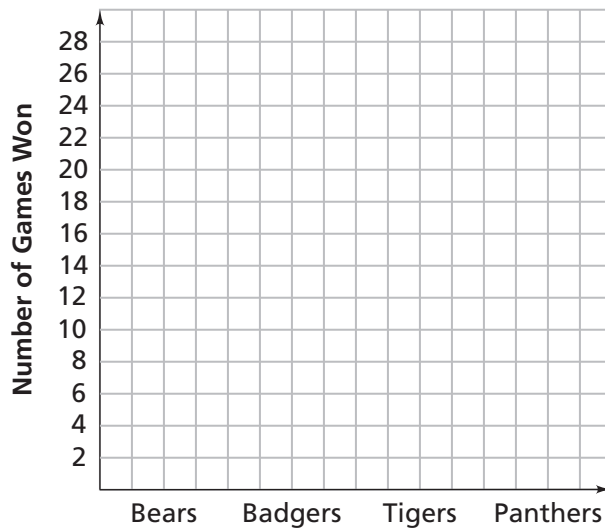
Labsheet 6.1

A. 4.

Team	Wins
Bears	
Badgers	
Tigers	
Panthers	

5.

Labsheet 6ACE Exercise 2

2. a.

Number of New Clients

Jan Feb Mar Apr May June

b.

Number of New Clients

Jan Feb Mar Apr May June