Misrepresenting Data

1.2

***MathLinks 8*, pages 18–27**

Suggested Timing
80–100 minutes

Materials
- grid paper
- ruler
- coloured pencils
- computer with spreadsheet software (optional)
- compass (optional)
- protractor (optional)
- variety of magazines and newspapers
- computer with Internet access (optional)
- scissors (optional)
- glue or tape (optional)

Blackline Masters
Master 8 Centimetre Grid Paper
Master 9 0.5 Centimetre Grid Paper
Master 12 Percent Circles (optional)
BLM 1–4 Chapter 1 Warm-Up
BLM 1–10 Section 1.2 Extra Practice
BLM 1–11 Section 1.2 Math Link

Mathematical Processes
- ☑ Communication (C)
- ☑ Connections (CN)
- ☐ Mental Mathematics and Estimation (ME)
- ☑ Problem Solving (PS)
- ☑ Reasoning (R)
- ☑ Technology (T)
- ☑ Visualization (V)

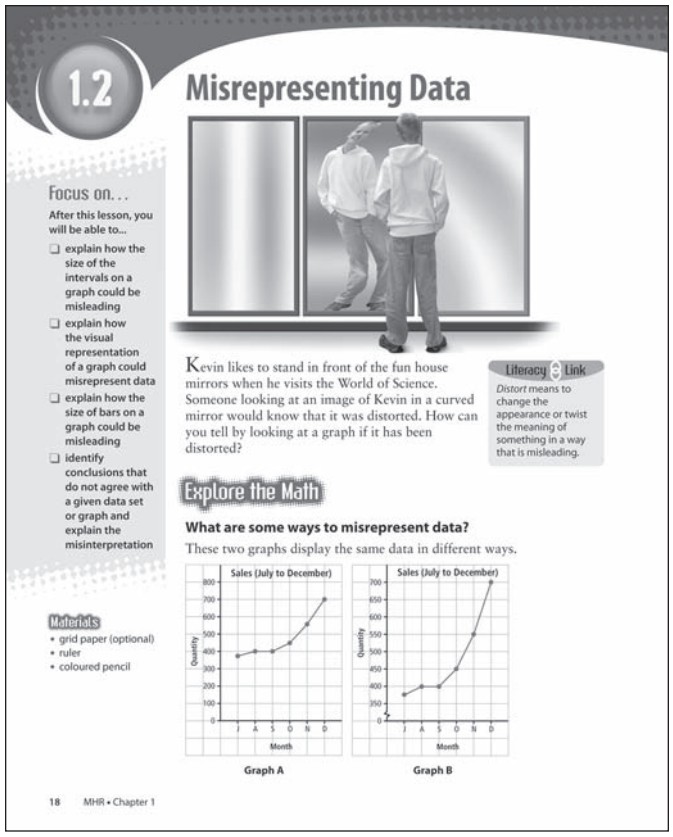
Specific Outcomes
SP1 Critique ways in which data is presented.

Category	Question Numbers
Essential (minimum questions to cover the outcomes)	1, 2, 4, 6, 8, 13, Math Link
Typical	1–4, 6, 9–18, Math Link
Extension/Enrichment	1–3, 9, 17, 19–22, Math Link

Planning Notes

Have students complete the warm-up questions on **BLM 1–4 Chapter 1 Warm-Up**.

As a class, read and discuss the introduction. Ask students to share their ideas about how they know if a graph is distorted.


1.2 Misrepresenting Data

Focus on...
After this lesson, you will be able to...
- explain how the size of the intervals on a graph could be misleading
- explain how the visual representation of a graph could misrepresent data
- explain how the size of bars on a graph could be misleading
- identify conclusions that do not agree with a given data set or graph and explain the misinterpretation

Kevin likes to stand in front of the fun house mirrors when he visits the World of Science. Someone looking at an image of Kevin in a curved mirror would know that it was distorted. How can you tell by looking at a graph if it has been distorted?

Literacy Link
Distort means to change the appearance or twist the meaning of something in a way that is misleading.

Explore the Math

What are some ways to misrepresent data?

These two graphs display the same data in different ways.

Materials
- grid paper (optional)
- ruler
- coloured pencil

Sales (July to December)
Quantity
Month
J A S O N D
Graph A

Sales (July to December)
Quantity
Month
J A S O N D
Graph B

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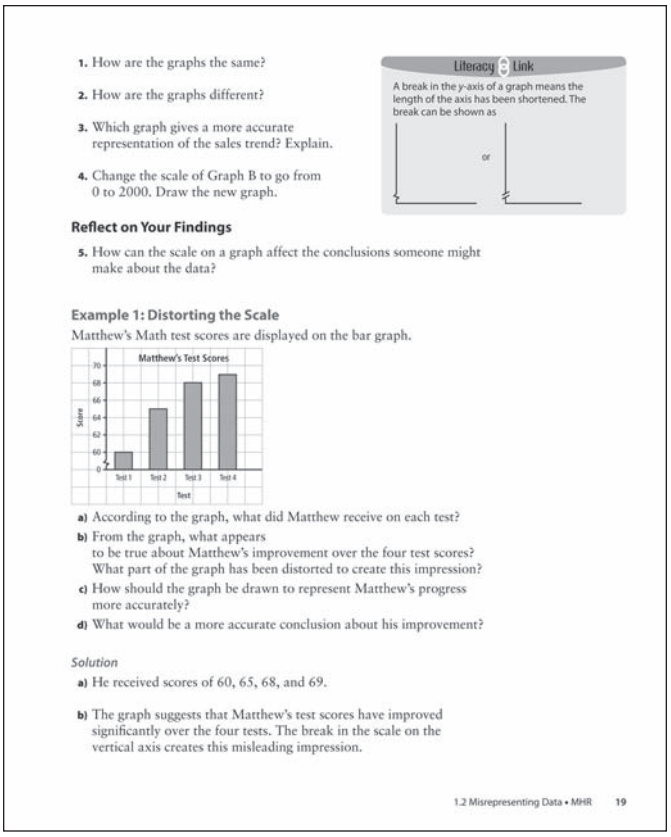
Literacy Link Point out the Literacy Link on page 18 that defines *distort*. You might have students think of other examples of distortions.

Explore the Math

In this exploration, students discover that the size of the intervals on a graph can be misleading.

Method 1 Students could work with a partner. Provide them with **Master 8 Centimetre Grid Paper** or **Master 9 0.5 Centimetre Grid Paper** to create their graph. As a class, have students discuss their findings.

Method 2 Use a modified jigsaw method for student discussion.
- Divide the class into groups of three students each. Number students in these original groups from 1 to 3. Have the original groups discuss the answers to #1 to #3 and develop a new graph for #4.
- Then, reform the groups so that all students with the number 1 form one group, all students with the



1. How are the graphs the same?
2. How are the graphs different?
3. Which graph gives a more accurate representation of the sales trend? Explain.
4. Change the scale of Graph B to go from 0 to 2000. Draw the new graph.

Literacy Link

A break in the *y*-axis of a graph means the length of the axis has been shortened. The break can be shown as

or

Reflect on Your Findings

5. How can the scale on a graph affect the conclusions someone might make about the data?

Example 1: Distorting the Scale

Matthew's Math test scores are displayed on the bar graph.

Matthew's Test Scores

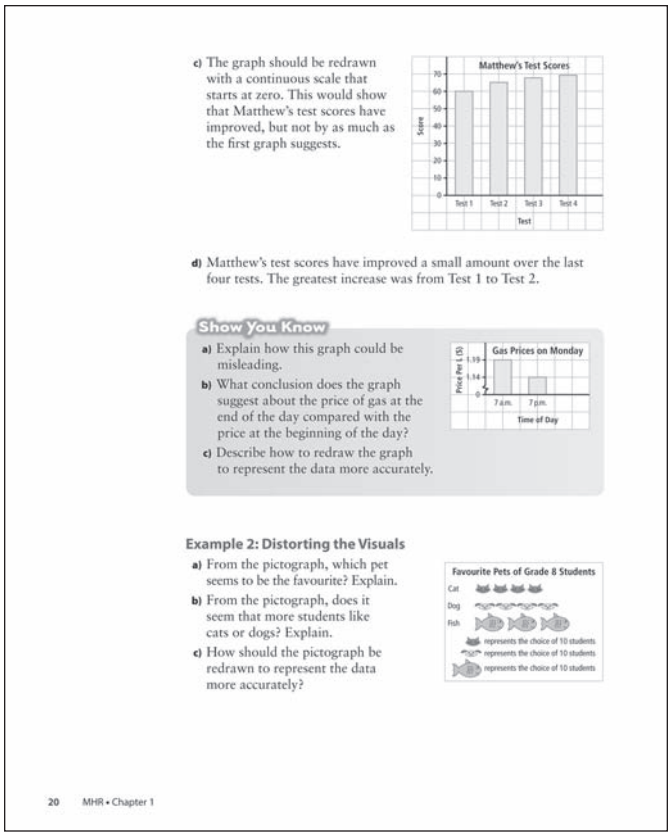
a) According to the graph, what did Matthew receive on each test?
b) From the graph, what appears to be true about Matthew's improvement over the four test scores? What part of the graph has been distorted to create this impression?
c) How should the graph be drawn to represent Matthew's progress more accurately?
d) What would be a more accurate conclusion about his improvement?

Solution

a) He received scores of 60, 65, 68, and 69.

b) The graph suggests that Matthew's test scores have improved significantly over the four tests. The break in the scale on the vertical axis creates this misleading impression.

1.2 Misrepresenting Data • MHR 19



c) The graph should be redrawn with a continuous scale that starts at zero. This would show that Matthew's test scores have improved, but not by as much as the first graph suggests.

Matthew's Test Scores

d) Matthew's test scores have improved a small amount over the last four tests. The greatest increase was from Test 1 to Test 2.

Show You Know

a) Explain how this graph could be misleading.
b) What conclusion does the graph suggest about the price of gas at the end of the day compared with the price at the beginning of the day?
c) Describe how to redraw the graph to represent the data more accurately.

Gas Prices on Monday

Example 2: Distorting the Visuals

a) From the pictograph, which pet seems to be the favourite? Explain.
b) From the pictograph, does it seem that more students like cats or dogs? Explain.
c) How should the pictograph be redrawn to represent the data more accurately?

Favourite Pets of Grade 8 Students

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number 2 form a second group, etc. Have students in these new groups share what they discussed and decided in their original groups, including their new graph. After this discussion, have the new groups consider how to answer #5.

- At the end of the two group discussions, have one individual from each of the new groups share suggestions for answering #5.

Note: Depending on the size of your class, you may need to modify the size and make up of your groups.

Literacy Link Point out the Literacy Link on page 19, which explains the symbol used to indicate a break in the axis on a graph.

Example 1

Example 1 illustrates how distorting the scale on a graph can be misleading. You might explain that although the vertical scale starts at zero, the scale is not continuous (does not go up in even steps). This distorts the graph and makes it look as though Matthew's test scores have improved greatly.

Example 2

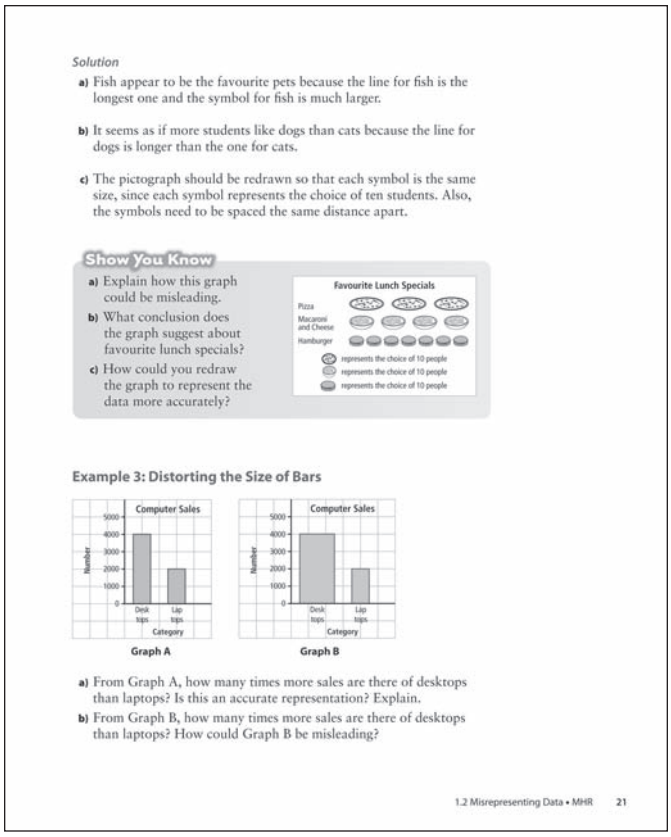
Example 2 illustrates how distorting the visuals on a graph can be misleading.

Example 3

Example 3 illustrates how distorting the size of bars on a graph can be misleading. Have students compare the size of the bars in Graph A and B. For each graph, ask how many bars representing laptop sales fit into the bar representing desktop sales.

Meeting Student Needs

- Consider inviting a guest speaker from a community organization to address how data from their organization has been represented in graphs. Have them address whether or not information has ever been misrepresented, and if so, how.
- Consider allowing students to use spreadsheet software or graphing calculators, if available, to create graphs.
- Students with motor difficulties may benefit from using technology to create graphs.
- For Example 1, consider having visual, concrete, and kinesthetic learners lay out rulers side by side to represent the bars for the test scores. Use a scale of 1 cm = 10%. They could overlay the "bars" on an *x*-axis and *y*-axis drawn on a piece of paper. By adjusting the vertical scales, students can see the effects. Have students verbalize what they see in each variation.



Solution

a) Fish appear to be the favourite pets because the line for fish is the longest one and the symbol for fish is much larger.

b) It seems as if more students like dogs than cats because the line for dogs is longer than the one for cats.

c) The pictograph should be redrawn so that each symbol is the same size, since each symbol represents the choice of ten students. Also, the symbols need to be spaced the same distance apart.

Show You Know

a) Explain how this graph could be misleading.

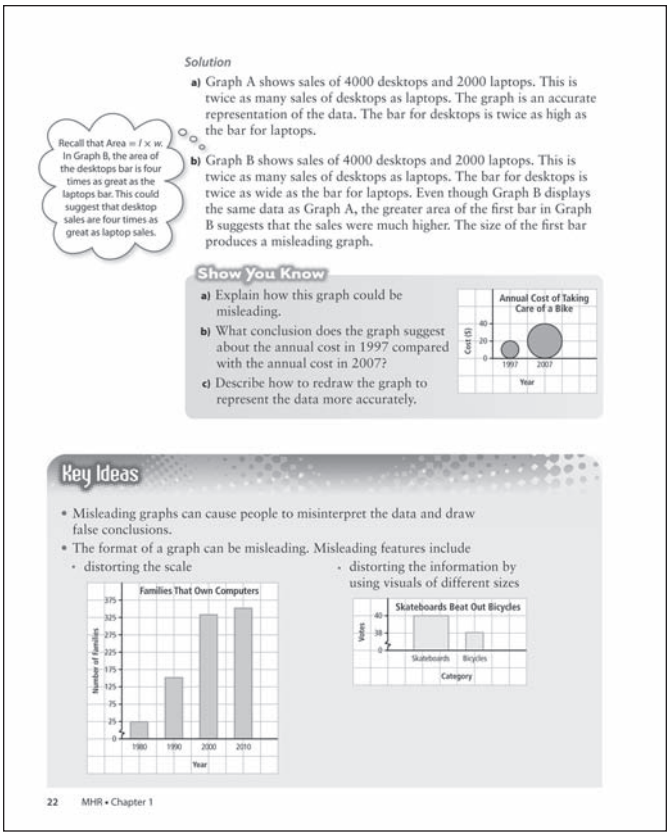
b) What conclusion does the graph suggest about favourite lunch specials?

c) How could you redraw the graph to represent the data more accurately?

Example 3: Distorting the Size of Bars

a) From Graph A, how many times more sales are there of desktops than laptops? Is this an accurate representation? Explain.

b) From Graph B, how many times more sales are there of desktops than laptops? How could Graph B be misleading?



Solution

a) Graph A shows sales of 4000 desktops and 2000 laptops. This is twice as many sales of desktops as laptops. The graph is an accurate representation of the data. The bar for desktops is twice as high as the bar for laptops.

Recall that Area = $l \times w$. In Graph B, the area of the desktops bar is four times as great as the laptops bar. This could suggest that desktop sales are four times as great as laptop sales.

b) Graph B shows sales of 4000 desktops and 2000 laptops. This is twice as many sales of desktops as laptops. The bar for desktops is twice as wide as the bar for laptops. Even though Graph B displays the same data as Graph A, the greater area of the first bar in Graph B suggests that the sales were much higher. The size of the first bar produces a misleading graph.

Show You Know

a) Explain how this graph could be misleading.

b) What conclusion does the graph suggest about the annual cost in 1997 compared with the annual cost in 2007?

c) Describe how to redraw the graph to represent the data more accurately.

Key Ideas

- Misleading graphs can cause people to misinterpret the data and draw false conclusions.
- The format of a graph can be misleading. Misleading features include
  - distorting the scale
  - distorting the information by using visuals of different sizes

- Consider walking through a second set of misleading graphs for Examples 1 to 3 before having students attempt the Show You Know. Students may need more practice with the concept of intervals being equal.

ELL

- English language learners may have difficulty with terms such as *mirrors*, *same*, *different*, *increase*, *accurate representation*, *trend*, *scale*, *vertical axis*, *misleading*, *continuous*, *pet*, *longest*, *longer*, *times more (meaning multiplication)*, *high*, *wide*, *greater*, and *much higher*. Have students add new terms to their dictionary.
- Consider giving a short lesson on comparatives by demonstrating with pictures on the board. For example, three volunteers lined up can show short, shorter, and shortest. A line on the board can show long, longer, and longest. Numbers can show great, greater, and greatest.

Common Errors

- Some students may not understand the proper use of a break in a vertical scale.

R_x Clarify that using a break symbol in the scale does have practical uses. For example, you might use a break to show all the data points on one graph rather than splitting them up into two different graphs, or to allow for a skip in the data that has no impact on the results of the study. Scientists use a break when working with very large or very small numbers to show experimental results.

- Some students may consider only the height of bars in a bar graph, and not the width.

R_x Reinforce that the bars must be the same width. Use an example to show that increasing the width of bars leads to false conclusions.

Answers

Explore the Math

1. Look for similarities. Examples:
- Both graphs display the same data.
- Both have the same title.
- Both vertical axes are labelled Quantity and both horizontal axes are labelled Month.

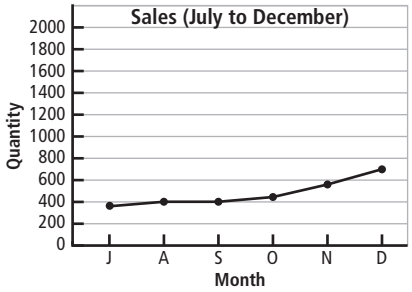
2. Look for differences. Examples:
- The graphs use different scales on the vertical axis. Graph A uses a continuous scale that increases by 100 units at a time, while Graph B has a break in the scale, starts at 350 and increases by 50 units at a time.

3. Graph A since it uses a continuous scale that starts at zero

Answers

Explore the Math

4.



5. Answers may vary. Example: Using smaller intervals in a scale may make changes in the data appear more significant, and using larger intervals in the scale may make changes appear less significant.

Show You Know: Example 1

a) The vertical axis was drawn with a break in the scale that makes the decrease in gas price seem more significant than it is.

b) The graph makes it appear that the price of gas is half as much as it was at the beginning of the day.

c) Answers will vary. Example: The graph could be redrawn with a continuous scale that starts at \$0.00 and goes to \$1.20, with intervals of ten cents.

Show You Know: Example 2

a) The symbols in the pictograph are not the same size, and they are not spaced evenly.

b) It appears that an equal number of people prefer each of the three lunch specials.

c) Draw the graph with symbols of equal size, spaced an equal distance apart.

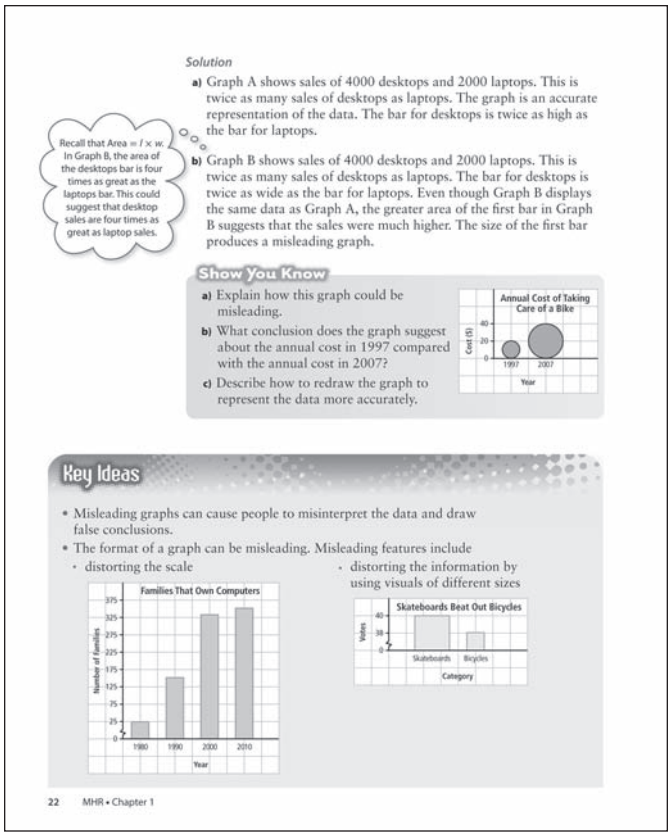
Show You Know: Example 3

a) The area of the large circle appears to be four times the area of the small circle. The greater area of the large circle suggests that the costs have greatly increased.

b) The cost in 2007 appears to be four times the cost in 1997, even though it is actually only two times the cost.

c) Answers will vary. Example: Use bars of the same width instead of circles.

Assessment	Supporting Learning
Assessment *as* Learning	
Reflect on Your Findings Listen as students discuss what they discovered during the Explore the Math. Try to have students generalize the conclusion about their findings.	• Provide access to computers with spreadsheet software for visual learners so that they can quickly change the vertical scales and see the effects. • You might have students think of ways to change the graph to show that sales changed very little from July to September.
Assessment *for* Learning	
Example 1 Have students do the Show You Know related to Example 1.	• Encourage students to verbalize their thinking. • You may wish to have students work with a partner. • Provide access to computers with spreadsheet software for visual learners so that they can quickly change the vertical scales and see the effects. • Have students lay out rulers side by side to represent the bars for the gas prices. Set 1 mm = 1¢. They could overlay the "bars" on an x-axis and y-axis drawn on a piece of paper. By adjusting the vertical scales, students can see the effects. • Give students a similar problem to solve. Allow them to work with a partner.
Example 2 Have students do the Show You Know related to Example 2.	• Encourage students to verbalize their thinking. • You may wish to have students work with a partner. • Have students identify where their eyes were drawn when they first viewed the pictograph (largest symbols). Ask them what would make this an accurate pictograph so that their eyes would not be drawn to one symbol in particular (use same-size symbols). • Give students a similar problem to solve. Allow them to work with a partner.
Example 3 Have students do the Show You Know related to Example 3.	• Encourage students to verbalize their thinking. • You may wish to have students work with a partner. • Have students identify where their eyes were drawn when they first viewed the graph (largest circle). Ask them what would make this an accurate graph so that their eyes would not be drawn to the largest circle. They may suggest redrawing the graph using bars, with the second bar two times as great as the first one or using same-sized ovals. • Give students a similar problem to solve. Allow them to work with a partner. • As a class, have students list ways that a graph can be distorted, and add to a master list.



Solution

a) Graph A shows sales of 4000 desktops and 2000 laptops. This is twice as many sales of desktops as laptops. The graph is an accurate representation of the data. The bar for desktops is twice as high as the bar for laptops.

Recall that Area = $l \times w$. In Graph B, the area of the desktops bar is four times as great as the laptops bar. This could suggest that desktop sales are four times as great as laptop sales.

b) Graph B shows sales of 4000 desktops and 2000 laptops. This is twice as many sales of desktops as laptops. The bar for desktops is twice as wide as the bar for laptops. Even though Graph B displays the same data as Graph A, the greater area of the first bar in Graph B suggests that the sales were much higher. The size of the first bar produces a misleading graph.

Show You Know

a) Explain how this graph could be misleading.

b) What conclusion does the graph suggest about the annual cost in 1997 compared with the annual cost in 2007?

c) Describe how to redraw the graph to represent the data more accurately.

Key Ideas

- Misleading graphs can cause people to misinterpret the data and draw false conclusions.
- The format of a graph can be misleading. Misleading features include
  - distorting the scale
  - distorting the information by using visuals of different sizes

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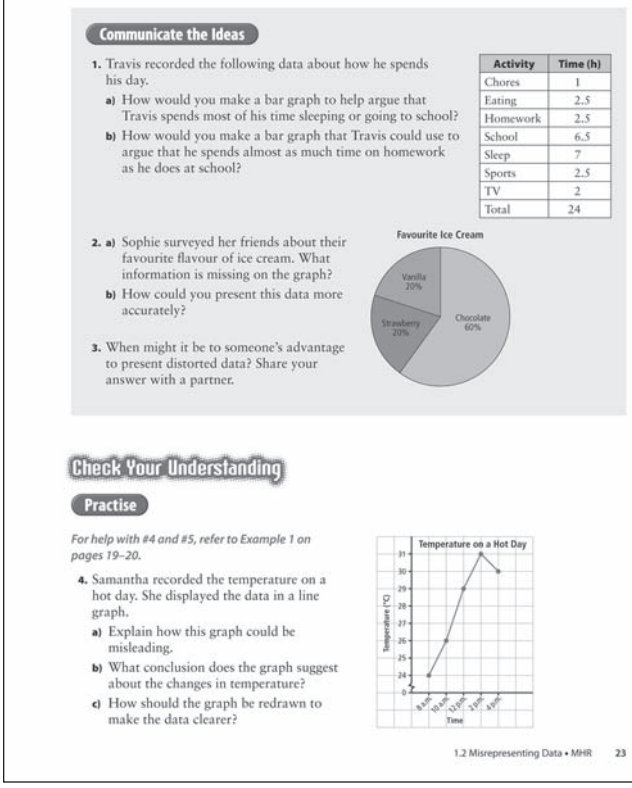


Communicate the Ideas

1. Travis recorded the following data about how he spends his day.

Activity	Time (h)
Chores	1
Eating	2.5
Homework	2.5
School	6.5
Sleep	7
Sports	2.5
TV	2
Total	24

a) How would you make a bar graph to help argue that Travis spends most of his time sleeping or going to school?

b) How would you make a bar graph that Travis could use to argue that he spends almost as much time on homework as he does at school?

2. a) Sophie surveyed her friends about their favourite flavour of ice cream. What information is missing on the graph?

b) How could you present this data more accurately?

3. When might it be to someone's advantage to present distorted data? Share your answer with a partner.

Check Your Understanding

Practise

For help with #4 and #5, refer to Example 1 on pages 19–20.

4. Samantha recorded the temperature on a hot day. She displayed the data in a line graph.

a) Explain how this graph could be misleading.

b) What conclusion does the graph suggest about the changes in temperature?

c) How should the graph be redrawn to make the data clearer?

1.2 Misrepresenting Data • MHR 23

The Key Ideas summarize how the format of a graph can be misleading. Reinforce that misleading graphs can result in misinterpreting information. As a class, discuss why people might intentionally misrepresent data. Students may say that people might do so for personal gain. For example, in an election, creating an impression that one candidate was in the lead might affect the people who had not yet voted. Have students prepare their own summary of the Key Ideas using words and visuals, and store it in their chapter Foldable.

Communicate the Ideas

These questions allow students to apply their understanding of misleading features on a graph. Have students work in small groups to discuss their ideas, and then work individually to answer the questions.

Meeting Student Needs

- Students with motor difficulties may benefit from using technology to create graphs.

Answers

Communicate the Ideas

1. a) Answers will vary. Example: Scale the *y*-axis by 0.5-h units, starting at 0, with each bar having the same width.

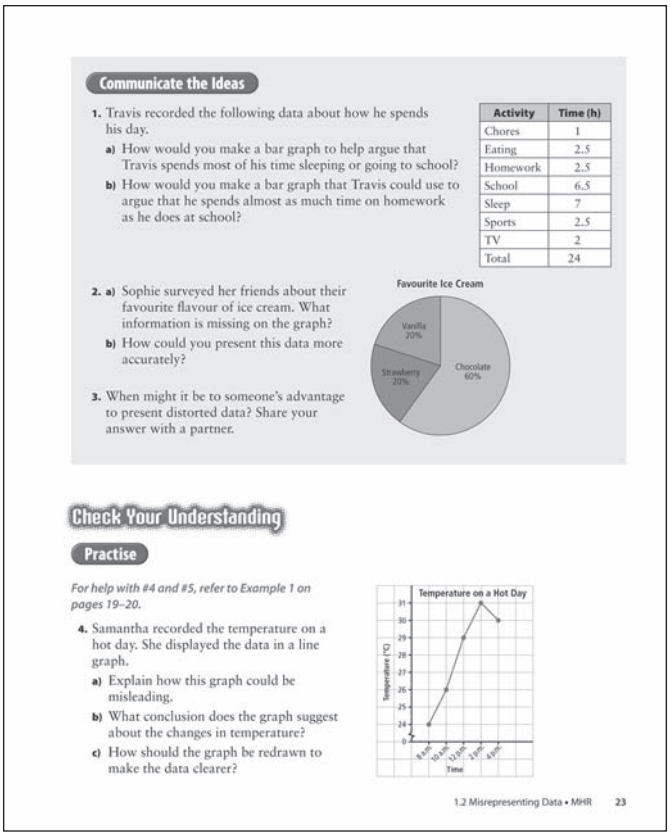
b) Answers will vary. Example: Scale the *y*-axis by 1-h units, from 0 h to 100 h, with the bar for homework twice as wide as the bar for school.

2. a) The total number of people surveyed is missing.

b) Answers will vary. Example: Include the number of people surveyed, or use a bar graph instead of a circle graph.

3. Answers will vary. Example: Companies may choose to distort data to make sales appear to be increasing at a greater rate than they actually are increasing.

Assessment	Supporting Learning
Assessment *as* Learning	
Communicate the Ideas Have students complete #1 and #2. Encourage them to share their answer to #1 with a partner and listen to each other's explanation.	• Check each student's answers to #1 and #2. Ensure that students understand the misleading features on the graphs. • You might have students sketch the graphs for #1, and then discuss them in small groups. Check that students correctly identify the misleading features of the proposed graphs.



Communicate the Ideas

1. Travis recorded the following data about how he spends his day.
   a) How would you make a bar graph to help argue that Travis spends most of his time sleeping or going to school?
   b) How would you make a bar graph that Travis could use to argue that he spends almost as much time on homework as he does at school?

Activity	Time (h)
Chores	1
Eating	2.5
Homework	2.5
School	6.5
Sleep	7
Sports	2.5
TV	2
Total	24

2. a) Sophie surveyed her friends about their favourite flavour of ice cream. What information is missing on the graph?
   b) How could you present this data more accurately?

3. When might it be to someone's advantage to present distorted data? Share your answer with a partner.

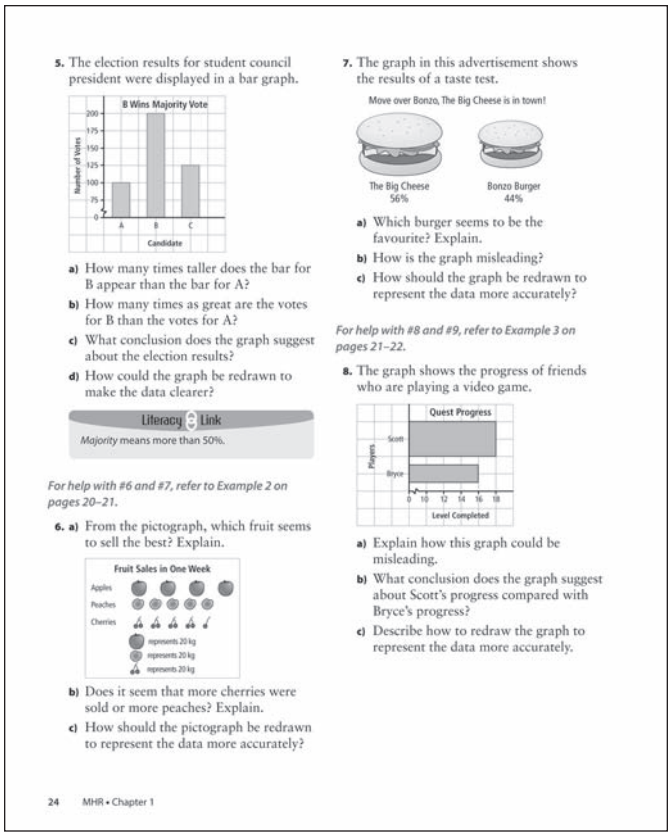
Check Your Understanding

Practise

For help with #4 and #5, refer to Example 1 on pages 19–20.

4. Samantha recorded the temperature on a hot day. She displayed the data in a line graph.
   a) Explain how this graph could be misleading.
   b) What conclusion does the graph suggest about the changes in temperature?
   c) How should the graph be redrawn to make the data clearer?

1.2 Misrepresenting Data • MHR 23



5. The election results for student council president were displayed in a bar graph.

   a) How many times taller does the bar for B appear than the bar for A?
   b) How many times as great are the votes for B than the votes for A?
   c) What conclusion does the graph suggest about the election results?
   d) How could the graph be redrawn to make the data clearer?

Literacy Link

Majority means more than 50%.

For help with #6 and #7, refer to Example 2 on pages 20–21.

6. a) From the pictograph, which fruit seems to sell the best? Explain.

   b) Does it seem that more cherries were sold or more peaches? Explain.
   c) How should the pictograph be redrawn to represent the data more accurately?

7. The graph in this advertisement shows the results of a taste test.

   a) Which burger seems to be the favourite? Explain.
   b) How is the graph misleading?
   c) How should the graph be redrawn to represent the data more accurately?

For help with #8 and #9, refer to Example 3 on pages 21–22.

8. The graph shows the progress of friends who are playing a video game.

   a) Explain how this graph could be misleading.
   b) What conclusion does the graph suggest about Scott's progress compared with Bryce's progress?
   c) Describe how to redraw the graph to represent the data more accurately.

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Check Your Understanding

Make copies of **Master 8 Centimetre Grid Paper**, **Master 9 0.5 Centimetre Grid Paper**, and **Master 12 Percent Circles** available for students to create their graphs in this section.

Practise

Note that #4 and #5, #6 and #7, and #8 and #9 are pairs of similar questions. Consider giving students a choice to do one question of each pair initially. These questions allow students to identify misleading features on graphs and suggest ways to represent the data accurately. Encourage students to draw diagrams to help explain their thinking.

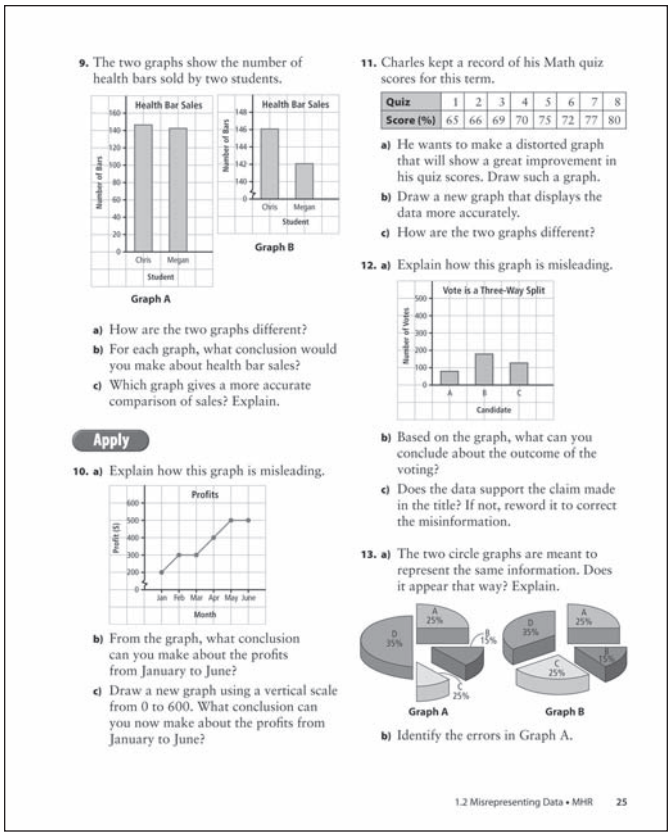
Literacy Link For #5, point out the Literacy Link on page 24 that explains the meaning of *majority*.

Apply

For #13, you may need to prompt students by asking how the relative placement of the sectors in Graph B affects the perception of the size of each sector. Ask about the relative size of sectors B and C in Graph A. Is sector C larger than sector B? For #14, prompt students to consider three dimensions (i.e., length, width, height).

Extend

For #22, consider providing a variety of magazines and newspapers for students to look through, and/or computer access. Have them cut out and glue or tape a graph into their notebooks. If students have difficulty finding a misleading graph, have them develop their own context and graph that misleads people about a scientific topic. Encourage students to share their original and revised graphs with the class.



9. The two graphs show the number of health bars sold by two students.

Graph A

Graph B

a) How are the two graphs different?
b) For each graph, what conclusion would you make about health bar sales?
c) Which graph gives a more accurate comparison of sales? Explain.

Apply

10. a) Explain how this graph is misleading.

b) From the graph, what conclusion can you make about the profits from January to June?
c) Draw a new graph using a vertical scale from 0 to 600. What conclusion can you now make about the profits from January to June?

11. Charles kept a record of his Math quiz scores for this term.

Quiz	1	2	3	4	5	6	7	8
Score (%)	65	66	69	70	75	72	77	80

a) He wants to make a distorted graph that will show a great improvement in his quiz scores. Draw such a graph.
b) Draw a new graph that displays the data more accurately.
c) How are the two graphs different?

12. a) Explain how this graph is misleading.

b) Based on the graph, what can you conclude about the outcome of the voting?
c) Does the data support the claim made in the title? If not, reword it to correct the misinformation.

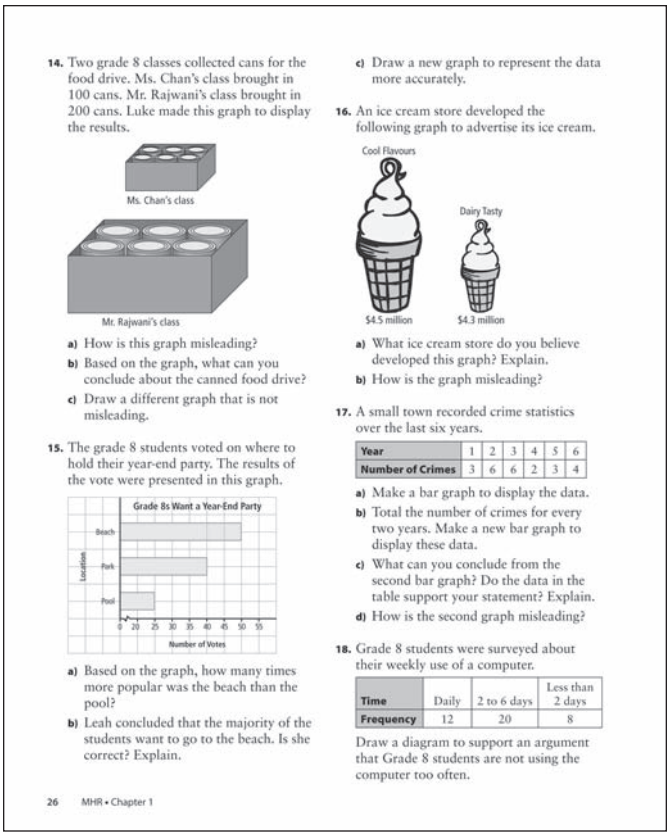
13. a) The two circle graphs are meant to represent the same information. Does it appear that way? Explain.

Graph A

Graph B

b) Identify the errors in Graph A.

1.2 Misrepresenting Data • MHR 25



14. Two grade 8 classes collected cans for the food drive. Ms. Chan's class brought in 100 cans. Mr. Rajwani's class brought in 200 cans. Luke made this graph to display the results.

Ms. Chan's class

Mr. Rajwani's class

a) How is this graph misleading?
b) Based on the graph, what can you conclude about the canned food drive?
c) Draw a different graph that is not misleading.

15. The grade 8 students voted on where to hold their year-end party. The results of the vote were presented in this graph.

a) Based on the graph, how many times more popular was the beach than the pool?
b) Leah concluded that the majority of the students want to go to the beach. Is she correct? Explain.
c) Draw a new graph to represent the data more accurately.

16. An ice cream store developed the following graph to advertise its ice cream.

$4.5 million

$4.3 million

a) What ice cream store do you believe developed this graph? Explain.
b) How is the graph misleading?

17. A small town recorded crime statistics over the last six years.

Year	1	2	3	4	5	6
Number of Crimes	3	6	6	2	3	4

a) Make a bar graph to display the data.
b) Total the number of crimes for every two years. Make a new bar graph to display these data.
c) What can you conclude from the second bar graph? Do the data in the table support your statement? Explain.
d) How is the second graph misleading?

18. Grade 8 students were surveyed about their weekly use of a computer.

Time	Daily	2 to 6 days	Less than 2 days
Frequency	12	20	8

Draw a diagram to support an argument that Grade 8 students are not using the computer too often.

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Math Link

The Math Link allows students to apply their understanding of misleading features on a graph. Students research data about music sales, choose an argument, and create a graph to support their argument. You might suggest researching and comparing sales of individual artists or researching album sales over the course of an artist's or group's music career, such as the Beatles. Make copies of **Master 8 Centimetre Grid Paper**, **Master 9 0.5 Centimetre Grid Paper**, and **Master 12 Percent Circles** available. Encourage students to share their graphs in small groups and use constructive feedback to revise their work. If possible, team students who used different types of graphs. As you circulate, check student work and provide constructive feedback.

Meeting Student Needs

- Allow students to present their work in any combination of oral and written form.
- Consider allowing students to use spreadsheet software to create graphs.

- Have students who struggle with #13 refer to Example 3 and the circle graph on page 7. Have them verbally explain the features of circle graphs. This is a very good pictorial assessment.
- Provide **BLM 1–10 Section 1.2 Extra Practice** to students who would benefit from more practice.

ELL

- English language learners may have difficulty with terms such as *food drive* in #14 and *franchise* in #21. Have students add new terms to their dictionary.

Gifted and Enrichment

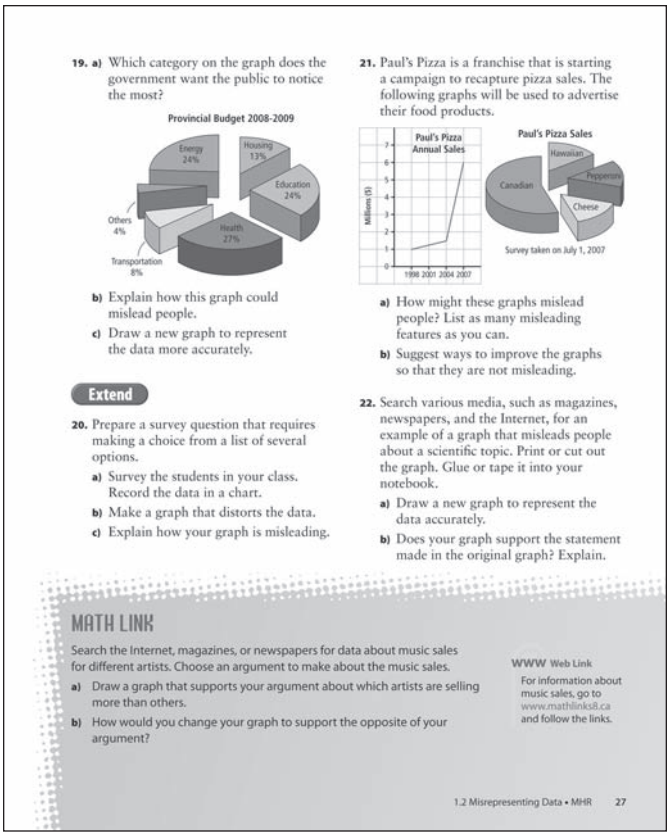
- Have students go to the library, collect newspapers set aside for recycling, and scan them for graphs. Have them note for each graph if it is accurate or misleading. If it is misleading, have students state how.

Web Link

For data about the top selling albums, top selling digital albums, and top digital songs by music artists, go to www.mathlinks8.ca and follow the links.

For a web site that provides links to the worldwide recording industry, go to www.mathlinks8.ca and follow the links.

For data from the Canadian Recording Industry Association, go to www.mathlinks8.ca and follow the links.



19. a) Which category on the graph does the government want the public to notice the most?

Provincial Budget 2008-2009

b) Explain how this graph could mislead people.

c) Draw a new graph to represent the data more accurately.

Extend

20. Prepare a survey question that requires making a choice from a list of several options.

a) Survey the students in your class. Record the data in a chart.

b) Make a graph that distorts the data.

c) Explain how your graph is misleading.

21. Paul's Pizza is a franchise that is starting a campaign to recapture pizza sales. The following graphs will be used to advertise their food products.

a) How might these graphs mislead people? List as many misleading features as you can.

b) Suggest ways to improve the graphs so that they are not misleading.

22. Search various media, such as magazines, newspapers, and the Internet, for an example of a graph that misleads people about a scientific topic. Print or cut out the graph. Glue or tape it into your notebook.

a) Draw a new graph to represent the data accurately.

b) Does your graph support the statement made in the original graph? Explain.

MATH LINK

Search the Internet, magazines, or newspapers for data about music sales for different artists. Choose an argument to make about the music sales.

a) Draw a graph that supports your argument about which artists are selling more than others.

b) How would you change your graph to support the opposite of your argument?

WWW Web Link

For information about music sales, go to www.mathlinks8.ca and follow the links.

Common Errors

- Some students may not complete their graphs.

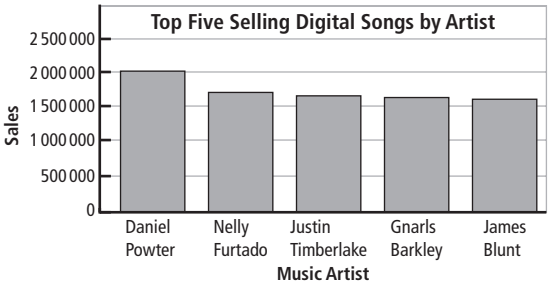
R_x Remind students to check that their graphs have labels and titles.

Answers

Math Link

Arguments will vary. Example: Daniel Powter had the top sales for a digital song in 2006.

a) Graphs will vary. Example:



b) Answers will vary. Example: An opposing argument could be that the sales of digital songs of the top five artists are quite close. The graph could be redrawn using bars twice as wide for sales of the other artists or the intervals could be decreased so that the bars all appear to be closer in height.

Assessment	Supporting Learning
Assessment *for* Learning	
Practise Have students do #4, #6, and #8. Students who have no problems with these questions can go on to the Apply questions.	• Provide additional coaching with Example 1 to students who need help with #4. Have students develop a sketch for #4c) and explain their thinking; clarify any misunderstandings. Coach students through corrections to their answers, and then have them complete #5 on their own. • Provide additional coaching with Example 2 to students who need help with #6. Have students develop a sketch for #6c) and explain their thinking; clarify any misunderstandings. You might have them check the model of the pictograph on page 7. Coach students through corrections to their answers, and then have them complete #7 on their own. • Provide additional coaching with Example 3 to students who need help with #8. Have students develop a sketch for #8c) and explain their thinking; clarify any misunderstandings. Coach students through corrections to their answers, and then have them complete #9 and #13 on their own.
Math Link The Math Link on page 27 is intended to help students work toward the chapter problem wrap-up titled Wrap It Up! on page 39.	• It is recommended that all students complete the Math Link. • Provide a variety of magazines and newspapers and/or computer access to students. • Consider having students use spreadsheet software to create their graph. • Students who need help getting started could use **BLM 1–11 Section 1.2 Math Link**, which provides scaffolding.
Assessment *as* Learning	
Math Learning Log Have students answer the following question: • Describe a situation when you saw a graph that was misleading. Explain how the graph was misleading. Suggest reasons why the graph was intended to be misleading. Describe or sketch how you might redraw the graph to represent the data more accurately.	• Have students refer to their notes and the student resource to help them recall the misleading features on graphs. • Some students may find it more manageable if you provide an example of a distorted graph. Alternatively, you may have students work in teams, with members developing distorted graphs for other team members to analyse and correct. • Encourage students to think of ways and times that the media have published misleading graphs. • Encourage students to use the What I Need to Work On section of their chapter Foldable to note what they continue to have difficulties with.