1 Representing Data

General Outcomes

- Collect, display and analyze data to solve problems.

Specific Outcomes

SP1 Critique ways in which data is presented.

By the end of this chapter, students will be able to:

Section	Understanding Concepts, Skills, and Processes
1.1	✓ compare information from different graphs
	✓ identify the advantages and disadvantages of different types of graphs
1.2	✓ 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
1.3	✓ explain how a graph is used to represent the data from a given situation

Assessment	Supporting Learning
Assessment *for* Learning	
Method 1: Use the Math Link introduction on page 5 in *MathLinks 8* to activate student prior knowledge about the skills and processes that will be covered in this chapter. **Method 2:** Have students develop a journal to explain what they personally know about different types of graphs and how graphs can be used.	• **BLM 1–2 Chapter 1 Math Link Introduction** provides scaffolding for the Math Link introduction. • Have students use the What I Need to Work On section of their chapter Foldable to keep track of the skills and processes that need attention. They can check off each item as they develop the skill or process at an appropriate level. • Students who require activation of prerequisite skills may wish to complete the Get Ready materials available on **BLM 1–3 Chapter 1 Get Ready**, in the *MathLinks 8 Practice and Homework Book*, and at the www.mathlinks8.ca book site.
Assessment *as* Learning	
Literacy Link (page 3) **Option 1** At the beginning of the chapter, have students use a KWL chart to identify what they know and want to learn about representing data before starting the chapter. After completing the chapter, have them revisit their KWL chart, answer the questions they asked in the What I **Want** to Know column and outline what else they have learned.	• Use student responses in the What I **Know** column to identify any misconceptions they may have about the topic. Deal with these when you come to an appropriate lesson during the chapter. • Before filling out the What I **Want** to Know column, have students scan the chapter by reading each section title, studying the picture, and reading the opening text and Focus on… list. Have them write down what they want to learn, sparked by this brief scan. • Before the Practice Test, have students fill out the What I **Learned** column. Model answering the questions asked in the What I **Want** to Know column.
Literacy Link (page 3) **Option 2** At the beginning of the chapter, have students use a KWL chart to identify what they know and want to learn about representing data before reading the chapter opener. After reading the chapter opener and doing the Math Link introduction, have them list what they have learned.	• Review the What I **Know** column to assess students' prior knowledge related to the topic. • In the What I **Want** to Know column, have students list at least three things they want to know related to the topic. This should be written in question form and include higher level questions that cannot be answered by a simple yes or no. • When filling out the What I **Learned** column, model providing details that clearly support what was learned. Discuss how students might now answer their questions in the What I **Want** to Know column and which ones still need to be answered.
Chapter 1 Foldable As students work on each section in Chapter 1, have them keep track of any problems they are having in the What I Need to Work On section of their chapter Foldable.	• As students complete each section, have them review the list of items they need to work on and check off any that have been handled.
Assessment *for* Learning	
BLM 1–4 Chapter 1 Warm-Up This BLM includes three warm-ups, one to be used at the beginning of each section. Each warm-up provides cumulative review questions for the entire student resource to that point, as well as mental math practice	• As students complete questions from previous chapters, note which skills they are retaining and which ones may need additional reinforcement. • Use the warm-up to provide additional opportunities for students to demonstrate their understanding of the chapter material. • Have students share their strategies for completing mental math calculations.

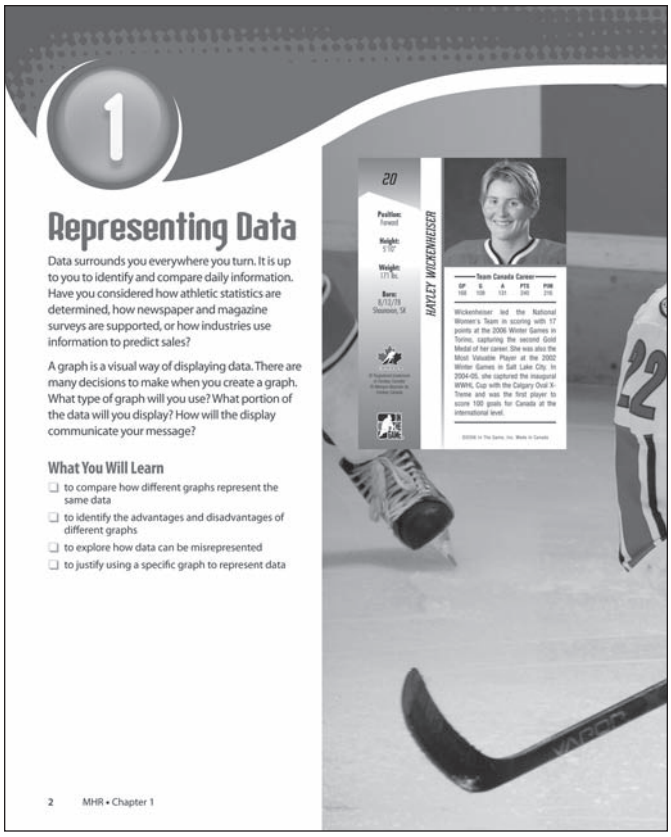
Problems of the Week

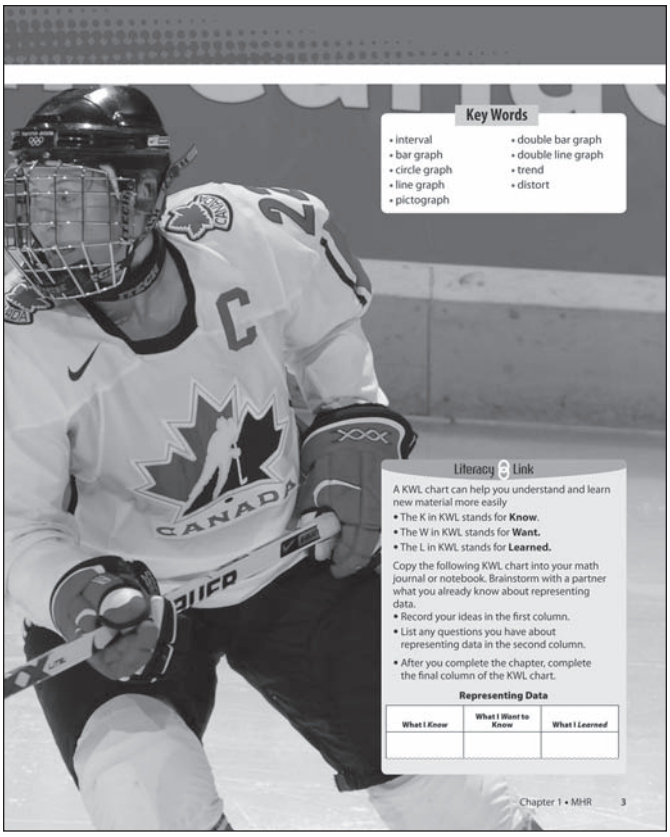
Have all students try at least one of the problems on **BLM 1–5 Chapter 1 Problems of the Week**. Many of these problems require students to think outside the box and experiment with a variety of approaches. Some have definitive answers; others can be answered in more than one way.

Students can take the problems home and consult with parents or guardians, work with other students when their work is completed, or try them on their own. The questions take a varying amount of time to solve, depending on the particular student and the problem itself. You may wish to give out these problems at the beginning of the chapter and discuss the solutions at appropriate times throughout your work on the chapter.

Chapter 1 Planning Chart

Section/ Suggested Timing	Prerequisite Skills	Materials/Technology	Teacher's Resource Blackline Masters	Exercise Guide	Extra Support	Assessment		
						Assessment *as* Learning	Assessment *for* Learning	Assessment *of* Learning
Chapter Opener • 50–60 minutes (TR page 5)	Students should be familiar with • different types of graphs and how to create graphs • completing a graph including title, labels on axes, scale, units	• 11 × 17 sheet of paper • ruler • stapler • several sheets of notebook paper cut into quarters or large index cards • scissors (optional) • grid paper • compass • protractor • coloured pencils	Master 8 Centimetre Grid Paper Master 9 0.5 Centimetre Grid Paper Master 12 Percent Circles Master 16 KWL Chart BLM 1–1 *Math Links 8* Scavenger Hunt BLM 1–2 Chapter 1 Math Link Introduction BLM 1–3 Chapter 1 Get Ready BLM 1–5 Chapter 1 Problems of the Week		Online Learning Centre	TR page 4 Chapter 1 Foldable, TR page 4	TR page 4	
1.1 Advantages and Disadvantages of Different Graphs • 80–100 minutes (TR page 10)	Students should be familiar with • performing percent operations to interpret and create circle graphs	• metre stick • chalk or masking tape • ruler • grid paper • coloured pencils • compass • protractor • scissors (optional) • variety of magazines and newspapers with graphs related to music or sports • computer with Internet access (optional) • glue or tape (optional)	Master 8 Centimetre Grid Paper Master 9 0.5 Centimetre Grid Paper Master 12 Percent Circles BLM 1–4 Chapter 1 Warm-Up BLM 1–6 Section 1.1 Explore the Math BLM 1–7 Compare a Bar Graph and a Pictograph BLM 1–8 Section 1.1 Extra Practice BLM 1–9 Section 1.1 Math Link	**Essential:** 1–4, 6–8, Math Link **Typical:** 1–4, 7, 10, 12–15, Math Link **Extension/Enrichment:** 1–3, 12, 15–17, Math Link	*MathLinks 8 Practice and Homework Book* *MathLinks 8 Solutions Manual*	TR pages 14, 16 Math Learning Log, TR page 18 Chapter 1 Foldable, TR page 18	TR pages 14, 18	
1.2 Misrepresenting Data • 80–100 minutes (TR page 19)	Students should be familiar with • performing calculations for area of rectangles and volume of cubes	• grid paper • ruler • coloured pencils • computer with spreadsheet software (optional) • compass (optional) • scissors (optional) • protractor (optional) • variety of magazines and newspapers • computer with Internet access (optional) • glue or tape (optional)	Master 8 Centimetre Grid Paper Master 9 0.5 Centimetre Grid Paper Master 12 Percent Circles BLM 1–4 Chapter 1 Warm-Up BLM 1–10 Section 1.2 Extra Practice BLM 1–11 Section 1.2 Math Link	**Essential:** 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	*MathLinks 8 Practice and Homework Book* *MathLinks 8 Solutions Manual*	TR pages 22, 23 Math Learning Log, TR page 26 Chapter 1 Foldable, TR page 26	TR pages 22, 26	
1.3 Critiquing Data Presentation • 80–100 minutes (TR page 27)	Students should be familiar with • different types of graphs and their conventions	• grid paper • ruler • coloured pencils • compass • protractor	Master 2 Two Stars and One Wish Master 8 Centimetre Grid Paper Master 9 0.5 Centimetre Grid Paper Master 12 Percent Circles Master 16 KWL Chart BLM 1–4 Chapter 1 Warm-Up BLM 1–12 Section 1.3 Extra Practice BLM 1–13 Section 1.3 Math Link	**Essential:** 1–4, 6, 8, 10, Math Link **Typical:** 1, 3, 4–6, 7–10, Math Link **Extension/Enrichment:** 1, 3, 11–13, Math Link	*MathLinks 8 Practice and Homework Book* *MathLinks 8 Solutions Manual*	Master 2 Two Stars and One Wish TR pages 29, 31 Math Learning Log, TR page 33 Chapter 1 Foldable, TR page 33	TR pages 29, 33	
Chapter 1 Review • 40–50 minutes (TR page 34)		• calculator (optional) • grid paper • ruler • coloured pencils • compass • protractor • computer with spreadsheet software (optional)	Master 8 Centimetre Grid Paper Master 9 0.5 Centimetre Grid Paper Master 12 Percent Circles BLM 1–8 Section 1.1 Extra Practice BLM 1–10 Section 1.2 Extra Practice BLM 1–12 Section 1.3 Extra Practice	Have students do at least one question related to any concept, skill, or process that has been giving them trouble.	*MathLinks 8 Practice and Homework Book* *MathLinks 8 CAB*	Chapter 1 Foldable, TR page 35	TR page 35	
Chapter 1 Practice Test • 40–50 minutes (TR page 36)		• grid paper • ruler • coloured pencils • calculator (optional) • compass • protractor • computer with spreadsheet software (optional)	Master 8 Centimetre Grid Paper Master 9 0.5 Centimetre Grid Paper Master 12 Percent Circles BLM 1–14 Chapter 1 Test	Provide students with the number of questions they can comfortably do in one class. Choose at least one question for each concept, skill, or process. **Minimum:** 1–3, 5, 6, 9	*MathLinks 8 CAB*	TR page 38		TR page 38 BLM 1–14 Chapter 1 Test
Chapter 1 Wrap It Up! • 40–50 minutes (TR page 39)		• grid paper • ruler • coloured pencils • calculator (optional) • compass (optional) • protractor (optional)	Master 1 Project Rubric Master 8 Centimetre Grid Paper Master 9 0.5 Centimetre Grid Paper Master 12 Percent Circles BLM 1–2 Chapter 1 Math Link Introduction BLM 1–9 Section 1.1 Math Link BLM 1–11 Section 1.2 Math Link BLM 1–13 Section 1.3 Math Link BLM 1–15 Chapter 1 Wrap It Up!		Online Learning Centre			TR page 40 Master 1 Project Rubric
Chapter 1 Math Games • 30–40 minutes (TR page 42)		• two dice per pair of students • grid paper	Master 8 Centimetre Grid Paper Master 9 0.5 Centimetre Grid Paper				TR page 42	
Chapter 1 Challenge in Real Life • 40–50 minutes (TR page 43)		• computer with Internet access • grid paper • ruler • coloured pencils • calculator (optional) • compass (optional) • protractor (optional)	Master 1 Project Rubric Master 8 Centimetre Grid Paper Master 9 0.5 Centimetre Grid Paper Master 12 Percent Circles BLM 1–16 Chapter 1 BLM Answers		Online Learning Centre		TR page 44	TR page 44 Master 1 Project Rubric





***MathLinks 8*, pages 2–5**

Suggested Timing

50–60 minutes

Materials

- 11 × 17 sheet of paper
- ruler
- stapler
- several sheets of notebook paper cut into quarters or large index cards
- scissors (optional)
- grid paper
- compass
- protractor
- coloured pencils

Blackline Masters

Master 8 Centimetre Grid Paper
Master 9 0.5 Centimetre Grid Paper
Master 12 Percent Circles
Master 16 KWL Chart
BLM 1–1 *MathLinks 8* Scavenger Hunt
BLM 1–2 Chapter 1 Math Link Introduction
BLM 1–3 Chapter 1 Get Ready
BLM 1–5 Chapter 1 Problems of the Week

Key Words

interval	line graph	double line graph
bar graph	pictograph	trend
circle graph	double bar graph	distort

What's the Math?

In this chapter, students focus on representing data using different types of graphs including bar graphs, circle graphs, line graphs, and pictographs. They begin by comparing how different graphs represent the same data and then, identifying the advantages and disadvantages of different graphs. Next, students explore how data can be misrepresented and cause people to misinterpret the data and draw false conclusions. Finally, they learn to justify using a specific graph to represent data.

Planning Notes

Introduce students to the various features of the *MathLinks 8 s*tudent resource by having them complete **BLM 1–1 MathLinks 8 Scavenger Hunt**.

In advance, collect or have students bring in some sports cards. Explain the focus of the chapter on representing data using different types of graphs. Have students discuss where they have seen graphs used. Consider brainstorming who uses graphs and for what purposes. Read the introduction and draw students' attention to the data on the sports cards they have collected. Encourage them to think of ways to display the data on the card. Prompt students to answer the questions in the student resource. Try to elicit ideas from all class members.

Literacy Link KWL charts are excellent resources to assess students' understanding and to check for misconceptions. Work through the KWL with students the first time you use it with them. Consider using an overhead copy of **Master 16 KWL Chart**. Continue to model its use throughout the chapter. The key to getting students familiar with this strategy is to model its use and then to allow enough practice that its use becomes a habit.

KWL charts can be used to access prior knowledge, to preview vocabulary and concepts, and to help students recall what they have read. You may wish to introduce the use of a KWL chart at the beginning of Chapter 1.

- Have students brainstorm what they already know as a class, in pairs, or individually, and place this information in the What I Know column.
- Ask students to list any interesting questions they may have about the topic in the What I Want to Know column.
- After a lesson, section, or chapter, ask students to complete the What I Learned column. Also have them circle what they knew was correct and underline what they thought they knew was incorrect in the first column.
- Consider having students complete a second KWL chart in section 1.3.

Meeting Student Needs

- Consider having students complete the questions on **BLM 1–3 Chapter 1 Get Ready** to activate the prerequisite skills for this chapter.
- Some students may not often see graphs in daily life. Consider collecting a variety of graphs (including graphs that misrepresent data) about topics of interest to students and using them throughout the chapter. Consider topics such as sports, ads for vehicles, weather, and wildlife.
- Consider showing students some examples of graphs that show changes in ecosystems or climate. For example, you might check the related Web Link on TR page 7 for information about the present state of the Arctic ecosystem and climate.
- Students may benefit from using **Master 16 KWL Chart** to create their own chart.
- You may need to reactivate students' skills in creating graphs. Work with them to make a checklist for constructing each type of graph. Have students store the checklists in their Foldable. Students might work together to create a classroom display of checklists for each type of graph. You might provide data for them to practise making each type of graph.

  For a bar graph:
  – Decide on a scale.
  – Title and label the x-axis.
  – Title and label the y-axis.
  – Plot the categories along the x-axis.
  – Plot the values along the y-axis.
  – Add a title.

  For a circle graph using a protractor:
  – Draw a circle using a compass.
  – Use a protractor to measure and draw each angle.
  – Label each sector with its category and its percent.
  – Shade each sector.
  – Add a title.

  For a circle graph using a percent circle on **Master 12 Percent Circles**, explain how a percent circle is divided into 100 equal sectors. Each sector represents 1%. Show students how to mark off and shade the sectors for each category.
  – Count off the part of the percent circle needed to show each percent.
  – Mark the beginning and end of each sector.
  – Label each sector with its category and its percent.
  – Shade each sector.
  – Add a title.

  For a line graph:
  – Decide on a scale.
  – Title and label the x-axis.
  – Title and label the y-axis.
  – Plot the categories along the x-axis.
  – Plot the values along the y-axis.
  – Join the data points.
  – Add a title.

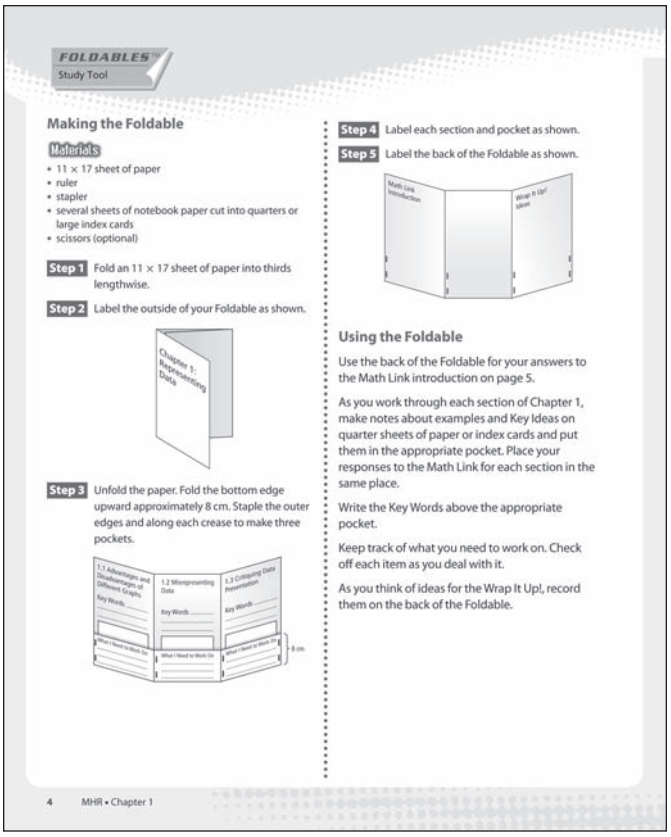
  For a pictograph:
  – Decide on a symbol.
  – Provide a key.
  – Add a title.

ELL

- English language learners may have difficulty with terms such as *data*, *display*, *advantages*, *disadvantages*, *misrepresented*, and *justify*. Have students add any new terms to their dictionary.
- Consider providing samples of graphs for each Key Word and having students label the samples by type of graph. Have students note similarities and differences in a group discussion. You might display the collage of labelled graphs in the classroom.
- Consider displaying Key Words on a math word wall. Encourage students to create their own vocabulary/picture dictionary. Matching a picture with a Key Word and its definition helps reinforce students' understanding of vocabulary.
- Work with students to create a poster labelled with the parts of a graph to aid in vocabulary retention.

Web Link

For information and graphs on the present state of Arctic ecosystems and climate in historical context, go to www.mathlinks8.ca and follow the links.



FOLDABLES™
Study Tool

Making the Foldable

Materials
- 11 × 17 sheet of paper
- ruler
- stapler
- several sheets of notebook paper cut into quarters or large index cards
- scissors (optional)

Step 1 Fold an 11 × 17 sheet of paper into thirds lengthwise.

Step 2 Label the outside of your Foldable as shown.

Step 3 Unfold the paper. Fold the bottom edge upward approximately 8 cm. Staple the outer edges and along each crease to make three pockets.

Step 4 Label each section and pocket as shown.

Step 5 Label the back of the Foldable as shown.

Using the Foldable

Use the back of the Foldable for your answers to the Math Link introduction on page 5.

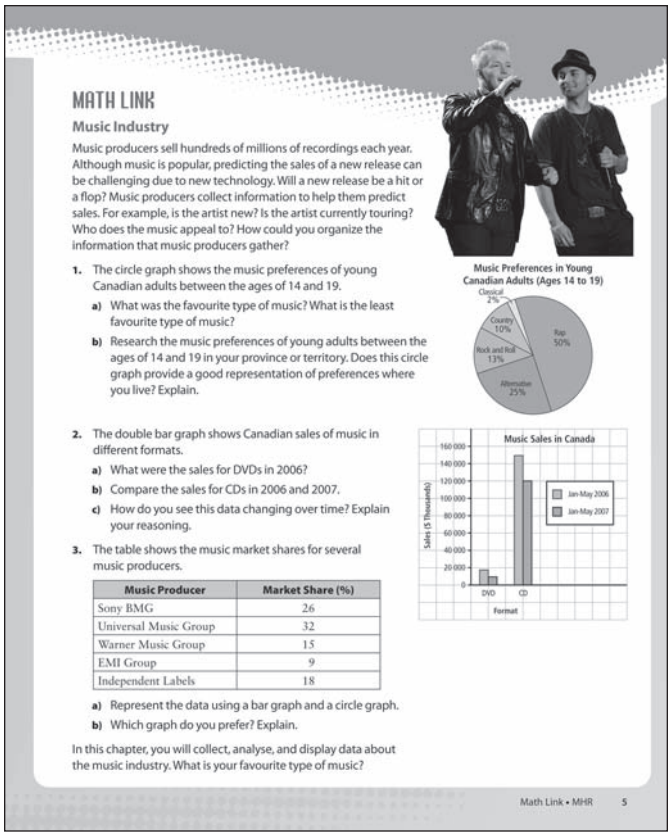
As you work through each section of Chapter 1, make notes about examples and Key Ideas on quarter sheets of paper or index cards and put them in the appropriate pocket. Place your responses to the Math Link for each section in the same place.

Write the Key Words above the appropriate pocket.

Keep track of what you need to work on. Check off each item as you deal with it.

As you think of ideas for the Wrap It Up!, record them on the back of the Foldable.

4 MHR • Chapter 1



MATH LINK

Music Industry

Music producers sell hundreds of millions of recordings each year. Although music is popular, predicting the sales of a new release can be challenging due to new technology. Will a new release be a hit or a flop? Music producers collect information to help them predict sales. For example, is the artist new? Is the artist currently touring? Who does the music appeal to? How could you organize the information that music producers gather?

1. The circle graph shows the music preferences of young Canadian adults between the ages of 14 and 19.
   a) What was the favourite type of music? What is the least favourite type of music?
   b) Research the music preferences of young adults between the ages of 14 and 19 in your province or territory. Does this circle graph provide a good representation of preferences where you live? Explain.

Music Preferences in Young Canadian Adults (Ages 14 to 19)
Classical 2%
Country 10%
Rock and Roll 13%
Alternative 25%
Pop 50%

2. The double bar graph shows Canadian sales of music in different formats.
   a) What were the sales for DVDs in 2006?
   b) Compare the sales for CDs in 2006 and 2007.
   c) How do you see this data changing over time? Explain your reasoning.

Music Sales in Canada
Sales (5 Thousands)
Jan–May 2006
Jan–May 2007
DVD
CD
Format

3. The table shows the music market shares for several music producers.

Music Producer	Market Share (%)
Sony BMG	26
Universal Music Group	32
Warner Music Group	15
EMI Group	9
Independent Labels	18

   a) Represent the data using a bar graph and a circle graph.
   b) Which graph do you prefer? Explain.

In this chapter, you will collect, analyse, and display data about the music industry. What is your favourite type of music?

Math Link • MHR 5

Foldables Study Tool

Have students make the Foldable in the student resource to keep track of the information in the chapter. Have them use the back of the Foldable for their answers to the Math Link introduction. Have students record notes about examples and Key Ideas on index cards and put them in the corresponding pocket of their Foldable. Have them place their response to the Math Links for each section in the same place. Have students write the Key Words above the appropriate pocket. Filling in the What I Need to Work On! column as they progress through the chapter will assist students in identifying and solving any difficulties with concepts, skills, and processes. Encourage them to record their ideas for the Wrap It Up! on the back of the Foldable.

Have students store the Foldable in a binder by punching holes through the folded Foldable. You may also wish to provide students with a plastic envelope that fits into their binder.

Math Link

The Math Link for this chapter is about the music industry. You might have students discuss some popular musicians and different kinds of music before reading the opening of the Math Link introduction on page 5 as a class. Prompt students to consider what types of information music producers use to predict sales of a new release. For example, is the artist new? Is the artist currently touring? Who does the music appeal to? Ask students what information the circle graph and bar graph display. Have students answer and then discuss the questions.

For #1b), consider having students do a class survey of music preferences to help answer the question. For #3, provide students with **Master 8 Centimetre Grid Paper** or **Master 9 0.5 Centimetre Grid Paper**. Consider allowing students to draw the circle graph using a protractor, a percent circle, or technology. You may wish to provide students with **Master 12 Percent Circles**.

The Math Links for this chapter integrate mathematical understanding about representing data with the music industry. Encourage students to collect and share examples of data and graphs that relate to the music industry.

Have students read the Wrap It Up! on page 39 to give them a sense of where the Math Link is heading. Students could start to collect data about the music industry as they work on the chapter. The Wrap It Up! problem is a summative assessment. As they work through the chapter, most students should complete all of the Math Links. These Math Links will assist them in doing the Wrap It Up! problem.

Meeting Student Needs

- Consider creating the chapter Foldable ahead of time to use as a model.
- Have students work individually or in pairs to complete the Math Link.
- Students with motor difficulties may need to use spreadsheet software or graphing calculators, if available, to create graphs. Alternatively, allow these students to use **Master 12 Percent Circles** to create circle graphs.
- Consider having students use the virtual manipulative in the related Web Link on this page to create bar graphs.
- To help them to get started, some students may benefit from using **BLM 1–2 Chapter 1 Math Link Introduction**, which provides scaffolding for this activity.

ELL

- English language learners may have difficulty with terms such as *recordings*, *flop*, *touring*, *preferences*, and *music market shares*. Have students add any new terms to their dictionary.

Common Errors

- Some students may not complete the bar graph correctly.

Rx Refer students to the checklist they developed and stored in their Foldable.

Web Link

For a virtual manipulative that allows students to create a bar graph, go to www.mathlinks8.ca and follow the links. Students can show quantities or percent values by labelling columns and clicking on values.

Answers

Math Link

1. a) The favourite type of music was Rap. The least favourite type of music was Classical.

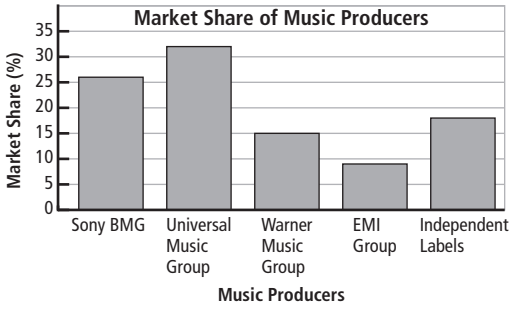
b) Answers will vary. Example: My classmates prefer country music to rap music.

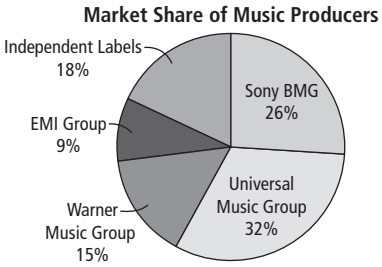
2. a) $18 000

b) CD sales dropped from 152 000 in 2006 to 120 000 in 2007.

c) Over time, CD and DVD sales are likely to continue to drop, given the popularity of online music and movie sources.

3. a)





b) Circle graph. It lets you compare the percent of each producer's market share to the entire market.