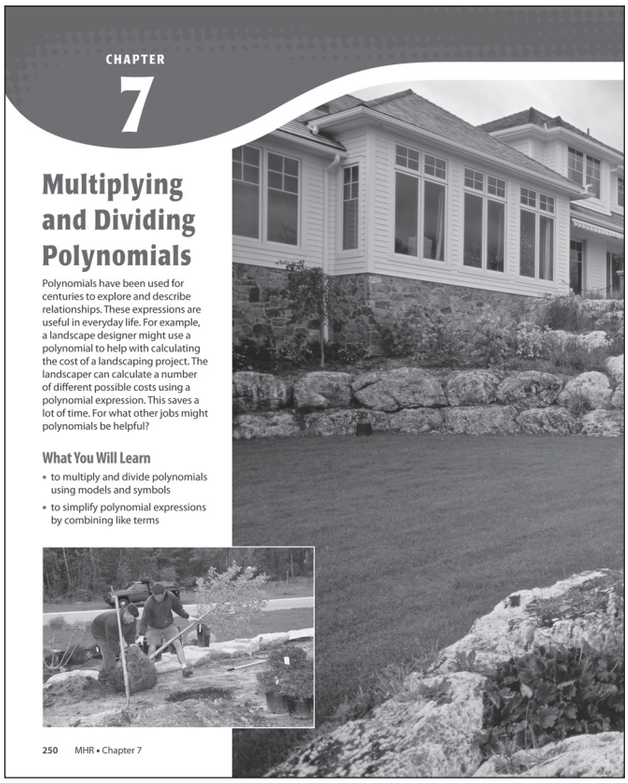
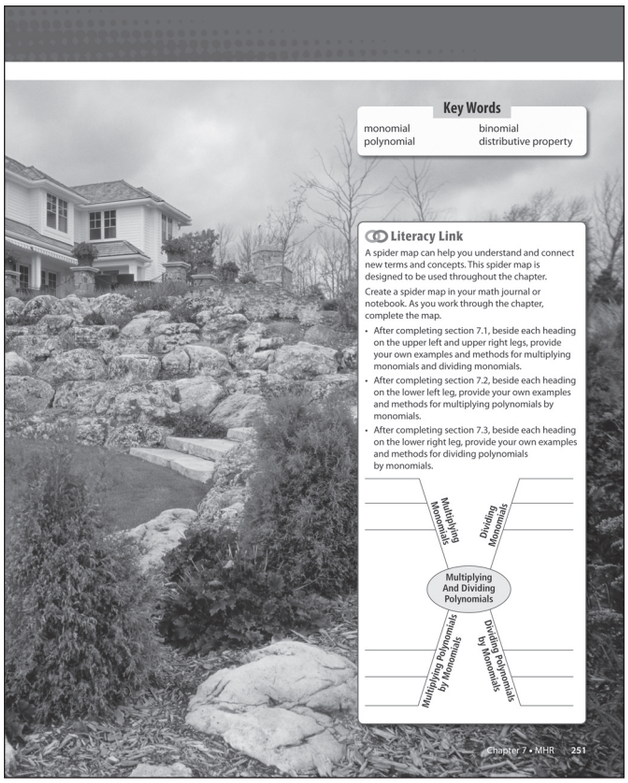




***MathLinks 9*, pages 250–251**

Suggested Timing
20–30 minutes

Materials
- sheet of 11 × 17 paper
- two sheets of 8.5 × 11 paper
- scissors
- three sheets of 8.5 × 11 grid paper
- ruler
- stapler

Blackline Masters
BLM 7–1 Chapter 7 Math Link Introduction
BLM 7–2 Chapter 7 Get Ready
BLM 7–4 Chapter 7 Problems of the Week

Key Words
monomial
binomial
polynomial
distributive property

What's the Math?

In this chapter, students multiply and divide polynomials and use these skills to solve problems. This entails representing polynomial multiplication and division with models, as well as algebraically.

Students begin by multiplying and dividing monomials represented pictorially by areas. Next, they use the same concepts to perform the operations algebraically. Then, students apply the same skills and concepts to model more complex polynomial multiplication and division expressions, using area models and algebra tiles, and solve them with models and algebraically. They learn how to apply their polynomial multiplication and division skills to solve a variety of real-life problems.

Planning Notes

Start by telling students that they will learn how to multiply and divide polynomials in a number of different ways. Ask students to recall what they know about using variables, coefficients, and constants in algebraic expressions. Ask such questions as the following:

- Where have you used variables, coefficients, and constants before?
- What do variables, coefficients, and constants represent?
- What are some examples of algebraic expressions? Point out the variables, coefficients, and constants.

Literacy Link Spider maps are graphic organizers that help students to understand essential characteristics of a concept and to make connections that show how the information is related. This form of mind map provides a method of summarizing each section with key words or phrases that are connected to the topic of multiplying and dividing polynomials.

The spider map is designed to help students make connections between four important concepts in this chapter. You may wish to model how to develop the spider map using an overhead copy of **Master 17 Spider Map**. A suggestion is that students keep this graphic organizer at the beginning of their notebook or journal so that they can access it easily at the end of each section. Have students use an entire page for the spider map so that they have enough space for all of the notes they will take. Allowing for expansion is important as each arm of the spider may not require the same number of subparts.

Ask students to develop an expression that models a problem situation such as "What is an expression that models the area of a rectangle that is $18m^2$, with a side length that is twice the width?" As a class, discuss some possibilities.

Then, have students come up with a real-life situation that can be modelled by a polynomial expression. Ask them what the variable, coefficient, and/or constant represent.

Meeting Student Needs

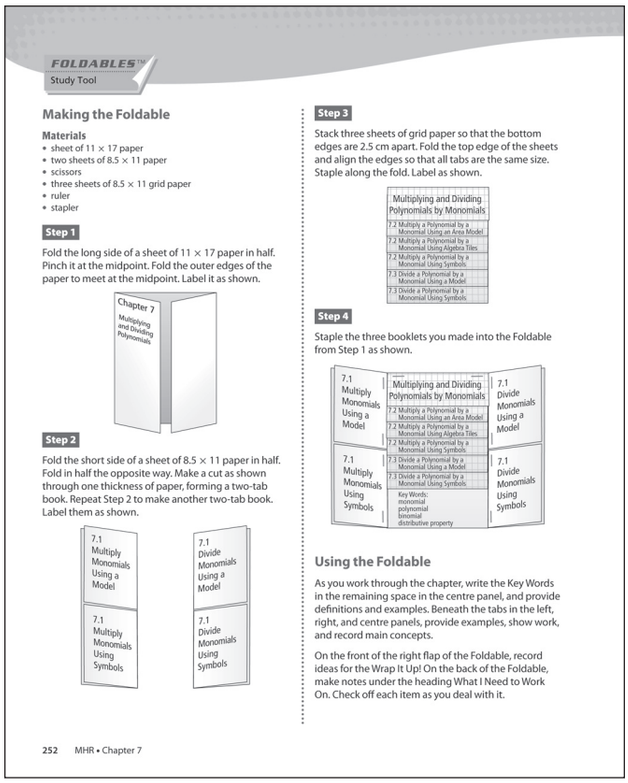
- You might wish to use Kidspiration®, a program that helps students to make graphic organizers.
- Consider reinforcing students' skills in the following areas before beginning the chapter:
  – vocabulary related to the chapter
  – ratio
  – area and volume
  – solving equations with rational numbers
  – exponents
- Consider having students complete the questions on **BLM 7–2 Chapter 7 Get Ready** to activate the prerequisite skills for this chapter.
- Some students may benefit from using **Master 17 Spider Map** for the Literacy Link activity.

ELL

- Teach in context that *centuries* refers to hundreds of years. Explain what a *landscaper* is and what this job might consist of.

Gifted and Enrichment

- Ask students to devise several reasons why multiplying and dividing polynomials developed as mathematical tools.
- Have students investigate uses of polynomials in engineering and science.



FOLDABLES™
Study Tool

Making the Foldable

Materials
- sheet of 11 × 17 paper
- two sheets of 8.5 × 11 paper
- scissors
- three sheets of 8.5 × 11 grid paper
- ruler
- stapler

Step 1

Fold the long side of a sheet of 11 × 17 paper in half. Pinch it at the midpoint. Fold the outer edges of the paper to meet at the midpoint. Label it as shown.

Step 2

Fold the short side of a sheet of 8.5 × 11 paper in half. Fold in half the opposite way. Make a cut as shown through one thickness of paper, forming a two-tab book. Repeat Step 2 to make another two-tab book. Label them as shown.

Step 3

Stack three sheets of grid paper so that the bottom edges are 2.5 cm apart. Fold the top edge of the sheets and align the edges so that all tabs are the same size. Staple along the fold. Label as shown.

Step 4

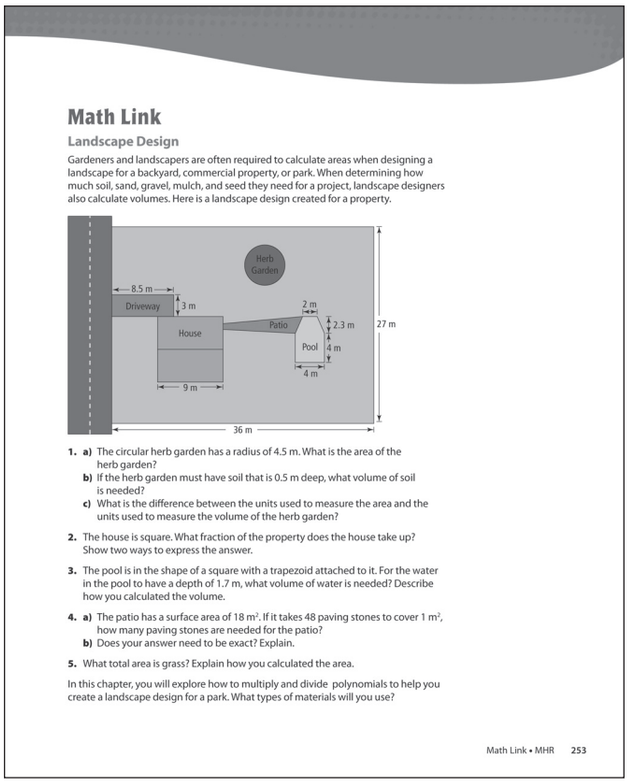
Staple the three booklets you made into the Foldable from Step 1 as shown.

Using the Foldable

As you work through the chapter, write the Key Words in the remaining space in the centre panel, and provide definitions and examples. Beneath the tabs in the left, right, and centre panels, provide examples, show work, and record main concepts.

On the front of the right flap of the Foldable, record ideas for the Wrap It Up! On the back of the Foldable, make notes under the heading What I Need to Work On. Check off each item as you deal with it.

252 MHR • Chapter 7



Math Link

Landscape Design

Gardeners and landscapers are often required to calculate areas when designing a landscape for a backyard, commercial property, or park. When determining how much soil, sand, gravel, mulch, and seed they need for a project, landscape designers also calculate volumes. Here is a landscape design created for a property.

1. **a)** The circular herb garden has a radius of 4.5 m. What is the area of the herb garden?
   b) If the herb garden must have soil that is 0.5 m deep, what volume of soil is needed?
   c) What is the difference between the units used to measure the area and the units used to measure the volume of the herb garden?
2. The house is square. What fraction of the property does the house take up? Show two ways to express the answer.
3. The pool is in the shape of a square with a trapezoid attached to it. For the water in the pool to have a depth of 1.7 m, what volume of water is needed? Describe how you calculated the volume.
4. **a)** The patio has a surface area of 18 m^2. If it takes 48 paving stones to cover 1 m^2, how many paving stones are needed for the patio?
   b) Does your answer need to be exact? Explain.
5. What total area is grass? Explain how you calculated the area.

In this chapter, you will explore how to multiply and divide polynomials to help you create a landscape design for a park. What types of materials will you use?

Math Link • MHR 253

Foldables Study Tool

Have students make the Foldable in the student resource to keep track of the information in the chapter. They may wish to use the back of the Foldable to keep track of what they need to work on as they progress through the chapter to assist them in identifying and solving any difficulties with concepts, skills, and processes.

Math Link

The Math Link for this chapter involves using polynomial multiplication and division to help a landscaper plan a park. After reading the opening Math Link paragraph, discuss with students the number of possible shapes that could have a given area or volume. Ask them how this might affect the work of a landscape designer.

Have students work individually or in pairs to complete the questions in the Math Link. These questions have students begin to think about exponents such as squares and cubes. The individual Math Links in this chapter help develop the skills needed to complete the Wrap It Up! Have students read the Wrap It Up! on page 281 to give them a sense of where the Math Link is heading. The Wrap It Up! problem is a summative assessment.

Meeting Student Needs

- To help them to get started, some students may benefit from using **BLM 7–1 Chapter 7 Math Link Introduction**, which provides scaffolding for this activity.
- Instead of using the landscaping theme for the Math Links, have students brainstorm ways polynomials can be used in their community. For example, for a farming community, students might design a farmyard. Other suggestions for students might include the following:
  – Calculate shipping costs for air freight and re-supply freight. These costs are based on volume or weight, whichever is higher.
  – Calculate the amount of fuel needed to supply the community for a year.
  – Calculate the volume of gravel needed for roads and house pads.
  – Calculate costs for a Northern travel/eco-tour, such as the cost of travelling by dogsled or canoe, the cost of food, etc.
- Another alternative to the landscape design might be a setup for a traditional tipi camp. You might want to invite an Elder from the nearest community to talk to students about how these camps are set up. Usually there are a number of tipis arranged in a circle, with the main lodge in the middle.

- For #3 of the Math Link, students might need some assistance in determining the area of the trapezoid in order to calculate the volume. You may wish to guide them to divide the trapezoid into two triangles and then calculate each area.

ELL

- Teach the following terms in context: *landscape*, *backyard*, *commercial property*, *soil*, *sand*, *gravel*, *mulch*, *seed*, *volume*, *herb*, *radius*, *area*, *depth*, *paving stones*, *patio*, and *exact*.
- Go over how to calculate area, volume, and surface area. If students already have an understanding of these mathematical processes, they will easily associate the English terms with what they know and understand what is being asked. If they do not, further instruction may be necessary.

Gifted and Enrichment

- Ask students to predict how polynomials will be used for the landscape design activities in the Math Links, such as for determining area and volume.

Common Errors

- Some students may mix up area and volume units.

R_x Remind students to identify the different measurements that are given and how they relate to 2-D shapes or 3-D objects.

Web Link

For collaborative online mind-mapping tools, go to www.mathlinks9.ca and follow the links.

Answers

Math Link

1. a) 63.6 m^2 **b)** 31.8 m^3

c) Area is measured in square units, while volume is measured in cubic units.

2. 1:12, $\frac{1}{2}$

3. 38.9 m^3. To determine the volume of the pool, first determine the area of the base of the pool, then multiply by the height.

4. a) 864 paving stones

b) No. You would likely buy more stones than calculated because of the shape of the patio; many stones will need to be cut to accommodate the angled sides of the patio.

5. 761.9 m^2. To determine the area that is grass, subtract the areas of the pool, driveway, house, patio, and herb garden from the total area of the property.