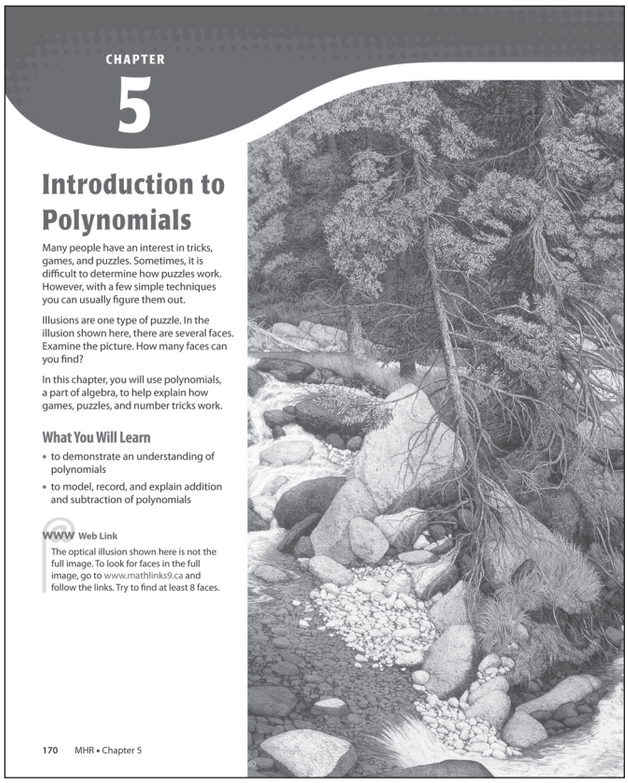
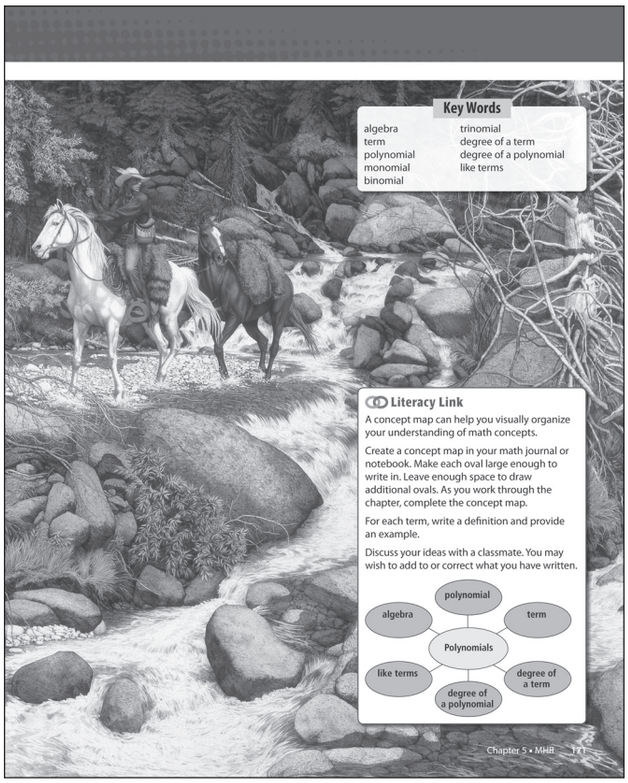




***MathLinks 9*, pages 170–173**

Suggested Timing
40–50 minutes

Materials
- sheet of 11 × 17 paper
- four sheets of 8.5 × 11 paper
- ruler
- scissors
- stapler
- two dice per pair of students

Blackline Masters
BLM 5–1 Chapter 5 Math Link Introduction
BLM 5–2 Chapter 5 Get Ready
BLM 5–4 Chapter 5 Problems of the Week

Key Words

algebra	term	polynomial
monomial	binomial	trinomial
degree of a term	degree of a polynomial	like terms

What's the Math?

In this chapter, students are introduced to a study of algebra involving polynomials. They learn terminology, combine like terms, and add and subtract polynomial expressions. The chapter begins by exploring terminology necessary for a study of polynomial operations. Students model polynomials using algebraic titles and use them to show whether expressions are equivalent. Next, they solve problems that require them to combine like terms in algebraic expressions. Students then learn to use different methods to add and/or subtract polynomials.

Planning Notes

Tell students that they will learn about algebra and use it to help them explain number tricks and puzzles. Explain that number tricks in mathematics initially appear as difficult to explain as illusions in a magic show.

Have students study the painting, *The Forest Has Eyes*, in the chapter opener. Allow a few minutes for students to look for faces in the illusion. Then, either work as a class or have students work in pairs to identify as many faces as possible. Some of the faces are obscured by pedagogical elements in the student resource. You may want to direct students to the

Web Link on page 170. They can then view the full, unobstructed image online. (There are 13 faces in the painting, according to the artist. However, some people claim to see more.)

Ask students if they know of other optical illusions. Perhaps, have students find other illusions and bring them to a future class.

Literacy Link Concept 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 term *polynomials*.

The concept map is designed to help students make connections between the important definitions in this chapter. At the beginning of the chapter, tell students that it is important to learn the language of algebra and that this graphic organizer will help them with this task. Suggest that students create a concept map similar to the one presented. Tell them to keep this graphic organizer at the beginning of their notes or journal so that they can access it easily at the end of each section. The ovals of the concept map should be quite large because students will be providing definitions and worked examples. Caution students to use small printing and to be as neat as possible.

Students will complete the concept map at the end of each section as they work through Chapter 5. Tell them that they should provide a definition and an example for each of the terms.

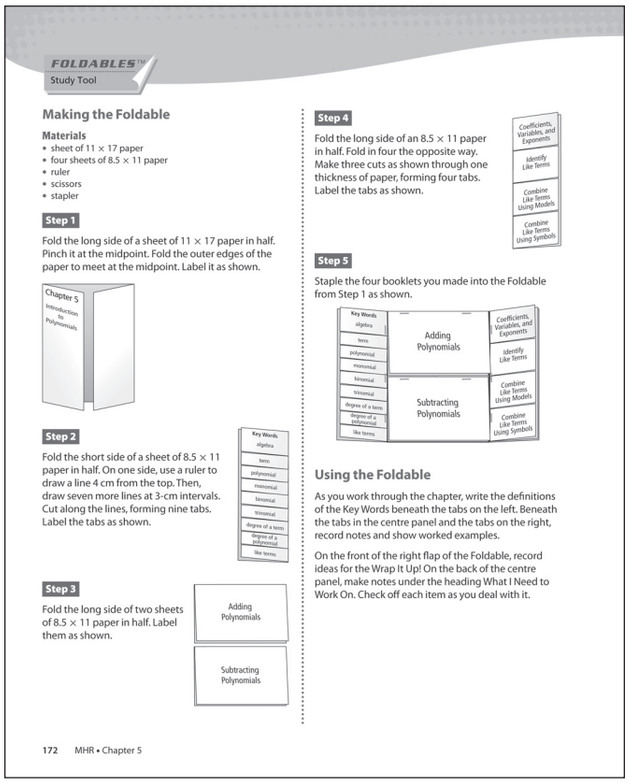
- Section 5.1 contains the most terms for students to learn. By the end of the section, students should be able to fill in the first five ovals of the concept map labelled *algebra*, *polynomial*, *term*, *degree of a term*, and *degree of a polynomial*.
- By the end of section 5.2, students will be able to fill in the oval labelled *like terms*.

Meeting Student Needs

- Before beginning this chapter, it may be beneficial for some students to go over the following concepts briefly:
  - the vocabulary related to equations
  - the difference between an expression and an equation
  - the parts of an equation
  - solving equations
  - exponents
  - order of operations
- Consider having students complete the questions on **BLM 5–2 Chapter 5 Get Ready** to activate the prerequisite skills for this chapter.
- Some students may need help finding the faces in the optical illusion because they are blended into the background, overlap, and are caricatures. Consider showing an example of a face in the background disguised in the rocks and trees.
- Present alternative illusions that have less complex designs. The Internet is a useful source for illusions. Do a search on *optical illusions*.

ELL

- Teach the following terms in context: *tricks*, *games*, *puzzles*, *techniques*, *illusions*, and *number tricks*.



FOLDABLES™
Study Tool

Making the Foldable

Materials
- sheet of 11 × 17 paper
- four sheets of 8.5 × 11 paper
- ruler
- scissors
- 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.

Chapter 5
Introduction to Polynomials

Step 2
Fold the short side of a sheet of 8.5 × 11 paper in half. On one side, use a ruler to draw a line 4 cm from the top. Then, draw seven more lines at 3-cm intervals. Cut along the lines, forming nine tabs. Label the tabs as shown.

Key Words
algebra
term
polynomial
monomial
binomial
trinomial
degree of a term
degree of a polynomial
like terms

Step 3
Fold the long side of two sheets of 8.5 × 11 paper in half. Label them as shown.

Adding Polynomials
Subtracting Polynomials

Step 4
Fold the long side of an 8.5 × 11 paper in half. Fold in four the opposite way. Make three cuts as shown through one thickness of paper, forming four tabs. Label the tabs as shown.

Coefficients, Variables, and Exponents
Identify Like Terms
Combine Like Terms Using Models
Combine Like Terms Using Symbols

Step 5
Staple the four booklets you made into the Foldable from Step 1 as shown.

Key Words
algebra
term
polynomial
monomial
binomial
trinomial
degree of a term
degree of a polynomial
like terms

Adding Polynomials
Subtracting Polynomials

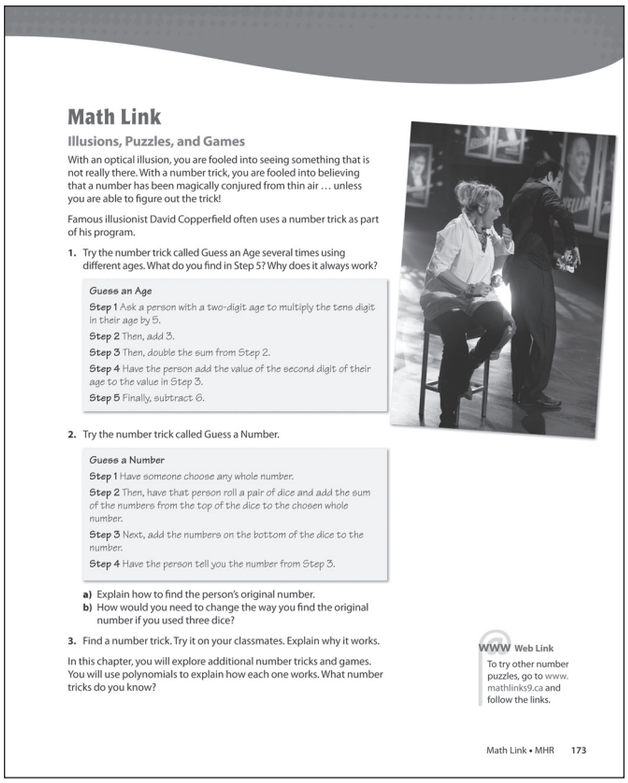
Coefficients, Variables, and Exponents
Identify Like Terms
Combine Like Terms Using Models
Combine Like Terms Using Symbols

Using the Foldable

As you work through the chapter, write the definitions of the Key Words beneath the tabs on the left. Beneath the tabs in the centre panel and the tabs on the right, record notes and show worked examples.

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

172 MHR • Chapter 5



Math Link

Illusions, Puzzles, and Games

With an optical illusion, you are fooled into seeing something that is not really there. With a number trick, you are fooled into believing that a number has been magically conjured from thin air … unless you are able to figure out the trick!

Famous illusionist David Copperfield often uses a number trick as part of his program.

1. Try the number trick called Guess an Age several times using different ages. What do you find in Step 5? Why does it always work?

Guess an Age
Step 1 Ask a person with a two-digit age to multiply the tens digit in their age by 5.
Step 2 Then, add 3.
Step 3 Then, double the sum from Step 2.
Step 4 Have the person add the value of the second digit of their age to the value in Step 3.
Step 5 Finally, subtract 6.

2. Try the number trick called Guess a Number.

Guess a Number
Step 1 Have someone choose any whole number.
Step 2 Then, have that person roll a pair of dice and add the sum of the numbers from the top of the dice to the chosen whole number.
Step 3 Next, add the numbers on the bottom of the dice to the number.
Step 4 Have the person tell you the number from Step 3.

a) Explain how to find the person's original number.
b) How would you need to change the way you find the original number if you used three dice?

3. Find a number trick. Try it on your classmates. Explain why it works.

In this chapter, you will explore additional number tricks and games. You will use polynomials to explain how each one works. What number tricks do you know?

WWW Web Link
To try other number puzzles, go to www.mathlinks9.ca and follow the links.

Math Link • MHR 173

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 introductory Math Link in this chapter is about exploring number tricks and using polynomials to explain how each one works. Read the Math Link introduction on page 173. Ask students if they have ever seen an illusionist, and if so, where he/she was performing. What illusions did they see?

Have students read, try, and discuss the Guess an Age number trick. Then, have students answer and discuss the remaining questions. You may wish to have students work in pairs. Consider having students present a number trick of their own. Number tricks are available in magazines, newspapers, airline magazines, encyclopedias, books, and on the Internet.

The individual Math Links in this chapter help develop the skills needed to complete the Wrap It Up! at the end of the chapter. Have students read the Wrap It Up! on page 203 to give them a sense of where the Math Link is heading. The Wrap It Up! is a summative assessment. Note that for students to complete the Math Link in section 5.2, they should first complete the Math Link in section 5.2.

Meeting Student Needs

- Some students may benefit from using **BLM 5–1 Chapter 5 Math Link Introduction** to help them get started, which provides scaffolding for this activity.
- In Guess an Age, it may be necessary to show students an example for Step 1: someone who is 23 years old has a 2 in the tens digit of their age.
- In Guess a Number, the problem is easier to figure out if students start with one die.

ELL

- Clarify the meaning of *optical illusions*. Model for English language learners both of the number tricks. Then, have students try them.

Common Errors

- Some students may not understand the pattern in the numbers on opposite sides of the die.

R_x Give each student a regular die. Encourage students to examine the numbers on opposite sides. Ask students to keep their responses to themselves so that every student has an opportunity to discover that the opposite numbers on a die always add to 7. Have students express the relationship in their own words, either verbally or in writing.

Answers

Math Link

1. Step 5 produces the age you started with. Example: This trick works because the tens digit of the person's age is multiplied by 10. Then, the ones digit is added. The same number is added and subtracted; therefore, no change is made to the number.

2. **a)** Subtract 14 from the number they gave you after Step 4.

b) Subtract 21 from the number they gave you after Step 4.

3. Example:

• Pick a number.	n
• Subtract 5 from it.	$n - 5$
• Multiply the result by 2.	$2n - 10$
• Add 8 to the result.	$2n - 2$
• Divide the answer by 2.	$n - 1$
• Now subtract your original number.	-1
• Add 8 to the number.	7

The result is always 7 because the steps from a) to f) will always result in the number -1. Adding 8 to -1 results in 7.