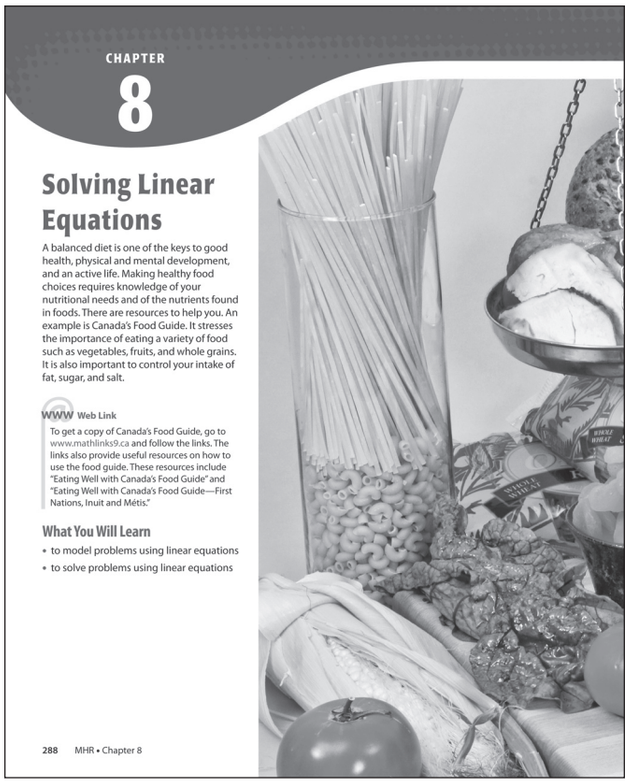
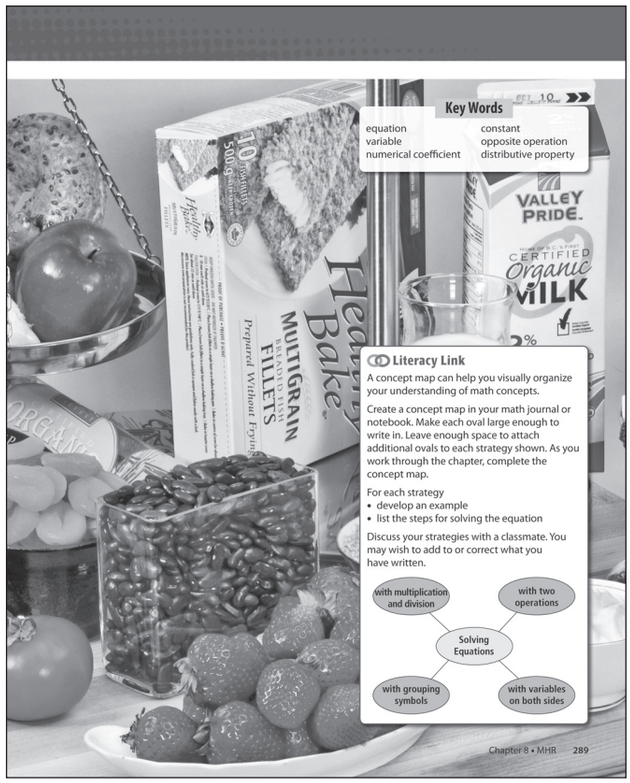




***MathLinks 9*, pages 288–291**

Suggested Timing
40–50 minutes

Materials
- sheet of 11 × 17 paper
- ruler
- four sheets of 8.5 × 11 paper
- scissors
- stapler
- index cards

Blackline Masters
Master 20 Multiplication Chart
BLM 8–1 Chapter 8 Math Link Introduction
BLM 8–2 Chapter 8 Get Ready
BLM 8–4 Chapter 8 Problems of the Week

Key Words

equation	constant
variable	opposite operation
numerical coefficient	distributive property

What's the Math?

In this chapter, students model and solve various forms of linear equations, including some that are not familiar from earlier grades. The chapter includes the application of linear equations to a wide variety of real-world contexts. Students extend their use of numbers in solving linear equations to include rational numbers.

The chapter begins with section 8.1, in which students solve linear equations with multiplication and division: $ax = b$, $\frac{x}{a} + b = c$, and $\frac{a}{x} = b$. Section 8.2 then explores modelling and solving linear equations involving two operations: $ax + b = c$ and $\frac{x}{a} + b = c$. Section 8.3 explores modelling linear equation that include grouping symbols on one side: $a(x + b) = c$. Finally, section 8.4 looks at linear equations that have variables on both sides: $ax = b + cx$, $ax + b = cx + d$, and $a(bx + c) = d(ex + f)$.

Planning Notes

Use the opening paragraph of the chapter to initiate a discussion of students' favourite foods. You might ask them if they think that their favourite foods are healthy choices, and have them explain why or why not. Refer to the Web Link and suggest that students consult Canada's Food Guide. Encourage them to think about whether their diet is balanced in the ways that the food guide recommends.

Tell students that, in this chapter, they will learn more about nutrition by writing and solving problems involving various foods.

Literacy Link Concept maps are graphic organizers that help students visually organize their understanding of math concepts. This tool enables students to visually represent their understanding of essential characteristics of a concept, and to make connections to show how information is related. Students will use their concept maps to summarize each section in regard to key terms and phrases that are connected to solving equations.

The concept map is designed to help students make connections between four important concepts in this chapter. Suggest to students that they 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. The ovals of the concept map should be quite large because students will be listing steps to solve an equation and working through an example. Caution students to use small printing and try to be as neat as possible.

Students will complete the concept map at the end of each section as they work through Chapter 8. They should create an example of the strategy in each oval. They should then attach another shape to each oval and list in it the steps required to use the strategy. In their descriptions, they should use the following vocabulary: *equation*, *constant*, *coefficient*, and *variable*.

- At the end of section 8.1, students should be able to complete the first oval of the concept map, which is to be used for concepts and key terms related to solving equations with multiplication and division. You may want to help students complete their work on this oval.
- At the end of section 8.2, have students work in pairs to complete the next oval, which is to be used for concepts and key terms related to solving equations with two operations.
- At the end of section 8.3, have students work in pairs to complete the next oval, which is to be used for concepts and key terms related to solving equations with grouping symbols.
- At the end of section 8.4, have students work in pairs to complete the last oval, which is to be used for concepts and key terms related to solving equations with variables on both sides.

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, including isolating variables
  – exponents
  – order of operations
- Consider having students complete the questions on **BLM 8–2 Chapter 8 Get Ready** to activate the prerequisite skills for this chapter.
- You might wish to have students use a copy of the *Eating Well With Canada's Food Guide—First Nations, Inuit and Métis*.
- Have students research "Aboriginal food" and look at traditional foods of Aboriginal peoples. Students may find the different types of food interesting. They may also find it interesting to look up the nutritional value of different plants, meat, and fish that are part of many peoples traditional diets; e.g., crowberries (blackberries), seaweed, buffalo, seal, whale, and salmon. This information could be used in the Wrap It Up! at the end of the chapter. For sites to explore, refer to the related Web Link that follows.
- As students work on the equations in this chapter, it is helpful if they have strong multiplication skills. You may wish to provide them with **Master 20 Multiplication Chart** to assist them as they practise their multiplication.

ELL

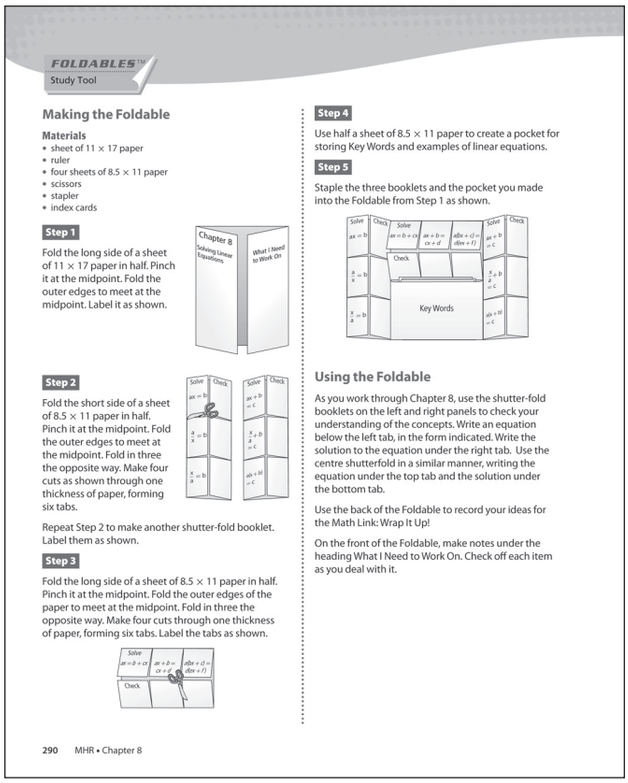
- Teach the following words in context: *balanced diet*, *keys to good health*, *active life*, *nutritional needs*, *stresses*, and *whole grains*.

Gifted and Enrichment

- One of the big questions in many students' mind in regard to algebra is, "When am I ever going to use this?" Invite students to browse through the chapter, and come up with a "Top Ten" list of reasons to study and become an expert on the topic of algebra.

Web Link

There are many sites that discuss traditional First Nations, Métis, and Inuit foods, diets, and recipes. Go to \www.mathlinks9.ca and follow the links.



FOLDABLES™
Study Tool

Making the Foldable

Materials
- sheet of 11 × 17 paper
- ruler
- four sheets of 8.5 × 11 paper
- scissors
- stapler
- index cards

Step 1

Fold the long side of a sheet of 11 × 17 paper in half. Pinch it at the midpoint. Fold the outer edges 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. Pinch it at the midpoint. Fold the outer edges to meet at the midpoint. Fold in three the opposite way. Make four cuts as shown through one thickness of paper, forming six tabs.

Repeat Step 2 to make another shutter-fold booklet. Label them as shown.

Step 3

Fold the long side of a sheet of 8.5 × 11 paper in half. Pinch it at the midpoint. Fold the outer edges of the paper to meet at the midpoint. Fold in three the opposite way. Make four cuts through one thickness of paper, forming six tabs. Label the tabs as shown.

Step 4

Use half a sheet of 8.5 × 11 paper to create a pocket for storing Key Words and examples of linear equations.

Step 5

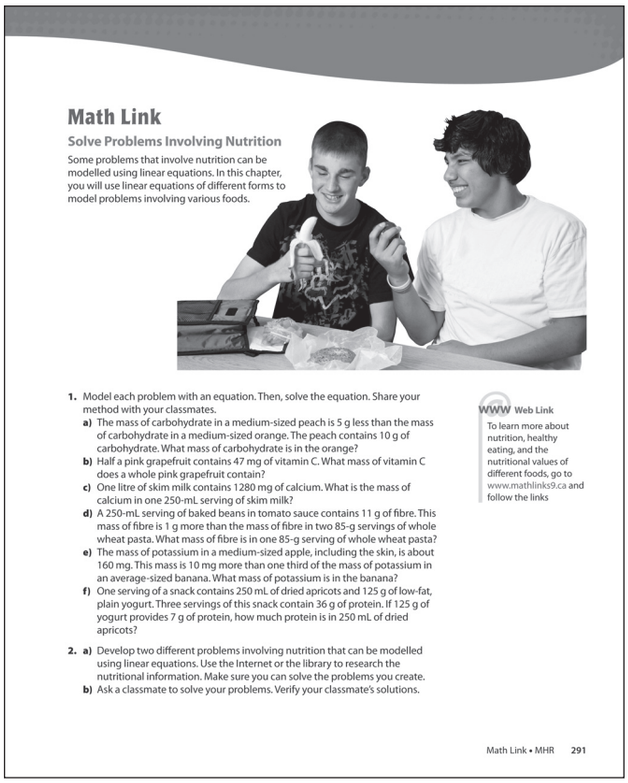
Staple the three booklets and the pocket you made into the Foldable from Step 1 as shown.

Using the Foldable

As you work through Chapter 8, use the shutter-fold booklets on the left and right panels to check your understanding of the concepts. Write an equation below the left tab, in the form indicated. Write the solution to the equation under the right tab. Use the centre shutterfold in a similar manner, writing the equation under the top tab and the solution under the bottom tab.

Use the back of the Foldable to record your ideas for the Math Link: Wrap It Up!

On the front of the Foldable, make notes under the heading What I Need to Work On. Check off each item as you deal with it.



Math Link

Solve Problems Involving Nutrition

Some problems that involve nutrition can be modelled using linear equations. In this chapter, you will use linear equations of different forms to model problems involving various foods.

1. Model each problem with an equation. Then, solve the equation. Share your method with your classmates.
- **a)** The mass of carbohydrate in a medium-sized peach is 5 g less than the mass of carbohydrate in a medium-sized orange. The peach contains 10 g of carbohydrate. What mass of carbohydrate is in the orange?
- **b)** Half a pink grapefruit contains 47 mg of vitamin C. What mass of vitamin C does a whole pink grapefruit contain?
- **c)** One litre of skim milk contains 1280 mg of calcium. What is the mass of calcium in one 250-mL serving of skim milk?
- **d)** A 250-mL serving of baked beans in tomato sauce contains 11 g of fibre. This mass of fibre is 1 g more than the mass of fibre in two 85-g servings of whole wheat pasta. What mass of fibre is in one 85-g serving of whole wheat pasta?
- **e)** The mass of potassium in a medium-sized apple, including the skin, is about 160 mg. This mass is 10 mg more than one third of the mass of potassium in an average-sized banana. What mass of potassium is in the banana?
- **f)** One serving of a snack contains 250 mL of dried apricots and 125 g of low-fat, plain yogurt. Three servings of this snack contain 36 g of protein. If 125 g of yogurt provides 7 g of protein, how much protein is in 250 mL of dried apricots?

2. **a)** Develop two different problems involving nutrition that can be modelled using linear equations. Use the Internet or the library to research the nutritional information. Make sure you can solve the problems you create.
- **b)** Ask a classmate to solve your problems. Verify your classmate's solutions.

WWW Web Link

To learn more about nutrition, healthy eating, and the nutritional values of different foods, go to www.mathlinks9.ca and follow the links

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 front right flap 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. Tell students that by filling out their Foldable, they are creating a review tool. They can return to the equations and solutions under the tabs at any time to test their understanding of a concept. You may even suggest that students share their Foldable with classmates, answering the questions in their classmates' Foldable for extra practice.

Math Link

By completing the Math Link on page 291, students activate and apply their equation-solving skills, within the context of nutrition. Ask students why they might be interested in knowing the comparative nutritional values of different types of foods.

In #1, students can use whole numbers to model the problems using the following familiar forms of linear equations:

a) $x + a = b$ **b)** $\frac{x}{a} = b$ **c)** $ax = b$

d) $ax + b = c$ **e)** $\frac{x}{a} + b = c$ **f)** $a(x + b) = c$

Have students work on #1 with a partner or in small groups, and have them compare their equations, their strategies for solving them, and their answers. Encourage students to suggest corrections and improvements to each other's solutions, and have them incorporate appropriate suggestions into their own solutions.

As students complete the parts of #1 in the Math Link, you may wish to ask coaching questions to help activate students' skills in solving equations. For example:
- Which quantity are you trying to determine?
- What variable will you use to represent this quantity?
- What equation represents the situation?
- What does it mean to isolate the variable?
- How will you isolate the variable in your equation?
- What are the correct units of your calculated answer?
- Have you included a summary statement to explain your calculated answer?
- How can you check that your answer is correct?

For #2 of the Math Link, you may wish to limit students to whole-number values when they research nutritional data. They have not previously solved equations involving decimals.

Meeting Student Needs

- Some students may benefit from using **BLM 8–1 Chapter 8 Math Link Introduction**, which provides scaffolding for this activity.

ELL

- Teach the following words in context: *mass*, *carbohydrate*, *less than*, *pink grapefruit*, *skim milk*, *more than*, and *plain yogurt*.
- Have English language learners work with English-speaking partners.
- Where possible, have pictures of all the different types of foods, with their names underneath.

Gifted and Enrichment

- Note that #2 in the Math Link is a great opportunity to tie into the health curriculum (it also crosses into the science curriculum). You could have students research and compare the nutritional values of different products:
  - Popular drinks: Have students look at the sugar, caffeine, water, and fat in soft drinks, energy drinks, juices, chilled coffee drinks, etc.
  - Fast foods: Most fast-food outlets have been forced to make nutritional information available if the customer asks for the information.
  - Different cereals: Look at the amount of different nutrients and other nutritional values, such as calories.

Common Errors

- Some students may be unable to develop their own problems in #2 of the Math Link.

R_x The easiest way for students to develop problems in #2 is to model them after parts of #1, using their own data. Refer to the given information and students' answers in #1, and help them to develop different problems by changing the unknown.

Answers

Math Link

1. Examples:

a) $r = p + 5, r = 15$ g

b) $w = 2h, w = 94$ mg

c) $s = 4c, c = 320$ mg

d) $b = 2p + 1, p = 5$ g

e) $a = \frac{b}{3} +$, b = 450 mg

f) $3(y + a) = 36, a = 5$ g

2. a) Examples: Problem #1: Two chocolate chip cookies contain 120 calories. This is 30 more calories than one Rice Krispies® square. How many calories are in one Rice Krispies® square? Problem #2: Two chocolate chip cookies contain 15 g of sugar. This is three times the amount of fat. How many grams of fat are in two chocolate chip cookies?

b) Problem #1: $c = 30 + s, s = 90$; Problem #2: $s = 3f, f = 5$g