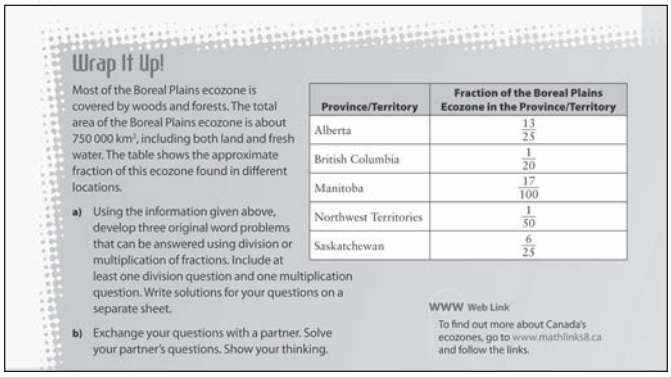
Wrap It Up!



Wrap It Up!

Most of the Boreal Plains ecozone is covered by woods and forests. The total area of the Boreal Plains ecozone is about 750 000 km², including both land and fresh water. The table shows the approximate fraction of this ecozone found in different locations.

Province/Territory	Fraction of the Boreal Plains Ecozone in the Province/Territory
Alberta	$\frac{13}{25}$
British Columbia	$\frac{1}{20}$
Manitoba	$\frac{17}{100}$
Northwest Territories	$\frac{1}{50}$
Saskatchewan	$\frac{6}{25}$

a) Using the information given above, develop three original word problems that can be answered using division or multiplication of fractions. Include at least one division question and one multiplication question. Write solutions for your questions on a separate sheet.

b) Exchange your questions with a partner. Solve your partner's questions. Show your thinking.

WWW Web Link

To find out more about Canada's ecozones, go to www.mathlinks8.ca and follow the links.

***MathLinks 8*, page 239**

Suggested Timing

40–50 minutes

Blackline Masters

Master 1 Project Rubric
BLM 6–1 Chapter 6 Math Link Introduction
BLM 6–7 Section 6.1 Math Link
BLM 6–11 Section 6.2 Math Link
BLM 6–13 Section 6.3 Math Link
BLM 6–15 Section 6.4 Math Link
BLM 6–18 Section 6.5 Math Link
BLM 6–20 Section 6.6 Math Link
BLM 6–22 Chapter 6 Wrap It Up!

Specific Outcomes

N6 Demonstrate an understanding of multiplying and dividing positive fractions and mixed numbers, concretely, pictorially and symbolically.

Planning Notes

As a class, read the instructions. Explain that the three word problems in part a) must include at least one fraction from the table, that the answers must involve multiplication or division of fractions, and that students must include at least one division question and one multiplication question. Emphasize that questions may involve more than one operation and may include addition or subtraction. Point out that the total area of the ecozone is provided and can be used in questions. Typical questions might include

- What is the area of the part of the ecozone in Alberta?
- What is the total area of the parts of the ecozone in British Columbia and the Northwest Territories?
- How much bigger is the area of the ecozone in Alberta than the area of the ecozone in Saskatchewan?
- For this ecozone, how many times as big is the area in Saskatchewan as the area in Manitoba?
- For this ecozone, what fraction of the area in British Columbia is the area in the Northwest Territories?

You might challenge students to express information from the table using mixed numbers and to write questions that involve them. For example, if the fraction of the ecozone in Saskatchewan is $\frac{6}{25}$, then the area of the entire ecozone is $\frac{25}{6}$ or $4\frac{1}{6}$ times the area of the part in Saskatchewan. A resulting question might be the following: The area of the entire Boreal Plains ecozone is $4\frac{1}{6}$ times the area of the part in Saskatchewan. What is the area of the part in Saskatchewan?

Common Errors

- Some students may be unable to generate questions from the data provided.

R_x Discuss one or more of the typical questions included in the Planning Notes section. Ask students which parts of the given data and which operations are required to answer them. Then, ask students to write questions modelled on the ones you discussed. For example, if you discussed the area of the part of the ecozone in Alberta, students could simply substitute Manitoba for Alberta. Ask students to identify the data and operations needed to answer the new question.

Web Link

For more information about Canada's ecozones, go to www.mathlinks8.ca and follow the links.

Answers

Wrap It Up!

a) Answers will vary. Example: How many square kilometres of the Boreal Plains ecozone fall within Alberta? (390 000 km^2); Alberta contains how many times as much of the total Boreal Plains ecozone as British Columbia? ($10\frac{2}{5}$); British Columbia, Manitoba, and the Northwest Territories contain about as much of the Boreal Plains ecozone as what single province? (Saskatchewan)

b) Answers will vary. Example: Which combination of locations contains approximately $\frac{3}{4}$ of the ecozone?; Answer: Alberta and Saskatchewan.

Assessment	Supporting Learning
Assessment *of* Learning	
Wrap It Up! This chapter problem wrap-up gives students an opportunity to apply and display their knowledge of developing and solving problems involving multiplication and division of fractions and mixed numbers. **Master 1 Project Rubric** provides a holistic descriptor that will assist you in assessing student work on this Wrap It Up! Page 323 in this TR provides notes on how to use the rubric for this Wrap It Up!	• You may wish to have students review the work they have completed in the Math Links in sections 6.1, 6.2, 6.3. 6.4, 6.5, and 6.6 before they begin. • If students have not completed the Math Links earlier, you may wish to provide them with **BLM 6–1 Chapter 6 Math Link Introduction**, **BLM 6–7 Section 6.1 Math Link**, **BLM 6–11 Section 6.2 Math Link**, **BLM 6–13 Section 6.3 Math Link**, **BLM 6–15 Section 6.4 Math Link**, **BLM 6–18 Section 6.5 Math Link**, and **BLM 6–20 Section 6.6 Math Link**. • You may wish to have students use **BLM 6–22 Chapter 6 Wrap It Up!**, which provides scaffolding for the chapter problem wrap-up.

The chart below shows the **Master 1 Project Rubric** for tasks such as the Wrap It Up! and provides notes that specify how to identify the level of specific answers for the project.

Score/Level	Holistic Descriptor	Specific Question Notes
5 **(Standard of Excellence)**	❑ Applies/develops **thorough** strategies and mathematical processes making **significant** comparisons/connections that demonstrate a **comprehensive** understanding of how to develop a complete solution ❑ Procedures are **efficient and effective** and may contain a **minor mathematical error** that does not affect understanding ❑ Uses **significant** mathematical language to explain their understanding and provides **in-depth** support for their conclusion	• provides a complete and correct solution
4 **(Above Acceptable)**	❑ Applies/develops **thorough** strategies and mathematical processes for making **reasonable** comparisons/connections that demonstrate a **clear** understanding ❑ Procedures are **reasonable** and may contain a **minor mathematical error** that may hinder the understanding in one part of a complete solution ❑ Uses **appropriate** mathematical language to explain their understanding and provides **clear** support for their conclusion	• provides a complete solution with a calculation error *or* • provides a complete and correct part a) but there is no evidence that part b) has been completed *or* • provides a complete solution that does not include questions involving multiplication and division; instead, the questions focus on one operation
3 **(Meets Acceptable)**	❑ Applies/develops **relevant** strategies and mathematical processes making **some** comparisons/connections that demonstrate a **basic** understanding ❑ Procedures are **basic** and may contain a **major error or omission** ❑ Uses **common** language to explain their understanding and provides **minimal** support for their conclusion	• provides three questions with two correct solutions *or* • provides three original questions and solutions but all focus on one operation *or* • provides three completed questions and shows evidence of having completed part b)
2 **(Below Acceptable)**	❑ Applies/develops **some relevant** mathematical processes making **minimal** comparisons/connections that lead to a **partial solution** ❑ Procedures are **basic** and may contain **several major mathematical errors** ❑ Communication is **weak**	• provides two completed questions with correct solutions *or* • provides three original questions but does not proceed any further
1 **(Beginning)**	❑ Applies/develops an **initial start** that may be **partially correct** or could have led to a correct solution ❑ Communication is **weak or absent**	• provides one completed question with its solution *or* • makes a correct initial start to the problem

Math Games

***MathLinks 8*, page 240**

Suggested Timing
20–30 minutes

Materials
- spinner with nine sectors numbered from 1 to 9 per pair of students
- paper clip per pair of students

Blackline Masters
BLM 6–23 Spinner
BLM 6–24 Fabulous Fractions Multiplication Sheet
BLM 6–25 Fabulous Fractions Division Sheet

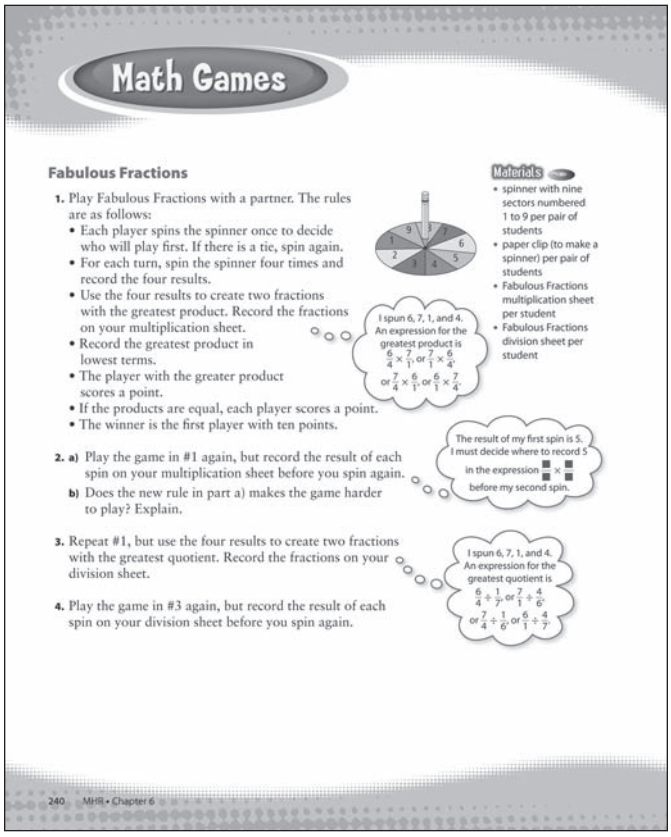
Specific Outcomes
N6 Demonstrate an understanding of multiplying and dividing positive fractions and mixed numbers, concretely, pictorially and symbolically.

Planning Notes

Before having students play the game, you may wish to read the directions with the class and have a small group of students do a demonstration round to show how to play the game.

Provide students with a template of the spinner by using **BLM 6–23 Spinner**. Each student should have one multiplication and one division sheet. The modified game described in #2a) provides less choice when making fractions, since students must decide whether to use a number as a numerator or denominator before spinning again. This allows less analysis of which numbers could be put together to make the optimum fractions for providing the greatest product. Some students may suggest that this option relies more on chance.

Provide students with **BLM 6–24 Fabulous Fractions Multiplication Sheet** and **BLM 6–25 Fabulous Fractions Division Sheet** to help them record their results.


Math Games

Fabulous Fractions

1. Play Fabulous Fractions with a partner. The rules are as follows:
   - Each player spins the spinner once to decide who will play first. If there is a tie, spin again.
   - For each turn, spin the spinner four times and record the four results.
   - Use the four results to create two fractions with the greatest product. Record the fractions on your multiplication sheet.
   - Record the greatest product in lowest terms.
   - The player with the greater product scores a point.
   - If the products are equal, each player scores a point.
   - The winner is the first player with ten points.

Materials
- spinner with nine sectors numbered 1 to 9 per pair of students
- paper clip (to make a spinner) per pair of students
- Fabulous Fractions multiplication sheet per student
- Fabulous Fractions division sheet per student

I spun 6, 7, 1, and 4. An expression for the greatest product is $\frac{6}{4} \times \frac{7}{1}$, or $\frac{7}{1} \times \frac{6}{4}$, or $\frac{7}{4} \times \frac{6}{1}$, or $\frac{6}{1} \times \frac{7}{4}$.

2. a) Play the game in #1 again, but record the result of each spin on your multiplication sheet before you spin again.
   b) Does the new rule in part a) makes the game harder to play? Explain.

The result of my first spin is 5. I must decide where to record 5 in the expression $\square \times \square$ before my second spin.

3. Repeat #1, but use the four results to create two fractions with the greatest quotient. Record the fractions on your division sheet.

I spun 6, 7, 1, and 4. An expression for the greatest quotient is $\frac{6}{4} \div \frac{1}{7}$, or $\frac{7}{1} \div \frac{4}{6}$, or $\frac{7}{4} \div \frac{1}{6}$, or $\frac{6}{1} \div \frac{4}{7}$.

4. Play the game in #3 again, but record the result of each spin on your division sheet before you spin again.

240 MHR • Chapter 6

Meeting Student Needs

- Partner students with others of similar skill. Pairing students who have similar abilities will make the game more interesting.

ELL
- Read the instructions aloud to students while actually doing the action described. This will allow students to see what is being asked of them.

Assessment	Supporting Learning
Assessment *for* Learning	
Fabulous Fractions Have students play the game with a partner.	• Help students realize that placing larger numbers in the numerator positions and smaller numbers in the denominator positions will result in the highest possible products.

Challenge in Real Life

***MathLinks 8*, page 241**

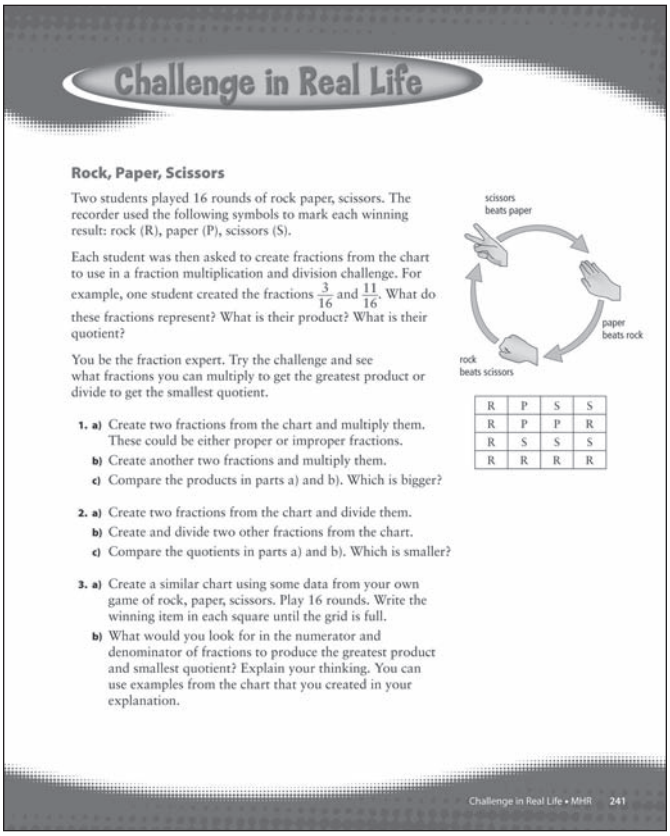
Suggested Timing
40–50 minutes

Materials
- ruler

Blackline Masters
Master 1 Project Rubric

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

Specific Outcomes
N6 Demonstrate an understanding of multiplying and dividing positive fractions and mixed numbers, concretely, pictorially and symbolically.



Challenge in Real Life

Rock, Paper, Scissors

Two students played 16 rounds of rock paper, scissors. The recorder used the following symbols to mark each winning result: rock (R), paper (P), scissors (S).

Each student was then asked to create fractions from the chart to use in a fraction multiplication and division challenge. For example, one student created the fractions $\frac{3}{16}$ and $\frac{11}{16}$. What do these fractions represent? What is their product? What is their quotient?

You be the fraction expert. Try the challenge and see what fractions you can multiply to get the greatest product or divide to get the smallest quotient.

1. a) Create two fractions from the chart and multiply them. These could be either proper or improper fractions.
   b) Create another two fractions and multiply them.
   c) Compare the products in parts a) and b). Which is bigger?
2. a) Create two fractions from the chart and divide them.
   b) Create and divide two other fractions from the chart.
   c) Compare the quotients in parts a) and b). Which is smaller?
3. a) Create a similar chart using some data from your own game of rock, paper, scissors. Play 16 rounds. Write the winning item in each square until the grid is full.
   b) What would you look for in the numerator and denominator of fractions to produce the greatest product and smallest quotient? Explain your thinking. You can use examples from the chart that you created in your explanation.

scissors beats paper
paper beats rock
rock beats scissors

R	P	S	S
R	P	P	R
R	S	S	S
R	R	R	R

Challenge in Real Life • MHR 241

Planning Notes

You may wish to use the following steps to introduce and complete this challenge:

1. Introduce the challenge by using the provided data from a Rock, Paper, Scissors game. Encourage students to experiment to discover what fractions they can develop to create the largest product and the smallest quotient. You may wish to make a class game out of this part.
2. Explain that students are going to create their own data by playing their own games of Rock, Paper, Scissors. They must complete 16 rounds in which there is a clear winner (ties do not count). They use these data to complete the challenge.
3. Encourage students to generalize about what they are learning. For example, when you multiply two whole numbers, you get a larger number. What happens when you multiply two fractions?
4. When the class has completed the challenge, discuss how they should have arrived at their answer to #3b), and explain the rationale behind it.
5. Clarify that the task is to
   - use the data provided to develop and multiply fractions to get the largest product
   - use the data provided to develop and divide fractions to get the smallest quotient
   - produce data by playing Rock, Paper, Scissors
   - use the data from Rock, Paper, Scissors to develop and multiply fractions to determine the largest product
   - use the data from Rock, Paper, Scissors to develop and divide fractions to determine the smallest quotient
6. Review the **Master 1 Project Rubric** with students so that they will know what is expected.

Meeting Student Needs

- Allow students to use calculators to multiply the denominators to make equivalent fractions or convert the fractions to decimals.

Gifted and Enrichment

- Invite students to produce a grid with a greater number of outcomes, such as 17 to 19. This would provide them with more challenging fractions to work with.

Answers

Challenge in Real Life

1., 2. Answers will vary depending on what fractions students create. Encourage students to record how they got each fraction.

3. a) Answeres will vary depending on the data students collect.

b) Answers will vary. Example:

- For common fractions, the larger products come from fractions that have larger denominators and numerators close to the value of the denominator. The closer the fraction is to 1, the larger the product.
- For common fractions, the smaller quotients come from proper fractions that have 1 in their numerator divided by whole numbers. The larger the dividend and the denominator in the divisor are, the smaller the quotient is.

This challenge can be used for either Assessment *for* Learning or Assessment *of* Learning.

Assessment	Supporting Learning
Assessment *for* Learning	
Rock, Paper, Scissors Discuss the challenge with the class.	• Have students discuss their ideas for #3b) in a group, try them out with sample fractions, and then individually report on their findings. • For a second challenge, complete with teaching notes and student exemplars, go to www.mathlinks8.ca, access the online Teacher Centre, go to Assessment, and then follow the links.
Assessment *of* Learning	
Rock, Paper, Scissors Introduce the challenge to the class.	• **Master 1 Project Rubric** provides a holistic descriptor that will assist you in assessing student work on this challenge. Page 327 provides notes on how to use the rubric for this challenge. • To view student exemplars, go to www.mathlinks8.ca, access the online Teacher Centre, go to Assessment, and then follow the links.

The chart below shows the **Master 1 Project Rubric** for tasks such as the Challenge in Real Life and provides notes that specify how to identify the level of specific answers for this project.

Score/Level	Holistic Descriptor	Specific Question Notes
5 (Standard of Excellence)	❑ Applies/develops **thorough** strategies and mathematical processes making **significant** comparisons/connections that demonstrate a **comprehensive** understanding of how to develop a complete solution ❑ Procedures are **efficient and effective** and may contain a **minor mathematical error** that does not affect understanding ❑ Uses **significant** mathematical language to explain their understanding and provides **in-depth** support for their conclusion	• provides a complete and correct solution with most justification present
4 (Above Acceptable)	❑ Applies/develops **thorough** strategies and mathematical processes for making **reasonable** comparisons/connections that demonstrate a **clear** understanding ❑ Procedures are **reasonable** and may contain a **minor mathematical error** that may hinder the understanding in one part of a complete solution ❑ Uses **appropriate** mathematical language to explain their understanding and provides **clear** support for their conclusion	• provides a complete response with a minor calculation error or weak communication in one part *or* • provides a complete solution with one error in #3b)
3 (Meets Acceptable)	❑ Applies/develops **relevant** strategies and mathematical processes making **some** comparisons/connections that demonstrate a **basic** understanding ❑ Procedures are **basic** and may contain a **major error or omission** ❑ Uses **common** language to explain their understanding and provides **minimal** support for their conclusion	• provides a correct #1, #2, and #3a) *or* • provides answers to parts a) and b) in #1 and #2 and a correct #3a)
2 (Below Acceptable)	❑ Applies/develops **some relevant** mathematical processes making **minimal** comparisons/connections that lead to a **partial solution** ❑ Procedures are **basic** and may contain **several major mathematical errors** ❑ Communication is **weak**	• provides a correct and complete #2 *or* • provides a correct and complete #1 and #2 with some communication missing Note: Dividing requires the process of multiplying; this is why students can earn a score of 2 with or without #1.
1 (Beginning)	❑ Applies/develops an **initial start** that may be **partially correct** or could have led to a correct solution ❑ Communication is **weak or absent**	• provides a correct and complete #1a) and #1b); #1c) may be weak *or* • provides a start to #3 with a completed table and evidence of attempting to multiply or divide

For student exemplars, go to www.mathlinks8.ca and follow the links.