
# #10140
# BASIC MATH: MULTIPLYING AND DIVIDING FRACTIONS

CEREBELLUM CORPORATION, 2001
Grade Level: 4-8
14 mins.
2 Instructional Graphics Enclosed

## DESCRIPTION

Step-by-step demonstration of multiplying and dividing fractions. Defines mixed numbers and improper fractions. Shows conversion of mixed numbers into improper fractions, adds them, and then reduces them to the lowest mixed number. Standard Deviants School.

## ACADEMIC STANDARDS

### Subject Area: Mathematics

- Standard: Understands and applies basic and advanced properties of the concepts of numbers
  - Benchmark: Understands the characteristics and properties (e.g., order relations, relative magnitude, base-ten place values) of the set of rational numbers and its subsets (e.g., whole numbers, fractions, decimals, integers) (See INSTRUCTIONAL GOALS 3 and 4.)
  - Benchmark: Understands basic number theory concepts (e.g., prime and composite numbers, factors, multiples, odd and even numbers, divisibility) (See INSTRUCTIONAL GOALS 3 and 4.)
  - Benchmark: Uses number theory concepts (e.g., divisibility and remainders, factors, multiples, prime, relatively prime) to solve problems (See INSTRUCTIONAL GOALS 1-5.)
- Standard: Uses basic and advanced procedures while performing the processes of computation
  - Benchmark: Adds, subtracts, multiplies, and divides whole numbers, fractions, decimals, integers, and rational numbers (See INSTRUCTIONAL GOALS 1, 2, 3, and 5.)

## INSTRUCTIONAL GOALS

1. To demonstrate the steps for multiplying fractions.
2. To demonstrate the steps for dividing fractions.
3. To review reducing fractions.
4. To define a *mixed number* and an *improper fraction*.
5. To explain how to add mixed numbers.



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## VOCABULARY

1. convert
2. denominator
3. divide
4. divisible by
5. flipped over
6. fraction
7. improper fraction
8. integer
9. inverse
10. mixed numbers
11. multiply
12. numerator
13. product
14. reciprocal
15. reduce
16. remainder
17. rewrite
18. simplified
19. whole numbers

## BEFORE SHOWING

1. Discuss where we can find fractions in life. List responses on the board. Possible responses are recipes, measuring cups, and spoons.
2. Propose converting a recipe to feed a class of 21 students.
   a. If a recipe makes 3 1/2 dozen cookies, how many cookies is this? (42)
   b. If there are 21 students in the class and they can eat 5 cookies a piece, how many cookies would be needed for the class? (105)
   c. For example, if one batch makes 42 cookies, how many batches of cookies are needed for each student to have 5 cookies? (2 1/2)
   d. Therefore, the students should multiply each fraction in the recipe by 2 1/2.
3. Copy and distribute the "Multiplying and Dividing Fractions: Viewing Guide." (See INSTRUCTIONAL GRAPHICS.)
   a. Encourage students to follow along on the guide with the video.
   b. Explain that they will have time to complete the problems either during pauses of the video or after viewing.

## DURING SHOWING

1. View the video more than once, with one showing uninterrupted.
2. Pause after the explanation for multiplying fractions.
   a. Review the steps.
   b. Allow time for students to complete the multiplying problem on the viewing guide.
   c. Do more practice examples if needed.
3. Pause after the explanation for dividing fractions.
   a. Discuss the concept that division is the inverse of multiplication. Give other examples of this (e.g., 27 ÷ 3 = ? is the inverse of 3 x ? = 27).
   b. Explain and practice forming reciprocal fractions.
   c. Allow time for the students to multiply 8/3 x 6/4 on the viewing guide. Check for understanding.
   d. Review how to reduce or simplify fractions. Do the work on the viewing guide. Do additional examples as necessary.
4. Pause after the explanation for converting a mixed number to an improper fraction. Discuss and clarify the process. Do additional examples as necessary.



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5. Pause after adding the improper fractions. Review the steps while allowing students time to do the work on the back of the viewing guide. Do more examples as needed.

## AFTER SHOWING

### Discussion Items and Questions

1. Explain the steps for multiplying fractions.
2. Explain the steps for dividing fractions.
3. How can division be the inverse of multiplication? What is a *reciprocal fraction*?
4. What are *mixed fractions*? What are *improper fractions*? How do you convert a mixed fraction to an improper fraction? Why do you need to do this?
5. Explain the steps for adding two mixed fractions.

### Applications and Activities

1. Review the information from the video using the viewing guide.
2. Complete the "Multiplying and Dividing Fractions: Check Your Knowledge" worksheet. (See INSTRUCTIONAL GRAPHICS.)
3. Practice solving fraction word problems involving multiplication and division.
   a. Locate fraction word problems in texts or on the Internet. Practice together and individually.
   b. In small groups or pairs, write original word problems involving adding and subtracting fractions.
   c. Exchange problems with another group and solve.
4. Some math textbooks teach the addition and subtraction of mixed numbers without changing the mixed number to an improper fraction first.
   a. Demonstrate this way to add and subtract mixed numbers.
   b. Demonstrate borrowing with mixed numbers.
5. Design a concentration game involving improper fractions and mixed numbers.
   a. Cut 24 three-inch squares from poster board or use index cards.
   b. Write 12 improper fractions on one side of 12 of the squares and their corresponding mixed numbers on the other 12 squares.
   c. Mix the squares and write the numbers 1-24 on the back.
   d. Arrange the squares in four rows, with the numbers showing.
   e. Select two numbers and try to match the improper fractions with the correct mixed number.
6. Make a large batch of cookies by tripling the amounts of ingredients in a cookie recipe.
7. Design a bulletin board display illustrating the rules for multiplying and dividing fractions and for adding mixed numbers.

## CMP RELATED RESOURCES

- *Basic Math: Adding and Subtracting Fractions* #10136
- *Basic Math: Fraction Basics* #10138
- *Fractions and All Their Parts–Part II* #3246
- *Fractions and All Their Parts–Part III* #3247



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## World Wide Web


The following Web sites complement the contents of this guide; they were selected by professionals who have experience in teaching deaf and hard of hearing students. Every effort was made to select accurate, educationally relevant, and "kid safe" sites. However, teachers should preview them before use. The U.S. Department of Education, the National Association of the Deaf, and the Captioned Media Program do not endorse the sites and are not responsible for their content.

- **FRACTIONS**

http://www.math.com/school/subject1/lessons/S1U4L1GL.html

Multiple-page Web site with explanations of multiplying and dividing fractions and adding and subtracting mixed numbers . Also has an interactive "workout" of online fraction problems.

- **E-LAB GRADE 5**

http://www.harcourtschool.com/activity/elab2002/grade_5/

This site provides several visual interactive models related to the concepts in the video. Additional materials are available on the 6th grade section of this site.

- **AAA MATH: FRACTIONS**

http://www.aaamath.com/B/fra.htm

Find a whole range of fraction activities, each with an explanation, interactive practice, and games.

- **MATH FORUM: ASK DR. MATH**

http://forum.swarthmore.edu/dr.math/

"Ask Dr. Math" allows users to e-mail questions to Dr. Math and access archived material. For other materials that relate to this media, click on "Elementary" and then "Fractions/Decimals," or choose "Middle School" and then "Factoring Numbers" or "Fractions/Percents."

## INSTRUCTIONAL GRAPHICS

- MULTIPLYING AND DIVIDING FRACTIONS: VIEWING GUIDE
- MULTIPLYING AND DIVIDING FRACTIONS: CHECK YOUR KNOWLEDGE



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# Multiplying and Dividing Fractions: Viewing Guide

## Multiplying Fractions

Three Easy Steps:
1. Multiply the numerators together.
2. Multiply the denominators together.
3. Reduce fraction if it can be reduced.

Example 1:

$$\frac{4}{5} \times \frac{5}{8} =$$

Did you check to see if the fraction can be reduced?

$$\frac{20 \div 20}{40 \div 20}$$

Remember: Multiplying saves time and effort!!!

## Dividing Fractions

Example 1:

$$\frac{8}{3} \div \frac{4}{6} =$$

What's the next step?

$$\frac{8}{3} \div \longrightarrow \frac{6}{4}$$

2. Multiply the two numerators by each other and the two denominators by each other.

$$\frac{8}{3} \times \frac{6}{4} =$$

3. Reduce the fraction.

$$\frac{48}{12} \times \frac{12}{12} =$$

## Working with Mixed Numbers

- A mixed number contains an integer and a fraction.

**Example:** $3\frac{1}{6} + 2\frac{1}{3} =$

$$\longrightarrow 3\frac{1}{6} \longleftarrow$$

**What is an improper fraction?**
- A fraction which has a larger numerator than denominator.

$$\frac{19}{6}$$

**Easy steps for mixed numbers:**
1. Convert the whole number to an improper fraction.
2. Add the two improper fractions.
3. Find the lowest common denominator if the denominators aren't the same.
4. Add the numerators.
5. Reduce the fraction.

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# Multiplying and Dividing Fractions: Check Your Knowledge

Total Score / 50

**A. All Mixed Up**

*Solve each of the given problems. Write the answer in the lowest terms (3 points each).*

1. $\frac{17}{24} \div \frac{1}{6} =$

2. $\frac{3}{10} \times \frac{7}{11} =$

3. $\frac{7}{8} \times \frac{2}{4} =$

4. $\frac{30}{14} \div \frac{45}{65} =$

5. $\frac{9}{10} \div \frac{12}{18} =$

6. $\frac{6}{9} \times \frac{1}{8} =$

7. $\frac{10}{12} \times \frac{1}{8} =$

8. $\frac{2}{9} \times \frac{4}{6} =$

9. $\frac{25}{28} \div \frac{35}{48} =$

10. $\frac{15}{100} \div \frac{9}{23} =$

11. $\frac{3}{8} \times \frac{2}{8} =$

12. $\frac{2}{7} \times \frac{4}{5} =$

13. $\frac{4}{5} \times \frac{11}{12} =$

14. $\frac{4}{9} \times \frac{5}{15} =$

15. $\frac{1}{12} \times \frac{1}{11} =$

**B. Word Problem**

*(5 points)*

Hobble Homes Incorporated sells land to families wanting to build houses in the country. Hobble Homes has 12 acres of land and allots 1/3 acre house plots for each family. Find out how many 1/3 acre house plots there are in 12 acres.

# Multiplying and Dividing Fractions: Check Your Knowledge

## Answer Key

Total Score / 50

**A. All Mixed Up**

*Solve each of the given problems. Write the answer in the lowest terms (3 points each).*

1. $\frac{17}{24} \div \frac{1}{6} = \mathbf{4\frac{1}{4}}$

2. $\frac{3}{10} \times \frac{7}{11} = \mathbf{\frac{21}{110}}$

3. $\frac{7}{8} \times \frac{2}{4} = \mathbf{\frac{7}{16}}$

4. $\frac{30}{14} \div \frac{45}{65} = \mathbf{3\frac{2}{21}}$

5. $\frac{9}{10} \div \frac{12}{18} = \mathbf{1\frac{7}{20}}$

6. $\frac{6}{9} \times \frac{1}{8} = \mathbf{\frac{1}{12}}$

7. $\frac{10}{12} \times \frac{1}{8} = \mathbf{\frac{5}{48}}$

8. $\frac{2}{9} \times \frac{4}{6} = \mathbf{\frac{4}{27}}$

9. $\frac{25}{28} \div \frac{35}{48} = \mathbf{1\frac{11}{49}}$

10. $\frac{15}{100} \div \frac{9}{23} = \mathbf{\frac{23}{60}}$

11. $\frac{3}{8} \times \frac{2}{8} = \mathbf{\frac{3}{32}}$

12. $\frac{2}{7} \times \frac{4}{5} = \mathbf{\frac{8}{35}}$

13. $\frac{4}{5} \times \frac{11}{12} = \mathbf{\frac{11}{15}}$

14. $\frac{4}{9} \times \frac{5}{15} = \mathbf{\frac{4}{27}}$

15. $\frac{1}{12} \times \frac{1}{11} = \mathbf{\frac{1}{132}}$

**B. Word Problem**

*(5 points)*

Hobble Homes Incorporated sells land to families wanting to build houses in the country. Hobble Homes has 12 acres of land and allots 1/3 acre house plots for each family. Find out how many 1/3 acre house plots there are in 12 acres.

$\mathbf{\frac{12}{1} \div \frac{1}{3}}$ $\mathbf{\frac{12}{1} \times \frac{3}{1} = 36}$ **house plots**

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