EXCEL MATHEMATICS

FRACTIONS PART 2

FREE E-BOOK.

MARIA TORRIENTE
JUAN JORRIN

Check out
https://www.excelmathematics.com
for details.

A GIFT

just for you

Fractions Part 2

You will study

- adding and subtracting fractions and mixed numbers with unlike denominators.
- multiplying and dividing fractions and mixed numbers.
- solving equations with fractions.

Why?

You can use the skills learned in this chapter

- to solve measurement problems that involve fractions and mixed numbers.
- to convert measurements from one unit to another.

Vocabulary Connections

To become familiar with some of the vocabulary terms in the chapter, consider the following. You may refer to the chapter, the glossary, or a dictionary if you like.

1. The word *reciprocal* means "inversely related or opposite." What do you think the **reciprocal** of a fraction will look like?
2. When people have something in *common,* they have something that they share. What do you think two numbers with a common multiple share? What do you think the **least common multiple** of two numbers is?
3. Fractions with the same denominator have a common denominator. What do you think the **least common denominator** of two fractions is?

least common denominator (LCD)
least common multiple (LCM)
reciprocal

Life Science Application

Sophie plants a young oak tree in her backyard. The distance around the trunk grows at a rate of $\frac{1}{8}$ inch per month. Use pictures to model how much this distance will increase in two months, then write your answer in simplest form.

$\frac{1}{8} + \frac{1}{8}$

$\frac{1}{8} + \frac{1}{8} = \frac{2}{8}$ *Add the numerators. Keep the same denominator.*

$= \frac{1}{4}$ *Write your answer in simplest form.*

The distance around the trunk will increase by $\frac{1}{4}$ inch.

Least Common Multiple

After games in Lydia's basketball league, one player's family brings snacks for both teams to share. This week Lydia's family will provide juice boxes and granola bars for 24 players.

You can make a model to help you find the least number of juice and granola packs Lydia's family should buy. Use colored counters, drawings, or pictures to illustrate the problem.

3, 5, and 6

3: 3, 6, 9, 12, 15, 18, 21, 24, 27, **30**, 33, . . . *List multiples of 3, 5, and 6.*

5: 5, 10, 15, 20, 25, **30**, 35, . . .

6: 6, 12, 18, 24, **30**, 36, . . . *Find the smallest number that is in all the lists.*

LCM: 30

Draw juice boxes in groups of 6. Draw granola bars in groups of 8. Stop when you have drawn the same number of each.

There are 24 juice boxes and 24 granola bars.

Lydia's family should buy 4 packs of juice and 3 packs of granola bars.

The smallest number that is a multiple of two or more numbers is the **least common multiple (LCM)**. In Example 1, the LCM of 6 and 8 is 24.

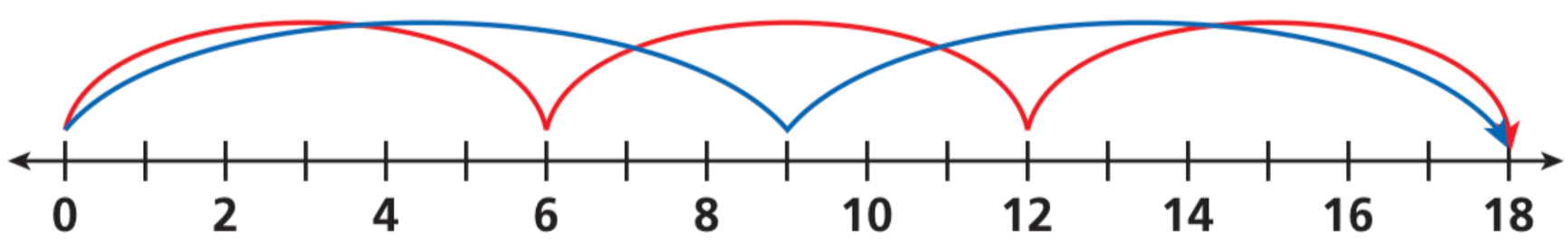
Using Multiples to Find the LCM

Find the least common multiple (LCM).

Method 1: Use a number line.

A **6 and 9**

Use a number line to skip count by 6 and 9.



The least common multiple (LCM) of 6 and 9 is 18.

Method 2: Use a list.

B **3, 5, and 6**

3: 3, 6, 9, 12, 15, 18, 21, 24, 27, **30**, 33, . . .
5: 5, 10, 15, 20, 25, **30**, 35, . . .
6: 6, 12, 18, 24, **30**, 36, . . .

List multiples of 3, 5, and 6.

Find the smallest number that is in all the lists.

LCM: 30

Method 3: Use prime factorization.

C **8 and 12**

$8 = 2 \cdot 2 \cdot 2$

$12 = 2 \cdot 2 \cdot 3$

$2 \cdot 2 \cdot 2 \cdot 3$

$2 \cdot 2 \cdot 2 \cdot 3 = 24$

Write the prime factorization of each number.

Line up the common factors.

To find the LCM, multiply one number from each column.

LCM: 24

D **12, 10, and 15**

$12 = 2^2 \cdot 3$

$10 = 2 \cdot 5$

$15 = 3 \cdot 5$

$2^2 \cdot 3 \cdot 5$

$2^2 \cdot 3 \cdot 5 = 60$

Write the prime factorization of each number in exponential form.

To find the LCM, multiply each prime factor once with the greatest exponent used in any of the prime factorizations.

LCM: 60

Adding and Subtracting with Unlike Denominators

The Pacific Ocean covers $\frac{1}{3}$ of Earth's surface. The Atlantic Ocean covers $\frac{1}{5}$ of Earth's surface. To find the fraction of Earth's surface that is covered by both oceans, you can add $\frac{1}{3}$ and $\frac{1}{5}$, which are unlike fractions.

To add or subtract unlike fractions, first rewrite them as equivalent fractions with a common denominator.

Social Studies Application

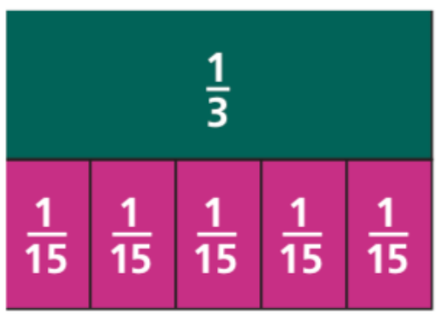
What fraction of Earth's surface is covered by the Atlantic and Pacific Oceans? Add $\frac{1}{3}$ and $\frac{1}{5}$.

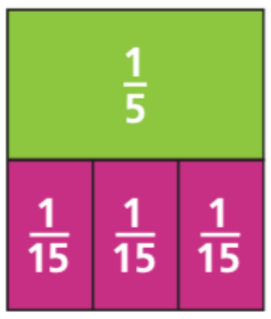
$$\begin{array}{r} \frac{1}{3} \\ +\ \frac{1}{5} \\ \hline \end{array}$$

Find a common denominator for 3 and 5: $3 \times 5 = 15$.

$\frac{1}{3} \rightarrow \frac{5}{15}$

Write equivalent fractions with 15 as the common denominator.

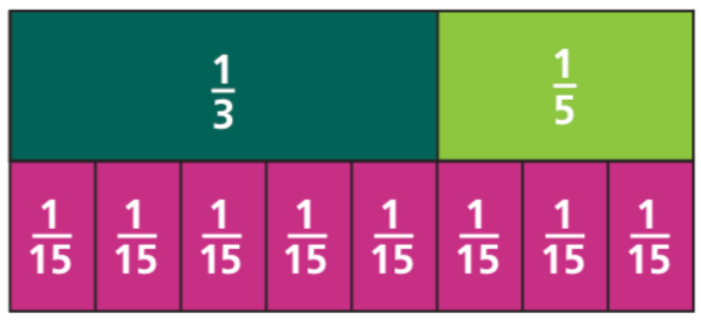




$$\begin{array}{r} +\ \frac{1}{5} \rightarrow \frac{3}{15} \\ \hline \end{array}$$

Add the numerators. Keep the common denominator.

$$\frac{8}{15}$$



The Pacific and Atlantic Oceans cover $\frac{8}{15}$ of Earth's surface.

You can use *any* common denominator or the *least common denominator* to add and subtract unlike fractions. The **least common denominator (LCD)** is the least common multiple of the denominators.

Adding and Subtracting Unlike Fractions

Add or subtract. Write each answer in simplest form.

Method 1: Multiply the denominators.

A $\frac{9}{10} - \frac{7}{8}$

$\frac{9}{10} - \frac{7}{8}$ *Multiply the denominators. $10 \cdot 8 = 80$*

$\frac{72}{80} - \frac{70}{80}$ *Write equivalent fractions with a common denominator.*

$\frac{2}{80}$ *Subtract.*

$\frac{1}{40}$ *Write the answer in simplest form.*

Method 2: Use the LCD.

B $\frac{9}{10} - \frac{7}{8}$ *Multiples of 10: 10, 20, 30, 40, . . .*

$\frac{9}{10} - \frac{7}{8}$ *Multiples of 8: 8, 16, 24, 32, 40, . . . The LCD is 40.*

$\frac{36}{40} - \frac{35}{40}$ *Write equivalent fractions with a common denominator.*

$\frac{1}{40}$ *Subtract.*

Method 3: Use mental math.

C $\frac{5}{12} + \frac{1}{6}$

$\frac{5}{12} + \frac{1}{6}$ *Think: 12 is a multiple of 6, so the LCD is 12.*

$\frac{5}{12} + \frac{2}{12}$ *Rewrite $\frac{1}{6}$ with a denominator of 12.*

$\frac{7}{12}$ *Add.*

D $\frac{1}{3} - \frac{2}{9}$

$\frac{1}{3} - \frac{2}{9}$ *Think: 9 is a multiple of 3, so the LCD is 9.*

$\frac{3}{9} - \frac{2}{9}$ *Rewrite $\frac{1}{3}$ with a denominator of 9.*

$\frac{1}{9}$ *Subtract.*

Adding and Subtracting Mixed Numbers

Chameleons can change color at any time to camouflage themselves. They live high in trees and are seldom seen on the ground.

A Parsons chameleon, which is the largest kind of chameleon, can extend its tongue $1\frac{1}{2}$ times the length of its body. This allows the chameleon to capture food it otherwise would not be able to reach.

To add or subtract mixed numbers with unlike denominators, you must first find a common denominator for the fractions.

The chameleon is the only animal capable of moving each eye independently of the other. A chameleon can turn its eyes about 360°.

Adding and Subtracting Mixed Numbers

Find each sum or difference. Write the answer in simplest form.

A $2\frac{3}{4} + 1\frac{1}{6}$

$3 + 1 = 4$

$$\begin{array}{r} 2\frac{3}{4} \longrightarrow 2\frac{18}{24} \\ +\ 1\frac{1}{6} \longrightarrow +\ 1\frac{4}{24} \\ \hline 3\frac{22}{24} = 3\frac{11}{12} \end{array}$$

Estimate the sum. Round each fraction to the nearest whole number.

Multiply the denominators. $4 \cdot 6 = 24$

Write equivalent fractions with a common denominator of 24.

Add the fractions and then the whole numbers, and simplify.

$3\frac{11}{12}$ is close to the estimate of 4. The answer is reasonable.

B $4\frac{5}{6} - 2\frac{2}{9}$

$5 - 2 = 3$

$$\begin{array}{r} 4\frac{5}{6} \longrightarrow 4\frac{15}{18} \\ -\ 2\frac{2}{9} \longrightarrow -\ 2\frac{4}{18} \\ \hline 2\frac{11}{18} \end{array}$$

Estimate the difference.

The LCD of 6 and 9 is 18.

Write equivalent fractions with a common denominator of 18.

Subtract the fractions and then the whole numbers.

$2\frac{11}{18}$ is close to the estimate of 3. The answer is reasonable.

Find each sum or difference. Write the answer in simplest form.

C $8\frac{2}{5} - 6\frac{3}{10}$

$8 - 6 = 2$

$8\frac{2}{5} \longrightarrow 8\frac{4}{10}$

$-\ 6\frac{3}{10} \longrightarrow -\ 6\frac{3}{10}$

$2\frac{1}{10}$

Estimate the difference.

Think: 10 is a multiple of 5, so 10 is the LCD.

Write equivalent fractions with a common denominator of 10.

Subtract the fractions and then the whole numbers.

$2\frac{1}{10}$ is close to the estimate of 2. The answer is reasonable.

Life Science Application

The length of a Parsons chameleon's body is $23\frac{1}{2}$ inches. The chameleon can extend its tongue $35\frac{1}{4}$ inches. What is the total length of its body and its tongue?

Add $23\frac{1}{2}$ and $35\frac{1}{4}$.

$23\frac{1}{2} \longrightarrow 23\frac{2}{4}$

$+\ 35\frac{1}{4} \longrightarrow +\ 35\frac{1}{4}$

$58\frac{3}{4}$

Find a common denominator. Write equivalent fractions with the LCD, 4, as the denominator. Add the fractions and then the whole numbers.

The total length of the chameleon's body and tongue is $58\frac{3}{4}$ inches.

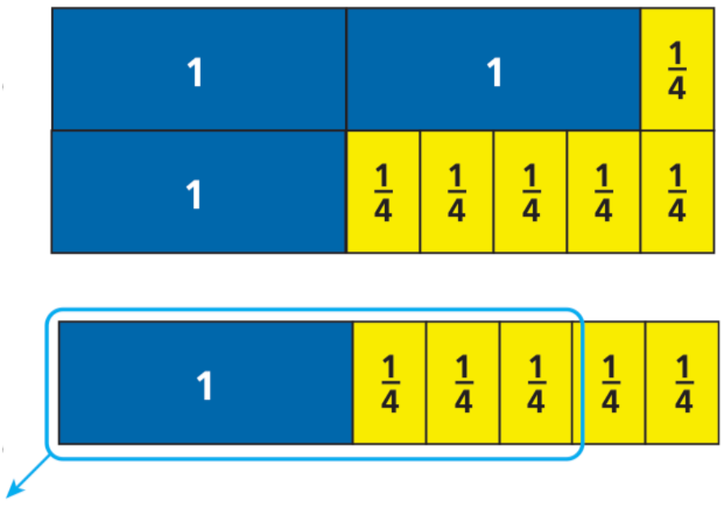
Regrouping to Subtract Mixed Numbers

Jimmy and his mother planted a tree when it was $1\frac{3}{4}$ ft tall. Now the tree is $2\frac{1}{4}$ ft tall. How much has the tree grown since it was planted?

The difference in the heights can be represented by the expression $2\frac{1}{4} - 1\frac{3}{4}$.

You will need to regroup $2\frac{1}{4}$ because the fraction in $1\frac{3}{4}$ is greater than $\frac{1}{4}$.

Divide *one whole* of $2\frac{1}{4}$ into fourths.



Regroup $2\frac{1}{4}$ as $1\frac{5}{4}$.

$$\begin{array}{r} 2\frac{1}{4} \rightarrow 1\frac{5}{4} \\ -\,1\frac{3}{4} \rightarrow -\,1\frac{3}{4} \\ \hline \frac{2}{4} = \frac{1}{2} \end{array}$$

Remove $1\frac{3}{4}$.

The tree has grown $\frac{1}{2}$ ft since it was planted.

1 Regrouping Mixed Numbers

Subtract. Write each answer in simplest form.

A $6\frac{5}{12} - 2\frac{7}{12}$

$6 - 3 = 3$ *Estimate the difference.*

$$\begin{array}{r} 6\frac{5}{12} \rightarrow 5\frac{17}{12} \\ -\,2\frac{7}{12} \rightarrow -\,2\frac{7}{12} \\ \hline 3\frac{10}{12} \\ = 3\frac{5}{6} \end{array}$$

Regroup $6\frac{5}{12}$ as $5 + 1\frac{5}{12} = 5 + \frac{12}{12} + \frac{5}{12}$.

Subtract the fractions and then the whole numbers.

Write the answer in simplest form.

$3\frac{5}{6}$ is close to the estimate of 3. The answer is reasonable.

Subtract. Write each answer in simplest form.

B $8 - 5\frac{3}{4}$

$8 - 6 = 2$ *Estimate the difference.*

$8 \longrightarrow 7\frac{4}{4}$ *Write 8 as a mixed number with a denominator of 4. Regroup 8 as $7 + \frac{4}{4}$.*

$-\ 5\frac{3}{4} \longrightarrow -\ 5\frac{3}{4}$ *Subtract the fractions and then the whole numbers.*

$2\frac{1}{4}$

$2\frac{1}{4}$ is close to the estimate of 2. The answer is reasonable.

Measurement Application

Dave is re-covering an old couch and cushions. He determines that he needs 17 yards of fabric for the job.

A **Dave has $1\frac{2}{3}$ yards of fabric. How many more yards does he need?**

$17 \longrightarrow 16\frac{3}{3}$ *Write 17 as a mixed number with a denominator of 3. Regroup 17 as $16 + \frac{3}{3}$.*

$-\ 1\frac{2}{3} \longrightarrow -\ 1\frac{2}{3}$ *Subtract the fractions and then the whole numbers.*

$15\frac{1}{3}$

Dave needs another $15\frac{1}{3}$ yards of material.

B **If Dave uses $9\frac{5}{6}$ yards of fabric to cover the couch frame, how much of the 17 yards will he have left?**

$17 \longrightarrow 16\frac{6}{6}$ *Write 17 as a mixed number with a denominator of 6. Regroup 17 as $16 + \frac{6}{6}$.*

$-\ 9\frac{5}{6} \longrightarrow -\ 9\frac{5}{6}$

$7\frac{1}{6}$ *Subtract the fractions and then the whole numbers.*

Dave will have $7\frac{1}{6}$ yards of material left.

QUIZ

1

1. Pencils are sold in packs of 12, and erasers in packs of 9. Mr. Joplin wants to give each of 36 students a pencil and an eraser. What is the least number of packs he should buy so there are none left over?

2 **Find the least common multiple (LCM).**

2. 3 and 5	**3.** 4 and 9	**4.** 2, 3, and 6	**5.** 2, 4, and 5
6. 4 and 12	**7.** 6 and 16	**8.** 4, 6, and 8	**9.** 2, 5, and 8
10. 6 and 10	**11.** 21 and 63	**12.** 3, 5, and 9	**13.** 5, 6, and 25

1

1. A trailer hauling wood weighs $\frac{2}{3}$ ton. The trailer weighs $\frac{1}{4}$ ton without the wood. What is the weight of the wood?

2 **Add or subtract. Write each answer in simplest form.**

2. $\frac{1}{3} + \frac{1}{9}$	**3.** $\frac{7}{10} - \frac{2}{5}$	**4.** $\frac{2}{3} - \frac{2}{5}$	**5.** $\frac{1}{2} + \frac{3}{7}$

1 **Find each sum or difference. Write the answer in simplest form.**

1. $7\frac{1}{12} + 3\frac{1}{3}$	**2.** $2\frac{1}{6} + 2\frac{3}{8}$	**3.** $8\frac{5}{6} - 2\frac{3}{4}$	**4.** $6\frac{6}{7} - 1\frac{1}{2}$

2

5. **Life Science** A sea turtle traveled $7\frac{3}{4}$ hours in two days. It traveled $3\frac{1}{2}$ hours on the first day. How many hours did it travel on the second day?

1 **Subtract. Write each answer in simplest form.**

1. $2\frac{1}{2} - 1\frac{3}{4}$	**2.** $8\frac{2}{9} - 2\frac{7}{9}$	**3.** $3\frac{2}{6} - 1\frac{2}{3}$	**4.** $7\frac{1}{4} - 4\frac{11}{12}$

2

5. Mr. Jones purchased a 4-pound bag of flour. He used $1\frac{2}{5}$ pounds of flour to make bread. How many pounds of flour are left?

EXCEL MATHEMATICS

Join our community

HTTPS://WWW.EXCELMATHEMATICS.COM

MARIA TORRIENTE

MATH TEACHER

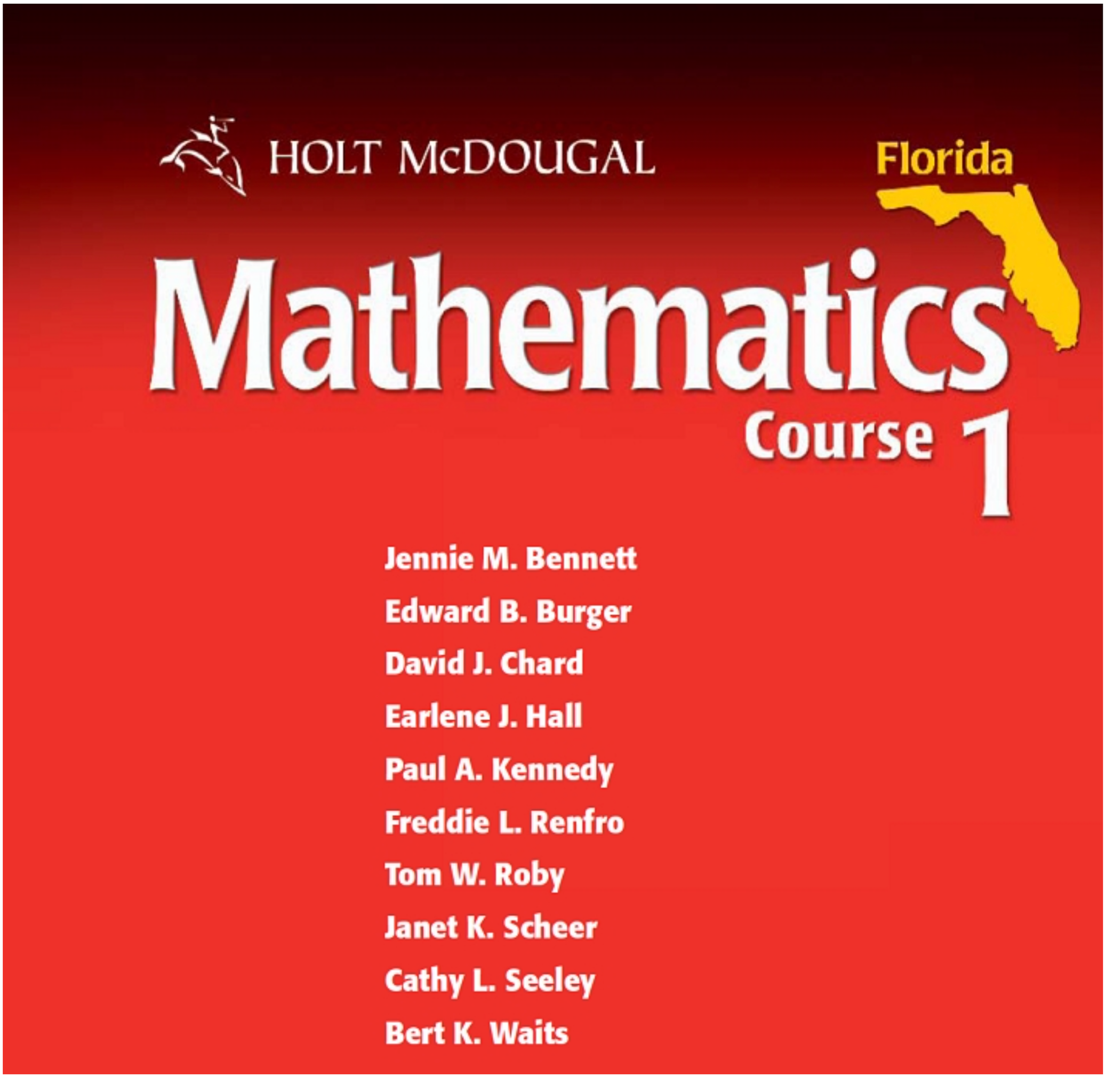
PRESIDENT

JUAN JORRIN

MATH TUTOR:

VICE-PRESIDENT

WORKS CITED


HOLT McDOUGAL
Florida
Mathematics
Course 1
Jennie M. Bennett
Edward B. Burger
David J. Chard
Earlene J. Hall
Paul A. Kennedy
Freddie L. Renfro
Tom W. Roby
Janet K. Scheer
Cathy L. Seeley
Bert K. Waits