

## Common Denominator

ID: 10985

Time required  
15 minutes

## Activity Overview

*In this activity, students will use the CelSheet App that multiplies the fraction by “1” to help determine the common denominator. Then they will use what they have learned to add and subtract fractions without the same denominators. As an extension, they will use the **LCM** command to quickly obtain the best denominator to complete the operations.*

## Topic: From Arithmetic to Algebra

- *Adding and Subtracting fractions*
- *Common denominators*

## Teacher Preparation and Notes

- *If an interactive white board is available, create some fractions and their physical representations using circle pieces or rectangular pieces, and then divide them up so that there is a common denominator.*
- ***To download the calculator file and student worksheet, go to [education.ti.com/exchange](http://education.ti.com/exchange) and enter “10985” in the quick search box.***

## Associated Materials

- *Alg1Week02\_CommonDenom\_worksheet\_TI-84.doc*
- *FRAC.8xv*

## Suggested Related Activities

- *Visual Fractions Exploration – 8652*
- *Adding and Subtracting Fractions – 8172*
- *Fractions Number Line – 2507*
- *Names for 100 – 5701*

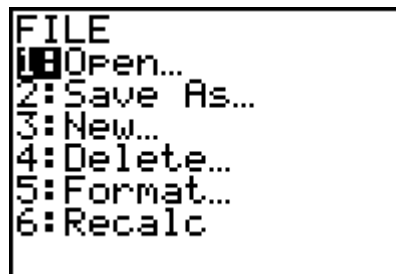
**Problem 1 – Finding a common denominator**

Before beginning a couple questions to discuss with students are:

- What is the difference between the least common denominator and a common denominator?
- Is there more than one possibility for the common denominator? Explain.

In this activity, students will use the CelSheet App. Press [APPS] and select it from the list.

To open the file **FRAC**, press [GRAPH] (Menu) > File > Open and select the file.



The **FRAC** calculator file is an interactive spreadsheet that creates an equivalent fraction. An example with the fractions  $\frac{2}{3}$  and  $\frac{1}{4}$ , is given for students to see how the spreadsheet is used so that the fractions have a common denominator. The common denominator will appear in cells **C1** and **C5**.

FRAC	A	B	C
1	2	4	8
2	3	4	12
3			
4	1	3	3
5	4	3	12
6			
A1: 2			[Menu]

They need to change the “1” fraction by changing the number in cells **B1** or **B4**. The equivalent fraction is updated each time the number is changed.

You may need to give details to students as to why the top and bottom of the fraction are multiplied by the same number. Explain that they will get an equivalent fraction, or a fraction that names the same number.

FRAC	A	B	C
1	4	4	8
2	3	4	12
3			
4	1	3	3
5	4	3	12
6			
A1: 4			

Students are then asked to change two more pairs of fractions. To change the fractions in column A, students need to type a number and then press enter.

They should see that the *least* common denominator is a product of the two denominators.

Students will then change the next set of fractions given on the worksheet using **FRAC**. They should see that for these pairs, the fractions are multiplied by a different number than the other fraction's denominator.

FRAC	A	B	C
1	4	2	8
2	15	2	30
3			
4	1	5	5
5	6	5	30
6			
A1: 4			[Menu]

Students should understand that the original denominator of the fraction is a factor of the common denominator.

**Problem 2 – Adding and subtracting fractions**

Students are asked, for which operations need a common denominator. This is a multi-select question.

You may want to discuss with students why they must have a common denominator to add or subtract two fractions, but not to multiply or divide two fractions.

Students are to then explain how to add or subtract two fractions with different denominators.

The worksheet gives two problems, the first one is adding and then second one is subtracting. Students are to use **FRAC** to change the fractions so that they have a common denominator.

FRAC	A	B	C
1	5	3	15
2	12	3	36
3			
4	2	4	8
5	9	4	36
6			
A1: 5			[Menu]

Then they need to transfer the fractions with the common denominator to the correct spaces in the addition problem. They should then add (mentally) the fractions and complete the equation.

**Extension – Finding the least common multiple**

Students often rely on the product of the two numbers as the “best” denominator for any fraction addition problem. The **lcm** command may surprise them sometimes with its result!

```
MATH NUM CPX PRB
3: iPart(
4: fPart(
5: int(
6: min(
7: max(
8: lcm(
9: gcd(
```

To enter the command, press **[MATH]**, arrow to the right for the **NUM** menu and select **lcm(** from the list. Students must be able to use the information from the LCM to create the new equivalent fractions before adding or subtracting.

```
lcm(12, 16)
48
```

Have students use the fractions from the worksheet or problems from their textbook/resource.

You may want to have a discussion on how prime factors are used to create the least common multiple.

Solutions – student worksheet

Problem 1

1. a.

$$\frac{4}{5} \cdot \frac{\boxed{4}}{\boxed{4}} = \frac{\boxed{16}}{\boxed{20}}$$

$$\frac{3}{4} \cdot \frac{\boxed{5}}{\boxed{5}} = \frac{\boxed{15}}{\boxed{20}}$$

b.

$$\frac{13}{5} \cdot \frac{\boxed{6}}{\boxed{6}} = \frac{\boxed{78}}{\boxed{30}}$$

$$\frac{5}{6} \cdot \frac{\boxed{5}}{\boxed{5}} = \frac{\boxed{25}}{\boxed{30}}$$

- The common denominator is the product of the two denominators.

2. a.

$$\frac{4}{15} \cdot \frac{\boxed{2}}{\boxed{2}} = \frac{\boxed{8}}{\boxed{30}}$$

$$\frac{1}{6} \cdot \frac{\boxed{5}}{\boxed{5}} = \frac{\boxed{5}}{\boxed{30}}$$

b.

$$\frac{3}{12} \cdot \frac{\boxed{4}}{\boxed{4}} = \frac{\boxed{12}}{\boxed{48}}$$

$$\frac{11}{16} \cdot \frac{\boxed{3}}{\boxed{3}} = \frac{\boxed{33}}{\boxed{48}}$$

c.

$$\frac{17}{8} \cdot \frac{\boxed{1}}{\boxed{1}} = \frac{\boxed{17}}{\boxed{8}}$$

$$\frac{7}{4} \cdot \frac{\boxed{2}}{\boxed{2}} = \frac{\boxed{14}}{\boxed{8}}$$

- The common denominator is NOT the product of the two denominators.

3. Add; Subtract

4. I would find a common denominator and then change the two fractions to have the common denominator. I would then add the two fractions and simplify if needed.

5. Use the **FRAC** file to help you add or subtract the following fractions.

a.

$$\frac{5}{12} \cdot \frac{\boxed{3}}{\boxed{3}} = \frac{\boxed{15}}{\boxed{36}}$$

$$\frac{2}{9} \cdot \frac{\boxed{4}}{\boxed{4}} = \frac{\boxed{8}}{\boxed{36}}$$

$$\frac{5}{12} + \frac{2}{9} = \frac{\boxed{15}}{\boxed{36}} + \frac{\boxed{8}}{\boxed{36}} = \frac{\boxed{23}}{\boxed{36}}$$

b.

$$\frac{32}{21} \cdot \frac{\boxed{13}}{\boxed{13}} = \frac{\boxed{416}}{\boxed{273}}$$

$$\frac{15}{13} \cdot \frac{\boxed{21}}{\boxed{21}} = \frac{\boxed{315}}{\boxed{273}}$$

$$\frac{32}{21} - \frac{15}{13} = \frac{\boxed{416}}{\boxed{273}} - \frac{\boxed{315}}{\boxed{273}} = \frac{\boxed{101}}{\boxed{273}}$$