
Fractions With Visual Models

ID: 11153

Time required
45 minutes

Activity Overview

In this activity, students will explore multiplication and division of fractions using several representations to develop fluency. Students will also solve problems involving similarity using proportions.

Topic: Numbers and Operations

- *Multiplying and dividing fractions*
 - *Multiplying and dividing decimals*
 - *Applying proportionality to solve similarity problems*
-

Teacher Preparation and Notes

- *Fraction tiles and graph paper will be useful in this activity.*
- *TI-Navigator is not required for this activity, but an extension is given for those teachers that would like to use it.*
- ***To download the student worksheet and navigator files, go to education.ti.com/exchange and enter “11153” in the quick search box.***

Associated Materials

- *MGAct02_VisFractions_worksheet_TI-73.doc*
- *MGAct02_VisFractions_self_LearnChk_TI-73.edc*
- *MGAct02_VisFractions_quiz_LearnChk_TI-73.edc*
- *MGAct02_VisFractions_01_Nav_TI-73.act*
- *MGAct02_VisFractions_02_Nav_TI-73.act*
- *Rational Number Rampage Application*

Suggested Related Activities

- *Fraction Decimal Challenge — 6681*
- *Dividing Fractions — 6682*
- *Visual Fractions Activity — 6669*

Problem 1 – Multiplying Fractions

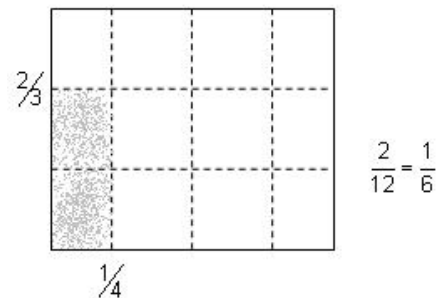
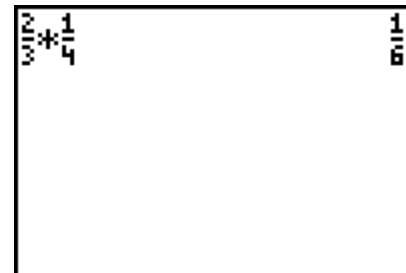
Students should be familiar with area models for multiplication. If they have not seen area models used for fractions, this may need a little extra time.

Questions 1

Students will enter fractions and multiply. To do this, they need to follow the directions on the worksheet, entering the numerator, the fraction key, the denominator, the multiplication operation, then the second fraction. In the example to the right the key press is, $\boxed{2} \boxed{\frac{\square}{\square}} \boxed{3} \boxed{\times} \boxed{1} \boxed{\frac{\square}{\square}} \boxed{4} \boxed{\text{ENTER}}$.

If students forget to press $\boxed{\rightarrow}$ they will continue entering in the denominator of the first fraction.

Ask students why the denominator is 6 instead of 12 (i.e. 3×4). They should explain that the fraction was reduced.

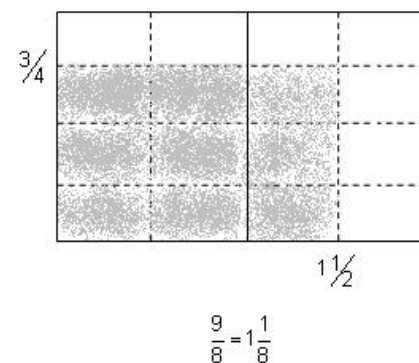
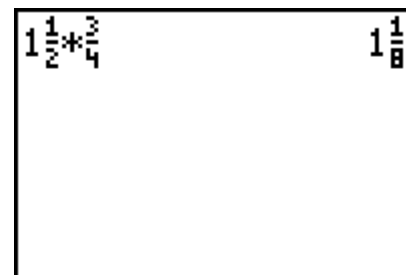


Question 2

To enter a mixed number, student will use the $\boxed{\text{UNIT}}$ key. The key press for this example is $\boxed{1} \boxed{\text{UNIT}} \boxed{1} \boxed{\frac{\square}{\square}} \boxed{2} \boxed{\times} \boxed{3} \boxed{\frac{\square}{\square}} \boxed{4} \boxed{\text{ENTER}}$.

After students work with using the area model to multiply fractions, put them in small groups. Have the groups discuss how the area model helps with multiplication.

Ask students why the numerator is 1 instead of 3. A common mistake is for students to multiply the numerators of the two fractions without converting the mixed number to an improper fraction first.



Problem 2 – Dividing Fractions with Fraction Tiles

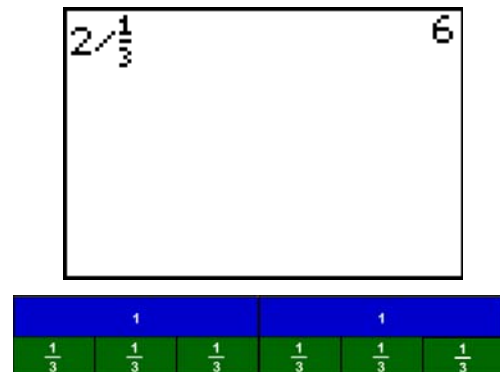
Many students have difficulty understanding what is being done when dividing by a fraction. It can be explained as finding how many “divisors” are in the “dividend”. Using Exercise 3 as an example, you are trying to figure out how many $\frac{1}{3}$'s are in 2. Using the fraction tiles should help students visualize this concept.

Question 3

Students will use both the TI-73 and fraction tiles to show division of fractions.

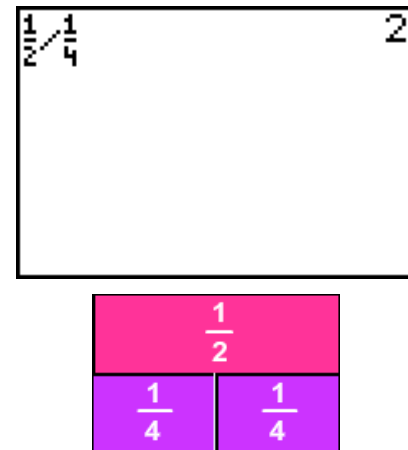
To indicate division, students should use the \div key. For the example to the right, the key press is $2 \div \frac{1}{3}$ $\frac{b}{c}$ 3 ENTER.

Some students may experiment and figure out that you can use the $\frac{b}{c}$ to put the 2 in the numerator and then use the \div in the denominator to enter $\frac{1}{3}$.



Question 4

Dividing a fraction by a fraction adds a little complexity but students should be familiar enough with the $\frac{b}{c}$ to perform this calculation. The key presses are $\frac{1}{2} \div \frac{1}{4}$ $\frac{b}{c}$ 1 $\frac{b}{c}$ 2 \div 1 $\frac{b}{c}$ ENTER.

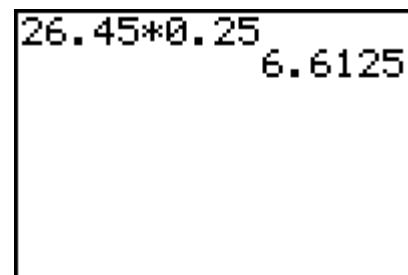


Problem 3 – Multiplying and Dividing Decimals

Question 5

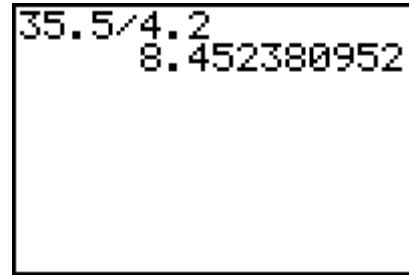
Students will likely be familiar with the key presses for multiplying and dividing on the home screen. Emphasis in this section that students should estimate the answer prior to performing the calculation as it is very easy to miss the decimal point or put it in the wrong location.

The key presses for the example at the right are 2 6 \cdot 4 5 \times 0 \cdot 2 5 ENTER.



Question 6

The key presses for the example at the right are $\boxed{3} \boxed{5} \boxed{.}$
 $\boxed{5} \boxed{\div} \boxed{4} \boxed{.} \boxed{2} \boxed{ENTER}$.

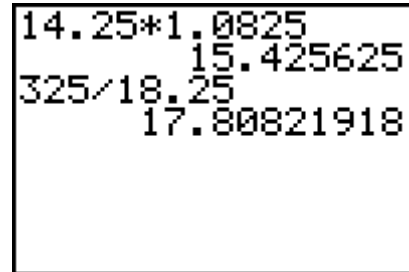


Questions 7 and 8

These two exercises give students a change to practice the keystrokes covered in Questions 5 and 6.

The solutions can be reached by the following key presses. $\boxed{1} \boxed{4} \boxed{.} \boxed{2} \boxed{5} \boxed{\times} \boxed{1} \boxed{.} \boxed{0} \boxed{8} \boxed{2} \boxed{5} \boxed{ENTER}$.

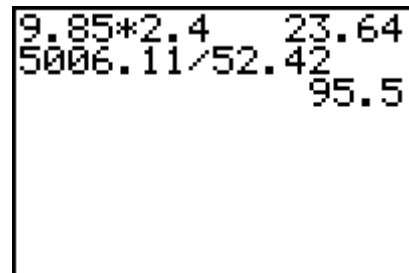
Exercise 8 key presses are $\boxed{3} \boxed{2} \boxed{5} \boxed{\div} \boxed{1} \boxed{8} \boxed{.} \boxed{2} \boxed{5} \boxed{ENTER}$.



Questions 9 and 10

This exercise should be done without the calculator. Students should be able to place the decimal point by estimating the solution. After students have completed the exercises, an overhead projection calculator could be used to show the solutions. Key presses for the examples to the right are $\boxed{9} \boxed{.} \boxed{8} \boxed{5} \boxed{\times} \boxed{2} \boxed{.} \boxed{4} \boxed{ENTER}$ and $\boxed{5} \boxed{0} \boxed{0} \boxed{6} \boxed{.} \boxed{1} \boxed{1} \boxed{\div} \boxed{5} \boxed{2} \boxed{.} \boxed{4} \boxed{2} \boxed{ENTER}$.

Have students justify their placement of the decimal. For example, 5000 divided by 50 is 100 so the answer of 5006.11 divided by 52.42 should be near 100.



Problem 4 – Solve a Similarity Problem

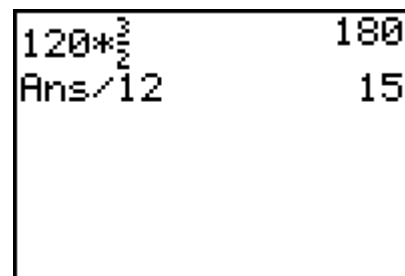
Question 11

Students can solve this problem a variety of ways. To find the proportional relationship between Jeffrey’s height and his shadow, the students should set up a proportion $\frac{60}{40}$

or $\frac{3}{2}$. They can then multiply the total shadow length,

120, by $\frac{3}{2}$ to get a height for the tree of 180 inches, or 15

feet. Key presses for the example to the right are $\boxed{1} \boxed{2} \boxed{0} \boxed{\times} \boxed{3} \boxed{\div} \boxed{2} \boxed{ENTER}$.

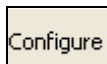


Extension – TI-Navigator™

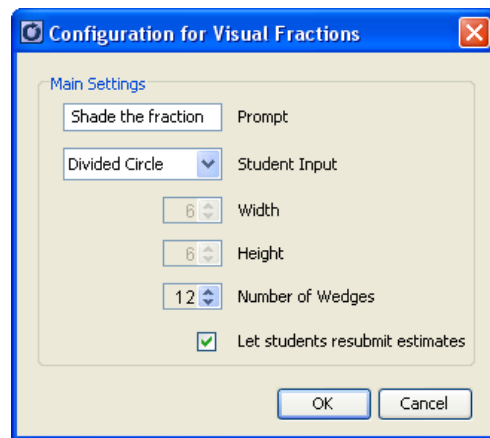
1. Send the **MCAct02_VisFractions_self_LearnChk_TI-73.edc** file to the students. This can be used by them as a self-check about the topics covered in the lesson.
2. Use **Screen Capture** as students are working Exercises 1 – 4 to see the techniques used. One student may find a method or multiplying or dividing that will help another student.
3. If preferred, you can use the **Number Line** in Activity Center to allow students to divide by fractions. Configure Activity Center to contribute Number Line, and set the intervals according to the problem you present to the class. See **MCAct02_VisFractions_01_Nav_TI-73.act** for configuration settings for Question 3.

4. Load the **MGAct02_VisFractions_02_TI-73.act** file to have students estimate fractional portions of a geometric figure. The settings open a circle with 12 wedges. Call out proportions to shade. Some examples are $\frac{9}{12}$. Then $\frac{3}{4}$. Have students recognize that these are the same percentage.

You can change the activity settings by clicking on

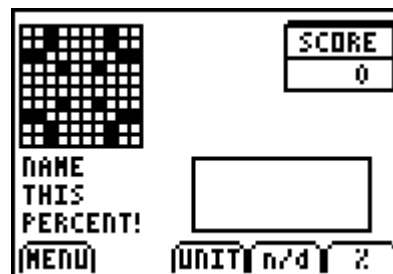


Change the geometric shape, change the numbers of sections, and so on.



4. Send the **MGAct02_VisFractions_quiz_LearnChk_TI-73.edc** file to the students. Have students complete the assessment and then retrieve the results. Use the Slideshow feature to discuss the results as a class. If you do not have time to complete the LearningCheck file in class, use it as a class warm up on the following day to assess student understanding.

5. Send the **Rational Number Rampage** App to students that finish early. This App will help them practice converting rational numbers among decimals, fractions, and percents. One game also includes estimating the percent of a square filled in. A rational number memory game (matching rational numbers) is also included.



Solutions to Student WorksheetProblem 1

1. $\frac{1}{6}$

2. $1\frac{1}{8}$

Problem 2

3. 6

4. 2

Problem 3

5. 6.6125

6. 8.452

7. 15.426

8. 17.808

9. 23.64

10. 95.5

Problem 4

11. 180 inches or 15 feet



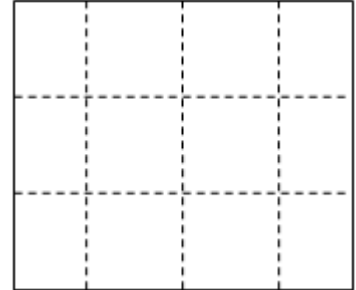
Problem 1 – Multiplying Fractions with Area Models

For each exercise, draw an **area model** representation of the multiplication.

1. Multiply $\frac{2}{3} \times \frac{1}{4}$.

Type the numerator, $\boxed{2}$ first, press $\boxed{\frac{\square}{\square}}$, and type the denominator $\boxed{3}$. Press $\boxed{\rightarrow}$ to move out of the denominator and $\boxed{\times}$. Type the numerator of the second fraction, $\boxed{1}$, press $\boxed{\frac{\square}{\square}}$, and type the denominator $\boxed{4}$. Press $\boxed{\text{ENTER}}$.

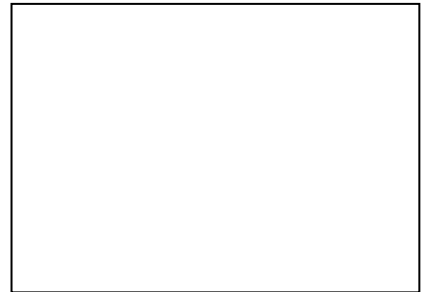
Write the fraction. _____



2. Multiply $1\frac{1}{2} \times \frac{3}{4}$.

Type the mixed fraction, $\boxed{1}$ $\boxed{\text{UNIT}}$ $\boxed{1}$ $\boxed{\frac{\square}{\square}}$ $\boxed{2}$. Press $\boxed{\rightarrow}$ to move out of the denominator and press $\boxed{\times}$. Enter the second fraction, $\boxed{3}$ $\boxed{\frac{\square}{\square}}$ $\boxed{4}$. Press $\boxed{\text{ENTER}}$.

Write the fraction. _____



Problem 2 – Dividing Fractions with Fraction Tiles

Show each division exercise with fraction tiles.

3. Divide $2 \div \frac{1}{3}$.

Type $\boxed{2}$ $\boxed{\div}$ $\boxed{1}$ $\boxed{\frac{\square}{\square}}$ $\boxed{3}$. Press $\boxed{\text{ENTER}}$.

Write the answer. _____



4. Divide $\frac{1}{2} \div \frac{1}{4}$.

Type $\boxed{1}$ $\boxed{\frac{\square}{\square}}$ $\boxed{2}$. Press $\boxed{\rightarrow}$ to move out of the denominator and press $\boxed{\div}$. Enter the second fraction, $\boxed{1}$ $\boxed{\frac{\square}{\square}}$ $\boxed{4}$. Press $\boxed{\text{ENTER}}$.

Write the answer. _____



Problem 3 – Multiplying and Dividing Decimals

Complete the following exercises. Estimate the answer before solving.

5. 26.45×0.25

Type $\boxed{2} \boxed{6} \boxed{.} \boxed{4} \boxed{5}$ and press $\boxed{\times}$. Enter the second decimal, $\boxed{0} \boxed{.} \boxed{2} \boxed{5}$, and press $\boxed{\text{ENTER}}$.

Write the answer. _____

6. $35.5 \div 4.2$

Type $\boxed{3} \boxed{5} \boxed{.} \boxed{5}$ and press $\boxed{\div}$. Enter the second decimal, $\boxed{4} \boxed{.} \boxed{2}$, and press $\boxed{\text{ENTER}}$.

Write the answer. _____

7. 14.25×1.0825

Write the answer. _____

8. $325 \div 18.25$

Write the answer. _____

Without using a calculator, place the decimal point in the correct location of Exercises 9 and 10. Explain your reasoning for both.

9.

$9.85 * 2.4$	2364

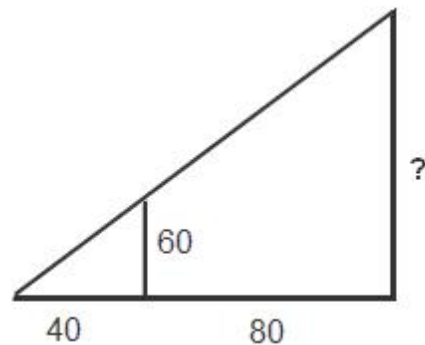
10.

$5006.11 / 52.42$	
955	

Problem 4 – Solve a Similarity Problem

Use the diagram to help you solve the problem.

11. When Jeffrey was born, his parents planted a tree in the backyard. He has decided on his 13th birthday to see how tall the tree is. Use proportions to determine the tree height. Show your work.



Write the answer. _____