Instructor's Manual

Module 5: Dividing Fractions

What Students Should Gain from this Module

At the end of this module, student should be able to:

- Divide fractions

Recommended Timing for this Module   3 hours and 30 minutes

Required Equipment and Materials

- An LCD projector and a Windows computer or laptop. The computer should have high speed internet access, a recent version of PowerPoint, an updated Internet browser, and speakers

- Cords for connecting the LCD projector to the computer

- A wireless presenter which allows you to move around the room while controlling the PowerPoint presentation

- A screen visible to all in the room

- *Dividing Fractions* PowerPoint file

- A copy of the *Dividing Slides* handout for each student and instructor

- A copy of the *Dividing Fractions Practice* handout for each student and instructor

- A copy of the *Finding the Center of a Wall* handout for each student and instructor

Optional Materials

At Math-Aids.com http://www.math-aids.com you can create and print a wide variety of practice problem sets (and answer keys) for students who want or need additional practice. You can also create problem sets that offer a higher degree of challenge for students who want an additional challenge. Be sure to confirm that your use of the Math-Aids resources complies with its usage guidelines.
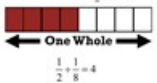
Note to the Instructor
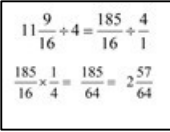
Some of the slides for this module require you to "Click" or press enter on the keyboard to reveal additional information on the slide. Especially where there is a lot of information on a slide, this will help you guide students' attention to the information you are addressing. In other cases, it engages students by giving them a chance to think through their own answer or strategy for solving a problem before the answer is revealed on the slide.

Time	Activity	Materials	What to Do
5	**Introduction**	What is the answer for each of the following? $6 \div 3 =$ $15 \div 5 =$ $32 \div 8 =$	**Ask** what the answer is for each problem. **Point out** that, for each, the answer is smaller than the number being divided.
		Is it possible to divide a positive number by another positive number and get a result that is larger than the number being divided (the first number)? If so, how?	**Ask** how it might be possible to divide a positive number by another positive number and get a result that is larger than the number being divided. **Say** that the answer is in this module.
60	**Dividing Fractions**	**Handout:** *Dividing Fractions Slides* At the end of this module, you should be able to divide fractions.	**Pass out** the slide handouts. **Review** the objective.
			Say that there will be many times when they will need to be able to divide fractions, such as when they have to determine how many pieces of material they can get out of a larger piece.
			Or when they have to space things at certain distances along a wall.

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Time	Activity	Materials	What to Do
			Or when they have to determine how much material they'll need for a job.
		Think of division like this: 6 ÷ 3 How many 3s fit into 6? 15 ÷ 5 How many 5s fit into 15? 32 ÷ 8 How many 8s fit into 32?	**Say** that when they see a division problem, it can be helpful to think of it as "How many ___ (the second number) fit into _____ (the first number)."
		$6 \div 3 =$ How many threes fit into 6? $6 \div 3 = 2$	**Ask** how they would say 6÷3 **CLICK** **Point out** the 6 objects. **CLICK** **Point out** the 2 sets of 3 that fit in 6. **CLICK**
		$15 \div 5 =$ How many fives fit into 15? $15 \div 5 = 3$	**Ask** how they would say 15÷5 **CLICK** **Point out** the 15 objects. **CLICK** **Point out** the 3 sets of 5 that fit in 15. **CLICK**
		$9 \div 2 =$ How many twos fit into 9? $9 \div 2 = 4\frac{1}{2}$	**Ask** how they would say 9÷2 **CLICK** **Point out** the 9 objects. **CLICK** **Point out** the 4 sets of 2 that fit in 9 with a remainder of 1. **CLICK**
		$5 \div \frac{1}{4} =$ How many fourths fit into 5? $5 \div \frac{1}{4} = 20$	**Point out** the 5 objects. **CLICK** **Point out** the twenty 1/4s that fit in 5. **CLICK**

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Time	Activity	Materials	What to Do
		$\frac{1}{2} \div \frac{1}{8} =$ How many $\frac{1}{8}$'s fit in $\frac{1}{2}$? One Whole $\frac{1}{2} \div \frac{1}{8} = 4$	**Point out** the 1/2 **CLICK** **Point out** the 8ths. **Point out** that 4 1/8ths fit in 1/2.
		To divide two fractions, flip the top and bottom numbers after the division sign, then multiply the two top numbers and the two bottom numbers.	**Say** that to divide two fractions, flip the top and bottom numbers after the division sign, then multiply the two top numbers and the two bottom numbers.
		To divide two fractions, flip the top and bottom numbers after the division sign... $5 \div \frac{1}{4} = \frac{5}{1} \div \left(\frac{1}{4}\right) \longrightarrow \frac{4}{1}$	**Ask** students what the bottom number is for 5. **CLICK** **Say** that only the fraction after the division sign is changed. The fraction before the division sign is unchanged. **Point out** how the fraction flipped.
		...then multiply the two top numbers and the two bottom numbers. $\frac{5}{1} \times \frac{4}{1} = \frac{20}{1} = 20$	**Show** how 5/1 x 4/1 = 20/1. **Say** to remember that any number over 1 = itself.
		$15 \div \frac{7}{8} =$	**Ask** whether the answer will be greater or less than 15.
		$15 \div \frac{7}{8} = \frac{15}{1} \div \frac{7}{8}$ $\frac{15}{1} \times \frac{8}{7} = \frac{120}{7} = 17\frac{1}{7}$	**Show** how 15 is the same as 15/1 **CLICK** **Show** how 7/8 was changed to 8/7 **CLICK**

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Time	Activity	Materials	What to Do
			Show how 15/1 x 8/7 = 120/7 **CLICK**
			Show how 120/7 = 17 1/7
			Point out that the answer is greater than 15.
		$7\frac{3}{8} \div \frac{1}{2} =$	**Ask** whether the answer will be greater or less than 7 3/8ths.
			Invite a student to the board to work out the problem.
			Have the other students write their own answer on their handout.
			Review and correct the answer as necessary.
		$11\frac{9}{16} \div 4 =$	**Ask** whether the answer will be greater or less than 11 9/16ths.
			Have students write the answer on their handout.
		$11\frac{9}{16} \div 4 = \frac{185}{16} \div \frac{4}{1}$ $\frac{185}{16} \times \frac{1}{4} = \frac{185}{64} = 2\frac{57}{64}$	**Show** how 11 9/16 is the same as 185/16 and 4 is the same as 4/1 **CLICK**
			Show how 4/1 was changed to 1/4 **CLICK**
			Show how 185/16 x 1/4 = 185/64 **CLICK**
			Show how 185/64 = 2 57/64
			Point out that the result is less than 11 9/16.
			Have students correct their answers (if necessary) on their handout.

Time	Activity	Materials	What to Do
		You have a metal bar that is $23\frac{1}{2}$ ft. long. If you cut it into six even pieces, how long, in feet, would each piece be?	**Invite** a student to the board to work out the problem.
			Have the other students write their own answer on their handout.
			Review and correct the answer as necessary.
		You need pieces of wood that are $4\frac{1}{4}$ inches long. How many can you get from a board that is 12' long?	**Have students write** out the problem and their answer on their handout.
		$12' = 144"$ $144 \div 4\frac{1}{4} = \frac{144}{1} \div \frac{17}{4}$	**Say** that the first step is to convert feet to inches so all calculations will be in the same unit.
			Show how 144 ÷ 4 1/4 is the same as 144/1 ÷ 17/4 **CLICK**
		$\frac{144}{1} \times \frac{4}{17} = \frac{576}{17} = 33\frac{15}{17}$	**Show** how 17/4 was changed to 4/17 **CLICK**
			Show how 144/1 x 4/17 = 576/17 **CLICK**
			Show how 576/17 = 33 15/17, so they could get thirty three, 4 1/4 pieces out of the board.
			Point out that the 15/17ths is 15/17ths of 4 1/4.
			Ask students what questions they have about dividing fractions.

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Time	Activity	Materials	What to Do
45	**Finding the Center of a Wall**	**Handout:** *Finding the Center of a Wall*	**Say** that one way they might use division is when they need to find the center of a wall, like when tiling a wall. **Pass out** the *Finding the Center of a Wall* handout and walk through the example on the board. **Have students work with a partner** and use the *Finding the Center of a Wall* handout to find the centers of walls that are: • 19' 2 1/4" • 14' 8" • 21' 1/2" **Ask** students what questions they have about finding the center of a wall.
90	**Dividing Fractions Practice**	**Handouts:** *Dividing Fractions Practice*	**Have students form groups** of 3 or 4. **Say** to remember that, in class or on the job, they will need to work as a team, which means supporting and encouraging one another. It is not enough for the group to get the right answers. Instead, they should take responsibility for helping one another until each member of the group has mastered the process and feels confident in her ability to solve the problems on her own. **Say** that they should remember the goal(s) they set for themselves, what they pledged to do to "Commit to Grit" in the *Being Gritty* handout at the beginning of the course, and the importance of maintaining a growth mindset if they have difficulty or get frustrated.

Time	Activity	Materials	What to Do
			Say that you can provide additional problem sets for students who want additional practice or additional challenge. See the information about Math-Aids under Optional Materials above.
			Pass out the *Dividing Fractions Practice* handout and have students work through the problems. As they do, check in with groups to answer questions and ensure that no individual(s) in the group is being left behind.
			Review the answers, answer questions, and review content students are struggling with.
Time	Activity	Materials	What to Do
10	**Planning to Apply their Learning**		**Have students reflect** on the learning from this module and note in their journal what they have learned that will be useful to them on the job, what they want to remember, tips, etc., and when they have demonstrated grit or a growth mindset.