

Basic Math: Keeping the Focus on Fractions

Saturday, November 3, 2007

1:15 pm - 2:05 pm

Why are Fractions so Difficult?

- Understanding, Rules, Avoidance

Methods Used

- Assigned a Fraction Mastery Test, worth 10% of the student's overall grade
- Presented the material differently from the order of the class textbook

Fraction Mastery Test

- Worth 10% of the student's grade
- Difficult grading scale
- Several opportunities to take computer regenerated versions

Order of Presentation

- Day 1: Introducing Whole Numbers, Fractions, and Decimals all together
- Day 2: Adding and Subtracting whole numbers, decimals & fractions
Rule: "You can only Add and Subtract Like Terms"
- Day 3: Multiplication of whole numbers, decimals & fractions
- Day 4: Division of whole numbers, decimals and fractions
- Day 5: Back to Addition and Subtraction so we could look at Unlike Fractions and how to make them "Like"

Results & What I would do differently

- Prerequisite Worksheet
- Mastery Test

Notes:

Sample Lecture Notes – Introducing all numbers

Understanding Whole Numbers

Place Value

154

67,154

Understanding Fractions

Part of a whole

1/3

1/3

1/2

1/3

1/2

numerator
of parts shaded

Denominator
of parts to make one whole

"one third"

"one half"

Understanding Decimals

Place Value

\$20.09

\$20.09

\$20 ⁹/₁₀₀

whole

decimal

part

Understanding Decimals

Part of a Whole

Number of parts considered = 3

Number of equal parts in the whole = 10

.3

3/10

View the entire set of lecture notes for Day 1: Understanding Numbers online at http://dv.pima.edu/~ajimenez/MAT082/Lecture/08_29_06.pdf

Sample Lecture Notes – Adding & Subtracting

Adding & Subtracting Whole Numbers

Rule: You can only add or subtract LIKE TERMS.

Example 1
56 + 89

	hundreds	tens	ones
		5	6
		8	9
+	1	4	5

Adding & Subtracting Decimals

Rule: You can only add or subtract LIKE TERMS.


Example 1
8.9 + 37.056 + 0.0023

	thousands	hundreds	tens	ones	tenths	hundredths	thousandths	ten-thousandths
				8	9	0	0	0
		3	7	0	5	6	0	
+			0	0	0	2	3	
		4	5	.	9	5	8	3

Adding & Subtracting Fractions

Rule: You can only add or subtract LIKE TERMS.

Example 1
 $\frac{1}{5} + \frac{3}{5} = \frac{1+3}{5}$



$\frac{4}{5}$

Adding & Subtracting Fractions

Rule: You can only add or subtract LIKE TERMS.

Example 3




$5\frac{7}{10} + 72\frac{2}{10}$
 $5\frac{7}{10}$
 $+ 72\frac{2}{10}$

$77\frac{9}{10}$

5.7
 72.2




View the entire set of lecture notes for Day 2: Adding & Subtracting Numbers online at http://dv.pima.edu/~ajimenez/MAT082/Lecture/08_31_06.pdf

Sample Lecture Notes – Multiplying

<div style="text-align: center; background-color: #f8d7da; padding: 5px; border: 1px solid black;">Multiplying Whole Numbers</div> <p>Repeated Addition $4 \times 3 = 12$</p> 	<div style="text-align: center; background-color: #f8d7da; padding: 5px; border: 1px solid black;">Multiplying Decimals</div> <p>Repeated Addition 4.2×3</p> <p style="font-size: small;">Steps of Multiplication: 1. Multiply Numbers (repeated addition) 2. Determine Value (with decimals/fractions)</p>  <p style="text-align: right;">4.2 $\times 3$ $\hline 12.6$</p>
<div style="text-align: center; background-color: #f8d7da; padding: 5px; border: 1px solid black;">Multiplying Fractions</div> <p>Repeated Addition</p> <p style="font-size: small;">Steps of Multiplication: 1. Multiply Numbers (repeated addition) 2. Determine Value (with decimals/fractions)</p> <p>$\frac{3}{4} \times 3$</p>  <p>$\frac{3}{4} \times \frac{3}{1} = \frac{9}{4}$</p>	<div style="text-align: center; background-color: #f8d7da; padding: 5px; border: 1px solid black;">Multiplying Fractions</div> <p>Example 1 Multiply.</p> <p style="font-size: small;">Steps of Multiplication: 1. Multiply Numbers (repeated addition) 2. Determine Value (with decimals/fractions)</p> <p>$\left(\frac{23}{100}\right)\left(\frac{4}{10}\right) = \frac{92}{1000}$</p> <p>$.23 \times .4 = .092$</p> <p>$\frac{92}{1000} \div \frac{2}{2} \Rightarrow \frac{46}{500} \div \frac{2}{2} \Rightarrow \frac{23}{250}$</p> <p style="text-align: right;">$\begin{array}{r} 23 \\ \times 4 \\ \hline 92 \end{array}$</p>

View the entire set of lecture notes for Day 3: Multiplying Numbers online at <http://dv.pima.edu/~ajimenez/MAT082/Lecture/090706.pdf>

Sample Lecture Notes – Dividing

<div style="text-align: center; border: 1px solid black; background-color: #f8d7da; padding: 5px; margin-bottom: 10px;">Dividing Whole Numbers</div> <p>Example 1 Divide. $234 \div 6$</p> <div style="display: flex; align-items: center;"> <div style="flex: 1;"> $\begin{array}{r} \boxed{39} \\ 6 \overline{)234} \\ \underline{-180} \\ 54 \\ \underline{-54} \\ 0 \end{array}$ </div> <div style="flex: 1; padding-left: 20px;"> <p style="color: blue;">$6 \times 100 = 600$ $6 \times 10 = 60$ $6 \times 1 = 6$</p> <p style="color: red;">39×6</p> </div> </div>	<div style="text-align: center; border: 1px solid black; background-color: #f8d7da; padding: 5px; margin-bottom: 10px;">Dividing Fractions</div> <p>Repeated Subtraction $\frac{1}{2} \div \frac{1}{4} = 2$ <i>How many $\frac{1}{4}$'s are in $\frac{1}{2}$?</i></p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div>
<div style="text-align: center; border: 1px solid black; background-color: #f8d7da; padding: 5px; margin-bottom: 10px;">Dividing Decimals</div> <p>Repeated Subtraction $3.5 \div 0.7 = 5$ <i>How many 0.7's are in 3.5?</i></p> <div style="display: flex; align-items: center;"> <div style="flex: 1;"> $\begin{array}{r} 3.5 \\ -0.7 \\ \hline 2.8 \\ -0.7 \\ \hline 2.1 \\ -0.7 \\ \hline 1.4 \\ -0.7 \\ \hline 0.7 \\ -0.7 \\ \hline 0 \end{array}$ </div> <div style="flex: 1; padding-left: 20px;"> <p style="color: blue;">$\frac{1}{2} \times \frac{10}{10} = \frac{10}{20}$</p> <p style="color: blue;">$\frac{3.5}{0.7} \times \frac{10}{10} = \frac{35}{7}$</p> </div> </div>	<div style="text-align: center; border: 1px solid black; background-color: #f8d7da; padding: 5px; margin-bottom: 10px;">Dividing Decimals</div> <p>Recall $3.5 \div 0.7 = 5$</p> <div style="text-align: center;">  </div>

View the entire set of lecture notes for Day 4: Dividing Numbers online at <http://dv.pima.edu/~ajimenez/MAT082/Lecture/091206.pdf>

Fraction Mastery Test

- **Syllabus Policy**

Fraction Mastery test: weighted as 10% of your final grade

- A 15-problem fraction exam worth 10 points will be available for you to take once per month throughout the semester. This test is only ten points, but is worth an entire letter grade (10%) of your final grade. You must show mastery of fractions to earn the full 10 points. Here is the grading scale:
- 0% - 69% correct on the test = 0 points
- 70% - 84% correct on the test = 5 points
- 85% - 100% correct on the test = 10 points
- You can take this each month until you can demonstrate mastery and earn the full 10 points.

- **Sample Test**

Write the mixed number as an improper fraction.

1) $5\frac{2}{7}$

Write the improper fraction as a mixed or whole number.

2) $\frac{23}{4}$

Write the fraction in lowest terms.

3) $\frac{77}{99}$

Multiply. Write your answer in lowest terms.

4) $\frac{3}{7} \cdot \frac{3}{5}$

5) $\frac{17}{18} \cdot \frac{58}{58} \cdot \frac{50}{26}$

Divide. Write the answer in lowest terms and change to a whole or a mixed number if possible.

6) $\frac{1}{4} \div \frac{5}{8}$

Multiply. Write your answer as a mixed number or a whole number.

7) $2\frac{1}{4} \cdot 2\frac{2}{3}$

Divide. Write the answer in lowest terms and change to a whole or a mixed number if possible.

8) $\frac{\frac{1}{3}}{\frac{1}{8}}$

Divide.

9) $36 \div 2\frac{2}{5}$

Add. Write the answer in lowest terms and as a mixed number if possible.

10) $\frac{14}{117} + \frac{18}{117} + \frac{13}{117}$

Add. Write your answer in lowest terms.

11) $\frac{1}{4} + \frac{3}{8}$

12) $\frac{5}{18} + \frac{1}{3} + \frac{1}{6}$

Subtract the fractions. Write the answer in lowest terms.

13) $\frac{5}{7} - \frac{1}{2}$

Add. Write the answer in lowest terms as a mixed number.

$1\frac{2}{3}$

$12\frac{1}{2}$

14) $\frac{1}{4}$

Subtract. Write the answer in lowest terms as a mixed number.

15) $13\frac{2}{15}$

$7\frac{2}{9}$

Student Feedback

Quotes:

- "I THOUGHT THE WAY YOU PRESENTED THE MATERIAL WAS WONDERFUL. I HAVE A VERY HARD TIME WITH MATH AND I RECEIVED AN "A" IN YOUR CLASS. NOT BECAUSE I STRUGGLED THROUGH IT OR BECAUSE I HAD TO GET OUTSIDE HELP, BUT BECAUSE OF THE WAY YOU PRESENTED THE INFORMATION. I TRUELY UNDERSTOOD WHAT YOU WERE TEACHING AND BECAUSE YOU INTRODUCED EVERYTHING TOGETHER ON THE FIRST DAY AND THEN INCORPORATED THE ADDING, SUBTRACTING, AND SO ON, I FEEL IT MADE FOR BETTER UNDERSTANDING OF THE MATERIAL. EVEN NOW, IN MY OTHER MATH CLASSES, I USE THE NOTES FROM YOUR CLASS."
- "I wanted to let you know that I do not think I would have done as well in MAT086 if I wasn't in your MAT082 class. A lot of people struggled in my MAT086 class because they were not given the same tools that I was given. I do believe that the teaching style for math needs to be consistent, and it sounds like you are on the right track. If I had not taken you for 82 I could have easily failed 86."
- It worked for me, I always had troubles with fractions but your teaching methods helped me to master them.
- It [fraction mastery test] really aides you in all aspects of fractions. It can be extremely useful for those who do not feel confident
- The test forced me to learn the material and being able to re-take helped me to learn where I was having troubles and study that area.

Give One Get One

Fill in three boxes with ideas of your own. Record key words in those three boxes to remember your ideas. Then Get up and start to mingle among your peers who are standing and get ideas for all the other boxes. Each time you interact with a different person, GIVE ONE – of your ideas – and GET ONE. Record key words or phrases to remember the idea and get that person to write their name in the box. When you have completed all nine boxes, return to your seat. Go for it!

AMATYC Conference
Saturday, November 3, 2007

©Research for Better Teaching, 56 Bellows Hill Road, Carlisle, MA 01741

Presenter: Ana Jiménez
ajimenez@pima.edu