# Fractional Mayhem

**Grade: Seventh**

**Ten-day unit**

**<u>Tools:</u>**
- θ M&M's
- θ Overhead
- θ Computer with Excel Spreadsheet
- θ Fraction Strips
- θ White Boards/Markers
- θ Graph Paper
- θ Pattern Blocks
- θ Calculator (TI-73)
- θ "I Have, Who Has" Cards
- θ Cuisenaire Rods

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# *Table of Contents*

# *Objectives*

The students should be able to:

- recognize fractions and there use in every day life situations.
- interpret information from a chart to make appropriate fractions.
- recognize various equivalent fractions.
- use fraction strips as a tool to represent equivalent fractions.
- use Excel spreadsheet to create fractional plots of land.
- use fraction circles to explore fractional equivalencies and inequalities.
- compare fractions to determine where to place an inequality sign.
- find the prime factorization of a number.
- find the greatest common factor (GCF) of a set of numbers.
- recognize and define a mixed number.
- convert between mixed numbers and improper fractions.
- recognize decimals and percent in relation to fractions.
- compute in decimals, fractions, and percents fluently.
- add and subtract fractions.
- determine fractional values of manipulatives.
- combine cuisenaire rods to represent fractional equations.
- identify and solve multiplication and division problems with fractions.
- use hands-on representation to solve multiplication and division of fractions.
- develop estimation skills with fractions.
- become more familiar with using the TI-73 calculator to do operations with fractions.
- demonstrate the methods and new knowledge acquired from the unit.
- identify the strengths and weaknesses of working with fractions

# *Standards*

NCTM Standards:

Number and Operation is used everyday within this unit because the students are constantly dealing with numbers and computation.

Data Analysis and Probability is used when the students are using charts and determining fractional values from a sample.

Problem Solving is used often within this unit because the students are presented with a problem and they must use their knowledge to develop a method of solving.

Communication is used everyday because there are many activities that involve the children and they must communicate either in duos, trios, groups, or with the teacher.

Connection is important and there are plenty of connections within this unit to other mathematical topics and also to real life. The unit built on itself so connections were a necessary part of the unit.

NYS Key Ideas:

All numbers under Number and Numeration were used in this unit. Representation of fractions, decimals, and percents is a large part of the lessons and applying these

to real life and hands-on situations.  Primes and factors are discussed in a lesson as well as the ordering of fractions and decimals.

Under the Operations heading the first two bullets are used within our unit.  The students used all four operations as they dealt with fractions and decimals and used the exponent notation in the lesson on Prime Factorization.

Modeling is done through the use of charts with the M&M's and the basketball and baseball statistics.

# *Resources*

Chapin, Suzanne.  Middle Grades Math: Tools for Success. Massachusetts:
     Prentice Hall Inc, 1999.

Ed Helper. http://www.edhelper.com

Year 3 I2T2

# _Materials and Equipment_

Day 1:
θ   M&M's, fun size bag for each student
θ   Overhead and transparency
θ   Overhead markers
θ   Math notebooks
θ   Worksheets for each group

Day 2:
θ   Computer with Excel worksheets
θ   Fraction strips for each student
θ   Overhead fraction strips
θ   Printer
θ   Pencils and Overhead markers

Day 3:
θ   White boards
θ   Dry erase markers
θ   Fraction circles worksheet

Day 4:
θ   Graph papers with large squares
θ   Markers
θ   Pencils and erasers
θ   Math journal
θ   White boards and dry erase markers
θ   Worksheets for each student

Day 5:
θ   Overhead
θ   Overhead pattern blocks
θ   Class set of pattern blocks
θ   Textbook
θ   Worksheets

Day 6:
θ   Fraction bars
θ   Percent worksheet
θ   Overhead with markers
θ   Math notebooks and pencils
θ   TI-73 calculator

Day 7:
θ   Cuisenaire rods for entire class
θ   Math notebooks and pencils
θ   Overhead cuisenaire rods

Day 8:
θ   Several sheets of paper for each student
θ   Pencils
θ   Overhead and markers

- θ   Pattern blocks for students and overhead
- θ   Pattern blocks worksheets

Day 9:
- θ   TI-73 calculators
- θ   Maze worksheets (one for decimals, one for fractions)
- θ   Estimation Grid worksheet
- θ   Pen/Pencil
- θ   Notebook
- θ   Winner sheet for each station
- θ   Directions for Between a Rock and a Hard Place

Day 10:
- θ   "I Have, Who Has" cards
- θ   Quiz

# *Overview*

**Day One: Introduction to Fractions**
The students will review fractions using M&M's to find fractional values of the whole sample and relate fractional usage to real life situations.

**Day Two: Equivalent Fractions**
The students will use fraction strips to show equivalent fractions and use an Excel spreadsheet to visually represent equivalent fractions.

**Day Three: Comparing Fractions**
The students will use fraction circles and white boards to represent fractional equivalences and inequalities. The students will also compare fractions to determine which is larger.

**Day Four: Prime Factorization**
The students will make factor trees to find the prime factorization of a number and find the greatest common factor (GFC).

**Day Five: Mixed Numbers and Fractions**
The students will find examples of mixed numbers in everyday life and use pattern blocks to demonstrate different mixed numbers and improper fractions.

**Day Six: Decimals and Percents**
The students will develop an understanding of the relationship between decimals and percents by using data, such as batting averages and percent of free throws made versus attempts. The students will also use fraction strips to represent fractions, decimals and percents.

**Day Seven: Adding and Subtracting Fractions**
The students will use Cuisenaire rods to add and subtract fractions by playing the "Yack" game to reinforce adding and subtracting of fractions.

**Day Eight: Multiplying and Dividing Fractions**
The students will use paper folding as a method of multiplying fractions. Then the students will arrange pattern blocks to multiply and divide fractional values of a whole figure.

**Day Nine: Fractions, Decimals, and Percents on Calculators**
The whole lesson will involve the students using calculators to do different activities in groups. One group will do Estimation Shoot, another will do a Maze activity and the last will play with the fraction line application on the TI-73 calculators. Each activity reinforces a topic that was introduced.

**Day Ten: The Wrap Up and Quiz Day**
This will be a final wrap up of the material taught on fractions. The students will play "I Have, Who Has" with decimals, fractions, and percents and have a short quiz at the end of the lesson.

# *Day One: An introduction to fractions*

Objectives:
The seventh grade students will be introduced to fractions. The students should be able to recognize fractions used in every day life situations. The students should also be able to interpret information from a chart to make appropriate fractions.

Standards:
θ   NCTM Standards: Number and Operation, Data Analysis and Probability, Problem Solving, and Communication
θ   NYS Key Ideas: 2A, 3A, 4F

Materials:
θ   M&M's, fun-size bag for each student
θ   Overhead and transparency
θ   Overhead markers
θ   Notebook and pencils for each student
θ   Worksheets for each group

Opening Activity:
There will be a whole class discussion on where we might see fractions in everyday life, which will lead to an example using pizza. The students will be given a situation where there is a whole pizza and someone ate a portion of it so how much will be left. There will be several different questions asked about different situations involving the parts of the pizza.

NOTE:
1.  Joe ate _ of a cheese and pepperoni pizza and the rest must be shared between Nancy and Melissa. How much does each girl get of the whole pizza? _
2.  Diana bought a party pizza for her class of 20 students. The pizza was cut into 24 squares. If 4 students ate 6 pieces altogether then what fraction of the pizza is remaining for the rest of the 16 students? _
3.  Bill has a study group and he buys a large pizza with 8 slices. Four of Bill's classmates show up to study. If each person has one slice then what fraction of the pizza is left over? 3/8

Depending on how well the students do with these problems we may do a couple more examples or move on.

Main Activity:
Each student will receive a fun-size bag of M&M's and they will be instructed to open up their packages and separate the colors. We will draw a chart on the overhead to record the data of each student. The students will copy the chart down and fill in the data as it is recorded. The room will be split into two equal sections and the data will be recorded for section one and section two separately. The students will then be split up into five groups of four or five students and each group will receive a different mini worksheet that they must complete together using the data from the chart.

**NOTE:**

| | Section One | Section Two | Total |
|---|---|---|---|
| *Blue* | | | |
| *Orange* | | | |
| *Yellow* | | | |
| *Red* | | | |
| *Brown* | | | |
| **Total** | | | |

Data will vary according to the different packages and the proportions of colored M&M's.
Informal assessment will be taking place as we walk around to observe the group work and make sure that each student is participating and on track.

Closing Activity:
Each group will go to the front of the class and share their questions and the answers that they got. They must explain how they got each answer.

NOTE:
This will be a form of informal assessment to see if the students can interpret information from a graph to answer questions.

Homework:
The students must find three uses of fractions outside of the classroom and write them down.

Name:_____          Date:_____

**<u>Worksheet Number One</u>**

1.  What is the total number of M&M's?_____

2.  What is the total number of Blue M&M's?_____

3.  Using the total number of M&M's, create a fraction to represent the number of Blue M&M's out of the total.
    _____

4.  Create a fraction to represent the number of Blue M&M's in Section One in the chart to the total number of Blue M&M's.
    _____

5.  Create a fraction using the number of Blue M&M's from Section Two in the chart to the total number of all M&M's.
    _____

Name:_____          Date:_____

**Worksheet Number Two**

1. What is the total number of M&M's?_____

2. What is the total number of Orange M&M's?_____

3. Using the total number of M&M's, create a fraction to represent the number of Orange M&M's out of the total.

   _____

4. Create a fraction to represent the number of Orange M&M's in Section One in the chart to the total number of Orange M&M's.

   _____

5. Create a fraction using the number of Orange M&M's from Section Two in the chart to the total number of all M&M's.

   _____

Name:_____          Date:_____

**<u>Worksheet Number Three</u>**

1.  What is the total number of M&M's?_____

2.  What is the total number of Red M&M's?_____

3.  Using the total number of M&M's, create a fraction to represent the number of Red M&M's out of the total.
    _____

4.  Create a fraction to represent the number of Red M&M's in Section One in the chart to the total number of Red M&M's.
    _____

5.  Create a fraction using the number of Red M&M's from Section Two in the chart to the total number of all M&M's.
    _____

Name:_____          Date:_____

**Worksheet Number Four**

1.  What is the total number of M&M's?_____

2.  What is the total number of Yellow M&M's?_____

3.  Using the total number of M&M's, create a fraction to represent the number of Yellow M&M's out of the total.

    _____

4.  Create a fraction to represent the number of Yellow M&M's in Section One in the chart to the total number of Yellow M&M's.

    _____

5.  Create a fraction using the number of Yellow M&M's from Section Two in the chart to the total number of all M&M's.

    _____

Name:_____          Date:_____

**Worksheet Number Five**

1. What is the total number of M&M's?_____

2. What is the total number of Brown M&M's?_____

3. Using the total number of M&M's, create a fraction to represent the number of Brown M&M's out of the total.

   _____

4. Create a fraction to represent the number of Brown M&M's in Section One in the chart to the total number of Brown M&M's.

   _____

5. Create a fraction using the number of Brown M&M's from Section Two in the chart to the total number of all M&M's.

   _____

# *Day Two: Equivalent Fractions*

Objectives:
The seventh grade students will explore equivalent fractions and should be able to recognize various equivalent fractions. The students should be able to use fraction strips as a tool to represent equivalent fractions. The students should be able to use an Excel spreadsheet to create fractional plots of land for planting crops.

Standards:
θ  NYS Key Ideas: 2A, 3A
θ  NCTM Standards: Number and Operation, Problem Solving, Communication, and Connections

Materials:
θ  Computer with Excel Spreadsheets
θ  Fraction Strips for each student
θ  Overhead fraction strips
θ  Printer
θ  Pencils and overhead markers

Opening Activity:
First we will begin a brief discussion of the students' findings of various fractions outside of the classroom that was assigned for homework the night before. Then each student will take out their pre-made fraction bars, halves, thirds, fourths, fifths, sixths, tenths, and twelfths. Using the overhead fraction bars we will begin to explore fractional equivalencies.

NOTE:
One half equals two fourths.
One fifth equals two tenths.
Ten twelfths equals five sixths.
These will be done as examples and it is important to remind students that there is more than one answer and all correct answers are accepted.

Main Activity:
Students will work in pairs at the computer lab to complete the excel activity. This activity will provide another visual representation of equivalent fractions. The directions will be explained specifically for the students for the first problem and then they can work together to complete the other fractional parts.

1. Open the Excel spreadsheet.
2. Click on the box between 1 and A so all of the spreadsheet is highlighted. Now go in between A and B until the double arrow appears. Click and drag towards A until you get a small, square cell. Let go and your spreadsheet should all have small, square cells.

3. Each square represents an acre. The first plot Tom planted was 84 acres of corn. He's betting heavy that corn is going to be very popular and earn him some money. The length was 12 acres and the width was 7 acres. Starting in cell A1, highlight a 12 x 7 acre plot. Go to the Formatting Bar and use the Paint Bucket to color it.
4. We need to label this plot, so go to the Drawing Bar and click on Text Box. Go to the middle of Tom's corn plot, click and drag the Text Box open. Inside the Text Box, type corn=1 whole. Size the Text Box around the text.
5. Right across the street to the south, Tom has another 84 acre plot. So draw another

plot of the same size starting in cell A9 below the corn plot and color it the same color.

6. This time Tom wants to divide the plot into 3 equal parts and plant 3 varieties of apples: fujis, reds, and romes. Let's divide Tom's plot into 3 equal parts. Start in cell A9, drag to D9, then drag down to row 15. Color this a new color. Now, you go ahead and divide the rest of the plot so we have 3 equal parts.

7. Using the Text Box, label each block with fujis=1/3, reds=1/3, and romes=1/3.

8. Now you should see that even though Tom has divided his second orchard into 3 equal parts, it is still equal in size to his corn plot. In other words, these plots are equal, or equivalent to each other. In adding fractions, it looks like this: 1/3+1/3+1/3=1.

9. However, Tom's not done planting yet. Across the street to the west, he plants two more plots of equal size. Starting in cell N1, put in another 84 acre plot. Do the same staring in cell N9. Color both.

10. Divide one plot into 4 equal parts and the other into 6 equal parts. Color each fraction of the plot a different color. Using Text Box, label each fractional part either 1/4 or 1/6.

11. Highlight all plots and go to File>Print Area>Set Print Area. Then Press Control P and print out your equivalent plots.

NOTE:
As the students are working we will be walking around to make sure that all pairs are doing everything correctly. A worksheet of the steps above will be made up for each group of students so that they can follow along if they get lost.

Closing Activity:
The class will have a brief open discussion about the information that was discovered about Tom's plots of land. We will reiterate the ideas behind the equivalent fractions that we just found; there are three 1/3's in a whole so 3/3 equals 1 whole. We will touch on other different equivalent fractions that can be tied into this lesson with the plots of land.

NOTE:
Realistically there probably will not be a lot of time left over for the closing activity so the topic can be refreshed the next day in the beginning of the lesson if there are any questions or new findings.

Homework:
The students will reflect in their math journals about equivalent fractions and what they learned in today's lesson.

# *Day Three: Comparing Fractions*

Objectives:
Students will use fraction circles to explore fractional equivalencies and inequalities.  The students should be able to compare a pair of fractions and determine which is greater or smaller.

Standards:
θ   NYS Key Ideas: 2A, 2B
θ   NCTM Standards: Number and Operation, Algebra, Problem Solving, and Communication

Materials:
θ   White Boards
θ   Dry Erase markers
θ   Fraction circles worksheet

Opening Activity:
We will begin by having an empty circle drawn on a white board and I will ask a student to come up and show how to represent one half.  Another empty circle will be drawn next to that and another student will come up to show one third.  This activity is just to see where they are and get them thinking about fractions.  After the two circles are correctly filled in then the students will have to decide which one is greater and a student will have to come up and draw the inequality sign correctly.  We will do another example in which the students come up and draw in the correct fractions and inequality signs to make sure that they understand the concept.

NOTE:
A brief review may be needed concerning the inequality signs and which one means greater than and which means less than.

Main Activity:
Students will work independently on a worksheet with several inequality fraction problems.  The students must fill in the correct part of the first circle to represent the first fraction and the second circle must be filled in to show the second fraction and then an inequality sign will be filled in to show which fraction is bigger and which fraction is smaller.  The worksheet should not take that long but what the students do not finish in 15 minutes will be assigned as homework.

Closing Activity:
We will play a game as a closing activity.  The class will be separated into two teams and we will use three white boards in the front of the room.  Three players from one side will come up to the front of the room and each receive a white board.  I will say one fraction and one student will write it on his/her white board and then I will say another fraction and another student will write that on his/her white board so that everyone can see.  The last student must figure out which inequality sign should be placed in the middle of the students.  So when they are finished there will be an inequality equation using white boards at the front of the room.  No one is to help the student with the correct sign.  Each student of the three gets a turn at placing the correct inequality sign and if all three students get their problems correct then their team receives 5 points.  We will go through as many students as time will allow and at the end the team with the most points will get a choice of candy from the candy box.

NOTE:
This little activity with the white boards is a great assessment tool to see how well the students understand the use and placement of inequality signs and the idea of comparing fractions.

Homework:

The homework assignment will be for those students that did not finish the fraction worksheet in 15 minutes. They must complete the worksheet to hand in the following day. Every student must write in their math journals how they felt about the lesson, what they learned, and what they already knew.
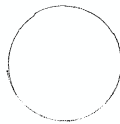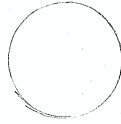
NOTE:
This will provide insight to their math learning experience.

Name:_____

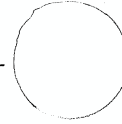Use Fraction Circles or sketches to answer each question by
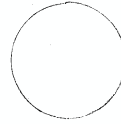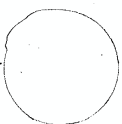writing < or >.

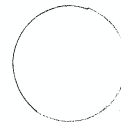$\frac{1}{2}$    $\frac{2}{2}$    ◯    ◯        $\frac{1}{2}$    $\frac{2}{6}$    ◯    ◯

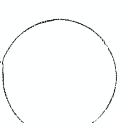$\frac{2}{3}$    $\frac{1}{3}$    ◯    ◯        $\frac{2}{5}$    $\frac{6}{9}$    ◯    ◯
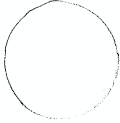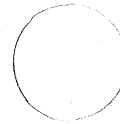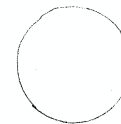
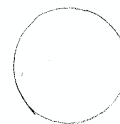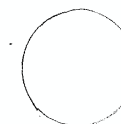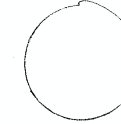$\frac{3}{6}$    $\frac{5}{6}$    ◯    ◯        $\frac{1}{4}$    $\frac{1}{6}$    ◯    ◯

$\frac{4}{5}$    $\frac{2}{5}$    ◯    ◯
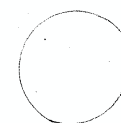
$\frac{8}{9}$    $\frac{9}{9}$    ◯    ◯

$\frac{7}{8}$    $\frac{2}{9}$    ◯    ◯

$\frac{5}{6}$    $\frac{2}{4}$    ◯    ◯

$\frac{3}{4}$    $\frac{3}{8}$    ◯    ◯

# *Day Four: Prime Factorization*

Objectives:
The students should be able to find the prime factorization of a number. The students should also be able to find the greatest common factor (GCF) of two numbers. This will aide in the computation of fractions.

Standards:
θ   NYS Key Ideas: 2C, 3B
θ   NCTM Standards: Number and Operation, Problem Solving, Communication

Materials:
θ   Graph Paper with large squares
θ   Markers
θ   Pencils and erasers
θ   Math Journal
θ   White boards and dry erase markers
θ   Worksheets for each student

Opening Activity:
Students will work in pairs and each pair will receive several pieces of graph paper. A number will be written on the chalkboard and the students must find as many ways as they can to make a rectangle or square using the number on the board on the graph paper.

NOTE:
If two is written on the board then the students can draw a 1 X 2 rectangle or a 2 X 1. Another example is 12. Twelve can be shown by a 3 X 4 rectangle, a 2 X 6 rectangle, and also a 1 X 12. Now let's consider the number 7. Seven can only be represented as a 1 X 7 or 7 X 1 rectangle, which shows that the only factors of seven are 1 and 7. The dimensions of the rectangles are the factors of the numbers represented. Ask students questions to lead them to this discovery if they are struggling.

Main Activity:
Discuss the vocabulary words, prime and composite numbers by using the examples from the opening activity.

NOTE: 12 has more than two factors, therefore it is called a composite number. 7 only has two factors, 1 and itself, therefore it is called a prime number.

The following examples will be placed on the overhead to reiterate the vocabulary words.
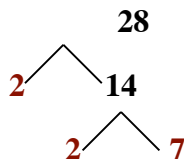A.) 11    B.) 12    C.) 13    D.) 14    E.) 15
The students must decide whether each of these numbers are prime or composite.
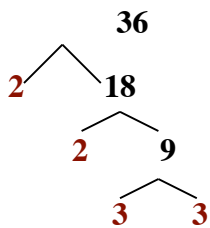
NOTE:
A.) Prime    B.) Composite    C.) Prime    D.) Composite    E.) Composite


Students will then be shown how to use a factor tree to find the prime factors of a number.

As shown the prime factors of 28 are 2, 2, and 7, or $2^2$ and $7^1$ because they are all prime numbers and cannot be factored any further.  Students will take out their white boards and markers to do a factor tree for the number 36.

NOTE:

$$
\begin{array}{c}
\textbf{36} \\
2 \quad\diagup\diagdown\quad \textbf{18} \\
\textbf{2}\quad\diagup\diagdown\quad \textbf{9} \\
\textbf{3}\quad\diagup\diagdown\quad \textbf{3}
\end{array}
$$

This shows that the prime factors of 36 are 2, 2, 3, and 3, or $2^2$ and $3^2$.  Ongoing assessment from the white board is used to see if another example is necessary.
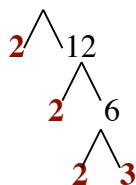
<u>Closing:</u>
Students will write in their math journals about the difference between a prime and a composite number and also make a factor tree for the number 2-4 on the worksheet that was handed out.

    2.  **4**              3.  **24**                  4.  See Above

**2** ∧ **2**              **2** ∧ 12
                               **2** ∧ 6
                                     **2** ∧ **3**

<u>Homework:</u>
Students will finish the worksheet that will be handed in the following day so that an assessment can be done on whether or not the students understood the material.

Name:_____     Date:_____

Find the prime factorization of each number.

1. 6

   **2,3**

2. 4

   **2,2**

3. 24

   **2,2,
   2,3**

4. 28

   **2,2,7**

5. 18

   **2,3,
   3**

6. 12

   **2,2,
   3**

7. 84

   **2,2,3,7,**

8. 62

   **2,31**

9. 72

   **2,2,
   2,3,
   3**

10. 48

    **2,2,2,2,3**

11. 26

    **2,13**

12. 10

    **2,5**

13. 42

    **2,3,7**

14. 60

    **2,2,
    3,5**

15. 36

    **2,2,
    3,3**

16. 16

    **2,2,2,2**

17. 82

    **2,41**

18. 20

    **2,2,
    5**

# *Day Five: Mixed Numbers and Fractions*

Objectives:
The students should be able to recognize and define a mixed number. The students should also be able to convert between mixed numbers and improper fractions.

Standards:
- θ  NCTM Standards: Numbers and Operation, Problem Solving, and Communication
- θ  NYS Key Ideas: 2A, 3A

Materials:
- θ  Overhead
- θ  Overhead Pattern Blocks
- θ  Pattern blocks
- θ  Textbook
- θ  Worksheets

Opening Activity:
Students will be given a warm up exercise to get their mind thinking about fractions. Students will work on their own for a 5-minute period.

NOTE:
Students are to be encouraged to reduce the fraction. The students will be provided with a sheet of blank circles so that they can use them to make the fractions if they need to.

What part of an hour is-
30 minutes?  (1/2)                    15 minutes?  (1/4)
10 minutes?  (1/6 or 10/60)          50 minutes?  (5/6 or 50/60)

How many hours are-
120 minutes?  (2)                     90 minutes?  (1 _)
150 minutes?  (2 _)                   75 minutes?  (1 _)

Review the possible answers and ask for any different solutions to share.

Main activity:
Students will be working with pattern blocks independently for this activity, assuming there are enough pattern blocks for each child.
For the sake of this part of the lesson, the students will be instructed that the          hexagon will stand for one whole. The value of the remaining shapes will be calculated using the pattern blocks. To do this, students will be instructed to cover the hexagon with each specific shape to determine the fractional value. The answers will be discussed and placed on the overhead.

NOTE:
The students will be instructed to copy these values in their notebook for a reference.

The values =              Hexagon = 1
                          Trapezoid = 1/2
                          Rhombus = 1/3
                          Triangle = 1/6

It is extremely important that the students understand how to come up with the values before moving on. As the students work to figure out the values an informal assessment will be taking place through observation and walking around.

*Example #1:*

NOTE:
It is helpful to remind students that for this problem, one rhombus is equal to the fractional value 1/3.

8 Rhombuses will be displayed on the overhead to show 8 thirds. (eight pieces each with a value of 1/3 = 8/3.) Students will be asked to name the display on the overhead.
            Possible responses: 8/3, 1 and 5/3, 2 and 2/3.
After the responses are discussed, the rhombuses will be rearranged to show two wholes and a fractional part. The way it is represented is called a mixed number. On the overhead, the students will be shown: 8/3 = 3/3 + 3/3 + 2/3 = 2 and 2/3.
Students will be asked how 8/3 can be equal to 2 and 2/3. Discuss responses.

*Example #2:*

Students will be asked to work with the person nearest them for the next problem. With only using triangles, students will be asked to represent the mixed number 2 and 1/6. Answers will be discussed.

NOTE:
Hints may be given as the teacher walks around the room to check for accuracy.

Answer: If each triangle is equal to 1/6 and we need to get to the number 2 1/6, first we need two wholes (6 triangles for each whole, so 12 triangles for 2 wholes) and then 1/6 can be represented by one more triangle. Total = 13 triangles = 2 1/6

*Example #3:*

Working with a partner, students will be asked to use the pattern blocks to represent the mixed number 3 and 5/6.

NOTE:
Students will be instructed that there is a possibility to come up with more than one answer for the problem. Students are to be told not to feel intimidated to combine different pattern blocks to arrive at an answer.

Answers will be discussed.
Possible answers: 3 hexagons and 5 triangles, 6 trapezoids and 5 triangles, or 23 triangles etc.
                3 5/6 = (6/6 + 6/6 + 6/6 + 5/6)

NOTE:
On-going assessment will be used to determine if another example is needed before the class moves on to the worksheet. Another possible example can be 4 and _.

            Possible answers: 4 hexagons and 1 trapezoid
                               6 rhombuses and 3 triangles
                               8 trapezoids and 3 triangles

<u>Closing Activity:</u>
The students will be broken up into groups of 4-5 and each group will be given a mixed number and they have to figure out 3 different ways to represent it using the pattern blocks. They will be given 8 minutes for this group activity and then each group will briefly present their mixed number to the group on the overhead.
1. 4 1/6          2. 3 2/3          3. 2 2/6          4. 1 1/2

<u>NOTE:</u>
The group activity will allow for assessments by observation and the closing presentations will also offer a final assessment for the lesson to see where the students are at and if they understand the material.

<u>Homework:</u>
In the math journals each student will make three mixed numbers and draw the corresponding shapes, or pattern blocks that correctly represent the mixed number. They must also write about one place that they have seen mixed numbers outside of math class.
Answers will vary for this homework.

# *Day Six: Decimals and Percents*

Objectives:
The students should be able to recognize decimals and percents and know the relationship to fractions.  The students should be able to compute in decimals, fractions, and percents fluently.

Standards:
- θ NCTM Standards: Number and Operation, Problem Solving, Communication, and Connection
- θ NYS Standards: 2A, 2B, 3A

Materials:
- θ Fraction Bars
- θ Percent Worksheet
- θ Overhead with markers
- θ Math notebooks and pencils for students
- θ Calculator

Opening Activity:
There will be a review on the students' prior knowledge of decimals.  A little introduction activity will be done using fraction strips.  The fraction strips with the tenths will be used on the overhead to show a simple decimal problem.  We will use a strip with four tenths shaded in and show that 4/10 equals 0.4 because the four must be placed in the tenths place.  Then for a real life example we will ask how to represent half of a dollar as a decimal.  The correct response will be **.50 cents**.

NOTE:
Depending on the comprehension level more examples will be done or if the students catch on really quick then more examples will not be needed.  If more examples are needed then we can stick with the real life examples, such as the fraction of a dollar that is .25 cents.  The fraction is **1/4**.
Another example is if I drive 50 miles and use _ of a tank of gas, how can that be represented as a decimal?  **.75**
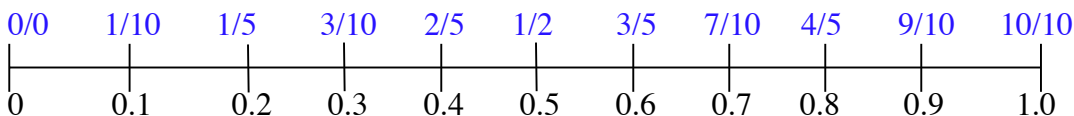
Main Activity:
The students will be shown how to change a fraction to a decimal by dividing the numerator by the denominator.
Example: 3/5 = 3 divided by 5 = .6
5/8 = 5 divided by 8 = .625

Students will next be shown how to change a decimal to a fraction.
1. Read the decimal to find the denominator.
2a. Write the decimal digits over 10, 100, or 1000.
.75 is 75 hundredths = 75/100

2b. Reduce if necessary
75/100 = 3/4

| 0/0 | 1/10 | 1/5 | 3/10 | 2/5 | 1/2 | 3/5 | 7/10 | 4/5 | 9/10 | 10/10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1.0 |

The students will get this number line and the decimals will be filled in. They will have to fill in the equivalent fraction at the top of each line for the decimals.

NOTE:
There will be ongoing assessment during this activity to see where the students are and if they need more help on the topic.

Closing Activity:
The closing activity will use fractions and decimals to compute statistics. The students will be given a chart of free throw attempts and successes and they have to make fractions and convert the fractions to decimals and then to percents. Eileen's total will be done as a group so that we can assess whether or not they need more instruction. If more needs to be done then we will go on and do Tom's total also. The students will then complete the rest of the table by themselves.

**Basketball Players' Statistics**

| Player | Free Throws | Attempts | Fraction, Decimal and Percent |
|--------|-------------|----------|-------------------------------|
| Eileen | 70 | 130 | 70/130 or .5385 or 53.85% |
| Tom | 55 | 190 | 55/190 or .2895 or 28.95% |
| Sue | 101 | 126 | 101/126 or .8016 or 80.16% |
| Paul | 85 | 180 | 85/180 or .4722 or 47.22% |

NOTE:
The students will need to use a calculator to do the chart and while they are working independently an informal assessment will be done by walking around and checking on them.

Homework:
For homework the students must complete the following chart.

Name:_____          Date:_____

Directions:  Janice went to a baseball game and recorded the following information but she forgot to fill in some of the spaces.  Let's help Janice and fill in the blanks in the chart.

| Player | Hits | Times at Bat | Batting Average (Hits/Times at Bat) |
|---|---|---|---|
| John Pacer | 47 | 164 | 47/164 or .2866 |
| Philip Leston | 35 | 137 | 35/137 or .2555 |
| Travis Tapinski | 32 | 93 | 32/93 or .3441 |
| Lenny Krates | 31 | 100 | 31/100 or .31 |

1.  In what order are the players listed?_____
    Descending order of the number of hits.

2.  Who had more times at bat Philip, Travis, or Lenny?_____
    Philip

3.  Do you think John Pacer or Travis Tapinski had hits a greater fraction of their times at bat?  Why?_____
    _____
    Travis Tapinski because .3441 is greater than .2866.

4.  If you could pick one of these players, which one would you want on your team? Why?_____
    Answers may vary but it should be Travis because he has the best batting average.

# *Day Seven: Adding and Subtracting Fractions*

Objectives:
The students should be able to add and subtract fractions.  They should be able to determine fractional values of manipulatives as well as combine cuisenaire rods to represent fractional equations.

Standards:
 θ    NCTM Standards: Number and Operation, Problem Solving, Communication, and Connection
 θ    NYS Standards: 2A, 2B, 3A

Materials:
 θ    Cuisenaire rods for entire class
 θ    Math notebook and pencils
 θ    Overhead cuisenaire rods

Opening Activity:
The class will be broken into four groups with each group receiving a set of cuisenaire rods.  Students will be instructed to combine one yellow and one black cuisenaire rod end-to-end.  This combination will be called a Yack.  With the remaining rods, students will be asked to make one-color combinations that will match the length of the Yack. Students will then find the fractional values for the of the one color combinations in relation to the Yack.  Students will copy the values down and have an open discussion of their findings.

NOTE:
For this activity, a "Yack" will be considered one whole unit.

Main Activity:
Students will use the information from the opening activity to play an adding and subtracting of fractions game.  Working in pairs, students will place a set of cuisenaire rods in a small box.  One player will be instructed to randomly select three rods from the box.  In the students' math notebook, the player that selected the three rods will write two addition sentences about the three rods.

*Example #1*:
1/3 Yack + 1/4 Yack + 1/6 Yack = 3/4 Yack

Next, the player will select two of the three rods and write two subtraction sentences about them.

*Example # 2*:
1/3 Yack – 1/4 Yack = 1/12 Yack.

The opposing player will then check the notebook for accuracy.  If the player is correct, he/she will earn two points.  If the opposing player finds an error, he/she will receive the two points.  The player with the highest score when time runs out is the WINNER.

Note:
This particular game should last about 3-4 rounds.  Also any discretion in scoring will be decided by the teacher.

Closing Activity:
Students will complete the following set of problems in their math notebook. After 5 minutes the answers will be placed on the board and discussed.

1. 3/7 + 4/7 = 1
2. 5 1/6 + 4/6 = 4 2/3
3. 7/8 + 3/4 = 13/8
4. 1 3/6 – 1 2/6 = 5 5/6
5. 4/5 – 1/10 = 7/10
6. 6/9 - 1/3 = 3/9 or 1/3


Homework:
Students will use money to come create sentences that involves adding and subtracting of fractions.  They will combine quarters, nickels, and dimes to come up with 8 fractional values.(one dollar = 1/1)  Students must write down the fractional value as well as exactly what they combined to reach that value.  They will then write 3 sentences for each addition and subtraction from their values they have created.
Students will be asked to write a short reflection on other ways that they see fractions in the real world.

# *Day Eight: Multiplying and Dividing Fractions*

Objectives:
The students should be able to identify and solve multiplication and division problems with fractions. The students should develop a their multiplication and division skills through a hands-on representation.

Standards:
θ   NCTM Standards: Number and Operation, Problem Solving, Communication, and Connection
θ   NYS Key Ideas: 2A, 2B, 2D, 3A

Materials:
θ   Several sheets of paper for each student
θ   Pen/Pencil
θ   Overhead and markers
θ   Pattern Blocks for students and overhead
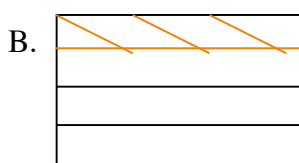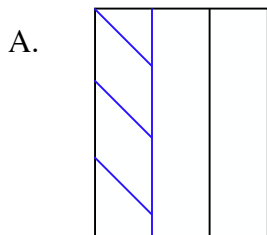θ   Pattern Block worksheet

Opening Activity:
Two fractions will be written on the board and the students will be asked to multiply them. The answers and methods of solving will be discussed. I will ask if there are any other ways to solve the problem and lead the class into the model of paper folding. I will demonstrate a sample problem for the class and have them follow along.
        1/3 * 1/4 = ☐

NOTE:
A. Fold paper in thirds the long way and shade one third. B. Then open it up and fold the paper in fourths the short way and shade in one fourth of the whole paper. C. There is one square that was shaded both times out of twelve total squares so the answer is 1/12.
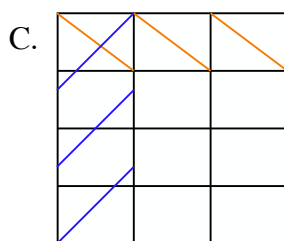


The students will then do three more by themselves.
        1/2 * 2/3 = 2/6
        3/4 * 1/3 = 3/12
        2/5 * 1/4 = 2/20

NOTE:
The students will be expected to reduce the fractions to lowest terms.

<u>Main Activity:</u>
Students will be given a set of pattern blocks and a worksheet. The worksheet contains a figure that is represents one whole and the students must find the fractional value of each pattern block. The students will work individually on this part and then the answers will be discussed as a whole group. The students will then work in pairs to complete the rest of the worksheet.

<u>NOTE:</u>
Walking around and observing during this part will provide an informal assessment. The students will be encouraged to find different ways to solve the problems but they must show their method with pattern blocks.

<u>Closing Activity:</u>
We will go over the answers as a class and discuss some alternative methods that the students used to solve the problems. Questions will be answered and addressed, if needed.
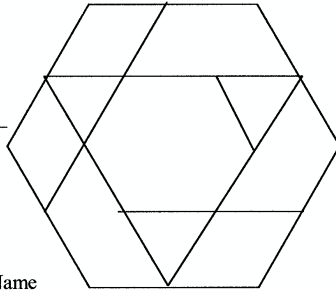
<u>Homework:</u>
Each student will find a recipe from home and copy it down. They will then proceed to double the recipe and halve the recipe. They must hand in the copied recipe, the doubled recipe and the halved recipe.

Name:_____

Date:_____

If this shape is a whole,
what fraction of the whole
is a single

1.  small diamond? _____
2.  triangle?_____
3.  trapezoid?_____
4.  hexagon?_____

Complete each equation. Name
the shape.  Use pattern blocks to verify answers.

5.  What piece is 1/6 of ¾?  1/6 * ¾=____        shape_____
6.  What piece is 2/3 of 1/8?  2/3 * 1/8=_____        shape_____
7.  What piece is ½ of ¼?      ½ * ¼ = _____        shape_____

Solve the equations, use the pattern blocks to verify.

8.   What part of a trapezoid is a diamond?          p * 1/8=1/12        _____
9.   A diamond can be divided into how many triangles?       1/12÷n=1/24        _____
10.  What part of 2 hexagons is 3 triangles?          p * ½=1/8        _____

Using the pattern blocks make a large triangle where a trapezoid is 1/3 of the whole then
draw it on your paper.  If the large triangle is one whole, what fraction if the whole is a
11. hexagon? _____                    12. diamond? _____
13. small triangle? _____

Name the shape that is
14. 1/6 of 2/3 _____        15. 2/3 of 1/3 _____

# *Day Nine: Fraction, Decimals, and Percents on Calculators*

Objectives:
The students will develop estimation skills with fractions and practice more with operations on fractions. The students will also become more familiar with using the calculator to do operations on fractions.

Standards:
- θ   NCTM Standards: Number and Operation, Problem Solving, Communication, and Connection
- θ   NYS Key Ideas: 2A, 2B, 3A

Materials:
- θ   TI-73 calculators
- θ   Maze worksheets (one for decimals, one for fractions)
- θ   Estimation Grid worksheet
- θ   Pen/Pencil
- θ   Notebook
- θ   Winner sheet for each station
- θ   Directions for Between a Rock and a Hard Place

Opening Activity:
There will be four different activities that will be discussed as a group before the students break up into smaller groups. The directions for each activity will given and a brief description on how the groups will operate will be given.

Main Activity:
Four different stations will be set up and there will be four groups of 5-6 students.

NOTE:
Calculators can be used in every activity. The winner in each activity in each group will write down his/her name on the winner's sheet. Ten minutes will be allowed for each station.

Station #1: Estimation Shoot
In duos or trios the students will play this game. The first player picks two numbers and an operation and crosses all three out. The student does the operation chosen with the two numbers that he/she chose and finds the solution. The students must then look at the grid at the bottom of the page to see how many points he/she received. Each player does this for five rounds and keeps a cumulative score and the highest score at the end of five rounds wins. The winner writes their name on the winner's sheet and if time allows they may play again.

Station #2: Maze with Decimals
Station #3: Maze with Fractions
Both of these games have the same rules.
Each player begins with 100 and they pick a path to the finish. As they go along they must perform the operation that is written. The students cannot go up a route that was already traveled down but they can go sideways. This game is played first to see who can get the highest score out of the group and if time allows the group can play again to see who can get the lowest score. The player in each group is recorded.

Station #4: Fraction Line

A pair or trio within the group will play this game together. There will be directions at the station for the students to follow. The object is to estimate and get in between two fractions on a number line. Each duo or trio should play best out of five and record the winner.

NOTE:
The application will already be programmed into each of their calculators.

Closing:
All of the winner sheets will be collected from each station and the class will regroup as a whole. The winners will each receive a prize, piece of candy or a homework pass. The class will briefly talk about the different activities and what was learned at each station.
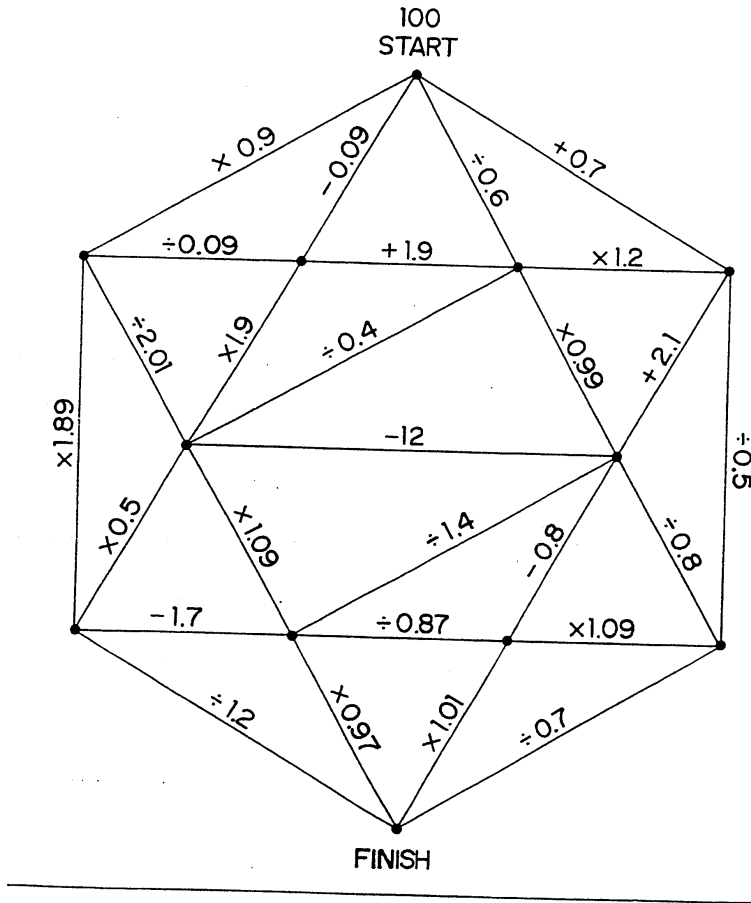
NOTE:
This will make the class fun for the students and allow time for me to walk around while they work and play to informally assess their strengths and weaknesses.

Homework:
The students will write in their math journals about the games that they played and which one was their favorite and why.
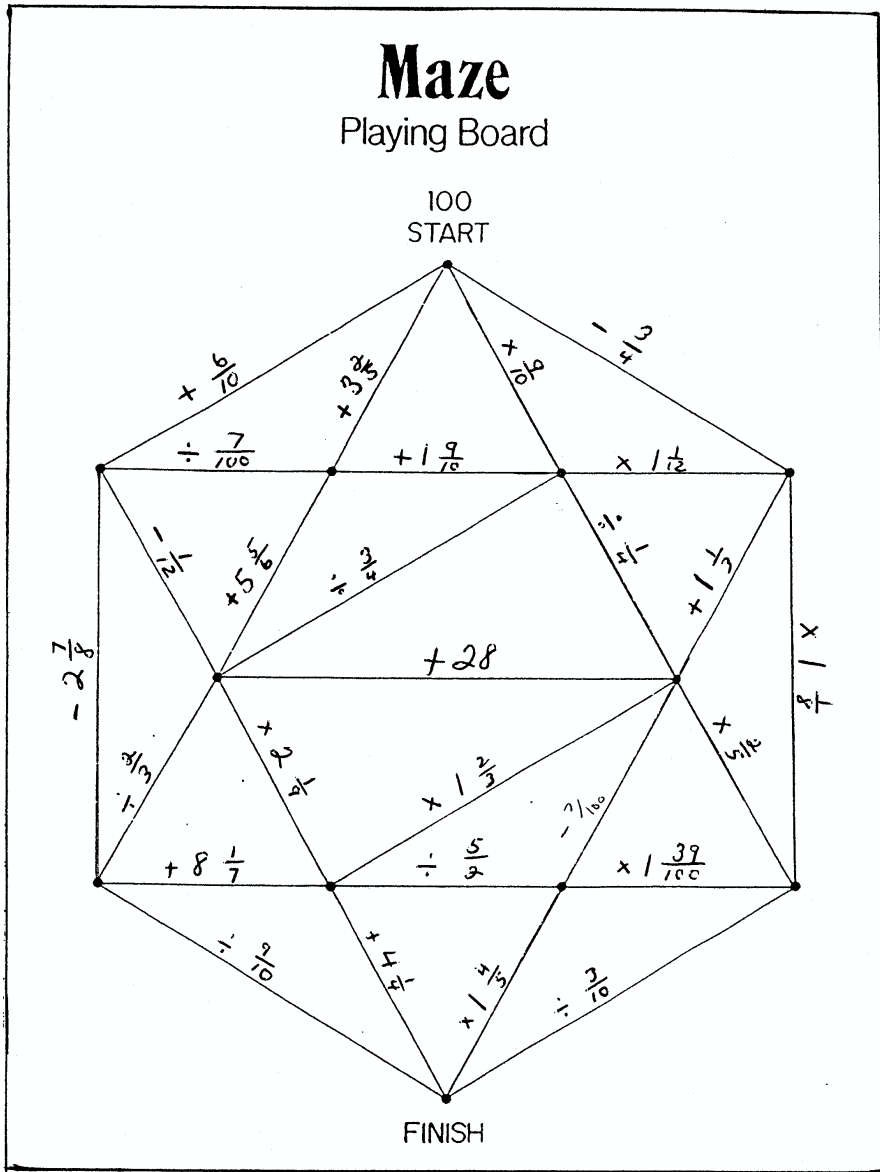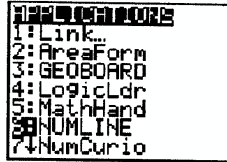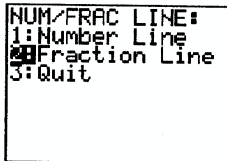
# Maze

## Playing Board



100
START

× 0.9  −0.09  ÷0.6  +0.7

÷0.09  +1.9  ×1.2

÷2.01  ×1.9  ÷0.4  ×0.99  +2.1

×1.89  −12  ÷0.5

×0.5  ×1.09  ÷1.4  −0.8  ÷0.8

−1.7  ÷0.87  ×1.09

÷12  ×0.97  ×1.01  ÷0.7

FINISH

# Maze
## Playing Board



100
START

FINISH

**Between a Rock and a Hard Place**

1. Start the Number Line application by pressing **APPS**.

```
APPLICATIONS
1:Link…
2:AreaForm
3:GEOBOARD
4:LogicLdr
5:MathHand
6:NUMLINE
7↓NumCurio
```

2. Press **2** to choose the fraction line.

```
NUM/FRAC LINE:
1:Number Line
2:Fraction Line
3:Quit
```

3. Set the window as shown.

```
WINDOW
 Min=0
 Max=1
 Dec Frac
Upper Indicator
 Start=0
 Step=1
↓     Frac  % Off
```
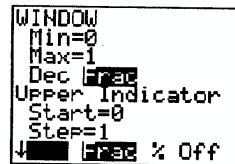
4. Press graph to see the number line interval.

```
0

0              1
```
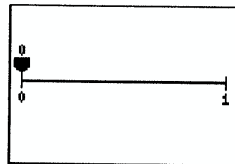
5. Press **DRAW** and then **1** to choose DrawLabel.

```
DRAW
1:DrawLabel
2:ClrDraw
```
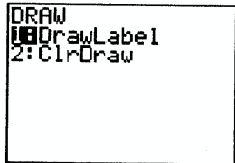
# Estimation Shoot Grid One

| | | | | | | |
|---|---|---|---|---|---|---|
| $\frac{1}{2}$ | $\frac{2}{3}$ | $\frac{1}{5}$ | $\frac{7}{8}$ | $\frac{7}{15}$ | $\frac{9}{19}$ | $\frac{21}{23}$ |
| $1\frac{2}{7}$ | $1\frac{3}{11}$ | $1\frac{15}{17}$ | $1\frac{4}{9}$ | $1\frac{1}{8}$ | $1\frac{5}{6}$ | $1\frac{9}{10}$ |
| $2\frac{1}{10}$ | $2\frac{20}{21}$ | $2\frac{3}{17}$ | $2\frac{14}{27}$ | $2\frac{4}{5}$ | $2\frac{1}{2}$ | $2\frac{3}{4}$ |
| $3\frac{2}{7}$ | $3\frac{1}{3}$ | $3\frac{2}{5}$ | $4\frac{1}{2}$ | $4\frac{7}{9}$ | $4\frac{3}{5}$ | $4\frac{1}{9}$ |
| 5 | 5 | 5 | 5 | 5 | 6 | 6 |
| 7 | 7 | 7 | 7 | 8 | 8 | 8 |

Operations: + + - - x x x x ÷ ÷ ÷ ÷
+ + - - x x x x ÷ ÷ ÷ ÷



0          5          22          44

+10 pts.    +5 pts.      -3 pts.       0 pts.      +9 pts.

Campbell & Matla – page 39
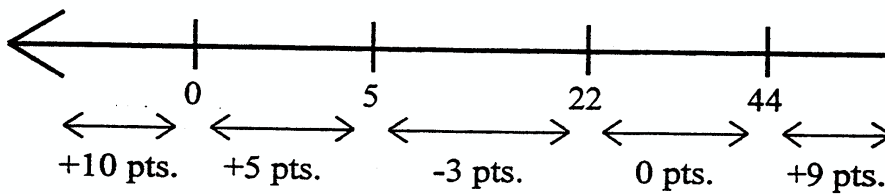
# *Day 10: The Wrap Up and Quiz Day*

Objectives:
The students will wrap up the fraction unit and demonstrate the methods and new knowledge that they have acquired.  The students will see how much they learned in the unit and weaknesses that may need to be addressed.

Standards:
θ   NCTM Standards: Number and Operation, Problem Solving, Communication, and Connections
θ   NYS Key Ideas: 2A, 2B, 3A

Opening Activity:
We will briefly review the concepts that were taught in the unit and clarify any confusion that the students may have.
We will ask specific questions regarding the information that was taught to see how well the students understood the concepts.
     "What is 4/5 + 2/10?"  10/10 or 1
     "What is _ - _?"  _
     Write 1 3/5 as an improper fraction.  8/5
     Complete a factor tree of 48.
     Use the paper folding technique to show 1/3 times 1/4.

Main Activity:
Each student will be given an index card with a number on the top and a number on the bottom.  The numbers could be percents, decimals, or fractions.  One child begins by saying "I have .20, who has 80%?", the student that has an equivalence of 80% in a fraction or decimal must speak next.  The next answer would be, "I have 4/5, who has 9/6?"  The game goes on and on until all of the cards have been used and each child has spoken.

NOTE:
If someone is stuck then the class will hold an open discussion on the possibilities of an answer.

Closing Activity:
As a closure for the unit the students will take a brief quiz to assess what was learned.

Homework:
There will be no homework for the end of the unit.

Name:_____          Date:_____

Find two equivalent fractions

1.  2/5  _____

          _____

Fill in the correct inequality sign to make the sentence true.

2.   16/40 _____ 7/12

Make a factor tree for the following number.

3.                              36

Change the mixed number into an improper fraction.

4.     5 _  = _____

Change the fraction to a decimal and then to a percent.

5.   5/6 = _____  = _____%

Add or subtract the following.

6.  1/4 + 2/8 =_____          7.  3/4 - 1/16 = _____

Multiply or divide the following.

8.  2/5 * 7/9 = _____          9.  5/8   2/3 = _____

| | | | | | |
|---|---|---|---|---|---|
| 15% <br><br> 1.75 | 1 ¾ <br><br> 200% | 4/2 <br><br> 0.01 | 1% <br><br> 5/2 | 250% <br><br> 0% | 0/100 <br><br> 1/20 |
| 5% <br><br> 0.1 | 1/10 <br><br> 20% | 20/100 <br><br> 1/4 | 0.25 <br><br> 30% | 0.3 <br><br> 33 1/3% | 1/3 <br><br> 50/100 |
| 1/2 <br><br> 2/3 | $0.\overline{6}$ <br><br> 75% | 3/4 <br><br> 90/100 | 9/10 <br><br> 1 | 100% <br><br> 12 ½ % | 1/8 <br><br> 0.4 |
| 2/5 <br><br> 16 2/3% | 1/6 <br><br> 125% | 1 ¼ <br><br> 1.5 | 3/2 <br><br> 12/10 | 120% <br><br> 4/3 | $133.\overline{3}\%$ <br><br> $0.8\overline{3}$ |
| 5/6 <br><br> 12/20 | 0.6 <br><br> 5/8 | 62 ½% <br><br> 8/40 | .20 <br><br> 80% | 4/5 <br><br> 9/6 | 150% <br><br> 30/200 |

| | | | | | |
|---|---|---|---|---|---|
| 15%<br><br>1.75 | 1 ¾<br><br>200% | 4/2<br><br>0.01 | 1%<br><br>5/2 | 250%<br><br>0% | 0/100<br><br>1/20 |
| 5%<br><br>0.1 | 1/10<br><br>20% | 20/100<br><br>1/4 | 0.25<br><br>30% | 0.3<br><br>33 1/3% | 1/3<br><br>50/100 |
| 1/2<br><br>2/3 | $0.\overline{6}$<br><br>75% | 3/4<br><br>90/100 | 9/10<br><br>1 | 100%<br><br>12 ½ % | 1/8<br><br>0.4 |
| 2/5<br><br>16 2/3% | 1/6<br><br>125% | 1 ¼<br><br>1.5 | 3/2<br><br>12/10 | 120%<br><br>4/3 | $133.\overline{3}\%$<br><br>$0.8\overline{3}$ |
| 5/6<br><br>12/20 | 0.6<br><br>5/8 | 62 ½%<br><br>8/40 | .20<br><br>80% | 4/5<br><br>9/6 | 150%<br><br>30/200 |