Fractions for Seventh Grade

A FIVE DAY FRACTION UNIT USING FRACTION SQUARES, FRACTION BARS, TANGRAMS, AND A GRAPHING CALCULATOR
Objectives of the Unit

NCTM Standards:
   Number and Operation:

   Understand numbers, ways of representing numbers, relationships among numbers and number systems. Understand meanings of operations and how they relate to one another. Compute frequently and make reasonable estimates.

NYS Standards:
   Number 3: Mathematics

   Students will understand mathematics and become mathematically confident by communicating and reasoning mathematically, by applying mathematics in real world settings, and by solving problems through the integrated study of number systems, geometry, algebra, data analysis, probability, and trigonometry.

   Number 7: Interdisciplinary Problem Solving

   Students will apply the knowledge and thinking skills of mathematics, science, and technology and make informed decisions.

Description of Resources
Materials and Equipment
Textbook: Prentice Hall; Middle Grades Math: Tools for Success
Course 2
Partial Class set of graphing calculators  TI-73
Overhead Projector
Calculator projector for the overhead
Overhead Tangrams
Overhead Fraction Bars
Overhead Fraction Squares
Overhead Fraction Circles
Scissors
Class set of wkst 131
Class set of wkst D-14
Class set of wkst 101
Class set of wkst 102
Class set of Fraction Models: Circles wkst
Class set of Fraction Models: Bars wkst
Class set of Divisibility Tests wkst
Fraction Spinners - 5 sets
Class set of Station packets
Class set of Adding Fractions worksheet

Outline

Day 1: Reducing Fractions and Equivalent Fractions
Students will look at fractions that are equivalent and prove that they are equivalent when they reduce the fraction. Students will practice reducing fractions.

Day 2: Ordering Fractions and Comparing Them to 0, __, and 1
Students will focus on ordering fractions from least to greatest by finding common denominators. Students will then be able to compare the original fraction to 0, __, and 1 on a number line.

Day 3: Adding Fractions
Students will discover why fractions need a common denominator before adding. They will review the process of addition of fractions.

Day 4: Subtracting Fractions
Students will discover why fractions need a common denominator before subtracting. They will review the process of addition of fractions.

Day 5: Fraction Stations!
Each student will complete a station packet that involves four stations so I can assess him or her on how well they understand the information.

Day 1

Number of students: 20
Time: 50 minutes
Objective:
Students will revisit fractions. They will determine equivalent fractions using fraction squares. They will also explore the process of reducing fraction.

Materials:
- fraction squares
- fraction bars
- fraction circles
- fraction models: bars (wkst)
- fraction models: circles (wkst)
- Divisibility Tests (wkst)
- overhead

Anticipatory Set:
Students will answer in their notebooks the question of the day:

Shade 1/2 of a circle, then shade 2/4 of another circle.

Procedure:
- Review what 1/2 of a shaded circle looks like on the overhead compared to 2/4 of a shaded circle.
- Make any connection between the fractions 1/2 and 2/4.
- Demonstrate with fraction squares and fraction bars how 4/12 is equivalent to 1/3 and 6/8 is equivalent to 3/4.
- Introduce the procedure to finding equivalent fractions by multiplying the numerator and the denominator by the same number.
- Stress to the students that what they do to the top they must also do to the bottom.
- Go through the procedure to reduce fractions to simplest terms, divide the numerator and the denominator by the same number.
- Remind students that what you do to the bottom, you must also do to the top.
- Give students the following fractions and allow them to work with table partners to discover how else these fraction can be written. Showing all of their work, students are encouraged to find at least three equivalent fractions (1 smaller than the original and 1 bigger than the original).

Allow students to use the fraction model worksheets and the divisibility test table as guides.
**Assessment:**
As an exit pass, on 1/2 sheet of paper students must find an equivalent fraction for 10/12 and 9/18.

**Homework:**
- Line Up wkst p(D-14)

**Reflection:**

---

**Day 2**

Number of students: 20
Time: 50 minutes

**Objective:**
Students will continue practice with fractions by having a better sense of where fractions belong on a number line.
Materials:
- fraction squares
- TI-73 calculator
- overhead
- wkst 131
- “Build It Up” cards
- scissors
- calculator projector for overhead
- “Build It Up” number line

Anticipatory Set:
Students will answer in their notebooks the question of the day:

Order from least to greatest the following fractions:
1/3, 1/8, 1/5, 1/10
while homework is collected.

Procedure:
Go over the question of the day, focusing on the size of the pieces of the wholes using fraction squares on the overhead.

Compare those pieces to 1/2.

On the overhead, create a number line where 0, 1/2, and 1 are the prominent points labeled.

Ask students if they can put any more labels on the number line between 0 and 1 (mainly looking for 1/4 and 3/4 as extra guides).

Give students fractions such as 2/5, 6/7, 2/3, 5/8, 4/6, and 3/9.
Collectively we will add those fractions to our number line. Students will create a copy in their notebooks.

Throughout the activity give students the following tips:

When the denominator is 2 times the numerator, the fraction is close to or equal to 1/2.
When the value of the numerator and the denominator is close to being equal, the fraction is close to 1.
When the value of the numerator and the denominator are farther apart, the fraction is closer to 0.

Distribute game pieces and give directions to the game “Build It Up.” Students work with table partner using one deck of “Build It Up” cards and two number lines to create a number line where fractions are ordered from least to greatest.

One of the partners must record their number lines on a 1/2 sheet of paper to be handed in.
Demonstrate on the overhead the calculator game, “Between a Rock
and a Hard Place."
Students in the room will be split into two teams to play the game

Assessment:
As an exit pass, students will hand in their half sheet of paper from the "Build It Up" activity.

Homework:
Comparing and Ordering Fractions wkst p (131)

Reflection:

Day 3
Number of students: 20
Time: 50 minutes

Objective:
Students will continue practice with fractions by exploring the use of common denominators when adding fractions.
**Materials:**
- fraction squares
- TI-73 calculators

**Anticipatory Set:**
Students will answer in their notebooks the question of the day:

*On your graphing calculators find the sum of 5/8 and 1/8 and then the sum of 1/4 and 1/3. Describe your observations.*

**Procedure:**
Discuss what the sum of \(5/8 + 1/8\) is and what the students' observations were.
Demonstrate with fraction squares what the sum of \(5/8 + 1/8\) is.
Discuss what the sum of \(1/4 + 1/3\) is and what the students' observations were.
Show with fraction squares the sum of \(1/4 + 1/3\) and how to derive the same answer that the calculator gave us.
Review the procedure for finding the common denominators, so that we have \(3/12 + 4/12\).
Restate that when we add fraction we keep the common denominator.
Show twelfths fraction square so students can visually see that \(3/12 + 4/12\) is equal to \(7/12\).
Together practice another example where the sum needs to be reduced such as \(5/12 + 1/4\)

**Give students a word problem:**

*I bought Halloween candy: 1/4 lb for school and 2/3 lb for trick or treaters. How many pounds did I buy?*

**Assessment:**
As an exit pass, students will hand in their half sheet of paper with the following problems solved:

\[4/7 + 11/21 = \] and \[1/3 + 3/10 = \]

**Homework:**
Adding Fractions wkst
Reflection:
Adding Fractions
Clearly show all of your work

1. \( \frac{1}{3} + \frac{4}{9} = \)

2. \( \frac{3}{10} + \frac{8}{15} = \)

3. \( \frac{1}{3} + \frac{2}{5} = \)

4. \( \frac{2}{3} + \frac{3}{8} = \)

5. \( \frac{2}{7} + \frac{4}{6} = \)

6. \( \frac{1}{5} + \frac{1}{4} = \)

7. \( \frac{9}{16} + \frac{3}{8} = \)

8. \( \frac{3}{7} = \frac{1}{6} = \)

9. \( \frac{3}{10} + \frac{7}{10} = \)

10. \( \frac{1}{3} + \frac{3}{4} = \)

11. \( 5 + \frac{7}{8} = \)

12. \( \frac{5}{12} + \frac{7}{24} + \frac{1}{6} = \)
Adding Fractions

Clearly show all of your work

1. \( \frac{1}{3} + \frac{4}{9} = \frac{7}{9} \)

7. \( \frac{9}{16} + \frac{3}{8} = \frac{15}{16} \)

2. \( \frac{3}{10} + \frac{8}{15} = \frac{5}{6} \)

8. \( \frac{3}{7} = \frac{1}{6} = \frac{25}{42} \)

3. \( \frac{1}{3} + \frac{2}{5} = \frac{11}{15} \)

9. \( \frac{3}{10} + \frac{7}{10} = 1 \)

4. \( \frac{2}{3} + \frac{3}{8} = \frac{1}{1/24} \)

10. \( \frac{1}{3} + \frac{3}{4} = 1 \frac{1}{12} \)

5. \( \frac{2}{7} + \frac{4}{6} = \frac{20}{21} \)

11. \( \frac{5}{7} + \frac{7}{8} = 5 \frac{7}{8} \)

6. \( \frac{1}{5} + \frac{1}{4} = \frac{9}{20} \)

12. \( \frac{5}{12} + \frac{7}{24} + \frac{1}{6} = \frac{7}{8} \)

Day 4
Number of students: 20
Time: 50 minutes

Objective:
Students will continue practice with fractions by exploring the use of common denominators when subtracting fractions.

Standards:

Materials:
TI-73 calculators
fractions bars

Anticipatory Set:
Students will answer in their notebooks the question of the day:

On your graphing calculators find the difference of 12/16 and 7/16 and then the difference of 8/9 and 1/6. Describe your observations.

Procedure:
Discuss what the difference of 12/16 - 7/16 is and what the student’s observations were.
Demonstrate with fraction bars what the difference of 12/16 and 7/16 is.
Discuss what the difference of 8/9 + 1/6 is and what the students observations were.
Show how to derive the same answer that the calculator gave us.
Review the procedure for finding the common denominators.
Restate that when we subtract fractions we keep the common denominator.
Together practice another example where the sum needs to be reduced such as 17/18 - 7/9.

Give students a word problem:
When making food for a party, 3 of my recipes call for hamburger. One recipe calls for 3/4 lb, another requires 11/10 lb, and
a third asks for 1/2 lb hamburger. If I have 2 lbs of hamburger, do I need to buy more hamburger?

Assessment:
As an exit pass, students will hand in their half sheet of paper with the following problems solved:

\[
\frac{7}{8} - \frac{3}{12} = \quad \text{and} \quad \frac{7}{12} - \frac{2}{5} =
\]

Homework:
In the textbook p195 2-30 evens only

Reflection:
Fraction Add/Sub Homework

2. $\frac{1}{5} + \frac{3}{5} =$

4. $\frac{7}{12} + \frac{1}{6} =$

6. $\frac{4}{5} + \frac{7}{8} =$

8. $\frac{4}{3} + \frac{2}{3} =$

10. $\frac{5}{6} + \frac{7}{8} =$

12. Tell whether or not the following problem is true or false. If it is false explain why. $\frac{4}{9} + \frac{3}{9} = \frac{7}{18}$

14. $\frac{4}{5} - \frac{1}{5} =$

16. $\frac{7}{10} - \frac{1}{6} =$

18. $\frac{9}{10} - \frac{2}{5} =$

20. $\frac{5}{6} - \frac{1}{3} =$

22. $\frac{3}{5} - \frac{1}{4} =$

24. $\frac{5}{6} - \frac{1}{4} =$

26. $\frac{7}{12} - \frac{1}{12} =$

28. $\frac{2}{3} - \frac{1}{8} =$

30. $\frac{1}{3} + \frac{5}{12} =$
2. \( \frac{1}{5} + \frac{3}{5} = \frac{4}{5} \)

4. \( \frac{7}{12} + \frac{1}{6} = \frac{3}{4} \)

6. \( \frac{4}{5} + \frac{7}{8} = \frac{67}{40} = 1 \frac{27}{40} \)

8. \( \frac{4}{3} + \frac{2}{3} = 2 \)

10. \( \frac{5}{6} + \frac{7}{8} = \frac{41}{27} = 1 \frac{17}{24} \)

12. Tell whether or not the following problem is true or false. If it is false explain why. \( \frac{4}{9} + \frac{3}{9} = \frac{7}{18} \)
   This problem is false because the denominators were added together and they shouldn't be. The correct answer should be \( \frac{7}{9} \).

14. \( \frac{4}{5} - \frac{1}{5} = \frac{3}{5} \)

16. \( \frac{7}{10} - \frac{1}{6} = \frac{8}{15} \)

18. \( \frac{9}{10} - \frac{2}{5} = \frac{1}{2} \)

20. \( \frac{5}{6} - \frac{1}{3} = \frac{1}{2} \)

22. \( \frac{3}{5} - \frac{1}{4} = \frac{7}{20} \)

24. \( \frac{5}{6} - \frac{1}{4} = \frac{7}{12} \)

26. \( \frac{7}{12} - \frac{1}{12} = \frac{1}{2} \)

28. \( \frac{2}{3} - \frac{1}{8} = \frac{13}{24} \)

30. \( \frac{1}{3} + \frac{5}{12} = \frac{3}{4} \)

Day 5
Number of students: 20
Time: 50 minutes

Objective:
Students will demonstrate their skills on fractions while participating in five fraction activity stations.

Standards:

Materials:
- stations packet (wksts)  
- TI-73 graphing calculator (5)
- tangrams  
- “Build It Up” fraction game
- fraction spinners 1 and 2 (5 sets)

Procedure:
- Students will work together in prearranged groups of 5.
- Each will record their work in the station packet and have 10 minutes to complete each station.

Station 1: Reducing Fractions
- Students will reduce fractions into lowest terms possible.

Station 2: Between a Rock and a Hard Place
- Students will play fraction game, “Between a rock and a hard place,” on their graphing calculators (have calculators already set up)

Station 3: Tangrams
- Students will work with tangrams and complete tangrams worksheet.

Station 4: Spinning for Subtraction
- Students will create their own fraction subtraction problems by spinning spinner 1 for the first number and spinner 2 for the second number.

Assessment:
- Students will hand in their station packets after we have gone over any questions that they may have encountered.

Homework: no homework!
Reflection:
Fraction Stations

Name ________________________________

Members of your group:

______________________________

______________________________

______________________________

______________________________

______________________________
Reducing Fractions

Reduce each of the fractions into the simplest terms possible. Clearly Show All Of Your Work.

<table>
<thead>
<tr>
<th>Fraction 1</th>
<th>Fraction 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>11/44</td>
<td>15/35</td>
</tr>
<tr>
<td>18/27</td>
<td>24/32</td>
</tr>
<tr>
<td>36/48</td>
<td>12/30</td>
</tr>
<tr>
<td>32/34</td>
<td>35/49</td>
</tr>
<tr>
<td>12/33</td>
<td>12/18</td>
</tr>
<tr>
<td>36/48</td>
<td>16/40</td>
</tr>
</tbody>
</table>
Between a Rock and a Hard Place

Setting up the calculator: Press APPS key, choose 2 (fraction line), set window, press graph, press draw, then press 1 (draw label)

Play with 2 or more players

Player 1: Enter a fraction between 0 and 1 and press enter.
Player 2: Enter another fraction between 0 and 1 and press enter.
Next Player: Enter a fraction between the two existing fractions
Next Player: Enter a fraction between the two most recent fractions.
Play continues until a player can no longer enter a fraction between the two most recent fractions.
Record ALL fractions that are inputted.

<--|----------------------------------------------------------------------------------|-->
> 0 1

<--|---------------------------------------------------------------|-->
> 0 1

<--|---------------------------------------------------------------|-->
> 0 1

<--|---------------------------------------------------------------|-->
> 0 1

<--|---------------------------------------------------------------|-->
> 0 1
Spinning for Subtraction

Spin spinner 1 record the fraction and spin spinner two and subtract that fraction from the outcome of the first spin.

ex. spinner 1 - spinner 2 = ?

1.

2.

3.

4.

5.

6.

7.

8.