INQUIRY-BASED LESSONS FORMAT

Each lesson consists of three parts, the lesson plan, the inquiry-based lesson, and the solution.

1. The lesson plan is designed for the 4th grade teacher and consists of the following components.

1. Lesson Title: Equivalent Fractions
2. Lesson Summary: Using manipulatives the students will discover equivalent fractions.
3. Key Words: simplest form, equivalent,
4. Background knowledge: numerator, denominator, factors, and basic fraction knowledge
5. NCTM Standard(s) Addressed: Standard # 12: Strand Using models to find equivalent fractions. Developing number sense for fractions.
6. Learning Objectives: Students will be able to identify and generate equivalent fractions.
8. Suggested procedures:
   a. Teacher will unwrap 2 Hershey bars. Teacher will ask students to identify how many sections the bar is divided into. Next, the teacher will break-off 6 pieces of one bar and give it to a student. Ask the students to identify how many pieces of the bar they were given. Remind students that the number of pieces they were given would represent the numerator and the denominator would be the total number of pieces in a whole candy bar. Have a student write the fraction on the board. Now, break the second candy bar in ½. (Take special care to show the undivided side when breaking the second bar in half.) Ask the students to identify what fraction of the candy bar they have now. Have a student write this fraction on the board. Ask the students who has more candy? Ask the students how the two pieces are related. Repeat this procedure by breaking the candy bar into fourths. Ask the students, “How many of these sections (1/4) would it take to equal a ½ section?”
   b. Using Stratified Random Assignments, we will group the students. Each student will be given a flip-book. Each page in the book will have a fraction strip on it. (See flip-book attachment) Page 1 will have a fraction strip showing ½’s, page 2, 1/3’s, and so on up to twelfths. The students will then be given a sheet of overhead that has fraction strips showing ½, 1/3, 2/3, ¼, 2/4 and ¾. (See overhead attachment) The students will cut out these fraction strips and put them into an envelope. Using the worksheet, the students will be asked to take out the ½ strip and answer the questions on the ½ section of the worksheet.
9. Assessment(s): Teacher observation and worksheet will be assessed using a rubric to determine what follow-up instruction is necessary.
II. The inquiry-based lesson is designed for the 4th grade student and consists of one or more investigations. Each investigation must have:

1. A title. Equal Parts, Different Pieces
2. Team members’ names and file name (if the students need to save their work as a file): Kelly Henninger, Leslie Schafer
3. Investigation’s Goal(s): In this activity you will use fraction strips and flip-books to identify equivalent fractions. We will focus on fractions that are equivalent to halves, thirds, and fourths.

   Different Pieces, Equal Parts

Team member’s names: ______________________________________________

Goal: To discover equivalent fractions using fraction strips and flip-books.

1. Take your clear ½ fraction strip out of the envelope.
2. Predict which of the strips in your flip-book would have parts that are equal to your ½ strip. Write your predictions down on the line.

3. Why did you make those predictions? ________________________________

4. Using your clear ½ fraction strip again; check your predictions by laying the strip on each of the different fraction bars in your flip-book. Be sure to check each page in your flip-book to find all of the fractions that equal ½. Check to see where the shaded part of your clear strip falls on each fraction bar. Does the shaded part of the clear fraction strip evenly line up with any lines on the bar? If you answer yes, record the number of parts of each bar that it took to equal the ½ clear strip. If you answer no, go on to the next page of your flip-book and try the next fraction bar.

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>How many parts = 1/2</th>
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</thead>
<tbody>
<tr>
<td>1/3</td>
<td></td>
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<td>½ =  /3</td>
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<tr>
<td>1/4</td>
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<td></td>
<td>½ =  /4</td>
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<td>1/5</td>
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<td>½ =  /5</td>
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<td>1/10</td>
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<td>½ =  /10</td>
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<tr>
<td>1/12</td>
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<td>½ =  /12</td>
</tr>
</tbody>
</table>
5. Write a list of all of the fractions that equal ½.

\( \frac{1}{2} = \) __________________________________________________________

6. Looking at your list, what do you notice about all of the denominators? ________
___________________________________________________________________

7. Looking at your list, how are the numerators and denominators related? ________
___________________________________________________________________

8. Using what you have discovered, list 3 other fractions that would be equal to ½.

**Equal to 1/4**

1. Take your 1/4 fraction strip out of the envelope.

2. Predict which of the strips in your flip-book would have parts that are equal to 1/4. Write your predictions down on the line.

3. Why did you make those predictions? ________________________________

4. Using your clear 1/4 fraction strip again; check your predictions by laying the strip on each of the different fraction bars in your flip-book. Be sure to check each page in your flip-book to find all of the fractions that equal 1/4. Check to see where the shaded part of your clear strip falls on each fraction bar. Does the shaded part of the clear fraction strip evenly line up with any lines on the bar? If you answer yes, record the number of parts of each bar that it took to equal the 1/4 clear strip. If you answer no, go on to the next page of your flip-book and try the next fraction bar.

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<th>How many parts = 1/4</th>
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</thead>
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<tr>
<td>½</td>
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<td></td>
<td>1/4 = /2</td>
</tr>
<tr>
<td>1/3</td>
<td></td>
<td></td>
<td>1/4 = /3</td>
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<tr>
<td>1/5</td>
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<td>1/4 = /5</td>
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<td>1/4 = /6</td>
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<td>1/4 = /8</td>
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<td>1/4 = /9</td>
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<td>1/4 = /10</td>
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<tr>
<td>1/12</td>
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<td>1/4 = /12</td>
</tr>
</tbody>
</table>
5. Write a list of all of the fractions that equal 1/4.

   1/4= __________________________________________________________

6. Looking at your list, what do you notice about all of the denominators? ________
   ___________________________________________________________________

7. Looking at your list, how are the numerators and denominators related? ________
   ___________________________________________________________________

8. Using what you have discovered, list 3 other fractions that would be equal to 1/4.

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**Equal to 1/3**

1. Take your 1/3 fraction strip out of the envelope.
2. Predict which of the strips in your flip-book would have parts that are equal to 1/3. Write your predictions down on the line.

   _________________________________________________________________

3. Why did you make those predictions? ________________________________
   __________________________________________________________________

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4. Using your clear 1/3 fraction strip again; check your predictions by laying the strip on each of the different fraction bars in your flip-book. Be sure to check each page in your flip-book to find all of the fractions that equal 1/3. Check to see where the shaded part of your clear strip falls on each fraction bar. Does the shaded part of the clear fraction strip evenly line up with any lines on the bar? If you answer yes, record the number of parts of each bar that it took to equal the 1/3 clear strip. If you answer no, go on to the next page of your flip-book and try the next fraction bar.

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<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>How many parts = 1/3</th>
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</thead>
<tbody>
<tr>
<td>½</td>
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<td></td>
<td>1/3 = /2</td>
</tr>
<tr>
<td>¼</td>
<td></td>
<td></td>
<td>1/3 = /4</td>
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<td>1/5</td>
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<td>1/12</td>
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<td>1/3 = /12</td>
</tr>
</tbody>
</table>
5. Write a list of all of the fractions that equal 1/3.

\[
\frac{1}{3} = \text{________________________________________________________}
\]

6. Looking at your list, what do you notice about all of the denominators? ________

___________________________________________________________________

7. Looking at your list, how are the numerators and denominators related? ________

___________________________________________________________________

8. Using what you have discovered, list 3 other fractions that would be equal to 1/3.

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**Extension Activity:**

Using your 2/4, 2/3, and \(\frac{3}{4}\) strips and what you have learned, fill in the following chart.

<table>
<thead>
<tr>
<th>Fraction</th>
<th>How many parts = 2/3</th>
<th>How many parts = 2/4</th>
<th>How many parts = 3/4</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\frac{1}{2})</td>
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<td></td>
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<tr>
<td>(\frac{1}{3})</td>
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<td>(\frac{1}{4})</td>
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<tr>
<td>(\frac{1}{12})</td>
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</table>

1. What do you notice about all of the denominators that equal 2/3’s? ________

___________________________________________________________________

2/4’s __________________________________________________________________

\(\frac{3}{4}\)’s __________________________________________________________________
Write what you have learned about equivalent fractions. ___________________
____________________________________________________________________
____________________________________________________________________
Flip-book Attachment
Overhead Fraction Strips

1/2

1/3

1/3

1/4

1/4

1/4