1. Launch: Getting Started
   a. Who is Stephen Tucker?
      i. Doctoral student in Mathematics Education & Leadership at Utah State University
      ii. Primary research interests: virtual manipulatives and technology, teacher education
   b. What is REFractions?
      i. Designed as a third grade teacher, refined as doctoral student
      ii. Used with students in grades 3-6, preservice and inservice teachers
      iii. In press for publication
   c. Common Core Standards in REFractions
      i. Main Standards
         1. Representing fractions (3.NF.1)
         2. Finding equivalent fractions (3.NF.3)
         3. Comparing fractions with like denominators (3.NF.3)
         4. Adding fractions with like denominators (4.NF.3)
      ii. Easy Extension Standards
         1. Fractions on a number line (3.NF.2)
         2. Adding mixed numbers (4.NF.3)
         3. Adding fractions with unlike denominators (5.NF.1)
         4. Comparing fractions with unlike denominators (4.NF.2)
   d. Instructions & Demonstration

2. Explore: Play, Think, Discuss
   a. Teacher & Student
      i. Multiple ways to represent the same fraction
         1. X of every Y
         2. X complete groups out of Y groups
      ii. More than one equivalent fraction (different arrangements)
   b. Teacher
      i. How does this activity develop fraction skills and connect to standards?
      ii. How do multiple concrete fraction representations help build understanding?
      iii. How does this activity connect concrete, pictorial, and symbolic representations?
      iv. How can you adapt/extend this activity? (12ths, number line, etc.)
      v. How will you facilitate inquiry? Questions for key skills?
      vi. How will you sequence the game/discussion focus over multiple days?
      vii. Strengths and areas for improvement?
   c. Student
      i. Students’ point of view?
      ii. Strengths and areas for improvement?

3. Discuss: Sharing Your Thoughts
   a. Discussion
      i. Using some of the Explore prompts
      ii. Other thoughts?
   b. Closure
      i. Keep the materials and see the NCTM upload site or email me for clean PDFs
      ii. Feedback & implementation updates help me develop this and other games, as well as guide research and professional development.
      iii. stephen.tucker@aggiemail.usu.edu
REFractions Recording Sheet
Record EVERY step on the chart as you go!

1) Roll the double dice and add your two numbers. Represent each amount on the game mat with a different color tile. Shade that many twenty-fourths in your picture and record your fraction.
2) Find and record at least one equivalent fraction for your original fraction, if possible. (Use only twenty-fourths, twelfths, eighths, sixths, fourths, thirds, or halves.) Demonstrate using the mat and your picture.
3) The second player repeats steps one and two.
4) If possible, find and record fractions with like denominators.
5) Circle the larger of the two original fractions. (If they are equal, circle neither.)
6) Add both players’ fractions together using fractions with like denominators.
7) If possible, find an equivalent fraction for the sum.

<table>
<thead>
<tr>
<th>Fraction 1</th>
<th>Picture 1</th>
<th>Fraction 2</th>
<th>Picture 2</th>
<th>Equation</th>
<th>Sum Picture</th>
<th>Eq Sum</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Stephen Tucker 2011 (NCTM 2013)
REFractions Representation Map

Use tiles to represent your fractions and help support your gameplay. Be sure to use a different color tile for each picture so you can add them together for steps 6 & 7.