

Fractions as Numbers: Considerations for Instruction

Purpose and Overview of Guide

The purpose of this guide and companion materials is to support developing and implementing lessons for students who need intensive instruction in the area of understanding fractions as numbers. Special education teachers, mathematics interventionists, and others working with students struggling in the area of fractions may find this guide helpful. Additional sample activities, worksheets, and supplemental materials are also available for download on the NCII website.

Within college- and career-ready standards, fractions are taught in Grades 3–5. This guide may be used as these concepts are introduced or with students in higher grade levels who continue to struggle with the concepts.

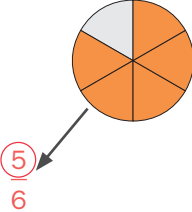
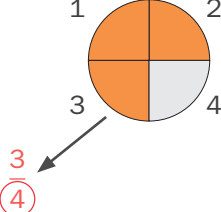
Sequence of Skills—College- and Career-Ready Standards

Develop an understanding of fractions as numbers:

- Part/whole relationship
- Number on the number line
- Equivalent fractions
- Whole numbers as fractions
- Comparing fractions

Language/Symbols

The following terms are important for students to understand when working with fractions.

<p>Fraction: A part of a whole, with all parts equivalent.</p> <p>$\frac{1}{4}, \frac{1}{2}, \frac{2}{3}, \frac{1}{8}, \frac{4}{5}$</p>	<p>Numerator: How many parts of the whole.</p> 	<p>Denominator: How many parts make up the whole.</p> 
<p>Common Denominator: One or more fractions have the same denominator. Necessary for adding and subtracting fractions.</p> <p>$\frac{1}{8} + \frac{2}{8}$</p>	<p>Equivalent Fractions: Fractions with equal value.</p> <p>$\frac{4}{6} = \frac{2}{3} \quad \frac{2}{8} = \frac{1}{4}$</p>	<p>Unit Fraction: A fraction with 1 in the numerator.</p> <p>$\frac{1}{12}, \frac{1}{8}, \frac{1}{5}, \frac{1}{3}, \frac{1}{2}$</p>

Conceptual Understanding

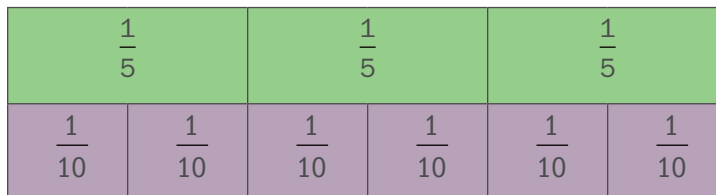
Fraction tiles, fraction circles, or other manipulatives can be used to help students visualize and conceptually understand many fraction concepts. These manipulatives should represent 1 whole, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{6}$, $\frac{1}{8}$, $\frac{1}{10}$, and $\frac{1}{12}$.

Develop understanding of fractions as numbers, such as the following:

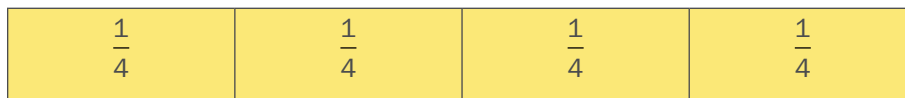
$\frac{1}{5}$ is the same as $\frac{2}{10}$.

$\frac{2}{5}$ is the same as $\frac{4}{10}$.

$\frac{3}{5}$ is the same as $\frac{6}{10}$.



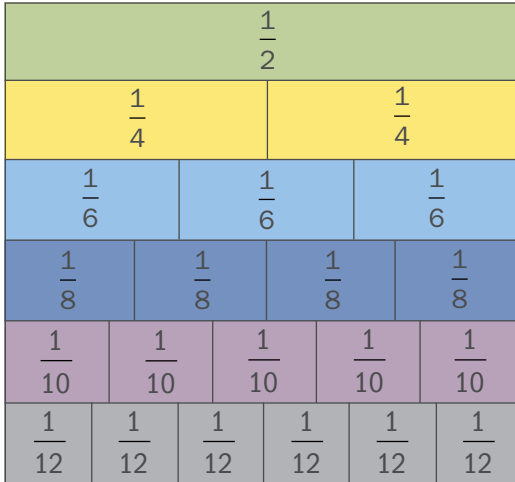
$\frac{4}{4}$ is the same as 1.



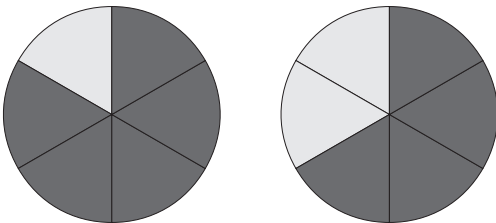


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$$1/2 = 2/4 = 3/6 = 4/8 = 5/10 = 6/12$$

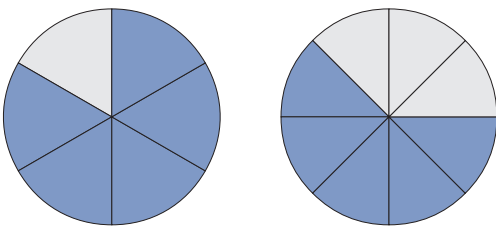


Comparing fractions with like denominators:



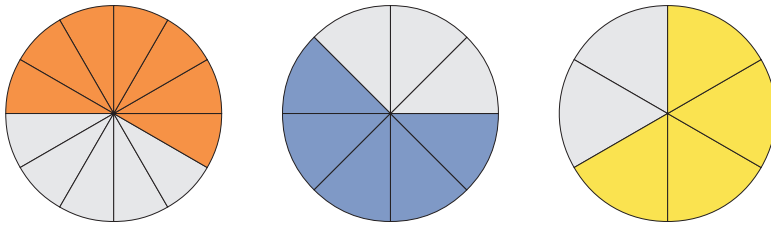
By showing both $5/6$ and $4/6$ using fraction circles, students can see that $5/6 > 4/6$.

Comparing fractions with the same numerator but unlike denominators:



By showing both $5/6$ and $5/8$ using fraction circles, students can see that $5/6 > 5/8$. This will help them understand that although 8 is larger than 6, sixths are larger than eighths in fractions.

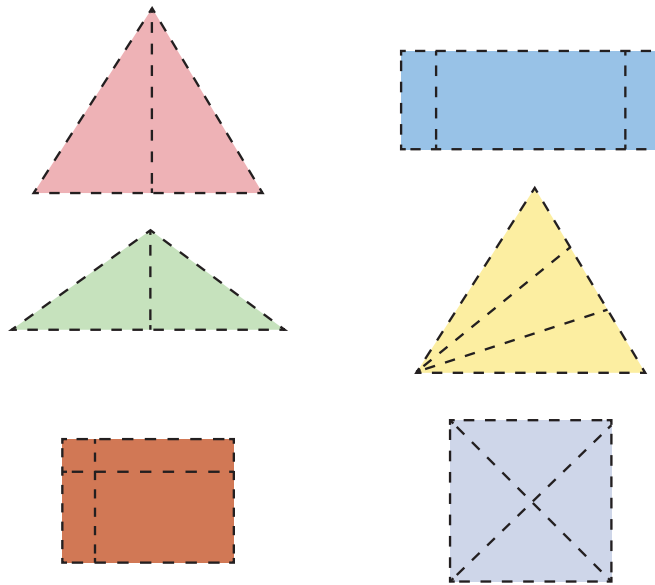
Putting fractions in descending order:



By showing $7/12$, $5/8$, and $4/6$ using fraction circles, students see that $7/12 < 5/8 < 4/6$.

Determine if parts are equal:

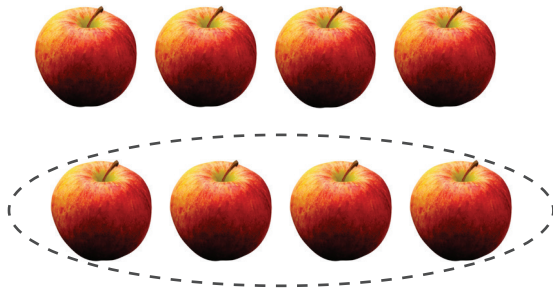
Students must understand that fractions are equal parts of a whole. If students have difficulty with the concept of equal, provide them with two-dimensional pictures and have them identify which ones are divided into equal parts and which ones are not. This will allow teachers to assess a student's knowledge of this concept.



Understanding part of a group:

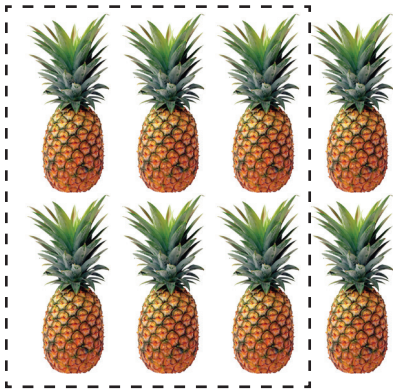
Understanding that fractions can be part of a group, or set, is important because students will often hear fractions being used to describe objects.

Circle $\frac{1}{2}$ of the apples.



Students must first understand that the apples need to be in two equal groups, as the denominator states. Students should realize that the two rows are equal and would circle one row.

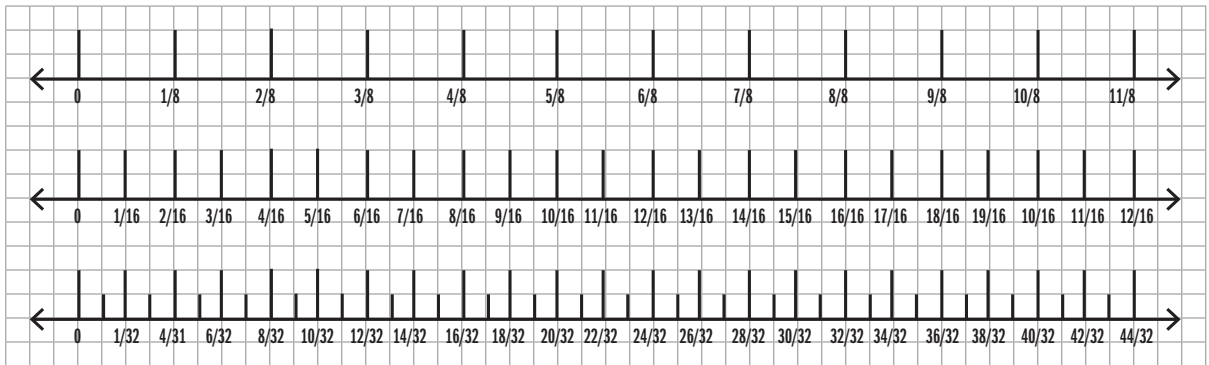
How many are $\frac{3}{4}$ of the pineapples?



Students should realize that there are four columns (which would be the denominator), so they should circle three columns (or three of the four groups). This will show them that $\frac{3}{4}$ of the 8 pineapples is 6 pineapples.

Number lines can be used to help students understand the relationship between whole numbers and fractions.

- Show students that $\frac{1}{8} = \frac{2}{16} = \frac{4}{32}$.
- Show students that $\frac{4}{16} < \frac{1}{8}$.
- Show students that $\frac{8}{8} = 1$, $\frac{16}{16} = 1$, and $\frac{32}{32} = 1$.



Graphic organizers may help students understand concepts by visually organizing concepts.

The following example shows fractions that are less than, equal to, and greater than $\frac{1}{2}$. Teachers could give this graphic organizer to students in blank form, give them fractions, and have them put the fractions in the correct spots. The graphic organizer also could be partially completed prior to having students interact with it.

