Teaching for Conceptual Understanding: Fractions

Professional Development

PARTICIPANT WORKBOOK

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Pearson School Achievement Services
Teaching for Conceptual Understanding: Fractions
Participant Workbook

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Reasoning about the Size of Fractions

Compare the following without the use of common denominators. Using the coherence of the Major Cluster: Develop Understanding of Fractions as Numbers, try to make connections back to the previous strategies employed in the progression.

7/8 13/15 7/9

Sorting Cards

Greater than 0 and less than 1/2	Equivalent to 1/2	Greater than 1/2 and less than 1	Equivalent to 1

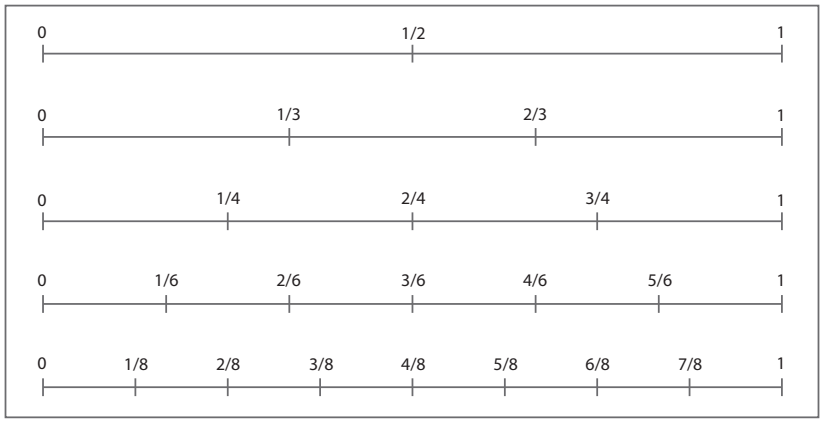
Share the Load

How could you use the chart below to help students understand how to represent simple equivalent fractions?

How could you use the chart below to help students compare fractions that have the same numerators?

How could you use the chart below to help students compare fractions that have the same denominators?

How would you want students to reason about equivalence and comparisons of fractions?



Supporting Cluster: Reason with Shapes and Their Attributes

Write down two ways that you envision how 3.G.2 can support the work in the Major Cluster: Develop Understanding of Fractions as Numbers.

Major Cluster: Extend Understanding of Fraction Equivalence and Ordering

Justifying Again with Number Line Diagrams and Visual Fraction Models

Complete the following with a partner:

- Use an area model to show that $^{2}/_{3} = {}^{(4 \times 2)}/_{(4 \times 3)}$.
- Use the number line to show that $^{4}/_{3} = {}^{(5 \times 4)}/_{(5 \times 3)}$.

Now, reverse roles to complete the following:

- Use an area model to show that $^{3}/_{4} = {}^{(5 \times 3)}/_{(5 \times 4)}$.
- Use the number line to show that $^{5}/_{4} = {}^{(3 \times 5)}/_{(3 \times 4)}$.

(The Common Core Standards Writing Team 2011, 5)

Grade 3		
MAJOR CLUSTER: Develop understanding of fractions as numbers.		
Standard	**Students should be able to *justify* the math with . . .**	**Notes**
CCSS.Math.Content.3.NF.A.1 Understand a fraction 1/*b* as the quantity formed by 1 part when *a* whole is partitioned into *b* equal parts; understand a fraction *a*/*b* as the quantity formed by a parts of size 1/*b*.	Unit Fractions	
CCSS.Math.Content.3.NF.A.2 Understand a fraction as a number on the number line; represent fractions on a number line diagram.	Number Line Diagrams	
CCSS.Math.Content.3.NF.A.2a Represent a fraction 1/*b* on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into *b* equal parts. Recognize that each part has size 1/*b* and that the endpoint of the part based at 0 locates the number 1/*b* on the number line.	Unit Fractions Number Line Diagrams	
CCSS.Math.Content.3.NF.A.2b Represent a fraction *a*/*b* on a number line diagram by marking off a lengths 1/*b* from 0. Recognize that the resulting interval has size *a*/*b* and that its endpoint locates the number *a*/*b* on the number line.	Unit Fractions Number Line Diagrams	
CCSS.Math.Content.3.NF.A.3 Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size.		
CCSS.Math.Content.3.NF.A.3a Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line.	Number Line Diagrams	
CCSS.Math.Content.3.NF.A.3b Recognize and generate simple equivalent fractions, e.g., 1/2 = 2/4, 4/6 = 2/3). Explain why the fractions are equivalent, e.g., by using a visual fraction model.	Visual Fraction Models	
CCSS.Math.Content.3.NF.A.3c Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. *Examples: Express 3 in the form 3 = 3/1; recognize that 6/1 = 6; locate 4/4 and 1 at the same point of a number line diagram.*	Number Line Diagrams	
CCSS.Math.Content.3.NF.A.3d Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model	Visual Fraction Models	
SUPPORTING CLUSTER: Represent and Interpret Data.		
Standard	**How can you connect the Supporting Cluster to the Major Cluster?**	

Grade 4		
MAJOR CLUSTER: Extend understanding of fraction equivalence and ordering.		
Standard	**Students should be able to *justify* the math with . . .**	**Notes**
CCSS.Math.Content.4.NF.A.1 Explain why a fraction *a*/*b* is equivalent to a fraction (*n* × *a*)/(*n* × *b*) by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions.	Visual Fraction Models	
CCSS.Math.Content.4.NF.A.2 Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.	Benchmark Fractions Visual Fraction Models	
MAJOR CLUSTER: Build fractions from unit fractions.		
CCSS.Math.Content.4.NF.B.3 Understand a fraction *a*/*b* with *a* > 1 as a sum of fractions 1/*b*.	Unit Fractions Visual Fraction Models	
CCSS.Math.Content.4.NF.B.3a Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.	Number Line Diagrams	
CCSS.Math.Content.4.NF.B.3b Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. *Examples: 3/8 = 1/8 + 1/8 + 1/8 ; 3/8 = 1/8 + 2/8 ; 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8.*	Unit Fractions Number Line Diagrams Visual Fraction Models	
CCSS.Math.Content.4.NF.B.3c Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction.	Unit Fractions Number Line Diagrams Visual Fraction Models	
CCSS.Math.Content.4.NF.B.3d Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem.	Visual Fraction Models Equations	
CCSS.Math.Content.4.NF.B.4 Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.		
CCSS.Math.Content.4.NF.B.4a Understand a fraction *a*/*b* as a multiple of 1/*b*. *For example, use a visual fraction model to represent 5/4 as the product 5 × (1/4), recording the conclusion by the equation 5/4 = 5 × (1/4).*	Unit Fractions Visual Fraction Models	
CCSS.Math.Content.4.NF.B.4b Understand a multiple of a/b as a multiple of 1/b, and use this understanding to multiply a fraction by a whole number. *For example, use a visual fraction model to express 3 × (2/5) as 6 × (1/5), recognizing this product as 6/5. (In general, n × (a/b) = (n × a)/b.)*	Unit Fractions Visual Fraction Models	
CCSS.Math.Content.4.NF.B.4c Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. *For example, if each person at a*	Visual Fraction Models Equations	