

Creating AHAs

## Creating Fraction & Decimal AHAs

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### Creating Fraction & Decimal AHAs

- Introduction
  - Foundational Experiences
  - Options
  - Game Descriptions
- Recording Sheets & Game Cards
- Assessment

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### 4 representations...

- Concrete      Build it
- Pictorial      Draw it
- Verbal      Words
- Symbolic      Symbols

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Concrete	Pictorial
Verbal Conceptual Language	Symbolic

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The standard is not the launching point

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### Foundational Experiences

Construct fractional units

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### Foundational Experiences

#### Fraction Kit

- Don't rush through making the kit to get to the activities. The making of fractional parts is an extremely important skill.
- Use equal parts language instead of fraction language when making the kit.
- Don't model.
- Don't label.

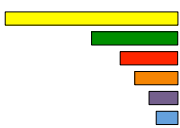
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### Foundational Experiences

- Students have made a fraction kit.
- Students have had time to explore the relationships of the pieces in their kit.

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### Foundational Experiences



- 3 red = 1 yellow
- 2 orange = 1 green
- 2 orange and 4 blue = 1 yellow
- 1 purple and 1 green = 2 red
- 1 green is bigger than 1 blue

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### Foundational Experiences

- Students have made a fraction kit.
- Students have had time to explore the relationships of the pieces in their kit.
- Students are comfortable representing mixed numbers.

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Show  $1\frac{1}{2}$

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### Foundational Experiences--Equivalency

- If a student really understood **equivalency** what would he or she understand?
- Repeated Reasoning & Reasoning Abstractly & Quantitatively


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**Carefully choose the model**


Show two-thirds yellow



Show four-sixths yellow



Show six-ninths yellow



$$\frac{2}{3} = \frac{4}{6} = \frac{6}{9}$$

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How many halves are in one and a half?

How many thirds in two and two-thirds?

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How many sixths are in one and a half?

How many eighths are in two and a half?

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**Foundational Experiences**

- Students have made a fraction kit.
- Students have had time to explore the relationships of the pieces in their kit.
- Students are comfortable representing mixed numbers.
- Students have explored equivalencies.

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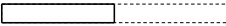
**Use repeated reasoning ...**

$$5 \frac{3}{4} =$$


$$\frac{27}{5} =$$

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$\frac{1}{2}$



$\frac{2}{3}$




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What are the conceptual similarities and differences in using a regional model and a number line model to represent fractions?

Related skills for each?

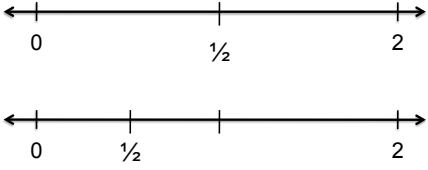
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0 2

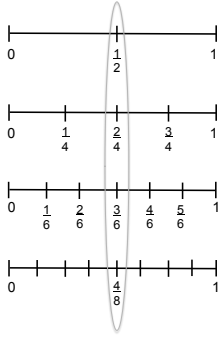
a.  $1/2$  e.  $0/8$   
 b.  $10/5$  f.  $\sqrt{.33}$   
 c.  $1\ 3/4$  g.  $.250$   
 d.  $1/4$

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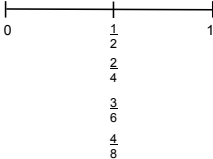
0  $1/2$  2  
 0  $1/2$  2

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0  $1/2$  1  
 0  $1/4$   $2/4$   $3/4$  1  
 0  $1/6$   $2/6$   $3/6$   $4/6$   $5/6$  1  
 0  $1/8$   $2/8$   $3/8$   $4/8$   $5/8$   $6/8$   $7/8$  1

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0  $1/2$  1  
 $2/4$   
 $3/6$   
 $4/8$   
 $5/10$

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Extend beyond one

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What understandings are needed?

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Draw and locate each fraction on a number line.

$$2 \frac{1}{4}$$

$$\frac{10}{5}$$

$$1 \frac{2}{3}$$

What understandings are needed?

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### Reinforcing Activities

Concentration  
Who has more?  
Less is more.

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			3 x 5		

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3 x 5

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3 x 5

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3 x 5

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3 x 5

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### Comparing fractions

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What do students need to understand to be able to compare fractions?  
What experiences are needed?

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### Comparing fractions

- Like denominators
- Like numerators
- Unlike numerators and denominators

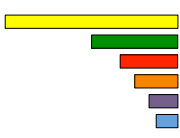
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### Like denominators

$$\frac{3}{8} \quad \frac{5}{8}$$

- read as three, one-eighth pieces and five, one-eighth pieces

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$$\frac{3}{8}$$


three, one-eighth pieces

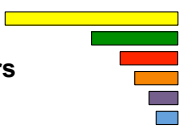
$$\frac{3}{8} = \frac{1}{8} + \frac{1}{8} + \frac{1}{8}$$

$$\frac{3}{8} = 3 \times \frac{1}{8}$$

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$$\frac{3}{8} < \frac{5}{8}$$

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**Like numerators**

$$\frac{3}{8} \quad \frac{3}{6}$$

- relative size of the unit fractions

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**Unlike numerators and denominators**

$$\frac{5}{8} \quad \frac{3}{7}$$

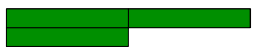
relative position of the fractions using benchmarks 0,  $\frac{1}{2}$ , 1

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$$1 \frac{1}{2} \div \frac{1}{2} = 3$$

← Symbols

How many halves in one and a half? ← Words



← Build it--Concrete

1	2
3	

← Draw it--Pictorial

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$$1 \frac{1}{2} \div \frac{1}{10} =$$

$$1 \frac{1}{2} \div .1 =$$

$$1.5 \div .1 =$$

$$2.3 \div .1 =$$

$$3.4 \div .01 =$$



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$$2\frac{1}{2} + 2\frac{1}{2}$$

put together  
join  
combine

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$$2\frac{1}{2} + 2\frac{1}{2}$$

put together  
join  
combine

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$$2\frac{1}{2} + 2\frac{1}{2}$$

put together  
join  
combine

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$$2\frac{1}{2} + 1\frac{3}{4} = 4\frac{1}{4}$$

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**4 ways...**

$\frac{1}{2}$	
one-half	one-half of ten is <u>five</u>

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**4 ways...**

$2\frac{1}{2} + 1\frac{3}{4}$	two and one-half put together with one and three-fourths
	$2\frac{1}{2} + 1\frac{3}{4} = 4\frac{1}{4}$ I know because two wholes and one more whole is three wholes. One-half combined with two-fourths is another whole which is four wholes. There is a fourth left over, four and one-fourth.

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$$12 \frac{1}{2} - 9 \frac{5}{6} = 2 \frac{4}{6}$$

$$\begin{array}{r} 12 \frac{1}{2} \\ - 9 \frac{5}{6} \\ \hline \end{array} \qquad \begin{array}{r} 12 \frac{3}{6} \\ - 9 \frac{5}{6} \\ \hline \end{array} \qquad \begin{array}{r} 12 \frac{9}{6} \\ - 9 \frac{5}{6} \\ \hline \end{array}$$

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Draw a picture to show  
 $12 \frac{1}{2} - 9 \frac{5}{6}$

Twelve and a half remove nine and five-sixths

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$$12 \frac{1}{2} - 9 \frac{5}{6} = 2 \frac{4}{6}$$

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$$12 \frac{1}{2} - 9 \frac{5}{6}$$

Twelve and a half is how many more than nine and five-sixths

$$9 \frac{5}{6} + \underline{\hspace{2cm}} = 12 \frac{1}{2}$$

$$12 \frac{1}{2} = 9 \frac{5}{6} + \underline{\hspace{2cm}}$$

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$$12 \frac{1}{2} - 9 \frac{5}{6} = 2 \frac{4}{6}$$

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**Whole number by fraction multiplication**

three groups of one and a half

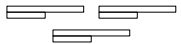
Four part chart

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Three groups of one and a half



Three groups of one and a half



three groups of one put together with three groups of one-half

$3 \times 1 \frac{1}{2} = 4 \frac{1}{2}$   
 $3 \times 1 \frac{1}{2} = 3 \times 1 + 3 \times \frac{1}{2}$

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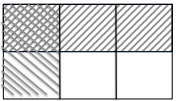
**Whole number by fraction multiplication**

three groups of one and a half

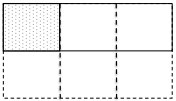
Four part chart

**two groups of three-fourths**

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$\frac{1}{2} \times \frac{2}{3}$



$\frac{1}{2}$

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**Fraction by fraction multiplication**

fractions less than one

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**Fraction by fraction multiplication**

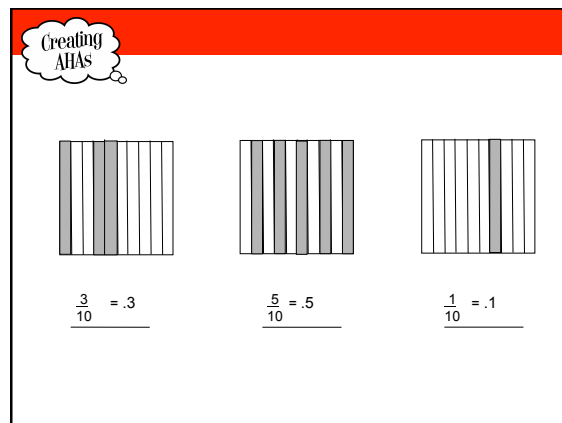
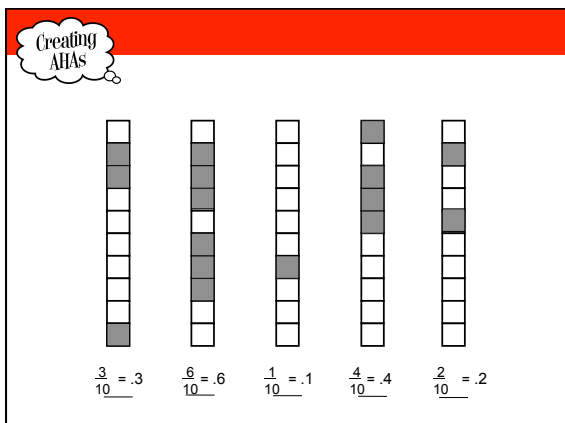
mixed number multiplication

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**5.NF.4b:**

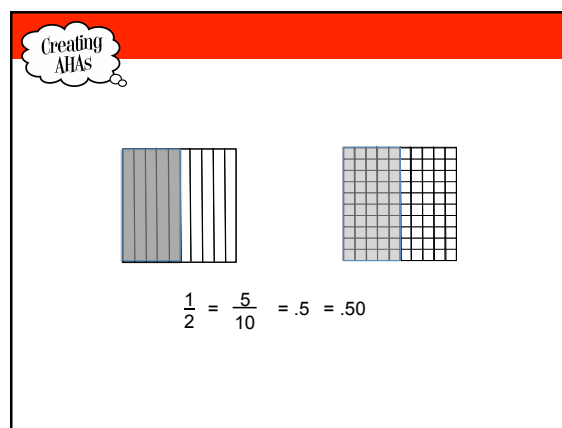
Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.

**What does this mean?**



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Number line challenge



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**Comparing decimal fractions**

.3    .03  
comparing fractions with like numerators

.35    .43  
comparing fractions with like denominators

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.7    .68  
comparing fractions with unlike numerators  
and denominators

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$1.5 \div .1$	How many tenths are in one and five-tenths?	$1.5 \div .1 = 15$
$15 \div 1$	How many ones are in fifteen?	$15 \div 1 = 15$
$150 \div 10$	How many tens are in one hundred fifty?	$150 \div 10 = 15$

Think-pair-share

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**Mathematics Education Professional Development**