

**Creating AHAs**

**Building Conceptual Understandings of Fractions, Decimals, & Percent Grades 4-8**

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**Creating AHAs**

**4 representations...**

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

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Concrete	Pictorial
Verbal Conceptual Language	Symbolic

**Creating AHAs**

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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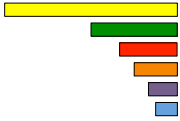
**Foundational Experiences**

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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**Comparing fractions**

**Creating AHAs**

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

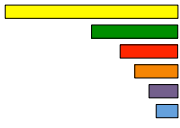
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**Like denominators**

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

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

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


three, one-eighth pieces

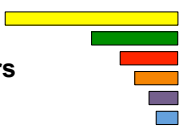
$$\frac{3}{8} = \frac{1}{8} + \frac{1}{8} + \frac{1}{8}$$

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

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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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**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 ...**


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

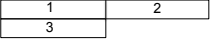
$\frac{27}{5} =$

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


How many halves in one and a half? ← Words

 ← Build it--Concrete

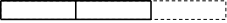
 ← Draw it--Pictorial

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$\frac{1}{2}$




$\frac{2}{3}$



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


put together  
join  
combine



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

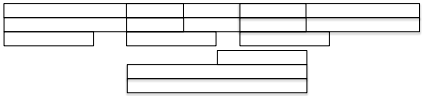
put together  
join  
combine



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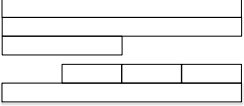
$2\frac{1}{2} + 2\frac{1}{2}$

put together  
join  
combine




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



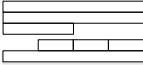
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4 ways...

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

$12\frac{1}{2}$	$12\frac{3}{6}$	$12\frac{9}{6}$
$- 9\frac{5}{6}$	$- 9\frac{5}{6}$	$- 9\frac{5}{6}$
		$2\frac{4}{6}$

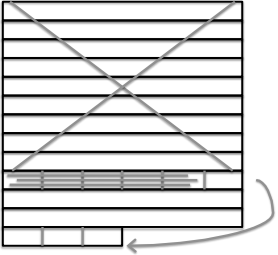
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Draw a picture to show  $12\frac{1}{2} - 9\frac{5}{6}$

Twelve and a half remove nine and five-sixths

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

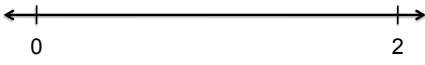


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What are the conceptual similarities and differences in using a regional model and a number line model to represent fractions?

Related skills for each?

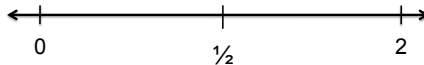
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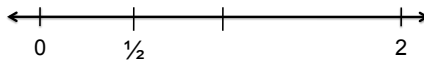
0 2

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

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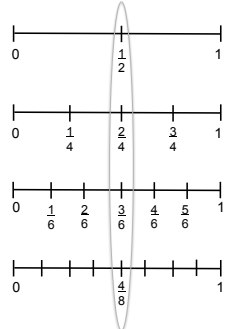


0  $1/2$  2



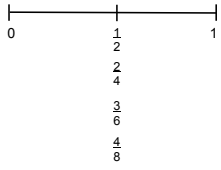
0  $1/2$  2

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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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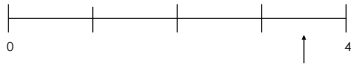


0  $1/2$  1  
 $2/4$   
 $3/6$   
 $4/8$


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Extend beyond one

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0 1 2 3 4



0 1 2 3

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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$\frac{3}{10} = .3$      $\frac{6}{10} = .6$      $\frac{1}{10} = .1$      $\frac{4}{10} = .4$      $\frac{2}{10} = .2$

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$\frac{3}{10} = .3$      $\frac{5}{10} = .5$      $\frac{1}{10} = .1$

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$\frac{1}{2} = \frac{5}{10} = .5 = .50$

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**Comparing decimal fractions**

.3    .03  
 comparing fractions with like numerators

.35    .43  
 comparing fractions with like denominators

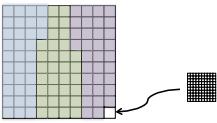
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.7    .68  
 comparing fractions with unlike numerators and denominators



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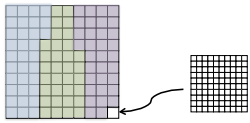
Separate into 3 equal groups (using whole squares).  
Leave leftovers alone for now.



$\frac{33}{100}$  or .33

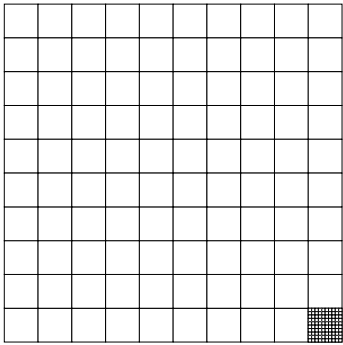
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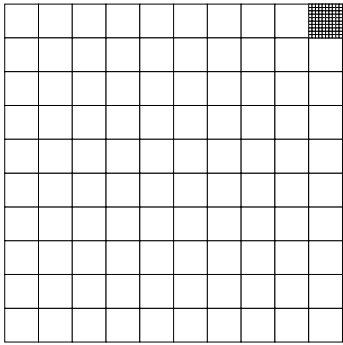


$\frac{33}{100}$  or .33

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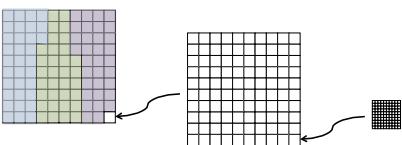


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Creating AHAs

Separate into 3 equal groups (using whole squares).  
Leave leftovers alone for now.



$\frac{33}{100}$  or .33

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What about  $\frac{2}{3}$ ?

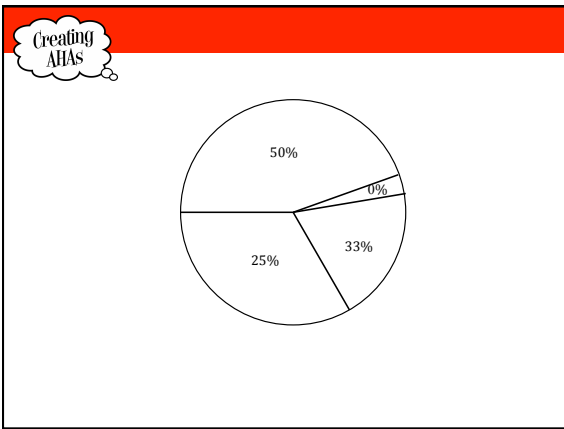
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**Percent**

- 100% is all
- 50% is half
- 25% is fourth
- 0%
- More than 100%

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Instead of  
Percent → Decimal → Fraction  
or  
Percent ↔ Decimal  
Percent → Fraction → Decimal



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**Reinforcing Activities**

Concentration  
Who has more?  
Less is more.

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3 x 5

Creating AHAs

3 x 5

Creating AHAs

Creating AHAs

Creating AHAs

3 x 5

Creating AHAs

3 x 5

