Problem Set Answer Key

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GRADE 5 • MODULE 3
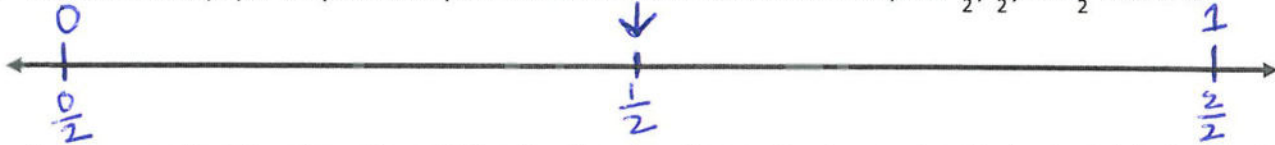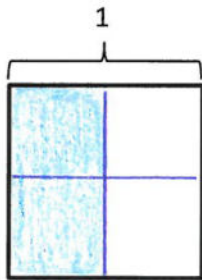Addition and Subtraction of Fractions
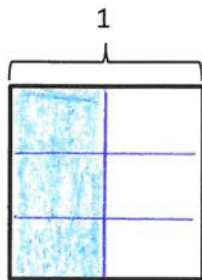
Name _____   Date _____

1. Use the folded paper strip to mark points 0 and 1 above the number line, and $\frac{0}{2}$, $\frac{1}{2}$, and $\frac{2}{2}$ below it.
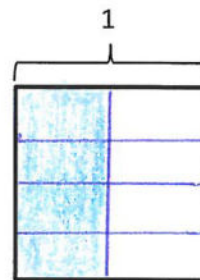

Draw one vertical line down the middle of each rectangle, creating two parts. Shade the left half of each.
Partition with horizontal lines to show the equivalent fractions $\frac{2}{4}$, $\frac{3}{6}$, $\frac{4}{8}$, and $\frac{5}{10}$. Use multiplication to show the change in the units.
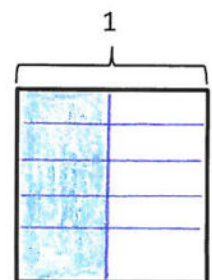

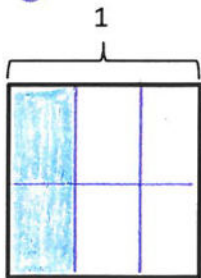$\frac{1}{2} = \frac{1 \times 2}{2 \times 2} = \frac{2}{4}$ $\frac{1}{2} = \frac{1 \times 3}{2 \times 3} = \frac{3}{6}$ $\frac{1}{2} = \frac{1 \times 4}{2 \times 4} = \frac{4}{8}$ $\frac{1}{2} = \frac{1 \times 5}{2 \times 5} = \frac{5}{10}$
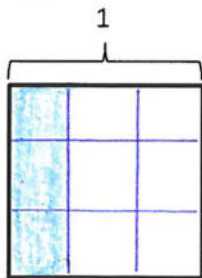
2. Use the folded paper strip to mark points 0 and 1 above the number line, and $\frac{0}{3}$, $\frac{1}{3}$, $\frac{2}{3}$, and $\frac{3}{3}$ below it.
Follow the same pattern as Problem 1, but with thirds.

$\frac{1}{3} = \frac{1 \times 2}{3 \times 2} = \frac{2}{6}$ $\frac{1}{3} = \frac{1 \times 3}{3 \times 3} = \frac{3}{9}$ $\frac{1}{3} = \frac{1 \times 4}{3 \times 4} = \frac{4}{12}$ $\frac{1}{3} = \frac{1 \times 5}{3 \times 5} = \frac{5}{15}$

COMMON CORE™   Lesson 1:   Make equivalent fractions with the number line, the area model, and
                                          numbers.   engage^ny   3.A.12
                          Date: 9/7/14

3. Continue the pattern with 3 fourths.

0   1

$\frac{0}{4}$ $\frac{1}{4}$ $\frac{2}{4}$ $\frac{3}{4}$

$$\frac{3}{4} = \frac{3 \times 2}{4 \times 2} = \frac{6}{8}$$

$$\frac{3}{4} = \frac{3 \times 3}{4 \times 3} = \frac{9}{12}$$

$$\frac{3}{4} = \frac{3 \times 4}{4 \times 4} = \frac{12}{16}$$
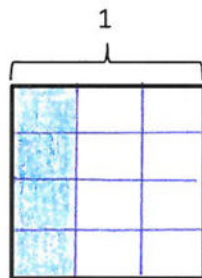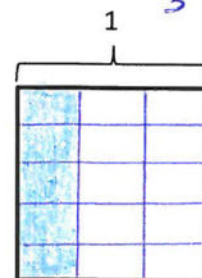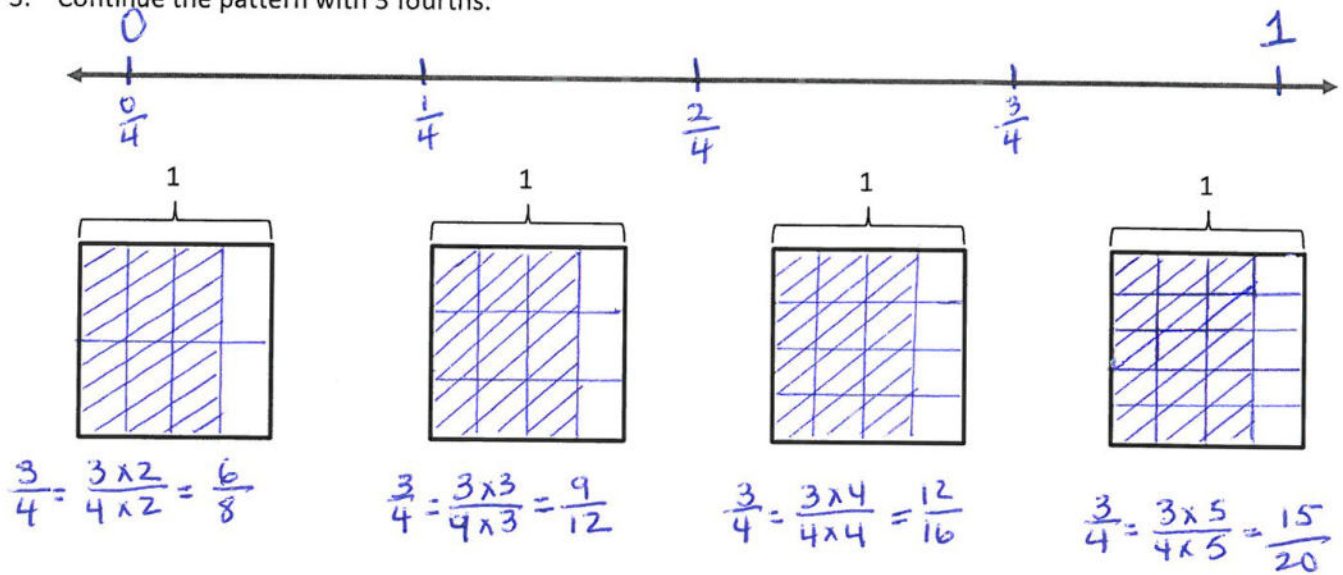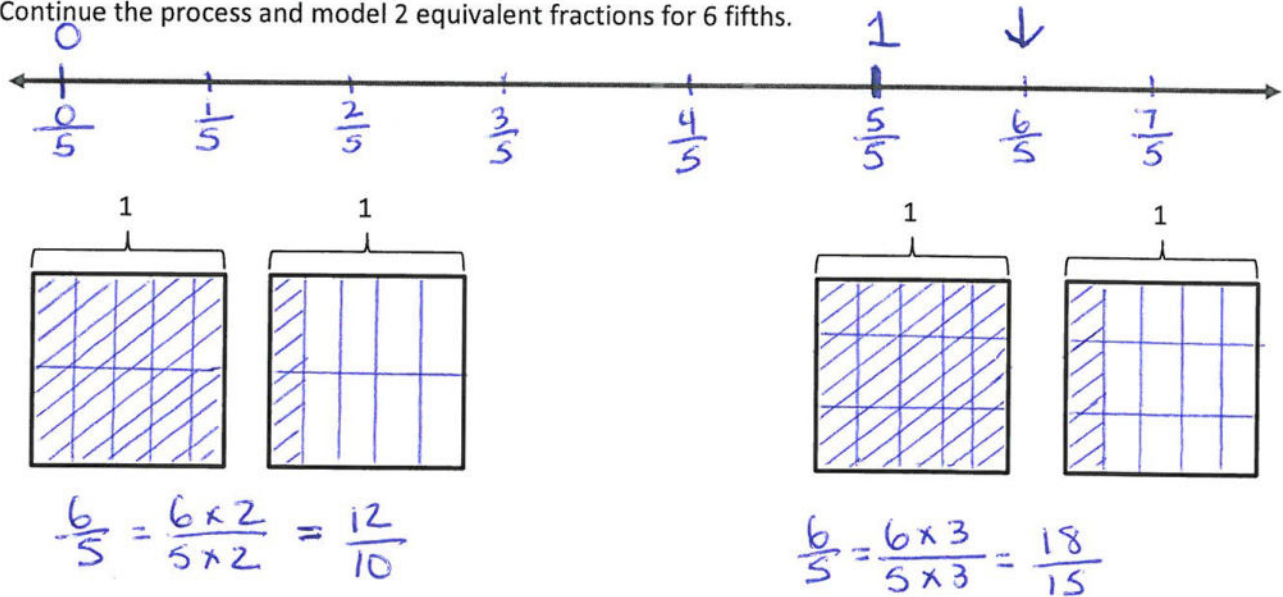
$$\frac{3}{4} = \frac{3 \times 5}{4 \times 5} = \frac{15}{20}$$

4. Continue the process and model 2 equivalent fractions for 6 fifths.

0   1   ↓

$\frac{0}{5}$ $\frac{1}{5}$ $\frac{2}{5}$ $\frac{3}{5}$ $\frac{4}{5}$ $\frac{5}{5}$ $\frac{6}{5}$ $\frac{7}{5}$

$$\frac{6}{5} = \frac{6 \times 2}{5 \times 2} = \frac{12}{10}$$

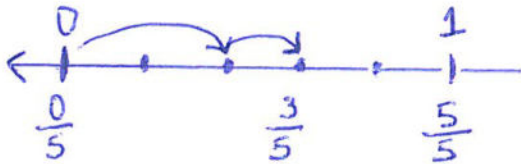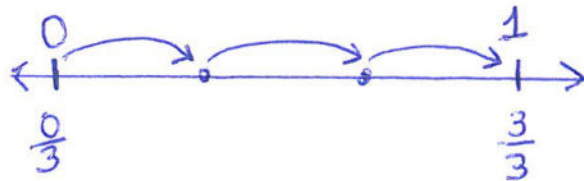$$\frac{6}{5} = \frac{6 \times 3}{5 \times 3} = \frac{18}{15}$$

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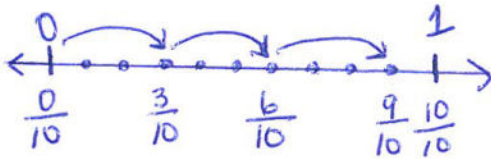
1. Show each expression on a number line. Solve.

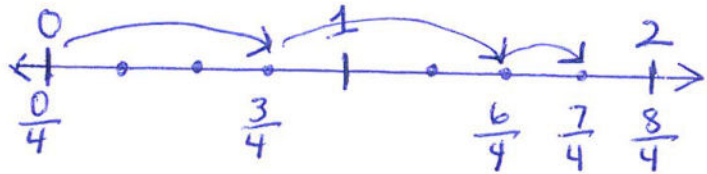a. $\frac{2}{5} + \frac{1}{5} = \frac{3}{5}$

b. $\frac{1}{3} + \frac{1}{3} + \frac{1}{3} = \frac{3}{3}$

c. $\frac{3}{10} + \frac{3}{10} + \frac{3}{10} = \frac{9}{10}$

d. $2 \times \frac{3}{4} + \frac{1}{4} = \frac{7}{4} = 1 + \frac{3}{4} = 1\frac{3}{4}$

2. Express each fraction as the sum of two or three equal fractional parts. Rewrite each as a multiplication equation. Show Part (a) on a number line.

a. $\frac{6}{7} = \frac{3}{7} + \frac{3}{7} = 2 \times \frac{3}{7}$
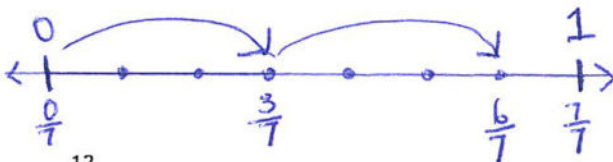
b. $\frac{9}{2} = \frac{3}{2} + \frac{3}{2} + \frac{3}{2} = 3 \times \frac{3}{2}$

c. $\frac{12}{10}$

$= \frac{4}{10} + \frac{4}{10} + \frac{4}{10}$

$= 3 \times \frac{4}{10}$

d. $\frac{27}{5} = \frac{9}{5} + \frac{9}{5} + \frac{9}{5}$
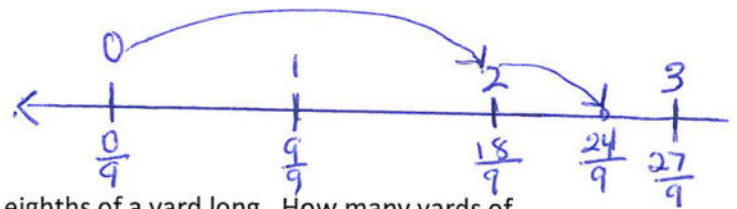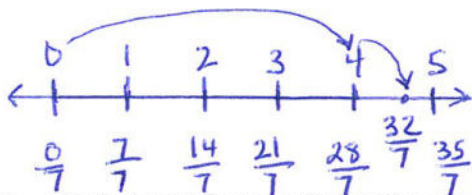
$= 3 \times \frac{9}{5}$

3. Express each of the following as the sum of a whole number and a fraction. Show Parts (c) and (d) on number lines.

a. $\frac{9}{7} = \frac{7}{7} + \frac{2}{7}$

    $= 1 + \frac{2}{7}$

    $= 1\frac{2}{7}$

b. $\frac{9}{2} = \frac{8}{2} + \frac{1}{2}$

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

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

c. $\frac{32}{7} = \frac{28}{7} + \frac{4}{7}$

    $= 4 + \frac{4}{7}$

    $= 4\frac{4}{7}$

d. $\frac{24}{9} = \frac{18}{9} + \frac{6}{9}$

    $= 2 + \frac{6}{9}$

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

4. Marisela cut four equivalent lengths of ribbon. Each was 5 eighths of a yard long. How many yards of fabric did she cut? Express your answer as the sum of a whole number and the remaining fractional units. Draw a number line to represent the problem.

$4 \times \frac{5}{8} = \frac{20}{8}$

    $= \frac{16}{8} + \frac{4}{8}$

    $= 2 + \frac{4}{8}$

    $= 2\frac{4}{8}$

Marisela's ribbon was $2\frac{4}{8}$ yards long.

COMMON CORE | Lesson 2:   Make equivalent fractions with sums of fractions with like denominators.

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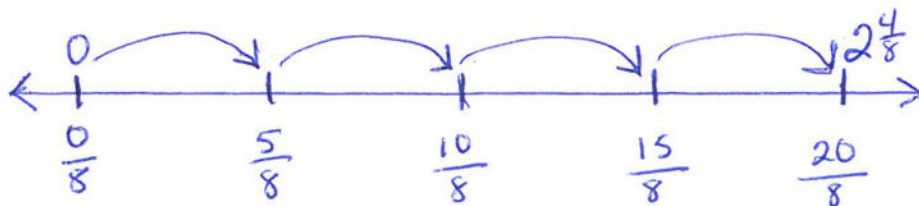
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1. Draw a rectangular fraction model to find the sum. Simplify your answer, if possible.

a. $\frac{1}{2} + \frac{1}{3} = \frac{3}{6} + \frac{2}{6} = \frac{5}{6}$
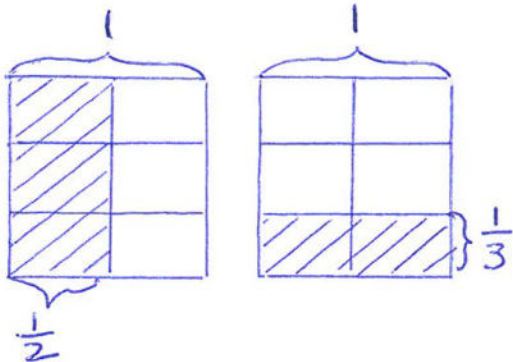
b. $\frac{1}{3} + \frac{1}{5} = \frac{5}{15} + \frac{3}{15} = \frac{8}{15}$
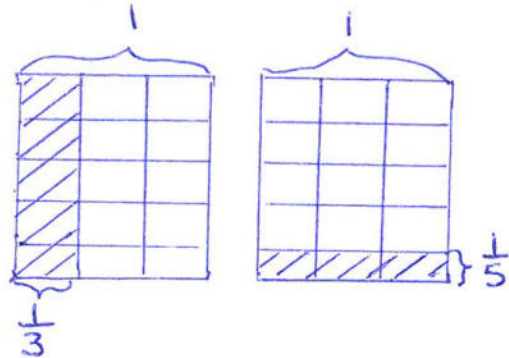
c. $\frac{1}{4} + \frac{1}{3} = \frac{3}{12} + \frac{4}{12} = \frac{7}{12}$
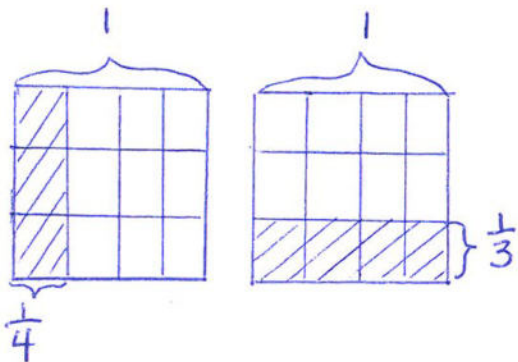
d. $\frac{1}{3} + \frac{1}{7} = \frac{7}{21} + \frac{3}{21} = \frac{10}{21}$

e. $\frac{3}{4} + \frac{1}{5} = \frac{15}{20} + \frac{4}{20} = \frac{19}{20}$

f. $\frac{2}{3} + \frac{2}{7} = \frac{14}{21} + \frac{6}{21} = \frac{20}{21}$

COMMON CORE

Lesson 3:   Add fractions with unlike units using the strategy of creating equivalent fractions.
Date: 9/9/14

engage^ny

3.B.14

Solve the following problems. Draw a picture and write the number sentence that proves the answer. Simplify your answer, if possible.

2. Jamal used $\frac{1}{3}$ yard of ribbon to tie a package and $\frac{1}{6}$ yard of ribbon to tie a bow. How many yards of ribbon did Jamal use?
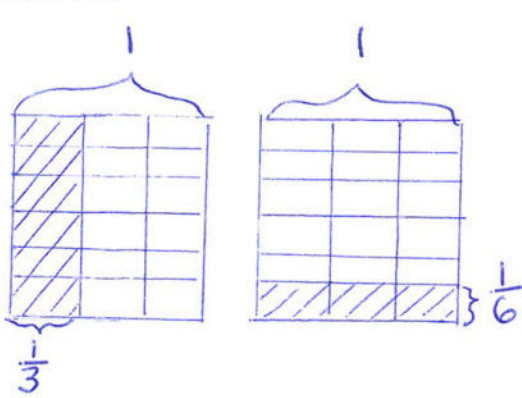
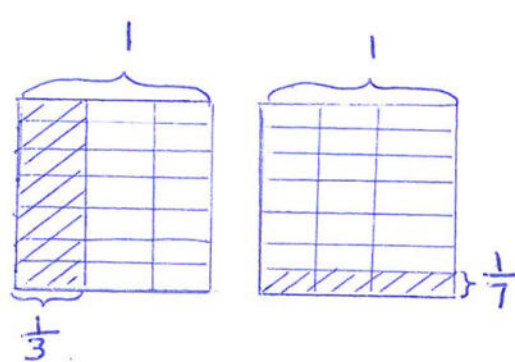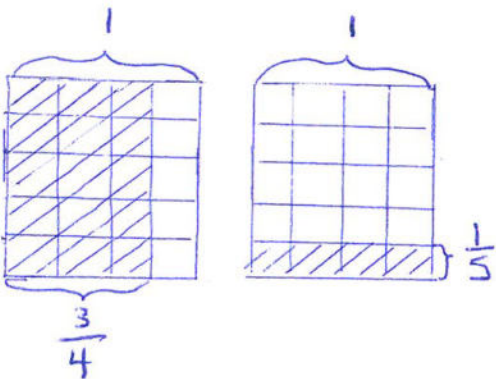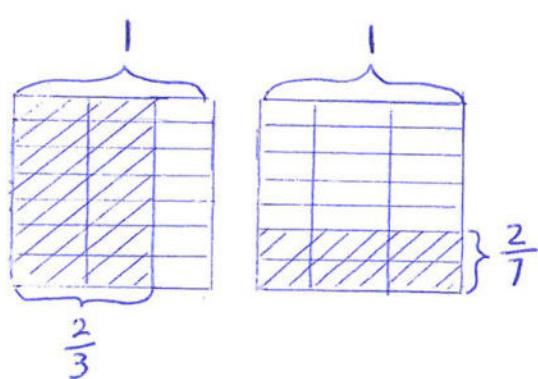$$\frac{1}{3} + \frac{1}{6}$$
$$= \frac{6}{18} + \frac{3}{18}$$
$$= \frac{9}{18}$$
$$= \frac{1}{2}$$

Jamal used $\frac{9}{18}$ or $\frac{1}{2}$ yard of ribbon.

3. Over the weekend, Nolan drank $\frac{1}{6}$ quart of orange juice, and Andrea drank $\frac{3}{4}$ quart of orange juice. How many quarts did they drink together?
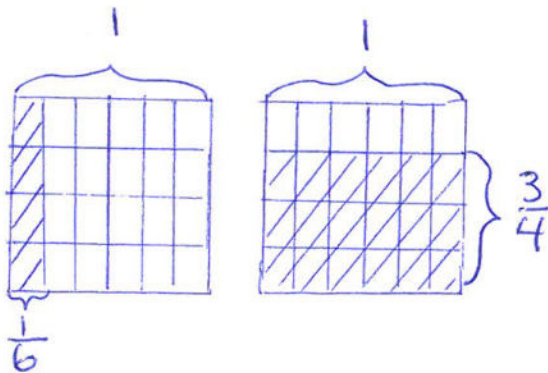
$$\frac{1}{6} + \frac{3}{4} = \frac{4}{24} + \frac{18}{24}$$
$$= \frac{22}{24}$$
$$= \frac{11}{12}$$

They drank $\frac{22}{24}$ or $\frac{11}{12}$ quart together.

4. Nadia spent $\frac{1}{4}$ of her money on a shirt and $\frac{2}{5}$ of her money on new shoes. What fraction of Nadia's money has been spent? What fraction of her money is left?
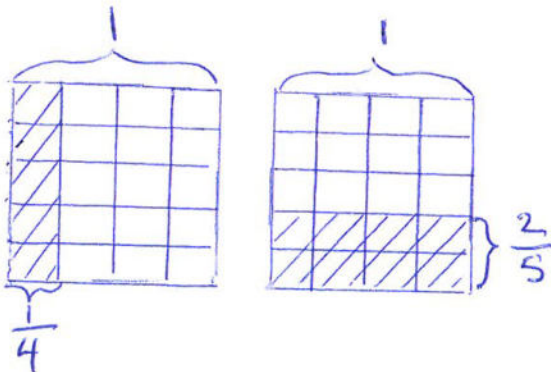
$$\frac{1}{4} + \frac{2}{5} = \frac{5}{20} + \frac{8}{20}$$
$$= \frac{13}{20}$$

Nadia spent $\frac{13}{20}$ and $\frac{7}{20}$ was left.

COMMON CORE | Lesson 3:   Add fractions with unlike units using the strategy of creating equivalent fractions.

Date: 9/9/14

engage^{ny}   3.B.15

Name _____　　Date _____

1. For the following problems, draw a picture using the rectangular fraction model and write the answer. When possible, write your answer as a mixed number.

a. $\frac{2}{3}+\frac{1}{2}=\frac{4}{6}+\frac{3}{6}=\frac{7}{6}=1\frac{1}{6}$
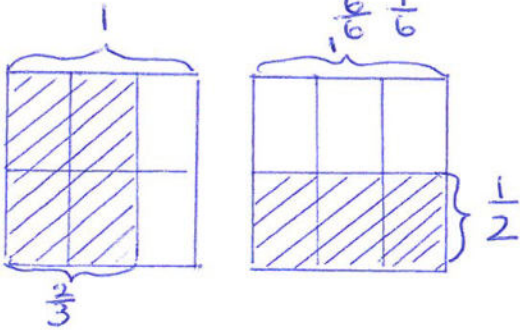
b. $\frac{3}{4}+\frac{2}{3}=\frac{9}{12}+\frac{8}{12}=\frac{17}{12}=1\frac{5}{12}$
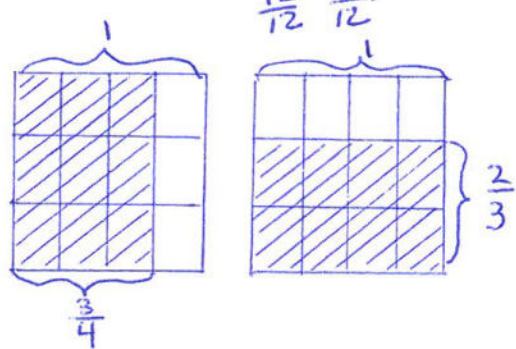
c. $\frac{1}{2}+\frac{3}{5}=\frac{5}{10}+\frac{6}{10}=\frac{11}{10}=1\frac{1}{10}$

d. $\frac{5}{7}+\frac{1}{2}=\frac{10}{14}+\frac{7}{14}=\frac{17}{14}=1\frac{3}{14}$
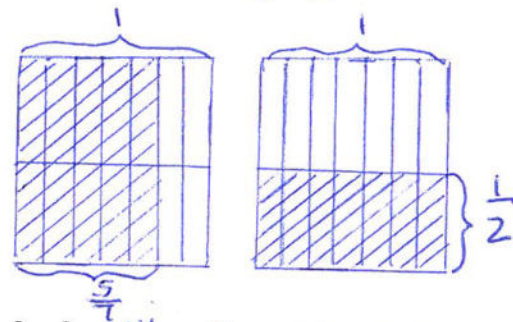
e. $\frac{3}{4}+\frac{5}{6}=\frac{18}{24}+\frac{20}{24}=\frac{38}{24}=1\frac{14}{24}=1\frac{7}{12}$
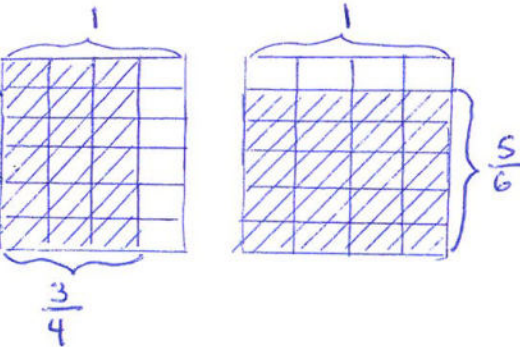

f. $\frac{2}{3}+\frac{3}{7}=\frac{14}{24}+\frac{9}{21}=\frac{23}{21}=1\frac{2}{21}$
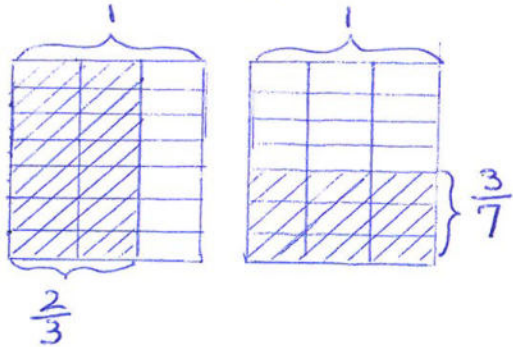
Solve the following problems. Draw a picture, and write the number sentence that proves the answer. Simplify your answer, if possible.

2. Penny used $\frac{2}{5}$ lb of flour to bake a vanilla cake. She used another $\frac{3}{4}$ lb of flour to bake a chocolate cake. How much flour did she use altogether?
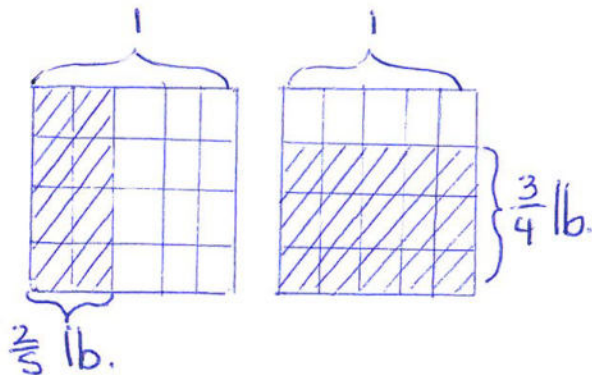
$$\frac{2}{5} + \frac{3}{4} = \frac{8}{20} + \frac{15}{20}$$
$$= \frac{23}{20}$$
$$= \frac{20}{20} + \frac{3}{20}$$
$$= 1\frac{3}{20}$$

$\frac{3}{4}$ lb.

$\frac{2}{5}$ lb.

Penny used $1\frac{3}{20}$ pounds of flour to bake her cakes.

3. Carlos wants to practice piano 2 hours each day. He practices piano for $\frac{3}{4}$ hour before school and $\frac{7}{10}$ hour when he gets home. How many hours has Carlos practiced piano? How much longer does he need to practice before going to bed in order to meet his goal?
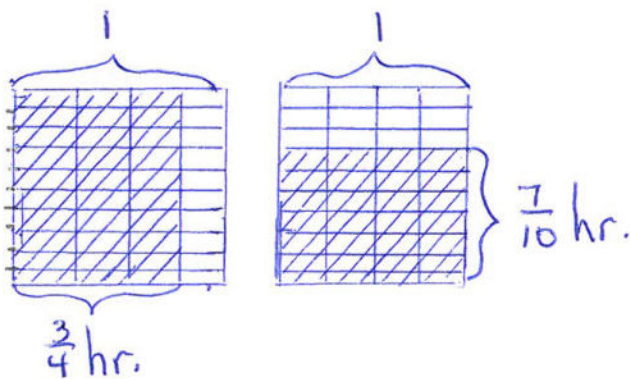
$$\frac{3}{4} + \frac{7}{10} = \frac{30}{40} + \frac{28}{40}$$
$$= \frac{58}{40}$$
$$= \frac{40}{40} + \frac{18}{40}$$
$$= 1\frac{18}{40}$$
$$= 1\frac{9}{20}$$

$\frac{7}{10}$ hr.

$\frac{3}{4}$ hr.

$$1\frac{9}{20} \text{ hr.} + \frac{11}{20} \text{ hr.} = 2 \text{ hr}$$

Carlos has practiced $1\frac{9}{20}$ hours and has $\frac{11}{20}$ hour to go to make his goal.

COMMON CORE   Lesson 4: Add fractions with sums between 1 and 2.
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engage^ny   3.B.28

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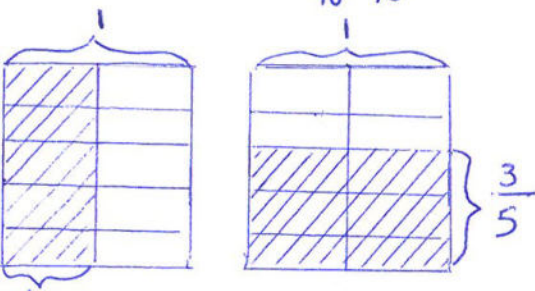1. For the following problems, draw a picture using the rectangular fraction model and write the answer. Simplify your answer, if possible.

a. $\frac{1}{3} - \frac{1}{4} = \frac{4}{12} - \frac{3}{12} = \frac{1}{12}$

$\frac{1}{4} = \frac{3}{12}$

$\frac{1}{3} = \frac{4}{12}$

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

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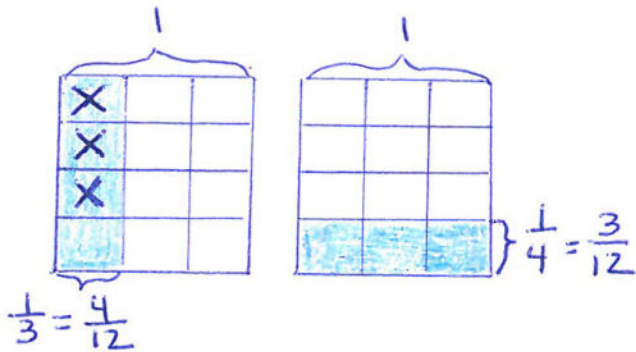
$\frac{2}{3} = \frac{4}{6}$

c. $\frac{5}{6} - \frac{1}{4} = \frac{20}{24} - \frac{6}{24} = \frac{14}{24} = \frac{7}{12}$

$\frac{1}{4} = \frac{6}{24}$

$\frac{5}{6} = \frac{20}{24}$

d. $\frac{2}{3} - \frac{1}{7} = \frac{14}{21} - \frac{3}{21} = \frac{11}{21}$

$\frac{1}{7} = \frac{3}{21}$

$\frac{2}{3} = \frac{14}{21}$

e. $\frac{3}{4} - \frac{3}{8} = \frac{24}{32} - \frac{12}{32} = \frac{12}{32} = \frac{3}{8}$

$\frac{3}{8} = \frac{12}{32}$

$\frac{3}{4} = \frac{24}{32}$

f. $\frac{3}{4} - \frac{2}{7} = \frac{21}{28} - \frac{8}{28} = \frac{13}{28}$

$\frac{2}{7} = \frac{8}{28}$

$\frac{3}{4} = \frac{21}{28}$

COMMON CORE | Lesson 5:   Subtract fractions with unlike units using the strategy of creating equivalent fractions.   engage^ny   3.B.40

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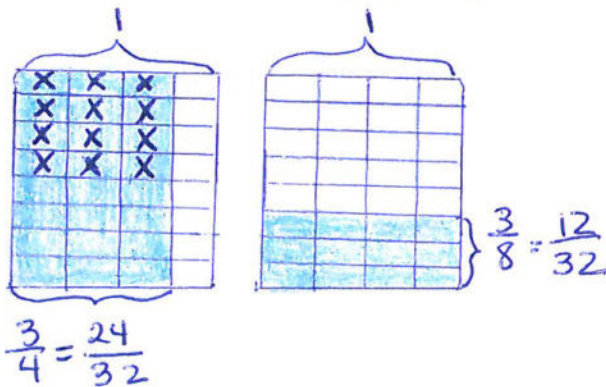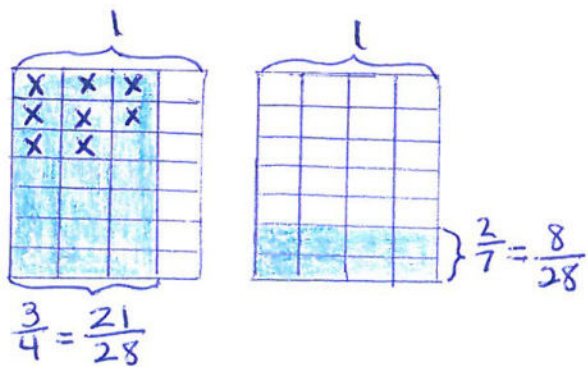
2. Mr. Penman had $\frac{2}{3}$ liter of salt water. He used $\frac{1}{5}$ of a liter for an experiment. How much salt water does Mr. Penman have left?

$$\frac{2}{3} - \frac{1}{5}$$

$$= \frac{10}{15} - \frac{3}{15}$$

$$= \frac{7}{15}$$

$$\frac{1}{5} = \frac{3}{15}$$

$$\frac{2}{3} = \frac{10}{15}$$
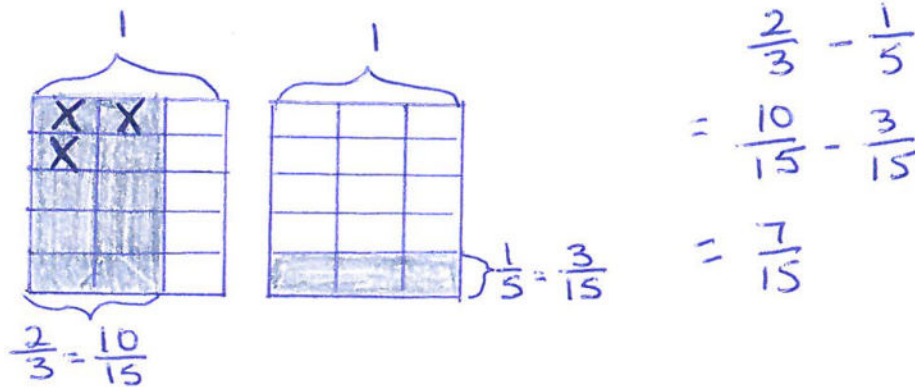
mr. Penman has $\frac{7}{15}$ liter left.

3. Sandra says that $\frac{4}{7} - \frac{1}{3} = \frac{3}{4}$ because all you have to do is subtract the numerators and subtract the denominators. Convince Sandra that she is wrong. You may draw a rectangular fraction model to support your thinking.

Sandra, you are wrong! The units aren't the same.
$\frac{3}{4}$ is only $\frac{1}{4}$ away from 1 whole. That means
your answer is impossible, because your answer
got bigger after you took away one third. You
need to make both fractions into like units
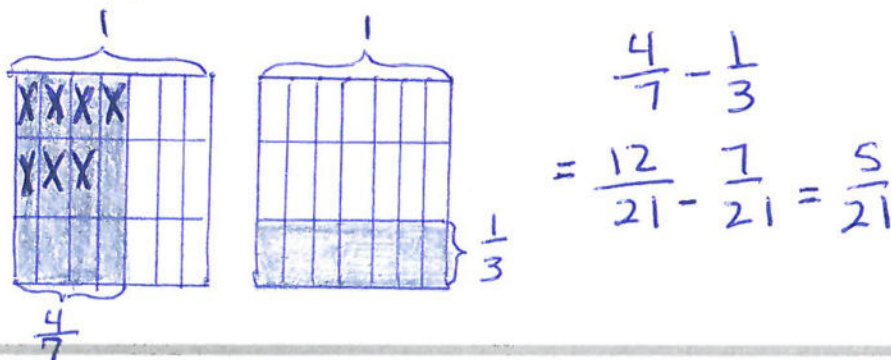
$$\frac{4}{7} - \frac{1}{3}$$

$$= \frac{12}{21} - \frac{7}{21} = \frac{5}{21}$$

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

$$\frac{4}{7}$$

COMMON CORE | Lesson 5: Subtract fractions with unlike units using the strategy of creating equivalent fractions.
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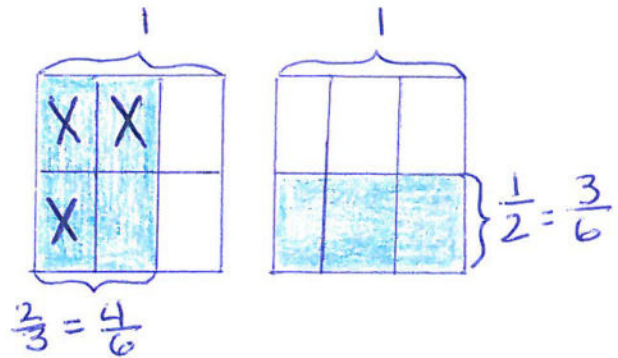
engage^ny   3.B.41

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1. For the following problems, draw a picture using the rectangular fraction model and write the answer. Simplify your answer, if possible.
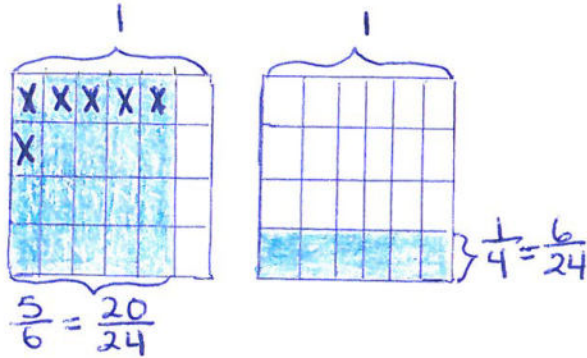
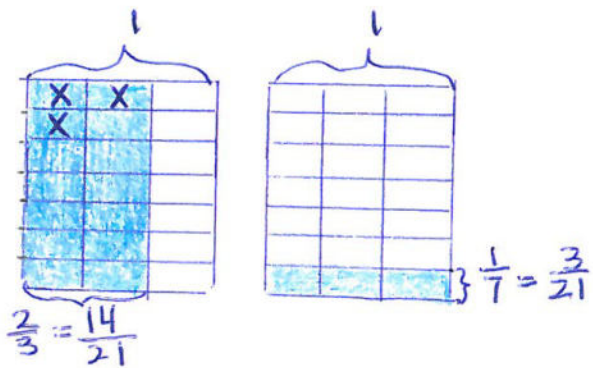a. $1\frac{1}{4} - \frac{1}{3} = \frac{15}{12} - \frac{4}{12} = \frac{11}{12}$

$1\frac{1}{4} = \frac{15}{12}$
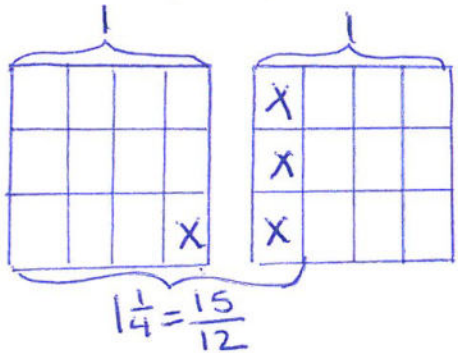
b. $1\frac{1}{5} - \frac{1}{3} = \frac{18}{15} - \frac{5}{15} = \frac{13}{15}$

$1\frac{1}{5} = \frac{18}{15}$
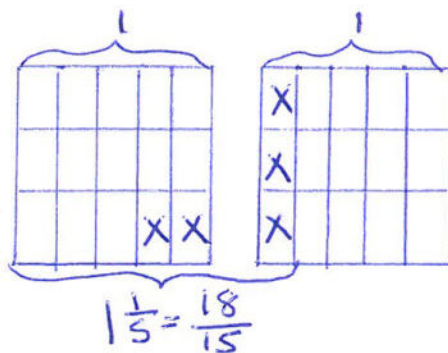
c. $1\frac{3}{8} - \frac{1}{2} = \frac{22}{16} - \frac{8}{16} = \frac{14}{16} = \frac{7}{8}$

$1\frac{3}{8} = \frac{22}{16}$
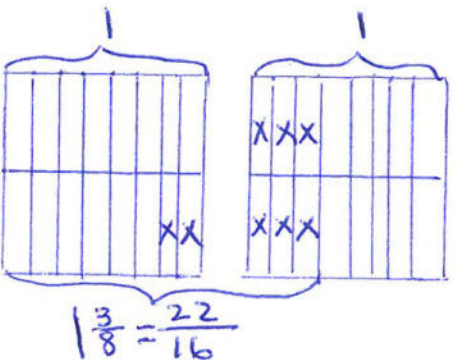
d. $1\frac{2}{5} - \frac{1}{2} = \frac{14}{10} - \frac{5}{10} = \frac{9}{10}$

$1\frac{2}{5} = \frac{14}{10}$
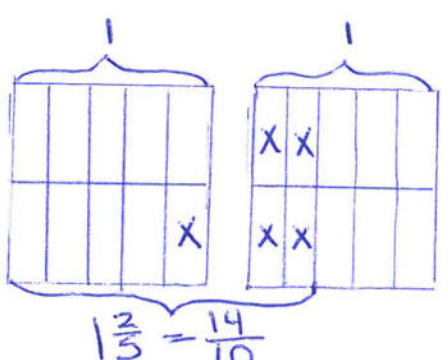
e. $1\frac{2}{7} - \frac{1}{3} = \frac{27}{21} - \frac{7}{21} = \frac{20}{21}$

$1\frac{2}{7} = \frac{27}{21}$
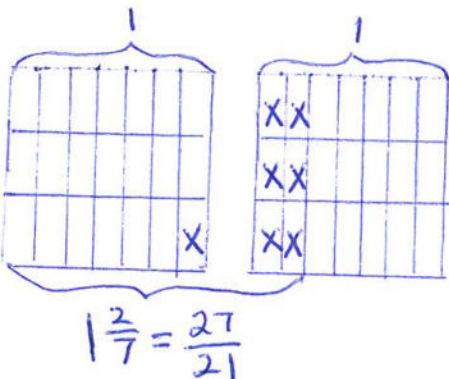
f. $1\frac{2}{3} - \frac{3}{5} = \frac{25}{15} - \frac{9}{15} = \frac{16}{15} = 1\frac{1}{15}$

$1\frac{2}{3} = \frac{25}{15}$
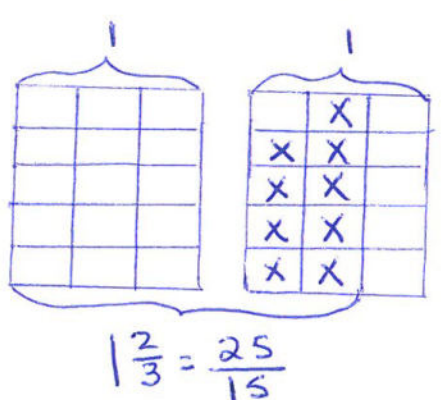
2. Jean-Luc jogged around the lake in $1\frac{1}{4}$ hour. William jogged the same distance in $\frac{5}{6}$ hour. How much longer did Jean-Luc take than William in hours?

$1\frac{1}{4} = \frac{30}{24}$
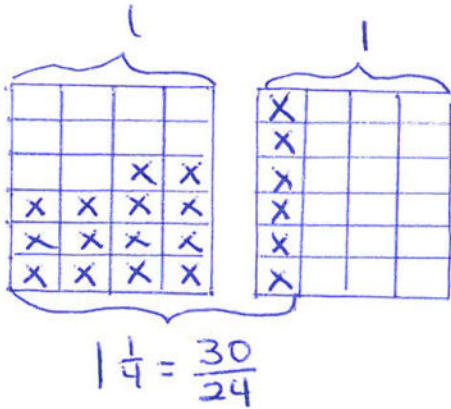
$$1\frac{1}{4} - \frac{5}{6} = \frac{30}{24} - \frac{20}{24}$$

$$= \frac{10}{24}$$

$$= \frac{5}{12}$$

Jean-Luc took $\frac{10}{24}$ or $\frac{5}{12}$ hour longer than William.

3. Is it true that $1\frac{2}{5} - \frac{3}{4} = \frac{1}{4} + \frac{2}{5}$? Prove your answer.

$1\frac{2}{5}$

1 $\frac{2}{5}$
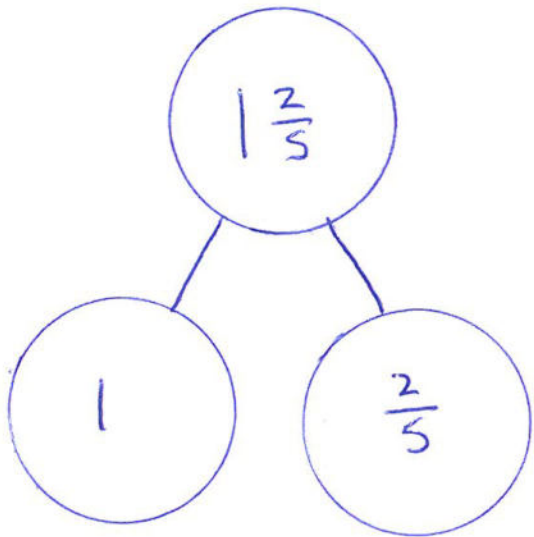
Yes. It is true

Take $\frac{3}{4}$ from 1 whole. That means $1 - \frac{3}{4} = \frac{1}{4}$. Then add that to $\frac{2}{5}$. The answer is the sum of $\frac{1}{4}$ and $\frac{2}{5}$.

$$\frac{1}{4} + \frac{2}{5} = \frac{5}{20} + \frac{8}{20}$$

$$= \frac{13}{20}$$

OR

$$1\frac{2}{5} - \frac{3}{4} = \frac{28}{20} - \frac{15}{20}$$

$$= \frac{13}{20}$$

Name _____   Date _____

Solve the word problems using the RDW strategy. Show all of your work.

1. George weeded $\frac{1}{5}$ of the garden, and Summer weeded some, too. When they were finished, $\frac{2}{3}$ of the garden still needed to be weeded. What fraction of the garden did Summer weed?

The Garden
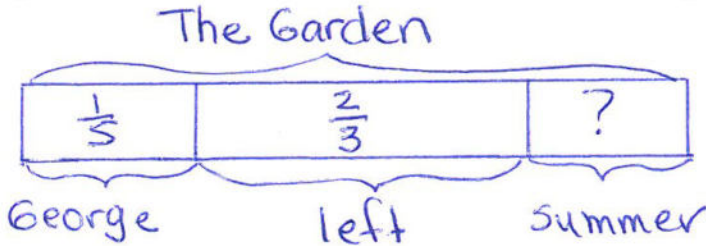
$\frac{1}{5}$	$\frac{2}{3}$	?
George	left	Summer

$1 - \frac{1}{5} - \frac{2}{3}$

$= \frac{4}{5} - \frac{2}{3}$

$= \frac{12}{15} - \frac{10}{15}$

$= \frac{2}{15}$

Summer weeded $\frac{2}{15}$ of the garden.

2. Jing spent $\frac{1}{3}$ of her money on a pack of pens, $\frac{1}{2}$ of her money on a pack of markers, and $\frac{1}{8}$ of her money on a pack of pencils. What fraction of her money is left?

all her money

$\frac{1}{3}$	$\frac{1}{2}$	$\frac{1}{8}$	?
Pens	markers	pencils	left
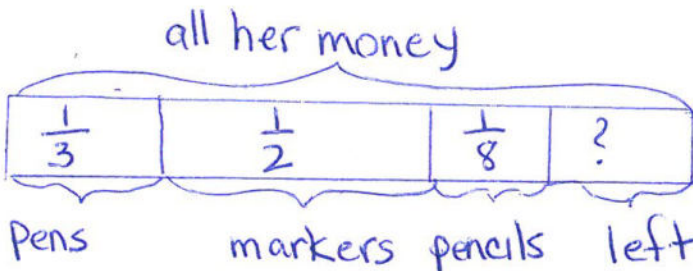
$1 - \frac{1}{3} - \frac{1}{2} - \frac{1}{8}$

$= \frac{2}{3} - \frac{1}{2} - \frac{1}{8}$

$= \frac{2}{3} - \frac{5}{8}$

$= \frac{16}{24} - \frac{15}{24}$

$= \frac{1}{24}$

Jing had $\frac{1}{24}$ of her money left.

3. Shelby bought a 2-ounce tube of blue paint. She used $\frac{2}{3}$ ounce to paint the water, $\frac{3}{5}$ ounce to paint the sky, and some to paint a flag. After that she has $\frac{2}{15}$ ounce left. How much paint did Shelby use to paint her flag?

2 ounces of paint

water   flag?   sky   flag left?
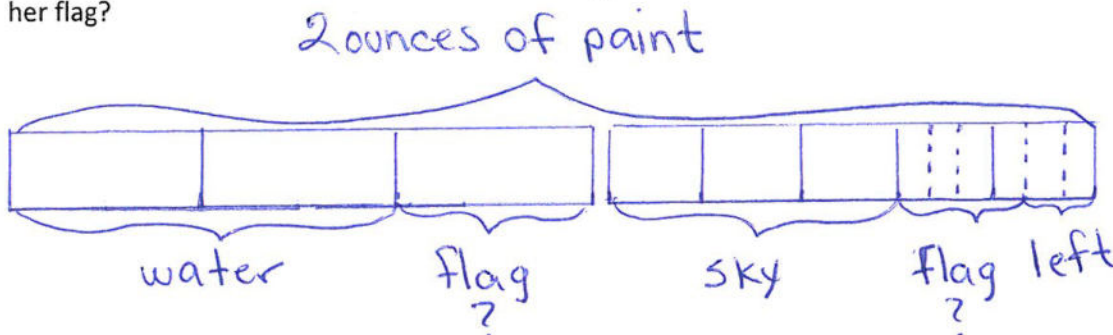
$\frac{1}{3} + \frac{4}{15} = \frac{5}{15} + \frac{4}{15} = \frac{9}{15}$

Shelby used $\frac{9}{15}$ ounce to paint the flag.

4. Jim sold $\frac{3}{4}$ gallon of lemonade. Dwight sold some lemonade, too. Together, they sold $1\frac{5}{12}$ gallons. Who sold more lemonade, Jim or Dwight? How much more?

$1\frac{5}{12} = \frac{17}{12}$ gal.

$\frac{3}{4}$ gal	?

Jim   Dwight
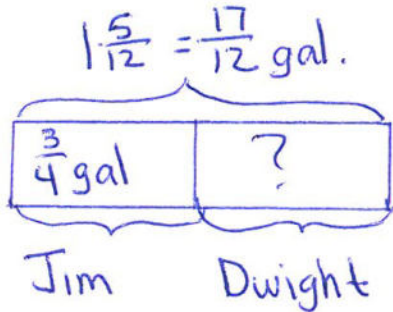
$\frac{17}{12} - \frac{3}{4} = \frac{17}{12} - \frac{9}{12} = \frac{8}{12}$

$\frac{9}{12} - \frac{8}{12} = \frac{1}{12}$

Jim sold more lemonade.

Jim sold $\frac{1}{12}$ gallon more than Dwight.

5. Leonard spent $\frac{1}{4}$ of his money on a sandwich. He spent 2 times as much on a gift for his brother as on some comic books. He had $\frac{3}{8}$ of his money left. What fraction of his money did he spend on the comic books?

all his money

				C	G	G

Sandwich   left   gift and comic books

gift | $\frac{1}{8}$ | $\frac{1}{8}$ |
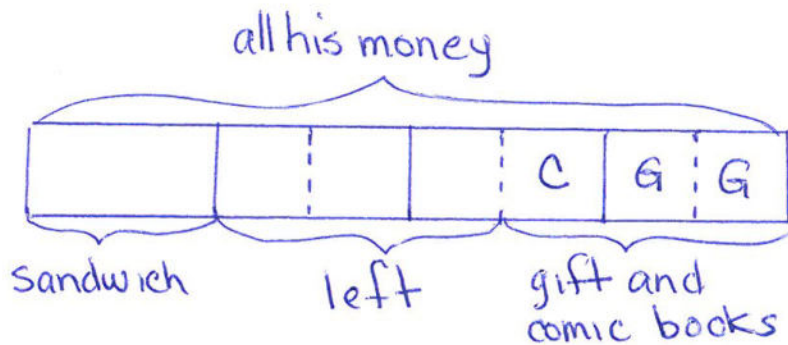
comics | $\frac{1}{8}$ |

$1 - \frac{7}{8} = \frac{1}{8}$

Leonard spent $\frac{1}{8}$ of his money on comics.

COMMON CORE | Lesson 7:   Solve two-step word problems.
Date: 9/8/14

engage^{ny}   3.B.67

Name _____   Date _____

1. Add or subtract.

a. $2 + 1\frac{1}{5} = 3\frac{1}{5}$
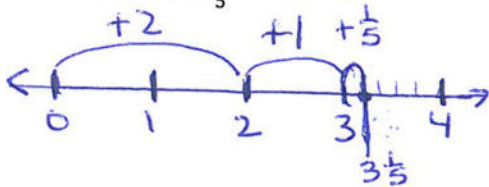
b. $2 - 1\frac{3}{8} = \frac{5}{8}$
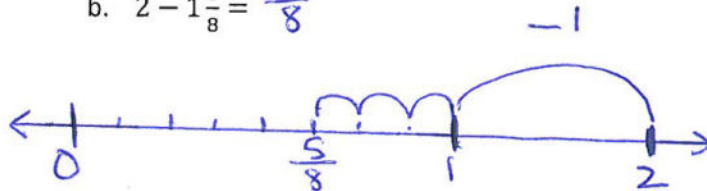
c. $5\frac{2}{5} + 2\frac{3}{5} = 8$
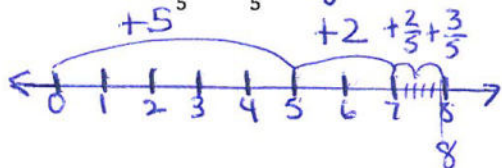
d. $4 - 2\frac{2}{7} = 1\frac{5}{7}$
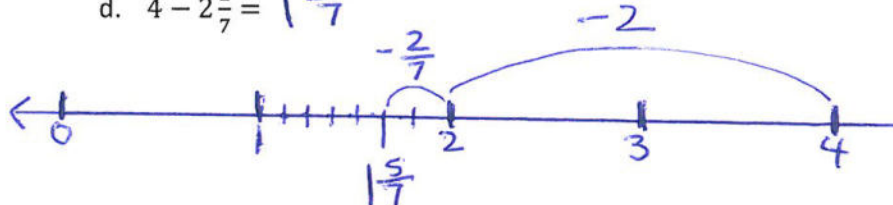
e. $9\frac{3}{4} + 8 = 17\frac{3}{4}$
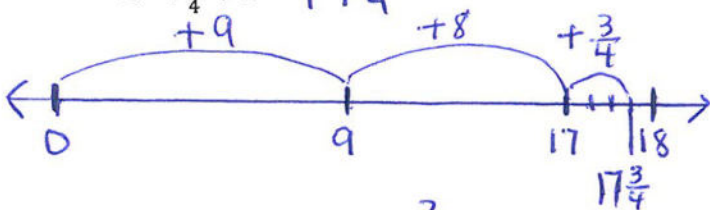
f. $17 - 15\frac{2}{3} = 1\frac{1}{3}$
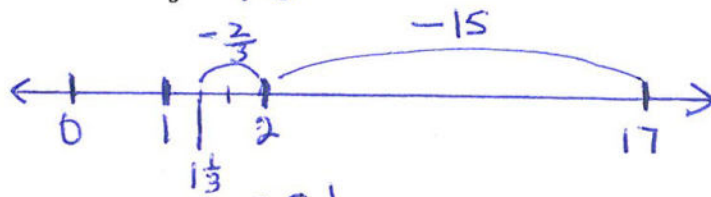
g. $15 + 17\frac{2}{3} = 32\frac{2}{3}$
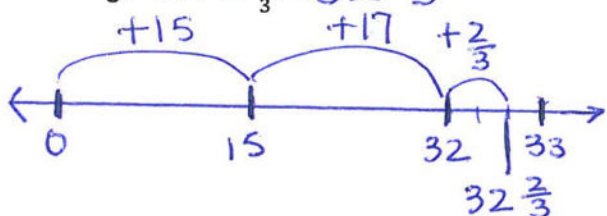
h. $100 - 20\frac{7}{8} = 79\frac{1}{8}$
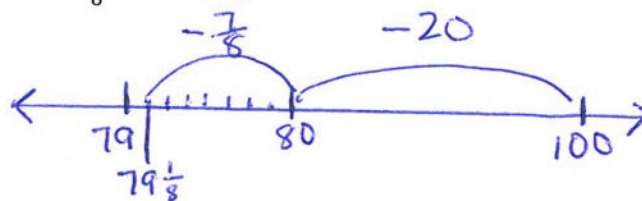
2. Calvin had 30 minutes in time-out. For the first $23\frac{1}{3}$ minutes, Calvin counted spots on the ceiling. For the rest of the time, he made faces at his stuffed tiger. How long did Calvin spend making faces at his tiger?

$$30 - 23\frac{1}{3} = 6\frac{2}{3}$$
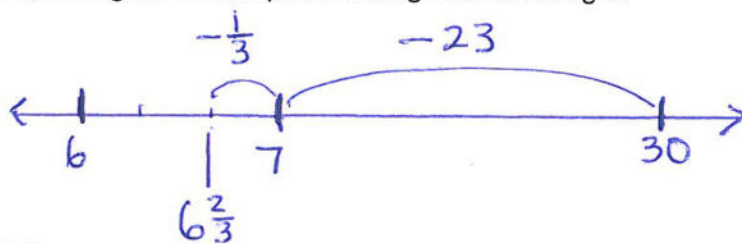
Calvin spent $6\frac{2}{3}$ minutes making faces at his tiger.

Lesson 8:   Add fractions to and subtract fractions from whole numbers using
equivalence and the number line as strategies.
Date: 9/8/14

engage^{ny}

3.C.10

3. Linda planned to spend 9 hours practicing piano this week. By Tuesday, she had spent $2\frac{1}{2}$ hours practicing. How much longer does she need to practice to reach her goal?
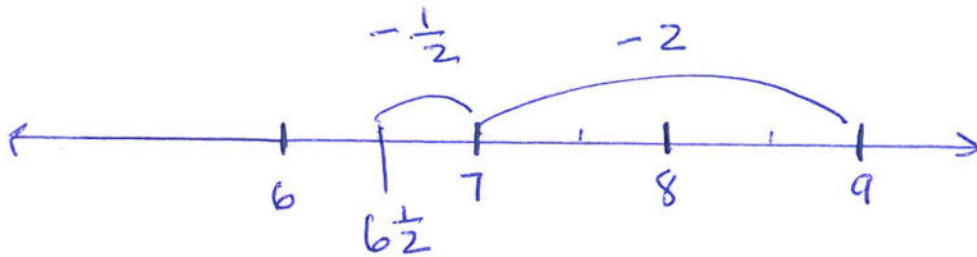
Linda needs to spend $6\frac{1}{2}$ hours more to reach her goal.

4. Gary says that $3 - 1\frac{1}{3}$ will be more than 2, since $3 - 1$ is 2. Draw a picture to prove that Gary is wrong.
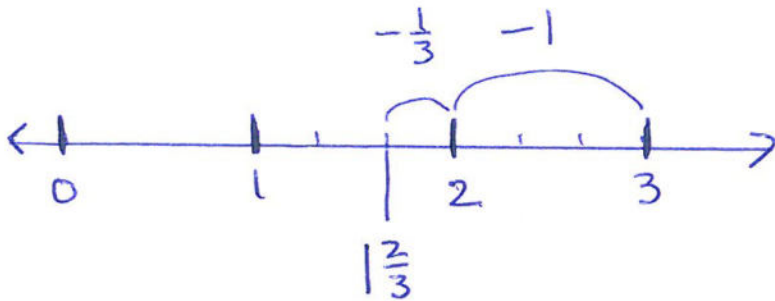
Gary is wrong. He estimated that $3 - 1\frac{1}{3}$ would be more than 2. He forgot that subtracting $\frac{1}{3}$ more will make the answer less than 2.

COMMON CORE

Lesson 8:   Add fractions to and subtract fractions from whole numbers using
              equivalence and the number line as strategies.
Date: 9/8/14

engage^{ny}   3.C.11

3.C.25

Name _____ Date _____

1. First make like units, then add.

a. $\frac{3}{4} + \frac{1}{7} = \left(\frac{3 \times 7}{4 \times 7}\right) + \left(\frac{1 \times 4}{7 \times 4}\right)$

$= \frac{21}{28} + \frac{4}{28}$

$= \frac{25}{28}$

b. $\frac{1}{4} + \frac{9}{8} = \left(\frac{1 \times 8}{4 \times 8}\right) + \left(\frac{9 \times 4}{8 \times 4}\right)$

$= \frac{8}{32} + \frac{36}{32}$

$= \frac{44}{32}$

$= \frac{32}{32} + \frac{12}{32} = 1\frac{12}{32} = 1\frac{3}{8}$

c. $\frac{3}{8} + \frac{3}{7} = \left(\frac{3 \times 7}{8 \times 7}\right) + \left(\frac{3 \times 8}{7 \times 8}\right)$

$= \frac{21}{56} + \frac{24}{56}$

$= \frac{45}{56}$

d. $\frac{4}{9} + \frac{4}{7} = \left(\frac{4 \times 7}{9 \times 7}\right) + \left(\frac{4 \times 9}{7 \times 9}\right)$

$= \frac{28}{63} + \frac{36}{63}$

$= \frac{64}{63} = \frac{63}{63} + \frac{1}{63} = 1\frac{1}{63}$

e. $\frac{1}{5} + \frac{2}{3} = \left(\frac{1 \times 3}{5 \times 3}\right) + \left(\frac{2 \times 5}{3 \times 5}\right)$

$= \frac{3}{15} + \frac{10}{15}$

$= \frac{13}{15}$

f. $\frac{3}{4} + \frac{5}{6} = \left(\frac{3 \times 3}{4 \times 3}\right) + \left(\frac{5 \times 2}{6 \times 2}\right)$

$= \frac{9}{12} + \frac{10}{12}$

$= \frac{19}{12} = \frac{12}{12} + \frac{7}{12} = 1\frac{7}{12}$

g. $\frac{2}{3} + \frac{1}{11} = \left(\frac{2 \times 11}{3 \times 11}\right) + \left(\frac{1 \times 3}{11 \times 3}\right)$

$= \frac{22}{33} + \frac{3}{33}$

$= \frac{25}{33}$

h. $\frac{3}{4} + 1\frac{1}{10} = \left(\frac{3 \times 5}{4 \times 5}\right) + \left(\frac{1 \times 2}{10 \times 2}\right) + 1$

$= \frac{15}{20} + \frac{2}{20} + 1$

$= 1\frac{17}{20}$

3.C.25

2. Whitney says that to add fractions with different denominators, you always have to multiply the denominators to find the common unit; for example:

$$\frac{1}{4} + \frac{1}{6} = \frac{6}{24} + \frac{4}{24}$$

Show Whitney how she could have chosen a denominator smaller than 24, and solve the problem.

Multiples of 4: 4, 8, ⃝12, 16, 20, ⃝24 $\frac{5 \times 2}{12 \times 2} = \frac{10}{24}$

6: 6, ⃝12, 18, ⃝24

$\left(\frac{1 \times 3}{4 \times 3}\right) + \left(\frac{1 \times 2}{6 \times 2}\right)$ 12 and 24 are both multiples of 4 and 6. 12 is the larger unit.

$= \frac{3}{12} + \frac{2}{12} = \frac{5}{12}$

3. Jackie brought $\frac{3}{4}$ of a gallon of iced tea to the party. Bill brought $\frac{7}{8}$ of a gallon of iced tea to the same party. How much iced tea did Jackie and Bill bring to the party?

$\left(\frac{3 \times 2}{4 \times 2}\right) + \frac{7}{8}$

$= \frac{6}{8} + \frac{7}{8}$

$= \frac{13}{8} = \frac{8}{8} + \frac{5}{8} = 1\frac{5}{8}$

Together they bought $1\frac{5}{8}$ gallons of iced tea to the party.

4. Madame Curie made some radium in her lab. She used $\frac{2}{5}$ kg of the radium in an experiment and had $1\frac{1}{4}$ kg left. How much radium did she have at first?
   (Extension: If she performed the experiment twice, how much radium would she have left?)

Extension:

$1\frac{13}{20} - \frac{4}{5}$

$\frac{5}{5} \quad 1\frac{13}{20}$

$\frac{5}{5} - \frac{4}{5} = \frac{1}{5}$

$\left(\frac{2 \times 4}{5 \times 4}\right) + 1 + \left(\frac{1 \times 5}{4 \times 5}\right)$

$= \frac{8}{20} + 1 + \frac{5}{20} = 1\frac{13}{20}$

$\frac{1}{5} + \frac{13}{20} = \frac{4}{20} + \frac{13}{20} = \frac{17}{20}$

At first she had $1\frac{13}{20}$ kg of radium.   She'd have $\frac{17}{20}$ kg left.

COMMON CORE   Lesson 9:   Add fractions making like units numerically.
                     Date: 9/8/14

engage^ny   3.C.26

Name _____   Date _____

1. Add.

a. $2\frac{1}{4} + 1\frac{1}{5} = 3 + \frac{1}{4} + \frac{1}{5}$

$= 3 + \left(\frac{1 \times 5}{4 \times 5}\right) + \left(\frac{1 \times 4}{5 \times 4}\right)$

$= 3 + \frac{5}{20} + \frac{4}{20}$

$= 3\frac{9}{20}$

b. $2\frac{3}{4} + 1\frac{2}{5} = 3 + \frac{3}{4} + \frac{2}{5}$

$= 3 + \left(\frac{3 \times 5}{4 \times 5}\right) + \left(\frac{2 \times 4}{5 \times 4}\right)$

$= 3 + \frac{15}{20} + \frac{8}{20}$

$= 3\frac{23}{20} = 4\frac{3}{20}$

c. $1\frac{1}{5} + 2\frac{1}{3} = 3 + \left(\frac{1 \times 3}{5 \times 3}\right) + \left(\frac{1 \times 5}{3 \times 5}\right)$

$= 3 + \frac{3}{15} + \frac{5}{15}$

$= 3\frac{8}{15}$

d. $4\frac{2}{3} + 1\frac{2}{5} = 5 + \left(\frac{2 \times 5}{3 \times 5}\right) + \left(\frac{2 \times 3}{5 \times 3}\right)$

$= 5 + \frac{10}{15} + \frac{6}{15}$

$= 5\frac{16}{15}$

$= 6\frac{1}{15}$

e. $3\frac{1}{3} + 4\frac{5}{7} = 7 + \frac{1}{3} + \frac{5}{7}$

$= 7 + \left(\frac{1 \times 7}{3 \times 7}\right) + \left(\frac{5 \times 3}{7 \times 3}\right)$

$= 7 + \frac{7}{21} + \frac{15}{21}$

$= 7\frac{22}{21} = 8\frac{1}{21}$

f. $2\frac{6}{7} + 5\frac{2}{3} = 7 + \frac{6}{7} + \frac{2}{3}$

$= 7 + \frac{18}{21} + \frac{14}{21}$

$= 7\frac{32}{21} = 8\frac{11}{21}$

g. $15\frac{1}{5} + 3\frac{5}{8} = 18 + \frac{1}{5} + \frac{5}{8}$

$= 18 + \frac{8}{40} + \frac{25}{40}$

$= 18\frac{33}{40}$

h. $15\frac{5}{8} + 5\frac{2}{5} = 20 + \frac{5}{8} + \frac{2}{5}$

$= 20 + \frac{25}{40} + \frac{16}{40}$

$= 20\frac{41}{40}$

$= 21\frac{1}{40}$

2. Erin jogged $2\frac{1}{4}$ miles on Monday. Wednesday, she jogged $3\frac{1}{3}$ miles, and on Friday, she jogged $2\frac{2}{3}$ miles.
    How far did Erin jog altogether?
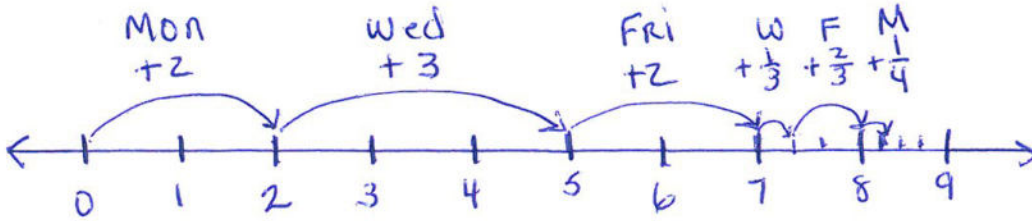
$$7\frac{1}{4} + \frac{1}{3} + \frac{2}{3} = 8\frac{1}{4}$$

Erin jogged $8\frac{1}{4}$ miles altogether.

3. Darren bought some paint. He used $2\frac{1}{4}$ gallons painting his living room. After that, he had $3\frac{5}{6}$ gallons left.
    How much paint did he buy?
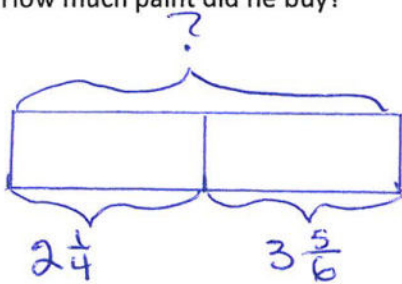
$$2\frac{1}{4} + 3\frac{5}{6}$$
$$= 5\frac{1}{4} + \frac{5}{6}$$
$$= 5\frac{3}{12} + \frac{10}{12}$$
$$= 5\frac{13}{12}$$
$$= 6\frac{1}{12}$$

He bought $6\frac{1}{12}$ gallons.

4. Clayton says that $2\frac{1}{2} + 3\frac{3}{5}$ will be more than 5, but less than 6 since $2 + 3$ is 5. Is Clayton's reasoning
    correct? Prove him right or wrong.

$2 + 3 + \frac{1}{2} + \frac{3}{5}$

5

more than 1
because $\frac{3}{5}$
is more than
$\frac{1}{2}$.

more than 6
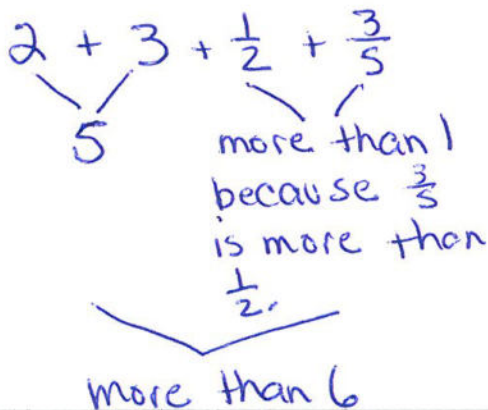
$$2\frac{1}{2} + 3\frac{3}{5}$$
$$= 5\frac{5}{10} + \frac{6}{10}$$
$$= 5\frac{11}{10} = 6\frac{1}{10}$$

Clayton will be wrong because $\frac{11}{10}$ is greater than 1. The answer will be between 6 and 7.

Name _____   Date _____

1. Generate equivalent fractions to get like units. Then, subtract.

a. $\frac{1}{2} - \frac{1}{3} = \frac{3}{6} - \frac{2}{6} = \frac{1}{6}$

b. $\frac{7}{10} - \frac{1}{3} = \frac{21}{30} - \frac{10}{30} = \frac{11}{30}$

c. $\frac{7}{8} - \frac{3}{4} = \frac{7}{8} - \frac{6}{8} = \frac{1}{8}$

d. $1\frac{2}{5} - \frac{3}{8} =$

$\frac{8}{8} \quad \frac{2}{5}$ $\frac{8}{8} - \frac{3}{8} = \frac{5}{8}$

$\frac{5}{8} + \frac{2}{5} =$

$\frac{25}{40} + \frac{16}{40} = \frac{41}{40} = 1\frac{1}{40}$

or $\frac{7}{5} - \frac{3}{8} =$

$\frac{56}{40} - \frac{15}{40} = \frac{41}{40} =$

$1\frac{1}{40}$

e. $1\frac{3}{10} - \frac{1}{6} =$

$1\frac{9}{30} - \frac{5}{30} = 1\frac{4}{30} = 1\frac{2}{15}$

f. $2\frac{1}{3} - 1\frac{1}{5} =$

$2\frac{5}{15} - 1\frac{3}{15} = 1\frac{2}{15}$

g. $5\frac{6}{7} - 2\frac{2}{3} =$

$5\frac{18}{21} - 2\frac{14}{21} = \boxed{3\frac{4}{21}}$

h. Draw a number line to show that your answer to (g) is reasonable.

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2. George says that, to subtract fractions with different denominators, you always have to multiply the denominators to find the common unit; for example:

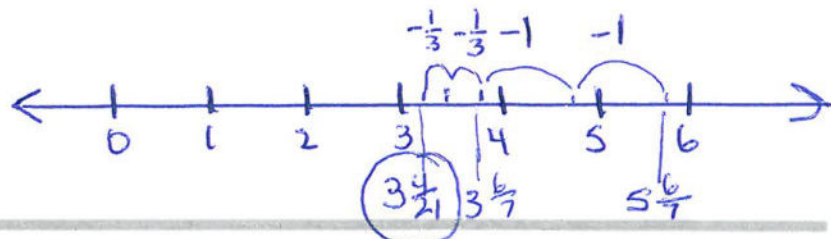$$\frac{3}{8} - \frac{1}{6} = \frac{18}{48} - \frac{8}{48}$$

(handwritten:) 6, 12, 18, ⟨24⟩ 30, 36, 42 ⟨48⟩
8, 16, ⟨24⟩, 32, 40, ⟨48⟩

Show George how he could have chosen a denominator smaller than 48, and solve the problem.

$$\frac{3}{8} - \frac{1}{6} = \frac{9}{24} - \frac{4}{24} = \frac{5}{24}$$

$$\frac{18}{48} - \frac{8}{48} = \frac{10}{48}$$

$$\frac{5 \times 2}{24 \times 2} = \frac{10}{48}$$

8 and 6 are factors of both 24 and 48.

3. Meiling has $1\frac{1}{4}$ liter of orange juice. She drinks $\frac{1}{3}$ liter. How much orange juice does she have left?
(Extension: If her brother then drinks twice as much as Meiling, how much is left?)
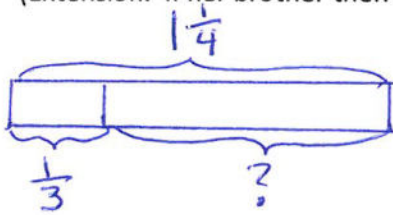
$1\frac{1}{4}$ $\frac{1}{3}$?

She has $\frac{11}{12}$ liter left.

Bonus!
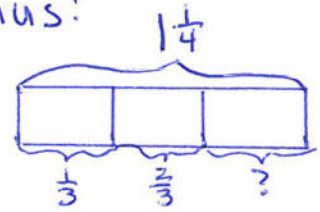
$1\frac{1}{4}$ $\frac{1}{3}$ $\frac{2}{3}$?

$$1\frac{1}{4} - \frac{1}{3}$$
$$\frac{3}{3} \quad \frac{1}{4}$$

$$\frac{3}{3} - \frac{1}{3} = \frac{2}{3}$$
$$\frac{2}{3} - \frac{1}{4} = \frac{8}{12} + \frac{3}{12} = \frac{11}{12}$$

$$1\frac{1}{4} - 1 = \frac{1}{4}$$

She has $\frac{1}{4}$ liter left.

4. Harlan used $3\frac{1}{2}$ kg of sand to make a large hourglass. To make a smaller hourglass, he only used $1\frac{3}{7}$ kg of sand. How much more sand did it take to make the large hourglass than the smaller one?

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

S   ←?→ $1\frac{3}{7}$
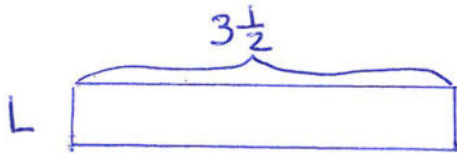
$$3\frac{1}{2} - 1\frac{3}{7} =$$
$$3\frac{7}{14} - 1\frac{6}{14} =$$
$$2\frac{1}{14}$$
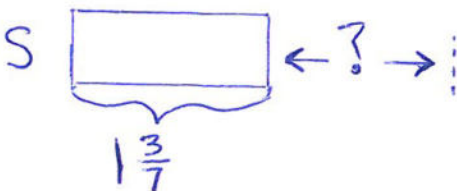
It takes $2\frac{1}{14}$ kg more sand to make the large hourglass than the smaller one.

COMMON CORE
Lesson 11:   Subtract fractions making like units numerically.
Date: 9/8/14

engage^ny   3.C.54

Name _____   Date _____

1. Subtract.

a. $3\frac{1}{5} - 2\frac{1}{4} = 3 - 2\frac{1}{4} = \frac{3}{4}$

$3 \diagdown_{\frac{1}{5}}^{\diagup}$ $\frac{3}{4} + \frac{1}{5} =$

$\frac{15}{20} + \frac{4}{20} = \frac{19}{20}$

b. $4\frac{2}{5} - 3\frac{3}{4} = 4 - 3\frac{3}{4} = \frac{1}{4}$

$4 \diagdown_{\frac{2}{5}}^{\diagup}$ $\frac{1}{4} - \frac{2}{5} =$

$\frac{5}{20} + \frac{8}{20} = \frac{13}{20}$

c. $7\frac{1}{5} - 4\frac{1}{3} = 3\frac{1}{5} - \frac{1}{3}$

$= 2\frac{6}{5} - \frac{1}{3}$

$= 2\frac{18}{15} - \frac{5}{15}$

$= 2\frac{13}{15}$

d. $7\frac{2}{5} - 5\frac{2}{3} = 2\frac{2}{5} - \frac{2}{3}$

$= 1\frac{7}{5} - \frac{2}{3}$

$= 1\frac{21}{15} - \frac{10}{15}$

$= 1\frac{11}{15}$

e. $4\frac{2}{7} - 3\frac{1}{3} = 4 - 3\frac{1}{3} = \frac{2}{3}$

$4 \diagdown_{\frac{2}{7}}^{\diagup}$ $\frac{2}{3} + \frac{2}{7} =$

$\frac{14}{21} + \frac{6}{21} = \frac{20}{21}$

f. $9\frac{2}{3} - 2\frac{6}{7} = 7\frac{2}{3} - \frac{6}{7}$

$= 6\frac{5}{3} - \frac{6}{7}$

$= 6\frac{35}{21} - \frac{18}{21}$

$= 6\frac{17}{21}$

g. $17\frac{2}{3} - 5\frac{5}{6} = 12\frac{2}{3} - \frac{5}{6}$

$= 11\frac{5}{3} - \frac{5}{6}$

$= 11\frac{10}{6} - \frac{5}{6}$

$= 11\frac{5}{6}$

h. $18\frac{1}{3} - 3\frac{3}{8} = 15\frac{1}{3} - \frac{3}{8}$

$= 14\frac{4}{3} - \frac{3}{8}$

$= 14\frac{32}{24} - \frac{9}{24}$

$= 14\frac{23}{24}$

2. Toby wrote the following:

$$7\frac{1}{4} - 3\frac{3}{4} = 4\frac{2}{4} = 4\frac{1}{2}$$

Is Toby's calculation correct? Draw a number line to support your answer.

No, Toby's calculation is not correct.
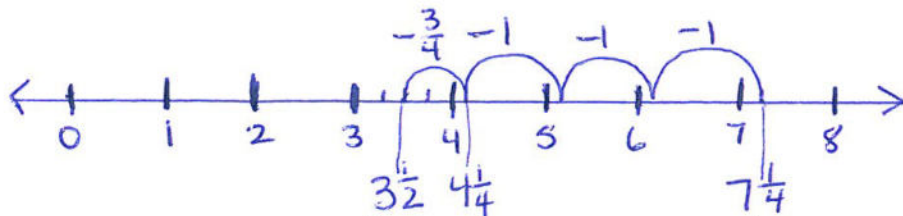
3. Mr. Neville Iceguy mixed up $12\frac{3}{5}$ gallons of chili for a party. If $7\frac{3}{4}$ gallons of chili was mild and the rest was extra spicy, how much extra spicy chili did Mr. Iceguy make?
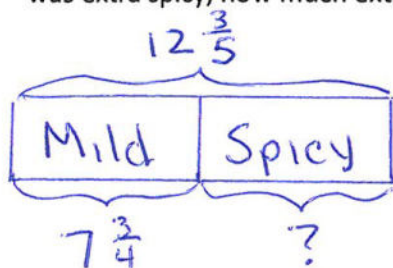
$$12\frac{3}{5} - 7\frac{3}{4}$$
$$= 5\frac{3}{5} - \frac{3}{4}$$
$$= 5\frac{12}{20} - \frac{15}{20}$$
$$= 4\frac{32}{20} - \frac{15}{20} = 4\frac{17}{20}$$

Mr. Iceguy made $4\frac{17}{20}$ gallons of spicy chili.

4. Jazmyne decided to spend $6\frac{1}{2}$ hours studying over the weekend. She spent $1\frac{1}{4}$ hours studying on Friday evening and $2\frac{2}{3}$ hours on Saturday. How much longer does she need to spend studying on Sunday in order to reach her goal?
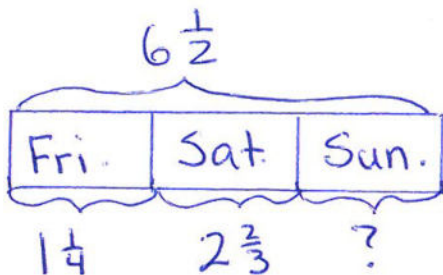
$$1\frac{1}{4} + 2\frac{2}{3} = 1\frac{3}{12} + 2\frac{8}{12} = 3\frac{11}{12}$$

$$6\frac{1}{2} - 3\frac{11}{12}$$
$$= 6\frac{6}{12} - 3\frac{11}{12}$$
$$= 5\frac{18}{12} - 3\frac{11}{12}$$
$$= 2\frac{7}{12}$$

Jazmyne needs to study $2\frac{7}{12}$ hours on Sunday to reach her goal.

Name _____ Date _____

1. Are the following expressions greater than or less than 1? Circle the correct answer.

   a. $\frac{1}{2} + \frac{2}{7}$ greater than 1   (less than 1)

   b. $\frac{5}{8} + \frac{3}{5}$ (greater than 1)   less than 1

   c. $1\frac{1}{4} - \frac{1}{3}$ greater than 1   (less than 1)

   d. $3\frac{5}{8} - 2\frac{5}{9}$ (greater than 1)   less than 1

2. Are the following expressions greater than or less than $\frac{1}{2}$? Circle the correct answer.

   a. $\frac{1}{4} + \frac{2}{3}$ (greater than $\frac{1}{2}$)   less than $\frac{1}{2}$

   b. $\frac{3}{7} - \frac{1}{8}$ greater than $\frac{1}{2}$ (less than $\frac{1}{2}$)

   c. $1\frac{1}{7} - \frac{7}{8}$ greater than $\frac{1}{2}$ (less than $\frac{1}{2}$)

   d. $\frac{3}{7} + \frac{2}{6}$ (greater than $\frac{1}{2}$)   less than $\frac{1}{2}$

3. Use >, <, or = to make the following statements true.

   a. $5\frac{2}{3} + 3\frac{3}{4}$ __>__ $8\frac{2}{3}$

   b. $4\frac{5}{8} - 3\frac{2}{5}$ __<__ $1\frac{5}{8} + \frac{2}{5}$

   c. $5\frac{1}{2} + 1\frac{3}{7}$ __=__ $6 + \frac{13}{14}$

   d. $15\frac{4}{7} - 11\frac{2}{5}$ __<__ $4\frac{4}{7} + \frac{2}{5}$

COMMON CORE | Lesson 13: Use fraction benchmark numbers to assess reasonableness of addition and subtraction equations.
Date: 9/9/14

engage^{ny}

3.D.11

4. Is it true that $4\frac{3}{5} - 3\frac{2}{3} = 1 + \frac{3}{5} + \frac{2}{3}$? Prove your answer.

$$4\frac{3}{5} - 3\frac{2}{3}$$

$$= 1\frac{3}{5} - \frac{2}{3}$$

$$= 1 + \frac{3}{5} - \frac{2}{3}$$

$$1 + \frac{3}{5} + \frac{2}{3} \neq 1 + \frac{3}{5} - \frac{2}{3}$$

No! It's not true! It's $\frac{2}{3}$ less, not more.

5. Jackson needs to be $1\frac{3}{4}$ inches taller in order to ride the roller coaster. Since he can't wait, he puts on a pair of boots that add $1\frac{1}{6}$ inches to his height and slips an insole inside to add another $\frac{1}{8}$ inch to his height. Will this make Jackson appear tall enough to ride the roller coaster?

Is $1\frac{1}{6} + \frac{1}{8}$ greater than or equal to $1\frac{3}{4}$?

Since both $\frac{1}{6}$ and $\frac{1}{8}$ is less than $\frac{1}{2}$ or $\frac{2}{4}$, then it is less than $\frac{3}{4}$. So, $1\frac{1}{6} + \frac{1}{8} < 1\frac{3}{4}$. No. The boots and the insole will not make Jackson appear tall enough to ride the roller coaster.

6. A baker needs 5 lb of butter for a recipe. She found 2 portions that each weigh $1\frac{1}{6}$ lb and a portion that weighs $2\frac{2}{7}$ lb. Does she have enough butter for her recipe?

Is $1\frac{1}{6} + 1\frac{1}{6} + 2\frac{2}{7} > 5$?

$$1 + 1 + 2 + \frac{2}{6} + \frac{2}{7}$$

$$4 + \underbrace{\frac{2}{6} + \frac{2}{7}}_{\text{less than 1}}$$

No. The baker does not have enough butter for her recipe.

So, $4 + \frac{2}{6} + \frac{2}{7} < 5$

Name _____   Date _____

1. Rearrange the terms so that you can add or subtract mentally, then solve.

a. $\frac{1}{4} + 2\frac{2}{3} + \frac{7}{4} + \frac{1}{3}$

$= \left(\frac{1}{4} + \frac{7}{4}\right) + \left(2\frac{2}{3} + \frac{1}{3}\right)$

$= \quad 2 \quad + 3$

$= \quad 5$

b. $2\frac{3}{5} - \frac{3}{4} + \frac{2}{5}$

$= \left(2\frac{3}{5} + \frac{2}{5}\right) - \frac{3}{4}$

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

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

c. $4\frac{3}{7} - \frac{3}{4} - 2\frac{1}{4} - \frac{3}{7}$

$= \left(4\frac{3}{7} - \frac{3}{7}\right) - \left(\frac{3}{4} + 2\frac{1}{4}\right)$

$= 4 - 3$

$= 1$

d. $\frac{5}{6} + \frac{1}{3} - \frac{4}{3} + \frac{1}{6}$

$= \left(\frac{5}{6} + \frac{1}{6}\right) - \frac{3}{3}$

$= 1 - 1$

$= 0$

2. Fill in the blank to make the statement true.

a. $11\frac{2}{5} - 3\frac{2}{3} - \frac{11}{3} = \underline{4\frac{1}{15}}$

$= 11\frac{2}{5} - \left(3\frac{2}{3} + \frac{11}{3}\right)$

$= 11\frac{2}{5} - \left(3\frac{2}{3} + 3\frac{2}{3}\right)$

$= 11\frac{2}{5} - 7\frac{1}{3}$

$= 11\frac{6}{15} - 7\frac{5}{15} = \boxed{4\frac{1}{15}}$

b. $11\frac{7}{8} + 3\frac{1}{5} - \underline{\frac{3}{40}} = 15$

$= \left(11\frac{7}{8} + 3\frac{1}{5}\right) - 15$

$= \left(11\frac{35}{40} + 3\frac{8}{40}\right) - 15$

$= 14\frac{43}{40} - 15$

$= 15\frac{3}{40} - 15 = \boxed{\frac{3}{40}}$

c. $\frac{5}{12} - \underline{\quad 1 \quad} + \frac{5}{4} = \frac{2}{3}$

$\frac{5}{12} - \underline{\quad\quad} + \frac{15}{12} = \frac{8}{12}$

$\frac{20}{12} - \underline{\quad\quad} = \frac{8}{12}$

$1\frac{8}{12} - \boxed{1} = \frac{8}{12}$

d. $\underline{58\frac{11}{12}} - 30 - 7\frac{1}{4} = 21\frac{2}{3}$

$= 30 + 7\frac{1}{4} + 21\frac{2}{3}$

$= 58\frac{1}{4} + \frac{2}{3}$

$= \boxed{58\frac{11}{12}}$

COMMON CORE | Lesson 14: Strategize to solve multi-term problems.
Date: 9/9/14

engage^ny   3.D.24

$4\frac{4}{5}$ $1\frac{1}{7}$

e. $\frac{24}{5} + \underline{\quad} + \frac{8}{7} = 9$ f. $11.1 + 3\frac{1}{10} - \underline{\quad} = \frac{99}{10}$

$4\frac{4}{5} + 1\frac{1}{7} + \underline{\quad} = 9$ $11.1 + 3.1 - \underline{\quad} = 9.9$

$5\frac{28}{35} + \frac{5}{35} + \underline{\quad} = 9$ $14.2 - \underline{\quad} = 9.9$

$9 - 5\frac{33}{35} = 8\frac{35}{35} - 5\frac{33}{38} \;\boxed{=3\frac{2}{35}}$

$$14.2$$
$$\underline{-\;\;9.9} \quad = \boxed{4.3}$$
$$4.3$$

3. DeAngelo needs 100 lb of garden soil to landscape a building. In the company's storage area, he finds 2 cases holding $24\frac{3}{4}$ lb of garden soil each, and a third case holding $19\frac{3}{8}$ lb. How much gardening soil does DeAngelo still need in order to do the job?

$24\frac{3}{4} + 24\frac{3}{4} + 19\frac{3}{8} + \underline{\quad} = 100$ DeAngelo needs

$67\frac{6}{4} + \frac{3}{8} + \underline{\quad} = 100$ $31\frac{1}{8}$ pounds

$68\frac{4}{8} + \frac{3}{8} + \underline{\quad} = 100$ of garden soil.

$68\frac{7}{8} + \underline{\quad} = 100$

$100 - 68\frac{7}{8} = 31\frac{1}{8}$

$99\frac{1}{8}$

4. Volunteers helped clean up 8.2 kg of trash in one neighborhood and $11\frac{1}{2}$ kg in another. They sent $1\frac{1}{4}$ kg to be recycled and threw the rest away. How many kilograms of trash did they throw away?

$8.2 + 11\frac{1}{2} - 1\frac{1}{4} = \underline{\quad}$ $11\frac{1}{2} = 11\frac{5}{10} = 11.5$

$8.2 + 11.5 - 1.25 = \underline{\quad}$ $1\frac{1}{4} = 1\frac{25}{100} = 1.25$

$19.7 - 1.25 = 18.45$ $18.45 = 18\frac{45}{100} = 18\frac{9}{20}$

They threw away 18.45 kg or $18\frac{9}{20}$ kg of trash.

Name _____   Date _____

Solve the word problems using the RDW strategy. Show all of your work.

1. In a race, the-second place finisher crossed the finish line $1\frac{1}{3}$ minutes after the first-place finisher. The third-place finisher was $1\frac{3}{4}$ minutes behind the second-place finisher. The third-place finisher took $34\frac{2}{3}$ minutes. How long did the first-place finisher take?
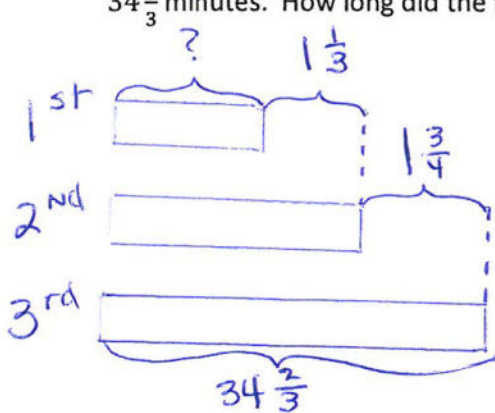
$$34\frac{2}{3} - 1\frac{3}{4} = 33\frac{2}{3} - \frac{3}{4}$$
$$= 33\frac{8}{12} - \frac{9}{12}$$
$$= 32\frac{20}{12} - \frac{9}{12}$$
$$= 32\frac{11}{12}$$

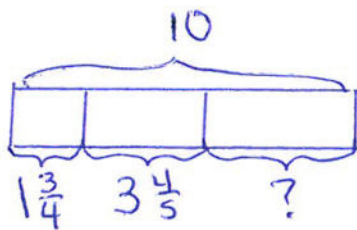$$32\frac{11}{12} - 1\frac{1}{3} = 31\frac{11}{12} - \frac{1}{3}$$
$$= 31\frac{11}{12} - \frac{4}{12}$$
$$= 31\frac{7}{12}$$
$$31\frac{7}{12}\ min. = 31\frac{35}{60}\ min$$

The 1ST place time was 31 min 35 sec.

2. John used $1\frac{3}{4}$ kg of salt to melt the ice on his sidewalk. He then used another $3\frac{4}{5}$ kg on the driveway. If he originally bought 10 kg of salt, how much does he have left?

$$1\frac{3}{4} + 3\frac{4}{5} = 4\frac{3}{4} + \frac{4}{5}$$
$$= 4\frac{15}{20} + \frac{16}{20}$$
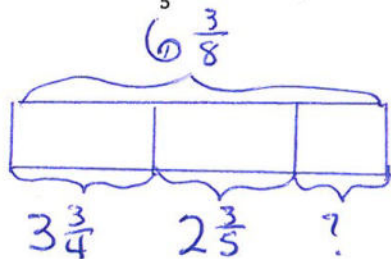$$= 4\frac{31}{20}$$
$$= 5\frac{11}{20}$$

$$10 - 5\frac{11}{20} = 5 - \frac{11}{20}$$
$$= 4\frac{9}{20}$$

He had $4\frac{9}{20}$ kg of salt left.

3. Sinister Stan stole $3\frac{3}{4}$ oz of slime from Messy Molly, but his evil plans require $6\frac{3}{8}$ oz of slime. He stole another $2\frac{3}{5}$ oz of slime from Rude Ralph. How much more slime does Sinister Stan need for his evil plan?

$$3\frac{3}{4} + 2\frac{3}{5} = 5\frac{3}{4} + \frac{3}{5}$$
$$= 5\frac{15}{20} + \frac{12}{20}$$
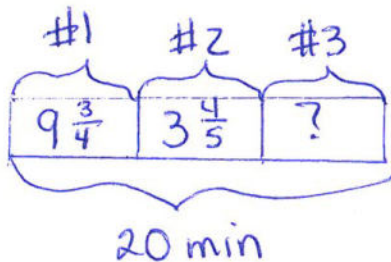$$= 5\frac{27}{20}$$
$$= 6\frac{7}{20}$$

$$6\frac{3}{8} - 6\frac{7}{20} = \frac{3}{8} - \frac{7}{20}$$
$$= \frac{15}{40} - \frac{14}{40}$$
$$= \frac{1}{40}$$

Sinister Stan needs $\frac{1}{40}$ ounce of slime.

4. Gavin had 20 minutes to do a three-problem quiz. He spent $9\frac{3}{4}$ minutes on question 1 and $3\frac{4}{5}$ minutes on question 2. How much time did he have left for question 3? Write the answer in minutes and seconds.
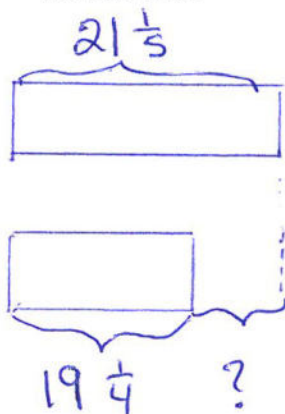
#1   #2   #3

| $9\frac{3}{4}$ | $3\frac{4}{5}$ | ? |

20 min

$20 - 9\frac{3}{4} - 3\frac{4}{5}$

$= 19\frac{20}{20} - 9\frac{15}{20} - 3\frac{16}{20}$

$= 10\frac{5}{20} - 3\frac{16}{20}$
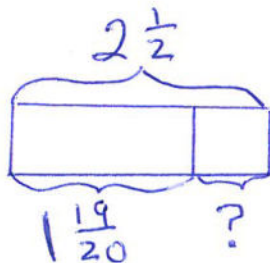
$= 9\frac{25}{20} - 3\frac{16}{20}$

$= 6\frac{9}{20}$

$6\frac{9}{20} = 6\frac{27}{60}$

$= 6\,min\,27\,sec$

He had 6 minutes 27 seconds for question 3.

5. Matt wants to save $2\frac{1}{2}$ minutes on his 5K race time. After a month of hard training, he managed to lower his overall time from $21\frac{1}{5}$ minutes to $19\frac{1}{4}$ minutes. By how many more minutes does Matt need to lower his race time?

$21\frac{1}{5}$

$19\frac{1}{4}$?

$2\frac{1}{2}$

$1\frac{19}{20}$?

$21\frac{1}{5} - 19\frac{1}{4} = 2\frac{1}{5} - \frac{1}{4}$

$= 2\frac{4}{20} - \frac{5}{20}$

$= 1\frac{24}{20} - \frac{5}{20}$

$= 1\frac{19}{20}$

$2\frac{1}{2} - 1\frac{19}{20} = 1\frac{1}{2} - \frac{19}{20}$

$= 1\frac{10}{20} - \frac{19}{20}$

$= \frac{30}{20} - \frac{19}{20}$

$= \frac{11}{20}$

Matt needs to shave $\frac{11}{20}$ minute off his race time.

COMMON CORE   Lesson 15:   Solve multi-step word problems; assess reasonableness of solutions using benchmark numbers.   engage^ny   3.D.39

Date: 9/9/14

Names _____ and _____ Date _____

1. Draw the following ribbons. When finished, compare your work to your partner's.

    a. 1 ribbon. The piece shown below is only $\frac{1}{3}$ of the whole. Complete the drawing to show the whole piece of ribbon.
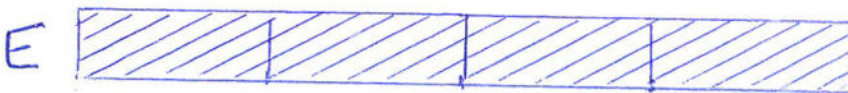
    b. 1 ribbon. The piece shown below is $\frac{4}{5}$ of the whole. Complete the drawing to show the whole piece of ribbon.

    c. 2 ribbons, A and B. One third of A is equal to all of B. Draw a picture of the ribbons.

    d. 3 ribbons, C, D, and E. C is half the length of D. E is twice as long as D. Draw a picture of the ribbons.

COMMON CORE | Lesson 16: Explore part to whole relationships.
Date: 9/9/14

engage^{ny}

3.D.49

2. Half of Robert's piece of wire is equal to 2 thirds of Maria's wire. The total length of their wires is 10 feet. How much longer is Robert's wire than Maria's?
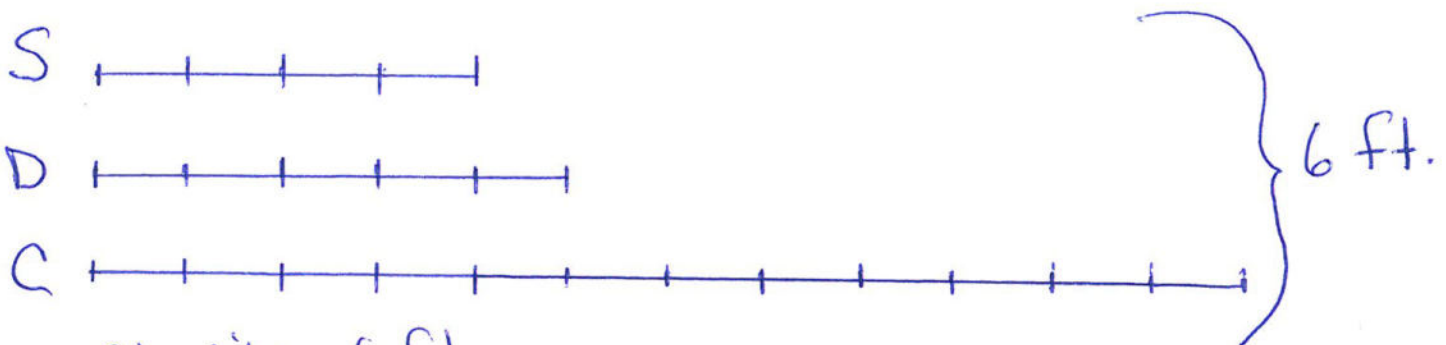
Robert's wire |—+—+—+—| ⎫
Maria's wire |—+—+—+⌣| ⎬ 10 ft.
           ? ⎭
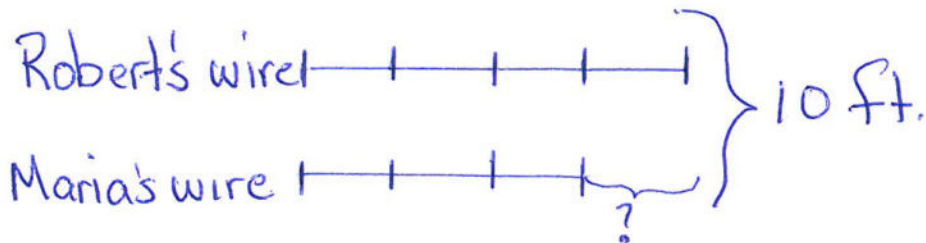
$7 \text{ units} = 10 \text{ ft.}$
$1 \text{ unit} = \frac{10}{7}$

Robert's wire is $\frac{10}{7}$ foot longer than Maria's

3. Half of Sarah's wire is equal to $\frac{2}{5}$ of Daniel's. Chris has 3 times as much as Sarah. In all, their wire measures 6 ft. How long is Sarah's wire in feet?

S |—+—+—+—|
D |—+—+—+—+—| ⎫
C |—+—+—+—+—+—+—+—+—+—+—| ⎬ 6 ft.
                         ⎭

$21 \text{ units} = 6 \text{ ft.}$
$1 \text{ unit} = \frac{6 \text{ ft}}{21 \text{ ft}}$
$\qquad = \frac{2}{7} \text{ ft}$
$\qquad = 4 \times \frac{2}{7} = \frac{8}{7} = 1\frac{1}{7} \text{ ft}$
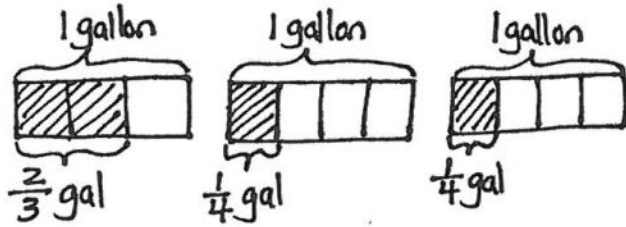
Sarah's wire is $1\frac{1}{7}$ ft long.
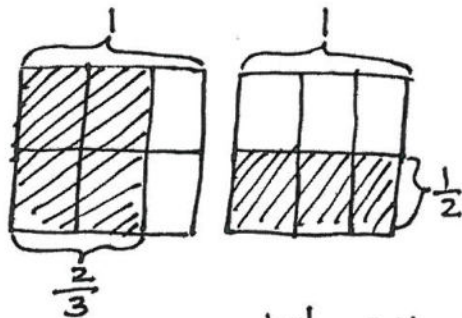
Name __Jacqueline__   Date _____

1. Lila collected the honey from 3 of her beehives. From the first hive she collected $\frac{2}{3}$ gallon of honey. The last two hives yielded $\frac{1}{4}$ gallon each.

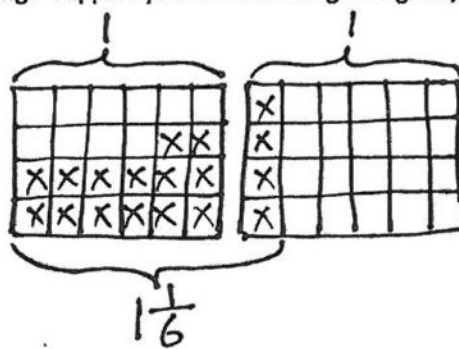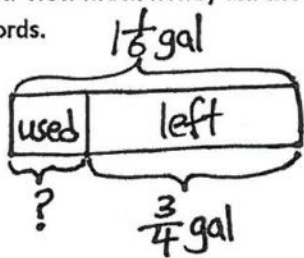   a. How many gallons of honey did Lila collect in all? Draw a diagram to support your answer.

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

$$\frac{2}{3} + \frac{1}{2} = \frac{4}{6} + \frac{3}{6}$$
$$= \frac{7}{6}$$
$$= 1\frac{1}{6}$$

Lila collected $\frac{7}{6}$ or $1\frac{1}{6}$ gallons in all.

   b. After using some of the honey she collected for baking, Lila found that she only had $\frac{3}{4}$ gallon of honey left. How much honey did she use for baking? Support your answer using a diagram, numbers, and words.


$$1\frac{1}{6} - \frac{3}{4}$$
$$= \frac{7}{6} - \frac{3}{4}$$
$$= \frac{28}{24} - \frac{18}{24}$$
$$= \frac{10}{24}$$
$$= \frac{5}{12}$$

Lila used $\frac{10}{24}$ or $\frac{5}{12}$ gallon for baking.

c. With the remaining $\frac{3}{4}$ gallon of honey, Lila decided to bake some loaves of bread and several batches of cookies for her school bake sale. The bread needed $\frac{1}{6}$ gallon of honey and the cookies needed $\frac{1}{4}$ gallon. How much honey was left over? Support your answer using a diagram, numbers, and words.
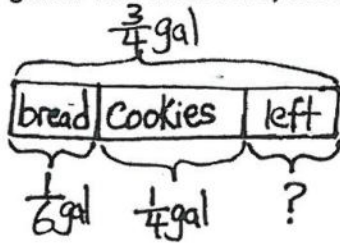

$$\frac{3}{4} - \left(\frac{1}{6} + \frac{1}{4}\right)$$
$$= \frac{3}{4} - \left(\frac{4}{24} + \frac{6}{24}\right)$$
$$= \frac{3}{4} - \frac{10}{24}$$
$$= \frac{18}{24} - \frac{10}{24}$$
$$= \frac{8}{24}$$
$$= \frac{1}{3}$$
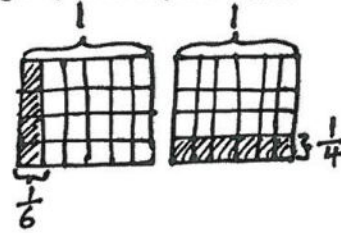
Lila had $\frac{1}{3}$ gallon left over.

d. Lila decided to make more baked goods for the bake sale. She used $\frac{1}{8}$ lb less flour to make bread than to make cookies. She used $\frac{1}{4}$ lb more flour to make cookies than to make brownies. If she used $\frac{1}{2}$ lb of flour to make the bread, how much flour did she use to make the brownies? Explain your answer using a diagram, numbers, and words.
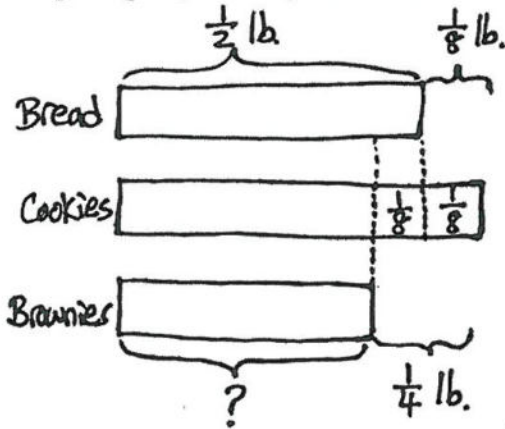
$$\frac{1}{2} - \frac{1}{8} = \frac{4}{8} - \frac{1}{8}$$
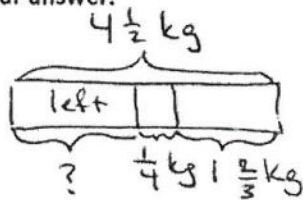$$= \frac{3}{8}$$

Lila used $\frac{3}{8}$ pound of flour to make the brownies.

Name _Jacqueline_   Date _____

1) On Sunday, Sheldon bought $4\frac{1}{2}$ kg of plant food. He used $1\frac{2}{3}$ kg on his strawberry plants, and used $\frac{1}{4}$ kg for his tomato plants.

a) How many kilograms of plant food did Sheldon have left? Write one or more equations to show how you reached your answer.

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

? $\frac{1}{4}$ kg $1\frac{2}{3}$ kg

Sheldon had $2\frac{7}{12}$ kg left.

$$4\frac{1}{4} - 1\frac{2}{3} = 3\frac{1}{4} - \frac{2}{3}$$
$$= 3\frac{3}{12} - \frac{8}{12}$$
$$= 2\frac{15}{12} - \frac{8}{12}$$
$$= 2\frac{7}{12}$$

b) Sheldon wants to feed his strawberry plants 2 more times, and his tomato plants one more time. He will use the same amounts of plant food as before. How much plant food will he need? Does he have enough left to do so? Explain your answer using words, pictures or numbers.

$$1\frac{2}{3} + 1\frac{2}{3} = 2\frac{2}{3} + \frac{2}{3}$$
$$= 3\frac{1}{3}$$
$$3\frac{1}{3} + \frac{1}{4} = 3\frac{4}{12} + \frac{3}{12}$$
$$= 3\frac{7}{12}$$

No, Sheldon does not have enough because

$$2\frac{7}{12} < 3\frac{7}{12}.$$

what he has left   what he needs.

2) Sheldon harvests the strawberries and tomatoes in his garden.

a. He picks $1\frac{2}{5}$ kg less strawberries in the morning than in the afternoon. If Sheldon picks $2\frac{1}{4}$ kg in the morning, how many kilograms of strawberries does he pick in the afternoon? Explain your answer using words, pictures or equations.

M $\boxed{2\frac{1}{4}kg}$ $2\frac{1}{4} + 1\frac{2}{5} = 3\frac{1}{4} + \frac{2}{5}$

A $\boxed{\qquad\qquad | 1\frac{2}{5} |}$ $= 3\frac{5}{20} + \frac{8}{20}$

         ? $= 3\frac{13}{20}$

Sheldon picked $3\frac{13}{20}$ kg strawberries in the afternoon.

b) Sheldon also picks tomatoes from his garden. He picked $5\frac{3}{10}$ kg but 1.5 kg were rotten and had to be thrown away. How many kilograms of tomatoes were not rotten? Write an equation that shows how you reached your answer.

$$5\frac{3}{10} - 1\frac{5}{10} = 4\frac{3}{10} - \frac{5}{10}$$

$$= 3\frac{13}{10} - \frac{5}{10}$$

$$= 3\frac{8}{10}$$

$3\frac{8}{10}$ kg or $3\frac{4}{5}$ kg were not rotten.

c) After throwing away the rotten tomatoes, did Sheldon get more kilograms of strawberries or tomatoes? How many more kilograms? Explain your answer using an equation.

Tomatoes : $3\frac{8}{10}$ kg

Strawberries : $2\frac{1}{4}$ kg $+ 2\frac{1}{4}$ kg $+ 1\frac{2}{5}$ kg

               $= 4\frac{1}{2} + 1\frac{2}{5}$

               $= 4\frac{5}{10} + 1\frac{4}{10}$

               $= 5\frac{9}{10}$ kg

$5\frac{9}{10}$ kg $> 3\frac{8}{10}$ kg

$5\frac{9}{10} - 3\frac{8}{10} = 2\frac{1}{10}$ kg

Sheldon got more strawberries, $2\frac{1}{10}$ kg more.