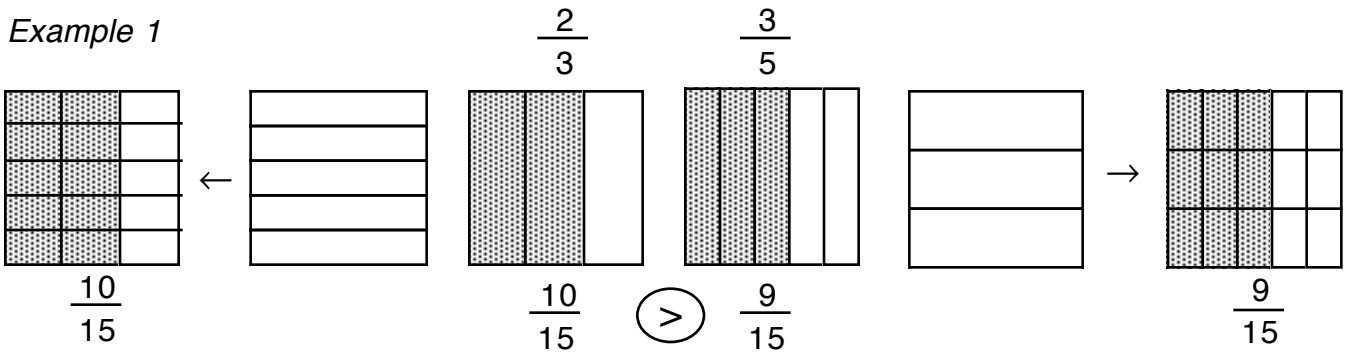
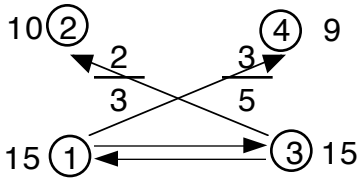
# Lesson 7 Comparing Fractions with the Rule of Four

So far we know that "=" means "equals" or "is the same as". If two fractions are not equal and one is larger or smaller than the other, there are symbols to represent this. As you read an equation from left to right, ">" means "is greater than" and "<" means "is less than". We call these symbols inequalities. For example, 9 is greater than 3, or $9 > 3$. If it were the other way around, you would write 3 is less than 9, or $3 < 9$. There are other ways to think of these symbols. Some say the open, or large, end of the symbols always points to the larger one, and the small end, or point, points at the smaller one. Some children think of the symbol as a hungry alligator with his mouth open, always trying to eat the larger number. Use whatever helps you remember this symbol.

Inequalities apply to fractions in two ways: denominators that are the same, and denominators that are different. If the denominators of two fractions are the same, then you just compare the numerators. An example of this is $3/4 > 1/4$, or three fourths is greater than one fourth. But what about 2/3 and 3/5? Which is larger? Remember what we did when adding two fractions with different denominators. We first made them the same kind, or same denominators, then combined the numerators. To compare or combine, they must be the same kind. So now we must make them the same kind, or denominator, then compare the numerators. We'll do this in the picture below. Using the overlays we get a pretty good idea which symbol to use, but the rule of 4 will determine the answer.

*Example 1*

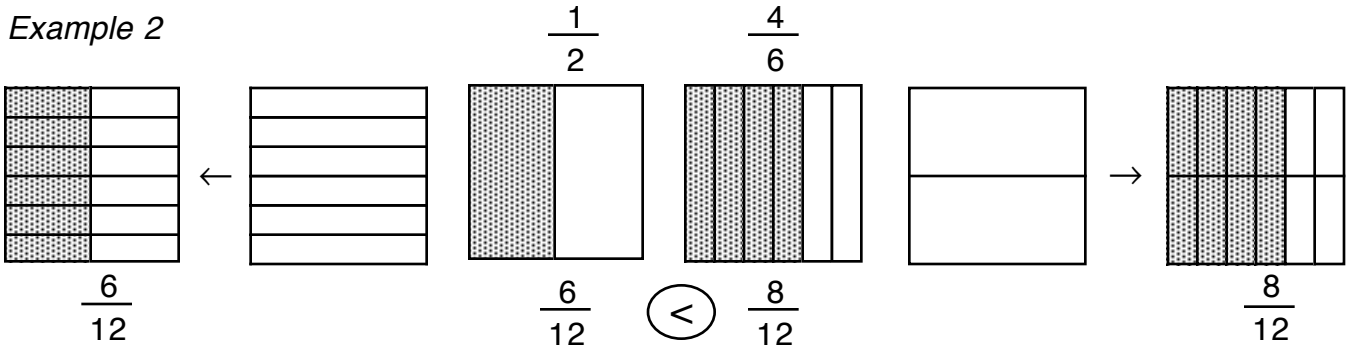


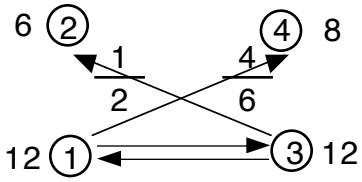




$\frac{10}{15} > \frac{9}{15} \longrightarrow \frac{2}{3} > \frac{3}{5}$

Two thirds is greater than three fifths.

*Example 2*



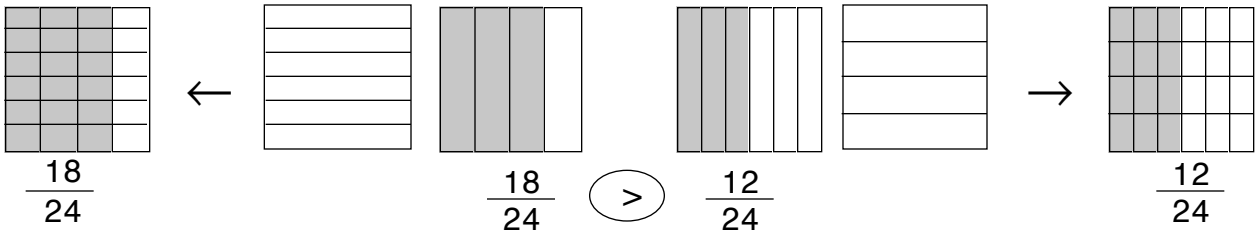




$\frac{6}{12} < \frac{8}{12} \longrightarrow \frac{1}{2} < \frac{4}{6}$

One half is less than four sixths.

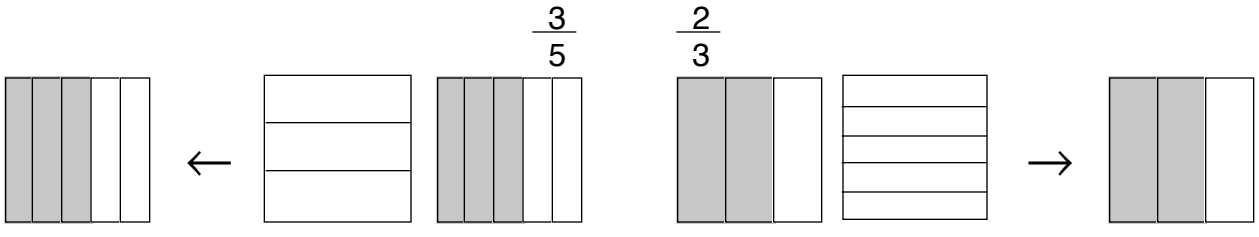
*Build the problems and draw lines to show what you did, then compare the fractions. Write ">", "<" or "=" in the ovals. The first one is done for you.*

1)




so $\frac{3}{4} > \frac{3}{6}$

2)

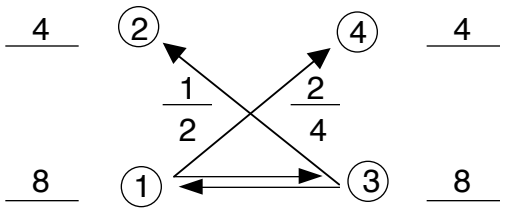



so $\frac{3}{5}$ ◯ $\frac{2}{3}$

**Sample Student Text Page**

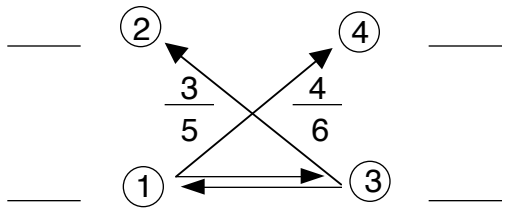
*Build, then compare using the rule of four. The first one is done for you.*

3)



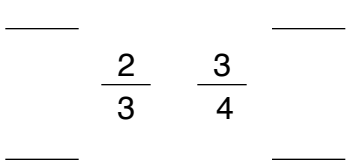

$\frac{4}{8} = \frac{4}{8}$ so $\frac{1}{2} = \frac{2}{4}$

4)



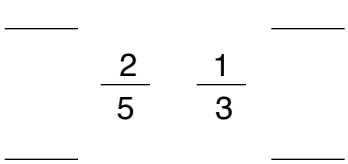

___ ◯ ___ so $\frac{3}{5}$ ◯ $\frac{4}{6}$

5)




___ ◯ ___ so $\frac{2}{3}$ ◯ $\frac{3}{4}$

6)




___ ◯ ___ so $\frac{2}{5}$ ◯ $\frac{1}{3}$

*Compare using the rule of four. Fill in the blanks and ovals. All of these can be built with the fraction overlays. The first one is done for you.*

**Sample Student Text Page**

1) $\frac{3}{6}$ $\frac{1}{2}$ $\frac{1}{3}$ $\frac{2}{6}$

$\frac{3}{6}$ (>) $\frac{2}{6}$ so $\frac{1}{2}$ (>) $\frac{1}{3}$

one half is greater than one third

2) ____ $\frac{2}{3}$ $\frac{5}{6}$ ____

____ ( ) ____ so $\frac{2}{3}$ ( ) $\frac{5}{6}$

two thirds is _____ five sixths

3) ____ $\frac{2}{3}$ $\frac{3}{6}$ ____

____ ( ) ____ so $\frac{2}{3}$ ( ) $\frac{3}{6}$

two thirds is _____ three sixths

4) ____ $\frac{1}{2}$ $\frac{2}{5}$ ____

____ ( ) ____ so $\frac{1}{2}$ ( ) $\frac{2}{5}$

one half is _____ two fifths

5) ____ $\frac{1}{3}$ $\frac{2}{6}$ ____

____ ( ) ____ so $\frac{1}{3}$ ( ) $\frac{2}{6}$

one third is _____ to two sixths

6) ____ $\frac{2}{4}$ $\frac{1}{5}$ ____

____ ( ) ____ so $\frac{2}{4}$ ( ) $\frac{1}{5}$

two fourths is _____ one fifth

7) 1/2 of the students voted for Trisha as class president, while 2/5 of them voted for Tom. Which person ended up with the most votes?

8) Mike ran 2/6 of a mile and Donald ran 2/3 of a mile. Which one ran the the greatest distance?

*Compare using the rule of four. Fill in the blanks and ovals. Not all of these can be built with the fraction overlays.*

1) ____ ____ $\frac{4}{5}$ $\frac{4}{6}$ ____ ____

____ ◯ ____ so $\frac{4}{5}$ ◯ $\frac{4}{6}$

four fifths is _____ four sixths

2) ____ ____ $\frac{4}{6}$ $\frac{2}{2}$ ____ ____

____ ◯ ____ so $\frac{4}{6}$ ◯ $\frac{2}{2}$

four sixths is _____ two halves

3) ____ ____ $\frac{3}{8}$ $\frac{4}{7}$ ____ ____

____ ◯ ____ so $\frac{3}{8}$ ◯ $\frac{4}{7}$

three eighths is _____ four sevenths

4) ____ ____ $\frac{2}{9}$ $\frac{1}{3}$ ____ ____

____ ◯ ____ so $\frac{2}{9}$ ◯ $\frac{1}{3}$

two ninths is _____ one third

*Use the rule of four to compare the fractions and write the correct symbol in the oval.*

5) $\frac{3}{4}$ ◯ $\frac{5}{6}$

6) $\frac{3}{6}$ ◯ $\frac{2}{4}$

**Sample Student Text Page**

7) $\frac{1}{2}$ ◯ $\frac{3}{10}$

8) $\frac{4}{5}$ ◯ $\frac{6}{7}$

9) Shirley ate 1/4 of a pizza and Andrea ate 1/6 of a pizza. Which girl ate more pizza?

10) Jeremiah had 3/5 of an acre of land on the east side of the road, and 7/12 of an acre on the west side. On which side of the road was the larger piece of land?

*Use the rule of four to compare the fractions and write the correct symbol in the oval.*

1) $\frac{1}{3}$ ◯ $\frac{3}{6}$ 2) $\frac{5}{8}$ ◯ $\frac{1}{2}$ 3) $\frac{3}{12}$ ◯ $\frac{1}{4}$

*Add or subtract.*

4) $\frac{2}{4} + \frac{1}{6} =$ ___ 5) $\frac{6}{10} - \frac{3}{8} =$ ___ 6) $\frac{2}{9} + \frac{5}{7} =$ ___

*Fill in the missing numbers in the numerators or denominators to make equivalent fractions.*

7) $\frac{6}{8} = \frac{\quad}{16} = \frac{\quad}{24} = \frac{24}{\quad}$



*Solve.*

8) $\frac{1}{2}$ of 6 = ____ 9) $\frac{3}{6}$ of 42 = ____ 10) $\frac{3}{8}$ of 24 = ____

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## ❖ Quick Review

When a division problem has a remainder, it may be written as a fraction by putting the remainder over the divisor. Look carefully at the one that is done for you.

*Divide. The first one is done for you.*

11)
$$\begin{array}{r} 6\ \frac{2}{4} \\ 4\overline{)\,26} \\ \underline{24} \\ 2 \end{array}$$

12) $5\overline{)\,23}$ 13) $7\overline{)\,59}$

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14) Alaina had 17 yards of fabric. She divided it into 4 equal parts to make curtains. How many yards of fabric does she have for each curtain? Write your remainder as a fraction.

15) Brad has completed 2/7 of the chores that needed to be done and Penny has done 5/8 of them. Which person has done the most chores? What part of the chores remain to be finished?

16) If Brad and Penny had a total of 56 chores to do, how many actual chores remain to be done? (#16)

17) One fourth of a cup of brown sugar is needed for one recipe and one third of a cup for another. How much brown sugar is needed in all?

18) During the first storm 1/3 of an inch of rain fell. The second storm gave us 7/8 of an inch of rain. How much more rain fell during the second storm than during the first?

*Use the rule of four to compare the fractions and write the correct symbol in the oval.*

1) $\frac{3}{5}$ ◯ $\frac{1}{3}$

2) $\frac{2}{3}$ ◯ $\frac{1}{6}$

3) $\frac{9}{10}$ ◯ $\frac{7}{12}$

*Add or subtract.*

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

5) $\frac{2}{4} - \frac{1}{3} =$ ___

6) $\frac{3}{8} + \frac{3}{5} =$ ___

*Fill in the missing numbers in the numerators or denominators to make equivalent fractions.*

7) $\frac{1}{10} = \frac{\quad}{\quad} = \frac{\quad}{\quad} = \frac{4}{\quad}$

*Solve.*

8) $\frac{7}{8}$ of 32 = _____

9) $\frac{2}{7}$ of 21 = _____

10) $\frac{3}{4}$ of 20 = _____

*Divide and write your remainder as a fraction.*

11) $6\overline{)32}$

12) $8\overline{)19}$

13) $5\overline{)48}$

**Sample Student Text Page**

*Estimate, then multiply to find the exact answer.*

14) 21 x 16 →

15) 34 x 29 →

16) 75 x 12 →

17) 1/6 of the cars that Valerie saw on her vacation were red and 1/7 of them were blue. What part of the cars that she saw were either red or blue?

18) Luke's team won 4/7 of the games they played this season. If they played 28 games, how many did they win?

19) Evan's rectangular lawn measures 8 yards by 10 yards. He planted a hedge along 1/4 of the perimeter. How long was his hedge?

20) Last week's storm gave us one half foot of snow. This week we had a storm that dropped three eighths of a foot. Write a comparison of the two storms using >, <, or =.

*Use the rule of four to compare the fractions and write the correct symbol in the oval.*

1) $\frac{5}{10}$ ◯ $\frac{6}{12}$

2) $\frac{2}{7}$ ◯ $\frac{3}{5}$

3) $\frac{1}{2}$ ◯ $\frac{2}{3}$

*Add or subtract.*

4) $\frac{2}{3} + \frac{1}{5} =$ ___

5) $\frac{4}{6} - \frac{1}{4} =$ ___

6) $\frac{5}{6} + \frac{1}{9} =$ ___

*Fill in the missing numbers in the numerators or denominators to make equivalent fractions.*

7) $\frac{3}{4} =$ ___ $=$ ___ $=$ ___

*Solve.*

8) $\frac{3}{5}$ of 10 = _____

9) $\frac{1}{4}$ of 12 = _____

10) $\frac{4}{6}$ of 24 = _____

*Divide and write your remainder as a fraction.*

11) $3\overline{)13}$

12) $4\overline{)39}$

13) $9\overline{)58}$

**Sample Student Text Page**

*Estimate, then multiply to find the exact answer.*

14)
$$\begin{array}{r} 64 \\ \times\ 51 \\ \hline \end{array} \rightarrow$$

15)
$$\begin{array}{r} 45 \\ \times\ 19 \\ \hline \end{array} \rightarrow$$

16)
$$\begin{array}{r} 82 \\ \times\ 37 \\ \hline \end{array} \rightarrow$$

17) What is the perimeter of a triangle with sides of 8 feet, 9 feet and 10 feet?

18) Kiley got 5/6 of the questions on the test correct, while Casey got 4/5 of the the questions on the same test correct. Write a comparison showing who got the larger fraction correct.

19) If there were 30 questions on the test in #18, how many questions did each girl answer correctly? Write another comparison using the actual number of questions correct. Does it agree with the comparison you wrote for #18?

20) Faith has finished 5/8 of her chores and Colleen has finished 3/4 of hers. Write a comparison of the progress of the two girls in finishing their chores.

*Use the rule of four to compare the fractions and write the correct symbol in the oval.*

1) $\frac{1}{4}$ ◯ $\frac{3}{7}$

2) $\frac{3}{8}$ ◯ $\frac{1}{2}$

3) $\frac{4}{5}$ ◯ $\frac{2}{9}$

4) $\frac{6}{11}$ ◯ $\frac{2}{3}$

5) $\frac{5}{9}$ ◯ $\frac{6}{7}$

6) $\frac{3}{4}$ ◯ $\frac{6}{8}$

*Add or subtract.*

7) $\frac{1}{8} + \frac{4}{9} =$ ___

8) $\frac{2}{3} - \frac{1}{5} =$ ___

9) $\frac{4}{5} + \frac{1}{6} =$ ___

*Fill in the missing numbers in the numerators or denominators to make equivalent fractions.*

10) $\frac{2}{5} =$ ___ $=$ ___ $=$ ___

**Sample Test Booklet Page**

*Divide and write your remainder as a fraction.*

11) $2\overline{)19}$

12) $6\overline{)51}$

13) $5\overline{)39}$

*Estimate, then multiply to find the exact answer.*

14) 39 x 24 →

15) 72 x 15 →

16) 68 x 43 →

17) Five eighths of the trees in my yard are maples. If there are 16 trees in my yard, how many are maple trees?

18) Christa ate 1/5 of the chocolates in the box and Douglas ate 3/10 of them. Write a comparison showing who ate the most chocolates.

19) If there were 20 chocolates in the box in #18, how many chocolates did each person eat? Write another comparison using the actual number of chocolates eaten. Does it agree with the comparison you wrote for #18?

20) Yesterday we got 2/10 of an inch of rain. Today we had 8/10 of an inch of rain. How much more rain did we get today?

## 6F

1) $\frac{20}{30}+\frac{6}{30}=\frac{26}{30}$

2) $\frac{6}{12}+\frac{4}{12}=\frac{10}{12}$

3) $\frac{22}{77}+\frac{21}{77}=\frac{43}{77}$

4) $\frac{5}{10}-\frac{2}{10}=\frac{3}{10}$

5) $\frac{8}{12}-\frac{3}{12}=\frac{5}{12}$

6) $\frac{18}{72}-\frac{16}{72}=\frac{2}{72}$

7) $\frac{5}{6}=\frac{10}{12}=\frac{15}{18}=\frac{20}{24}$

8) $\frac{1}{10}=\frac{2}{20}=\frac{3}{30}=\frac{4}{40}$

9) $28 \div 7 = 4$; $4 \times 3 = 12$

10) $54 \div 6 = 9$; $9 \times 1 = 9$

11) $8 \div 8 = 1$; $1 \times 4 = 4$

12) $(70) \times (90) = (6{,}300)$
$73 \times 89 = 6{,}497$

13) $(30) \times (90) = (2{,}700)$
$26 \times 91 = 2{,}366$

14) $(50) \times (10) = (500)$
$47 \times 11 = 517$

15) $18 \times 12 = 216$

16) $312 \times 3 = 936$ mi.

17) $\frac{4}{9}+\frac{3}{6}=\frac{24}{54}+\frac{27}{54}=\frac{51}{54}$

18) 5/6 of 60= 50

19) 300

20) $13 + 18 + 13 + 18 = 62$"
$2 \times 24 = 48$"
$62" > 48"$; no

## 7A

1) done

2) $\frac{9}{15}<\frac{10}{15}$ so $\frac{3}{5}<\frac{2}{3}$

3) done

4) $\frac{18}{30}<\frac{20}{30}$ so $\frac{3}{5}<\frac{4}{6}$

5) $\frac{8}{12}<\frac{9}{12}$ so $\frac{2}{3}<\frac{3}{4}$

6) $\frac{6}{15}>\frac{5}{15}$ so $\frac{2}{5}>\frac{1}{3}$

## 7B

1) done

2) $\frac{12}{18}<\frac{15}{18}$ so $\frac{2}{3}<\frac{5}{6}$
less than

3) $\frac{12}{18}>\frac{9}{18}$ so $\frac{2}{3}>\frac{3}{6}$
greater than

4) $\frac{5}{10}>\frac{4}{10}$ so $\frac{1}{2}>\frac{2}{5}$
greater than

5) $\frac{6}{18}=\frac{6}{18}$ so $\frac{1}{3}=\frac{2}{6}$
equal

6) $\frac{10}{20}>\frac{4}{20}$ so $\frac{2}{4}>\frac{1}{5}$
greater than

7) $\frac{5}{10}>\frac{4}{10}$ so $\frac{1}{2}>\frac{2}{5}$
Trisha got more votes

8) $\frac{6}{18}<\frac{12}{18}$ so $\frac{2}{6}<\frac{2}{3}$
Donald ran further

## 7C

1) $\frac{24}{30}>\frac{20}{30}$ so $\frac{4}{5}>\frac{4}{6}$
greater than

2) $\frac{8}{12}<\frac{12}{12}$ so $\frac{4}{6}<\frac{2}{2}$
less than

3) $\frac{21}{56}<\frac{32}{56}$ so $\frac{3}{8}<\frac{4}{7}$
less than

4) $\frac{6}{27}<\frac{9}{27}$ so $\frac{2}{9}<\frac{1}{3}$
less than

5) $\frac{18}{24}<\frac{20}{24}$

6) $\frac{12}{24}=\frac{12}{24}$

7) $\frac{10}{20}>\frac{6}{20}$

8) $\frac{28}{35}<\frac{30}{35}$

9) $\frac{6}{24}>\frac{4}{24}$ Shirley

10) $\frac{36}{60}>\frac{35}{60}$ east side

## 7D

1) $\frac{6}{18}<\frac{9}{18}$

2) $\frac{10}{16}>\frac{8}{16}$

3) $\frac{12}{48}=\frac{12}{48}$

4) $\frac{12}{24}+\frac{4}{24}=\frac{16}{24}$

5) $\frac{48}{80}-\frac{30}{80}=\frac{18}{80}$

6) $\frac{14}{63}+\frac{45}{63}=\frac{59}{63}$

7) $\frac{6}{8}=\frac{12}{16}=\frac{18}{24}=\frac{24}{32}$

8) $6 \div 2 = 3$;
$3 \times 1 = 3$

9) $42 \div 6 = 7$;
$7 \times 3 = 21$

10) $24 \div 8 = 3$;
$3 \times 3 = 9$

11) done

12) $4\frac{3}{5}$

13) $8\frac{3}{7}$

14) $17 \div 4 = 4\frac{1}{4}$ yds.

15) $\frac{16}{56}<\frac{35}{56}$ Penny did more
$\frac{16}{56}+\frac{35}{56}=\frac{51}{56}$ done
$\frac{56}{56}-\frac{51}{56}=\frac{5}{56}$ left

16) 5/56 of 56:
$56 \div 56 = 1$; $1 \times 5 = 5$

17) $\frac{3}{12}+\frac{4}{12}=\frac{7}{12}$

18) $\frac{21}{24}-\frac{8}{24}=\frac{13}{24}$ inches