Unit 2

Fraction Equivalence and Comparison

Essential Questions

- How do you know whether 2 fractions are equivalent without drawing a model?
- How can you compare fractions made up of different-sized parts?

Unit Story: One Step at a Time

You can read the Unit Story with your student by visiting the Unit Story page on the Caregiver Hub.

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Unit Investigation

Lesson 1 is the Unit Investigation. Students create number lines that show different types of fractions to build curiosity and apply their own knowledge in a variety of ways. Use the **Caregiver Connection** to help students continue to explore the math they will see in the unit.

Caregiver Connection

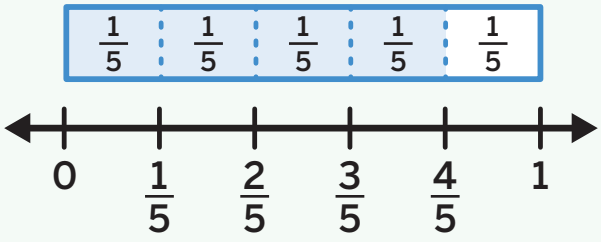
Students may enjoy exploring fraction equivalence and comparison in baking and measuring. You may ask:

- "How could you measure the ingredients for a recipe using the fewest number of different measuring scoops possible?"
- "How could you measure the ingredients for a recipe so that you would have to make the fewest number of measurements?"

Summary | Lesson 2

Number lines can be used to represent fractions by equipartitioning the whole into the number of parts represented by the denominator and locating the fraction at the tick mark that represents the distance from 0 to the fraction.

Locate $\frac{4}{5}$ on the number line.



Try This

For Problems 1 and 2, locate and label the fraction on the number line.

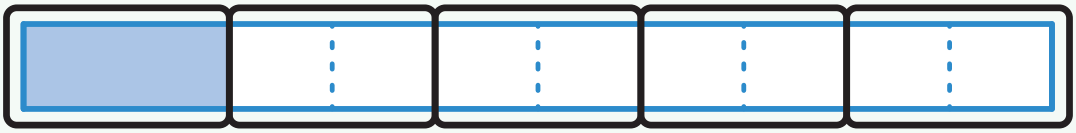
1 $\frac{6}{10}$

2 $\frac{7}{12}$

Summary | Lesson 3

Unit fractions with related denominators can be represented on the same fraction strip by equipartitioning or combining given parts.

Combine two $\frac{1}{10}$ to show $\frac{1}{5}$.



Split $\frac{1}{5}$ into 2 equal pieces to show $\frac{1}{10}$.

Try This

For Problems 1 and 2, write a unit fraction that represents the size of 1 part in each fraction strip.

1

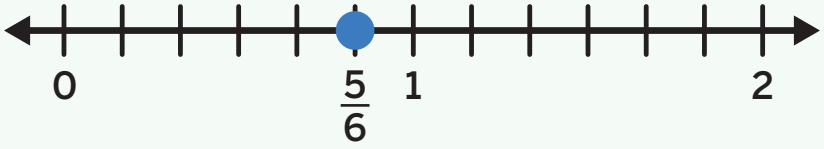
_____

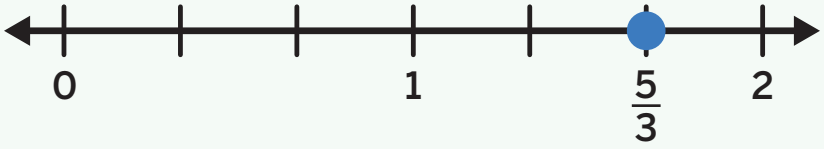
2

_____

Summary | Lesson 4

Number lines can be used to represent fractions that are less than 1 and fractions that are greater than 1.

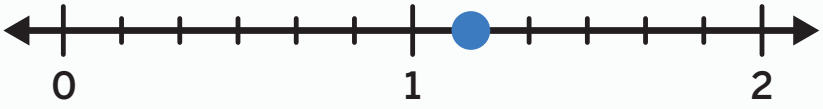




Try This

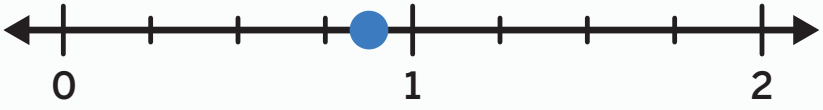
For Problems 1 and 2, select the fraction that is represented by the point on the number line.

1



(A) $\frac{5}{6}$ (B) $\frac{7}{5}$ (C) $\frac{7}{6}$ (D) $\frac{6}{5}$

2

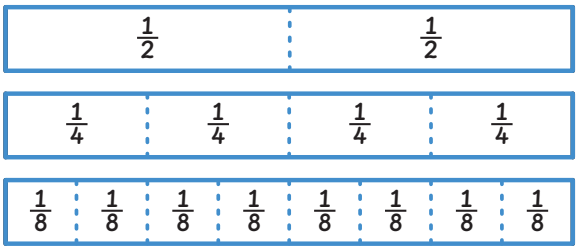


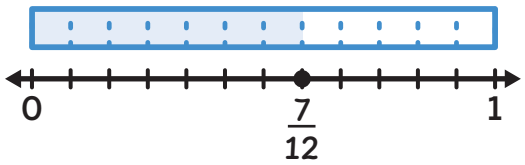
(A) $\frac{3}{4}$ (B) $\frac{7}{8}$ (C) $\frac{3}{8}$ (D) $\frac{7}{4}$

Sub-Unit 1 | Summary

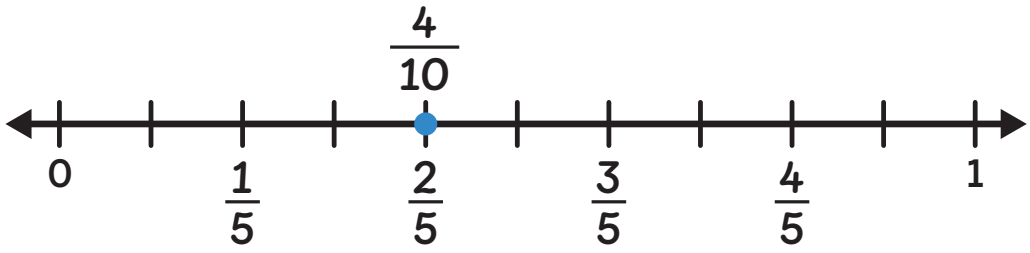
In this sub-unit . . .

- We used fraction-strip diagrams and number lines to represent fractions with denominators of 2, 3, 4, 5, 6, 8, 10, 12, and 100.





- We used the same fraction strip or number line to represent fractions with related denominators by equipartitioning or combining parts.

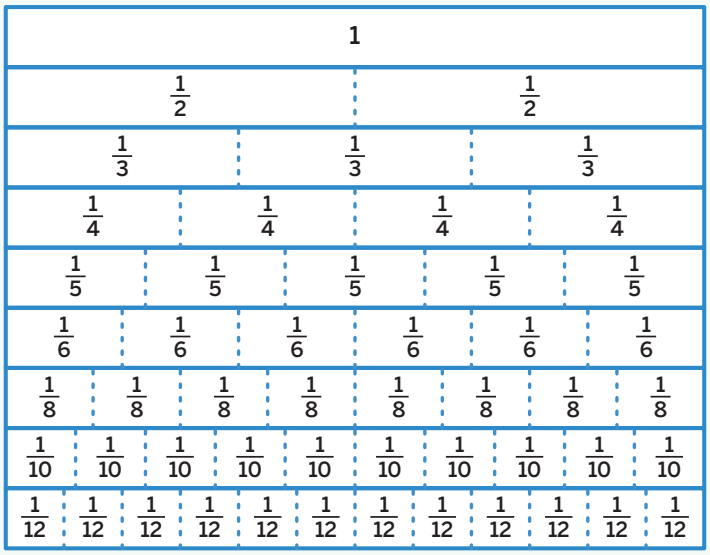


Math tip: As the denominator increases, the size of the pieces gets smaller.

- We asked questions to guess the values of specific fractions.
  - Is the fraction less than 1 whole?
  - Is the numerator an even number?
  - Is the denominator a multiple of 4?

Summary | Lesson 5

Fraction-strip diagrams can be used to identify equivalent fractions that have the same value.

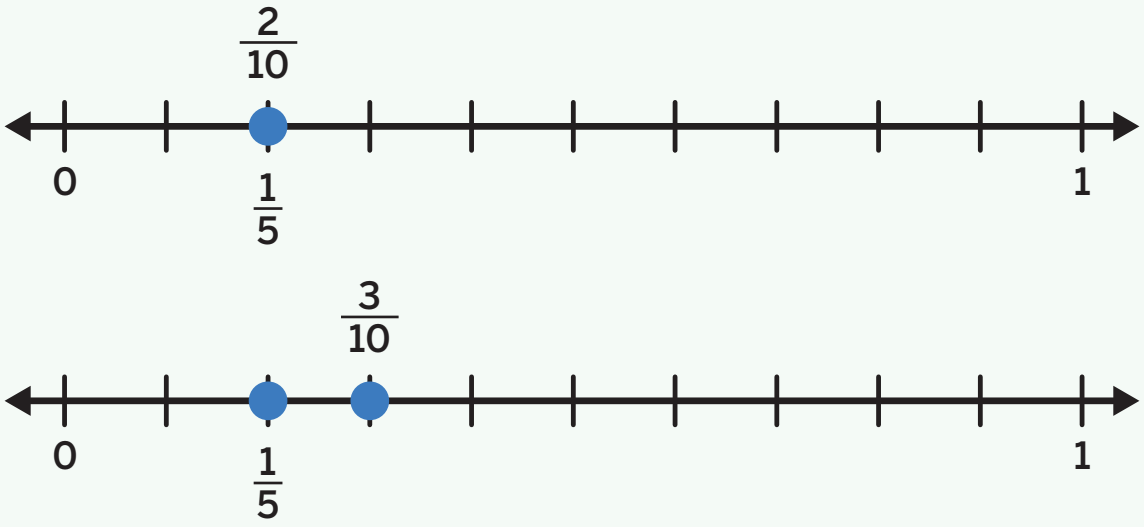


Try This

1 Use the fraction strips in the Summary to name 3 pairs of equivalent fractions. Explain how you know the fractions are equivalent.

Summary | Lesson 6

Fractions located at the same point on a number line are equivalent. When fractions are not located at the same point on a number line, they are not equivalent.



Try This

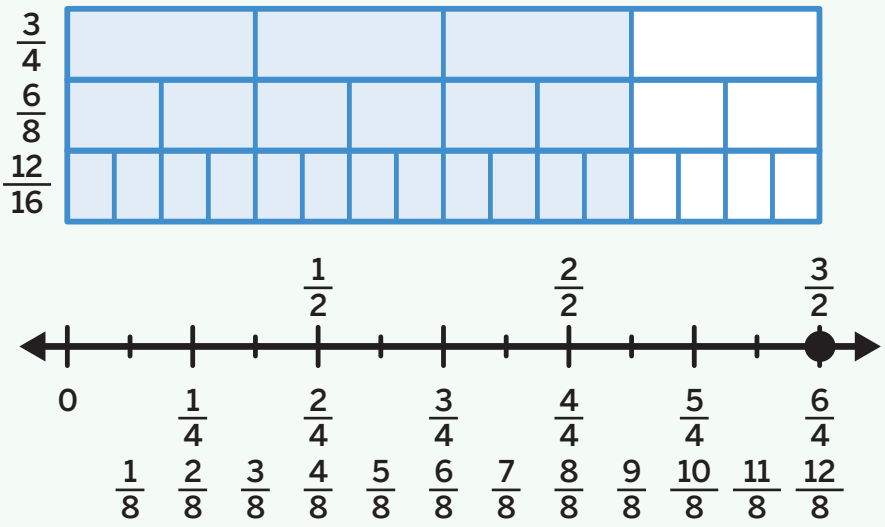
1 Represent $\frac{4}{10}$ on the number line. Then determine a fraction that is equivalent to $\frac{4}{10}$.

Show your thinking.

answer: _____

Summary | Lesson 7

Fraction-strip diagrams and number lines can be used to show that 2 or more fractions are equivalent.



Practice

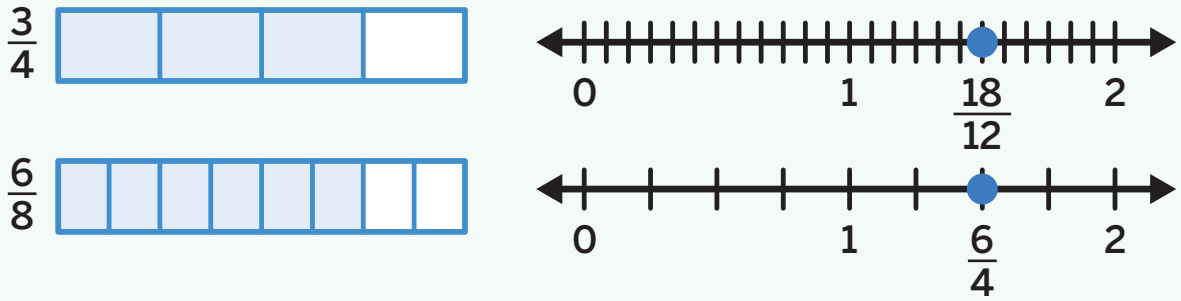
1 Determine 2 fractions that are equivalent to $\frac{5}{3}$. Use a fraction-strip diagram or number line to show how the 3 fractions are equivalent.

Show your thinking.

answer: _____

Summary | Lesson 8

Multiplication and division can be used to generate equivalent fractions.



$$\frac{3 \times 2}{4 \times 2} = \frac{6}{8} \qquad \frac{18 \div 3}{12 \div 3} = \frac{6}{4}$$

Try This

1 Determine whether the fractions $\frac{10}{3}$ and $\frac{40}{12}$ are *equivalent* or *not equivalent* using a visual model, words, or equations.

Show or explain your thinking.

answer: _____

Summary | Lesson 9

Multiples or factors can be used to generate equivalent fractions.

Multiples

$$\frac{1 \times 2}{8 \times 2} = \frac{2}{16}$$

$$\frac{1 \times 3}{8 \times 3} = \frac{3}{24}$$

$$\frac{1 \times 4}{8 \times 4} = \frac{4}{32}$$

Factors

$$\frac{18 \div 2}{12 \div 2} = \frac{9}{6}$$

$$\frac{18 \div 3}{12 \div 3} = \frac{6}{4}$$

$$\frac{18 \div 6}{12 \div 6} = \frac{3}{2}$$

Try This

1 Determine 2 fractions that are equivalent to $\frac{10}{6}$.

Show or explain your thinking.

answer: _____

Summary | Lesson 10

Multiples can always be used to determine more equivalent fractions. Factors can only be used to determine equivalent fractions when the numerator and the denominator have a factor in common.

	Multiples	Factors
$\frac{8}{6}$	$\frac{8 \times 2}{6 \times 2} = \frac{16}{12}$	$\frac{8 \div 2}{6 \div 2} = \frac{4}{3}$
$\frac{5}{4}$	$\frac{5 \times 2}{4 \times 2} = \frac{10}{8}$	

Try This

For Problems 1–4, identify 2 fractions that are equivalent to the given fraction.

1. $\frac{16}{8}$ _____

2. $\frac{40}{10}$ _____

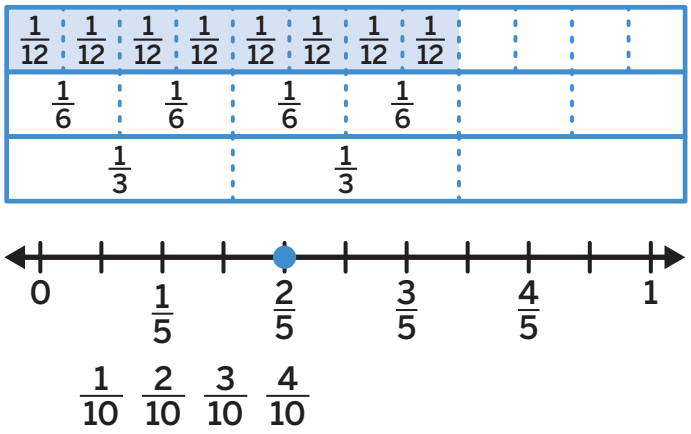
3. $\frac{8}{6}$ _____

4. $\frac{90}{100}$ _____

Sub-Unit 2 | Summary

In this sub-unit . . .

- We used fraction-strip diagrams and number lines to identify and determine equivalent fractions.



$$\frac{8}{12} = \frac{4}{6} = \frac{2}{3}$$

$$\frac{2}{5} = \frac{4}{10}$$

- We used multiples and factors to help us determine equivalent fractions.

$$\frac{1 \times 2}{8 \times 2} = \frac{2}{16} \qquad \frac{18 \div 2}{12 \div 2} = \frac{9}{6}$$

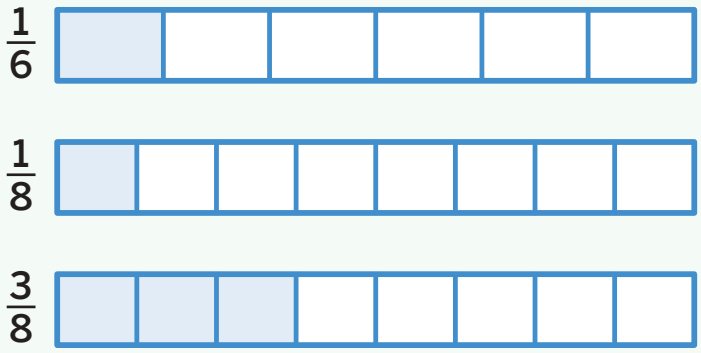
$$\frac{1 \times 3}{8 \times 3} = \frac{3}{24} \qquad \frac{18 \div 3}{12 \div 3} = \frac{6}{4}$$

Math tip: You can always use multiples to determine equivalent fractions, but you can only use factors when the numerator and denominator share a common factor.

- We used what we learned about equivalent fractions to answer questions about fractional distances.
  - In one week, Ingrid ran $\frac{6}{8}$ miles on the sidewalk, $\frac{8}{10}$ miles on the bridge, and $\frac{9}{12}$ miles at the beach. Did she run the same distance at any of the locations that week?

Summary | Lesson 11

Fractions with the same numerator can be compared by considering the size of each of the parts. Fractions with the same denominator can be compared by considering the number of same-sized parts.



Try This

1 Which fraction is *greater*: $\frac{1}{8}$ or $\frac{1}{10}$?

Show or explain your thinking.

answer: _____

Summary | Lesson 12

Fractions with different numerators and different denominators that are related can be compared by rewriting 1 of the fractions as an equivalent fraction so that the fractions have **common denominators**.

Compare $\frac{8}{12}$ and $\frac{3}{4}$.

$\frac{8}{12}$ 

$\frac{3}{4}$ 

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

$\frac{8}{12} < \frac{3}{4}$

Try This

1 Determine whether each statement is *true* or *false*. Place a check mark in the correct column.

	True	False
$\frac{15}{21}$ is greater than $\frac{4}{7}$.		
$\frac{7}{8}$ is greater than $\frac{8}{7}$.		
$\frac{50}{100}$ is greater than $\frac{3}{4}$.		
$\frac{2}{4}$ is greater than $\frac{3}{12}$.		

Summary | Lesson 13

Fractions can be compared by using common denominators or **common numerators**.

Compare $\frac{2}{5}$ and $\frac{5}{12}$.

$$\frac{2 \times 5}{5 \times 5} = \frac{10}{25}$$
$$\frac{5 \times 2}{12 \times 2} = \frac{10}{24}$$
$$\frac{10}{25} < \frac{10}{24}$$
$$\frac{2}{5} < \frac{5}{12}$$

$$\frac{2 \times 12}{5 \times 12} = \frac{24}{60}$$
$$\frac{5 \times 5}{12 \times 5} = \frac{25}{60}$$
$$\frac{24}{60} < \frac{25}{60}$$
$$\frac{2}{5} < \frac{5}{12}$$

Try This

For Problems 1 and 2, determine whether the comparison statement is *true* or *false*.

Show or explain your thinking.

1. $\frac{5}{8} = \frac{8}{12}$

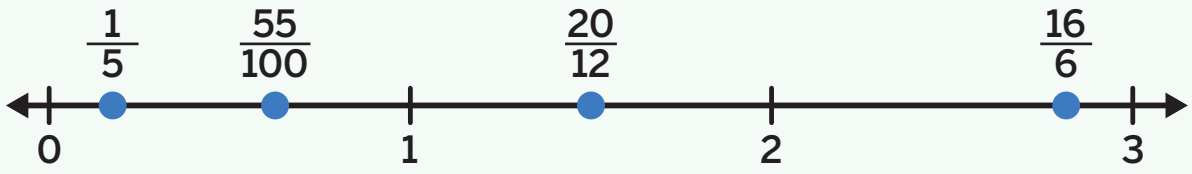
answer: _____

2. $\frac{8}{6} < \frac{13}{10}$

answer: _____

Summary | Lesson 14

When putting fractions in order, it is helpful to choose strategies to compare the fractions based on their numerators and denominators.



Try This

1 Fill in the blank to make the comparison statement true.

$\frac{6}{8} < \frac{\ }{4} < \frac{3}{2}$

2 Circle the set of fractions that is ordered from *least* to *greatest*.

$\frac{2}{12}, \frac{3}{8}, \frac{5}{9}$

$\frac{1}{4}, \frac{3}{2}, \frac{6}{5}$

Summary | Lesson 15

Making equivalent fractions and using benchmark numbers can be useful strategies for comparing and ordering sets of fractions.

Order from least to greatest: $\frac{1}{4}, \frac{14}{12}, \frac{7}{12}, \frac{2}{3}$

$\frac{14}{12}$ is greater than 1.

$\frac{1}{4}$ is less than $\frac{1}{2}$.

$\frac{7}{12}$ and $\frac{2}{3}$ are more than $\frac{1}{2}$ but less than 1.

$\frac{2 \times 4}{3 \times 4} = \frac{8}{12}$, so $\frac{7}{12} < \frac{2}{3}$.

least to greatest: $\frac{1}{4}, \frac{7}{12}, \frac{2}{3}, \frac{14}{12}$

Try This

1 Determine which fraction is *greatest.*

$\frac{13}{12}$ $\frac{3}{6}$ $\frac{6}{5}$ $\frac{95}{100}$

Show or explain your thinking.

answer: _____

Sub-Unit 3 | Summary

In this sub-unit . . .

- We compared fractions using a variety of strategies.

$\frac{5}{12} > \frac{3}{8}$

$\frac{13}{5} > \frac{11}{6}$

$\frac{13}{5} > 2$ and $\frac{11}{6} < 2$

- We compared fractions with different numerators and different denominators by writing equivalent fractions that shared a **common denominator** or **common numerator**.

$\frac{5}{6} > \frac{3}{4}$

$\frac{5 \times 2}{6 \times 2} = \frac{10}{12}$ $\frac{3 \times 3}{4 \times 3} = \frac{9}{12}$

$\frac{10}{12} > \frac{9}{12}$ so $\frac{5}{6} > \frac{3}{4}$

$\frac{2}{6} < \frac{4}{10}$

$\frac{2 \times 4}{6 \times 4} = \frac{8}{24}$ $\frac{4 \times 2}{10 \times 2} = \frac{8}{20}$

$\frac{8}{24} < \frac{8}{20}$ so $\frac{2}{6} < \frac{4}{10}$

Math tip: Determine a common denominator by identifying a common multiple of both original denominators.

- We ordered sets of 3 or more fractions by repeatedly comparing pairs of fractions.

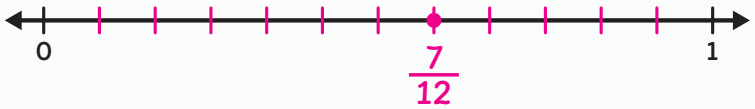
Try This | Answer Key

Lesson 2

1

$\frac{6}{10}$

2



$\frac{7}{12}$

Lesson 3

1 $\frac{1}{9}$

2 $\frac{1}{7}$

Lesson 4

1 C

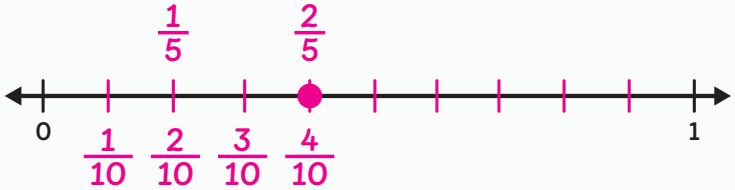
2 B

Lesson 5

1 Sample response: $\frac{2}{12}$ and $\frac{1}{6}$, $\frac{4}{12}$ and $\frac{2}{6}$, $\frac{6}{12}$ and $\frac{3}{6}$
They are equivalent because the parts that represent each fraction start and end at the same place, so their length is the same.

Lesson 6

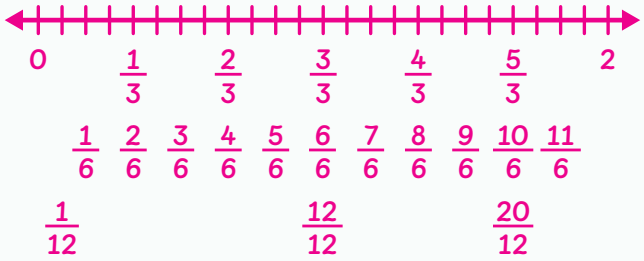
1 Sample response:



answer: $\frac{2}{5}$

Lesson 7

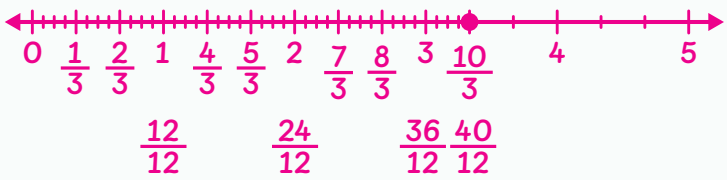
1 Sample response:



answer: $\frac{10}{6}$, $\frac{20}{12}$

Lesson 8

1 Sample work:



answer: equivalent

Lesson 9

1 Sample response:

$\frac{10 \times 2}{6 \times 2} = \frac{20}{12}$ $\frac{10 \div 2}{6 \div 2} = \frac{5}{3}$

answer: $\frac{20}{12}$, $\frac{5}{3}$

Lesson 10

1 Sample response: $\frac{8}{4}$, $\frac{4}{2}$

2 Sample response: $\frac{4}{1}$, $\frac{20}{5}$

3 Sample response: $\frac{16}{12}$, $\frac{4}{3}$

4 Sample response: $\frac{9}{10}$, $\frac{45}{50}$

Lesson 11

1 Sample explanation: $\frac{1}{8}$ is greater because eighths are larger than tenths.

answer: $\frac{1}{8}$

Lesson 12

1

	True	False
$\frac{15}{21}$ is greater than $\frac{4}{7}$.	✓	
$\frac{7}{8}$ is greater than $\frac{8}{7}$.		✓
$\frac{50}{100}$ is greater than $\frac{3}{4}$.		✓
$\frac{2}{4}$ is greater than $\frac{3}{12}$.	✓	

Lesson 13

1 Sample work:

$\frac{5 \times 3}{8 \times 3} = \frac{15}{24}$ $\frac{8 \times 2}{12 \times 2} = \frac{16}{24}$

answer: false

2 Sample work:

$\frac{8 \times 5}{6 \times 5} = \frac{40}{30}$ $\frac{13 \times 3}{10 \times 3} = \frac{39}{30}$

answer: false

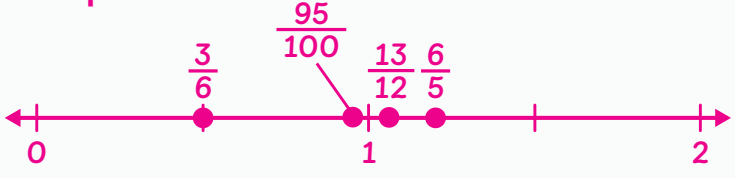
Lesson 14

1 Sample response: $\frac{6}{8} < \frac{5}{4} < \frac{3}{2}$

2 $\frac{2}{12}, \frac{3}{8}, \frac{5}{9}$

Lesson 15

1 Sample work:



answer: $\frac{6}{5}$