

TOPIC 10

Understand Fractions as Numbers



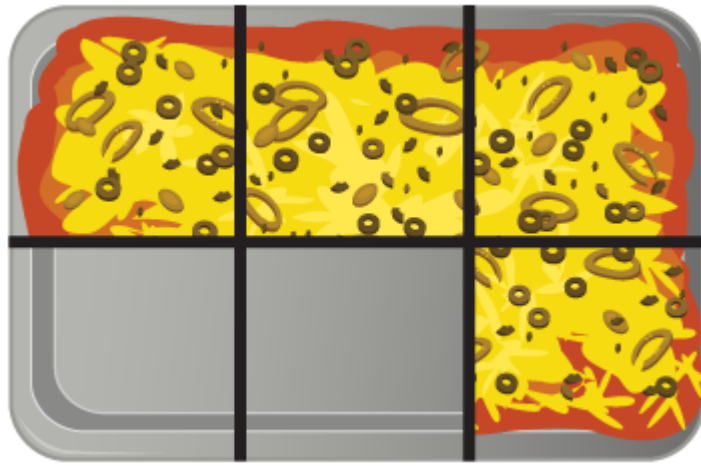
OVERVIEW

Topic 10 focuses on understanding that fractions are numbers that can represent a portion of a whole or a point on the number line. The work in this topic also includes measuring lengths to the nearest half inch and fourth inch or measuring liquid volume to the nearest half cup and quarter cup.

FRACTION MEANINGS AND REPRESENTATIONS

Partitioning Regions Your child will use fractions to describe equal parts of a region. A unit fraction, such as $\frac{1}{6}$, describes one equal part. Other fractions, such as $\frac{5}{6}$, describe multiple equal parts. A fraction such as $\frac{6}{6}$ describes the whole.

To describe the part of the casserole that has been eaten, count the original number of equal pieces. Use this number as the bottom number of the fraction (the denominator). Then determine the number of pieces that were eaten and use that number for the top number of the fraction (the numerator).



$\frac{2}{6}$ of the casserole has been eaten.

$\frac{4}{6}$ of the casserole is left.

Fractions and Sets Your child will identify and write fractions that name a part of a group or set. The group is considered the whole.

Here is how your child would answer the question, "What fraction of the group of kittens is orange?"



The unit fraction $\frac{1}{8}$ represents one kitten in the set of 8 kittens.

To find the fraction of the set that are orange, count all the kittens.

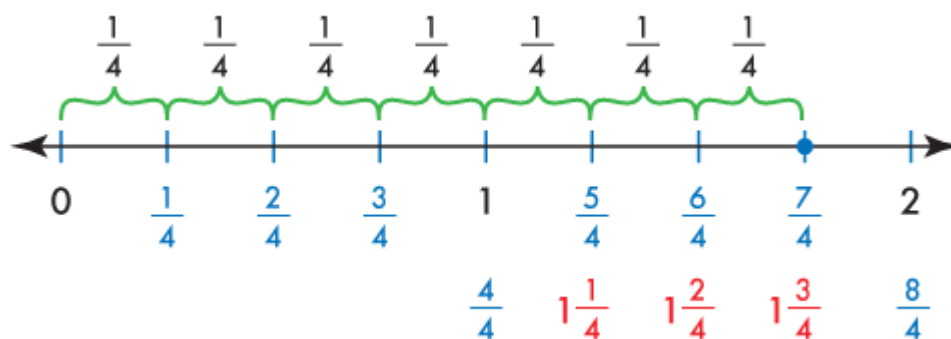
Then count the orange kittens.

$$\frac{6}{8} \leftarrow \begin{array}{l} \text{Number of orange kittens} \\ \text{Total number of kittens} \end{array}$$

Say: *Six eighths* of the kittens are orange.

Fractions on a Number Line Your child will learn that a fraction is represented by a point on the number line. Students learn that every number on a number line represents a distance from 0. When the distance from 0 to 1 is divided into equal lengths, a unit fraction, such as $\frac{1}{4}$, describes the distance from 0 to one of those equal lengths. Other fractions, such as $\frac{2}{4}$, $\frac{4}{4}$, and $\frac{7}{4}$, describe multiple equal lengths from 0.

The point showing 7 lengths of $\frac{1}{4}$ can be labeled $\frac{7}{4}$.



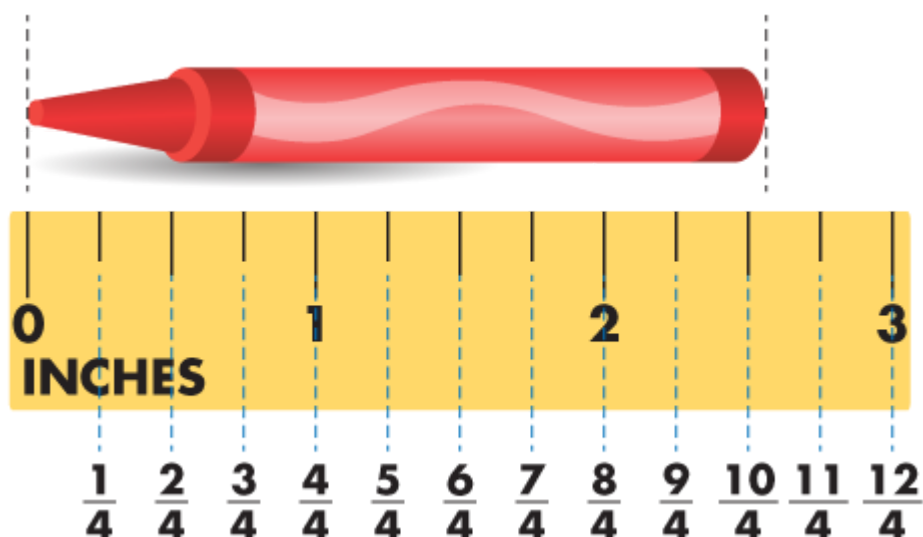
Seven fourths can also be written as $1\frac{3}{4}$, which is a mixed number. A mixed number is made up of a whole number and a fraction.

MEASURE LENGTH AND CAPACITY USING FRACTIONAL PARTS

Number Line and Measuring Length Your child will learn how to use a ruler to measure the length of objects to the nearest half and fourth inch. Measuring to these fractions of an inch connects your child's knowledge of equal intervals on a number line to the

sections on a ruler.

This crayon measures two whole inches and two fourth inches.



The length of the crayon can be written as $2\frac{2}{4}$ inches.

Number Line and Measuring Liquids Your child will use measuring cups to measure liquid to the nearest half cup and quarter cup.

Your child will see that a measuring cup has a vertical number line that is used to measure liquid capacity.

There is $\frac{1}{4}$ cup of liquid in this measuring cup.



There is $1\frac{1}{2}$ cups of liquid in this measuring cup.



CONNECT THE MATH

You can connect the math in this topic to everyday experiences. When you cut rectangular, square, or circular pans of food into equal pieces, have your child name the fractional parts—for example, *eighths*. Then serve some of the parts and ask your child to use a fraction to describe the part of the pan that has been served, as well as the part that remains. You can also have your child name parts of a set. You might say, “There are 6 seats at the kitchen table, and 4 of the seats have people seated in them tonight. What fraction of the chairs have people in them? What fraction are empty?”

TOPIC 10 LESSONS

- | | |
|--------------------|--|
| Lesson 10-1 | <u>Split Regions into Equal Parts</u> |
| Lesson 10-2 | <u>Fractions and Regions</u> |
| Lesson 10-3 | <u>Understand the Whole</u> |
| Lesson 10-4 | <u>Fractions and Sets</u> |
| Lesson 10-5 | <u>Number Line: Fractions Less Than 1</u> |
| Lesson 10-6 | <u>Number Line: Fractions Greater Than 1</u> |
| Lesson 10-7 | <u>Number Line: Use a Ruler</u> |
| Lesson 10-8 | <u>Number Line: Measure Liquids</u> |
| Lesson 10-9 | |

MATH THINKING AND REASONING

Participate in Effortful Learning

LESSON 10-1

Split Regions into Equal Parts

 [MA.3.FR.1.1](#), [MA.3.FR.1.3](#), [MA.3.FR.1.2](#), [MTR.1.1](#), [MTR.2.1](#), [MTR.6.1](#)

For more help with this lesson, view the [Visual Learning Animation](#) or the [Another Look Video](#).

MATH HELP AT HOME

Sample Additional Practice Exercise 1

Tell if the figure shows equal or unequal parts. If the parts are equal, name one of the parts using a unit fraction.



Equal parts; $\frac{1}{8}$

The rectangle is divided into 8 equal squares. One square is one eighth, written as the unit fraction $\frac{1}{8}$.

HOME ACTIVITY

Colorful Flags

MATERIALS

Grid Paper, Colored Pencils

ACTIVITY

On grid paper, draw a rectangle 4 units across and 3 units down. Draw a total of 4 rectangles like this. Have your child color each rectangular “flag” in a different way, as described here. Tell your child there is more than one possible way to color each flag.

Flag 1: 2 equal parts, 2 colors.

Flag 2: 3 equal parts, 3 colors.

Flag 3: 4 equal parts, 4 colors.

Flag 4: 2 unequal parts, 2 colors.

LESSON 10-2

Fractions and Regions

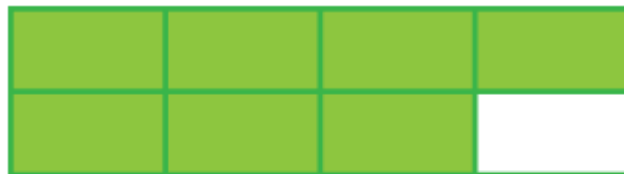
 [MA.3.FR.1.1](#), [MA.3.FR.1.2](#), [MA.3.FR.1.3](#), [MTR.2.1](#), [MTR.5.1](#)

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MATH HELP AT HOME

Sample Additional Practice Exercise 1

Write the unit fraction that represents each part of the whole. Next write the number of shaded parts. Then write the fraction of the whole that is shaded.



$\frac{1}{8}$; 7 shaded parts; $\frac{7}{8}$

Count the number of equal parts in the whole. There are 8. So, each part is $\frac{1}{8}$.

Count the number of parts that are shaded. There are 7. The fraction that is shaded is 7 out of a total of 8 parts, or $\frac{7}{8}$.

HOME ACTIVITY

Colorful Circles

MATERIALS

Paper, Pencil, Cup, Number Cubes, Colored Pencils

ACTIVITY

On a sheet of paper, trace around the bottom of a cup to draw a circle. Have your child roll two number cubes, write a fraction using the two numbers (smaller number on top), then color the circle to show the fraction. Here is an example: Your child rolls 3 and 4, writes $\frac{3}{4}$, draws lines to divide the circle into 4 equal parts, and colors 3 of the parts. If the two numbers rolled are equal, such as 5 and 5, write $\frac{5}{5}$, draw 5 equal parts, and color all 5 parts. Draw more circles and repeat.

LESSON 10-3

Understand the Whole

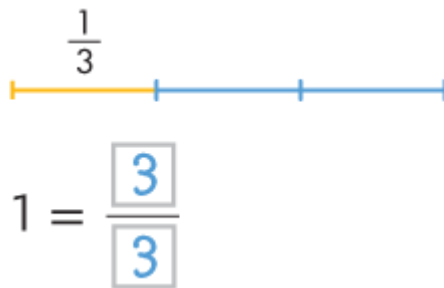
 [MA.3.FR.1.1](#), [MA.3.FR.1.2](#), [MTR.1.1](#), [MTR.4.1](#), [MTR.6.1](#)

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MATH HELP AT HOME

Sample Additional Practice Exercise 1

Draw a picture of the whole and write a fraction to represent the whole.



The part shown is $\frac{1}{3}$ of the whole. One whole is $\frac{3}{3}$, so draw 2 more parts.

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

HOME ACTIVITY

Fraction Noodles

MATERIALS

Uncooked Spaghetti Noodles

ACTIVITY

Break a noodle in half. Give one half to your child, tell your child this is $\frac{1}{2}$ of a whole noodle, and ask how long the whole noodle would be. Help your child place the 2 halves end-to-end. Set another noodle alongside to show that 2 halves equal $\frac{2}{2}$ which is equal to 1. Break a new noodle in half, then break each half in half. Give one fourth to your child, tell your child this is $\frac{1}{4}$ of a whole noodle, and ask how long the whole noodle would be. Ask your child how many more fourths are needed to equal the length of a whole noodle (3). Give your child the other 3 fourths and show that four fourths equal $\frac{4}{4}$ or 1. Break a new noodle in eighths and repeat.

LESSON 10-4

Fractions and Sets

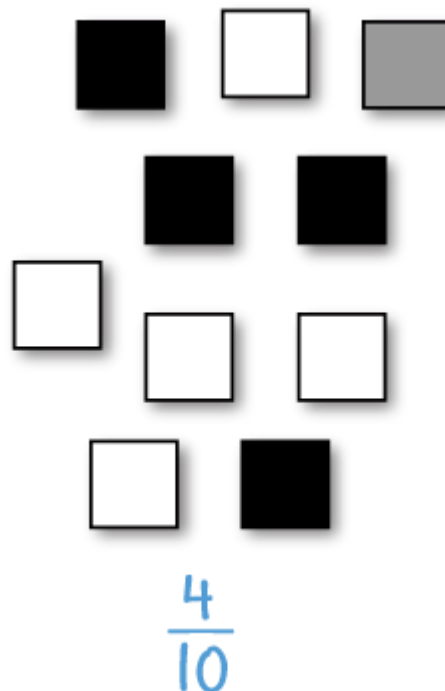
 [MA.3.FR.1.1](#), [MA.3.FR.1.2](#), [MTR.2.1](#), [MTR.4.1](#)

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MATH HELP AT HOME

Sample Additional Practice Exercise 1

Write the fraction of the tiles that are black.



Count the black tiles. There are 4. Count all the tiles. There are 10. Write the fraction that compares black tiles to all tiles: $\frac{4}{10}$.



HOME ACTIVITY

Coin Count

MATERIALS

Coins (Pennies, Nickels, Dimes, Quarters)

ACTIVITY

Gather a set of coins (12 or fewer) and place them on a table. Ask your child, “What fraction of the coins are pennies?” Help your child count the pennies and the total number of coins, then write the fraction that compares the number of pennies to the total number of coins. Next ask your child to write the fraction of the coins that are nickels, dimes, and quarters. Repeat with a different set of coins.

LESSON 10-5

Number Line: Fractions Less Than 1

 [MA.3.FR.2.1](#), [MA.3.FR.1.2](#), [MA.3.FR.1.3](#), [MTR.2.1](#), [MTR.6.1](#)

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MATH HELP AT HOME

Sample Additional Practice Exercise 1

Divide the number line into 3 equal lengths. Then mark and label $\frac{2}{3}$.



Find the point halfway between 0 and 1. This is $\frac{1}{2}$, which divides the number line into 2 equal lengths. To divide the number line into 3 equal lengths, mark one point to the left of $\frac{1}{2}$ and one point to the right of $\frac{1}{2}$. The first point is $\frac{1}{3}$, and the second point is $\frac{2}{3}$.

HOME ACTIVITY

Fold the Fractions

MATERIALS

Scissors, Paper, Pencil

ACTIVITY

Cut 3 strips of paper, each about 2 inches by 8.5 inches. On each strip, have your child write 0 on the left edge and 1 on the right edge (so that 0 and 1 are about 8.5 inches apart). Your child will fold each strip as described here, dividing it into equal lengths and writing fractions.

Strip 1: Fold a strip in half, so that 1 is on top of 0. Unfold the strip and write $\frac{1}{2}$ on the fold line.

Strip 2: Fold a strip in half, then fold in half again in the same direction. Unfold the strip and write $\frac{1}{4}$, $\frac{2}{4}$, and $\frac{3}{4}$ on the 3 fold lines.

Strip 3: Fold a strip in half, fold in half again, and fold in half again. Unfold the strip and write $\frac{1}{8}$, $\frac{2}{8}$, $\frac{3}{8}$, $\frac{4}{8}$, $\frac{5}{8}$, $\frac{6}{8}$, and $\frac{7}{8}$ on the 7 fold lines.

LESSON 10-6

Number Line: Fractions Greater Than 1

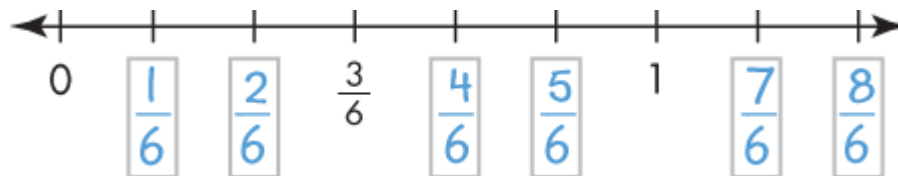
 [MA.3.FR.2.1](#), [MA.3.FR.1.2](#), [MA.3.FR.1.3](#), [MTR.1.1](#), [MTR.3.1](#), [MTR.6.1](#)

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MATH HELP AT HOME

Sample Additional Practice Exercise 1

The number line has equal lengths marked. Write the missing fractions or mixed numbers.



Count how many equal lengths are between 0 and 1. There are 6. So, the number line is divided into sixths. The first mark after 0 is $\frac{1}{6}$, the second is $\frac{2}{6}$, the third is $\frac{3}{6}$, the fourth is $\frac{4}{6}$, the fifth is $\frac{5}{6}$, the sixth is $\frac{6}{6}$ or 1, the seventh is $\frac{7}{6}$ or $1\frac{1}{6}$, and the eighth is $\frac{8}{6}$ or $1\frac{2}{6}$.

HOME ACTIVITY

Fold More Fractions

MATERIALS

Scissors, Paper, Pencil

ACTIVITY

Cut 4 strips of paper, each about 2 inches by 8.5 inches. On each strip, have your child write 0 on the left edge and 2 on the right edge (so that 0 and 2 are about 8.5 inches apart). Your child will fold each strip as described here, dividing it into equal lengths and writing fractions.

Strip 1: Fold a strip in half, so that 2 is on top of 0. Unfold the strip and write 1 on the fold line.

Strip 2: Fold a strip in half, then fold in half again in the same direction. Unfold the strip and write $\frac{1}{2}$, $\frac{2}{2}$, and $\frac{3}{2}$ on the 3 fold lines.

Strip 3: Fold a strip in half, fold in half again, and fold in half again. Unfold and write $\frac{1}{4}$, $\frac{2}{4}$, $\frac{3}{4}$, $\frac{4}{4}$, $\frac{5}{4}$, $\frac{6}{4}$, and $\frac{7}{4}$ on the 7 fold lines.

Strip 4: Fold a strip in half, fold in half again, fold in half again, and fold in half again. Unfold and write $\frac{1}{8}$, $\frac{2}{8}$, $\frac{3}{8}$, $\frac{4}{8}$, $\frac{5}{8}$, $\frac{6}{8}$, $\frac{7}{8}$, $\frac{8}{8}$, $\frac{9}{8}$, $\frac{10}{8}$, $\frac{11}{8}$, $\frac{12}{8}$, $\frac{13}{8}$, $\frac{14}{8}$, and $\frac{15}{8}$ on the 15 fold lines.

LESSON 10-7

Number Line: Use a Ruler

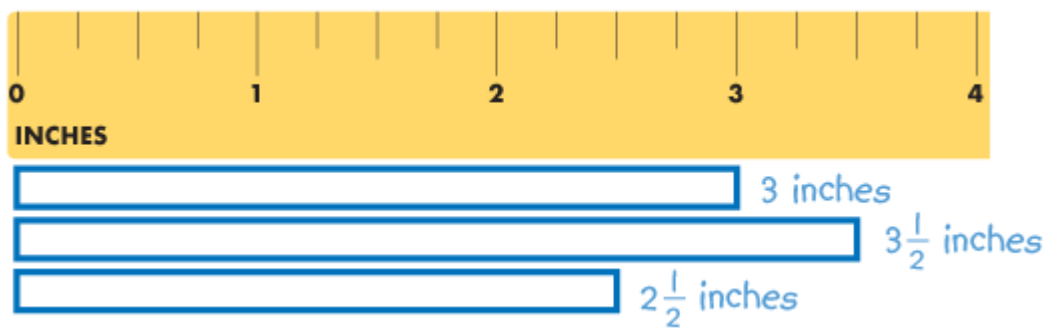
 [MA.3.M.1.1](#), [MA.3.FR.1.1](#), [MA.3.FR.2.1](#), [MTR.1.1](#), [MTR.5.1](#), [MTR.7.1](#)

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MATH HELP AT HOME

Sample Additional Practice Exercise 1

Measure the length of each rectangle to the nearest half inch.



Four equal lengths are marked between 0 and 1, so this ruler shows inches divided into fourths. Two fourths is the same mark as one half, or $\frac{2}{4} = \frac{1}{2}$.

The first rectangle measures 3 inches.

The second rectangle is close to $3\frac{2}{4}$ or $3\frac{1}{2}$ inches.

The third rectangle is close to $2\frac{2}{4}$ or $2\frac{1}{2}$ inches.

HOME ACTIVITY

Three Dimensions

MATERIALS

12-Inch Ruler, Book, Paper, Pencil

ACTIVITY

Find any book in your home. Ask your child to measure its length, width, and height to the nearest half inch. Check your child's measurements and write them down. Ask your child to measure the three dimensions of the book again, this time to the nearest quarter inch. Check your child's measurements and write them down. Together, compare the two sets of measurements. Did any of them change? If so, why? Repeat with a different book.

LESSON 10-8

Number Line: Measuring Liquids

 [MA.3.M.1.1](#), [MA.3.FR.1.1](#), [MA.3.FR.2.1](#), [MTR.1.1](#), [MTR.3.1](#), [MTR.7.1](#)

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MATH HELP AT HOME

Sample Additional Practice Exercise 1

Measure the water in the measuring cup to the nearest quarter cup.



Four equal parts are marked between 1 cup and 2 cups, so this measuring cup is divided into fourths. Each fourth is one quarter cup. The top of the water lines up with 2 cups.

HOME ACTIVITY

Pour Out More

MATERIALS

Measuring Cup, Water

ACTIVITY

Fill any measuring cup with water, up to the highest volume marked. With your child, read the volume of water in the cup. Pour out some of the water and ask your child to measure the new volume to the nearest half cup. Check your child's measurement. Pour out more water and again ask your child to measure the new volume to the nearest half cup, and check. Continue until the cup is nearly empty. Fill the measuring cup again and repeat, but this time have your child measure each volume to the nearest quarter cup. Continue to pour out more water, measure, and check. Discuss with your child which is easier, measuring to the nearest half cup or to the nearest quarter cup.