

Fractions on a Number Line

NCTM Standards 1, 2, 3, 4, 6, 12
Common Core State Standards 3.NF 2, 3

Lesson Planner

STUDENT OBJECTIVES

- To understand a fraction as a number on the number line
- To represent fractions on a number line diagram

1 Daily Activities (CCRG p. CC 3)

Open Ended Problem Solving/Headline Story

Skills Practice and Review—
Comparing to $\frac{1}{2}$

2 Teach and Practice (CCRG p. CC 4–CC 6)

A Connecting Pieces of a Fraction Bar to
Number Line Locations (CCRG p. CC 4)

B Fractions on a Number Line (CCRG p. CC 5)

C Fraction Match (CCRG p. CC 6)

MATERIALS

- CCRG: Activity Masters, Fraction Cards, Fractions on a Line
-  LAB Masters, CCRG pp. CC 8–CC 9

3 Differentiated Instruction (CCRG p. CC 7)

Leveled Problem Solving (CCRG p. CC 7)

Intervention Activity (CCRG p. CC 7)

Extension Activity (CCRG p. CC 7)

Practice Master, CCRG p. CC 10

Extension Master, CCRG p. CC 11

Lesson Notes

Lesson 7.6-1 has been added. Use Lesson 7.6-1 after Lesson 7.6. Alternatively, you might introduce this lesson and use Activities A and B after Lesson 7.1, and Activity C after Lesson 7.3.

About the Lesson

In previous lessons, students have been thinking about a fraction as a part of a whole. This lesson presents another way to think about a fraction—as a number on a number line. For example, $\frac{1}{2}$ is a number halfway between 0 and 1.

Students will see that, when talking about fractions as numbers, equivalent fractions are at the same location on the number line.

About the Mathematics

The number line includes positive and negative numbers, whole numbers, fractions, and decimals. Because the number line extends beyond the numbers we choose to label it, the line is intentionally extended past the first and last number labeled on the line.

Number lines appear in many areas of mathematics and in everyday life. Rulers, thermometers, measuring cups, and clocks are all examples of number lines.

Developing Mathematical Language

Vocabulary: fraction, number line

A *number line* is a line that shows numbers as points on a line. A *number line* is usually horizontal with smaller numbers to the left and greater numbers to the right.



Review the term *number line* with students.

Beginning Draw a *number line* on the board, label it with whole numbers from 0 to 10 and write the term *number line*. Have students identify the line and the numbers that make up the *number line*.

Intermediate On the board draw a *number line* and draw tick marks at intervals of 1, starting at 0. Label the 0 and have volunteers come to the board to label the remaining tick marks with the numbers 1 to 9.

Advanced Draw a *number line* on the board. Have students draw tick marks at intervals of 1 and label the tick marks from 0 to 10.

1 Daily Activities

Open-Ended Problem Solving

Write the following story on the board. If students have difficulty getting started, suggest that they draw pictures or use objects.



Headline Story

Some children shared 12 stickers equally. What fraction of the total number of stickers might each child get? How many stickers would that be?

Possible responses:

If 2 children shared the stickers, they would each get $\frac{1}{2}$ of the stickers, or 6 stickers. If 6 children shared the stickers, they would each get $\frac{1}{6}$ of the stickers, or 2 stickers.



Skills Practice and Review

Comparing to $\frac{1}{2}$

Write three headings on the board as shown below. Ask volunteers to think of fractions and write them in the appropriate categories. If one category is underrepresented, you may want to specify the type of fraction you would like.

Less than $\frac{1}{2}$	Equal to $\frac{1}{2}$	Greater than $\frac{1}{2}$
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2 Teach and Practice

whole class



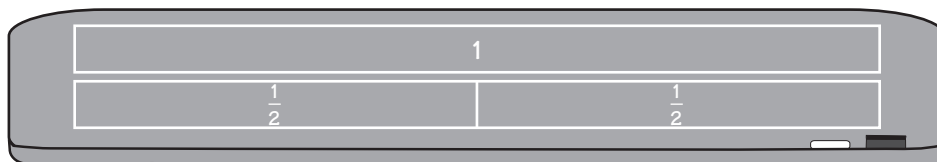
15 MIN

NCTM Standards 1, 2, 3, 4, 6, 12
CCSS 3.NF 2, 3

A Connecting Pieces of a Fraction Bar to Number Line Locations

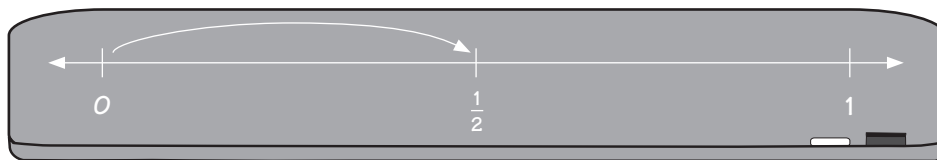
Purpose To represent fractions as locations on a number line

Introduce Draw a fraction bar on the board and draw the same bar cut into 2 equal pieces. Ask a volunteer to label each piece of the bar with a fraction.



Tell students that fractions can also be thought of as numbers on a number line.

Task Draw a number line on the board directly underneath the fraction bars. Remind students that a number line shows numbers as points on a line. Tell students that you will use tick marks instead of points to locate the numbers. Draw tick marks and label them 0 and 1. Then draw another tick mark at $\frac{1}{2}$.



Talk Math

- ❓ Are there numbers between 0 and 1? What kinds of numbers?
Possible answers: Yes; fractions and decimals
- ❓ Point to the tick mark at $\frac{1}{2}$. What fraction should I write to label this point?
How do you know? Possible answer: $\frac{1}{2}$. It is halfway between 0 and 1.
Point out that you divided the number line from 0 to 1 into 2 equal parts.
If you count off one of the parts, the fraction you get to is $\frac{1}{2}$.

Now sketch the following number line. Tell students you are going to divide the line between 0 and 1 into 3 equal parts. Label the line as students answer the following questions.



Talk Math

- ❓ Point to the tick mark at $\frac{1}{3}$. What fraction is shown at this point? $\frac{1}{3}$
- ❓ Point to the tick mark at $\frac{2}{3}$. What fraction is shown at this point? $\frac{2}{3}$
- ❓ Point to the tick mark at 1. What fraction is shown at this point? $\frac{3}{3}$

Practice Draw another number line and partition it into eighths. With the class, count the number of parts the line is divided into. Ask volunteers to come to the board and locate $\frac{1}{8}$, $\frac{3}{8}$, $\frac{4}{8}$, and $\frac{7}{8}$ on the line.

Concept Alert

Make sure that students are counting the number of parts, not the number of tick marks to determine the denominator of the fraction.

B Fractions on a Number Line

LAB Masters, CCRG, pp. CC 8–CC 9



Purpose To recognize fractions as numbers on a number line

NCTM Standards 1, 2, 3, 4, 6, 12
CCSS 3.NF 2, 3

Lesson Activity Book Master, CCRG p. CC 8

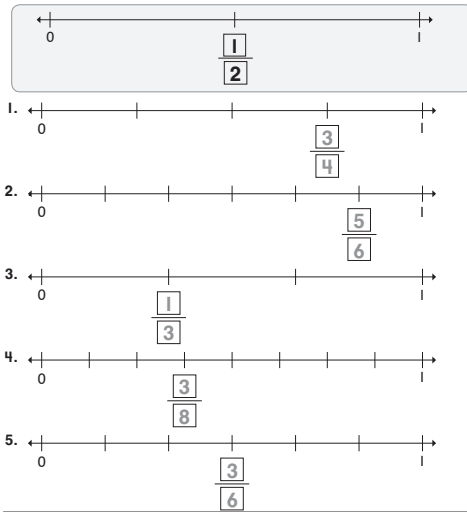
Chapter 7
Lesson 6-1

Fractions on a Number Line

NCTM Standards 1, 2, 3, 4, 6, 12
Common Core State Standards 3.NF 2, 3

Sample work is shown.

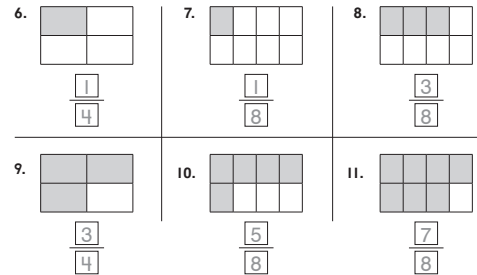
Write the missing numbers.



NOTE: Your child is learning to solve story problems involving comparisons. Play a game where you and your child guess numbers from clues, such as, "My number is 18 more than 53."

Lesson Activity Book Master, CCRG p. CC 9

Write the fractions for the shaded shapes. The denominators should show the total number of pieces.

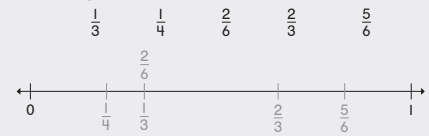


Write the fractions from Problems 6–11 at their locations on the number line.



Challenge

13. Challenge Show each number's location on the number line.



Teaching Notes for LAB Master, CCRG p. CC 8

On this page, students label points on a number line between 0 and 1. They should start by identifying the total number of equal parts the number line has been divided into.

Ongoing Assessment Help children who are having difficulty writing a fraction by asking them to identify how many parts the line has been divided into to find the denominator. Then, have them identify how many tick marks over from 0 the number is to find the numerator.

Teaching Notes for LAB Master, CCRG p. CC 9

Students connect a fraction as part of a whole to a fraction on a number line.

Challenge Problem In this problem, students must draw the tick marks themselves to locate the given fractions. They should recognize that $\frac{1}{3}$ is equivalent to $\frac{2}{6}$.

Reflect and Summarize the Lesson

Write Math

Write the fractions that are shown at the tick marks on the number line. Explain how you decided.

Possible answer: The line from 0 to 1 is divided into 6 equal parts so the denominator of each fraction must be 6.





pairs

15
MIN

Fraction Match

Materials

- For each pair of students: AM: Fraction Cards, AM: Fractions on a Number Line

NCTM Standards 1, 2, 3, 4, 6, 12
CCSS 3.NF 2, 3

Purpose To match fractions with their locations on a number line

Introduce Tell children that they will work with a partner to locate fractions on number lines. Give each pair a copy of Activity Master: Fractions on a Number Line and cards cut from Activity Master: Fraction Cards. Go through the instructions for the page with the class.

Task Match each fraction card with a location on a number line. Each pair places cards face down in a pile. One partner selects a card. Pairs work to determine which number line shows that kind of fraction. The other partner writes the fraction to show its location on the appropriate number line.

When pairs have located each fraction on the number lines, bring the class together and discuss the following.

Talk Math

- Look at your number lines. What fractions are equivalent to $\frac{1}{2}$?
 $\frac{2}{4}$, $\frac{3}{6}$, and $\frac{4}{8}$
- What fractions are equivalent to $\frac{1}{3}$? To $\frac{2}{3}$? $\frac{2}{6}$, $\frac{4}{6}$
- Can you find other fractions that are equivalent? Possible answers: $\frac{1}{4}$ is equivalent to $\frac{2}{8}$, $\frac{3}{4}$ is equivalent to $\frac{6}{8}$

Extend Discuss the relative size of the fractions. Students should recognize that, for example, $\frac{5}{8}$ is between $\frac{1}{2}$ and 1 and that $\frac{7}{8}$ is greater than $\frac{1}{3}$. They should also be able to identify fractions that are close to 0, close to $\frac{1}{2}$, or close to 1.

3 Differentiated Instruction

Leveled Problem Solving

Lee is thinking of a number between 0 and 1.

1 Basic Level

Her number is to the left of $\frac{1}{2}$ on the number line. Lee could be thinking of a fraction. She could be thinking of $\frac{1}{4}$ or $\frac{1}{3}$. She could also be thinking of $\frac{1}{6}$ or $\frac{1}{8}$.

2 On Level

Her number is equivalent to $\frac{1}{2}$. Lee could be thinking of $\frac{2}{4}$. She could also be thinking of $\frac{3}{6}$ or $\frac{4}{8}$.

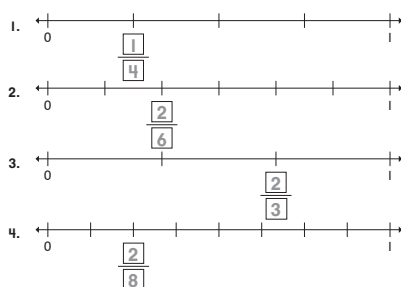
3 Above Level

Her number is between $\frac{1}{2}$ and $\frac{7}{8}$ on the number line. Lee could be thinking of $\frac{2}{3}$ or $\frac{3}{4}$. She could be thinking of $\frac{5}{8}$ or $\frac{6}{8}$. There are many other numbers Lee could be thinking of.

Practice Master, CCRG p. CC 10

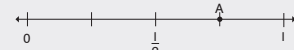
Fractions on a Number Line

Write the missing numbers.



Test Prep

5. Point A is shown on the number line below.



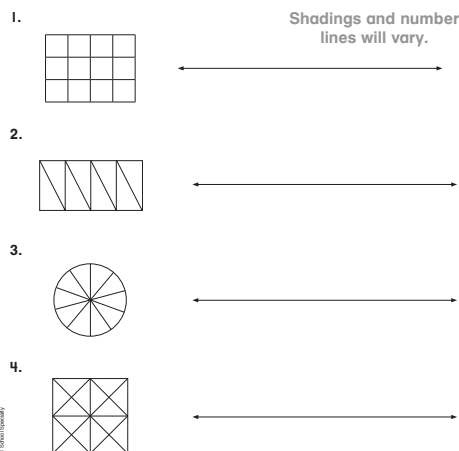
Which fraction best names Point A on the number line?

- A. $\frac{1}{4}$ C. $\frac{2}{3}$
 B. $\frac{3}{4}$ D. $\frac{2}{5}$

Extension Master, CCRG p. CC 11

Fractions on a Number Line

For each problem, shade the figure to show a fraction. Then draw a number line model to show the fraction.



Intervention Activity

Number Line Labels

On the board, draw a number line from 0 to 1 showing fourths. Ask students to talk you through the steps they would take to label the number line with fractions. Write these steps on the board. Have students copy the steps onto index cards. Then draw a number line showing sixths. Discuss whether the same steps can be used to label this line.

Extension Activity

Comparing Fractions

Challenge pairs of students to give examples of each of the following:

- When two fractions have the same numerator, the fraction with the smaller denominator is larger.
- When two fractions have the same denominator, the fraction with the larger numerator is larger.

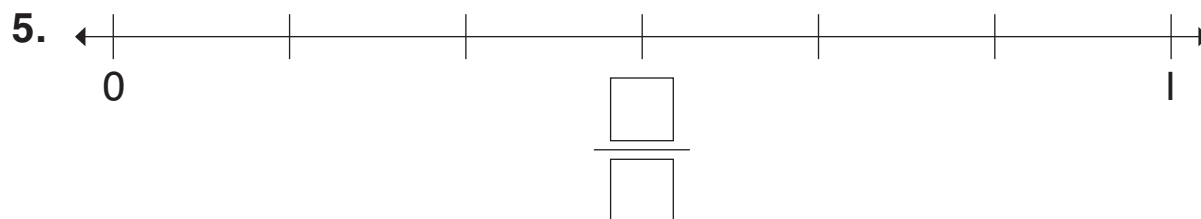
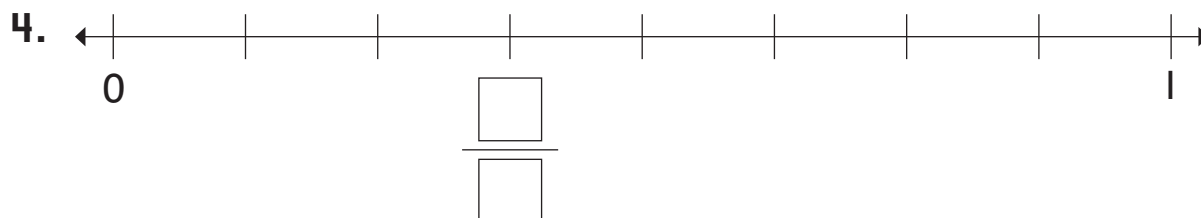
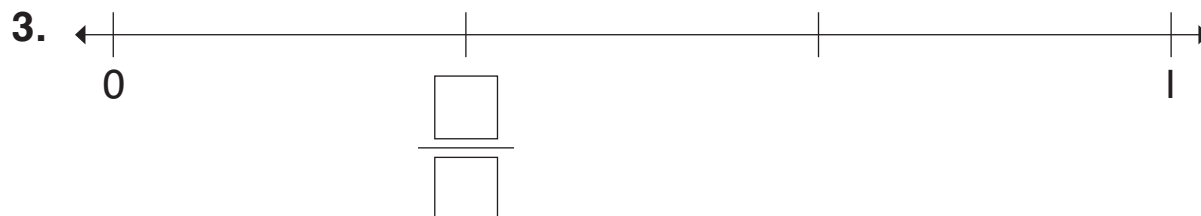
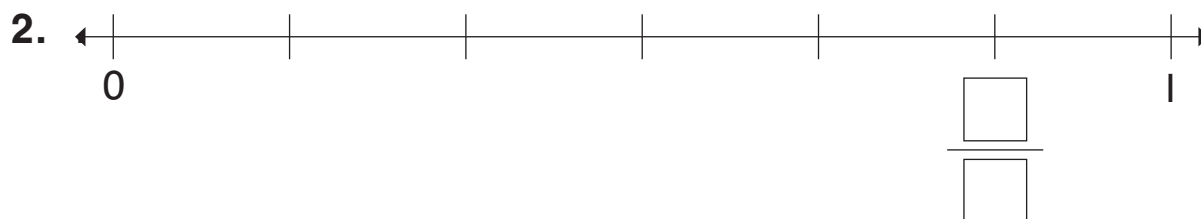
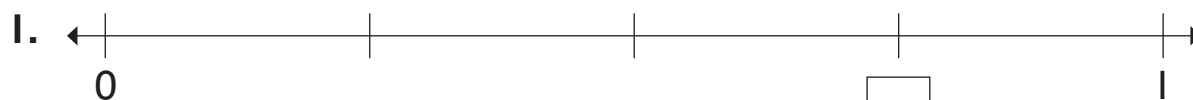
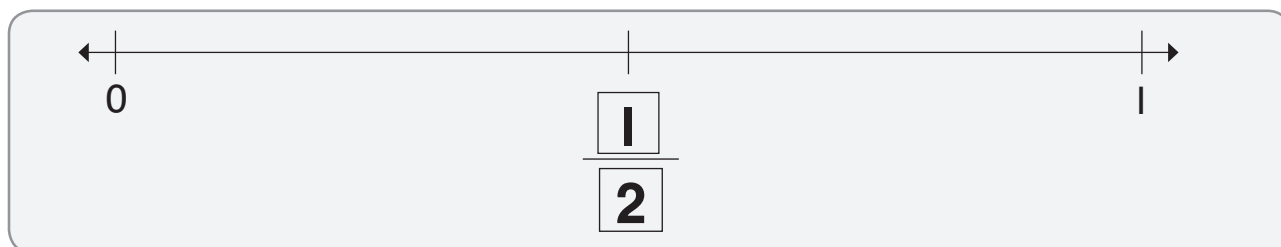
After students have provided examples for each statement, have them explain their thinking.

Fractions on a Number Line

NCTM Standards 1, 2, 3, 4, 6, 12

Common Core State Standards 3.NF 2, 3

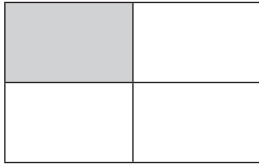
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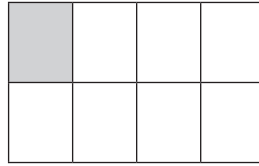
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6.



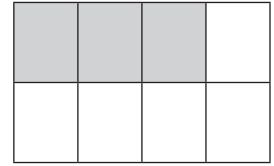
$$\frac{\square}{\square}$$

7.



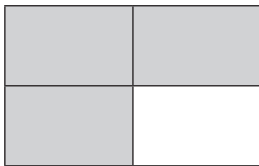
$$\frac{\square}{\square}$$

8.



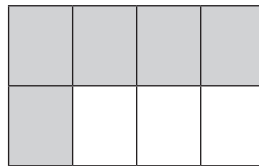
$$\frac{\square}{\square}$$

9.



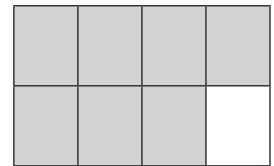
$$\frac{\square}{\square}$$

10.



$$\frac{\square}{\square}$$

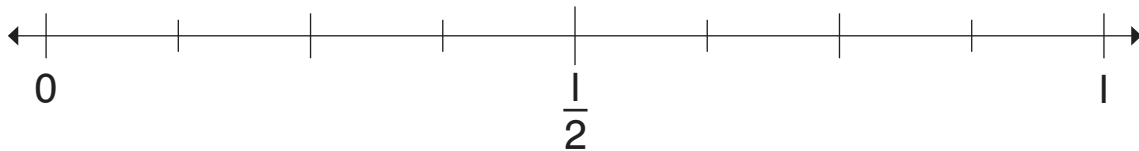
11.



$$\frac{\square}{\square}$$

Write the fractions from Problems 6–11 at their locations on the number line.

12.



Challenge

13. Show each number's location on the number line.

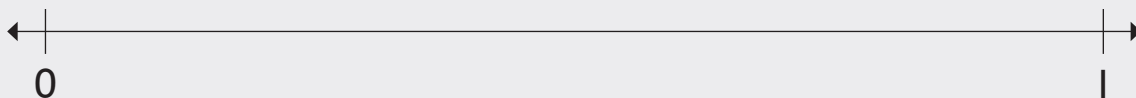
$$\frac{1}{3}$$

$$\frac{1}{4}$$

$$\frac{2}{6}$$

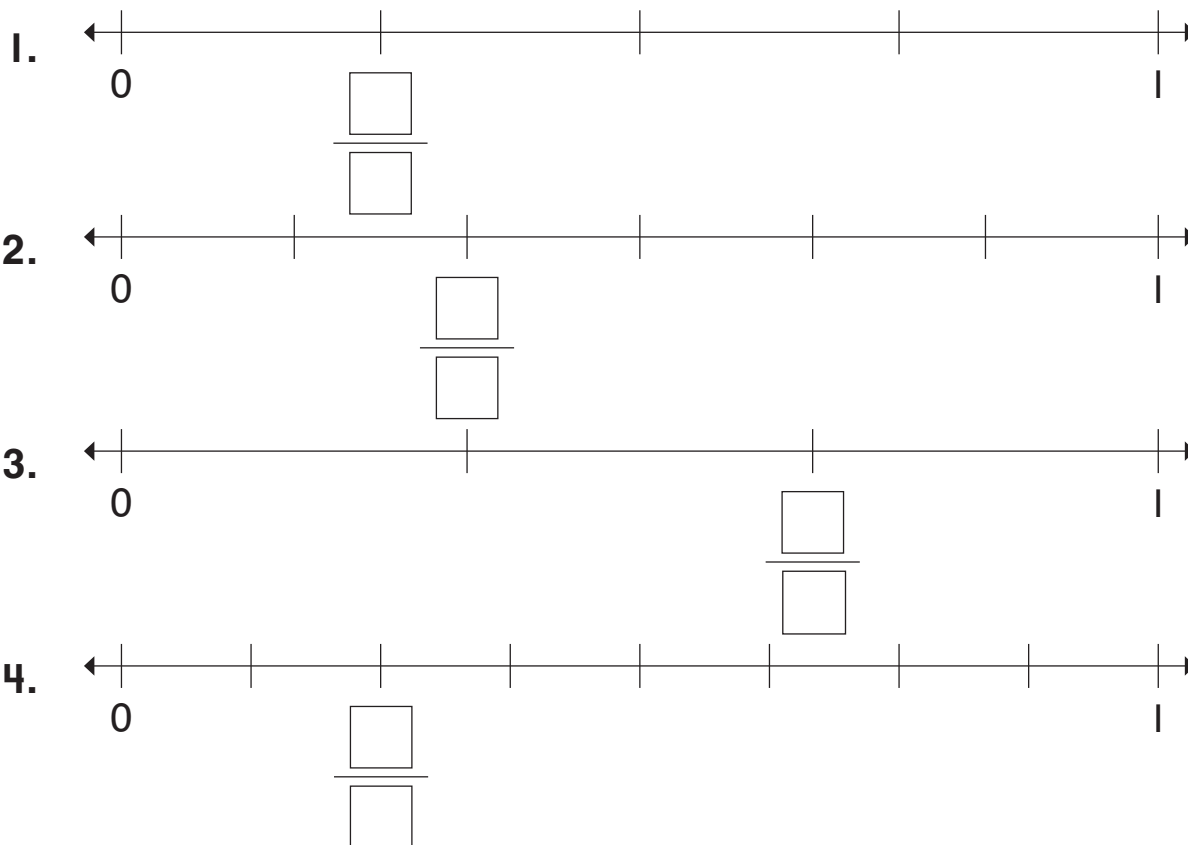
$$\frac{2}{3}$$

$$\frac{5}{6}$$



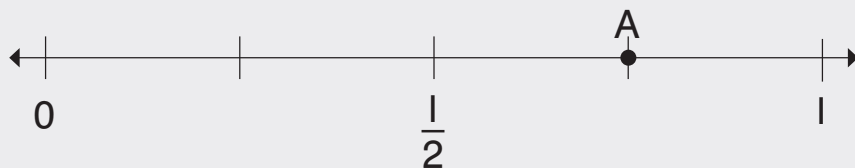
Fractions on a Number Line

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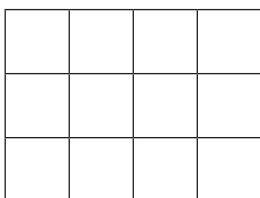
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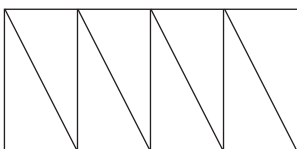
Fractions on a Number Line

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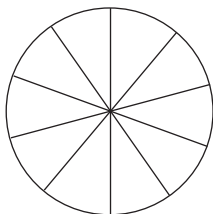
1.



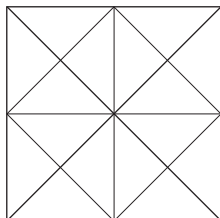
2.



3.



4.



Fraction Cards

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

$$\frac{2}{4}$$

$$\frac{4}{6}$$

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

$$\frac{2}{6}$$

$$\frac{4}{8}$$

$$\frac{1}{4}$$

$$\frac{2}{8}$$

$$\frac{5}{6}$$

$$\frac{1}{6}$$

$$\frac{3}{4}$$

$$\frac{5}{8}$$

$$\frac{1}{8}$$

$$\frac{3}{6}$$

$$\frac{6}{8}$$

$$\frac{2}{3}$$

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

$$\frac{7}{8}$$

Fractions on a Number Line

