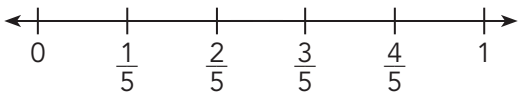
Getting Closer

Benchmark Fractions

2

WARM UP

1. Locate $\frac{1}{2}$ on this number line.



2. How did you determine the location of $\frac{1}{2}$ on the number line?

LEARNING GOALS

- Identify fractions and their equivalents on a 10 X 10 grid.
- Represent fractions on a number line.
- Estimate fractions by using benchmark fractions.
- Estimate sums of fractions using benchmark fractions.

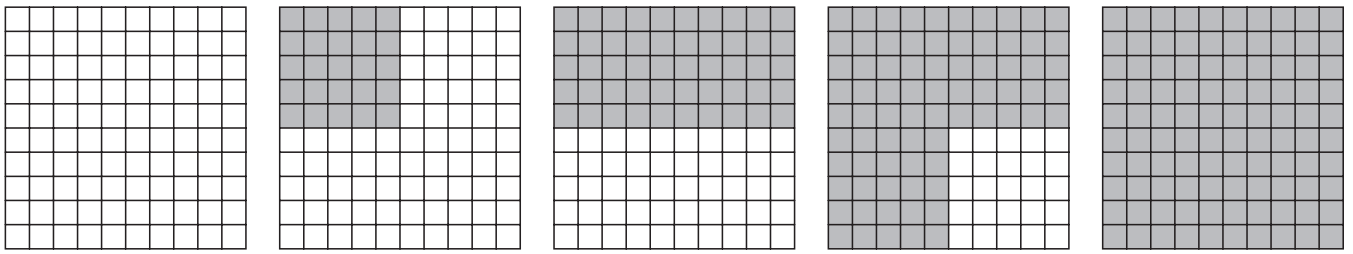
KEY TERM

- benchmark fractions

You have created strip diagrams and used them to compare numbers. How can you use grids and number lines of common fractions like $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{4}$ to estimate the value of other fractions?

Shady Grids

Consider the grids shown.



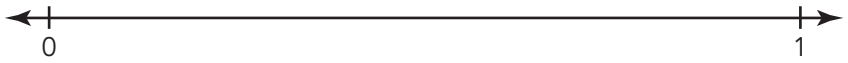
1. What fraction does each grid represent? Write a fraction under each grid.

2. How does each 10 × 10 grid representation change as you move from left to right? Explain your reasoning.

ACTIVITY
2.1 Graphing Strip Diagrams

In the previous lesson, you folded strips of paper to represent fractions. Let's consider how to translate those strip diagrams to number lines.

1. Label the number line to represent fourths.

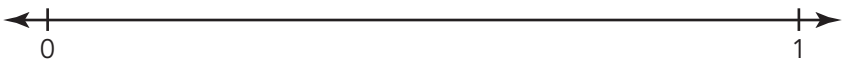


a. How does this number line connect with the grid representations in the Getting Started?

b. Plot the fractions $\frac{1}{4}$ and $\frac{3}{4}$.

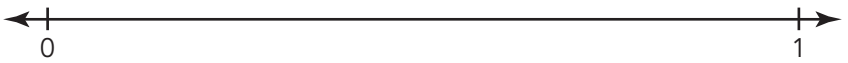
2. Label each number line to represent the fractional part provided and plot the given fractions.

a. twelfths



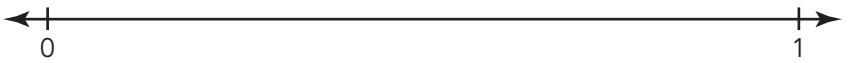
- $\frac{5}{12}$
- $\frac{11}{12}$
- $\frac{1}{12}$
- $\frac{7}{12}$

b. sixteenths



- $\frac{10}{16}$
- $\frac{1}{16}$
- $\frac{7}{16}$
- $\frac{15}{16}$

c. eighths



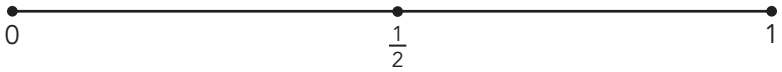
- $\frac{5}{8}$
- $\frac{7}{8}$
- $\frac{1}{8}$
- $\frac{3}{8}$

As you get ready to label each number line, think about how you folded your strips in the Rocket Strips lesson. This will help you get the number line evenly spaced. To get fourths, you folded the strip in half first, so mark $\frac{2}{4}$ on the number line first. Then, mark $\frac{1}{4}$, and finally mark $\frac{3}{4}$.

ACTIVITY
2.2 Benchmark Fractions

Benchmark fractions are common fractions you can use to estimate the value of fractions.

Three common benchmark fractions are 0, $\frac{1}{2}$, and 1.



A fraction is close to 0 when the numerator is very small compared to the denominator.

A fraction is close to $\frac{1}{2}$ when the numerator is about half the size of the denominator.

A fraction is close to 1 when the numerator is very close in size to the denominator.

1. Use each number line you completed in Activity 2.1 to write a fraction that is:

a. less than $\frac{1}{2}$

b. exactly $\frac{1}{2}$

c. greater than but not equal to $\frac{1}{2}$

d. close to but not equal to 0

e. exactly 1

f. close to but not equal to 1

g. exactly 0

2. Name the closest benchmark fraction for each fraction given.

a. $\frac{4}{9}$ b. $\frac{8}{9}$ c. $\frac{6}{100}$

d. $\frac{5}{67}$ e. $\frac{7}{15}$ f. $\frac{7}{12}$

g. $\frac{5}{6}$ h. $\frac{14}{27}$ i. $\frac{12}{13}$

j. $\frac{1}{17}$ k. $\frac{5}{11}$ l. $\frac{3}{7}$

3. **Write the unknown numerator or denominator so that each fraction is close to but less than $\frac{1}{2}$.**

a. $\frac{(\ \ )}{12}$

b. $\frac{(\ \ )}{27}$

c. $\frac{8}{(\ \ )}$

d. $\frac{7}{(\ \ )}$

e. $\frac{(\ \ )}{13}$

f. $\frac{9}{(\ \ )}$

4. **Write the unknown numerator or denominator so that each fraction is close to but less than 1.**

a. $\frac{(\ \ )}{17}$

b. $\frac{11}{(\ \ )}$

c. $\frac{(\ \ )}{8}$

d. $\frac{(\ \ )}{18}$

e. $\frac{13}{(\ \ )}$

f. $\frac{(\ \ )}{10}$

5. **Rewrite each expression using benchmark fractions. Then, estimate the sum. Explain your reasoning.**

a. $\frac{8}{9} + \frac{6}{7}$

b. $\frac{1}{11} + \frac{8}{17}$

c. $\frac{10}{11} + \frac{11}{12} + \frac{12}{13} + \frac{13}{14} + \frac{14}{15}$

NOTES

6. If three fractions that are greater than $\frac{1}{2}$ but less than 1 are added together, what can you say about their sum? Explain your reasoning.

7. If two fractions that are less than $\frac{1}{2}$ but greater than 0 are added together, what can you say about their sum? Explain your reasoning.

8. If seven fractions that are slightly less than 1 are added together, what can you say about their sum? Explain your reasoning.

NOTES

TALK the TALK

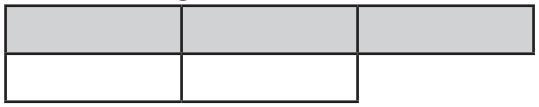
Copycat!

The teacher asked each of her students to create a rectangular design and shade only a portion of their design. The table describes three students' designs.

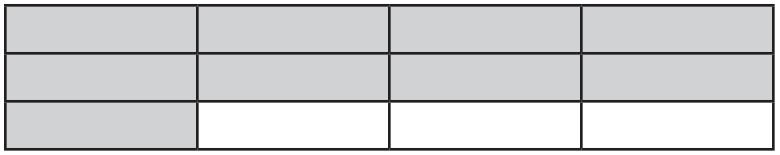
Student	Unshaded portion	Shaded portion
Lily	$\frac{1}{4}$	$\frac{3}{4}$
Emma	$\frac{2}{5}$	$\frac{3}{5}$
Molly	$\frac{3}{12}$	$\frac{9}{12}$

Lily's design:

Emma's design:



Molly's design:



When the students saw each other's designs Lily immediately accused Molly of being a copycat! Molly replied that she did no such thing and Lily must be confused, as usual. Molly said her design was much bigger than Lily's and not even the same shape. Emma said she was staying out of this argument and would not take Lily or Molly's side of the disagreement.

1. **Do you think Molly copied Lily's design? Why would Lily accuse Molly of copying her design? Explain your reasoning.**

2. **Molly thought her design contained the largest portion of parts not shaded. Why does Molly think this way? Do you agree with her? Explain your reasoning.**