







## FROM MARILYN BURNS

Dear Colleague,

Students now learn the fifth Comparing Fractions Toolkit strategy—compare fractions to  $\frac{1}{2}$ . This strategy builds on the focus on  $\frac{1}{2}$  introduced in the previous lessons. When applying this new strategy for comparing fractions, students also make use of the other strategies they have learned. The pairs of fractions that students compare in these lessons were specifically chosen so that more than one strategy is useful for comparing them. For example, to compare  $\frac{5}{12}$  and  $\frac{5}{8}$ , students can decide that  $\frac{5}{8}$  is greater by using the strategy of compare fractions to  $\frac{1}{2}$  and also by using the strategy of compare fractions with common numerators.



compare fractions to  $\frac{1}{2}$ 

compare fractions with common numerators

 $s_0 \frac{5}{12} < \frac{5}{8}$ 

 $\frac{1}{12} < \frac{1}{8}$  $so \frac{5}{12} < \frac{5}{8}$ 

Students extend their fraction work from the previous lessons with two-color cube trains, now comparing fractions to the benchmark of  $\frac{1}{2}$ . They consider real-world situations that involve fractions and decide whether each fraction can best be described as exactly half, about half, less than half, or greater than half. Students learn a new symbol, pprox, which means about equal to. Along with supporting students' understanding of  $\frac{1}{2}$ , these experiences introduce students to estimating with fractions.

When pitching, Joe struck out 7 of 12 batters.

$$\frac{7}{12} > \frac{1}{2}$$

$$\frac{7}{12} \approx \frac{1}{2}$$

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In Lessons 16–20,

Compare fractions using

benchmarks, common

numerators, common

fractions one unit fraction

· Communicate ideas with

unit fraction, equivalent,

and common denominator.

key math vocabulary:

numerator, common numerator, denominator,

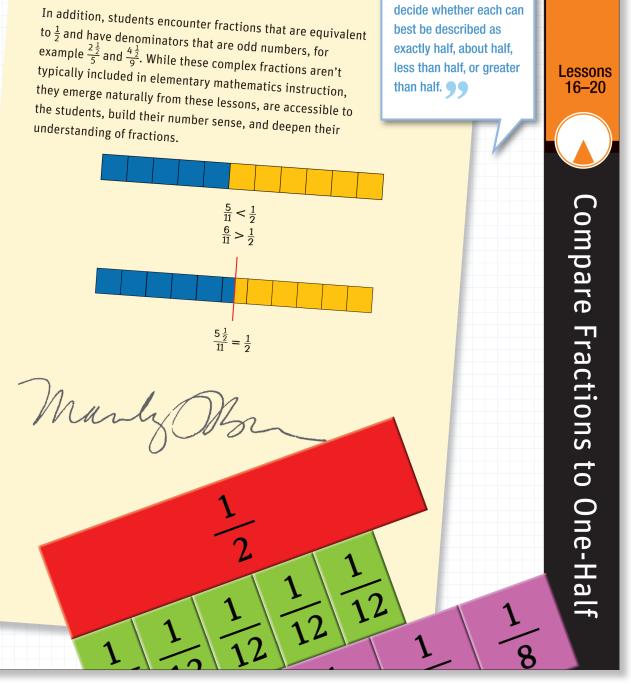
denominators, and

from 1 whole.

fractions.

Identify equivalent

students...



Fractions B: Equivalence and Comparison Reduced Teacher Guide, pages 72-73

Students consider real-world situations that involve fractions and

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See pages 52-55 for full lesson.

See pages 56-58 for full lesson.



Lessons 16–20

Compare

Fractions

to One-Half





Planner: Lessons 16-20

PLANNER	LESSON 16	LESSON 17	LESSON 18	LESSON 19	LESSON 20
Lesson Summary	Students learn a new strategy for the Comparing Fractions Toolkit—compare fractions to $\frac{1}{2}$ .	Students transform two-color cube trains that are not half blue, half yellow to half-and-half trains.	Students continue to compare fractions to $\frac{1}{2}$ , including fractions with denominators that are odd numbers.	Students compare fractions to $\frac{1}{2}$ in real-world situations.	Students demonstrate understanding of the objectives of Lessons 16–19 by completing <i>WorkSpace</i> pages independently.
Objectives Find an alignment to standards at www.scholastic.com/DoTheMath/community	<ul> <li>Compare fractions to ½.</li> <li>Identify fractions equivalent to ½.</li> <li>Communicate ideas with key math vocabulary: numerator, common numerator, denominator, unit fraction, equivalent, and common denominator.</li> </ul>	<ul> <li>Compare fractions to ½.</li> <li>Identify fractions equivalent to ½.</li> <li>Communicate ideas with key math vocabulary: denominator, unit fraction, equivalent, and common denominator.</li> </ul>	<ul> <li>Compare fractions to ½.</li> <li>Identify fractions equivalent to ½.</li> <li>Communicate ideas with key math vocabulary: numerator, common numerator, denominator, and equivalent.</li> </ul>	<ul> <li>Compare fractions to ½.</li> <li>Identify fractions equivalent to ½.</li> <li>Communicate ideas with key math vocabulary: common numerator, unit fraction, and common denominator.</li> <li>Solve problems using fractions.</li> </ul>	Compare fractions using benchmarks, common numerators, common denominators, and fractions one unit fraction from 1 whole.  Identify equivalent fractions.  Communicate ideas with key math vocabulary: numerator, denominator, and common denominator.  Solve problems using fractions.
Materials  T = Teacher Bag  S = Student Bag	WorkSpace pages 1 and 27     fraction strips     magnetic fraction strips       Comparing Fractions Toolkit chart	WorkSpace pages 1 and 28     connecting cubes	WorkSpace pages 1 and 29     connecting cubes	WorkSpace pages 1, 30, and 31     Comparing Fractions Toolkit chart	WorkSpace pages 1, 32, 33, and 49     connecting cubes      fraction strips     Comparing Fractions Toolkit chart     red and blue fraction cubes
Built-in Differentiation	Creating the Comparing Fractions Toolkit and listing the strategies on a chart build a <b>routine</b> students can follow as they compare fractions that depend on students' knowledge of fraction numbers and notation.	Using cube trains as <b>hands-on manipulatives</b> provides students with a concrete way to compare fractions to one-half, providing wider access to the concept.	Combining the <b>visual representation</b> of the cube train with the <b>symbolic representation</b> of the corresponding fractions helps students better understand the <b>language and notation</b> of math.	Discussing and using symbols such as <i>greater than</i> or <i>approximately equal to</i> improve students' ability to <b>communicate</b> mathematical ideas clearly.	Assessing with visual models and symbolic representations they have been using in Lessons 16–19 allows students to show their understanding without having to approach the material in an unfamiliar format.
	Teaching Arithmetic: Lessons for Introducing Fra by Marilyn Burns, pages 30–3		TeacherSpace™: Fraction contains videos, professio reproducibles to support t	onal articles, and	

Fractions B: Equivalence and Comparison Reduced Teacher Guide, pages 74-75

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**Marilyn Burns** 

## LESSON 16 Using a new Comparing Fractions Toolkit strategy

**Lesson** (16) Students learn a new strategy for the Comparing Fractions Toolkitcompare fractions to  $\frac{1}{2}$ .

Next Lesson Students transform two-color cube trains that are not half blue, half yellow to half-and-half trains.

### **Lesson Summary**

Students learn a new strategy for the Comparing Fractions Toolkit—compare fractions to  $\frac{1}{2}$ .

### **Objectives**

- Compare fractions to \(\frac{1}{2}\).
- Identify fractions equivalent to \(\frac{1}{2}\).
- · Communicate ideas with key math vocabulary: numerator, common numerator, denominator, unit fraction, equivalent, and common denominator.

### **Materials**

- WorkSpace pages 1 and 27
- T = Teacher Bag
- fraction strips
- magnetic fraction strips **T**
- . Comparing Fractions Toolkit chart

### **Language Development**

### **Key Math Vocabulary**

**FNGLISH** SPANISH común denominador common denominator common numerator común numerador denominator denominador equivalent equivalente numerador numerator fracción unitaria unit fraction

### **Academic Vocabulary**

ENGLISH	SPANISH
compare	comparar
greater than	mayor que
less than	menor que
strategy	estrategia

Cognates are shown in italics; pointing out the similarity of these words to their English equivalents will help your Spanish-speaking students acquire vocabulary.

### WHOLE GROUP

STEP

**Students practice** a toolkit strategy.

### **1** Introduce the lesson.

Today you will learn a new strategy for the Comparing Fractions Toolkit. It's called the compare fractions to  $\frac{1}{2}$  strategy.

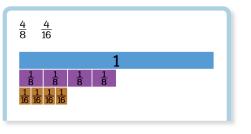
### **2** Present two fractions to compare.

Here are two fractions to compare.

Write  $\frac{4}{8}$  and  $\frac{4}{16}$  on board.

Have students read each fraction aloud.

Display magnetic fraction strips.



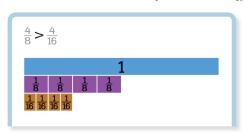
Compare these two fractions. Use your fraction pieces and talk with your partner.

Give students time to confer.

 $\bigcirc$  Let's say aloud which fraction is greater. (48)

Let's say aloud which fraction is less.  $(\frac{4}{16})$ 

Write > between the fractions. Point at the board and have students read aloud with you:  $\frac{4}{8}$  is greater than  $\frac{4}{16}$ .



### 3 Relate the problem to the *Comparing* Fractions Toolkit.

Last Lesson Students demonstrate

understanding of the objectives of

Lessons 11-14.

Refer to the *Comparing Fractions Toolkit* and read Strategy 1: *compare unit fractions*.

☐ I don't think this strategy helps. Why not?  $(\frac{4}{8}$  and  $\frac{4}{16}$  are not unit fractions)

Read Strategy 2: compare fractions with common numerators.

 $\bigcirc$  I think this strategy helps. Why? ( $\frac{4}{8}$  and  $\frac{4}{16}$  have the same numerator)

Read Strategy 3: compare fractions with common denominators.

 ☐ I don't think this strategy helps. Why not?  $(\frac{4}{8}$  and  $\frac{4}{16}$  do not have the same deno

Read Strategy 4: compare fractions that are one unit fraction from 1 whole.

I don't think this strategy helps. Why not? (both fractions are much less than a whole; also neither fraction is a unit fraction away from 1 whole)

Just one of the strategies—Strategy 2—helps us compare  $\frac{4}{8}$  and  $\frac{4}{16}$ . But there is another strategy that can help us compare these two fractions.

A new element is now added to the procedure for comparing fractions. For each pair of fractions, students refer to the strategies they've learned to see if any of them prove useful. They practice this procedure from now on when comparing fractions and learn that sometimes more than one strategy will apply. For example, for  $\frac{4}{8}$  and  $\frac{4}{16}$ , both Strategy 2 and Strategy 5 can be used to establish that  $\frac{4}{8} > \frac{4}{16}$ .

# STEP

WHOLE GROUP

Introduce the compare fractions to  $\frac{1}{2}$  strategy.

### • Explain the new strategy.

Here's a new strategy to try. It is called comparing fractions to  $\frac{1}{3}$ . Which of the two fractions we are comparing is equivalent to  $\frac{1}{2}$ ? ( $\frac{4}{8}$ )

Have students think, pair, share to explain why  $\frac{4}{8} = \frac{1}{2}$ . (4 is half of 8, so  $\frac{4}{8} = \frac{1}{2}$ )

 $\bigcirc$  I know that  $\frac{4}{16}$  is less than  $\frac{1}{2}$ .

Have students think, pair, share to explain why.  $(\frac{8}{16} = \frac{1}{2} \text{ and } \frac{4}{16} \text{ is less than } \frac{8}{16})$ 

 $\bigcirc \frac{4}{16}$  is less than  $\frac{1}{2}$ , and  $\frac{4}{8}$  is equivalent to  $\frac{1}{2}$ , so I know that  $\frac{4}{8}$  is greater than  $\frac{4}{16}$ .

### **2** Write Strategy 5 on the chart.

### **Comparing Fractions Toolkit**

Strategy 1: compare unit fractions

 $\frac{1}{2} > \frac{1}{6}$ 

Strategy 2: compare fractions with common numerators

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

Strategy 3: compare fractions with common denominators

 $\frac{1}{4} < \frac{2}{4}$ 

Strategy 4: compare fractions that are one unit fraction from 1 whole

 $\frac{2}{3} < \frac{5}{4}$ 

Strategy 5: compare fractions to  $\frac{1}{2}$ 

 $\frac{4}{8} > \frac{4}{16}$ 

CONTINUE

Lesson 16 77

### Fractions B: Equivalence and Comparison Reduced Teacher Guide, pages 76-77

**Compare Fractions to One-Half** 

# STEP

**Guide students to use** the Comparing Fractions Toolkit.

### • Present two fractions to compare.

○ We can also use this new strategy when neither fraction is equivalent to one-half. Here are two other fractions.

Write  $\frac{5}{12}$  and  $\frac{3}{4}$  on the board.

Call on students to read each fraction aloud.

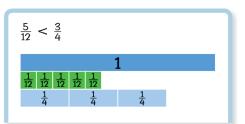
Compare these fractions. Use your fraction pieces and talk with your partner.

Give students time to confer.

Let's say aloud which fraction is greater. (3/4)

Let's say aloud which fraction is less.  $(\frac{5}{12})$ 

Display magnetic fraction strips. Write < between the fractions. Point to the board and have students read aloud with you:  $\frac{5}{12}$  is less than  $\frac{3}{4}$ .



### **2** Use the Comparing Fractions Toolkit strategies to compare the fractions.

Let's see if we can use our Comparing Fractions Toolkit strategies to reason.

Follow the same process used in Step 1. Go through the first four strategies to see if any can be used to compare  $\frac{5}{12}$  and  $\frac{3}{4}$ . For each, have a student read the strategy, and then have students think, pair, share about why it is or isn't useful.

Here are possible answers for each:

Strategy 1: No,  $\frac{5}{12}$  and  $\frac{3}{4}$  are not unit fractions.

Strategy 2: No,  $\frac{5}{12}$  and  $\frac{3}{4}$  don't have the same numerators.

Strategy 3: No,  $\frac{5}{12}$  and  $\frac{3}{4}$  don't have the same denominators.

Strategy 4: No,  $\frac{3}{4}$  is a unit fraction  $(\frac{1}{4})$  away from 1 whole, but  $\frac{5}{12}$  is not.

 $\bigcirc$  Let's try Strategy 5: compare fractions to  $\frac{1}{2}$ . I know that  $\frac{5}{12}$  is less than  $\frac{1}{2}$ . Why?  $(\frac{6}{12}$  is equal to  $\frac{1}{2}$ and  $\frac{5}{12}$  is less than  $\frac{6}{12}$ )

And I know that  $\frac{3}{4}$  is greater than  $\frac{1}{2}$ . Why?  $(\frac{2}{4}$  is equal to  $\frac{1}{2}$  and  $\frac{3}{4}$  is greater than  $\frac{2}{4}$ )

 $\frac{5}{12}$  is less than  $\frac{1}{2}$  and  $\frac{3}{4}$  is greater than  $\frac{1}{2}$ , so  $\frac{5}{12}$  is less than  $\frac{3}{4}$ .

Strategy 5 works for two situations. It works when you are comparing two fractions with one greater than  $\frac{1}{2}$  and the other less than  $\frac{1}{2}$ . It also works when one of the fractions is equal to  $\frac{1}{2}$  and the other is less than or greater than  $\frac{1}{2}$ .

### WHOLE GROUP

**Guide students to** use the Comparing Fractions Toolkit.

• Present two fractions to compare.

 ☐ Here are two more fractions to compare. Write  $\frac{5}{12}$  and  $\frac{5}{8}$  on the board.

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

### 2 Show that two strategies can be used to compare the fractions.

© Explain how to use Strategy 5 to compare these two fractions.

Have students think, pair, share. Choose a student to explain.  $(\frac{5}{12}$  is less than  $\frac{1}{2}$  and  $\frac{5}{8}$  is greater than  $\frac{1}{2}$ , so  $\frac{5}{12} < \frac{5}{8}$ )

 ☐ I can also compare these fractions using Strategy 2. Explain how I can use that strategy.

Have students think, pair, share. Choose a student to explain. (They have a common numerator of 5, and  $\frac{1}{12}$ is less than  $\frac{1}{8}$ , so  $\frac{5}{12} < \frac{5}{8}$ )

When you compare fractions, sometimes you can use more than one strategy to decide which is greater or less.

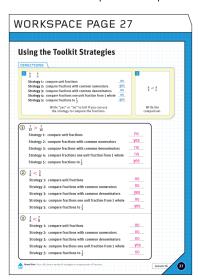
The fractions chosen for these introductory examples are fractions that students can verify using their fraction pieces. In later lessons, students will also apply the *compare fractions to*  $\frac{1}{2}$  strategy to fractions that are not in the fraction pieces.

# INDIVIDUALS

### Students use the STEP **Comparing Fractions** Toolkit strategies.

• Students complete WorkSpace page 27.

> Explain the directions to the WorkSpace page, and have students complete it independently.



STOP

Lesson 16 79

Fractions B: Equivalence and Comparison Reduced Teacher Guide, pages 78-79

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esson 16 (continued

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Last Lesson Students compare fractions to  $\frac{1}{2}$  in real-world situations.

Lesson 20 Students demonstrate understanding of the objectives of Lessons 16–19.

Next Lesson Students learn the sixth strategy for the Comparing Fractions Toolkit—change fractions to equivalent fractions.

### Lesson Summary

Students demonstrate understanding of the objectives of Lessons 16–19 by completing *WorkSpace* pages independently.

### **Objectives**

- Compare fractions using benchmarks, common numerators, common denominators, and fractions one unit fraction from 1 whole.
- Identify equivalent fractions.
- Communicate ideas with key math vocabulary: numerator, denominator, and common denominator.

### **Materials**

- connecting cubes (\$
- fraction strips
- Comparing Fractions Toolkit chart
- red and blue fraction cubes S

### **Language Development**

### **Key Math Vocabulary**

ENGLISH	SPANISH
common denominator	común denominador
denominator	denominador
numerator	numerador

### **Academic Vocabulary**

ENGLISH	SPANISH
about	aproximadamente
exactly	exactamente
compare	comparar
greater than	mayor que
less than	menor que
strategy	estrategia

Cognates are shown in italics; pointing out the similarity of these words to their English equivalents will help your Spanish-speaking students acquire vocabulary.



Compare Fractions to One-Half

### WHOLE GROUP

## STEP

LESSON (20) Assessing student understanding

**Students practice toolkit strategies.** 

### 1 Introduce the lesson.

Today you will practice comparing fractions with the strategies you have learned. Then you will complete an assignment that will help me know what you've learned about fractions so far and how I can help you learn more.

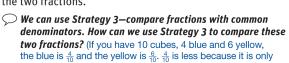
### 2 Students compare two fractions.

Write  $\frac{4}{10}$  and  $\frac{6}{10}$  on the board.

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

Have students refer to the *Comparing Fractions Toolkit* on *WorkSpace* page 1, or to the classroom chart.

Read each strategy on the chart and have students think about whether that particular strategy would help compare the two fractions.



Then have students think, pair, share about how to use Strategy 5 to compare the fractions. ( $\frac{4}{10}$  is less than  $\frac{1}{2}$  and  $\frac{6}{10}$  is greater than  $\frac{1}{2}$  so  $\frac{4}{10}$  is less than  $\frac{6}{10}$ )

Write < between the fractions and read it aloud with students.  $(\frac{4}{10}$  is less than  $\frac{6}{10}$ )



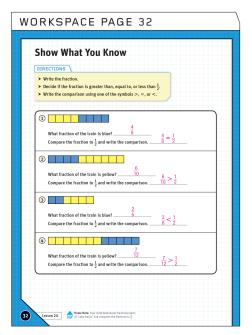
### 🔒 INDIVIDUALS

# STEP 2

**Students complete an assessment.** 

## **1** Students complete *WorkSpace* pages 32 and 33.

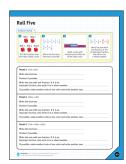
Explain the directions to the *WorkSpace* pages, and tell students that they may use connecting cubes and fraction pieces as they work on the assessment. Have students complete the pages independently.



Shara Mihat Vari Karan	
Show What You Know	
DIRECTIONS	
> Write the fraction.	
> Write "yes" or "no" next to each question.	
> Write the comparison.	
When pitching, Tonya struck out 8 of 16 batters.	)
What fraction of the batters struck out?	
Is the fraction exactly half? $\left(=\frac{1}{2}\right)$ <u>yes</u>	
Is the fraction about half? $\left(\approx \frac{1}{2}\right)$ NO	
Is the fraction less than half? $\left(<\frac{1}{2}\right)$ NO	
Is the fraction greater than half? $\left( > \frac{1}{2} \right)$ 10	
Compare the fraction to $\frac{1}{2}$ . $\frac{\sqrt{16}}{16} = \frac{1}{2}$	
2 Taylor planted 9 seeds. 5 have sprouted. The rest have not.	
What fraction of the seeds have sprouted?	
Is the fraction exactly half? $\left(=\frac{1}{2}\right)$ no	
Is the fraction about half? $\left(=\frac{1}{2}\right)$ <u>yes</u>	
Is the fraction less than half? $\left(<\frac{1}{2}\right)$ NO	
Is the fraction greater than half? $\left(>\frac{1}{2}\right)$ yes	
Compare the fraction to $\frac{5}{9}$ > $\frac{1}{2}$ and $\frac{5}{9} \approx \frac{1}{2}$	
(3) Rose walks dogs to earn money. She has 8 dogs to walk. She has walked	I 3 dogs.
What fraction of the dogs has she walked?	
Is the fraction exactly half? $\left(=\frac{1}{2}\right)$ NO	
Is the fraction about half? $\left(\approx \frac{1}{2}\right)$ <u>yes</u>	
Is the fraction less than half? $\left(<\frac{1}{2}\right)$ <u>yes</u>	
Is the fraction greater than half? $\left( > \frac{1}{2} \right) = \frac{10}{3}$	
Compare the fraction to $\frac{1}{2}$ . $\frac{3}{8} < \frac{1}{2}$ and $\frac{3}{8} \approx \frac{1}{2}$	

### 2 Students play *Uncover* or *Roll Five*.

As students finish the assessment, they can play either of the games. If they choose to play *Roll Five*, have them record their equations on one of the recording pages that start on *WorkSpace* page 49.



AFTER THE LESSON

Lesson 20 93

**Fractions B:** Equivalence and Comparison Reduced Teacher Guide, pages 92–93

Fractions B
Teacher Guide

To review

the full-size

Annotated Teacher

**Version of this** 

WorkSpace see

page 59.





# LESSON 20 Assessing student understanding

ASSESSMENT

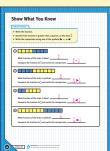
**✓** Progress Monitoring

### **Objectives**

- Compare fractions using benchmarks, common numerators, common denominators, and fractions one unit fraction from 1 whole.
- Identify equivalent fractions.
- Communicate ideas with key math vocabulary: numerator, denominator, and common denominator.

### **Assess**

Use the annotated pages to correct *WorkSpace* pages 32 and 33.



Show What You Know

Note the progress of each student in the appropriate rows on the tracking chart on page 147.

### **Differentiating Instruction**

Although the lessons are carefully scaffolded and paced at a rate more likely to give students a chance for optimal learning, there will be instances when some students are still struggling and need extra support. Likewise, there will be instances when some students would benefit from additional challenges or practice. Try the teaching ideas below.

### For Students Who Need More Support

• Work one-on-one with the student, using blue and yellow connecting cubes. Have the student make several trains that are  $\frac{1}{2}$  blue and  $\frac{1}{2}$  yellow. Choose one of the trains, and ask the student to make several trains of the same length that are not  $\frac{1}{2}$  blue and  $\frac{1}{2}$  yellow. Work with the student to record several comparisons that compare the fractions represented by those trains to  $\frac{1}{2}$ .

### For Students Ready for a Challenge

• Provide a student who needs a challenge a spinner with the numbers 16, 2, 3, 4, 8, and 6 (find one in the reproducible section of the *TeacherSpace*™ *CD-ROM*). Have the student draw several fraction bars on a sheet of paper.

Then have the student spin the spinner two times for each fraction bar. The first spin is the denominator and the second is the numerator.

The student scores one point for any fraction that is less than  $\frac{1}{2}$ , two points for any fraction that is equal to  $\frac{1}{2}$ , and zero points for any fraction that is greater than  $\frac{1}{2}$ .

> 8 3 16

This score so far is 1 + 2 + 0 = 3 points.

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**Show What You Know** DIRECTIONS > Write the fraction.  $\rightarrow$  Decide if the fraction is greater than, equal to, or less than  $\frac{1}{2}$ . ➤ Write the comparison using one of the symbols >, =, or <. 1 What fraction of the train is blue? Compare the fraction to  $\frac{1}{2}$  and write the comparison. What fraction of the train is yellow? Compare the fraction to  $\frac{1}{2}$  and write the comparison. What fraction of the train is blue? Compare the fraction to  $\frac{1}{2}$  and write the comparison. What fraction of the train is yellow? Compare the fraction to  $\frac{1}{2}$  and write the comparison. Home Note: Your child determines fractional parts (32) Lesson 20 of "cube trains" and compares the fractions to  $\frac{1}{2}$ 

> Fractions B: Equivalence and Comparison Reduced Annotated WorkSpace, page 32

Fractions B: Equivalence and Comparison Reduced Teacher Guide, page 94