

# Divide and Conquer!

## Activity 5

Rasheed and Jade have a summer job at a kiosk called Ribbon Remnants. This is a place where you can get small amounts of ribbon very inexpensively from end-of-bolt pieces of ribbon. In each situation that follows, use the chart to organize your reasoning and find your solution.

1. Rasheed takes a customer order to cut ribbons for conference badges. It takes  $\frac{1}{6}$  of a yard to make a ribbon for a badge. How many badge ribbons can he make from the given remnants of ribbon? For each answer that has a remainder  $\frac{1}{m}$  some ribbon left over  $\frac{1}{m}$  tell what fractional part of another badge ribbon you could make with the amount left over.

Situation	Think About It (in your own words)	Picture It	Write In Symbols	Process It (What do you actually do?)	Solve It
a. $\frac{1}{2}$ yard?					
b. $\frac{3}{4}$ yard?					
c. $\frac{5}{8}$ yard?					
d. $2\frac{2}{3}$ yard?					



**Divide and Conquer!**  
**Activity 5** (continued)

1. Jade is working on an order for bows for the conference workers to wear so that they can be easily recognized. It takes  $\frac{2}{3}$  of a yard of ribbon to make one bow. How many bows can Jade make from each of the following remnants?

Situation	Think About It (in your own words)	Picture It	Write In Symbols	Process It (What do you actually do?)	Solve It
a. $\frac{4}{5}$ yards?					
b. $\frac{8}{9}$ yards?					
c. $1\frac{3}{4}$ yards?					
d. $2\frac{1}{3}$ yards?					



## Divide and Conquer!

### Activity 5 (continued)

3. Based on your work in problems 1 and 2, what general procedure makes sense for dividing with fractions? Remember that a set of steps to do a computation is called an algorithm. So this should be your algorithm for dividing fractions.

4. Test your algorithm on the following division calculations.

a.  $2/5 \div 2$

b.  $6 \div 2/3$

c.  $3/4 \div 2/3$

d.  $1 \frac{3}{4} \div 1/2$

e.  $7 \div 3$

f.  $2/3 \div 1 \frac{1}{4}$

5. Write a story problem that can be solved by the division  $1 \frac{3}{4} \div 1/2$ . Explain why the calculation matches the story.



## Teacher notes for Activity 5

This activity is intended to build on the experiences students have had with the earlier problems and extend their thinking to include problems where a fraction is divided by a fraction. While this is conceptually and procedurally more difficult, the basis for understanding has been built through Activities 3 and 4. Activity 5, problem 1 deals with a unit fraction divided by unit and non-unit fractions and a mixed number. Problem 2 deals with a non-unit fraction divided by a non-unit fraction and a mixed number. Remind students to use the chart to organize their thinking.

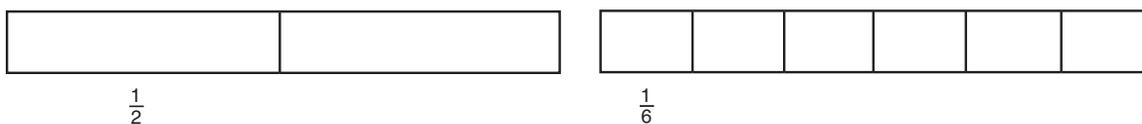
How are the situations in problems 1 and 2 different from the ones in Activity 3 and 4?

The student might answer: “In Activities 3 and 4 we worked with a whole number and a fraction, but in Activity 5 both of the numbers in the problem are fractions.”

What are the numbers in the problems and what do they represent? What do you need to find? What do the answers tell you? Are the problems grouping or sharing problems?

The student might answer: “These are grouping problems because we know the whole amount (length of ribbon) and the size of the share (amount of ribbon it takes to make a badge ribbon or bow), but we don’t know how many groups (badge ribbons, bows) can be made.”

What does the answer tell you? Show me a diagram for problem 1a and explain how it answers the question.



The student might answer: “I drew a fraction strip to show  $\frac{1}{2}$ . Then I drew another strip to show  $\frac{1}{6}$ . This lets me see how many  $\frac{1}{6}$ s are in  $\frac{1}{2}$ . The picture shows that  $\frac{1}{2}$  divided by  $\frac{1}{6}$  equals 3. So I can make 3 badge ribbons from  $\frac{1}{2}$  yard of ribbon.”



Does anyone have another way to think about this one?

The student might answer: “I got a common denominator. So I wrote  $1/2$  as  $3/6$ . Then I had to find how many  $1/6$ s are in  $3/6$ . This is the division problem  $3/6$  divided by  $1/6$ , which is 3.”

What is different about problem 1b?

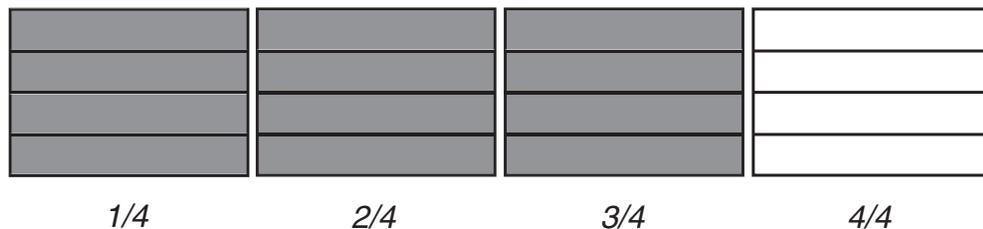
The student might answer: “You have a non-unit fraction amount of ribbon.”

Will the same strategies work for problem 1b as for problem 1a?

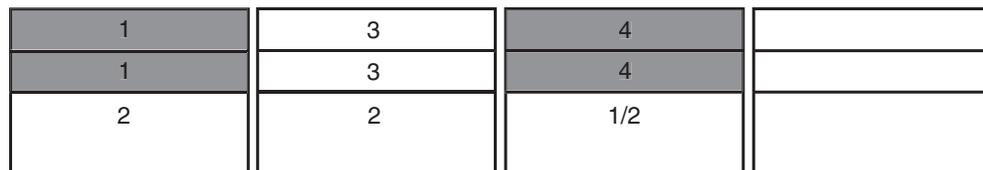
The student might answer: “Yes, you can still ask the question, ‘How many  $1/6$  are in  $3/4$ ?’ You can still draw a diagram. And you can still do common denominators. “

Students might give the following examples:

The student might answer: “I used common denominators to write the  $3/4$  as  $9/12$  and the  $1/6$  as  $2/12$ . So I just had to divide 9 by 2 and get  $4 \frac{1}{2}$  badges. I drew a picture.”



Another student might answer: “I drew the three-fourths of the whole and then divided the strip in thirds to make twelfths. But it takes two twelfths to make a sixth. So I have  $4 \frac{1}{2}$  badges. You can see them in the diagram below.”



What is the answer to 1c?

The student might answer: “I got  $30/8 = 3 \frac{6}{8} = 3 \frac{3}{4}$  badges.”

If students have difficulty dealing with the remainder, go through the common denominator approach and draw a picture to help them understand.

What is the answer to problem 1d and how did you find it?

The student might answer: “We need to find the number of  $1/6$ s in  $8/3$ . It is easy if we find a common denominator.  $8/3$  is equivalent to  $16/6$ , so we can make 16 badges.”

