

Rational Number Project

Fraction Operations and Initial Decimal Ideas Lesson 27: Overview	Materials <ul style="list-style-type: none">• Student Pages A-E for students• Transparencies of student pages for teacher
Students solve measurement division story problems by using pictures and recording solutions using division sentences with common denominators.	

Teaching Actions

Warm Up

Draw a picture to solve this problem.

You have $3\frac{1}{2}$ pounds of peanuts. If you put them into $\frac{3}{4}$ pound bags, how many full bags can you make?

Large Group Introduction

1. Using a transparency of Student Page A, present this story problem. Students follow along on their copy of Student Page A.

You have a piece of lumber that is 3 yards long. You want to cut lengths $\frac{3}{4}$ yard long to use in a shelf you are building. How many shelves can you cut?

2. Estimate first: Do you think you can cut at least one shelf? 6 shelves?
3. Ask students to draw a picture using a rectangle as the unit.
 - First show 3 yards using 3 rectangles.
 - Partition the rectangles to show more easily how many $\frac{3}{4}$'s in the 3 yards.

Comments

The type of thinking you are encouraging would be like this: Greater than 3 because each shelf is less than 1 yard; less than 6 because each shelf is greater than $\frac{1}{2}$ yard.

Teaching Actions

- Find out how many groups of the 3-fourths are in 3?
 - There are 4 groups of $\frac{3}{4}$ in the 3 rectangles.
4. Record with symbols.
- $3 \div \frac{3}{4} = 4$ This is the number sentence that comes directly from the story.
 - $\frac{12}{4} \div \frac{3}{4} = 4$ This is a record of how students solve the problem using pictures
5. Repeat the process with the same story using these numbers: 4 yards; $\frac{2}{3}$ of a yard length for the shelves. Estimate, draw pictures to solve problem, record in symbols. (The last problem will be done at the end of the lesson).

Small Group/Partner Work

6. Assign students Student Pages B - D. The last challenge problem involves a fractional answer. Observe how students solve that problem.
7. While students work, observe what difficulties they are having.

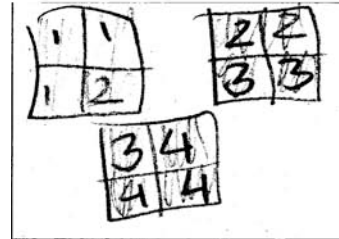
Wrap Up

8. Review each problem together. (See Teacher Notes for Lesson 27 for examples of students' solutions).
9. End this section by asking the following. Imagine 6-eighths? How many groups of 2-eighths could you make from that amount? Repeat for $\frac{12}{4} \div \frac{3}{4}$;

$$\frac{6}{18} \div \frac{1}{9}$$

Comments

Student's work for the lumber problem.



$$3 \div \frac{3}{4} = 4$$

$$3 \div \frac{3}{4} = \frac{12}{4} \div \frac{3}{4} = 4$$

At this point you are trying to make the connections between the picture strategy and common denominator procedure explicit. See if students can verbalize this connection.

Teaching Actions

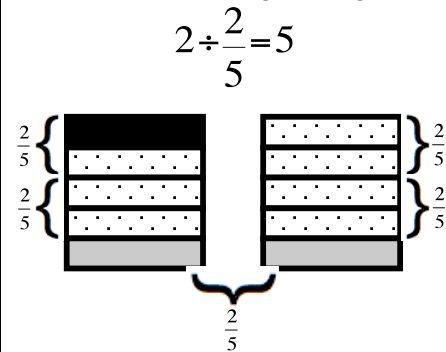
- Return to the last problem on Student Page A. Ask students to imagine the picture. What would you first draw? How would you partition each unit so you can easily see how many groups of $\frac{2}{5}$'s you could make?
- Write the problem based on this image using common denominators? $\frac{10}{5} \div \frac{2}{5}$?
- Ask: How many groups of $\frac{2}{5}$ in 10-fifths?
- Now draw the picture they imagined to verify that the answer is 2.
- Conduct a discussion on the use of common denominators as an easy way to help solve division problems. Use a transparency of Student Page E; students should have their own copy.
- For each problem ask students to rewrite the symbols using common denominators. For example, for the problem $\frac{4}{6} \div \frac{1}{3}$, rewrite as $\frac{4}{6} \div \frac{2}{6}$. Find the solution by asking a question like: How many 2-sixths in 4-sixths? Then verify the solution using a picture.
- The last problem has a fractional remainder. Extra attention will be needed to help students use their common denominator strategy on this problem. Verifying with a picture will help students see why the answer is $1\frac{1}{2}$.

Translations:

- Real life to picture to verbal
- Picture to picture to verbal

Comments


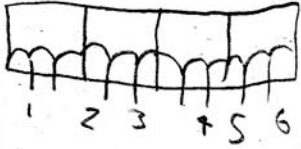
Possible picture using rectangles.



Additional Teacher Notes
Lesson 27

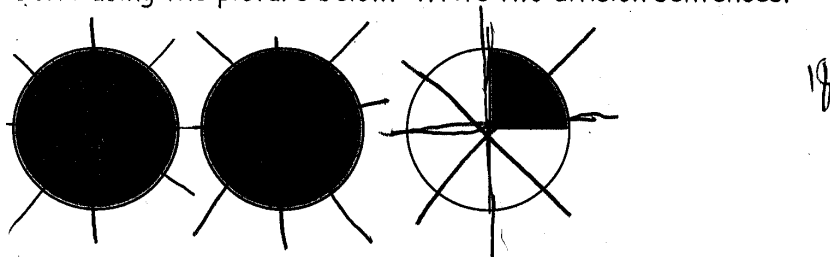
Examine students' pictures to see how they solved these division problems.

Division Story Problems Set I

<p>You have a piece of lumber that is 4 yards long. You want to cut lengths $\frac{2}{3}$ of a yard long to use in a shelf you are building. How many shelves can you cut?</p>			$4 \div \frac{2}{3} = 6$	$1\frac{2}{3} \div \frac{2}{3} = 6$
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Division Story Problems Set II

1) You have $2\frac{1}{4}$ yards of string. You cut the string into pieces $\frac{1}{8}$ yard in length. How many $\frac{1}{8}$ yard lengths can be made from $2\frac{1}{4}$ yards of string. Solve using the picture below. Write two division sentences.



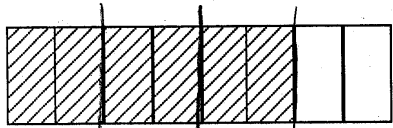
Division sentence:

$$\frac{18}{8} \div \frac{1}{8} = 18$$

Division sentence with common denominators:

$$\frac{18}{8} \div \frac{1}{8} = 18$$

2) You have about $\frac{6}{8}$ of pint of ice cream leftover in the pint container. You want to make servings of about $\frac{1}{4}$ of a pint. How many servings can you dish out? Solve this problem using the picture below.



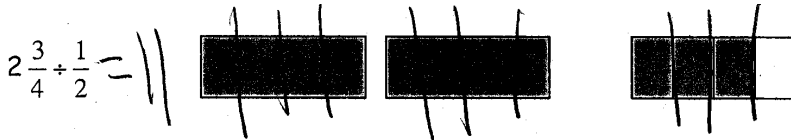
Division sentence: $\frac{6}{8} \div \frac{1}{4} = 3$

$$\frac{6}{8} \div \frac{1}{4} = 3$$

Division sentence with common denominators:

$$\frac{3}{4} \div \frac{1}{4} = 3$$

3)



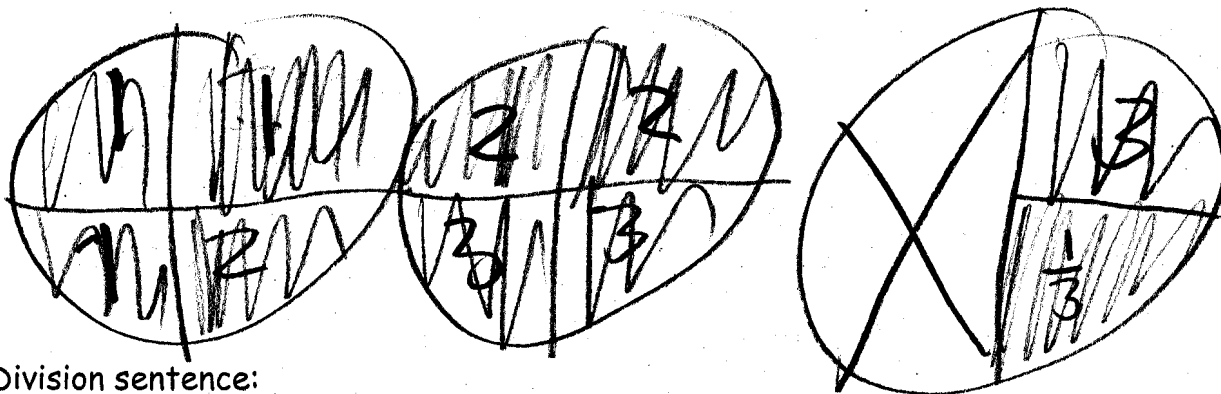
Division sentence with common denominators:

$$\frac{11}{4} \div \frac{2}{4} = 5 \frac{1}{2}$$

Challenge Problem

4) CHALLENGE: Addis is building a bookshelf. She has a piece of lumber $2\frac{1}{2}$ yards in length. Each shelf will be $\frac{3}{4}$ of a yard. Draw a picture to show how many lengths she can make. If there are any leftover amounts, name it as a fraction.

Picture:



Division sentence:

$$2\frac{1}{2} \div \frac{3}{4} = 3\frac{1}{3}$$

Division sentence with common denominators:

$$\frac{10}{4} \div \frac{3}{4} = 3\frac{1}{3}$$

Draw a picture to solve this problem.

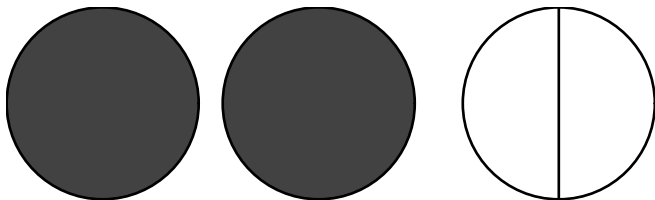
You have $3\frac{1}{2}$ pounds of peanuts. If you put them into $\frac{3}{4}$ pound bags, how many full bags can you make?

Division Story Problems Set I

Problem	Estimate	Picture	Number Sentence	Number Sentence with Common Denominators
You have a piece of lumber that is 3 yards long. You want to cut lengths $\frac{3}{4}$ of a yard long to use in a shelf you are building. How many shelves can you cut?				
You have a piece of lumber that is 4 yards long. You want to cut lengths $\frac{2}{3}$ of a yard long to use in a shelf you are building. How many shelves can you cut?				
You have a piece of lumber that is 2 yards long. You want to cut lengths $\frac{2}{5}$ of a yard long to use in a shelf you are building. How many shelves can you cut?				

Division Story Problems Set II

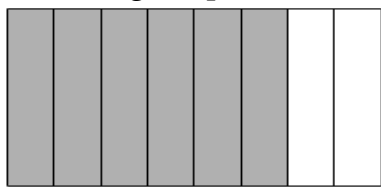
- 1) You have $2\frac{1}{4}$ yards of string. You cut the string into pieces $\frac{1}{8}$ yard in length. How many $\frac{1}{8}$ yard lengths can be made from $2\frac{1}{4}$ yards of string. Solve using the picture below. Write two division sentences.



Division sentence:

Division sentence with common denominators:

- 2) You have about $\frac{6}{8}$ of pint of ice cream leftover in the pint container. You want to make servings of about $\frac{1}{4}$ of a pint. How many servings can you dish out? Solve this problem using the picture below.



Division sentence:

Division sentence with common denominators:

- 3) Use the pictures to solve each problem. Write a division sentence with common

denominators.

$$\frac{3}{4} \div \frac{1}{8}$$



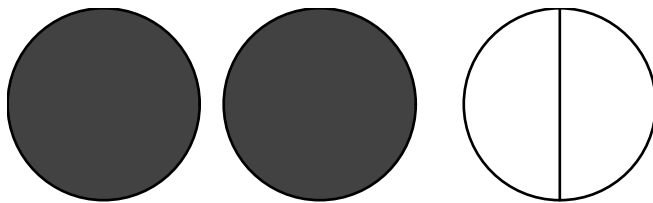
Division sentence with common denominators:

$$2\frac{3}{4} \div \frac{1}{2}$$



Division sentence with common denominators:

$$2\frac{1}{2} \div \frac{3}{4}$$



Division sentence with common denominators:

- 4) CHALLENGE: Addis is building a bookshelf. She has a piece of lumber $2\frac{1}{2}$ yards in length. Each shelf will be $\frac{3}{4}$ of a yard. Draw a picture to show how many lengths she can make. If there are any leftover amounts, name it as a fraction.

Picture:

Division sentence:

Division sentence with common denominators:

Name _____

Problem	Number Sentence with Common Denominators	Picture
$\frac{4}{6} \div \frac{1}{3}$		
$\frac{7}{4} \div \frac{2}{8}$		
$\frac{1}{2} \div \frac{1}{3}$		

Post Lesson Reflection

Lesson _____

1) Number of class periods allocated to this lesson: _____

2) Student Pages used: _____

3) Adaptations made to lesson: (For example: added extra examples, eliminated certain problems, changed fractions used)

4) Adaptations made on Student Pages:

5) To improve the lesson I suggest: