

Rational Number Project

Fraction Operations and Initial Decimal Ideas Lesson 28: Overview	Materials
Students build on their experiences with pictures, contexts, and benchmarks of $\frac{1}{2}$ and 1 to estimate quotients to fraction division problems.	<ul style="list-style-type: none"> • Student Pages A, B, and C • Overhead of student pages for teacher • Overhead of Student Page C for teacher (optional for students)

Teaching Actions

Warm Up

Imagine drawing a picture to solve this problem. From that picture in your mind, find the actual answer.

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

Large Group Introduction

1. Begin the class with these estimations problems. Students should have a copy of Student Pages A and B with these problems.
2. Ask students to imagine the picture they would draw to solve the first problem.

You have 4 cups of flour. The recipe you are making calls for $\frac{2}{3}$ cup of flour. About how many full recipes can you make?

Ask: If the recipe called for $\frac{1}{2}$ cup of flour, how many recipes can you make? But the recipe calls for $\frac{2}{3}$ cup of flour; will you have more or less than 8 recipes? Do you think you will have more than 4 recipes? Explain your ideas.

3. Repeat for problem 2 on Student Page A.

Comments

Encourage students to explain their estimates based on order, equivalence ideas, and mental images students have for each problem.

For example, to estimate $4 \div \frac{2}{3}$, a student could reason that the answer must be greater than 4 because $\frac{2}{3} < 1$.

The answer will be less than 8 because $\frac{2}{3} > \frac{1}{2}$. If it was $4 \div \frac{1}{2}$, the answer is clearly 8.

Using 1 and $\frac{1}{2}$ as benchmarks will help them in their estimation.

Teaching Actions

You have $2\frac{1}{2}$ yards of ribbon. You cut it into pieces $\frac{3}{4}$ in length? Estimate: About how many full pieces can you cut? At least 2? At least 5?

Guiding Questions: If you cut a length of 1 yard, how many pieces? If you cut a length $\frac{1}{2}$ of a yard, how many pieces? $\frac{3}{4}$ is greater than $\frac{1}{2}$. Is the total number of pieces more or less than 5?

- Repeat for problem 3 on Student Page A

Estimate by finding the whole number closest to the exact answer: $3\frac{2}{3} + \frac{1}{4}$.

Guiding Questions: How many fourths in three? Is $\frac{1}{4} >$ or $< \frac{2}{3}$? Can you get two more fourths out of the $\frac{2}{3}$?

Small Group/Partner Work

- Assign the rest of Student Pages A and 2B to students to work with a partner. Guiding questions embedded in the problems lead students to their estimates.

Wrap Up

- Use Teacher Page C to guide students to find the exact answer to three problems from the work completed in this lesson.
- Ask for their estimate first. Then ask them to imagine the picture they would draw to solve the problem. Ask: How would they partition that picture to make solving the problem easy?

Ask: What is the number sentence with common denominators for this problem? Find the exact answer. Possible estimation strategies follows:

Comments

Teaching Actions**Comments**

- a. $2 \div \frac{2}{5}$. If the problem was $2 \div \frac{1}{2}$ then the answer would be 4. $\frac{2}{5} < \frac{1}{2}$ so the answer will be more than 4 but not much more as $\frac{2}{5}$ is close to $\frac{1}{2}$. ($\frac{10}{5} \div \frac{2}{5} = 5$).
- b. $3\frac{1}{2} \div \frac{3}{4}$. If the problem was $3\frac{1}{2} \div \frac{1}{2}$ the answer would be 7. If it was $3\frac{1}{2} \div 1$, the answer would be $3\frac{1}{2}$. $\frac{3}{4}$ is greater than $\frac{1}{2}$ but less than one so the answer is between 3 and 7. ($\frac{14}{4} \div \frac{3}{4} = 4\frac{2}{3}$)
- c. $3\frac{1}{2} \div \frac{1}{8}$. It would be greater than 24 because there are 24-eighths in 3. But it is less than 32 because there are 32-eighths in 4. ($\frac{28}{8} \div \frac{1}{8} = 28$).

Translations:

- Story problem to picture to verbal
- Symbol to symbol to verbal
- Symbol to symbol to picture

Imagine drawing a picture to solve this problem. From that picture in your mind, find the actual answer.

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

Division Estimation Problems

- (1) You have 4 cups of flour. The recipe you are making calls for $\frac{2}{3}$ cup of flour.
Estimate: About how many full recipes can you make? At least 4? At least 8?
- (2) You have $2\frac{1}{2}$ yards of ribbon. You cut it into pieces $\frac{3}{4}$ in length? Estimate: About how many full pieces can you cut? At least 2? At least 5?
- (3) Estimate by finding the whole number closest to the exact answer:
$$3\frac{2}{3} \div \frac{1}{4} =$$

(4) You know that $2 \div \frac{1}{2} = 4$. About how much would $2 \div \frac{2}{5}$ be? Is it more or less than 4?

(5) You know that $3 \div \frac{1}{2} = 6$. About how much would $3 \div \frac{2}{3}$ be? Is it more or less than 6?

(6) You know that $4 \div \frac{1}{2} = 8$. About how much would $4 \div \frac{3}{4}$ be? Is it more or less than 8?

(7) You know that $2 \div \frac{1}{2} = 4$. About how much would $2 \div \frac{1}{3}$ be? Is it more or less than 8?

(8) You know that $3 \frac{1}{2} \div \frac{1}{2} = 7$. About how much would $3 \frac{1}{2} \div \frac{3}{4}$ be? Is it more or less than 7?

(9) You know that $3 \frac{3}{4} \div \frac{3}{4} = 7$. About how much would $3 \frac{3}{4} \div \frac{1}{8}$ be? Is it more or less than 7?

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: