

# Rational Number Project

<b>Fraction Operations and Initial Decimal Ideas</b> <b>Lesson 5: Overview</b>	<b>Materials</b> <ul style="list-style-type: none"><li>• Fraction Circles for students and teacher</li><li>• Student Pages A and B</li></ul>
Students transition from using fraction circles and symbols to adding fractions using only symbols. Connections between concrete model and symbols are emphasized.	

## Teaching Actions

### Warm Up

$$\frac{2}{3} + \frac{1}{5}$$

Is the sum  $> 1$  or  $< 1$ ?  
Find the exact sum.

### Large Group Introduction

1. Explain: You have been solving fraction addition problems using fraction circles. You have explained how to add fractions with the circles. You have recorded your steps with symbols.
2. Suggest that students imagine that they are using the fraction circles to add  $\frac{2}{6} + \frac{1}{4}$ . Ask: What color pieces are you putting on the black circle?
3. Ask: Do you think the answer will be greater than  $\frac{1}{2}$  or less than  $\frac{1}{2}$ ?
4. Ask: What would you do to find the exact answer using fraction circles? As students explain their steps record them on the board. They should be something like the list that follows:
  - Show  $\frac{2}{6}$  on the black circle
  - Show  $\frac{1}{4}$  on the black circle.
  - Look for a way to show both fractions using the

## Comments

Students are not using the circles but they are just imagining that they are.

You want students to be able to verbalize this process with the manipulatives.

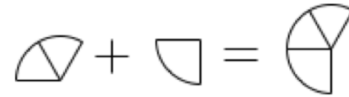
## Teaching Actions

- same color pieces
- Make the exchanges and then add the fractions to find how many pieces of that color I have.
5. Explain that they stated that they would need to show each fraction using the same color. Ask: What color do you think we can use to show both fractions? What denominator would that be? (12ths)
  6. State: Using your multiplication rule for equivalence instead of using the fraction circles, rewrite  $\frac{2}{6}$  as 12ths and  $\frac{1}{4}$  in 12ths. Explain to a partner at your table how to do this.
  7. Ask: When you rewrite each fraction as 12ths, what would the action be using the circles? (Exchanging to reds).
  8. Now actually solve the problems with fraction circles and record each step with symbols.
  9. Repeat for  $\frac{1}{12} + \frac{3}{4}$  and  $\frac{1}{2} + \frac{2}{5}$

## Small Group/Partner Work

10. Students work in groups to complete Student Pages A and B. They are working through different translations: symbol to fraction circles to symbols; symbols to symbols to fraction circles.

## Comments



You are asking students to connect symbols back to the concrete model.

Students might comment that the problems on Student Page B where they listed equivalent fractions helped them solve the addition problems on that page.

Check in with students who struggle. Encourage them to use fraction circles to act out each problem and explain to you what they are doing. Once they have the language help them make the connections to symbols. If when working with symbols only, students add numerator and denominators, encourage them to imagine the fraction circles. Question if their picture matches the answer.

## Teaching Actions

### Wrap Up

11. Ask students to explain their strategy for finding a common denominator. Possible strategies are: just multiply the two denominators; use guess and check method; list equivalent fractions for both fractions added.
12. Ask students to present to the class their solutions to the two problems where they had to create their own addition problems.
13. End the lesson by asking students to solve these two problems using "mental math". Have students explain how they can do this without circles or paper and pencil.

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

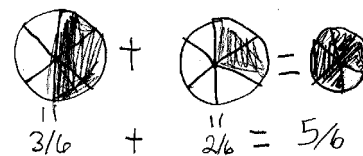
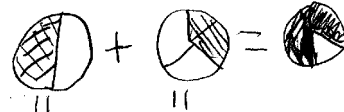
$$\frac{3}{8} + \frac{1}{4}$$

## Comments

We are not committed to any one way to find the common denominator. Students seemed to construct their own ways. Many found the common denominators and used the traditional method to find equivalent fractions. The listing idea is presented for those students who do not think of their own way to find equivalent fractions with common denominators.

Below find examples of ways students record their number sentences:

$$\frac{1}{3} + \frac{1}{2} =$$



Solve this problem using equivalent fractions with 16ths as the denominator.

$$\frac{4}{16} + \frac{10}{16} = \frac{14}{16}$$

$$\frac{5}{8} + \frac{1}{4} =$$

$$4 \times 4 = 16 = \frac{4}{16}$$

$$8 \times 2 = 16 = \frac{10}{16}$$

$$\frac{9}{15} + \frac{5}{15} = \frac{14}{15}$$

## Teaching Actions

## Comments

$$\begin{aligned} \frac{2}{3} + \frac{4}{9} &= \\ \frac{2}{3} &= \frac{4}{6} & \frac{4}{9} &= \frac{4}{9} & \frac{6+4}{9} &= \frac{10}{9} \text{ or } 1\frac{1}{9} \\ \frac{2}{3} &= \frac{12}{18} & \frac{4}{9} &= \frac{8}{18} & \frac{12+8}{18} &= \frac{20}{18} \text{ or } 1\frac{2}{9} \end{aligned}$$

### Translations:

- Symbols to verbal
- Symbols to symbols to verbal

$$\frac{2}{3} + \frac{1}{5}$$

Is the sum  $>1$  or  $<1$ ?  
Find the exact sum.

## Adding Fractions with Fraction Circles

Do you think the answer will be greater than one or less than one?

$$\frac{1}{3} + \frac{1}{2} =$$

Use fraction circles to solve and then describe what you did with the circles to find the answer.

Now record the steps you used with the fraction circles to solve this problem with symbols.

$$\frac{1}{3} + \frac{1}{2} =$$

Solve this problem using equivalent fractions with 8<sup>ths</sup> as the common denominator.

$$\frac{5}{8} + \frac{1}{4} =$$

Verify using the fraction circles.

Solve in two ways. Use 9<sup>ths</sup> as a common denominator and use 18<sup>ths</sup> as the common denominator. Why are the answers equivalent?

$$\frac{2}{3} + \frac{4}{9} =$$

<p>List at least 4 fractions equivalent to</p> $\frac{3}{5}$ <p>List at least 4 fractions equivalent to</p> $\frac{1}{3}$	<p>Solve this problem. Show your work.</p> $\frac{3}{5} + \frac{1}{3} =$
<p>List at least 5 fractions equivalent to</p> $\frac{1}{6}$ <p>List at least 5 fractions equivalent to</p> $\frac{1}{10}$	<p>Solve this problem. Show your work.</p> $\frac{1}{6} + \frac{1}{10} =$
<p>Create your own addition problem using two fractions with different denominators whose sum is greater than <math>\frac{1}{2}</math> but less than one.</p>	<p>Create your own addition problem using two fractions with different denominators whose sum is greater than 1 but less than <math>1\frac{1}{2}</math>.</p>

## 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: