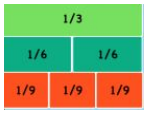
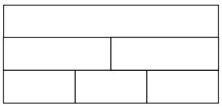
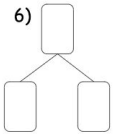
Facilitator Guide: Bar Model Equivalence

Lesson Overview:

Big Idea: Fraction bars give students a chance to build equivalent fractions and create visual models that build up to symbolic equations like 1/2 = 3/6. Students begin by exploring a fraction bar manipulative to find equivalent relationships among bar models, they may find that two 1/4 bars are equivalent to four 1/8 bars. After students explore the tool and find many equivalent fractions, they transfer those relationships to a graphic organizer (Fractangles). Students then take the visual model of equivalent fractions and create number bonds that represent equivalence in a more symbolic and abstract way. The last step is to write equations that show equivalent fractions.







1/3 = 2/6

Lesson Flow: Project slide that shows how bar models can be used to represent equivalent fractions, then have students use the *Fraction Bar Tool* to explore other ways to show equivalent fractions using the bar model. Distribute the **Fractangles Problem Sheet** and have students work in pairs, sharing a computer, to solve the problems. Project the fractangles slide that asks students for two ways to find equivalent fractions for 5-tenths. Next, project the number bonds slide. Introduce number bonds and equations as other ways to represent equivalent fractions. Pass out the **Number Bonds Problem Sheet** and have students complete it in small groups. Project the conclusion slide and discuss patterns in fractions equivalent to 1/2.

Warm Up: Bar Model Relationships

Project prompt, Students use *Fraction Bar Tool* to create as many rectangles as possible (5 min)

- Ask students to describe the relationship they see in the example
- Students use *Fraction Bar Tool* to represent equivalent relationships by making rectangles made up of rows of unit fractions
- *Monitor*: Ask students to find rectangle combinations that make a rectangle with two or more rows of fraction bars.
  - Can you find a bar that equals two of these bars (e.g. 1/4)?
  - Can you make a bar of this length (e.g. 1/2) using only these bars (e.g., 1/8)?
  - Can you make a rectangle with 3 rows of bars, each row using only on kind of bar?

Activity One: Fractangles

Part 1: Students use *Fraction Bar Tool* to complete the **Fractangles Problem Sheet** in small groups (5 min)

- Have students share a computer and work in small groups to create the relationships in the Fractangles Problem Sheet

(Part 2 on next page ---->)

Part 2: Discuss Fractangle Slide (5 min)

- Students need to find two ways to make 5/10 using 3 bars (sixths) and 2 bars (fourths)
- Have students work in pairs, sharing a computer, to solve this problem using their *Fraction Bar Tool*
    - Students may find that 5/10 is equal to 1/2 and then work back from there to find 2/4 and 3/6
- Ask students to explain their strategies:
    - How did you begin trying to solve this problem?
    - What do you already know? How many tenths are there?
    - Can you think of one bar that is equivalent to 5/10?

Activity Two: Equivalent Fraction Equations

Part 1: Discuss number bonds intro slide (5 min)

- Explain that this slide shows three different representations of the equivalence between halves and fourths. On the left is a bar model, the one in the middle is a number bond and the one on the right is an equation.
    - Describe the relationship we see in the bar model between one-half and two-fourths
    - What do you think goes in the two black spaces in the number bond?
    - What is missing in the equation? How can we make this equation true?

Part 2: Students use *Fraction Bar Tool* to complete the **Number Bonds Problem Sheet** in small groups (12 min)

- Ask students to share a computer and work together to use the *Fraction Bar Tool*

Conclusion: Multiplicative Relationships

Part 1: Fill in the blanks on the conclusion slide and discuss the relationships between them (5 min)

- There are many fractions that can be used to complete this statement. Ask students to share as many as they can find.
- After recording sample solutions on the board (1/2 = 2/4 = 3/6 = 4/8….), ask students to look for patterns.
    - Have students to think on their own, then share with a partner before discussing as a whole class
- *Big Idea:* All fractions equal to 1/2 have a denominator that is twice as large as the numerator and, conversely, a numerator that is half the quantity as the denominator. This holds true for any fraction. Multiply the numerator by 2 and the product is the denominator: 31/62 and 3241/6482!!!
    - If you write the fractions in order (1/2 , 2/4, 3/6…) students may notice that the numerators ‘grow by one’ and the denominators ‘grow by two’. While this is true, it is not the multiplicative relationship and pattern.
    - Re-arrange the fractions or write others in place. The equations will still be true but the counting pattern will no longer be true.