

Multiplying Fractions – Using Models

STRAND: Computation and Estimation

STRAND CONCEPT: Rational Numbers Estimation and Operations

SOL 6.5a

Remediation Plan Summary

Students use squares, rectangles and triangles to build a conceptual understanding of what it means to multiply a whole number or a fraction by a fraction.

Common Misconceptions

- Some students will apply the wrong procedure and cross multiply instead of multiplying the numerators together and the denominators together.
- Some students apply their understanding of whole numbers to multiplying fractions and believe the answer should be larger than the two factors.
- When using manipulatives, some students struggle to name the pieces by their fractional part and say, “I have 2 pieces” instead of each piece represents $\frac{1}{2}$.

Materials

- Brownie Modeling Introductory Activity, cut out squares, rectangles, and triangles, Fraction Multiplication recording sheet.

Introductory Activity

- Hand each student a Brownie Modeling introductory activity to complete individually. Once students complete the activity, have them share their answers with a partner. Encourage student pairs to share their ideas with the group.

Plan for Instruction

- In advance, cut out the squares, rectangles, and triangles.
- Give each student or student pairs a set of the cut out squares, rectangles and triangles.
- Ask students, “*If the large square represents one whole, what does each of the other shapes represent?*” Encourage students to talk to a partner about how all the shapes relate to each other.
- Have students use two rectangles to create a whole. Ask, “*How much of the whole is one of the rectangles?*” Point out that “one-half of one whole” means “one out of the two equal-sized pieces that make one whole,” and have them write $\frac{1}{2} \cdot 1 = \frac{1}{2}$.
- Have students use 4 small squares to create one whole. Ask, “*How much of the whole is one of the small square?*” Point out that “one-fourth of one whole” means “one out of the four equal-sized pieces that make one whole,” and have them write $\frac{1}{4} \cdot 1 = \frac{1}{4}$.
- Ask students, “*What fraction does the small square represent of the rectangle?*” Encourage students to use the rectangles and the squares and investigate with their partner. Ask, “*How would we write an equation that would help us find the total value of the square when it is compared to the rectangle?*”
Students should see that the square is $\frac{1}{2}$ of the rectangle and the rectangle is $\frac{1}{2}$ of the large square so

AR Remediation Plan – Rational Number Equivalencies

$\frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$. If they are confused by this, ask them to count the number of small squares that would cover a rectangle ($\frac{1}{2}$) then how many would cover a large square (one whole).

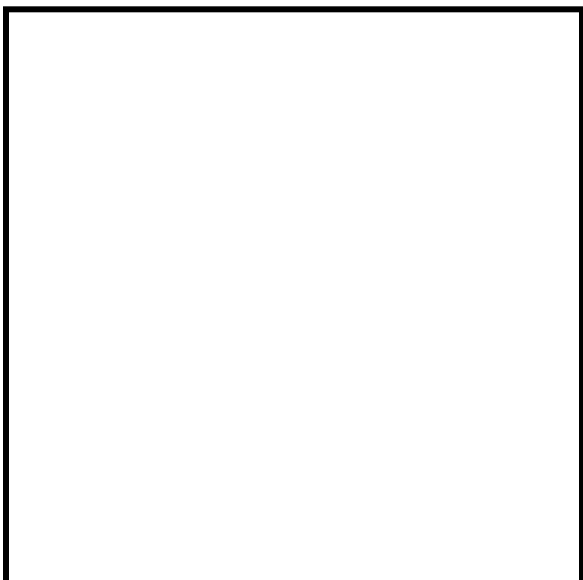
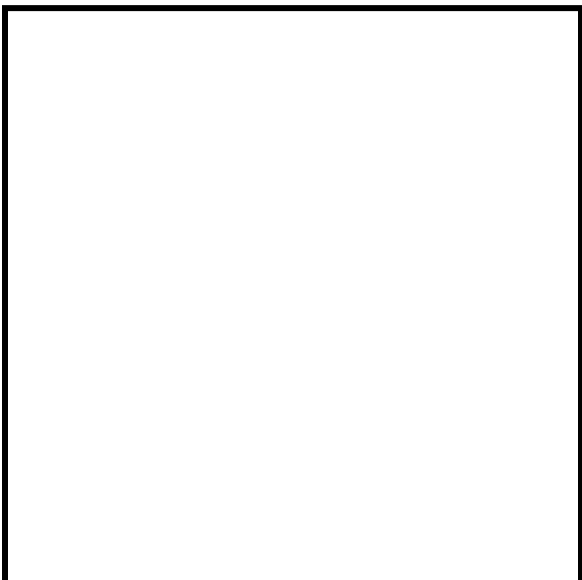
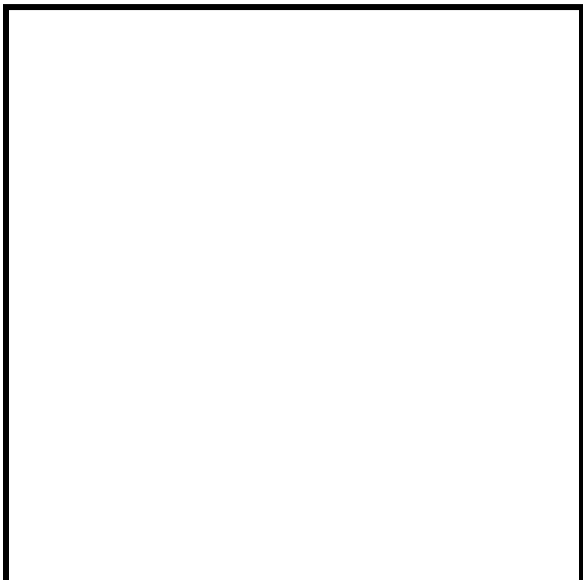
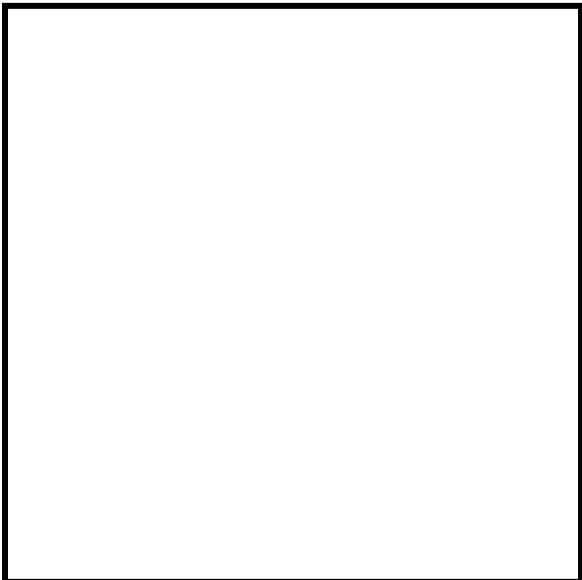
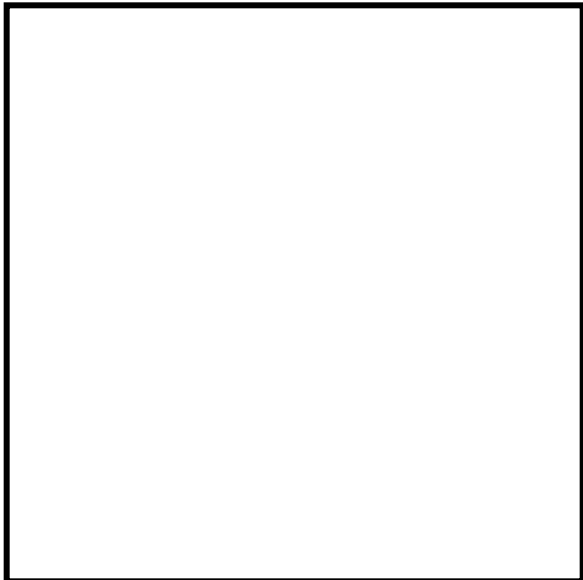
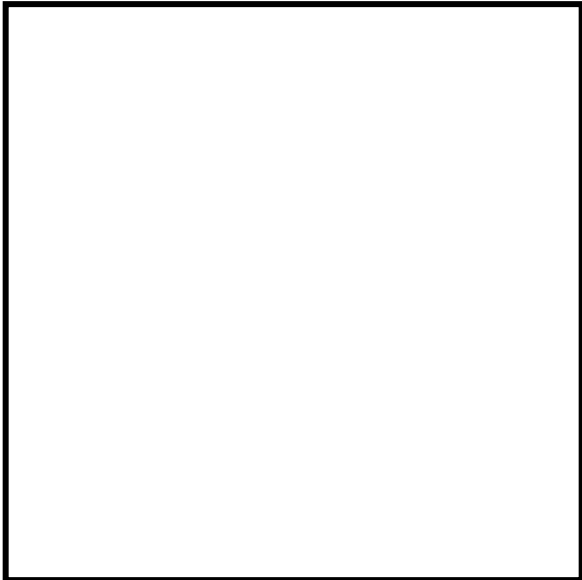
- Have students investigate with all the different pieces and how they relate to each other. Have students write their equations on the recording sheet
- Allow students to model their solutions for the class, including the equations.
- Ask, “How can you use what you learned in this lesson to determine the product of $\frac{1}{4} \cdot \frac{1}{4}$? $\frac{1}{8} \cdot \frac{1}{2}$? Encourage students to talk to their partner and come up with a unified explanation.

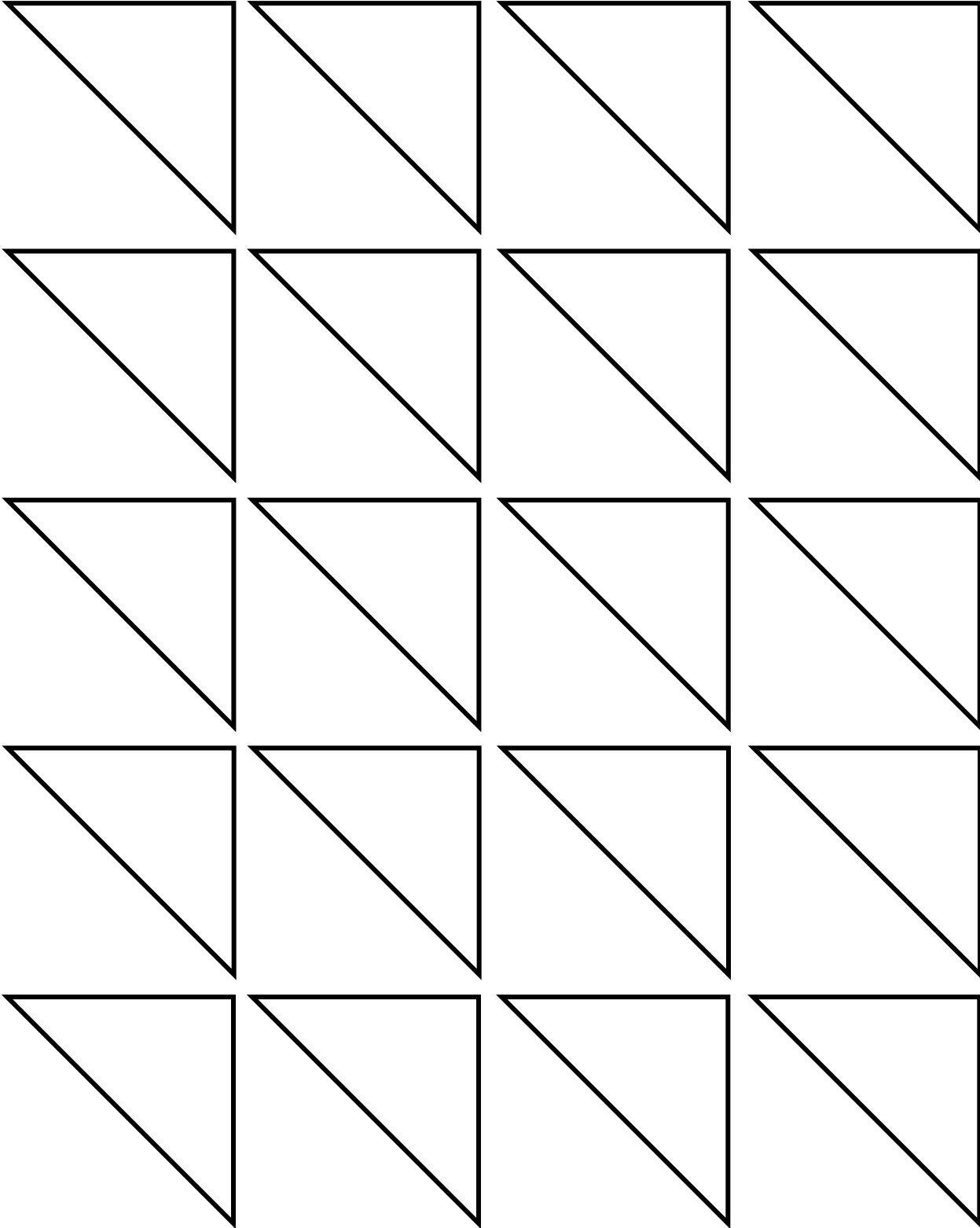
Pulling It All Together (Reflection)

1. When multiplying two fractions, such as $\frac{1}{2} \cdot \frac{1}{4}$, why is the product less than each of the fractions?
2. What model could you use to illustrate the expression $\frac{3}{4} \cdot \frac{1}{2}$? Draw and explain your model.

Note: The following pages are intended for classroom use for students as a visual aid to learning.

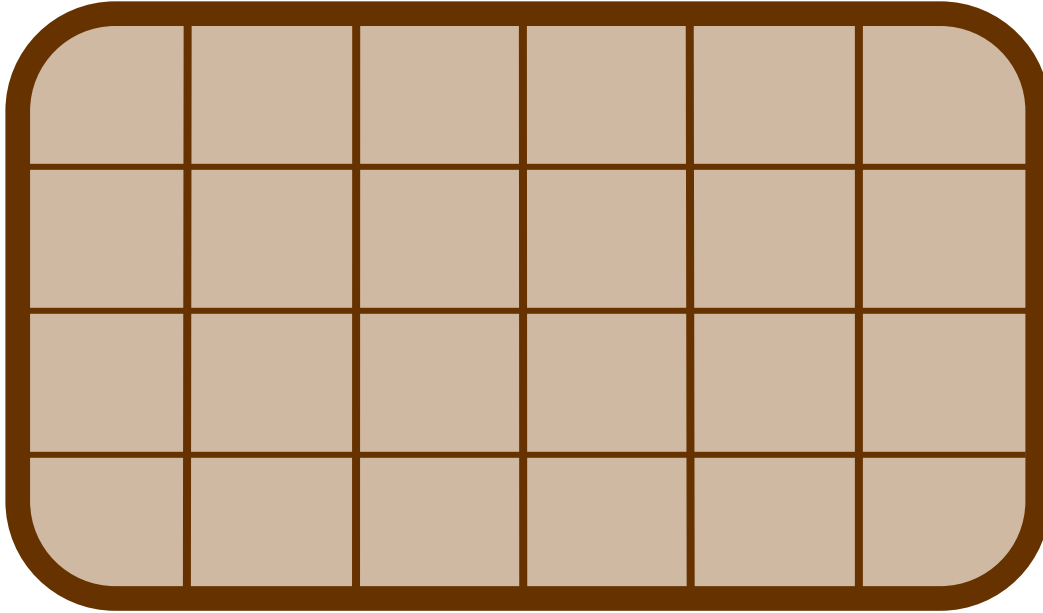
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Brownie Model Introductory Activity

Hannah made a pan of brownies and cut them in to 24 equal pieces. Use the picture of her brownies to help you answer the following questions.



1. If you ate half of the brownies, how many pieces did you eat? How did you determine the amount?
2. If you ate $\frac{1}{4}$ of the brownies, how many pieces did you eat? How did you determine the amount?
3. If you ate $\frac{1}{2}$ of the pan of brownies, how much of the whole pan did you eat? How is this question different than the first two questions?

Recording Sheet for Models and Products

Draw a model to illustrate the expression and write the product in the blank.

1. $1 \cdot \frac{1}{2} = \underline{\hspace{2cm}}$	2. $1 \cdot \frac{1}{4} = \underline{\hspace{2cm}}$
3. $1 \cdot \frac{1}{8} = \underline{\hspace{2cm}}$	4. $\frac{1}{2} \cdot \frac{1}{2} = \underline{\hspace{2cm}}$
5. $\frac{1}{2} \cdot \frac{1}{4} = \underline{\hspace{2cm}}$	6. $\frac{1}{4} \cdot \frac{1}{4} = \underline{\hspace{2cm}}$

Reflection:

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2. What model could you use to illustrate the expression $\frac{3}{4} \cdot \frac{1}{2}$? Draw and explain your model.