MISSISSIPPI DEPARTMENT OF EDUCATION
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MISSISSIPPI
EXEMPLAR
Units & Lessons
MATHEMATICS

Grade 5

W.K. KELLOGG FOUNDATION

Lesson 2: Adding Unlike Fractions

Focus Standard(s): 5.NF.1, 5.NF.2

Standards for Mathematical Practice: SMP.5, SMP.6, SMP.7

Estimated Time: 60 minutes

Resources and Materials:

- Cuisenaire rods
- Fraction bars
- Number lines
- Pattern blocks
- Handout 2.1: Fraction Bars
- Handout 2.2: Cuisenaire Rods
- Handout 2.3: Pattern Blocks
- Handout 2.4: Number Lines
- Handout 2.5: Modeling Addition of Unlike Fractions

Lesson Target(s):

- Students will model addition of fractions with unlike denominators
- Students will add unlike fractions with denominators 2, 4, and 8 with a sum less than 1.

Guiding Question(s):

- Is the size of the “whole” important when adding and subtracting fractions?
- How can we use models and math tools to add unlike fractions?
- What challenges arise when we add fractions with unlike denominators?

Vocabulary

Academic Vocabulary:

- add
- addends
- denominator
- fraction
- improper fraction
- like fraction
- mixed number
- model
- numerator
- sum

Instructional Strategies for Academic Vocabulary:

- ☐ Introduce words with student-friendly definition and pictures
- ☐ Model how to use the words in discussion
- ☐ Read and discuss the meaning of word in a mathematical context
- ☐ Students write/discuss using the words

Symbol	Type of Text and Interpretation of Symbol
	Instructional support and/or extension suggestions for students who are EL, have disabilities, or perform well below grade level and/or for students who perform well above grade level
✓	Assessment (Pre-assessment, Formative, Self, or Summative)

Instructional Plan

Understanding Lesson Purpose and Student Outcomes:
Students will explore adding fractions with unlike denominators using manipulatives and models. Students will make connections between the numerators of the addends and the numerator of the sum.

Anticipatory Set/Introduction to the Lesson:
Display the following question:

"Ben and Jason have jobs as busboys, cleaning tables in a restaurant after school. Jason cleaned $\frac{1}{4}$ of the tables, and Ben cleaned $\frac{1}{2}$ of the tables. What fraction of the tables have they cleaned? What fraction of the restaurant do they still need to clean?"

Provide students with an array of manipulatives. Fraction bars, Cuisenaire rods, square tiles, number lines, and linking cubes are recommended, but students could also use two-color counters, base-10 blocks (units), pattern blocks, and pan balances. **Handout 2.1: Fraction Bars, Handout 2.2: Cuisenaire Rods, Handout 2.3: Pattern Blocks, and Handout 2.4: Number Lines** may be printed if manipulatives are not available (SMP.5).

Prompting Questions:

- What tool did you choose to help you model the problem?
- What made you choose this one?
- Was it helpful?
- Is there another tool that might be more helpful?
- How are $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{3}{4}$ related?
- Could you have added $\frac{1}{2}$ and $\frac{1}{4}$ without using manipulatives?

For students who are EL, have disabilities, or perform well below grade level:

- Provide the fraction bars to solve the problem (SMP.5).
- Read the question aloud.

Extensions for students with high interest or working above grade level:

- Have students solve the problem using multiple models.

Note: Ensure that students attend to precision by including the units for each fraction sum. (SMP.6).

Activity 1: Adding Unlike Fractions with Models

Distribute **Handout 2.5: Modeling Addition of Unlike Fractions**. Distribute fraction tiles, number lines, pattern blocks, and Cuisenaire Rods. Tell students they will solve a word problem that includes adding fractions with unlike denominators using manipulatives (SMP.5). Explain that the problem will indicate which manipulative to use. Model the following: To solve $\frac{1}{2} + \frac{1}{3}$ using pattern blocks, the yellow hexagon is the whole, red trapezoids represent $\frac{1}{2}$, the blue rhombi represent $\frac{1}{3}$, and the green triangles represent $\frac{1}{6}$. Attempt to layer one trapezoid and one rhombus on top of a hexagon – it cannot be done. To add a red trapezoid and a blue rhombus, place green triangles over both the rhombus and the trapezoid showing that 2 tringles take up the same space as the rhombus and 3 triangles take up the same space as the trapezoid. Count how many triangles it took to cover the trapezoid and rhombus (5), giving a sum of $\frac{5}{6}$. Place the 5 triangles on top of the hexagon leaving a void of one triangle or $\frac{1}{6}$. Demonstrate the same addition using fraction tiles and Cuisenaire Rods. Tell students some manipulatives

are not appropriate for all problems. Tell students they will work individually to solve each of the four problems and they will show all their work on the paper. Once students have completed their work, have them exchange papers with their elbow buddy and check each other's work. Call on students to share their calculations, answer any questions and clarify any misconceptions.

Note: Question 4 requires students to choose the manipulative that would work best to solve the equation. Students are required to reason that with denominators of 4 and 8, pattern blocks would not be useful. Cuisenaire rods could be used, but the whole would have to be the brown rod. Students would most likely find success using the fraction bars. Students who solve #4 quickly could be encouraged to find another method using a different manipulative.

For students who are EL, have disabilities, or perform well below grade level:
- Read the question aloud.
- Guide students as they use the manipulatives.

Extensions for students with high interest or working above grade level:
- Have students solve the problem using multiple models.

Guide students to make connections within the equations about the denominator and realize the sum will often have the same denominator as the smallest addend (SMP.7).

✓ Actively monitor student understanding, providing support through questioning.

Prompting Questions:
- How does the denominator affect what manipulative you choose?
- Does the denominator change as you add the parts?
- Can you find a pattern for when and how the denominator changes?
- Focusing on question 3, how can you explain the times when the denominator changes in a different way?

Reflection and Closing: Making Predictions Based on Patterns

Display the following equations on the board:

$\frac{1}{3}+\frac{3}{6}=$ $\frac{3}{10}+\frac{3}{5}=$ $\frac{1}{4}+\frac{5}{12}=$ $\frac{3}{8}+\frac{1}{6}=$ $\frac{2}{5}+\frac{1}{4}=$

✓ Ask students to consider these equations. What do they predict the denominator of the sum will be? This can be an oral discussion or a journal entry. Students will revisit their predictions in Lesson 3.

Note: Students will likely predict 6, 10, 12, 8, and 5 for the respective denominators based on the patterns they have observed.

Prompting Questions:

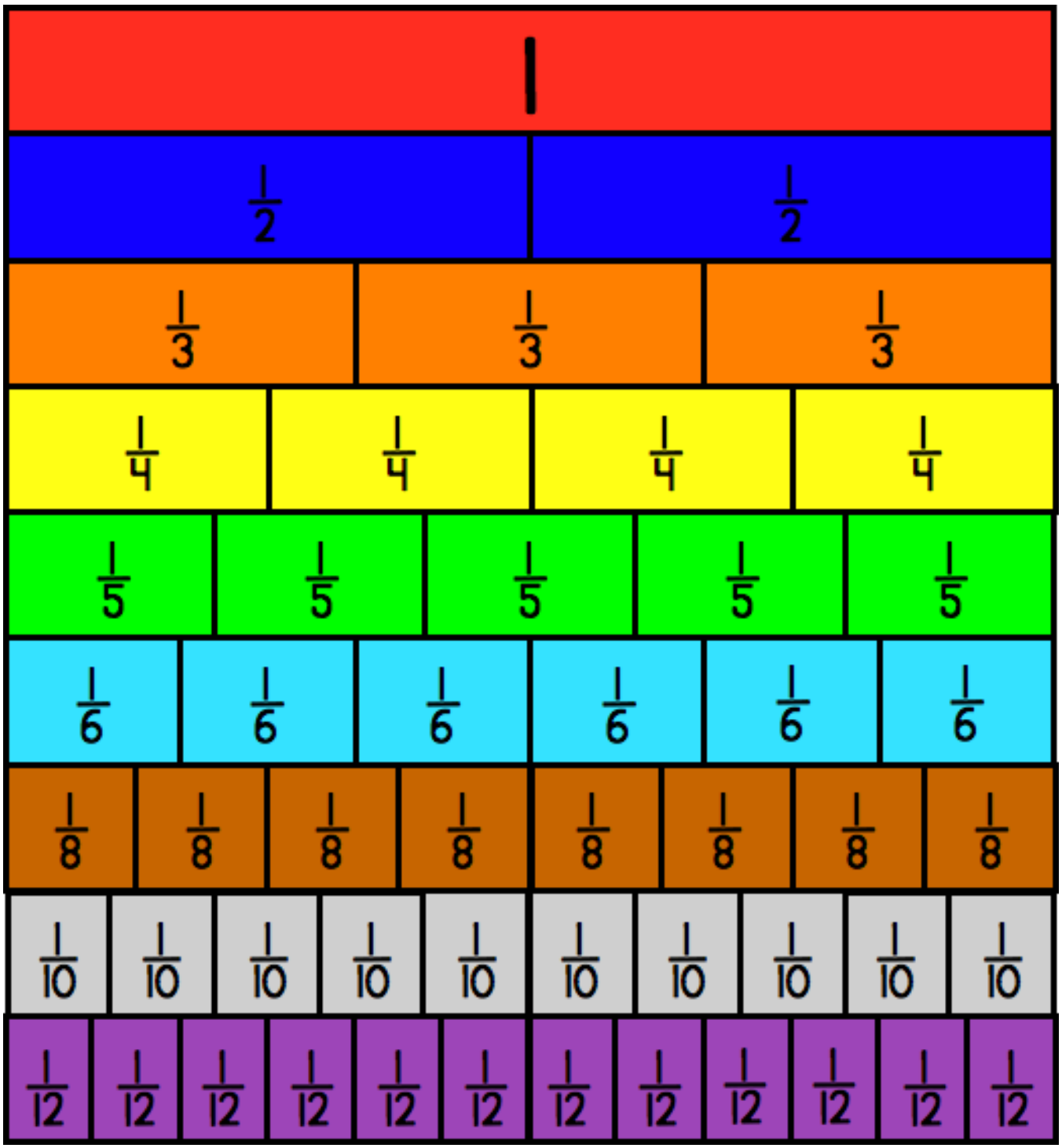
- Why did you predict this value for the denominator?
- What rule or pattern did you use to come up with your prediction?
- Will this rule or pattern work with every pair of addends on the board?
- Why can't we add unlike fractions as they are (without using models or equivalent fractions)?

Homework

Students should look for instances in the real world where adding fractions is helpful or necessary. Findings can be added to a graffiti wall in the classroom daily.

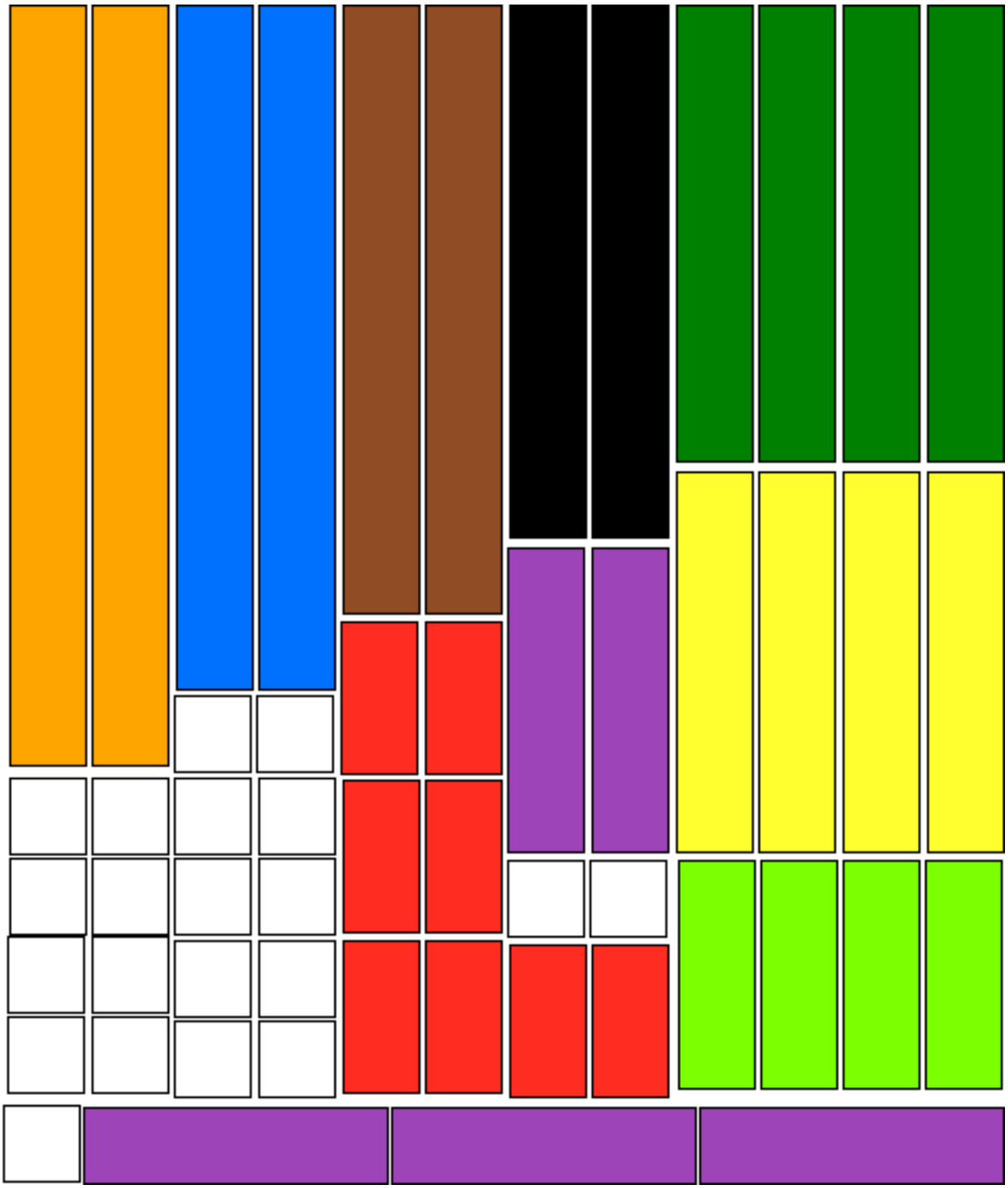
Handout 2.1: Fraction Bars

Name: _____



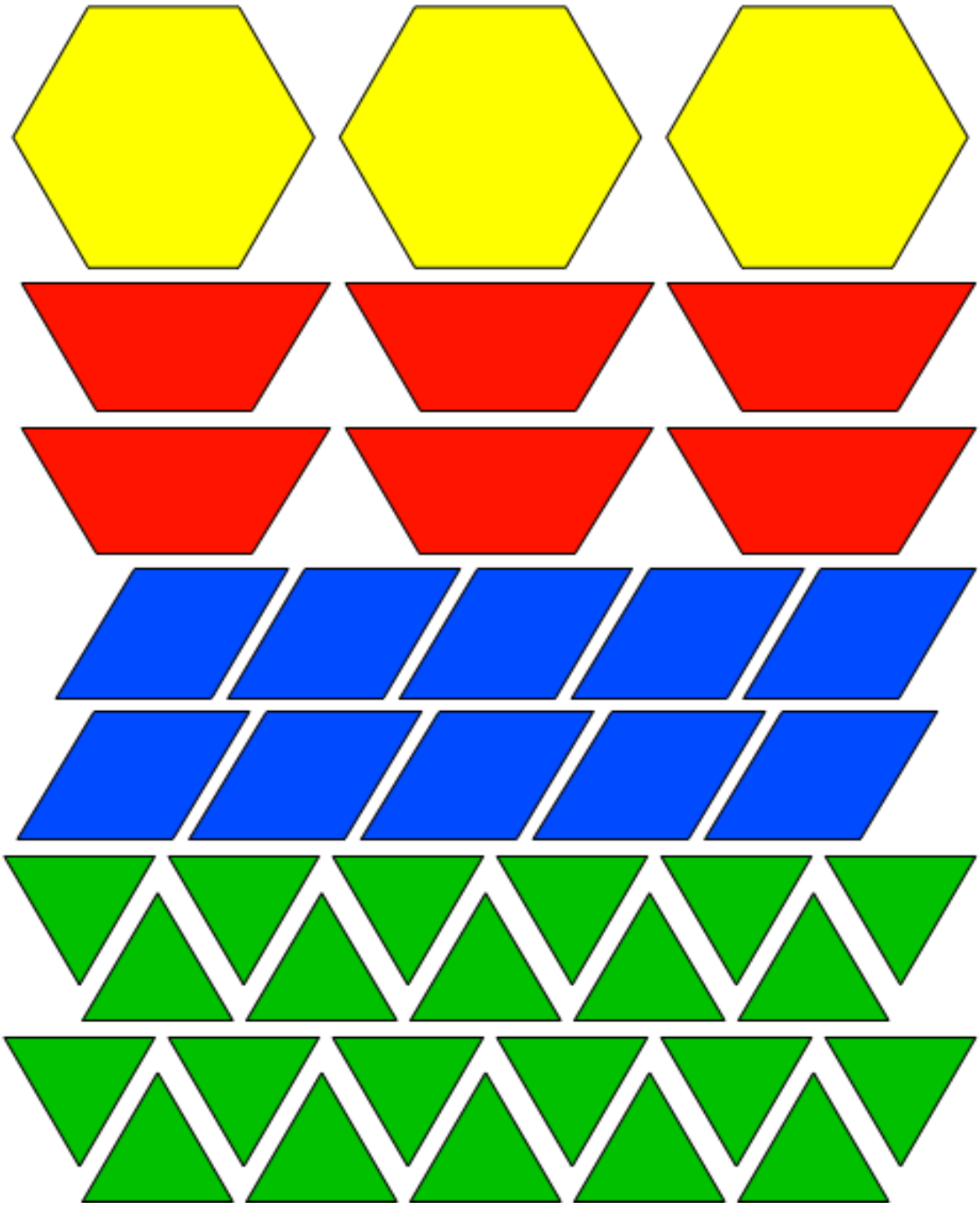
Handout 2.2: Cuisenaire Rods

Name: _____



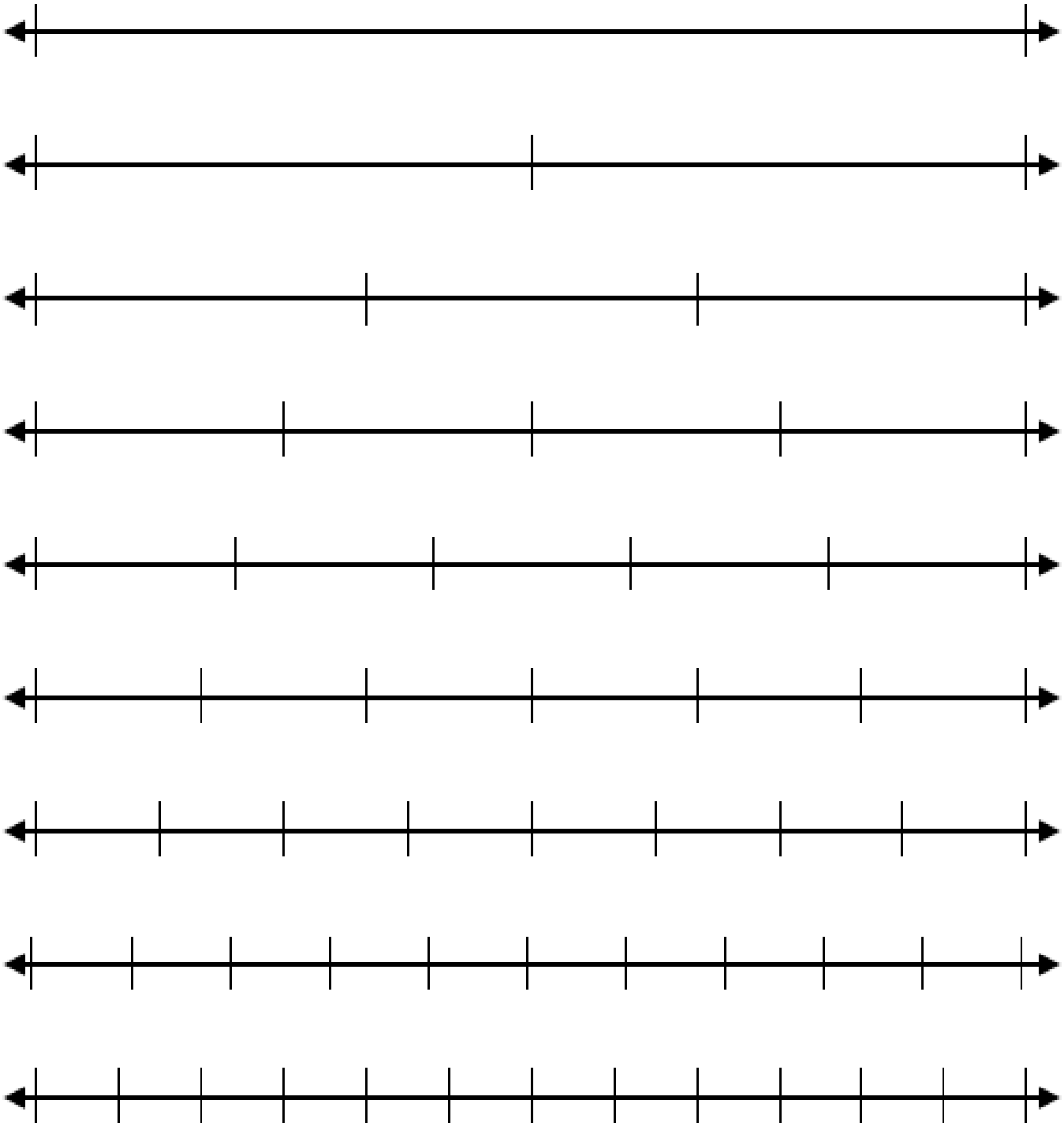
Handout 2.3: Pattern Blocks

Name: _____



Handout 2.4: Number Lines

Name: _____



Handout 2.5: Modeling Addition of Unlike Fractions

Name: _____

1. Jasmine finished reading $\frac{1}{3}$ of *The Lightning Thief*. Her best friend Jacqueline has read $\frac{2}{6}$ of *The Lightning Thief*. How much of *The Lightning Thief* have the girls read in all?

Use **pattern blocks** to model and solve the problem.

2. In Ms. Mason's class, $\frac{1}{5}$ of the students have blonde hair. Another $\frac{7}{10}$ have brown hair. What fraction of Ms. Mason's class has blonde or brown hair?

Use a **number line** to model and solve the problem.

3. The boys' basketball team has played $\frac{1}{4}$ of the games on their schedule. The girls' team has played of $\frac{2}{6}$ their games. What fraction of their games have the basketball teams played so far?

Use **fraction bars** to model and solve the problem.

4. On the most recent report cards, $\frac{1}{8}$ of the fifth graders made the all-A honor roll. Another $\frac{1}{4}$ of the fifth graders made the all-A and B honor roll. What fraction of the fifth graders made the honor roll?

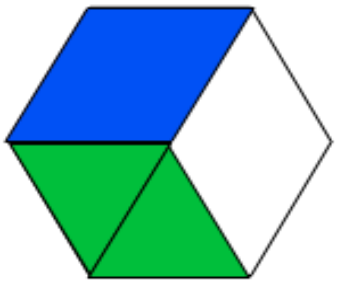
Use **your choice** of manipulatives to model and solve the problem.

Handout 2.5: Modeling Addition of Unlike Fractions - Key

Name: _____

1. Jasmine finished reading $\frac{1}{3}$ of *The Lightning Thief*. Her best friend Jacqueline has read $\frac{2}{6}$ of *The Lightning Thief*. How much of *The Lightning Thief* have the girls read in all?

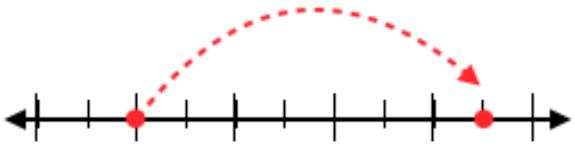
Use **pattern blocks** to model and solve the problem.



Jasmine and Jacqueline have read $\frac{4}{6}$ or $\frac{2}{3}$ of *The Lightning Thief*.

2. In Ms. Mason's class, $\frac{1}{5}$ of the students have blonde hair. Another $\frac{7}{10}$ have brown hair. What fraction of Ms. Mason's class has blonde or brown hair?

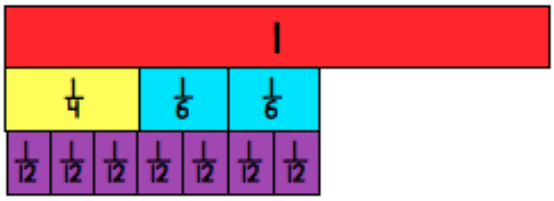
Use a **number line** to model and solve the problem.



$\frac{9}{10}$ of the students have brown or blonde hair

3. The boys' basketball team has played $\frac{1}{4}$ of the games on their schedule. The girls' team has played of $\frac{2}{6}$ their games. What fraction of their games have the basketball teams played so far?

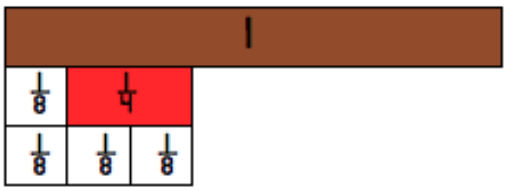
Use **fraction bars** to model and solve the problem.



$\frac{7}{12}$ of the basketball games have been played

4. On the most recent report cards, $\frac{1}{8}$ of the fifth graders made the all As honor roll. Another $\frac{1}{4}$ of the fifth graders made the all As and Bs honor roll. What fraction of the fifth graders made the honor roll?

Use **your choice** of manipulatives to model and solve the problem.



$\frac{3}{8}$ of the fifth graders made the honor roll.

For training or questions regarding this unit,
please contact one of the following:

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