



San Diego Unified School District

Instructional Module to Enhance the Teaching of

HARCOURT

Math

California Edition

Grade 2

Module 10 - Revised

Number Sense and Fractions

– WORK IN PROGRESS –

Harcourt Math – Grade 2

11 Days

Key Mathematical Concepts:

- Identify groups
- Build, read, and write numbers
- Compare and order numbers
- Identify equal parts
- Identify and compare fractions
- Compare parts of a whole
- Solve problems

<p>Chapter 23 Parts of a Whole Lesson 23.1: Explore Fractions Lesson 23.2: Unit Fractions Lesson 23.3: Other Fractions Lesson 23.4: Compare Unit Fractions Lesson 23.5: Fractions Equal to 1</p>	<p>Chapter 24: Parts of a Group Lesson 24.1: Explore Fractions Lesson 24.2: Unit Fractions Lesson 24.3: Other Fractions Lesson 24.4: Compare Parts of a Group Lesson 24.5: Problem Solving Assessment</p>
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Harcourt Math: Grade 2
Module 10: Number Sense and Fractions
 Days 139 - 149
 11 Days

<u>Day 1</u> Unit 5 Lesson 23.1	<u>Day 2</u> Unit 5 Lesson 23.2	<u>Day 3</u> Unit 5 Lesson 23.3	<u>Day 4</u> Unit 5 Lesson 23.4	<u>Day 5</u> Unit 5 Lesson 23.5
<u>Day 6</u> Unit 5 Lesson 24.1	<u>Day 7</u> Unit 5 Lesson 24.2	<u>Day 8</u> Unit 5 Lesson 24.3	<u>Day 9</u> Unit 5 Lesson 24.4	<u>Day 10</u> Unit 5 Lesson 24.5
<u>Day 11</u> Unit 5 Assessment				

MODULE 10 – FRACTIONS
Modules represent individual units of study that lead to essential learnings

THREADS THROUGHOUT THE YEAR:

The threads represent ongoing learning opportunities in which students should be actively engaged throughout all units of inquiry during the entire school year. These items should not be isolated to any one particular unit of inquiry

Students will:

- Develop understanding of numbers and the number system and use their understanding to solve problems and recognize reasonable results.
- Develop understanding of and fluency in basic computation and procedural skills.
- Use mathematical reasoning to solve problems.
- Communicate their mathematical thinking by using words, numbers, symbols, graphs and charts.
- Express generalizations of patterns and relationships.
- Develop logical thinking to analyze evidence and build arguments to support or refute a hypothesis.
- Make connections among mathematical ideas and between other disciplines.
- Develop and use strategies, skills, and concepts to solve problems.
- Use appropriate tools, including technology, as vehicles to learn mathematical concepts.

These are essential learnings that represent bigger ideas/concepts:

- Students recognize, name, record and compare fractions of a whole and parts of a group.
- Students understand that when all fractional parts are included, such as four fourths, the result is equal to the whole and to one.
- Students understand the more fractional parts used to make the whole, the smaller the parts. The number of parts used to make the whole is the denominator, and the number of parts being considered is the numerator.

These are essential questions that learners ask themselves in order to achieve the essential learnings:

- How do I identify and record the fraction of a whole or group?
- How do I identify the whole?
- How do I use concrete materials and drawings to understand and show understanding of fractions (from $1/12^{\text{th}}$ to $1/2$)?
- How do I explain the meaning of a fraction and its numerator and denominator, and use my understanding to represent and compare fractions?
- How do I explain how changing the size of the whole affects the size or amount of a fraction?

Resources: Van de Walle, Chapters 15, pp. 242-246; *Mathematics Source Book*, pp. 59-78

DAY 1
 UNIT 5: Number Sense and Fractions
 Chapter 23: Parts of a Whole
 LESSON 23.1
 TE, P. 335A

LESSON FOCUS:	Explore Fractions
CALIFORNIA STANDARD:	Number Sense 4.1 Recognize, name and compare unit fractions from $\frac{1}{12}$ to $\frac{1}{2}$.
PURPOSE OF LESSON:	Learn the meaning of fractions of a whole.
ROUTINE: Materials: • Timer • Two sheets of acetate/acetate clocks from Module 3, Lesson 9.1	Suggestion: Throughout the Day • Set a timer to ring “on the hour.” Write both the analog and digital times. Students make observations at the end of the day. Suggestion: Approximating Time • Use the acetate clock. Approximate time to the hour by using the one-handed clock. Move the circle to show times such as the following: “about 4 o’clock”, “halfway between 1 and 2 o’clock”, “a little past 8 o’clock.” Use approximate language.
LAUNCH: Materials: • Cuisenaire rods (see Note) OR • Pattern blocks (see Note)	Rod Relationships • Give students time to explore the rods. Introduce “equivalent” and “equal parts.” • Ask them to find equivalent relationships: rods of the same color that can be put together, end-to-end so that they are equal in length to other rods (e.g., 2 whites = 1 red, 2 reds = 1 purple). • Ask students to find how many yellow rods are equal to an orange rod (2). Have a student prove the following: “The yellow rod is half a long as the orange rod.” Note: If Cuisenaire rods are unavailable, introduce Launch and Explore, Day 2, Lesson 23.2, providing two days for students to explore fractions using pattern blocks
EXPLORE: Materials: • Cuisenaire rods	Fraction Rods • Have students find all the other pairs of halves they can. • Have students do the same with thirds (e.g., three whites = 1 light green; the white rod is $\frac{1}{3}$ the light green rod), fourths (e.g., 4 red rods = 1 brown rod; the red rod is $\frac{1}{4}$ the brown rod) and fifths (e.g., 5 red rods is = 1 orange rod; the red rod is $\frac{1}{5}$ the orange rod). • Students can find relationship equal to more than one rod (e.g., 2 black rods = 1 orange + 1 purple).
PRACTICE:	As time allows: Pp. 335 and/or 336.
SUMMARIZE:	Closure: • Revisit purpose of the lesson with students. • Prove that 2 red rods is $\frac{1}{2}$ a brown rod. What is the whole? How many reds equal 1 brown?

HOMEWORK: Materials: • Homework: Paper Folding worksheet	Suggestion: Have students fold a sheet of paper into two equal parts. Have them repeat with other sheets of paper, folding one into three, one into four and one into eight equal parts. Discuss with an adult: Are the parts equal? How many parts in the whole? OR Pp. 335 and/or 336
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Homework: Paper Folding

1.

Fold a sheet of paper into **two** equal parts.

Are the parts equal?

How many parts in the whole?

2.

Fold a sheet of paper into **three** equal parts.

Are the parts equal?

How many parts in the whole?

3.

Fold a sheet of paper into **four** equal parts.

Are the parts equal?

How many parts in the whole?

4.

Fold a sheet of paper into **eight** equal parts.

Are the parts equal?

How many parts in the whole?

DAY 2
 UNIT 5: Number Sense and Fractions
 Chapter 23: Parts of a Whole
 LESSON 23.2
 TE, P. 337A

LESSON FOCUS:	Unit Fractions
CALIFORNIA STANDARD:	Number Sense 4.1 Recognize, name and compare unit fractions from $\frac{1}{12}$ to $\frac{1}{2}$.
PURPOSE OF LESSON:	Learn how to identify fractions that represent 1 part out of any number of equal parts of a whole.
ROUTINE: Materials: <ul style="list-style-type: none"> • Timer • Two sheets of acetate/acetate clocks from Module 3, Lesson 9.1 • Cuisenaire rods 	Suggestion: Throughout the Day <ul style="list-style-type: none"> • Set a timer to ring “on the half hour.” Write both the analog and digital times. Students make observations at the end of the day. Suggestion: Clock Hand Relationships <ul style="list-style-type: none"> • Use the overhead clock. Approximate time to the hour by using the one-handed clock. • Move the circle to show times such as the following: “about 4 o’clock”, “halfway between 1 and 2 o’clock”, “a little past 8 o’clock.” Use approximate language. • Using the same model, placing the larger circle on first (making a clock with two hands) or another type of “teaching clock”, talk about what happens to the big hand as the little hand moves from hour to hour. • Focus the discussion on what happens when the hour hand is halfway between hours. Discuss where the minute hand would be if the hour hand is a little before or past (approximately 15 minutes) an hour. Discussing Homework <ul style="list-style-type: none"> • Have students share folded paper from Day 1, Lesson 23.1. Begin with those papers that are folded into two equal parts; discuss “one-half” and “$\frac{1}{4}$.” • Ask students what relationships they see between the sheets of paper and the Cuisenaire rods (Explore, Day 1, Lesson 23.1). • Discuss how the size of the “whole” changes but the name of each equal part (“one half”) does not. Repeat with other papers/rods/relationships. It is very important to ask yourself, “<i>What is the whole.</i>”
LAUNCH: Materials: <ul style="list-style-type: none"> • Pattern blocks 	<ul style="list-style-type: none"> • Pattern Block Relationships • Give students time to explore the pattern blocks. Review “equivalent” and “equal parts.” • Ask them to find equivalent relationships: blocks of the same color that can be put together so that they are equal to the size of the yellow hexagon (e.g., two red trapezoids, three blue rhombi, six green triangles). • Ask students to find how many trapezoids are equal to a hexagon (2). Have a student prove the following: “The trapezoid is half the size of hexagon.” Discuss:

	<ul style="list-style-type: none"> • If the yellow hexagon is one whole, what fractional part of one is a blue rhombus ($\frac{1}{3}$)? Have a student prove the following: “The blue rhombus is one third the size of hexagon.” • If the yellow hexagon is one whole, what fractional part of one is a green triangle ($\frac{1}{6}$)? Have a student prove the following: “The green triangle is one sixth the size of hexagon.” • Discuss how the size of a fractional part is dependent upon the size of the whole. During Explore, the size of the whole will change.
EXPLORE: Materials: <ul style="list-style-type: none"> • Pattern blocks 	Fraction Pattern Blocks <ul style="list-style-type: none"> • Have students find other fractional relationships (e.g., a green triangle is $\frac{1}{2}$ a blue rhombus, a green triangle is $\frac{1}{3}$ a red trapezoid, a blue rhombus is $\frac{1}{3}$ a yellow hexagon). • Have students trace blocks and label with fraction words (e.g., one-half) or symbols (e.g., $\frac{1}{2}$).
PRACTICE:	As time allows: Pp. 337 and/or 338.
SUMMARIZE:	<ul style="list-style-type: none"> • Discuss the fractional relationships between Cuisenaire rods, pattern blocks and folded paper. • Emphasize how the size of the fractional part is dependent upon the size of the whole (e.g., the triangle has a value of one-third when the trapezoid is the whole but it has a value of $\frac{1}{6}$ when the hexagon is the whole). Identifying the “whole” is <u>very</u> important. Closure: Revisit purpose of the lesson with students.
HOMEWORK: Materials: <ul style="list-style-type: none"> • P. TR 90 	Suggestion: <ul style="list-style-type: none"> • Students cut out and cut apart circles and look for relationships. • Students write about how these fraction circles relate to their experiences with Cuisenaire rods, pattern blocks, and folded paper. Students will need these circles for a later assignment.

DAY 3
 UNIT 5: Number Sense and Fractions
 Chapter 23: Parts of a Whole
 LESSON 23.3
 TE, P. 339A

LESSON FOCUS:	Other Fractions
CALIFORNIA STANDARD:	Number Sense 4.2 Recognize fractions of a whole and parts of a group.
PURPOSE OF LESSON:	Learn to identify, model, and record fractions that represent more than 1 equal part.
ROUTINE: <ul style="list-style-type: none"> • Timer • Two sheets of acetate/acetate clocks from Module 3, Lesson 9.1 	<p>Suggestion: Throughout the Day</p> <ul style="list-style-type: none"> • Set a timer to ring “on the quarter hour.” Write both the analog and digital times. Students make observations at the end of the day. <p>Suggestion: Clock Hand Relationships</p> <ul style="list-style-type: none"> • Use the overhead clock. Continue to focus the discussion on what happens when the hour hand is halfway between hours. • Discuss where the minute hand would be if the hour hand is a little before or past (approximately 15 minutes) an hour.
LAUNCH: Materials: <ul style="list-style-type: none"> • A packet of five 3x18 inch strips of construction paper, in five different colors per student • Pair of scissors per student <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • P. TR 92 	<p>Fraction Kits</p> <ul style="list-style-type: none"> • Model the following: <ol style="list-style-type: none"> 1. Take a strip of a specific color (all students should use the same color). Label strip “one whole.” 2. Take another strip, fold it in half, and cut it into two pieces. Label each piece $\frac{1}{2}$. Discuss label. 3. Take another strip of a specific color. Fold and cut into into four pieces. Label each piece $\frac{1}{4}$. Discuss label. 4. Take another strip of a specific color. Fold and cut into 8 pieces. Label each piece $\frac{1}{8}$. Discuss label. <p>Note: P. TR 92 can be used as an alternative, if necessary. However, having students constructing their own Fraction Kits is more meaningful.</p>
EXPLORE:	<p>Fraction Kit Relationships</p> <ul style="list-style-type: none"> • Students explore relationships between the strips. • Give students time to explore the fraction strips. Review “equivalent” and “equal parts.” • Ask them to find equivalent relationships: strips of the same color that can lie put together so that they are equal to the length of another color. • Students discuss and write about their explorations. Students discuss and write about how the strips are related to Cuisenaire rods, pattern blocks, and folded paper.
PRACTICE:	As time allows: Pp. 339 and/or 340.
SUMMARIZE:	<ul style="list-style-type: none"> • Students share their written work. They discuss the relationships they observed in their Fraction Kits. • Students discuss how Fraction Kits are similar to and different from other fraction models they have used. <p>Closure: revisit purpose of the lesson with students.</p>

<p>HOMEWORK:</p> <p>Materials:</p> <ul style="list-style-type: none">• A packet of five 3x18 inch strips of construction paper, in five different colors per student <p>OR</p> <ul style="list-style-type: none">• P. TR 92	<p>Suggestion: Students make a Fraction Kit at home using construction paper or P. TR 92.</p>
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DAY 4
 UNIT 5: Number Sense and Fractions
 Chapter 23: Parts of a Whole
 LESSON 23.4
 TE, P. 341A

LESSON FOCUS:	Compare Unit Fractions
CALIFORNIA STANDARD:	Number Sense 4.1 Recognize, name and compare unit fractions from $1/12$ to $1/2$.
PURPOSE OF LESSON:	Learn to compare unit fractions of a whole
ROUTINE: Materials: • Timer • Clock with moveable hands	Suggestion: Throughout the Day <ul style="list-style-type: none"> • Set a timer to ring “at five minute intervals” at different points throughout the day. • Write both the analog and digital times. Students make observations at the end of the day. Suggestion: Counting by Five Minute Intervals <ul style="list-style-type: none"> • Do Counting by Five Minute Intervals, TE, P. 125A. Rather than focusing on the minute hand pointing on the 7, encourage students to express that it is about 35 minute after the hour. • Suggest that students always look at the hour hand to learn the approximate time, and then focus on the minute hand.
LAUNCH: Materials: • Pattern blocks • Fraction Kit • Fraction die spinner $1/2$, $1/2$, $1/4$, $1/4$, $1/8$, $1/8$ or Pattern Block die spinner $1/2$, $1/2$, $1/3$, $1/3$, $1/6$, $1/6$ (P.TR 107), per pair of students	Comparing Fractions <ul style="list-style-type: none"> • Review the fractional relationships in the pattern blocks, considering the yellow hexagon as “1” or “one whole.” • Have students discuss the fraction “name” for the green triangle ($1/6$), blue rhombus ($1/3$), and red trapezoid ($1/2$). • Students compare the fractional parts, writing less than and greater than statements. (Note: Students may experience confusion because 3 is less than 6, yet $1/3$ is greater than $1/6$.) <p>Example: $1/3 > 1/6$ $1/2 < 1$ $2/3 > 1/2$</p> Introduce: Cover Up <ul style="list-style-type: none"> • Introduce Cover Up for two partners. The winner is the person that covers up the whole first, with no overlapping pieces. • Players take turns rolling the fraction die (or spinning the spinner). On each turn, players take the size piece that comes up on the die or spinner. • Students must roll exactly what is needed to fill up the whole.
EXPLORE: Materials: • Fraction Kits • fraction die (or spinner) per pair of students	Cover Up <ul style="list-style-type: none"> • Students play Cover Up.
PRACTICE:	As time allows: Pp. 341 and/or 342.


SUMMARIZE:	<ul style="list-style-type: none">• Discuss: What did you learn from playing Cover Up? What greater than/less than statements can you make about the pieces you used to play the game (i.e., $1/4$ is less than $1/2$)? Closure: <ul style="list-style-type: none">• Revisit purpose of the lesson with students.
HOMEWORK: Materials: <ul style="list-style-type: none">• Teacher's Resource Book P. 107• Fraction Kit/P. TR 92	Suggestion: <ul style="list-style-type: none">• Students practice collaboratively playing Cover Up by themselves or with an adult.• Students will need spinner for another assignment. OR Pp. 341 and/or 342

DAY 5
 UNIT 5: Number Sense and Fractions
 Chapter 23: Parts of a Whole
 LESSON 23.5
 TE, P. 343A

LESSON FOCUS:	Fractions Equal to 1
CALIFORNIA STANDARD:	Number Sense 4.3 Know that when all fractional parts are included, such as four-fourths, the result is equal to the whole and to one.
PURPOSE OF LESSON:	Learn to identify the fraction for the whole.
ROUTINE: Materials: • Timer • Clock with movable hands	Suggestion: Throughout the Day <ul style="list-style-type: none"> • Set a timer to ring at different points throughout the day. • Write both the analog and digital times. Students make observations at the end of the day. Suggestion: Predicting Readings <ul style="list-style-type: none"> • Shown an analog clock, students predict what a digital clock will look like and vice versa.
LAUNCH: Materials: • Cuisenaire rods • Pattern blocks • Fraction Kits • Folded paper	Equal to One <ul style="list-style-type: none"> • Show students the yellow hexagon as “one whole”; on top, arrange six green triangles in the shape of the hexagon. • Discuss the fraction represented by one triangle (1/6) and the fraction represented by one whole (6/6). • Take one triangle away; ask students what has been removed (1/6) and what remains (5/6). • Repeat with rhombi. Discuss the fraction represented by one rhombus (1/3) and the fraction represented by one whole (3/3). Take one rhombus away; ask students what has been removed (1/3) and what remains (2/3). • Repeat with trapezoids. Discuss the fraction represented by one trapezoid (1/2) and the fraction represented by one whole (2/2). Take one trapezoid away; ask students what has been removed (1/2) and what remains (1/2). • Repeat this process with the other models that have been used (Cuisenaire rods, and Fraction Kits). Discuss different ways to represent one whole with materials and symbols.
EXPLORE: Materials: • Fraction Kits • Fraction die/spinner per pair of students (see Day 4)	Cover Up <ul style="list-style-type: none"> • Students play Cover Up. Today, students write different equations equal to one (recording the pieces used to cover the whole). <p>Example: $1/2 + 1/4 + 1/8 + 1/8 = 1$</p>
PRACTICE	As time allows: Pp. 343 and/or 344

SUMMARIZE:	Discuss: <ul style="list-style-type: none">• What are different ways to combine fractions to make one whole? Closure: <ul style="list-style-type: none">• Revisit purpose of the lesson with students.
HOMEWORK: <ul style="list-style-type: none">• Fraction Circles (P. TR 90)• 6-section spinner (P. TR 107), (label sections: $\frac{1}{2}$, $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{4}$, $\frac{1}{8}$ and $\frac{1}{8}$)	Suggestion: <ul style="list-style-type: none">• Students label Fraction Circles with fraction names and collaboratively play Cover Up with an adult.

DAY 6
 UNIT 5: Number Sense and Fractions
 Chapter 24: Parts of a Group
 LESSON 24.1
 TE, P. 349A

LESSON FOCUS:	Explore Fractions
CALIFORNIA STANDARD:	Number Sense 4.0 Students understand that fractions and decimals may refer to parts of a set and parts of a whole.
PURPOSE OF LESSON:	Learn the meaning of fractions of a group
ROUTINE: Materials: • Timer • Clock with movable hands	Suggestion: Throughout the Day <ul style="list-style-type: none"> • Set a timer to ring at different points throughout the day. Write both the analog and digital times. • Students make observations at the end of the day. Suggestion: Predicting Readings <ul style="list-style-type: none"> • Shown an analog clock, students predict what a digital clock will look like and vice versa.
LAUNCH: Materials: • A six-pack of soda • A four-pack of juice boxes • A five-pack of gum • A three-pack box of crackers OR • Other sets of objects	Introduce: Fractions as Part of a Set <ul style="list-style-type: none"> • Use a six pack of soda. Tell students, “<i>Pretend that I drink one can of soda. I can write a fraction to represent what part of the six-pack I drank.</i>” • Write one-sixth and $1/6$. Discuss: <ul style="list-style-type: none"> • <i>What does the ‘6’ refer to?</i> • <i>What does the ‘1’ refer to?</i> • <i>Why does this notation make sense?</i> • <i>What if I drank 2, 3, 4, 5, 6 sodas? Write the fraction in words and symbols.</i> • <i>If I drank 1 soda, how can I write a fraction to represent the sodas I didn’t drink? 2 sodas? 3 sodas? 4 sodas? 5 sodas?</i> • Write the fraction in words and symbols. • Repeat this process with other sets of objects.
EXPLORE: Materials: • A six-pack of soda • A four-pack of juice boxes • A five-pack of gum • A three-pack box of crackers	Fractions as Part of a Set <ul style="list-style-type: none"> • Students choose sets of objects. On the right side of a folded sheet of paper, students draw pictures that represent all and parts of a set; on the left side of the paper, students record words and fractions that represent all and parts of the set. <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="text-align: center;"> <p>Words</p> <p>Two-fifths of the gum is chewed. $2/5$ Three-fifths of the gum is not chewed. $3/5$</p> </div> <div style="text-align: center;"> <p>Pictures</p>  </div> </div>
PRACTICE:	As time allows: <ul style="list-style-type: none"> • Students share their fraction pictures with classmates. • Classmates try to guess the fraction that is represented in pictures.

SUMMARIZE:	Discuss: <ul style="list-style-type: none">• How do fractions representing parts of a set (e.g., cans of soda from the parts of a set model) relate to fractions representing parts of a whole (e.g., triangles on a hexagon from the parts of a whole model)? Closure: <ul style="list-style-type: none">• Revisit purpose of the lesson with students.
HOMEWORK: Materials: <ul style="list-style-type: none">• Homework: Parts of a Set worksheet	Suggestion: <ul style="list-style-type: none">• Students look at home for objects that typically come in sets.• Students record pictures, words and fractions that represent all and parts of the sets.• Students bring in sets to share with classmates.

Homework: Parts of a Set**Directions:**

Look for objects that usually come in sets.

Record pictures, words and fractions to show all and parts of that set.

Repeat with other sets.

Bring in sets to share with your classmates.

Pictures	Words	Fractions

