Heinemann
Dedicated to Teachers™

Do The Math®

Created by Marilyn Burns

Summer School Planning and Pacing Guide

SAMPLER

GRADE 2

Addition & Subtraction A

Table of Contents

An Overview of *Do The Math*

Instructional Principles 2
Program Structure 4
Teacher and Student Materials 6
Classroom Materials: Addition & Subtraction 7
Understanding the Lesson Structure. 8
Curricular Progressions. 9
Big Ideas: Addition & Subtraction 10
Mapping the Lessons: Addition & Subtraction A 11

Teaching Addition & Subtraction A

Understanding the Pacing Guide 12
Instructional Pacing 13

Supplemental Lessons: Addition & Subtraction B

Addition & Subtraction B: Lesson 1 18
Addition & Subtraction B: Lesson 2 24
Addition & Subtraction B: Lesson 3 29
Addition & Subtraction B: Lesson 4 35

Resources

Beginning-of-Module Assessment 42
End-of-Module Assessment 44
Assessment Answer Key 46
Objectives Tracker 47
Game Variation Notes. 48
Addition Capture Cards 49

Instructional Principles

***Do The Math* focuses on helping at-risk and struggling students rebuild their foundations of understanding through a classroom-tested teaching philosophy.**

1 Teaching for Understanding

Step-by-step lessons help students develop understanding, learn new mathematical skills, see relationships, and make connections. Typically, students who struggle do not look for relationships or make connections among ideas. Instead, they rely on memorized facts and often see each operation as something new to be learned. However, connecting to prior knowledge is an important starting point for any lesson.

- Students need learning experiences that link concepts and skills to mathematical representations and language.
- Using concrete and pictorial models consistently provides students with a strong foundation in key mathematical concepts, procedures, and strategies.

2 Scaffolded Content

Breaking down the content into chunks makes the mathematics more accessible to students. We've all seen the look in students' eyes when they get lost in math class. Many of these students need to unlearn before they relearn and to replace misconceptions with correct concepts. They need time to process new ideas and practice new skills in order to internalize them.

- Scaffolded content is at the heart of planning instruction for struggling students. Thinking about the mathematical content in order to scaffold it is like peeling an onion—identifying the essential mathematics and discarding what is extraneous.

3 Multiple Strategies

Exploring a variety of strategies for developing concepts and skills builds students' mathematical reasoning. Given the fragile understanding that struggling students have, it's important to engage them with each concept and skill in multiple ways in order to deepen their mathematical knowledge.

- Students often grow in confidence as they explore hands-on manipulatives and digital tools, both of which give them concrete experiences to test out and model abstract ideas.
- Developing mathematical strategies through classroom games reinforces students' understanding and fluency in numbers and operations.
- The use of children's literature in instruction engages students' interest and provides springboards for lessons.

4 Mathematical Thinking

Standards help develop mathematical expertise and habits of mind in all students. Guiding students to develop into confident mathematical thinkers requires instruction that consistently encourages students to:

- Persevere when solving problems and look for entry points to solutions.
- Reason abstractly to make sense of quantities and their relationships in problem situations.
- Use stated assumptions, definitions, and previously established results to construct viable arguments.
- Model with mathematics to solve real-world and mathematical problems.

5 Classroom Routines

Routines such as "think, pair, share" promote engagement and deepen student understanding, particularly among English language learners. It's often been said that you know something best once you've taught it. That's because teaching entails verbalizing ideas in order to communicate them coherently, which calls for formulating, reflecting, and clarifying—all processes that support learning. In the same way, providing students with opportunities to voice their ideas helps them to develop and cement their learning.

- The routine "think, pair, share" asks students to first think on their own to collect their thoughts. Then, they talk with a partner, and finally, they share with the whole group.
- English language learners benefit from as much practice speaking as possible, and doing so is especially helpful.

6 Independent Student Work

Assignments provide students with opportunities to practice, strengthen, and extend their learning. Regular practice is essential, and intervention students typically need more practice. It's important for that practice to be directly connected to students' learning experiences, with problems chosen to support the scaffolded instruction, and always with an eye toward promoting understanding as well as skills.

- Students may work on assignments in pairs for additional learning support or by themselves so the teacher can assess and monitor individual progress.

7 Vocabulary and Language

Explicit vocabulary instruction helps students communicate effectively about the math they are learning. In many ways, math is another language, and words in math often have meanings that differ from their use in common language—for example, even, odd, difference, product, factor, power, and times. Many intervention students are lost in the world of mathematical vocabulary.

- It's important that developing understanding of mathematical concepts always precedes teaching vocabulary so that new terminology has an anchor in understanding.
- Vocabulary should be explicitly taught in the context of a learning activity and then used consistently.
- A Math Vocabulary chart is a useful class reference that students can also use as they create their own lists of mathematical words they've learned.

8 Assessment and Differentiation

Ongoing assessment and progress monitoring helps teachers meet individual student needs. Probing students' internal reasoning processes reveals both their grasp of foundational concepts as well as their misconceptions.

- During instruction, teachers should observe students working in the whole group, with partners, and independently. Specific guidance for teachers on how to promote understanding and address student misconceptions is integrated into the lessons.
- Suggestions for differentiating instruction help teachers to support both students who need additional help and those who are ready for a challenge.

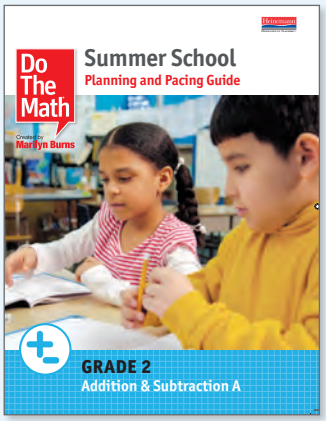
Program Structure

Every module includes thirty 30-minute lessons that provide teachers with a consistent structure for instruction and frequent opportunities for differentiation and formative assessment.

1

Review the Summer School Planning and Pacing Guide

Use the Table of Contents to locate the lesson sequence for your module.

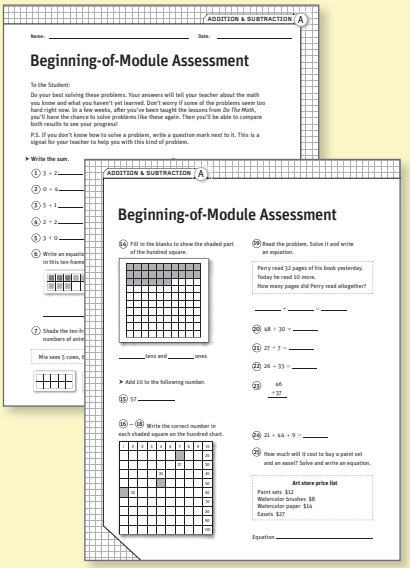


2

Administer the Beginning-of-Module Assessment

This assessment provides a pre-module snapshot of students' knowledge. A printable version of the assessment can be found in this guide.

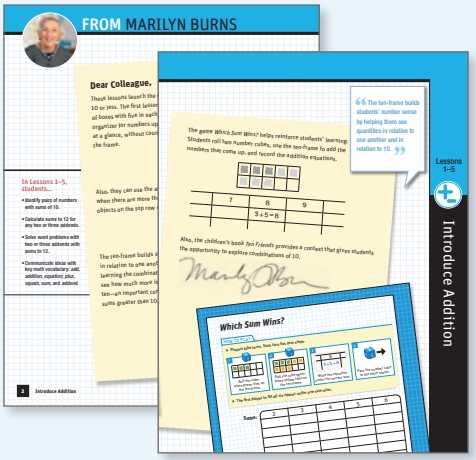
Students also complete the Attitude Survey to measure their disposition towards math.

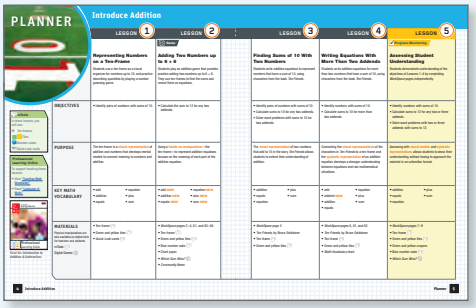


3

Prepare for Instruction

Every group of five lessons begins with a summary, an overview from Marilyn Burns, and a planner to help with lesson planning.

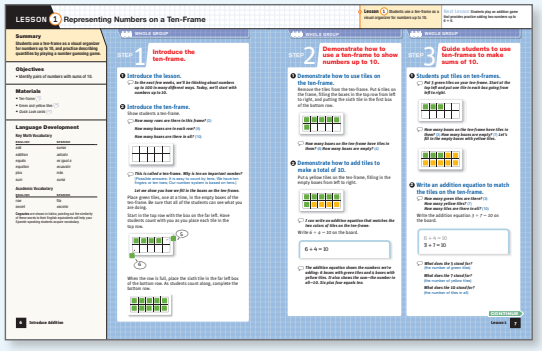


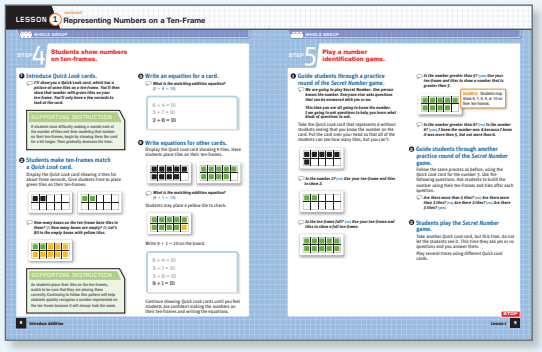


4

Teach the Lessons

Each lesson begins with a Summary, Objectives, Materials, and Language Development, followed by step-by-step instruction.



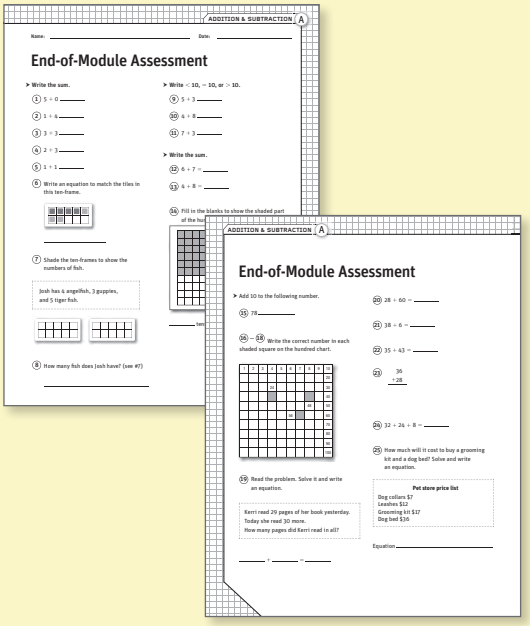


5

Administer the End-of-Module Assessment

This assessment measures student growth when compared with the results of the Beginning-of-Module Assessment.

Students retake the Attitude Survey to determine whether their disposition towards math has changed.



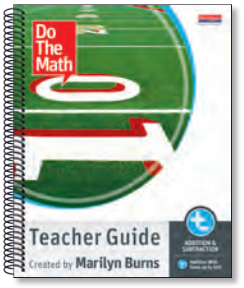
Teacher and Student Materials

Do The Math **includes a range of exciting resources to support teachers and students in the classroom and beyond.**

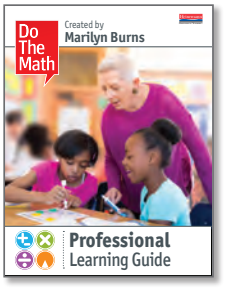
FOR THE TEACHER

The **Teacher Bookcase** contains all the teaching materials and professional resources needed for clear instructional guidance and lesson planning.

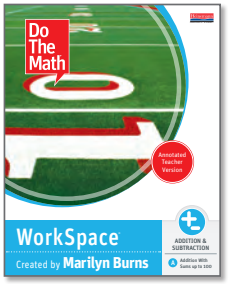
The ***Teacher Guide*** provides all the information needed for lesson planning, monitoring student progress, and using both the student materials and the demonstration tools effectively.



The ***Professional Learning Guide*** provides a comprehensive overview of the program's architecture and instructional strategies.



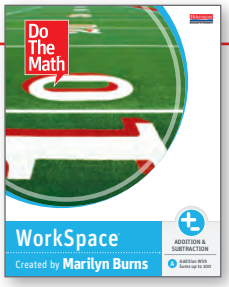
The ***Annotated WorkSpace*** provides clear representations of model student answers to help teachers provide timely progress monitoring.



Read Alouds provide engaging children's literature to support the instruction throughout the program.

FOR THE STUDENT

The ***WorkSpace*** is designed to support students' transition to independent work and to help teachers monitor students' progress and understanding.



The **Classroom Materials Box** provides hands-on resources and manipulatives that support and extend student learning throughout the modules.

Classroom Materials: Addition & Subtraction

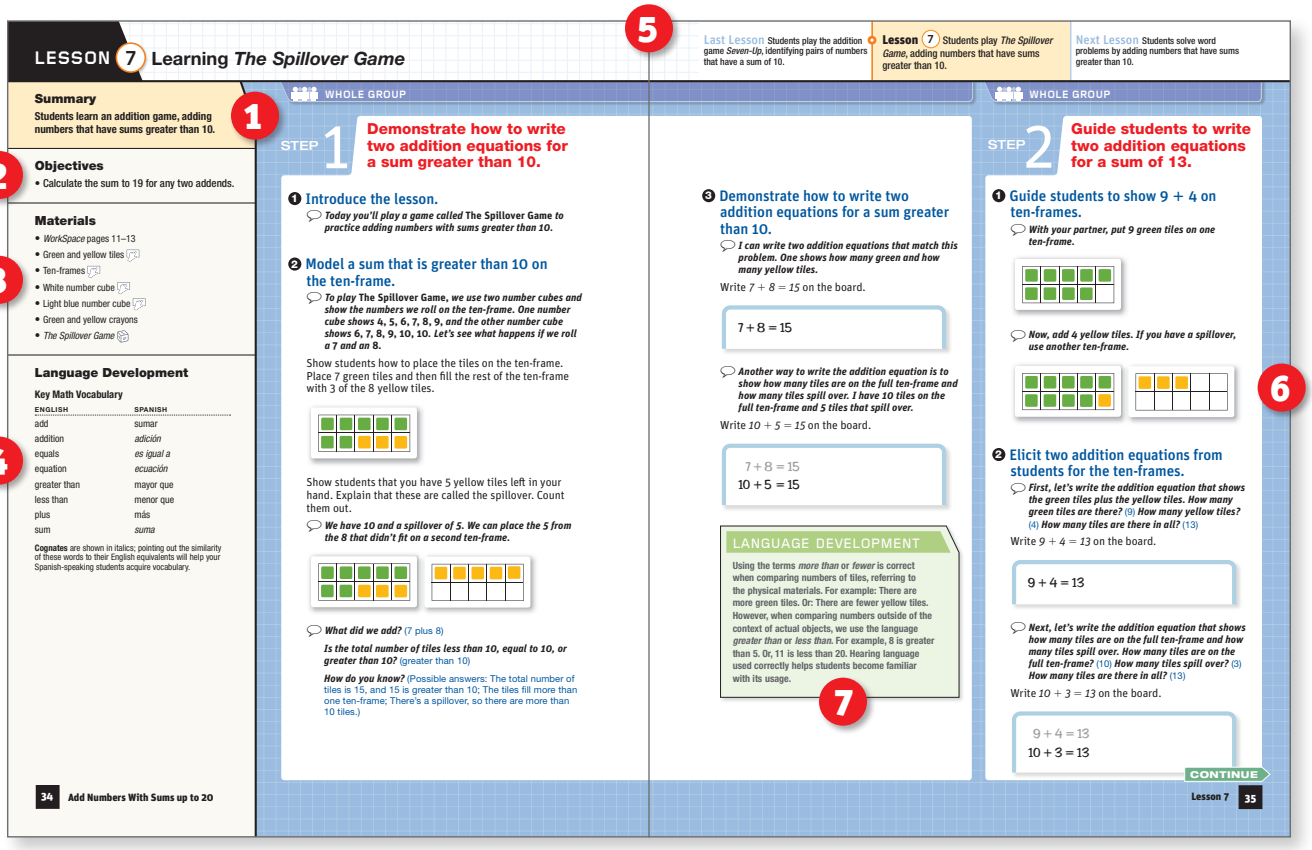
This box provides hands-on resources and manipulatives that support and extend student learning throughout the Addition & Subtraction modules.

	Manipulatives	Quantity	Number Core	A	B	C
1	Number Cubes (blue)	30 cubes	✓	✓	✓	✓
	Number Cubes (white)	20 cubes		✓	✓	
	Number Cubes (orange)	5 cubes		✓		
	Number Cubes (light blue)	30 cubes		✓		✓
	Number Cubes (red)	5 cubes	✓			
	Number Cubes (yellow)	5 cubes	✓			
2	Color Tiles (green)	5 bags of 40		✓		
	Color Tiles (yellow)	5 bags of 40		✓		
3	Plastic Cups	9 cups	✓			
	Two-Color Counters	200 pieces	✓			
4	Connecting Cubes (blue)	100 cubes	✓			
	Connecting Cubes (yellow)	100 cubes	✓			
5	Addition Capture Cards	5 decks of 52	✓			
	Number Cards	5 decks of 40		✓		
	Quick Look Cards	10 cards		✓		
	Quick Look Circle Cards	10 cards	✓			
	Ten-Frame Cards	18 cards	✓	✓		
	Ten-Frame Number Cards	5 decks of 44	✓			
6	Dry Erase Markers	8		✓	✓	
	Spinners (0-9)	5	✓			✓
	* *Magnetic Board (Grid Card, Magnetic Strips/Squares)*	1		✓	✓	
	* *Pocket Wall Chart (with cards)*	1		✓	✓	

* *Denotes teaching materials that are packaged in the* Do The Math *Teacher Bookcase.*

Understanding the Lesson Structure

The lessons in each *Teacher Guide* are designed to help teachers develop all students' understanding and skills.



1. Step-by-step instruction provides **careful scaffolding** of the mathematics content.
2. The **Objectives** identify the key concepts and skills for each lesson.
3. The list of **Materials** includes all the resources that teachers and students may need for lessons and activities.
4. **Key Math Vocabulary** for the lesson is provided in both English and Spanish. Math vocabulary is explicitly taught through a vocabulary routine.
5. The **Lesson Tracker** at the top of each lesson helps teachers identify where they are in the progression of the module.
6. The instruction includes **visual representations** that are modeled with manipulatives from the Classroom Materials Box.
7. Most lessons contain **Language Development**, **Supporting Instruction**, or **Mathematics Background** support for teachers.

Curricular Progressions for Number and Operations in Addition & Subtraction

Addition & Subtraction

Beginning Number Concepts	• Read and write whole numbers. • Represent a number using words, numerals, pictures, or manipulatives. • Recognize that the value of a digit is determined by its place in the number. • Compare and order numbers on a number line.
Foundational Concepts	• Use concrete objects to visualize and model addition and subtraction. • Apply place-value understanding and properties of operations to compute sums and differences up to 100. • Add and subtract within 1000, compare numbers, and develop proficiency with mental computation. • Analyze word problems by breaking down contextualized language to identify addition or subtraction situations.
Extensions	• Develop fluency with addition and subtraction through 1,000,000 using the standard algorithm. • Use grouping symbols with operations to evaluate expressions. • Build a foundation for algebra by solving word problems using addition and subtraction. • Expand understanding of operations with whole numbers to operate with decimals and fractions. • Extend computation with whole numbers to negative numbers. • Consider subtraction as “adding the opposite.” • Evaluate expressions and solve equations and inequalities using the inverse operations of addition and subtraction. • Apply the properties of operations to linear, quadratic, polynomial, trigonometric, and radical expressions and equations.

Big Ideas

These key concepts develop students' place-value understanding, number sense, and flexibility with multiple strategies.

1 Numbers such as 5 and 10 are important **benchmarks** for mental math strategies in the base-ten system.

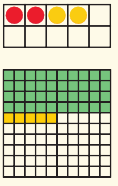
2 **Making 10** is an essential strategy for developing number sense and using place value to compose and decompose greater numbers.

3 Applying the **inverse relationship** between addition and subtraction gives students the flexibility to use multiple strategies to solve problems.

4 Interpreting the minus sign as the **distance between two numbers** is an alternative to the traditional algorithm.

5 The **properties of addition** with whole numbers prepare students to add and subtract all types of numbers.

Visual Models/Tools

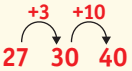


Ten-frames and **hundred-frames** provide visual structure to build students' understanding of place value.

Counters and **tiles** help students to represent sums and differences concretely.

Spinners and **number cubes** generate random numbers in addition and subtraction games.

Connecting cubes represent joining and comparing problems in addition and subtraction.



Open number lines are a tool for students to solve addition and subtraction problems.

Mapping the Lessons

A Addition With Sums up to 100

Topics	Teachers will:	Students will:
Introduce Addition	• Demonstrate how to write equations. • Model equations on a ten-frame.	• Write addition equations. • Write equations with more than two addends.
Add Numbers With Sums up to 20	• Review numbers with a sum of 10. • Demonstrate solving a word problem with a sum greater than 10. • Model adding without ten-frames.	• Represent addition of two numbers with a sum greater than 10 with two ten-frames. • Solve addition word problems. • Practice splitting an addend to get 10. • Add one-digit numbers with sums less than 20 mentally.
Represent Numbers as Tens and Ones	• Introduce the hundred-frame. • Write numbers as tens and ones. • Model adding 10 with a hundred-frame. • Guide students to identify patterns.	• Count by 2s, 5s, and 10s. • Write numbers as tens and ones. • Add 10 to two-digit numbers. • Write numbers on a 1 to 100 chart.
Add Multiples of 10 to Two-Digit Numbers	• Demonstrate adding 10 on a hundred-frame. • Demonstrate adding multiples of 10. • Model going to the next 10 and adding the spillover.	• Write equations to add 10. • Add multiples of 10 to solve problems. • Solve problems by going to the next 10 and adding the spillover.
Add Numbers With Sums up to 100	• Introduce and model adding multiples of 10 with an open number line. • Demonstrate adding 2 two-digit numbers.	• Add using an open number line. • Use the strategy of going to the next 10. • Add one-digit numbers to two-digit numbers and add 2 two-digit numbers.
Add Numbers With Sums up to 100	• Model adding two-digit numbers by splitting them into place-value parts. • Demonstrate adding when the sum of the ones is greater than 10. • Review addition concepts.	• Solve problems in three ways. • Add numbers vertically by finding partial sums. • Review addition concepts. • Solve addition problems by splitting numbers by place value.

Understanding the Pacing Guide

The lessons and activities of *Do The Math* are grouped into two 30-minute blocks of instruction. These lessons and activities are suggested for daily pacing. Teachers may set their own pacing by prioritizing lessons before games and activities.

Summer school begins with a **module assessment** and the **attitude survey**. Teachers can use this for student snapshots and measurement of growth.

Page references are listed for: lessons in the **TG**, student **WS**, and printable resources in both the TG and **PPG** that are needed for instruction.

Daily instruction ranges from:
- **Lesson** + Lesson
- Lesson + **Game**
- Lesson + **Community News**

Notes inform teachers about variations to teaching lessons, preparations needed prior to instruction, and additional materials that may be needed for games and lessons.

	LESSON/ACTIVITY	SUMMARY	PAGES	NOTES
1	**ASSESSMENT** Beginning-of-Module	Students take a module assessment before starting Lesson 1.	**PPG** pp. 40–41	Compare these assessment results with the module assessment after Lesson 30 to measure student growth.
	ATTITUDE SURVEY	Students take a survey about their feelings and comfort level for learning math.	**TG** p. 144	
2	**LESSON 1** Making Sums of 5	Students generate pairs of addends that make 5.	**TG** pp. 6–9 **WS** p. 2	Have students play *Shake and Spill* in groups of 2 or 3.
	LESSON 2 Finding Addend Pairs That Make 5	Students list all pairs of addends that make 5.	**TG** pp. 10–13 **WS** pp. 3–5	Students may also use their hands to shake and spill the counters when playing *Race to the Top*.
3	**LESSON 3** Using 5 as a Benchmark	Students build numbers and find sums to 10.	**TG** pp. 14–17, 152 **WS** pp. 6–7	Print out and distribute additional copies of the ten-frame cards to use during the lesson. **Save the cards for future use.*
	LESSON 4 Using the Benchmark of 5 for Sums of 6 to 10	Students represent sums of 6 to 10 using the benchmark of 5.	**TG** pp. 18–21 **WS** p. 8	Distribute copies of the ten-frame cards for the *Roll and Add* activity.
4	**LESSON 5** Assessing Student Understanding	Students demonstrate understanding of the objectives of Lesson 1-4.	**TG** pp. 22–24 **WS** pp. 9–10	
	Community News Lessons 1–5	Students play a game to practice with writing equations for sums to 10.	**TG** pp. 146, 153	Print out the following pages from the TG: **1** Community News **2** The 0–5 spinner
5	**LESSON 6** Assessing Student Understanding	Students demonstrate understanding of the objectives of Lessons 11–14.	**TG** pp. 68–70 **WS** pp. 29–30	
	GAME VARIATIONS	Students practice addition and subtraction by playing: **1** *On Your Own* **2** *Need Fish?* **3** *Wild Number Empty the Box*	**PPG** pp. 45–46	Refer to the Game Variation Notes in the back of this guide. Students may rotate in centers to play all three games.

Supplemental Lessons

Lessons from the next module are available for summer school classrooms that are ready for further extension and learning.

After completing the module, teachers may continue by teaching select lessons from Addition & Subtraction B.

- These lessons extend from concepts learned in Addition & Subtraction A and continue to stretch student learning.
- *Teacher Guide* lessons are available in the back of this guide for instructional planning.
- Student *WorkSpace* reproducibles are also available in the back of this guide.

LESSON/ACTIVITY	SUMMARY	PAGES	NOTES
ASSESSMENT Beginning-of-Module	Students take a module assessment before starting Lesson 1.	**PPG** pp. 40–41	Compare these assessment results with the module assessment after Lesson 30 to measure student growth.
ATTITUDE SURVEY	Students take a survey about their feelings and comfort level for learning math.	**TG** p. 144	
LESSON 1 Making Sums of 5	Students generate pairs of addends that make 5.	**TG** pp. 6–9 **WS** p. 2	Have students play *Shake and Spill* in groups of 2 or 3.
LESSON 2 Finding Addend Pairs That Make 5	Students list all pairs of addends that make 5.	**TG** pp. 10–13 **WS** pp. 3–5	Students may also use their hands to shake and spill the counters when playing *Race to the Top*.

	LESSON/ACTIVITY	SUMMARY	PAGES	NOTES
1	**ASSESSMENT** Beginning-of-Module	Students take a module assessment before starting Lesson 1.	**PPG** pp. 42–43	Compare this assessment result with the module assessment after Lesson 30 to measure student growth.
	ATTITUDE SURVEY	Students take a survey about their feelings and comfort level for learning math.	**TG** p. 139	
2	**LESSON 1** Representing Numbers on a Ten-Frame	Students play a number-guessing game by describing quantities using a ten-frame.	**TG** pp. 6–9	
	LESSON 2 Adding Two Numbers Up to 6 + 6	Students play an addition game that provides practice adding two numbers up to 6 + 6.	**TG** pp. 10–13 **WS** pp. 2–4	
3	**LESSON 3** Finding Sums of 10 With Two Numbers	Students write addition equations to represent numbers that have a sum of 10.	**TG** pp. 14–17 **WS** p. 5	
	GAMES	Students practice addition of sums to 10 by playing the game *Hit the Target*.	**Teacher Bookcase** (Game Rules)	**1** Review the Game Rules card and teach how to play *Hit the Target*. **2** Have students play in groups of 3.
4	**LESSON 4** Writing Equations With More Than Two Addends	Students write addition equations for more than two addends that have a sum of 10.	**TG** pp. 18–21 **WS** p. 6	
	GAMES	Students practice addition of sums to 10 by playing *Get to a 10*.	**Teacher Bookcase** (Game Rules, Recording Sheets)	**1** Review the Game Rules and teach how to play *Get to a 10*. **2** Make copies of the Recording Sheet.
5	**LESSON 5** Assessing Student Understanding	Students demonstrate understanding of the objectives of Lessons 1–4.	**TG** pp. 22–24 **WS** pp. 7–9 **PPG** p. 47	Circulate as students complete the "Show What You Know" pages. Use the Objectives Tracker to monitor student progress after every 5 lessons.
	LESSON 6 Learning *Seven-Up*, an Addition Game	Students play the addition game *Seven-Up* to practice identifying numbers with a sum of 10.	**TG** pp. 30–33 **WS** p. 10	Have students play *Seven Up* in groups of 3.

	LESSON/ACTIVITY	SUMMARY	PAGES	NOTES
21	**LESSON 30** Assessing Student Understanding	Students demonstrate understanding of the objectives of Lessons 26–30.	**TG** pp. 136–138 **WS** pp. 57–60 **PPG** p. 47	Use the Objectives Tracker in the back of this guide to record student progress.
	Community News Lessons 26–30	Students complete the activity *Shop and Add* to practice adding two-digit numbers.	**TG** p. 146	Print and distribute the Community News 26–30 from the TG. Students may work collaboratively with a partner.
22	**ASSESSMENT** End-of-Module	Students take the End-of-Module Assessment for Addition & Subtraction A.	**PPG** pp. 44–45	Compare this assessment result with the Beginning-of-Module Assessment from Day 1 to determine student growth.
	GAMES	Students practice addition by playing: **1** *Seven-Up* **2** *Tic Tac Ten* **3** *Pathways to 100* **4** *101 and Out* **5** *Addition Capture*	**PPG** p. 48 **Teacher Bookcase** (Game Rules, Recording Sheets)	Distribute copies of the Game Rules in your Teacher Bookcase and the PPG. Students may rotate in centers to play the different games.

Lessons from Addition & Subtraction B

For Summer School classrooms that would benefit from extension after completing Addition & Subtraction A, teach the lessons from the next module.

LESSON	SUMMARY	PAGES	NOTES
LESSON 1 Relating Addition and Subtraction	Students relate addition and subtraction, and use patterns on a hundred-pocket chart to subtract one-digit numbers from multiples of 10.	**PPG** pp. 18–23	Students should be familiar with finding addends to make a sum of 10. This lesson relates finding missing addends to subtraction.
LESSON 2 Using Open Number Lines to Add and Subtract	Students use open number lines to add and subtract numbers up to 10.	**PPG** pp. 24–28	
LESSON 3 Subtracting From Two-Digit Numbers	Students subtract one-digit numbers from two-digit numbers.	**PPG** pp. 29–34	
LESSON 4 Learning *Six Rolls*, a Subtraction Game	Students subtract one-digit numbers from numbers up to 50 by playing a game.	**PPG** pp. 35–41	

LESSON 1 Relating Addition and Subtraction

Summary

Students relate addition and subtraction, and use patterns on a hundred-pocket chart to subtract one-digit numbers from multiples of 10.

Objectives

- Identify pairs of numbers with sums of 10.
- Use the inverse relationship of addition and subtraction to calculate sums and differences.
- Calculate the difference between numbers up to 100.

Materials

- *WorkSpace* pages 2–3
- Hundred-pocket chart

Preparation

- Hundred-pocket chart
  Place the number cards in order in the pockets (starting with 1 in the upper-left pocket) so that the blue numbers on white background face out.

Language Development

Key Math Vocabulary

ENGLISH	SPANISH
addition	*adición,* suma
addition equation	*ecuación de adición,* ecuación de suma
equals	*es igual a*
minus	*menos*
plus	más
subtraction	resta
subtraction equation	ecuación de resta

Academic Vocabulary

ENGLISH	SPANISH
pattern	*modelo*

Cognates are shown in italics; pointing out the similarity of these words to their English equivalents will help your Spanish-speaking students acquire vocabulary.

WHOLE GROUP

STEP 1 Identify number pairs with sums of 10.

❶ Introduce the lesson.

Today you're going to be learning about subtraction. What you know about addition can help you with subtraction, so we'll begin by looking for patterns in addition and subtraction equations.

❷ Students name missing addends.

Watch as I write some addition equations with missing numbers.

Write the following equations on the board, one at a time. After you write the first equation, point to it as you read it.

1 plus blank equals 10. What number is missing in this equation? Let's say the missing number together. (9)

Write 9 in the first equation. Repeat the procedure for each of the other equations.

$1 + \_\_9\_\_ = 10$
$2 + \_\_8\_\_ = 10$
$3 + \_\_7\_\_ = 10$
$4 + \_\_6\_\_ = 10$
$5 + \_\_5\_\_ = 10$
$6 + \_\_4\_\_ = 10$
$7 + \_\_3\_\_ = 10$
$8 + \_\_2\_\_ = 10$
$9 + \_\_1\_\_ = 10$

SUPPORTING INSTRUCTION

Having students respond together gives them a "safe voice" when offering answers. Also, it gives you an informal way to assess their understanding. Students who do not know these missing addends would be placed more appropriately in *Do The Math™: Addition & Subtraction A.*

Objectives Tracker

Add a checkmark in the appropriate boxes as students are assessed on each of the objectives. Students may demonstrate understanding as they play games, complete activities, and are assessed on the "Show What You Know" pages.

Addition & Subtraction A Module Objectives	STUDENT NAMES							
LESSONS 1–5								
Identify pairs of numbers with sums of 10.								
Calculate sums to 12 for any two addends.								
Solve word problems with sums to 10.								
Calculate sums to 10 for more than two addends.								
Solve word problems with sums to 12.								
LESSONS 6–10								
Identify pairs of numbers with sums of 10.								
Calculate sums to 19 for any two addends.								
Solve word problems with sums to 19.								
LESSONS 11–15								
Write any two-digit number as tens and ones.								
Calculate sums to 19 for more than two addends.								
Calculate sums to 99 for any two addends.								
LESSONS 16–20								
Solve word problems with sums to 99.								
Calculate sums to 99 for any two addends.								
Write any two-digit numbers as tens and ones.								
Identify pairs of numbers with sums of 10.								
LESSONS 21–25								
Solve word problems with sums to 99.								
Calculate sums to 99 for any two addends.								
Identify pairs of numbers with sums of 10.								
LESSONS 26–30								
Solve word problems with sums to 99.								
Calculate sums to 99 for any two addends.								
Write any two-digit numbers as tens and ones.								
Identify pairs of numbers with sums of 10.								

Heinemann
Dedicated to Teachers™

Do The Math®

Created by
Marilyn Burns

Summer School Planning and Pacing Guide SAMPLER

GRADE 5

Fractions A

Table of Contents

An Overview of *Do The Math*

Instructional Principles 2
Program Structure 4
Teacher and Student Materials 6
Classroom Materials: Fractions 7
Understanding the Lesson Structure 8
Curricular Progressions 9
Big Ideas: Fractions 10
Mapping the Lessons: Fractions A 11

Teaching Fractions A

Understanding the Pacing Guide 12
Instructional Pacing 13

Supplemental Lessons: Fractions B

Fractions B: Lesson 1 18
Fractions B: Lesson 4 24
Fractions B: Lesson 6 31
Fractions B: Lesson 11 37

Resources

Beginning-of-Module Assessment 44
End-of-Module Assessment 46
Assessment Answer Key 48
Objectives Tracker 49
Game Variation Notes 50
Spinner ($\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{6}$, $\frac{1}{12}$, $\frac{1}{12}$) 51

Curricular Progressions for Number and Operations in Fractions

Fractions

Beginning Number Concepts	• Partition figures into equal-sized pieces. • Develop number sense through work with whole number operations. • Use fraction language to describe partitions of shapes into equal shares. • Recognize halves, quarters, thirds, and fourths.
Foundational Concepts	• Use fractions to represent numbers equal to, greater than, or less than 1. • Add and subtract fractions with like denominators, using manipulatives where appropriate. • Convert between fractions and mixed numbers. • Add and subtract fractions with unlike denominators.
Extensions	• Multiply fractions. • Understand why fraction division makes sense. • Recognize fractions, decimals, and percentages as different representations of rational numbers. • Work with ratios and proportional reasoning. • Utilize fractional ideas learned in earlier grades to manipulate rational numbers. • Evaluate expressions and solve equations and inequalities involving fractions. • Apply properties of operations to linear, quadratic, polynomial, trigonometric, and radical expressions and equations.

Big Ideas

These key concepts and skills are foundational to students' understanding of fractions.

1. Fractions represent **parts of a whole** or **parts of a set.**

2. A fraction is a **number** that represents division and is the **ratio** of two numbers.

3. A fraction has a **numerator** and a **denominator**. The denominator tells the number of equal parts, and the numerator tells how many parts are selected.

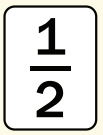
4. A fraction only gains meaning when the value of the **whole** is defined.

5. Fractions can be **composed** and **decomposed**.

6. A number expressed by a fraction has an **infinite number of fractional representations**.

Visual Models/Tools

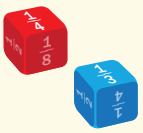
Fraction strips help students to identify fractions and understand fraction equivalence.



Fraction cards are used for ordering fractions from least to greatest.

Connecting cubes create fraction trains and represent parts of a set.

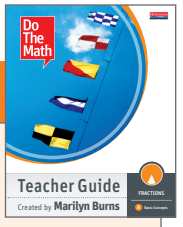
Fraction circles are used to model sharing problems.



Fraction cubes generate random numbers in fraction games.

Mapping the Lessons

A Basic Concepts



Topics	Teachers will:	Students will:
Introduce Fractions	• Demonstrate how to make fraction kits. • Model fraction equations for sums of 1. • Introduce the concept of fraction equivalence.	• Create fraction kits. • Explore equivalent fractions. • Identify fraction relationships. • Write fraction equations. • Combine unit fractions.
Compare Fractions	• Introduce equivalent fractions. • Introduce math vocabulary and symbols. • Guide students as they compare fractions.	• Share strategies used in a fraction game. • Compare fractions.
Combine Fractions	• Guide students to combine fractions. • Demonstrate making one whole and writing equations. • Show a real-world example of a fraction greater than one whole. • Demonstrate adding fractions with sums that are greater than 1.	• Practice combining fractions with fraction pieces. • Make a whole and write equations. • Identify equivalent fractions and write equations using fraction pieces. • Identify equivalent fractions greater than 1.
Solve Fraction Problems	• Guide students to solve a sharing problem. • Demonstrate comparing two fractions with concrete materials.	• Solve a sharing problem. • Discuss solutions to problems. • Compare fractions and mixed numbers with concrete materials. • Explain how to compare fractions with unlike denominators.
Introduce More Fractions	• Demonstrate how to cut thirds, sixths, and twelfths. • Demonstrate combining fractions with unlike denominators. • Demonstrate that the sum of two or more fractions can be represented by fractions with different denominators.	• Cut thirds, sixths, and twelfths. • Identify equivalent fractions. • Combine fractions with unlike denominators using fraction pieces.
Compare and Order Fractions	• Demonstrate a sharing problem. • Guide students to compare and order fractions.	• Solve a sharing problem. • Find fractions equivalent to $\frac{1}{2}$. • Think about fractions that are greater than or less than $\frac{1}{2}$. • Compare fractions to $\frac{1}{2}$. • Use $\frac{1}{2}$ as a benchmark to order fractions less than, equal to, or greater than 1.

Understanding the Pacing Guide

The lessons and activities of *Do The Math* are grouped into two 30-minute blocks of instruction. These lessons and activities are suggested for daily pacing. Teachers may set their own pacing by prioritizing lessons before games and activities.

Summer school begins with a **module assessment** and the **attitude survey**. Teachers can use this for student snapshots and measurement of growth.

Page references are listed for: lessons in the **TG**, student **WS**, and printable resources in both the TG and **PPG** that are needed for instruction.

Daily instruction ranges from:
- **Lesson** + Lesson
- Lesson + **Game**
- Lesson + **Community News**

Notes inform teachers about variations to teaching the lesson, preparations needed prior to instruction, and additional materials that may be needed for games and lessons.

	LESSON/ACTIVITY	SUMMARY	PAGES	NOTES
1	**ASSESSMENT** Beginning-of-Module	Students take a module assessment before starting Lesson 1.	**PPG** pp. 42–43	Compare this assessment with the End-of-Module assessment after Lesson 30 to measure student growth.
	ATTITUDE SURVEY	Students take a survey about their feelings and comfort level for learning math.	**TG** p. 137	
2	**LESSON 1** Making *Fraction Kits*	Students make a fractions kit of halves, fourths and eighths.	**TG** pp. 6–9	Distribute the plastic bags. Students are to write their names and keep the pieces of their *Fraction Kits* inside for future use.
	LESSON 2 Making *Fraction Kits (continued)*	Students cut strips into sixteenths and use them to identify relationships among halves, fourths, eighths, and sixteenths.	**TG** pp. 10–13 **WS** pp. 2–3	Have students add the sixteenths fraction pieces to their *Fraction Kits*.
3	**LESSON 3** Learning *Cover Up*, a Fraction Game	Students play a game in which they use combinations of fraction pieces to cover a whole strip exactly.	**TG** pp. 14–17, 146 **WS** p. 4	Print and distribute copies of the spinner. Have some student pairs use it to play *Cover Up* instead of the red fraction cube. **Save the spinners for future use.*
	LESSON 4 Writing Fraction Equations	Students identify fraction pieces that exactly cover a whole and write equations to show the sum.	**TG** pp. 18–21, 146 **WS** pp. 4–5	Students use their *Fraction Kit* to complete *Cover the Whole*. Have some student pairs use the spinner to play *Cover Up* instead of the red fraction cube.
4	**LESSON 5** Assessing Student Understanding	Students demonstrate understanding of the objectives of Lessons 1–4.	**TG** pp. 22–24 **WS** pp. 6–7	Circulate as students complete the "Show What You Know" pages. Use the Objectives Tracker to monitor student progress after every 5 lessons.
	GAMES	Students practice comparing fractions by playing *Cover Up*.	**TG** p. 146 **WS** p. 4	Have some student pairs play the games using the spinner instead of the red fraction cube.
5	**LESSON 6** Learning to Compare Fractions	Students use their fraction pieces to compare fractions among halves, fourths, eighths, and sixteenths.	**TG** pp. 34–37, 146 **WS** pp. 4, 8–9	Have student pairs use the spinner to play *Cover Up* or *Uncover*.
	Community News Lessons 6–10	Students use their fraction pieces to compare fractions with unlike denominators in the *Measuring Cup Activity*.	**TG** p. 140	Print and distribute copies of the Community News.

Supplemental Lessons

Lessons from the next module are available for summer school classrooms that are ready for further extension and learning.

After completing the module, teachers may continue by teaching select lessons from Fractions B.

- These lessons extend from concepts learned in Fractions A and continue to stretch student learning.
- Teacher Guide lessons are available in the back of this guide for instructional planning.
- Student *WorkSpace* reproducibles are also available in the back of this guide.

LESSON	SUMMARY	PAGES	NOTES
LESSON 1 Introducing Comparing Fractions	Students compare unit fractions and fractions with common numerators.	**PPG** pp. 18–23	Students have already created their *Fraction Kits*. They may use them during this lesson.
LESSON 4 Identifying Equivalent Fractions	Students practice comparing fractions and identifying equivalent fractions.	**PPG** pp. 24–28	Students are already familiar with the games *Uncover* and *Roll Five*. They may play either game.
LESSON 6 Using *Comparing Fractions Toolkit* Strategy 3	Students compare fractions with common denominators.	**PPG** pp. 29–34	Have students refer to their copy of the *Comparing Fractions Toolkit* from Lesson 1.
LESSON 11 Using *Comparing Fractions Toolkit* Strategy 4	Students compare fractions that are one unit fraction from 1 whole.	**PPG** pp. 35–40	Have students refer to their copy of the *Comparing Fractions Toolkit* from Lesson 1.

	LESSON/ACTIVITY	SUMMARY	PAGES	NOTES
1	**ASSESSMENT** Beginning-of-Module	Students take a module assessment before starting Lesson 1.	**PPG** pp. 42–43	Compare this assessment with the End-of-Module assessment after Lesson 30 to measure student growth.
	ATTITUDE SURVEY	Students take a survey about their feelings and comfort level for learning math.	**TG** p. 137	
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	LESSON 2 Making *Fraction Kits (continued)*	Students cut strips into sixteenths and use them to identify relationships among halves, fourths, eighths, and sixteenths.	**TG** pp. 10–13 **WS** pp. 2–3	Have students add the sixteenths fraction pieces to their *Fraction Kits*.
3	**LESSON 3** Learning *Cover Up*, a Fraction Game	Students play a game in which they use combinations of fraction pieces to cover a whole strip exactly.	**TG** pp. 14–17, 146 **WS** p. 4	Print and distribute copies of the spinner. Have some student pairs use it to play *Cover Up* instead of using the red fraction cube. **Save the spinners for future use.*
	LESSON 4 Writing Fraction Equations	Students identify fraction pieces that exactly cover a whole and write equations to show the sum.	**TG** pp. 18–21, 146 **WS** pp. 4–5	Students use their *Fraction Kit* to complete *Cover the Whole*. Have some student pairs use the spinner to play *Cover Up* instead of using the red fraction cube.
4	**LESSON 5** Assessing Student Understanding	Students demonstrate understanding of the objectives of Lessons 1–4.	**TG** pp. 22–24 **WS** pp. 6–7	Circulate as students complete the "Show What You Know" pages. Use the Objectives Tracker to monitor student progress after every 5 lessons.
	LESSON 6 Learning *Uncover*, a Fraction Game	Students play a game to identify equivalent fractions among halves, fourths, eighths, and sixteenths.	**TG** pp. 30–33, 146 **WS** p. 8	When playing *Uncover*, have some student pairs use the spinner instead of the red fraction cube.
5	**LESSON 7** Learning to Compare Fractions	Students use their fraction pieces to compare fractions expressed as halves, fourths, eighths, and sixteenths.	**TG** pp. 34–37, 146 **WS** pp. 4, 8–9	Have student pairs use the spinner instead of the red fraction cube to play *Cover Up* or *Uncover*.
	Community News Lessons 6–10	Students use their fraction pieces to compare fractions with unlike denominators in the *Measuring Cup Activity*.	**TG** p. 140	Print and distribute copies of the Community News.

WHOLE GROUP

STEP 6 Introduce the *Comparing Fractions Toolkit.*

❶ Explain the *compare unit fractions* strategy.

💬 ***When we compared $\frac{1}{2}$ and $\frac{1}{8}$, we looked at the denominators to tell which piece was bigger. Then, because there is just one piece of each, we knew that $\frac{1}{2}$ is greater than $\frac{1}{8}$.***

When we compare unit fractions this way, we will call it the* compare unit fractions *strategy.

Write on the *Comparing Fractions Toolkit* chart.

Comparing Fractions Toolkit

Strategy 1: compare unit fractions

$\frac{1}{2} > \frac{1}{8}$

❷ Explain the *compare fractions with common numerators* strategy.

💬 ***When we compared $\frac{3}{4}$ and $\frac{3}{12}$ we also looked at the denominators to tell which fraction is less, twelfths or fourths. Since the numerators are the same we knew that $\frac{3}{12} < \frac{3}{4}$.***

When we compare fractions with a common numerator this way, we will call it the* compare fractions with common numerators *strategy.

Write the strategy on the chart.

Comparing Fractions Toolkit

Strategy 1: compare unit fractions

$\frac{1}{2} > \frac{1}{8}$

Strategy 2: compare fractions with common numerators

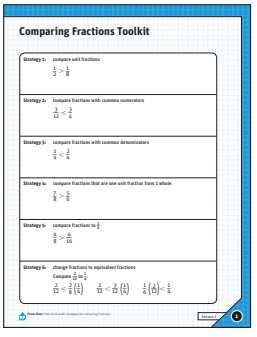
$\frac{3}{12} < \frac{3}{4}$

INDIVIDUALS

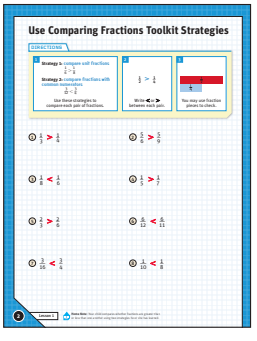
STEP 7 Students write the strategies.

❶ Students compare fractions.

Have students read the two strategies and examples on *WorkSpace* page 1.



❷ Have students complete *WorkSpace* page 2.



LANGUAGE DEVELOPMENT

Students typically refer to fractions as "bigger" or "larger" rather than "greater." This makes sense when comparing the physical fraction kit pieces. However, when comparing numerical fractions, as with all numbers, use "greater than" consistently to help students become familiar with that terminology. Similarly, use "less than" instead of "smaller than."

STOP

Resources

Beginning-of-Module Assessment

End-of-Module Assessment

Assessment Answer Key

Objective Tracker

Game Variation Notes

Spinner $\left(\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{6}, \frac{1}{12}, \frac{1}{12}\right)$

Name: _____ Date: _____

Beginning-of-Module Assessment

➤ **To the Student:**

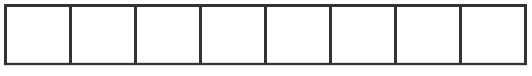
Do your best solving these problems. Your answers will tell your teacher about the math you know and what you haven't yet learned. Don't worry if some of the problems seem too hard right now. In a few weeks, after you've been taught the lessons from *Do The Math*, you'll have the chance to solve problems like these again. Then you'll be able to compare both results to see your progress!

P.S. If you don't know how to solve a problem, write a question mark next to it. This is a signal for your teacher to help you with this kind of problem.

---

(1) How many pieces is this strip cut into?

_____

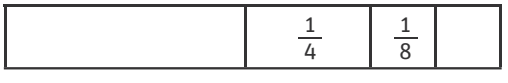


(2) What is the fraction for the shaded part of this strip? _____

(3) There are _____ halves in one whole.

(4) $\frac{1}{4} + \frac{1}{4} + \_\_\_\_ = 1$

(5)



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

➤ **Write >, <, or =**

(6) $\frac{3}{8}$ _____ $\frac{1}{2}$

(7) $\frac{9}{16}$ _____ $\frac{1}{2}$

(8) $\frac{3}{8}$ _____ $\frac{9}{16}$

(9) $\frac{1}{2}$ _____ $\frac{4}{8}$

➤ **Fill in the missing number.**

(10) $\frac{3}{4} = \frac{\square}{8}$

(11) $\frac{2}{8} = \frac{1}{\square}$

(12) $\frac{1}{2} + \frac{1}{8} = \frac{\square}{8}$

(13) $\frac{13}{8} + \frac{8}{8} = \frac{\square}{8}$

(14) $\frac{7}{4} = 1\frac{\square}{4}$

CONTINUE