Grade 4

Mathematics Curriculum Resource for the Maryland College and Career Ready Standards

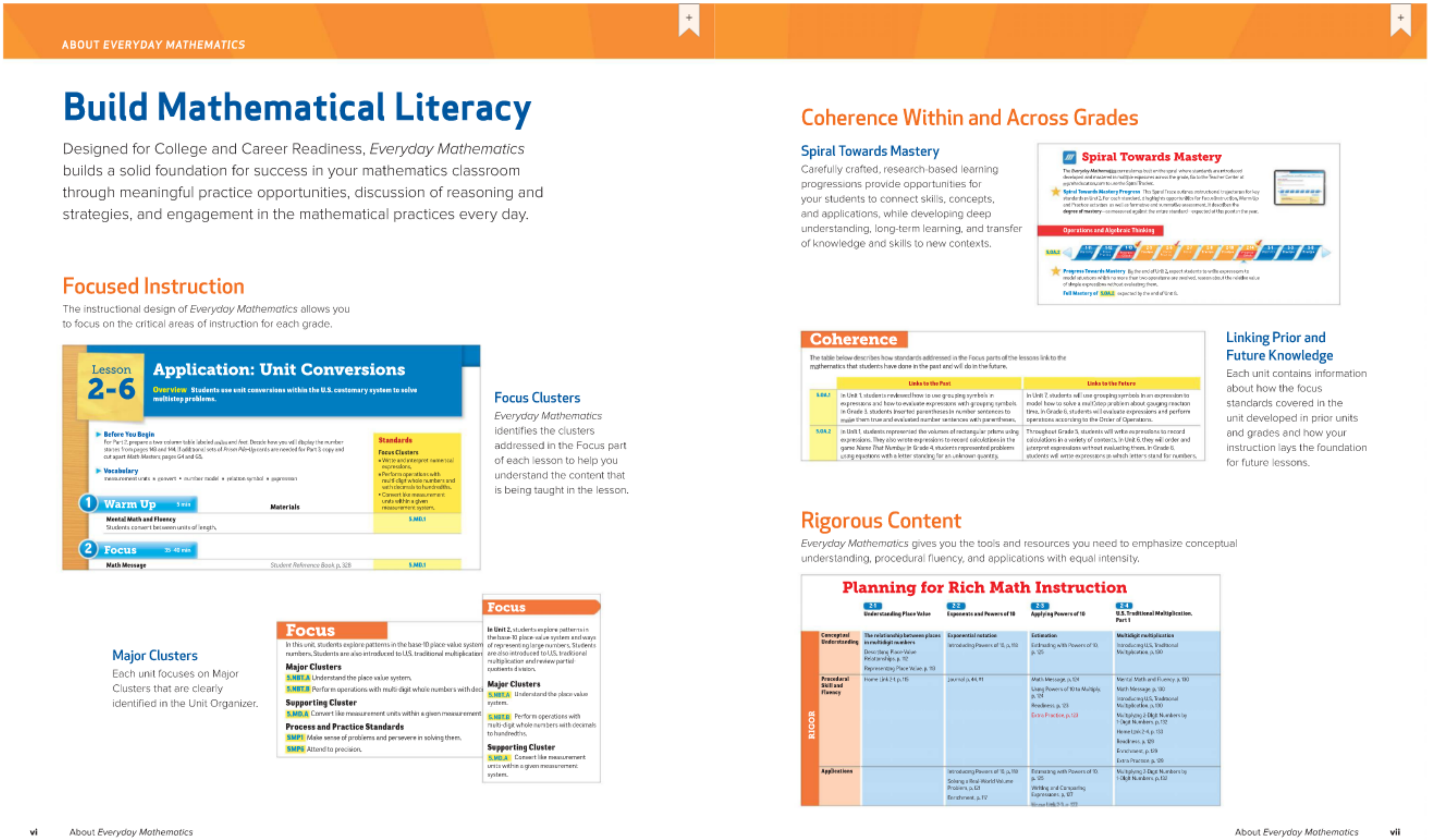
WICOMICO COUNTY PUBLIC SCHOOLS

<u>Everyday Mathematics 4</u>

- EM4 strategically distributes instruction and practice in a spiral design format. Therefore, it is vital to follow the sequence of lessons and units.
- The goal is to complete four lessons per week utilizing the fifth day for reviewing concepts through EM 4 activities, differentiation, additional resources, and enrichment.
- The additional resources listed in this document are to supplement lessons for differentiation, re-teaching, or review.
- Since the program spirals, it is **not** necessary to master concepts before moving on.
- Some lessons may take more than one day. However, you should adhere to the suggested timeline for each unit in this document so that your students will be adequately prepared for local assessments and MCAP.
- It is required that you complete the Open Response and Reengagement lessons in each unit. These provide you with formative information which focus on the eight Standards for Mathematical Practice. Utilize PLCs for scoring and range finding.
- It is expected that information be distributed to families regarding the Clever log in procedures to access math apps and programs.
- “Math Boxes” are a daily math student journal page or activity that reviews material on a regular basis and can be completed at any point during the day. It can provide useful ongoing assessment information.
- Games are a vital part of the program. They provide the repetition of the concepts needed for reinforcement and practice therefore, they should be played regularly.
- It is expected to continue the routines of Math Meetings and Number Talks in addition to the EM4 lesson components. (See the Suggested 75-minute planning template).
- The county expectation for **Dreambox** is 5 lessons per week.
- Continue to utilize the tasks from the Reasoning and Modeling Item Bank which can be found in eDoctrina.

Components for Focus, Coherence and Rigor

These components can be found at the beginning of each unit to focus instruction on rigorous content, as well as coherence of vertical alignment across grade levels.


ABOUT EVERYDAY MATHEMATICS

Build Mathematical Literacy

Designed for College and Career Readiness, *Everyday Mathematics* builds a solid foundation for success in your mathematics classroom through meaningful practice opportunities, discussion of reasoning and strategies, and engagement in the mathematical practices every day.

Focused Instruction

The instructional design of *Everyday Mathematics* allows you to focus on the critical areas of instruction for each grade.

Lesson 2-6 Application: Unit Conversions

Focus Clusters

Everyday Mathematics identifies the clusters addressed in the Focus part of each lesson to help you understand the content that is being taught in the lesson.

Major Clusters

Each unit focuses on Major Clusters that are clearly identified in the Unit Organizer.

Coherence Within and Across Grades

Spiral Towards Mastery

Carefully crafted, research-based learning progressions provide opportunities for your students to connect skills, concepts, and applications, while developing deep understanding, long-term learning, and transfer of knowledge and skills to new contexts.

Linking Prior and Future Knowledge

Each unit contains information about how the focus standards covered in the unit developed in prior units and grades and how your instruction lays the foundation for future lessons.

Rigorous Content

Everyday Mathematics gives you the tools and resources you need to emphasize conceptual understanding, procedural fluency, and applications with equal intensity.

Planning for Rich Math Instruction

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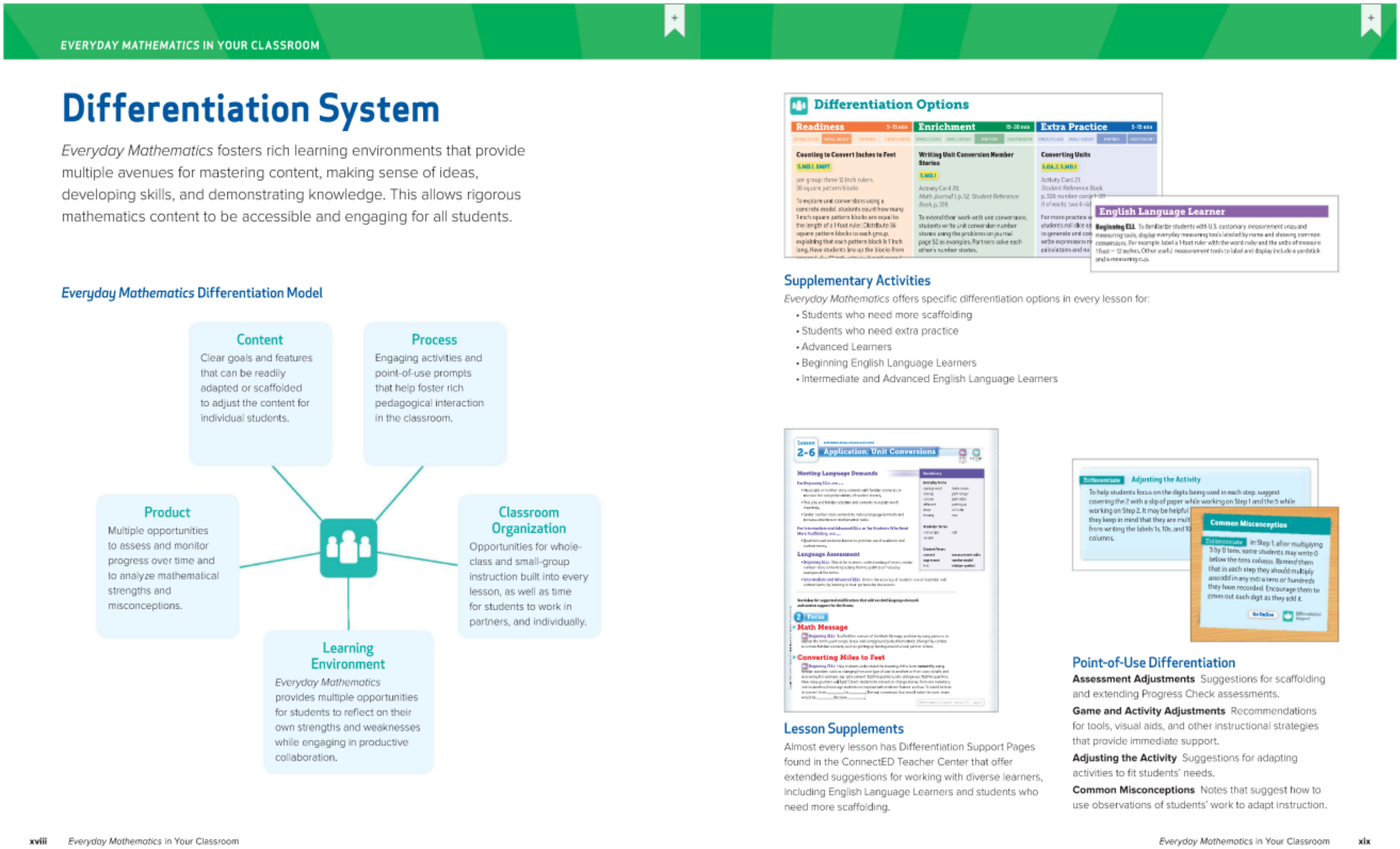
Components for Differentiation

These components provide instructional support within the lessons to address the needs of special populations.



EVERYDAY MATHEMATICS IN YOUR CLASSROOM

Differentiation System

Everyday Mathematics fosters rich learning environments that provide multiple avenues for mastering content, making sense of ideas, developing skills, and demonstrating knowledge. This allows rigorous mathematics content to be accessible and engaging for all students.

Everyday Mathematics Differentiation Model

Supplementary Activities

Everyday Mathematics offers specific differentiation options in every lesson for:

- Students who need more scaffolding
- Students who need extra practice
- Advanced Learners
- Beginning English Language Learners
- Intermediate and Advanced English Language Learners

Lesson Supplements

Almost every lesson has Differentiation Support Pages found in the ConnectED Teacher Center that offer extended suggestions for working with diverse learners, including English Language Learners and students who need more scaffolding.

Point-of-Use Differentiation

Assessment Adjustments Suggestions for scaffolding and extending Progress Check assessments.

Game and Activity Adjustments Recommendations for tools, visual aids, and other instructional strategies that provide immediate support.

Adjusting the Activity Suggestions for adapting activities to fit students' needs.

Common Misconceptions Notes that suggest how to use observations of students' work to adapt instruction.

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WIN Time and Flex Day Clarification

<table>
<tr><th>WIN (What I Need) Time
25 Minutes Daily</th><th>Flex Days
1-2 Per Week</th></tr>
<tr><td colspan="2">**Use eDoctrina Unit Report, MAP reports, exit tickets, clipboard cruising, etc. to determine what you will focus on in both WIN time and flex days.

**Dreambox can be utilized either day, but usage should not exceed 60 minutes per week.</td></tr>
<tr><td>• Meet with small groups based on data.
• Different groups can focus on different skills. (data based)
• Grade 4 Air Tutor groups meet on M/W/F.
• Do the Math small groups meet.
• Provide enrichment as well as intervention.</td><td>• This is a teaching day, whether it be whole group or small group, it is not a game day.
• These days can be used to “catch up” if you are beyond the suggested dates of the At-a-Glance document.
• Reteach or extend a lesson.
• Build background for an upcoming unit. (Example: Review equivalent fractions before a unit on adding fractions with unlike denominator
• Use additional resources from Google shared drive unit folders.
• Complete writing tasks from Reasoning and Modeling Item Bank.
• Give students opportunities to work with problems in the format they will encounter on MCAP. (MCAP Practice Tests, MCAP Released Items, Responses requiring Students to TYPE Responses)
• Give students activities to promote independence. Written or task type activities should be completed without support/clarification and with time limits.
• Use technology resources aligning with current unit including Braining Camp or Tang Math.</td></tr>
</table>

GR K-5 Suggested Math Lesson Plan Template (75 Minute Block)

<table>
<tr><td colspan="8">EM4 Lesson and Overview –</td></tr>
<tr><td colspan="8">Standards/Objectives –</td></tr>
<tr><td colspan="8">Standards for Mathematical Practice (Circle those applicable.)</td></tr>
<tr><td>1. Students make sense of problems and persevere in solving them</td><td>2. Students reason abstractly and quantitatively</td><td>3. Students construct viable arguments and critique the reasoning of others</td><td>4. Students model with mathematics</td><td>5. Students use appropriate tools strategically</td><td>6. Students attend to precision</td><td>7. Students look for and make use of structure</td><td>8. Students look for and express regularity in repeated reasoning</td></tr>
<tr><td colspan="8">**Times are approximate and may vary for each component based on lesson/skill.</td></tr>
</table>

<table>
<tr><td>Lesson Component</td><td>Time</td><td>Activities</td><td>Materials</td></tr>
<tr><td>Lesson Openers</td><td>10 min

10 min</td><td>• Math Meeting and/or Number Talk
• Daily Structured Word Problem

• Strategy focused basic fact discussion</td><td>Number Talk Book
Quick Look Cards (K-3)
Math Meeting Materials
Tang Math Word Problems</td></tr>
<tr><td></td><td>Time</td><td>EM4 Focus</td><td>Materials</td></tr>
<tr><td>Lesson Focus (Step 2)

(2-4 activities)

Practice (Step 3)</td><td>30 min</td><td>• Math Message
• Share objective, essential questions, and success criteria
• Focus Activities
• Journal Pages/Reasoning & Modeling Tasks
• Math Boxes – Math Boxes must be completed daily to give students sufficient opportunities to review skills and concepts.
• Assessment Check-In</td><td>EM4, Math Journals
Reasoning & Modeling Tasks
3 Act Tasks
Tang Math
Nearpod
Brainingcamp</td></tr>
<tr><td>Lesson Component</td><td>Time</td><td>Activities</td><td>Materials</td></tr>
<tr><td>Supplemental Support</td><td>15-20 min</td><td>• Small Group Support/DreamBox</td><td>EM4
Tang Math</td></tr>
<tr><td>Lesson Component</td><td>Time</td><td>Activities</td><td></td></tr>
<tr><td>Closure</td><td>5-10 min</td><td>• Review objective(s), essential question, and success criteria.
• Students reflect on their learning and the success criteria</td><td>Formative assessment in eDoctrina
Exit ticket</td></tr>
</table>

GR K-5 Suggested Math Lesson Plan Template (75 Minute Block)

EM4 Lesson and Overview –

Standards/Objectives –

Standards for Mathematical Practice (Circle those applicable.)							
1. Students make sense of problems and persevere in solving them	2. Students reason abstractly and quantitatively	3. Students construct viable arguments and critique the reasoning of others	4. Students model with mathematics	5. Students use appropriate tools strategically	6. Students attend to precision	7. Students look for and make use of structure	8. Students look for and express regularity in repeated reasoning

**Times are approximate and may vary for each component based on lesson/skill.

Lesson Component	Time	Activities	Materials
Lesson Openers	10/15 min 10 min	• Math Meeting and/or Number Talk • Daily Structured Word Problem • <u>Strategy</u> focused basic fact <u>discussion</u>	
	Time	EM4 Focus	Materials
Lesson Focus (Step 2) (2-4 activities) Practice (Step 3)	30 min	• Math Message • Focus Activities • Journal Pages/Math Boxes/ ACIs	
Lesson Component	Time	Activities	Materials
Supplemental Support	15-20 min		
Lesson Component	Time	Activities	Materials
Closure	5-10 min		

Math Meetings

Math Meetings **must** be done 2-5 times a week. A Math Meeting gets your students thinking and ready for math class. It helps create a routine for part of the 75-minute math block.

Value of Routines -

1. Bring sense of predictability and comfort to our classrooms.
2. Help with organization and classroom management and help make transitions smooth.
3. Can enhance instruction.
4. Offer access to big ideas in mathematics and allow deep understanding of math concepts.
5. Can be designed to focus on the desired math content/student needs.
6. Give students opportunities to develop expertise with the eight Standards for Mathematical Practice.

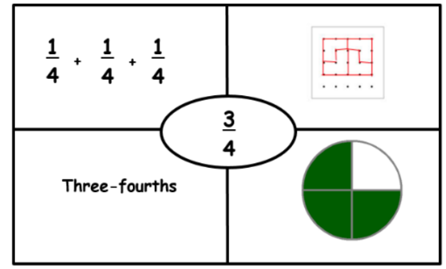
Elements of a Math Meeting:

- Takes place daily unless a full Number Talk is done that day
- Is 10 - 15 minutes in duration (timer would be helpful)
- Students use whiteboards/pinch cards/templates to show responses
- Include a variety of activities based on place value, fact fluency, number sense, and problem solving
- The expectation is to complete several activities in 10-15 minutes
- Students can be brought to a common area around the teacher (or move some closer)
- Review of skills previously taught this year and earlier years (spiral)
- Add variety as the year progresses

Grade 4 Suggested Math Meeting Activities

- Odd Man Out
- Missing Factor Cards
- Missing Divisor Cards
- Four Square
- Here to There
- Fraction Number Bonds
- Fractions Make It Whole
- Number Jumbles for Multiplication & Division
- Fractions Missing Addends
- Distributive Property with Array Cards
- Extended Fact Triangles

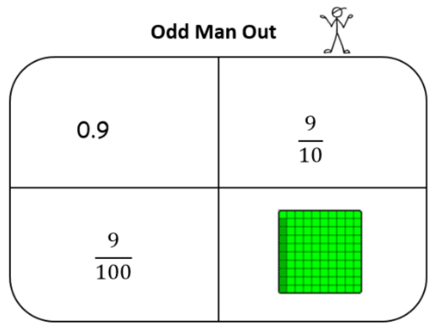
Four Square



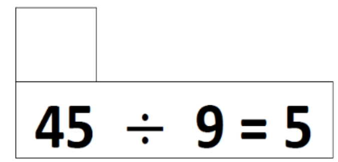
Fraction Missing Addends

$$\frac{3}{8} + \square = \frac{7}{8}$$

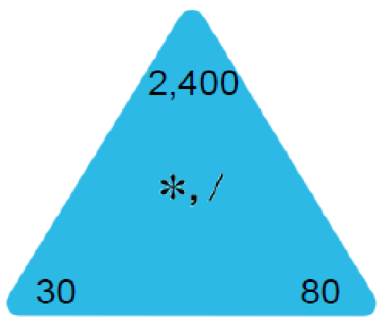
Odd Man Out



Missing Divisor Cards



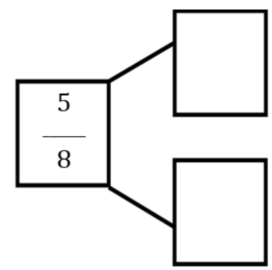
Extended Fact Triangles



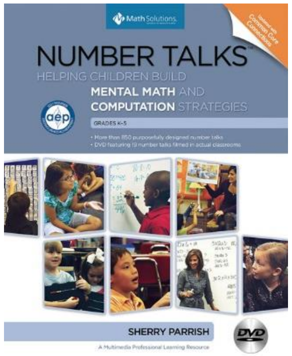
Here to There

100	→	50
250	→	150
100	→	75
347	→	547
430	→	830

Fraction Number Bonds



Number Talks



Number Talks **must** be done at least 2-3 times a week. The activity will take between 5 and 15 minutes. Sherry Parrish's book, *Number Talks,* provides examples that will help build students' fluency, mental math capabilities and reasoning skills. The following video clip from Math Solutions is an excellent example of a number talk in action.

http://www.mathsolutions.com/videopage/videos/Final/Classroom_NumberTalk_Gr3.swf

During the Number Talk, the teacher is not the definitive authority. The teacher is the facilitator and is listening for and building on the students' natural mathematical thinking. The teacher writes a problem horizontally on the board in whole group or a small setting. The students mentally solve the problem and share with the whole group **how** they derived the answer. They must justify and defend their reasoning. The teacher simply records the students' thinking and poses extended questions to draw out deeper understanding for all.

The effectiveness of Numbers Talks depends on the routines and environment that is established by the teacher. Students must be given time to think quietly without pressure from their peers. To develop this, the teacher should establish a signal, other than a raised hand, of some sort to identify that one has a strategy to share. One way to do this is to place a finger on their chest indicating that they have one strategy to share. If they have two strategies to share, they place out two fingers on their chest and so on.

Number talks often have a focus strategy such as "making tens" or "compensation." Providing students with a string of related problems, allows students to apply a strategy from a previous problem to subsequent problems. Some units lend themselves well to certain Number Talk topics. These mental math strategies should be applied with problems throughout daily math lessons.

<u>Wicomico County's Fact Fluency Expectations</u>

A substantial amount of mathematics education research shows that children do not master their math facts through memorization alone. Instead, true mastery comes from being equipped with quick and effective strategies for finding the solution. By using these strategies, children will always have the mental tools needed to find the correct answer and the confidence to use them (Boaler, 2009).

Pivotal Ideas for Numerical Fluency (Steve Leinwand)

1. All quantities are comprised of **parts and wholes** so that one understands that quantities can be put together and taken apart in a variety of ways.
2. All numbers greater than 1 can be **decomposed into small numbers**. Automaticity with decomposing the numbers 3, 4, 5 and 6 are non-negotiable and completely teachable aspects of numerical fluency. THIS ONE IS A GATEKEEPER!
3. **Acquisition of the language of the four operations** must precede the learning of facts because number sentences and equations make no sense unless grounded in situations. Accordingly, storytelling and acting out are essential strategies for developing operation sense and numerical fluency.
4. There are several **powerful properties of operations** that reduce memory load and contribute to numerical fluency.
5. **Numerical fluency requires that students talk** about how numbers relate to one another and participate in discussions of alternative approaches that students use.
6. **5 and 10 are cornerstones of numerical fluency** and play a critical role in our number system, hence the power of five frames and ten frames. Mastery of 5 + numbers, that is, 5 + 1, 5 + 2, 5 + 3, etc., is critical for developing fluency.
7. **A deep understanding that 9 and (10 – 1)** are the same number, supports numerical fluency with a range of so-called "hard" addition, subtraction, multiplication and division facts.
8. **Deep knowledge of groups of 2, 3, 5 and 10 are cornerstones to multiplication fluency.**
9. **Addition facts are a foundation for all of the rest of the operations.**
10. **Place value understanding dominates fluency with larger numbers.**

Wicomico County's Fact Fluency Expectations (cont.)

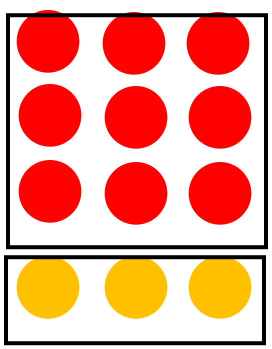
Students develop basic fact fluency through stages:

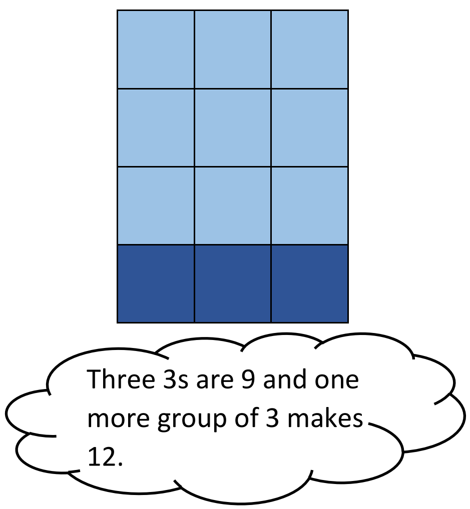
1. Introduce a strategy with concrete materials and pictorial representations.
2. Reinforcing the strategy through pictorial models and connecting it to the symbolic models.
3. Practice the strategy through a range of activities that are written and oral. This stage develops accuracy and speed of recall.
4. Extend the strategy by applying the strategy to other numbers.

In grades 3-5 stage 1 and 2 utilize square tiles, counters, graph paper, arrays and equal grouping representations, and repeated addition. Then students should connect pictorial models to a written strategy first by orally explaining and then by writing.

In fifth grade, the focus should be on connecting to written strategies. Representations alone are not enough to demonstrate fluency.

For example: Near Squares





Example: $4 \times 3 = ?$

Square helper fact: $3 \times 3 = 9$

Near square: $4 \times 3 = 12$

How I solved it: *I added a group of 3 to find 4 × 3.*

Resources for Fluency Practice
See Chapter 3: Helping Children Master the Basic Facts in Van de Walle (3-5)
EM 4 Strategies: Skip Counting, Turn-Around Rule (Commutative Property), Repeated Addition, Break Apart, Adding a Group. Subtracting a Group, Doubling, Near Squares
Number Talks: Repeated Addition and Skip Counting, Making Landmark or Friendly Numbers, Partial Products or Distributive Property, Doubling and Halving, Breaking Factors into Smaller Factors
Quick Look Cards, Subitizing Cards, Triangle Flashcards
Games which reinforce strategies – EM 4 Games, See folder in shared drive for additional resources
Use flashcards for purposeful practice. See Van de Walle (sorting facts, supporting a strategy)
Drill and practice which focus on strategies – See Van de Walle pg. 117.
Assessment – student interviews, observation, and writing prompts. See samples below. Avoid timed tests and drills since they offer little insight about how flexible students are in their use of strategies or even which strategies a student selects.

FIGURE 2

Various responses to a journal prompt illustrate the strategies that first graders used and reveal which children were able to appropriately select and explain an efficient strategy for the task.

If your friend did not know the answer to 4 + 5, how could he figure it out?

MAY 10, 2012
I would tell my friend to take 5 and count 4 in your hand

I would tell my friend to Start with 5 then add 2 Then one more 2 and then You have 9.

I would tell my friend to yous a duble pluc 1. 4+4=8 so count 1 up now you get your ancer

I would tell my friend to takaway one number from ten. And that is nine. I know that five plus five equals ten.

TABLE 3

This collection of prompts addresses the four components of fluency with basic facts. Writing about their strategies on a weekly basis engages students in self-reflection and monitoring, as well as emphasizes the importance of strategies in practicing basic facts.

Writing prompts for developing fluency with the basic facts

Appropriate strategy selection	Flexibility
• Explain how to use the "count on" strategy for 3 + 9. • What strategy did you use to solve 6 + 8? • A friend is having trouble with some of his times 6 facts. What strategy might you teach him? • Emily solved 6 + 8 by changing it in her mind to 4 + 10. What did she do? Is this a good strategy? Tell why or why not.	• How can you use 7 × 10 to find the answer to 7 × 9? • Solve 6 × 7 using one strategy. Now try solving it using a different strategy. • Emily solved 6 + 8 by changing it in her mind to 4 + 10. What did she do? Does this strategy always work?
Efficiency	**Accuracy**
• What strategy did you use to solve 9 + 3? • How can you use 7 × 7 to solve 7 × 8? • Which facts do you "just know"? For which facts do you use a strategy?	• Crystal explains that 6 + 7 is 12. Is she correct? Explain how you know. • What is the answer to 7 × 8? How do you know it is correct (how might you check it)?

Creative writing ideas that address several components

- Develop a "Face the facts" or "Ask Cougar" column (like Dear Abby) for the class. (Pick a fun name for the column that makes sense for the class, such as the school mascot.) Students send a letter about a tough fact. Rotate different students into the role of responder. The responder writes letters back, suggesting a strategy for the tough fact.
- Create a strategy rhyme (e.g., If times four is giving me trouble, I'll remember to double and double).
- Make a facts survival guide. Children prepare pages illustrating with visuals (e.g., ten frames or arrays) of how find "tough" facts.
- Write a yearbook entry to some facts (e.g., Dear 8 × 7, I …)

(See McIntosh 1997 for many more ideas).

Grade 4 Overview

Operations and Algebraic Thinking (OA)

- Use the four operations with whole numbers to solve problems.
- Gain familiarity with factors and multiples.
- Generate and analyze patterns.

Number and Operations in Base Ten (NBT)

- Generalize place value understanding for multi-digit whole numbers.
- Use place value understanding and properties of operations to perform multi-digit arithmetic.

Number and Operations—Fractions (NF)

- Extend understanding of fraction equivalence and ordering.
- Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.
- Understand decimal notation for fractions and compare decimal fractions.

Measurement and Data (MD)

- Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.
- Represent and interpret data.
- Geometric measurement: understand concepts of angle and measure angles.

Geometry (G)

- Draw and identify lines and angles and classify shapes by properties of their lines and angles.

Major Cluster Supporting Cluster Additional Cluster

Standards for Mathematical Practice	
Standards	**Explanations and Examples**
1. Make sense of problems and persevere in solving them.	In fourth grade, students know that doing mathematics involves solving problems and discussing how they solved them. Students explain to themselves the meaning of a problem and look for ways to solve it. Fourth graders may use concrete objects or pictures to help them conceptualize and solve problems. They may check their thinking by asking themselves, “Does this make sense?” They listen to the strategies of others and will try different approaches. They often will use another method to check their answers.
2. Reason abstractly and quantitatively.	Fourth graders should recognize that a number represents a specific quantity. They connect the quantity to written symbols and create a logical representation of the problem at hand, considering both the appropriate units involved and the meaning of quantities. They extend this understanding from whole numbers to their work with fractions and decimals. Students write simple expressions, record calculations with numbers, and represent or round numbers using place value concepts.
3. Construct viable arguments and critique the reasoning of others.	In fourth grade, students may construct arguments using concrete referents, such as objects, pictures, and drawings. They explain their thinking and make connections between models and equations. They refine their mathematical communication skills as they participate in mathematical discussions involving questions like “How did you get that?” and “Why is that true?” They explain their thinking to others and respond to others’ thinking.
4. Model with mathematics.	Students experiment with representing problem situations in multiple ways including numbers, words (mathematical language), drawing pictures, using objects, making a chart, list, or graph, creating equations, etc. Students need opportunities to connect the different representations and explain the connections. They should be able to use all of these representations as needed. Fourth graders should evaluate their results in the context of the situation and reflect on whether the results make sense.
5. Use appropriate tools strategically.	Fourth graders consider the available tools (including estimation) when solving a mathematical problem and decide when certain tools might be helpful. For instance, they may use graph paper or a number line to represent and compare decimals and protractors to measure angles. They use other measurement tools to understand the relative size of units within a system and express measurements given in larger units in terms of smaller units.
6. Attend to precision.	As fourth graders develop their mathematical communication skills, they try to use clear and precise language in their discussions with others and in their own reasoning. They are careful about specifying units of measure and state the meaning of the symbols they choose. For instance, they use appropriate labels when creating a line plot.
7. Look for and make use of structure.	In fourth grade, students look closely to discover a pattern or structure. For instance, students use properties of operations to explain calculations (partial products model). They relate representations of counting problems such as tree diagrams and arrays to the multiplication principal of counting. They generate number or shape patterns that follow a given rule.
8. Look for and express regularity in repeated reasoning.	Students in fourth grade should notice repetitive actions in computation to make generalizations Students use models to explain calculations and understand how algorithms work. They also use models to examine patterns and generate their own algorithms. For example, students use visual fraction models to write equivalent fractions.

GRADE 4 COMMON CORE INTRODUCTION

In Grade 4, instructional time should focus on three critical areas: (1) developing understanding and fluency with multi-digit multiplication, and developing understanding of dividing to find quotients involving multi-digit dividends; (2) developing an understanding of fraction equivalence, addition and subtraction of fractions with like denominators, and multiplication of fractions by whole numbers; (3) understanding that geometric figures can be analyzed and classified based on their properties, such as having parallel sides, perpendicular sides, particular angle measures, and symmetry.

1. Students generalize their understanding of place value to 1,000,000, understanding the relative sizes of numbers in each place. They apply their understanding of models for multiplication (equal-sized groups, arrays, area models), place value, and properties of operations, in particular the distributive property, as they develop, discuss, and use efficient, accurate, and generalizable methods to compute products of multi-digit whole numbers. Depending on the numbers and the context, they select and accurately apply appropriate methods to estimate or mentally calculate products. They develop fluency with efficient procedures for multiplying whole numbers; understand and explain why the procedures work based on place value and properties of operations; and use them to solve problems. Students apply their understanding of models for division, place value, properties of operations, and the relationship of division to multiplication as they develop, discuss, and use efficient, accurate, and generalizable procedures to find quotients involving multi-digit dividends. They select and accurately apply appropriate methods to estimate and mentally calculate quotients, and interpret remainders based upon the context.
2. Students develop understanding of fraction equivalence and operations with fractions. They recognize that two different fractions can be equal (e.g., 15/9 = 5/3), and they develop methods for generating and recognizing equivalent fractions. Students extend previous understandings about how fractions are built from unit fractions, composing fractions from unit fractions, decomposing fractions into unit fractions, and using the meaning of fractions and the meaning of multiplication to multiply a fraction by a whole number.
3. Students describe, analyze, compare, and classify two-dimensional shapes. Through building, drawing, and analyzing two-dimensional shapes, students deepen their understanding of properties of two-dimensional objects and the use of them to solve problems involving symmetry.

The Table below is an important resource for understanding addition and subtraction structures. Problems in this format should be used on a regular basis.

Glossary

Table 1 Common addition and subtraction situations[1]

	Result Unknown	Change Unknown	Start Unknown
Add to	Two bunnies sat on the grass. Three more bunnies hopped there. How many bunnies are on the grass now? $2 + 3 = ?$	Two bunnies were sitting on the grass. Some more bunnies hopped there. Then there were five bunnies. How many bunnies hopped over to the first two? $2 + ? = 5$	Some bunnies were sitting on the grass. Three more bunnies hopped there. Then there were five bunnies. How many bunnies were on the grass before? $? + 3 = 5$
Take from	Five apples were on the table. I ate two apples. How many apples are on the table now? $5 - 2 = ?$	Five apples were on the table. I ate some apples. Then there were three apples. How many apples did I eat? $5 - ? = 3$	Some apples were on the table. I ate two apples. Then there were three apples. How many apples were on the table before? $? - 2 = 3$
	Total Unknown	**Addend Unknown**	**Both Addends Unknown[2]**
Put Together/ Take Apart[3]	Three red apples and two green apples are on the table. How many apples are on the table? $3 + 2 = ?$	Five apples are on the table. Three are red and the rest are green. How many apples are green? $3 + ? = 5$, $5 - 3 = ?$	Grandma has five flowers. How many can she put in her red vase and how many in her blue vase? $5 = 0 + 5$, $5 = 5 + 0$ $5 = 1 + 4$, $5 = 4 + 1$ $5 = 2 + 3$, $5 = 3 + 2$
	Difference Unknown	**Bigger Unknown**	**Smaller Unknown**
Compare[4]	("How many more?" version): Lucy has two apples. Julie has five apples. How many more apples does Julie have than Lucy? ("How many fewer?" version): Lucy has two apples. Julie has five apples. How many fewer apples does Lucy have than Julie? $2 + ? = 5$, $5 - 2 = ?$	(Version with "more"): Julie has three more apples than Lucy. Lucy has two apples. How many apples does Julie have? (Version with "fewer"): Lucy has 3 fewer apples than Julie. Lucy has two apples. How many apples does Julie have? $2 + 3 = ?$, $3 + 2 = ?$	(Version with "more"): Julie has three more apples than Lucy. Julie has five apples. How many apples does Lucy have? (Version with "fewer"): Lucy has 3 fewer apples than Julie. Julie has five apples. How many apples does Lucy have? $5 - 3 = ?$, $? + 3 = 5$

[2]These take apart situations can be used to show all the decompositions of a given number. The associated equations, which have the total on the left of the equal sign, help children understand that the = sign does not always mean makes or results in but always does mean is the same number as.

[3]Either addend can be unknown, so there are three variations of these problem situations. Both Addends Unknown is a productive extension of this basic situation, especially for small numbers less than or equal to 10.

[4]For the Bigger Unknown or Smaller Unknown situations, one version directs the correct operation (the version using more for the bigger unknown and using less for the smaller unknown). The other versions are more difficult.

The Table below is an important resource for understanding multiplication and division structures. Problems in this format should be used on a regular basis.

Table 2 Common multiplication and division situations[1]

	Unknown Product $3 \times 6 = ?$	Group Size Unknown ("How many in each group?" Division) $3 \times ? = 18$, and $18 \div 3 = ?$	Number of Groups Unknown ("How many groups?" Division) $? \times 6 = 18$, and $18 \div 6 = ?$
Equal Groups	There are 3 bags with 6 plums in each bag. How many plums are there in all? *Measurement example*. You need 3 lengths of string, each 6 inches long. How much string will you need altogether?	If 18 plums are shared equally into 3 bags, then how many plums will be in each bag? *Measurement example*. You have 18 inches of string, which you will cut into 3 equal pieces. How long will each piece of string be?	If 18 plums are to be packed 6 to a bag, then how many bags are needed? *Measurement example*. You have 18 inches of string, which you will cut into pieces that are 6 inches long. How many pieces of string will you have?
Arrays,[2] Area[3]	There are 3 rows of apples with 6 apples in each row. How many apples are there? *Area example*. What is the area of a 3 cm by 6 cm rectangle?	If 18 apples are arranged into 3 equal rows, how many apples will be in each row? *Area example*. A rectangle has area 18 square centimeters. If one side is 3 cm long, how long is a side next to it?	If 18 apples are arranged into equal rows of 6 apples, how many rows will there be? *Area example*. A rectangle has area 18 square centimeters. If one side is 6 cm long, how long is a side next to it?
Compare	A blue hat costs $6. A red hat costs 3 times as much as the blue hat. How much does the red hat cost? *Measurement example*. A rubber band is 6 cm long. How long will the rubber band be when it is stretched to be 3 times as long?	A red hat costs $18 and that is 3 times as much as a blue hat costs. How much does a blue hat cost? *Measurement example*. A rubber band is stretched to be 18 cm long and that is 3 times as long as it was at first. How long was the rubber band at first?	A red hat costs $18 and a blue hat costs $6. How many times as much does the red hat cost as the blue hat? *Measurement example*. A rubber band was 6 cm long at first. Now it is stretched to be 18 cm long. How many times as long is the rubber band now as it was at first?
General	$a \times b = ?$	$a \times ? = p$, and $p \div a = ?$	$? \times b = p$, and $p \div b = ?$

[2]The language in the array examples shows the easiest form of array problems. A harder form is to use the terms rows and columns: The apples in the grocery window are in 3 rows and 6 columns. How many apples are in there? Both forms are valuable.
[3]Area involves arrays of squares that have been pushed together so that there are no gaps or overlaps, so array problems include these especially important measurement situations.

MCAP Grade 4 Evidence Statements

Overview

The Maryland Comprehensive Assessment Program (MCAP) includes a coherent set of summative mathematics assessments aligned to the Maryland College and Career Ready Mathematics Standards. Students are required to take the MCAP Mathematics assessment at the end of grades 3-8 and at the end of Algebra I. Students may also take a MCAP Mathematics Assessment at the end of Geometry and Algebra II.

The MCAP Mathematics assessment development process is based on Evidence-Centered Design (ECD). The Evidence-Centered Design process begins by establishing the answer to "What skills and understandings should be assessed?". The MCCRMS describe the skills and understandings that the MCAP Mathematics assessments assess. Assessments are then designed to gather evidence that allows inferences to be made. Assessments can be designed to allow inferences of various grain sizes. The MCAP Mathematics assessments are summative assessments and are therefore designed to provide evidence that allows only general inferences about a student's mathematical skills and understandings. The MCAP Mathematics Claims Structure describes the grain size of the evidence that the MCAP Mathematics assessments will yield. Assessment items are designed to elicit evidence of a student's level of proficiency for each claim.

MCAP Mathematics Claims Structure

Master Claim

The student is college and career ready or is "On-Track" to being college and career ready in mathematics

Sub-Claims

Content	• The student solves problems related to all content of the grade/course related to the Standards for Mathematical Practice
Reasoning	• The student expresses grade/course level appropriate mathematical reasoning
Modeling	• The student solves real-world problems with a degree of difficulty appropriate to the course

MCAP Grade 4 Evidence Statements

Reasoning - Calculators are available for all reasoning items

MCCRS Code	Evidence Statement	Clarifications
4.R.1	Base reasoning/explanations using a given pictorial representations and explains how the pictorial model represents a mathematical concept, or how it can be used to justify or refute a statement (with or without flaws) or how it can be used to generalize.	• Tasks provide visual (drawn) representations for students to explain how a given visual representation represents a mathematic concept OR • Tasks provide a visual representation for students to explain how it can justify or refute a statement or reasoning OR • Tasks provide a given visual representation to make a conjecture or generalization. • Tasks should focus on content in standards that specify reasoning using visual mathematical representations (number lines, diagrams, and tables, etc.) **Type I Tasks** - Must have a simple context to support reasoning in a 1-point task. ▪ May ask students to identify or select given reasoning that explains how the visual models represents a given mathematical concept ▪ May ask students to use the visual model and select a statement or work that will justify or refute a given conjecture ▪ May ask students to use the given visual model and select the correct generalization that the model proves is true **Type II Tasks** - Must have context rich enough to support reasoning of a 3-point task. ▪ Constructed response tasks allow students to provide work and/or a written explanation and/or use the drawing tool to describe their own reasoning. ▪ Tasks may prompt students to explain why the pictorial representations does or does not represent the mathematical concept or procedure; or to justify or refute an argument.
4.R.2	Identify flawed thinking/reasoning and explain how to correct the thinking or work.	• Tasks prompt students to identify the flaw in thinking/reasoning and explain how to correct the thinking or work **Type I tasks**- Must have a simple context to support reasoning in a 1-point task. ▪ Provide a statement or work with flawed thinking/reasoning and have students identify the flaw. OR ▪ Prompt students to select or identify given statements or work that describe how to correct the flaw (could be correct work) OR **Type II Tasks**- Must have a rich enough context to support reasoning in a 3-point task. ▪ Constructed response tasks allow students to explain the flaw AND how to correct the flaw using written explanations with words, work or use the drawing tool to support or further explain their own reasoning.

MCAP Grade 4 Evidence Statements

MCCRS Code	Evidence Statement	Clarifications
4.R.2	Identify flawed thinking/reasoning and explain how to correct the thinking or work.	• Tasks prompt students to identify the flaw in thinking/reasoning and explain how to correct the thinking or work **Type I Tasks**- Must have a simple context to support reasoning in a 1-point task. ▪ Provide a statement or work with flawed thinking/reasoning and have students identify the flaw. OR ▪ Prompt students to select or identify given statements or work that describe how to correct the flaw (could be correct work) OR **Type II Tasks**- Must have a rich enough context to support reasoning in a 3-point task. ▪ Constructed response tasks allow students to explain the flaw AND how to correct the flaw using written explanations with words, work or use the drawing tool to support or further explain their own reasoning.
4.R.3	Prove or disprove a statement, conjecture or generalization, using correct and precise mathematical examples. (visual representation, words, symbols, equations or expressions)	**Type I Tasks**- Must have a simple context to support reasoning in a 1-point task. ▪ Tasks should state a conjecture based a mathematical concept that is either true or false. Students are then prompted to provide specific mathematically correct examples, Examples should be appropriate and precise. ▪ Tasks should require students to provide at least two and no more than three examples. ▪ Tasks should not provide or expect answers that are in the negative. ▪ Provide a conjecture or generalization and ask students to select two examples that prove or disprove the statement ▪ Students may select examples that may be visual representations, words and symbols, equations or expressions to prove or disprove the conjecture. **Type II Tasks**- Must have context rich enough to support reasoning in a 3-points task. ▪ Constructed response tasks allow students to prove or disprove a statement, conjecture, or generalization with mathematical examples. ▪ Students provide at least two examples that may be visual representations, words and symbols, equations or expressions.

MCAP Grade 4 Evidence Statements

MCCRS Code	Evidence Statement	Clarifications
4.R.4	Reason mathematically to create a correct and precise solution to a real-world problem and be able to explain why the answer is mathematically correct	• Content scope of tasks is based on evidence statements that ask students to explain their thinking/reasoning to major mathematics concepts in the grade. **Type I Tasks** - Must have real-world problems with a simple context to support reasoning in a 1-point task. ▪ Tasks may ask students to identify the steps that would justify why the solution to a problem or a mathematical concept is true. ▪ Tasks could provide solution paths that describe the most common reasoning strategies and prompt students to select the correct solution path. **Type II Tasks** - Must have context rich enough to support reasoning in a 3-point task. ▪ Constructed response Type II tasks allow the students to provide their own solution path to justify why the solution to the problem is correct. ▪ Students are prompted to represent their reasoning using complete and precise work, an explanation using words and or symbols, and or the drawing tool.

MCAP Grade 4 Evidence Statements

Modeling - One-point items could be assessed using 4.M1-1, 4.M.1-2, or 4.M.1-3. Three-point items could be assessed with 4.M.1-4 and/or 4.M.1-5 or a combination of two or more one-point evidence statements depending on the context of the problem situation.

MCCRS Code	Evidence Statement	Clarifications
4.M.1-1	Determine the problem that needs to be solved in a real-world, situation.	• Tasks do not require a solution. • Some tasks may include charts or graphs that could be analyzed for information about the problem. • Some tasks could require students to describe, in their own words, the problem that needs to be solved. (What is the problem that needs to be solved?) • Some tasks could provide a real-world situation without a question to solve and students would be prompted to create a question that could be asked based on the problem situation. • Some tasks could require students to restate the problem in their own words.
4.M.1-2	Determine the information that is needed to solve a problem in a given real-world situation. (What information is needed to solve the situation, no operations or a solution path is needed)	• Tasks do not require a solution, expressions, or equations. • Tasks may include charts or graphs that can be analyzed for information. • Some tasks may prompt students to identify the information, from a given problem, that is needed to solve the problem. • Some tasks may not provide all of the information needed to solve the problem. Students will make assumptions based on the information that is given in the problem.
4.M.1-3	Identify the mathematics that is needed to create a solution path for areal-world, situation (No solution path, just identify which operations will be needed to solve the problem).	• Tasks do not require a solution path with answers. Tasks could prompt the students to identify the sequence of operations needed to create a solution path. (For example, "First add then subtract") • Tasks could prompt students to identify or write an expression with the correct sequence of operations, write an equation with a letter for the answer, or write expressions. • Responses should be mathematically correct and precise.
4.M.1-4	Create a solution path that represents the mathematics needed to solve a real-world situation.	• Tasks must provide a problem scenario that allows for a solution path that shows two-steps. • Tasks should prompt students to represent a solution path using correct and precise mathematical representations. (words, symbols, drawings, etc.) • Tasks would require a complete and accurate solution path that includes the answer.
4.M.1-5	Evaluate a partial or complete solution to a real-world situation. (Check work)	• Tasks require students to analyze a given solution path (partial or complete) to determine if it is a mathematically correct solution path for the given real-world situation. If the solution path is correct, then students should explain why it is correct. • If the solution path is incorrect, tasks should ask students to improve or refine a problem solution.

Grade 4 Math At-A-Glance 2022 – 2023		
Units	**Suggested Dates**	**Important Dates**
Building Math Routines & Community • **Do not jump into instruction.** • Create a math learning environment. • Get students on Dreambox. • Establish Math Meeting routine and introduce activities. • Have students complete group activities and explain group expectations. • Model think-alouds. • Model and practice class discussions where students agree or disagree with other students' thinking. • Do Number Talks. • Do fluency formative assessments to identify student needs. • Introduce Greg Tang website. • Explore Braining Camp with students. • Explore Student Resource Book, **Lesson 1.4**, Math Journal, and EM4 games. • Do activities using content from previous grade so students meet with success. • Have students practice logging in, exploring tools, and take a practice test in eDoctrina. • Do the Math Pretesting	September 6-16	**MAP Testing**
Unit 1: **Place Value: Multi-Digit Addition and Subtraction** Students explore place-value concepts for multidigit whole numbers. They use U.S. traditional addition and subtraction to add and subtract multidigit whole numbers.	Sept. 19 - Oct. 14 20 days 13 lessons	
Unit 2: **Multiplication and Geometry** Students explore various applications for multiplication. They classify shapes by properties and develop formulas for finding the area of a rectangle.	Oct. 17 – Nov. 16 19 days 14 lessons	October 21 Professional Day (MSEA Convention) November 8 Election Day
Unit 3: **Fractions and Decimals** Students explore fraction equivalence and compare and order fractions using different representations. They then extend their understanding of fractions to decimals, comparing and ordering decimals using the same methods as for comparing fractions.	Nov. 17 – Dec. 16 19 days 14 lessons	November 23-25 Thanksgiving Holiday December 19 – January 2 Winter Holiday

Unit 4: **Multi-Digit Multiplication** Students are introduced to the basic principles of multidigit multiplication by focusing on extending multiplication skills and exploring the partial-products method. They use their knowledge of multiplication to find the areas of rectangles and to convert units of measurement.	Jan. 2 – Jan. 27 19 days 12 lessons	**MAP Testing** Lessons 4.10 and 4.13 can be skipped or done on a flex day. January 16 MLK Day
Unit 5: **Fraction and Mixed Number Computation, Measurement** Students explore the whole in fractions as well as adding and subtracting fractions and mixed numbers. Students use these computation skills to answer questions about line plots. They are also introduced to adding tenths and hundredths. Students build on their knowledge of rays to explore unit iteration for angles.	Jan. 31 – Feb. 24 17 days 14 lessons	January 30 Professional Day February 20 Presidents' Day
Unit 6: **Division and Angles** Students explore the relationship between multiplication and division by developing a method for dividing whole numbers and solving division number stories. They are introduced to protractors and explore using them to measure and construct angles.	Feb. 27 – March 24 19 days 14 lessons	March 1 Early Dismissal, PM PD
Unit 7: **Multiplication of a Fraction by a Whole Number and Measurement** Students formalize their understanding of multiplying a fraction by a whole number and use this knowledge to solve problems in real-world scenarios.	March 27--April 28 21 days 14 lessons	April 5 Early Dismissal, PM PD April 6-April 10 Spring Holiday **MCAP Testing**
Unit 8: **Fraction Operations & Applications** Students apply their knowledge of fractions, number concepts, patterns, and geometry to different real-world scenarios. **This unit is for students that are ready for a higher level of application. The remaining instructional time may be better used for reteaching of standards identified as weaknesses by unit summative and MAP data.**	May 1 -- EOY	**MAP Testing** May 29 Memorial Day

Grade 4 Math Standards	Units							
The following standards will appear in the Curriculum Document in the Units as marked.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
4.OA.A.1 Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.		X						
4. OA.A.2 Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.		X	X	X				
4. OA.A.3 Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.	X			X	X	X	X	X
4. OA.B.4 Find all factor pairs for a whole number in the range 1–100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1–100 is prime or composite.		X	X			X		
4. OA.C.5 Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in rule itself.	X	X	X				X	
4. NBT.A.1 Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. *For example, recognize that 700 ÷ 70 = 10 by applying concepts of place value and division.*	X			X		X		
4. NBT.A.2 Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.	X			X		X		
4. NBT.A.3 Use place value understanding to round multi-digit whole numbers to any place.	X			X	X	X		
4. NBT.B.4 Fluently add and subtract multi-digit whole numbers using the standard algorithm.	X	X		X	X	X	X	X
4. NBT.B.5 Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. **The focus of instruction should be on strategies other than the algorithm.**	X	X		X	X	X	X	X
4. NBT.B.6 Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. **The focus of instruction should be on strategies and models before the algorithm**		X		X		X	X	X

Grade 4 Math Standards	Units							
The following standards will appear in the Curriculum Document in the Units as marked.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
4.NF.A.1 Explain why a fraction *a*/*b* is equivalent to a fraction (*n* × *a*)/(*n* × *b*) by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions.			X					X
4. NF.A.2 Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.			X				X	X
4. NF.B.3 Understand a fraction a/b with a > 1 as a sum of fractions 1/b. a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. b. Decompose a fraction into a sum of fractions with the same denominator in more than one way while recording each decomposition by an equation. Justify decompositions**, e.g., by using a visual fraction model.** c. Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction. d. Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators			X		X	X	X	
4. NF.B.4 Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. a. Understand a fraction a/b as a multiple of 1/b. For example, use a visual fraction model to represent 5/4 as the product 5 × (1/4), recording the conclusion by the equation 5/4 = 5 × (1/4). b. Understand a multiple of a/b as a multiple of 1/b, and use this understanding to multiply a fraction by a whole number. For example, use a visual fraction model to express 3 × (2/5) as 6 × (1/5), recognizing this product as 6/5. (In general, n × (a/b) = (n × a)/b.) c. Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. For example, if each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?						X	X	
4.NF.C.5 Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100.2 For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100.			X		X			X
4. NF.C.6 Use decimal notation for fractions with denominators 10 or 100. For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram.			X		X			X

Grade 4 Math Standards	Units							
The following standards will appear in the Curriculum Document in the Units as marked.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
4. NF.C.7 Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model.			X					
4.MD.A.1 Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. *For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ...*	X	X	X	X		X	X	
4. MD.A.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.	X	X	X	X			X	
4. MD.A.3 Apply the area and perimeter formulas for rectangles in real world and mathematical problems.	X	X		X		X	X	
4. MD.B.4 Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.					X		X	X
4. MD.C.5 Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle management.					X	X		
4. MD.C.6 Measure angles in whole-number degrees using a protractor. Sketch angles of a specified measure.						X		
4. MD.C.7 Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g. by using an equation with a symbol for the unknown angle measure.						X		X
4. G.A.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.	X	X			X	X		
4. G.A.2 Classify two-dimensional figures on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category and recognize right triangles.	X	X						
4. G.A.3 Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line symmetric figures and draw lines of symmetry.		X			X			X

Grade 4 Unit One Place Value, Multi-Digit Addition and Subtraction	
Connections/Notes	**Additional Resources**
Lesson 1-1 Place Value in Whole Numbers, Lesson 1-2 Place-Value Concepts **4.NBT.A.1** Recognize that a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. **4.NBT.A.2** Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of the comparisons.	
4.NBT.A.1 Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000. Generalize place value understanding for multi-digit whole numbers. Students generalize their previous understanding of place value for multi-digit whole numbers This supports their work in multi-digit multiplication and division, carrying forward into grade 5, when students will extend place value to decimals. Students should be familiar with and use place value as they work with numbers. Some activities that will help students develop understanding of this standard are: • Investigate the product of 10 and any number, then justify why the number now has a 0 at the end. (7 x 10 = 70 because 70 represents 7 tens and no ones, 10 x 35 = 350 because the 3 in 350 represents 3 hundreds, which is 10 times as much as 3 tens, and the 5 represents 5 tens, which is 10 times as much as 5 ones.) While students can easily see the pattern of adding a 0 at the end of a number when multiplying by 10, they need to be able to justify why this works. • Investigate the pattern, 6, 60, 600, 6,000, 60,000, and 600,000 by dividing each number by the previous number. **Example:** **Recognize that 700 ÷ 70 = 10 applying concepts of place value and division.** **In the number 85,254, how many times greater is the 5 in the thousands place than the 5 in the tens place?** **4.NBT.A.2** **MCAP Evidence Statement:** The language of the standard should guide the creation of the tasks, including the ideas in the given examples. **Clarifications** • Tasks assess conceptual understanding, e.g. by including a mixture of expanded form, number names, and base ten numerals within items. • Grade 4 expectations are limited to whole numbers less than or equal to 1,000,000.	**4.NBT.A.1** **Lessons:** Recognize a Digit Represents 10 Times the Value as the Digit to Its Right **4.NBT.A.2** **Lessons:** [Expand That Number!] Read and Write Numbers Using Base Ten Numerals, Number Names, and Expanded Form **Activities and Tasks:** Place Value Arrow Cards Place Value Problems Practice/Assessment Sheet Numeral, Word, and Expanded Form Ordering 4-Digit Numbers Place Value QR Code Task Cards

Connections/Notes	Additional Resources
MCAP Sample Question: Which **two** comparisons are true? Select the **two** correct answers. ☐ A. $999{,}999 < 1{,}000{,}000$ ☐ B. $253{,}800 > 443{,}166$ ☐ C. $42{,}709 = 42{,}907$ ☐ D. $24{,}604 < 24{,}218$ ☐ E. $11{,}386 > 11{,}368$ **Common Misconception** Watch for students who insert the word *and* when reading a whole number. The number 4,009 should be read as "four thousand nine," not " four thousand and nine." Proper use of the word "and" is especially important in reading decimals.	
Lesson 1-3 Formal Procedures for Rounding, Lesson 1-5 Estimation Strategies 4.NBT.A.2 Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of the comparisons. 4.NBT.A.3 Use place value understanding to round multi-digit whole numbers to any place.	
4.NBT.A.3 **MCAP Evidence Statement**: The language of the standard should guide the creation of the tasks, including the ideas in the given examples**.** **Clarifications:** • Tasks include items with a thin context as well as using only numerical representations. • Grade 4 expectations are limited to whole numbers less than or equal to 1,000,000.	***Teaching Student-Centered Mathematics*** *pg. 47, Approximate Numbers & Rounding, Figure 2.6* **Lessons:** Round Numbers to Any Place Using the Vertical Number Line Use Place Value to Round Numbers Using Real World Applications

Connections/Notes	Additional Resources
MCAP Sample Questions: Round 796,814 to the nearest ten thousand. Enter your answer in the space provided. [ ] A student rounded 3872 to the nearest hundred and to the nearest thousand. The student noticed that the results, 3900 and 4000, were not equal. The student claimed that the two results will never be equal when a number is rounded to the nearest hundred and to the nearest thousand. Which **two** numbers could be used to show that the student's claim is incorrect? Select the **two** correct answers. ☐ A. 43,594 ☐ B. 55,962 ☐ C. 67,299 ☐ D. 72,357 ☐ E. 81,974	**Activities and Tasks:** Rounding to Nearest Ten Number Line **Search YouTube for the activities below:** Round Numbers to the Leading Digit Using a Number Line Round Numbers to a Specified Place on a Number Line Round in Real-Life Situations **Templates and Visuals:** Estimating Chart Hundreds Chart for Rounding

Grade 4 Unit One Place Value, Multi-Digit Addition and Subtraction	
Connections/Notes	**Additional Resources**
The expectation is that students have a deep understanding of place value and number sense and can explain and reason about the answers they get when they round. Students should have number experiences using a **number line and hundreds chart** as tools to support their work with rounding. In our number system, some numbers are easier to manipulate. Typically, multiples of 10, 100, and so on are easier to work with than numbers such as 94 or 367. Estimation skills and flexible thinking with numbers are connected to the ability to substitute a number that is easy to work with for one that is more difficult. In Lesson 1-3 students use their place-value understanding to learn formal procedures for rounding. In Lesson 1-5 students explore rounding as a way of finding estimates in place of exact answers. **Common Misconception** When students are rounding numbers to a place less than the greatest place value in the number, watch for those who omit digits in greater place-value positions after having rounded to the given place. For example, when rounding 296,042 to the nearest thousand, some may answer 6,000 instead of 296,000. Pointing out the difference of magnitude in these two numbers may help students focus on whether the rounded number in the answer is reasonable. Watch for students who continue to find only the exact answer and not an estimate. It is important to help them understand why estimates are useful and, at times, preferable.	
Lesson 1-6 Guide to Solving Number Stories **4.OA.A.3** Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. **4.NBT.B.4** Fluently add and subtract multi-digit whole numbers using the standard algorithm**.**	
4.OA.A.3-1 **MCAP Evidence Statement:** Tasks focus on solving multistep word problems in which the remainder is not interpreted. **Clarifications:** • Multi-step is defined as three steps or processes. • Tasks should include a letter standing for the unknown. • Calculations must have at least three steps. • Tasks include all four operations. Division problems in which remainders are not interpreted. • For addition and subtraction, note standards 4.NBT.4-1 and 4.NBT.4-2 for limitations on the number of digits allowed. • For Multiplication and division, note standards 4.NBT.B.5-1, 4.NBT.B5-2, and 4.NBT.B.6 for limitation on the number of digits that can be used in problems.	**4.OA.A.3** **Activities and Tasks:** Adding and Subtracting Word Problems Multistep Problems Add-Subtract

Connections/Notes	Additional Resources
• For content tasks, the last sentence in the standard is not assessed. • Tasks include representing the problems using a variable for the unknown. Variables are lower case and italic font when typed. **Avoid Use of Key Words** **1. Key words are misleading.** Some key words typically mean addition or subtraction. This is not always true. Consider: There were 4 jackets left on the playground on Monday and 5 jackets left on the playground on Tuesday. How many jackets were left on the playground? "Left" in this problem does not mean subtract. **2. Many problems have no key words.** Example: How many legs do 7 elephants have? There is no key word. However, any 1st grader should be able to solve the problem by thinking and drawing a picture or building a model. **3. It sends a bad message.** The most important strategy when solving a problem is to make sense of the problem and to think. Key words encourage students to ignore meaning and look for a formula. Mathematics is about meaning (Van de Walle, 2012). Students represent multistep addition and subtraction number stories with number models, using a letter to stand for the unknown. Students make estimates and compare their answers to their estimates as a way to assess the reasonableness of their answers. **MCAP Sample Question:** A student will prepare 20 gift bags. Each bag will have 10 stickers. The student already has 50 stickers and will buy more stickers in packages. Each package has 15 stickers. How many packages of stickers does the student need to buy? Enter your answer in the space provided.	

Grade 4 Unit One Place Value, Multi-Digit Addition and Subtraction	
Connections/Notes	**Additional Resources**
Lesson 1-7 U.S. Traditional Addition, Lesson 1-9 U.S. Traditional Subtraction **4.NBT.A.2** Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of the comparisons. **4.NBT.B.4** Fluently add and subtract multi-digit whole numbers using the standard algorithm**.** **4.OA.A.3** Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.	
4.NBT.B.4 **MCAP Evidence Statement:** This standard involves two operations. The standard is split for assessment for both operations. This will be adding multi-digit whole numbers using the standard algorithm. **Clarifications:** • The given addends are such as to require an efficient/standard algorithm (e.g., 7263 + 487) • Addends in the task do not suggest any obvious ad hoc or mental strategy (as would be present for example in a case such as 1,699 + 3,501) • Tasks do not have context. • For tasks that involve adding multi-digit numbers, each addend should be up to four-digit numbers. The given subtrahend and minuend are such as to require an efficient/standard algorithm (e.g., 7263 – 4875 or 7406 – 4637). The subtrahend and minuend do not suggest any obvious mental strategy (as would be present for example in a case such as 7300 – 6301). • Tasks do not have a context. • Subtrahend and minuend may be three or four digits. **MCAP Sample Question:** What is the value of the expression? $5217 - 3146$ Enter your answer in the space provided.	**4.NBT.B.4** ***Teaching Student-Centered Mathematics*** *pg. 113 Figure 4.7, refer to top bullets* **Lessons:** Add with Standard Algorithm Multi-Step Word Problems with Bar Models Solve Multi-Step Problems Using the Standard Algorithm 2-Step Subtraction **Activities and Tasks:** Making Sense of the Algorithm Adding and Subtracting Word Problems Addition and Subtraction Number Stories **Search YouTube for the activities below:** Add Using the Standard Algorithm Subtract Using the Standard Algorithm

<table>
<tr><th colspan="2">Grade 4 Unit One
Place Value, Multi-Digit Addition and Subtraction</th></tr>
<tr><th>Connections/Notes</th><th>Additional Resources</th></tr>
<tr><td>In Grades 2 and 3, students used methods such as partial-sums addition and trade-first subtraction. This foundational work provided students with place-value understanding and knowledge of the properties of operations; these understandings prepare them for traditional addition and subtraction for multidigit numbers introduced in Lessons 1-7 and 1-9.</td><td></td></tr>
<tr><td colspan="2">Lesson 1-8 Cracking the Muffin Code Open Response & Reengagement 2 Days
4.OA.C.5 Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself.
4.NBT.B.5 Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.</td></tr>
<tr><td>This is the first Open Response and Reengagement lesson in Grade 4. These two-day lessons appear in each unit to provide students consistent opportunities to engage in the Mathematical Practices as they solve problems. In these lessons, students solve an open response problem on Day 1 and reengage with the same problem on Day 2 to deepen their understanding of the content and practices.

Day 1: Students solve a problem about codes based on place-value structures.
Day 2: Students discuss some solutions and the similarities between the codes and the base-10 place-value, and then they revise their work.

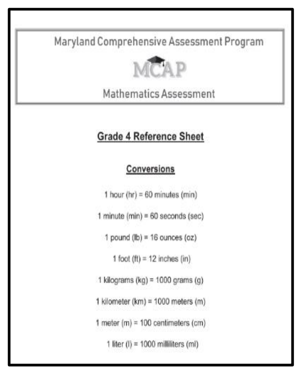
4.OA.C.5
MCAP Evidence Statement:
The language of the standard should guide the creation of the tasks, including the ideas in the given examples.
Clarifications:
• Task must provide the rule.
• Tasks do not require students to determine a rule.
• Tasks could involve extending patterns.
• Tasks could involve generalizing patterns

MCAP Sample Question:

In the following number pattern, the first term is 3. Use the rule "Add 7" to find the next three terms in the pattern.

Enter your answers in the three spaces provided.

3, ______ , ______ , ______</td><td></td></tr>
</table>

Grade 4 Unit One Place Value, Multi-Digit Addition and Subtraction	
Connections/Notes	**Additional Resources**
The focus of this lesson is GMP7.2. Students use their understanding of **place value**, a mathematical structure, to decipher codes. In a bakery context, items are boxed first in groups of 25 (5 × 5), 5 (5 × 1), and 1; then in groups of 27 (3 × 3 × 3), 9 (3 × 3), 3 (3 × 1), and 1; and finally in groups of 100 (10 × 10), 10 (10 × 1), and 1, as in the traditional place-value system. In each case, a digit in one place represents 5, 3, or 10 times what it represents in the place to its right, which is the foundational structure of place value. Students sometimes use everyday base-10 number names for a code that uses a different grouping system. For example, *12* in our everyday base-10 system is called *twelve*. It is 1 group of 10 and 2 groups of 1. However, when grouping by 3s as in the muffin code, the code *12* is read as *one, two*. It means 1 group of 3 and 2 groups of 1. When grouping by multiples of 3s (or 5s), encourage students to describe the grouping explicitly or say "one, two" for 12.	
Lesson 1-10 U.S. Customary Units of Length, Lesson 1-13 Use Strategies to Find the Perimeters of Rectangles **4.NBT.B.5** Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. **4.MD.1** Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. **4.MD.A.2** Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.	
Lesson 1-10 Use the MCAP Grade 4 Reference Sheet during instruction. Students will be allowed to reference this sheet during unit formative and summative assessments as well as MCAP Testing.  Maryland Comprehensive Assessment Program MCAP Mathematics Assessment Grade 4 Reference Sheet Conversions 1 hour (hr) = 60 minutes (min) 1 minute (min) = 60 seconds (sec) 1 pound (lb) = 16 ounces (oz) 1 foot (ft) = 12 inches (in) 1 kilograms (kg) = 1000 grams (g) 1 kilometer (km) = 1000 meters (m) 1 meter (m) = 100 centimeters (cm) 1 liter (l) = 1000 milliliters (ml) **4.NBT.B.5** Students will multiply with factors up to 12 to find measurement equivalencies. **4.MD.1** Students examine measurement scales and convert from larger to smaller units**,** yards to feet and feet to inches.	**4.MD.1** **Activities and Tasks:** Fruit Roll Up Measurement **Search YouTube for the activities below:** Compare and Convert Customary Units of Length

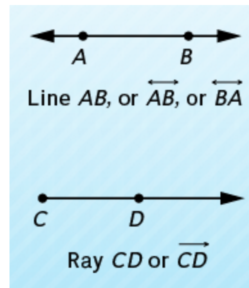
Grade 4 Unit One Place Value, Multi-Digit Addition and Subtraction	
Connections/Notes	**Additional Resources**
Problem solving involving measurement is a focus in Grade 4. Lesson 1-10 introduces this topic in a format that will be repeated with different systems of units. Students convert between U.S. customary units of length, recording equivalent measures in a 2-column table. They solve addition and subtraction number stories and convert U.S. customary unit of length solutions from larger to smaller units. A *measurement scale* is introduced as a tool for unit conversion. **Lesson 1-13** **Point out the ∗ symbol.** Explain that in Grades 4, 5, and 6 of *Everyday Mathematics,* an asterisk (∗) is usually used to indicate multiplication. A slash (/) is often used to indicate division but the ÷ and the) symbols are also used. The symbols ∗ and / are used for multiplication and division on computer keyboards. The asterisk helps avoid confusion between the × symbol and the variable *x* in algebra. Watch for students who think that they have found the answer by adding only the 2 labeled sides. Suggest that they label the lengths of the other two sides. Remind these students that even though all sides may not be labeled, all sides do need to be included in the calculation.	
Lesson 1-11 Points, Lines Segments, Lines, and Rays, Lesson 1-12 Angles, Triangles, and Quadrilaterals 4.G.A.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. 4.G.A.2 Classify two-dimensional figures on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category and recognize right triangles.	
Students might explore line segments, lengths, perpendicularity, and parallelism on different types of grids, such as rectangular and triangular (isometric) grids. Can you find a rectangle on a triangular grid? Can you find a non-rectangular parallelogram on a rectangular grid? Given a segment on a rectangular grid that is not parallel to a grid line, draw a parallel segment of the same length with a given endpoint. **MCAP Evidence Statement:** The language of the standard should guide the creation of the tasks, including the ideas in the given examples**.**	4.G.A.1 **Teaching Student Centered Mathematics** *pg. 217 Can You Make It? Activity 8.5* **Lessons:** Parallel Lines Points, Lines, Segments, Rays and Angles Lines, Segments, Rays Unit

Grade 4 Unit One
Place Value, Multi-Digit Addition and Subtraction

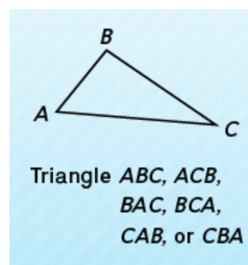
Connections/Notes

Clarifications:
- The angle rays in the graphics should be long enough so that they extend out beyond the protractor.
- A trapezoid is defined as "A quadrilateral with **at least** one pair of parallel sides."
- Students will not be asked to provide a definition of the word trapezoid. They should understand the definition so they are able to recognize attributes of the trapezoid.
- Tasks may include terminology: equilateral, isosceles, scalene, acute, right, and obtuse.
- When identifying right triangles, the 90-degree symbol may be used or the language, "appear to be right angles" may be used.

The notations used in secondary school geometry are introduced in Lessons 1-11 and 1-12, including symbols distinguishing lines, line segments, rays, and angles, as well as representations of basic geometric figures with letters. (*See right.*)



Equivalent names are emphasized throughout *Everyday Mathematics*. Triangle *ABC,* for example, may also be named *ACB, BAC, BCA, CAB, or CBA.* (*See right.*)



Lessons 1-11 and 1-12 develop precise definitions of figures and their properties. Students classify geometric figures and work to understand the relationships among figures. For example, students explore the properties of parallel lines and identify them in various quadrilaterals. 4.G.1, 4.G.2 Students explore right, acute, and obtuse angles, as well as perpendicular line segments, learning to identify them in triangles and quadrilaterals.

Additional Resources

Activities and Tasks:
Identifying Lines
Alphabet Lines
QR Code Scavenger Hunt
Parallel and Perpendicular

4.G.A.2

Lessons:
Rectangles and Parallelograms
What's So Special About Triangles, Anyway?
Trying Out Tangrams
Polygon Capture
Analyze and Classify Triangles
Classify Triangles
Quadrilateral Unit

Activities and Tasks:
Classifying Triangles 1 and 2
Isosceles Triangles on the Geoboard
Constructing Quadrilaterals
Are These Right?
Classifying 2-Dimensional Figures
Classifying Quadrilaterals
Quadrilateral Word Problems
Special Quadrilateral Reference Sheet
Monster Munch Identifying Triangles

Videos:
Know Your Quadrilaterals

<table>
<tr><th colspan="2">Grade 4 Unit One
Place Value, Multi-Digit Addition and Subtraction</th></tr>
<tr><th>Connections/Notes</th><th>Additional Resources</th></tr>
<tr><td>*IRC has die cuts for: squares, rectangles, octagon, hexagon, pentagon, trapezoid, triangle, and rhombus. One piece of construction paper will produce 4 of each 2D figure for students to use in sorting activities. Ordering multiple figures will allow you to modify the 2D shapes. Example: Cut one trapezoid to make it a right trapezoid.</td><td><u>Search YouTube for the activities below:</u>

Classify Various Quadrilaterals by Describing Their Properties
Classify Two-Dimensional Figures by Examining Their Properties
Classify Triangles by Examining Their Properties</td></tr>
<tr><td colspan="2">Lesson 1- 14 Unit 1 Progress Check</td></tr>
</table>

<table>
<tr><th colspan="2">Grade 4 Unit Two
Multiplication and Geometry</th></tr>
<tr><th>Connections/Notes</th><th>Additional Resources</th></tr>
<tr><td colspan="2">Lesson 2-1 Square Number Patterns, Lesson 2-3 Factors and Factor Pairs, Lesson 2-4 Multiples, Lesson 2-5 Prime and Composite Numbers, Lesson 2-6 Little and Big Open Response & Reengagement 2 Days, Lesson 2-8 Multiplicative Comparisons, Lesson 2-9 Multiplicative Comparison Number Stories
4.OA.C.5 Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself.
4.OA.B.4 Find all factor pairs for a whole number in the range 1–100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1–100 is prime or composite.
4.NBT.B.5 Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
4.NBT.B.6 Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
4.OA.A.1 Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.</td></tr>
</table>

<table>
<tr><th colspan="2">Grade 4 Unit Two
Multiplication and Geometry</th></tr>
<tr><th>Connections/Notes</th><th>Additional Resources</th></tr>
<tr><td colspan="2">4.OA.A.2 Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.</td></tr>
<tr><td>4.OA.C.5
MCAP Evidence Statements: The language of the standard should guide the creation of the tasks, including the ideas in the given examples.
Clarifications:
• Task must provide the rule.
• Tasks do not require students to determine a rule.
• Tasks could involve extending patterns.
• Tasks could involve generalizing patterns.

4.NBT.B.6
MCAP Evidence Statement: The language of the standard should guide the creation of the tasks, including the ideas in the given examples.
Clarifications:
• Tasks should be written to enable students to explain (show) the strategies they use using words and or equations. The intent of the standard is more than finding the correct answer.
• Tasks find whole number quotients using three- or four-digit dividends and one-digit divisors.
• Tasks do not have a context.

Students developed understanding of area and perimeter in 3rd grade by using <u>visual models.</u>

While students are expected to use formulas to calculate area and perimeter of rectangles, they need to understand and be able to communicate their understanding of why the formulas work.

The formula for area is l x w and the answer will always be in square units.

The formula for perimeter can be 2 l + 2 w or 2 (l + w) and the answer will be in linear units.

This standard provides the context of area and perimeter of rectangles to use for problem solving. Students are first introduced to formulas in this unit and make sense of the formulas using their prior work with area and perimeter.

New content for fourth graders in Lesson 2-1 is linking arrays to square numbers, or numbers for which arrays have the same number of rows and columns. In Lesson 2-3 students are introduced to the concept of factors and factor pairs. Factors are numbers that are multiplied together, and factors have many applications. The terms prime number, composite number, and square number are all defined in terms of their factors. Lesson 2-4 introduces the concept of multiples. A multiple of a number is the product of that number and some other whole number. Every multiple of a number is evenly divisible by its factors. Students extend their understanding of factors and multiples in Lesson 2-5 as they examine prime and</td><td>4.OA.B.4
<u>Activities and Tasks:</u>
Prime Number Hunt
Factor Flip Prime/Composite
Factor Practice Sheets
Cross the Board Game
Factor Race Game
Multiples and Factors Fun with QR Codes
Least Common Multiples

<u>Search YouTube for the activity below:</u>
Find All the Factor Pairs of a Number Using Area Models

4.OA.A.2
<u>Lessons:</u>
Multiplicative Comparison Word Problems
2-Step Multiplicative Comparison

<u>Activities and Tasks:</u>
Representing Multiplicative Comparison Problems
Multiplicative Comparison Problems
Multiplicative Comparison Task Cards

<u>Online:</u></td></tr>
</table>

Connections/Notes	Additional Resources
composite numbers. In Lessons 2-6, 2-8, and 2-9 students learn to interpret multiplication equations as multiplicative comparisons, and conversely, to represent statements of multiplicative comparisons as multiplication equations. The concept of multiplicative comparison becomes more accessible in context, as in the following number story: *Jane has 3 pretzels. Jack has 4 times as many pretzels as Jane. How many pretzels does Jack have?* Multiplicative comparison problems contain two quantities: in this problem, Jane's set of pretzels and Jack's set of pretzels. The two quantities are related to each other: one quantity is a number of times as large as the other. The unknown quantity can be determined from the comparison. Students' work with multiplicative comparisons lays the groundwork for future study of algebra. **Lesson 2-6** **Day 1:** Students use multiplicative reasoning to make predictions based on information in an open response problem and then make mathematical arguments to support their predictions (conjectures). **Day 2:** Students analyze others' conjectures and arguments and then revise their own work. The focus of this lesson is GMP3.1. A **conjecture** is a type of prediction based on some given information. An **argument** is an explanation that supports or refutes the conjecture. In this lesson students make a conjecture about the height of a dog based on information given in the problem and then write an argument to support their thinking. **Lesson 2-8**	Thinking Blocks

Multiplicative Comparison	Smaller Unknown:	Larger Unknown:	Multiplier Unknown:
4th Grade 4.OA.2	The giraffe is 18 feet tall. She is 3 times as tall as the kangaroo. How tall is the kangaroo? Measurement Example: A rubber band is stretched to be 18 centimeters long and that is 3 times as long as it was at first. How long was the rubber band at first?	The giraffe is 3 times as tall as the kangaroo. The kangaroo is 6 feet tall. How tall is the giraffe? Measurement Example: A rubber band is 6 centimeters long. How long will the rubber band be when it is stretched to be 3 times as long?	The giraffe is 18 feet tall. The kangaroo is 6 feet tall. The giraffe is how many times taller than the kangaroo? Measurement Example: A rubber band was 6 centimeters long at first. Now it is stretched to be 18 centimeters long. How many times as long is the rubber band now as it was at first?

Grade 4 Unit Two
Multiplication and Geometry

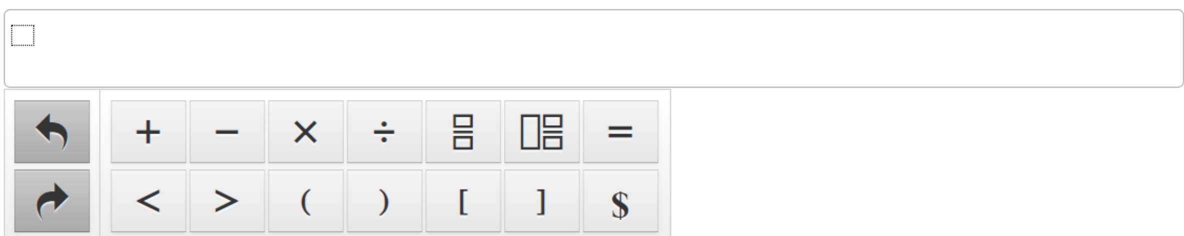
Connections/Notes	Additional Resources
4.OA.A.1 **MCAP Evidence Statement:** This evidence statement contains two ways students can interpret multiplication comparisons. 4.OA.A.1-1 measures the first part of the standard (bolded font) **Clarifications:** • Tasks should measure interpreting multiplicative comparisons using a multiplication equation. • Tasks do not have a context. See example in the standard. • Tasks include the wording "-times as many as". • Tasks should use multiplication expressions or equations up to 10 x 10	

MCAP Sample Question:

There are 5 motorcycles in a parking lot. The number of cars in the parking lot is 8 times as many as the number of motorcycles.

Write an equation that shows how to find the number of cars in the parking lot.

Enter your equation in the space provided. Enter **only** your equation.



Connections/Notes	Additional Resources
4.OA.A.2 **MCAP Sample Question:** Four problems are given in the table. Identify whether 30×40 could be used to solve each problem. Select only one box per row.	

Problem	Could be solved using 30×40	Could not be solved using 30×40
One box has 30 pencils. Another box has 40 pencils. How many pencils are in the boxes in all?	○	○
A classroom has 30 books. The number of pages in the books is 40 times as many as the number of books. How many pages are in the books?	○	○
One elementary school has 30 teachers. There are 40 more teachers at a middle school than the elementary school. How many teachers are at the middle school?	○	○
There are 30 employees at a store. The number of hours the employees worked this week is 40 times as many as the number of employees. How many hours did the employees work this week?	○	○

Connections/Notes	Additional Resources
Lesson 2-9 Students will use bar models or tape diagrams to help them solve multiplicative comparison word problems. During the summer, Daryn read 5 times as many books as Julie. Julie read 8 books. How many books did Daryn read? $J = \boxed{8}$ $D = \boxed{8}\boxed{8}\boxed{8}\boxed{8}\boxed{8}$	
Lesson 2-2 The Area Formula for Rectangles, Lesson 2-7 Units of Time 4.MD.A.3 Apply the area and perimeter formulas for rectangles in real world and mathematical problems. 4.MD.A.1 Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table.	
4.MD.A.3 It is essential that students understand the concept of area before being introduced to the formula. Lesson 2-2 links conceptual work done in previous grades to a meaningful understanding of why application of the formula results in the value of the area. Working with a diagram of a rectangle divided into unit squares helps students see the one-to-one correspondence between the number of squares in a row and the units measuring the length of the rectangle, as well as the correspondence between width and the number of columns. By following the conceptual development of formulas, students gain insight into the ideas and relationships behind them. This understanding in turn makes it less likely for students to confuse area and perimeter, or to select the wrong formula to apply to a given problem. Students who understand where formulas come from are more likely to remember them and understanding reinforces the idea that mathematics makes sense. 4.MD.A.3 **MCAP Evidence Statement:** The language of the standard should guide the creation of the tasks, including the ideas in the given examples**.** The intent of the standard is to apply the area and perimeter formulas for rectangles and the relationship between the two concepts**.** **Clarifications:**	4.MD.A.1 **Activities and Tasks:** Time Equivalents 4.MD.A.3 **Activities and Tasks:** Using Equations to Find Area of Shapes Finding Area of Rod Designs Area with Cuisenaire Rods Designing a Zoo Enclosure **Search YouTube for the activity below:** Use Area Models to Find the Area of Rectangles Find Missing Side Lengths Using the Formula for Area

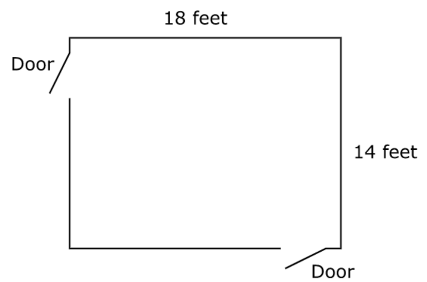
Grade 4 Unit Two
Multiplication and Geometry

Connections/Notes	Additional Resources

• Tasks that assess only area or perimeter should use grade 4 appropriate numbers (not all single digit values)
• Tasks that include both area and perimeter should use reasonable numbers within grade 4 NBT limits. The numbers used should not be so difficult that it prevent students from answering the task without getting confused by the computation.

MCAP Sample Question:

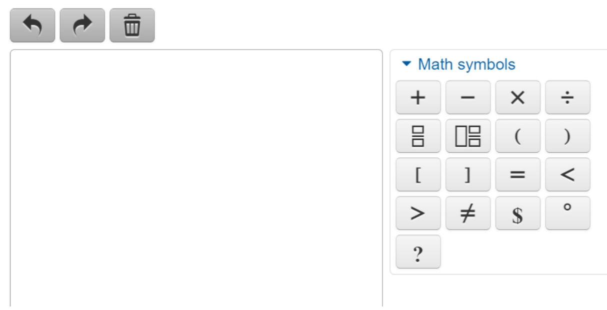
The figure shows the dimensions of a rectangular floor. The two openings represent doors. Each door is 3 feet wide.



A contractor will buy baseboards to place around the entire floor, except for the doors. Each baseboard is 8 feet long and costs $11.

Find the total cost of the baseboards the contractor needs to buy for the room.

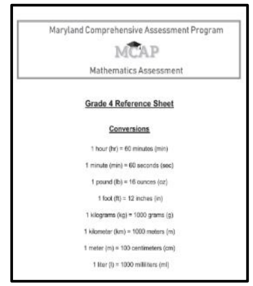
Enter your answer and your work or explanation in the space provided. You may also use the drawing tool to help explain or support your answer.



The Common Core State Standards for grade 4 mathematics requires students to apply the area and perimeter formulas for rectangles. The intent of the Common Core State Standards at this grade level is to extend the conceptual understanding and discovery of area and perimeter by using models in real world and mathematical problems. **Therefore, the area and perimeter formulas for rectangles are considered requisite knowledge.** **(**The formula for area is I x w and the answer will always be in square units.)

Students will complete tables to show conversions.

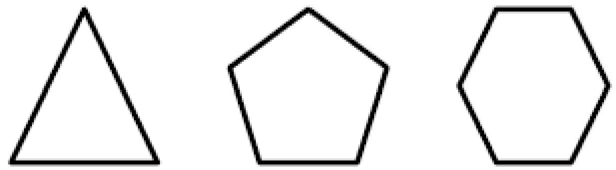
Minutes	Seconds
11	
14	
22	
	1,500
30	

<table>
<tr><th colspan="2">Grade 4 Unit Two
Multiplication and Geometry</th></tr>
<tr><th>Connections/Notes</th><th>Additional Resources</th></tr>
<tr><td>Use the MCAP Grade 4 Reference Sheet during instruction.
Students will be allowed to reference this sheet during unit formative and summative assessments as well as MCAP Testing.

Maryland Comprehensive Assessment Program
MCAP
Mathematics Assessment
<u>Grade 4 Reference Sheet</u>
<u>Conversions</u>
1 hour (hr) = 60 minutes (min)
1 minute (min) = 60 seconds (sec)
1 pound (lb) = 16 ounces (oz)
1 foot (ft) = 12 inches (in)
1 kilograms (kg) = 1000 grams (g)
1 kilometer (km) = 1000 meters (m)
1 meter (m) = 100 centimeters (cm)
1 liter (l) = 1000 milliliters (ml)</td><td></td></tr>
<tr><td colspan="2">Lesson 2-10 Classifying Triangles, Lesson 2-11 Classifying Quadrilaterals, Lesson 2-12 Finding Line Symmetry
4.G.A.2 Classify two-dimensional figures on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category and recognize right triangles.
4.G.A.3 Recognize a line of symmetry for a two-dimensional figure as a line across the figure such t the figure can be folded along the line into matching parts.   Identify line symmetric figures and draw lines of symmetry.</td></tr>
<tr><td>4.G.A.2
MCAP Evidence Statement: The language of the standard should guide the creation of the tasks, including the ideas in the given examples.
Clarifications:
• A trapezoid is defined as “A quadrilateral with at least one pair of parallel sides.”
• Students will not be asked to provide a definition of the word trapezoid. They should understand the definition, so they are able to recognize attributes of the trapezoid.
• Tasks may include terminology: equilateral, isosceles, scalene, acute, right, and obtuse.
• When identifying right triangles, the 90-degree symbol may be used or the language, “appear to be right angles” may be used.

Students need experiences with figures which are symmetrical and non-symmetrical. Figures include both regular and non-regular polygons. Folding cut-out figures will help students determine whether a figure has one or more lines of symmetry.
Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts.
Identify line-symmetric figures and draw lines of symmetry.
Given a half of a figure and a line of symmetry, accurately draw the other half to create a symmetric figure.</td><td>4.G.A.2
<u>Lessons:</u>
<u>What's So Special About Triangles, Anyway?</u>
<u>Rectangles and Parallelograms</u>
<u>Trying Out Tangrams</u>
Analyze and Classify Triangles
Classify Triangles

<u>Activities and Tasks:</u>
Classifying Triangles
Right Triangles on the Geoboard
Isosceles Triangles on the Geoboard
Monster Munch Identifying Triangles
Line Flip Book
Are These Right?
Quadrilateral Criteria
Classifying 2-D Figures</td></tr>
</table>

Grade 4 Unit Two
Multiplication and Geometry

Connections/Notes	Additional Resources
Polygons with an odd number of sides have lines of symmetry that go from a midpoint of a side through a vertex.  *IRC has die cuts for: squares, rectangles, octagon, hexagon, pentagon, trapezoid, triangle, and rhombus. One piece of construction paper will produce 4 of each 2D figure for students to use in sorting activities. Ordering multiple figures will allow you to modify the 2D shapes. Example: Cut one trapezoid to make it a right trapezoid. **Lesson 2-10** Discuss the word *vertex* and its irregular plural, *vertices*. **Lesson 2-12** Watch for students who incorrectly think Shape F on *Math Masters,* page 86 has line symmetry. Shape F <u>cannot</u> be folded so that both halves match. It can be confusing because it has rotational symmetry, meaning that it can be rotated and still look the same.  Students build on their knowledge of geometric attributes and begin classifying shapes according to properties. Geometry instruction at this level relies heavily on vocabulary, so students must be adept in their use of key words. Frequently review vocabulary introduced in Unit 1, including *acute, right,* and *obtuse angle,* and *parallel line segment.* Vocabulary can be reviewed quickly in a variety of ways, such as having students use gestures to demonstrate different types of angles or represent each property in a sketch.	**<u>Search YouTube for the activities below:</u>** Classify Triangles by Examining Their Properties Classify Various Quadrilaterals by Describing Their Properties Classify Two-Dimensional Figures by Examining Their Properties **4.G.A.3** **<u>Lessons:</u>** Recognize Lines of Symmetry **<u>Activities and Tasks:</u>** Determining Symmetry Lines of Symmetry for Triangles Lines of Symmetry for Quadrilaterals Lines of Symmetry for Circles **<u>Search YouTube for the activities below:</u>** Identify Line Symmetry in Regular Polygons Identify Line Symmetry in Irregular Polygons Identify Line Symmetry in a Geometric Figure

Grade 4 Unit Two
Multiplication and Geometry

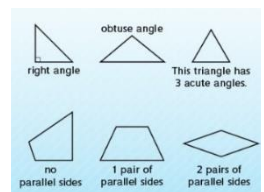
Connections/Notes	Additional Resources

In Lesson 2-10 students review common properties of triangles and construct them, focusing on types of angles: right, obtuse, and acute. They discover that a triangle can only have one right angle.

In Lesson 2-11 students classify quadrilaterals based on whether they have parallel lines. Sorting by pairs of parallel sides may not occur to most students, as the concept of parallel is relatively new and abstract. It may help to focus on parallel sides as a property. For example, find groups of quadrilaterals that do not all fit into any one classification related to one property, and ask whether all of them would fit according to a different property. If the only shared property is the number of pairs of parallel sides, sorting by pairs of parallel sides is the only method that will accommodate all of them.

In Lesson 2-12 students work with *line symmetry,* in which figures can be divided so that the two halves are mirror images of each other.

Students explore line symmetry by folding and drawing on paper. Looking for lines of symmetry in triangles and quadrilaterals helps them connect the concept of symmetry to their work in Lessons 2-10 and 2-11



Lesson 2-13 Finding the Pattern

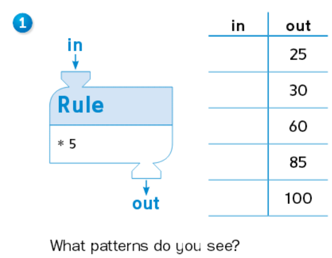
4.OA.C.5 Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself.

4.OA.C.5

MCAP Evidence Statements: The language of the standard should guide the creation of the tasks, including the ideas in the given examples.

Clarifications:

- Task must provide the rule.
- Tasks do not require students to determine a rule.
- Tasks could involve extending patterns.
- Tasks could involve generalizing patterns.



Lessons:

[Patterns on Charts Illuminations]
[Growing Patterns Illuminations]
[Polygons, Perimeter, and Patterns Illuminations]
A Banquet at Tony's AIMS

Activities and Tasks:

Numeric Patterns Practice
Double Plus One

Grade 4 Unit Two Multiplication and Geometry	
Connections/Notes	**Additional Resources**
Students will complete "What's My Rule?" Tables and Function Machines and explain patterns.	**Search YouTube for the activity below:** Find the Rule for a Function Machine Using a Vertical Table
Lesson 2- 14 Unit 2 Progress Check	

Grade 4 Unit Three Fractions and Decimals	
Connections/Notes	**Additional Resources**
Lesson 3-1 Equal Sharing and Equivalence, Lesson 3-2 Fraction Circles and Equivalence, Lesson 3-3 Number Lines and Equivalence, Lesson 3-4 An Equivalent Fractions Rule, Lesson 3-5 Veggie Pizzas Open Response & Reengagement 2 Days, Lesson 3-6 Comparing Fractions, Lesson 3-7 Comparing and Ordering Fractions, Lesson 3-8 Modeling Tenths with Fraction Circles **4.NF.A.1** Explain why a fraction *a*/*b* is equivalent to a fraction ($n \times a$)/($n \times b$) by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions. **4.NF.A.2** Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model. **4.NF.B.3** Understand a fraction a/b with a > 1 as a sum of fractions 1/b. a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. b. Decompose a fraction into a sum of fractions with the same denominator in more than one way while recording each decomposition by an equation. Justify decompositions**, e.g., by using a visual fraction model.** c. Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction. d. Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators **4.NF.C.6** Use decimal notation for fractions with denominators 10 or 100. For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram. **4.NF.C.7** Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model.	

Grade 4 Unit Three
Fractions and Decimals

Connections/Notes	Additional Resources

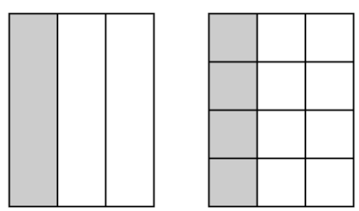
4.MD.A.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.
4.OA.B.4 Find all factor pairs for a whole number in the range 1–100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1–100 is prime or composite.
4.OA.C.5 Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself.

4.NF.A.1
MCAP Evidence Statement: The language of the standard should guide the creation of the tasks, including the ideas in the given examples**.**

Clarifications:
• Visual fractions models include linear fraction models such as bar models/tape diagrams and number lines or area models such as rectangles or squares will be used in tasks.
• Tasks are limited to denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.
• Tasks may include fractions that equal whole numbers that are no larger than 5.

MCAP Sample Question:

Each model shown represents one whole and each model is shaded into equal parts.



Model 1 Model 2

Complete the statement to explain what the models show.

Select from the drop-down menus to correctly complete the statement.

The shaded parts of the models show that the fraction [Choose...] is equivalent to the fraction [Choose...] because [Choose...] .

4.NF.A.1

Lessons:
[Investigating Fractions with Pattern Blocks]
[Investigating Equivalent Fractions with Relationship Rods]
[Fraction Clothesline]
Black Wholes AIMS
Fraction Fringe AIMS
Fractions with Pattern Blocks
Fraction Time AIMS
Shady Fractions AIMS
Fraction Equivalence Using a Tape Diagram
Half Track AIMS

Activities and Tasks:
One-Color Rod Trains
Equal Fraction Pairs with Cuisenaire Rods
Pattern Block Puzzles
Using Benchmarks to Compare Fractions

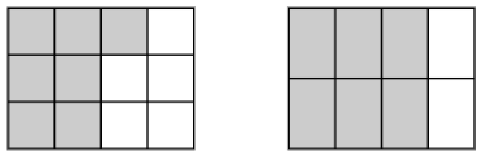
Grade 4 Unit Three Fractions and Decimals	
Connections/Notes	**Additional Resources**
MCAP Sample Question Which equation is true? Select one answer. ○ A. $\frac{6}{12} = \frac{4}{8}$ ○ B. $\frac{4}{5} = \frac{9}{10}$ ○ C. $\frac{1}{2} = \frac{1}{100}$ ○ D. $\frac{3}{6} = \frac{2}{6}$ 4.NF.A.2 **MCAP Evidence Statement**: The language of the standard should guide the creation of the tasks, including the ideas in the given examples**.** **Clarifications:** • Tasks should also include comparing fractions using benchmark fractions. • Tasks should include language when fractions are being compared that the comparisons are valid only when the two fractions refer to the same whole. • Tasks could require the student to choose the comparison strategy autonomously. • Tasks are limited to denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100. • Tasks may include fractions that are no larger than 5. • Linear fraction models such as bar models/tape diagrams and number lines or area models will be used in tasks.	Running Laps Task **Search YouTube for the activity below:** Recognize Equivalent Fractions Using Area Models 4.NF.A.2 **Lessons:** Fraction Sort Using Benchmarks to Compare Fractions **Activities and Tasks:** Birthday Fractions Spin to Win Game Who Ate More? Which is Larger? Snack Time Compare Fraction Strategies **Search YouTube for the activities below:** Compare Fractions Using the Benchmark Fraction 1/2 Compare Fractions to a Benchmark of One-Half Using Number Lines

Grade 4 Unit Three
Fractions and Decimals

Connections/Notes	Additional Resources

MCAP Sample Question:

A student used these models to compare the fractions $\frac{7}{12}$ and $\frac{6}{8}$. The student incorrectly claimed that $\frac{7}{12} > \frac{6}{8}$ because more sections are shaded in the model that represents the fraction $\frac{7}{12}$ than in the model that represents the fraction $\frac{6}{8}$.



$\frac{7}{12}$ > $\frac{6}{8}$

Explain why the student's claim is incorrect.

Select from the drop-down menus to correctly complete the sentences.

The claim is incorrect because the student only compared the Choose... . The student should have compared the number of Choose... and the Choose... in each model.

4.NF.B.3

MCAP Evidence Statement: This standard addresses the language of the entire standard keeping in mind the essential understandings given in the first row for 4.NF.B.3a.

Clarifications:

- Tasks should include the examples given for this standard in the e.g. portion of the standard.
- Tasks do not have a context.
- Denominators are limited to grade 3 possibilities (2, 3, 4, 6, 8) to keep computational difficulty lower.

Grade 4 Unit Three
Fractions and Decimals

Connections/Notes	Additional Resources
MCAP Sample Questions:	

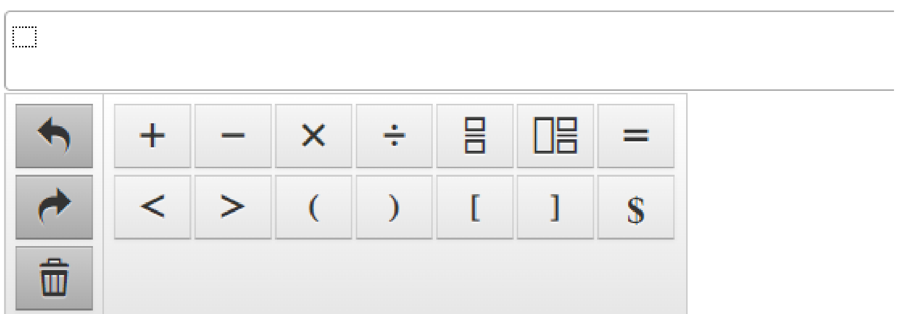
Which **two** expressions are equivalent to $\frac{8}{12}$?

Select the **two** correct answers.

- ☐ A. $\frac{1}{6} + \frac{8}{2}$
- ☐ B. $\frac{4}{1} + \frac{4}{12}$
- ☐ C. $\frac{4}{10} + \frac{4}{2}$
- ☐ D. $\frac{1}{12} + \frac{7}{12}$
- ☐ E. $\frac{3}{4} + \frac{3}{4} + \frac{2}{4}$
- ☐ F. $\frac{1}{12} + \frac{2}{12} + \frac{2}{12} + \frac{3}{12}$

What is the value of $4\frac{1}{4} - 1\frac{3}{4}$?

Enter your answer in the space provided. Enter **only** your answer.



4.NF.C.6

Grade 4 Unit Three
Fractions and Decimals

Connections/Notes	Additional Resources
Evidence Statement: The language of the standard should guide the creation of the tasks, including the ideas in the given examples**.** **Clarifications:** • Understand that 0.62 and 62/100 are different representations for the same number. • See the example provided in the standard when using meters or centimeters on a number line when measuring length. **MCAP Sample Question:** What is the decimal value of $2\frac{5}{100}$? Enter your answer in the space provided. **4.NF.C.7** **MCAP Evidence Statement**: The language of the standard should guide the creation of the tasks, including the ideas in the given examples**.** **Clarifications:** • Tasks should have a "limited context" (one-step problems) if written for content. • Students should record the results using comparison symbols. • Tasks may ask students to put decimals in order from least to greatest or greatest to least. **MCAP Sample Question:** Which comparison is true? Select one answer. A. $4.7 = 7.4$ B. $0.3 > 0.8$ C. $0.20 = 0.02$ D. $0.06 < 0.10$	

Grade 4 Unit Three
Fractions and Decimals

Connections/Notes	Additional Resources

4.MD.A.2
MCAP Evidence Statement: The language of the standard should guide the creation of the tasks, including the ideas in the given examples**.**
Clarifications:
• Measurement units should be within one system of units, not across systems.
• Tasks only include conversion from larger units in terms of smaller units.

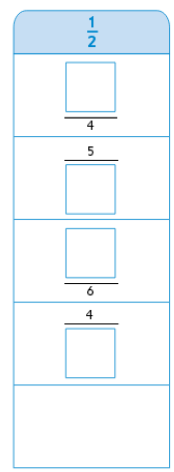
Common Misconception
Students leave gaps between the fraction circle pieces or allow them to overlap.

Lesson 3-1

In Grade 3, students worked with the denominators 2, 3, 4, 6, and 8. In Grade 4, students extend their work to include the denominators 5, 10, 12, and 100.

Lesson 3-4

Students will complete Name Collection Boxes for Equivalent Fractions



Common Misconception
Students overgeneralize the rule to addition or subtracting the same amount to or from the denominator to create an equivalent fraction.

Lesson 3-5

Day 1: Students use mathematical models to compare fractions with different numerators and denominators and justify their reasoning.

Day 2: Students discuss models and explanations and revise their work.

Grade 4 Unit Three Fractions and Decimals	
Connections/Notes	**Additional Resources**
The focus of this lesson is GMP4.2. Students use drawings to model fractions to help them solve a real-world problem. Since students have not yet been introduced to standard procedures for comparing fractions with different numerators and denominators, they will need to use conceptual understanding and mathematical reasoning to model the fractions and solve the problem. This work will in turn deepen their understanding of fractions. **Lesson 3-6** Watch for students who incorrectly reason that $\frac{2}{5}$ is smaller than $\frac{6}{10}$ because the fraction with the denominator 5 has been divided into fewer pieces than the fraction with the denominator 10: $2 < 6$. They may have given the correct answer, but they have done so for the wrong reason. **Common Misconception** Students use whole number reasoning to conclude that since $4 > 3$, fourths must be greater than thirds. **Lesson 3-8** Watch for students who incorrectly believe 0 is larger than 0.1, reasoning that because 0 is a whole number to the left of the decimal point, it must be greater than a decimal with a number to the right of the decimal point. Equivalence is one of the most crucial ideas in mathematics. Much of elementary arithmetic can be thought of in terms of rewriting numbers in equivalent forms. When we ask children to solve 850 + 125, we are asking for a single number, 975, that is equivalent to the number 850 + 125. Understanding equivalence is critical to learning across all branches of mathematics. In third grade, students studied special cases of equivalence in fractions, including simple equivalencies such as $\frac{1}{2} = \frac{2}{4}$, fractions that are equivalent to whole numbers, and equivalent fractions on the number line. Students' work with these special cases is built on an understanding of sharing, division, and measurement that they developed previously in third grade and before. Students learned to reason, for example, that $\frac{1}{2} = \frac{2}{4}$	

Connections/Notes	Additional Resources
because a fair share of one pizza divided by two people $\frac{1}{2}$ is the same as a fair share of two pizzas divided among four people $\frac{2}{4}$. In fourth grade, students extend their understanding of fractions to find and explain a multiplication rule for producing equivalent fractions. GMP8.1 Students explore the rule $\frac{a}{b} = \frac{n*a}{n*b}$ using visual representations of fractions and thinking about sharing, division, and measurement. At this stage, the rule for students is an empirical fact that they can explain in various ways.	

Lesson 3-9 Modeling Decimals with Base-10 Blocks, Lesson 3-10 Tenths and Hundredths, Lesson 3-11 Tenths and Hundredths of a Meter, Lesson 3-12 Tenths of a Centimeter, Lesson 3-13 Comparing Decimals

4.NF.C.5 Express a fraction with denominator 10 as an equivalent fraction with denominator 100 and use this technique to add two fractions with respective denominators 10 and 100.2 For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100.
4.NF.C.6 Use decimal notation for fractions with denominators 10 or 100. For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram.
4.NF.C.7 Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model.
4.OA.A.2 Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.
4.MD.A.1 Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr., min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table.
4.MD.A.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.

4.NF.C.5 **MCAP Evidence Statement**: The language of the standard should guide the creation of the tasks, including the ideas in the given examples**.**	**4.NF.C.5** **Lessons:** What's the (Decimal) Point?

Grade 4 Unit Three
Fractions and Decimals

Connections/Notes	Additional Resources
Clarifications: • Tasks may or may not have context. **MCAP Sample Questions:** A student added $\frac{3}{10}$ and $\frac{2}{100}$ and got a result of $\frac{5}{100}$. The student's work is shown. Step 1 (replace $\frac{3}{10}$ with an equivalent fraction): $\frac{3}{10}+\frac{2}{100}=\frac{3}{100}+\frac{2}{100}$ Step 2 (combine fractions): $\frac{3}{100}+\frac{2}{100}=\frac{3+2}{100}$ Step 3 (add numerators): $\frac{3+2}{100}=\frac{5}{100}$ Which statement is true about the student's work and answer? ○ A. The work and answer are correct. ○ B. The answer is incorrect. The student made a mistake in step 1 because $10+100=110$. ○ C. The answer is incorrect. The student made a mistake in step 1 because $\frac{3}{10}$ is not equal to $\frac{3}{100}$. ○ D. The answer is incorrect. The student made a mistake in step 2 because $100+100=200$. What is the value of $\frac{3}{10}+\frac{8}{100}$? Enter your answer as a fraction in the spaces provided.	[Fraction Decimal Equivalence on Place Value Chart] **Activities and Tasks:** Sums of One Equivalent Fractions with Denominators of 100 Expanded Fractions and Decimals Fractions and Decimal Number Line Show What You Know About Decimals **Search YouTube for the activities below:** Use a Number Line to Show How Fractions with Denominators of 10 and 100 Are Equivalent **4.NF.C.6** **Lessons:** Decimal Detectives AIMS Express Money Amounts as Decimal Numbers Model Equivalence of Tenths and Hundredths **Activities and Tasks:** Decimal Fraction Dominoes Equivalence Dominoes Decimal Scavenger Hunt Decimals in Money

Grade 4 Unit Three
Fractions and Decimals

Connections/Notes	Additional Resources
Lesson 3-9 Work with students to create an anchor chart showing visuals linked with the word *one-tenth*: 0.1, 0.10, a dime, a long, $\frac{1}{10}$ of a fraction circle; and for *one-hundredth*: 0.01, a penny, and a cube. **Lesson 3-10** Watch for students who answer 0.7 instead of 0.07. Have them compare the 7 cubes on the grid to 7 longs. Discuss the difference. **Lesson 3-13** **Common Misconception** Watch for students who incorrectly reason that decimal numbers with more digits are smaller, therefore concluding 0.4 > 0.56. These students may believe this is true because hundredths are smaller than tenths, and therefore 56 *hundredths* must be smaller than 4 *tenths.* Model the numbers using base-10 blocks. Rather than approaching decimals in fourth grade as an extension of our system of whole-number numeration, the Common Core treats decimals as special fractions: fractions that have denominators that are positive powers of 10. By approaching decimals in this way, students extend their understanding of decimals based on their knowledge of fractions. In Lessons 3-8 through 3-12, students apply to decimals the same kinds of reasoning they know from finding equivalent fractions. They express fractions as equivalent decimals, use a variety of visual representations for decimals, and solve problems involving decimals in various contexts. In Lesson 3-8, and in Lessons 3-10 through 3-13, students compare decimals using visual representations, common denominators, benchmarks, and reasoning about quantities, precisely the methods they used for comparing fractions before. A particularly important and mathematically complex representation for decimals is metric measurement, especially length. Measurement provides contexts for problem solving in these lessons and throughout the unit.	Decimal Model Matching Cards **Search YouTube for the activity below:** Convert Decimals to Fractions to the Tenths **4.NF.C.7** **Teaching Student Centered Mathematics** *pg. 191 Activity 7.9 Line 'Em Up, Figure 7.11* *pg. 202-203 Expanded Lesson Friendly Fractions to Decimals* **Lessons:** Compare Decimals Dueling Decimals AIMS **Activities and Tasks:** Ordering Decimals Decimal Path Game

Grade 4 Unit Three
Fractions and Decimals

Connections/Notes	Additional Resources
What is the decimal form of each fraction? Drag and drop the correct decimal form into the box below each fraction. 0.8 | 0.9 | 0.08 | 0.09 | 0.008 | 0.009 Fraction Form: $\frac{9}{100}$ $\frac{8}{10}$ Decimal Form:	

Lesson 3- 14 Unit 3 Progress Check

Grade 4 Unit Four
Multi-digit Multiplication

Connections/Notes	Additional Resources

Lesson 4-1 Extended Multiplication Facts, Lesson 4-2 Making Reasonable Estimates for Products, Lesson 4-5 Walking Away with a Million Dollars Open Response & Reengagement 2 Days

4.NBT.A.1 Recognize that a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right.
4.NBT.A.3 Use place value understanding to round multi-digit whole numbers to any place.
4.NBT.B.4 Fluently add and subtract multi-digit whole numbers using the standard algorithm.
4.NBT.B.5 Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
4.OA.A.3 Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

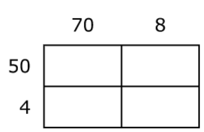
Grade 4 Unit Four
Multi-digit Multiplication

Connections/Notes	Additional Resources
These lessons focus on extending multiplication skills, in preparation for the introduction of algorithms for multiplication. Fact extensions are a powerful mental-arithmetic strategy for all operations involving larger numbers. In Lessons 4-1 and 4-2, students extend basic multiplication facts and use mental arithmetic to estimate products in multidigit multiplication problems, setting the stage for exploring multiplication algorithms such as partial products and the lattice method. **Lesson 4-5** **Day 1:** Students use mathematical models to compare fractions with different numerators and denominators and justify their reasoning. **Day 2:** Students discuss models and explanations and revise their work. The focus of this lesson is GMP1.4. Checking whether an answer makes sense is a habit of mind that students develop as they solve problems, and it should become routine in their problem-solving process. Effective strategies include estimating and solving the problem a second way. Redoing calculations a second time is less effective because the same mistakes may be repeated.	**4.NBT.B.5** **Lessons:** Number Line Dancing Multiplying with Tens AIMS

Lesson 4-3 Partitioning Rectangles, Lesson 4-6 Introducing Partial-Products Multiplication, Lesson 4-9 Partial-Products Multiplication, Lesson 4-10 Multiplication Wrestling, Lesson 4-13 Lattice Multiplication
4.NBT.A.2 Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of the comparisons.
4.NBT.B.4 Fluently add and subtract multi-digit whole numbers using the standard algorithm.
4.NBT.B.5 Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
4.MD.A.3 Apply the area and perimeter formulas for rectangles in real world and mathematical problems.

4.NBT.B.5
MCAP Sample Question:

A model is shown.



Explain how the model could be used to find the result of 54×78. Then find the result of 54×78.

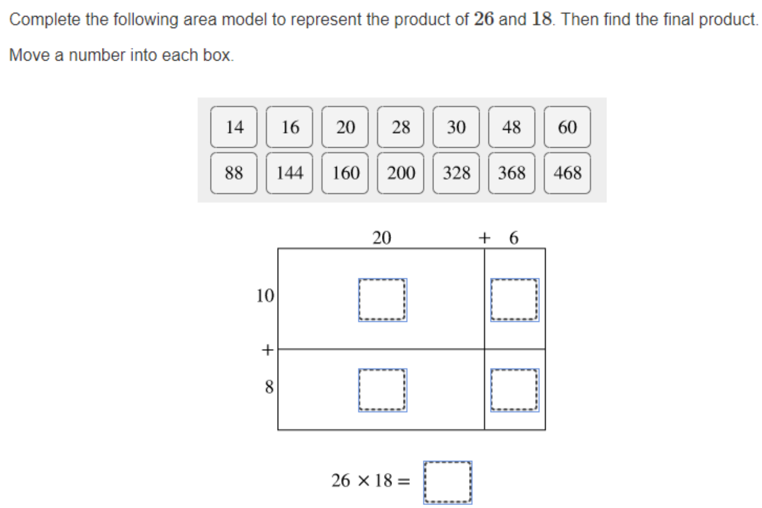
Enter your answer and your explanation in the space provided. You may also use the drawing tool to help explain or support your answer.

4.NBT.B.5

Teaching Student-Centered Mathematics
pg. 113-118, Figures 4.8, 4.10, 4.11, 4.12, pg. 129 Expanded Area Lesson

Lessons:
Connect Area Models and Partial Products

Grade 4 Unit Four
Multi-digit Multiplication

Connections/Notes	Additional Resources
MCAP Sample Question:  Complete the following area model to represent the product of 26 and 18. Then find the final product. Move a number into each box. 14 16 20 28 30 48 60 88 144 160 200 328 368 468 20 + 6 10 + 8 26 × 18 = 4.MD.A.3 **MCAP Evidence Statement:** The language of the standard should guide the creation of the tasks, including the ideas in the given examples**.** The intent of the standard is to apply the area and perimeter formulas for rectangles and the relationship between the two concepts**.** **Clarifications:** • Tasks that assess only area or perimeter should use grade 4 appropriate numbers (not all single digit values) Tasks that include both area and perimeter should use reasonable numbers within grade 4 NBT limits. The numbers used should not be so difficult that they prevent students from answering the task without getting confused by the computation. Students developed understanding of area and perimeter in 3rd grade by using visual models. While students are expected to use formulas to calculate area and perimeter of rectangles, they need to understand and be able to communicate their understanding of why the formulas work. The formula for area is I x w and the answer will always be in square units. The formula for perimeter can be 2 l + 2 w or 2 (l + w) and the answer will be in linear units. This standard provides the context of area and perimeter of rectangles to use for problem solving. Students are first introduced to formulas in this unit and make sense of the formulas using their prior work with area and perimeter.	Frame Filling AIMS Multiplication Stretch AIMS [Multiply and Conquer] **Search YouTube for the activities below:** Use an Array to Multiply a Two-Digit Number by a One-Digit Number Use Area Models to Show Multiplication of Whole Numbers Use Place Value Understanding to Multiply Three- and Four-Digit Numbers **Activities and Tasks:** Multiplication Using the Area Model Teaching Pkt. Partial Products Template Area Model for Multiplication Multiplication Strategy: Partial Products 1

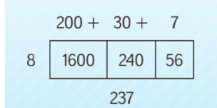
Grade 4 Unit Four
Multi-digit Multiplication

Connections/Notes	Additional Resources

4.MD.A.3
Students developed understanding of area and perimeter in 3rd grade by using visual models.

Example:
Find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula is a multiplication equation with an unknown factor.

In Lessons 4-3, 4-6, and 4-9, students decompose numbers and then use partitioned rectangles and equations to represent their thinking when multiplying large numbers.



Partitioned rectangle for 8 ∗ 237

The lessons also introduce the partial-products method, and students practice using it with both 1- and 2-digit multipliers. By connecting students' thinking to prior work with fact strategies, extended multiplication facts, and expanded notation, this approach helps students see the partial-products algorithm as a natural extension of what they already know about multiplication and place value.

Partial-products method

```
     63
∗    24
  1,200  ← 20 [60s] or 20 ∗ 60
     60  ← 20 [3s] or 20 ∗ 3
    240  ← 4 [60s] or 4 ∗ 60
+    12  ← 4 [3s] or 4 ∗ 3
  1,512
```

Lesson 4-8 Money Number Stories, Lesson 4-12 Multi-Step Multiplication Number Stories
4.NBT.A.3 Use place value understanding to round multi-digit whole numbers to any place.
4.NBT.B.4 Fluently add and subtract multi-digit whole numbers using the standard algorithm.
4.NBT.B.5 Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. The focus of instruction should be on strategies other than the algorithm.

Grade 4 Unit Four
Multi-digit Multiplication

Connections/Notes	Additional Resources
4.MD.A.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale. **4.OA.A.3** Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.	
4.NBT.B.5 **MCAP Evidence Statement**: This full standard contains two types of multiplication of whole numbers. This evidence statement only focuses on 4.NBT.B.5-1 Multiply a whole number of up to four-digits by a one- digit number **Clarifications:** • Tasks do not have a context • Tasks should only assess this standard with factors of 3 digits and 4 digits by one digit. • Tasks should be written to include the both bolded sentences in the standard, "Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models" Tasks that include both area and perimeter should use reasonable numbers within grade 4 NBT limits. The numbers used should not be so difficult that they prevent students from answering the task without getting confused by the computation. Students developed understanding of area and perimeter in 3rd grade by using visual models. While students are expected to use formulas to calculate area and perimeter of rectangles, they need to understand and be able to communicate their understanding of why the formulas work. The formula for area is l x w and the answer will always be in square units. The formula for perimeter can be 2 l + 2 w or 2 (l + w) and the answer will be in linear units. This standard provides the context of area and perimeter of rectangles to use for problem solving. Students are first introduced to formulas in this unit and make sense of the formulas using their prior work with area and perimeter. Students apply prior knowledge to solve number stories involving money, and in Lesson 4-12 they use multiplication algorithms to solve multistep number stories. These problems are centered on real-world contexts to help students build and apply conceptual understanding, as well as provide practice in procedural fluency in computation.	**4.MD.A.2** **Activities and Tasks:** Word Problems **4.OA.A.3** **Activities and Tasks:** Multistep Problems Add Multiply

Grade 4 Unit Four
Multi-digit Multiplication

Connections/Notes	Additional Resources

4.MD.A.2
MCAP Sample Question:

A train museum has a toy train that goes around the entire museum. The train goes around 10 times in 2 hours.

A student calculated the amount of time it takes for the train to go around 1 time. The work is shown.

2 hours $\div$ 10 $=$ 0.2 hour

0.2 is the same as 0.20, so it takes
20 minutes for the train to go around 1 time.

The student's work is incorrect.

- Explain any errors in the student's work.
- Explain how to correct the student's work and find the amount of time it takes for the train to go around the museum 1 time.

Enter your answer and your work or explanation in the space provided. You may also use the drawing tool to help explain or support your answer.

4.OA.A.3
MCAP Evidence Statement: 4.OA.A.3-1 Tasks focus on solving multistep word problems in which the remainder is not interpreted.

Clarifications:
• Multi-step is defined as three steps or processes.
• Tasks should include a letter standing for the unknown.
• Calculations must have at least three steps.
• Tasks include all four operations. Division problems in which remainders are not interpreted.
• For addition and subtraction, note standards 4.NBT.4-1 and 4.NBT.4-2 for limitations on the number of digits allowed.
• For Multiplication and division, note standards 4.NBT.B.5-1, 4.NBT.B5-2, and 4.NBT.B.6 for limitation on the number of digits that can be used in problems.
• For content tasks, the last sentence in the standard is not assessed.
• Tasks include representing the problems using a variable for the unknown. Variables are lower case and italic font when typed.

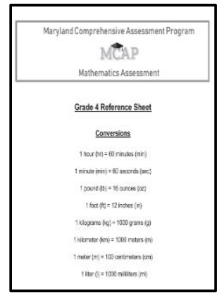
Connections/Notes	Additional Resources
MCAP Sample Question: A teacher with 25 students needs to prepare 40 one-page worksheets for each student. Each package of paper has 500 pages. The teacher thinks that 2 packages of paper are needed. Which **two** steps are part of a solution path to show why the teacher's thinking is correct? Select the **two** correct answers. ☐ A. Add 40 to 25 to determine the total number of worksheets the teacher needs. ☐ B. Divide 40 by 25 to determine the total number of worksheets the teacher needs. ☐ C. Multiply 40 by 25 to determine the total number of worksheets the teacher needs. ☐ D. Add the total number of worksheets to 500 to determine the number of packages the teacher needs. ☐ E. Divide the total number of worksheets by 500 to determine the number of packages the teacher needs.	

Lesson 4-4 Converting Liquid Measures, Lesson 4-7 Metric Units of Mass, Lesson 4-11 Area Models for Rectangles and Rectilinear Figures

4.NBT.B.4 Fluently add and subtract multi-digit whole numbers using the standard algorithm**.**
4.NBT.B.5 Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
4.NBT.B.6 Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
4.MD.A.1 Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table.
4.MD.A.3 Apply the area and perimeter formulas for rectangles in real world and mathematical problems.

4.MD.A.1 **MCAP Evidence Statement:** The language of the standard should guide the creation of the tasks, including the ideas in the given examples**.**	**4.MD.A.1** **Activities and Tasks:** Equivalent Capacities

Grade 4 Unit Four
Multi-digit Multiplication

Connections/Notes	Additional Resources
Clarifications: • Measurement units should be within one system of units, not across systems. • Tasks only include conversion from larger units in terms of smaller units. Use the MCAP Grade 4 Reference Sheet during instruction. Students will be allowed to reference this sheet during unit formative and summative assessments as well as MCAP Testing.  Maryland Comprehensive Assessment Program MCAP Mathematics Assessment Grade 4 Reference Sheet Conversions 1 hour (hr) = 60 minutes (min) 1 minute (min) = 60 seconds (sec) 1 pound (lb) = 16 ounces (oz) 1 foot (ft) = 12 inches (in) 1 kilograms (kg) = 1000 grams (g) 1 kilometer (km) = 1000 meters (m) 1 meter (m) = 100 centimeters (cm) 1 liter (l) = 1000 milliliters (ml) **4.MD.A.1** The units of measure that have not been addressed in prior years are pounds, ounces, kilometers, milliliters, and seconds. Students' prior experiences were limited to measuring length, mass, liquid volume, and elapsed time. Students did not convert measurements. Students need ample opportunities to become familiar with these new units of measure. Students may use a two-column chart to convert from larger to smaller units and record equivalent measurements. They make statements such as, if one foot is 12 inches, then 3 feet has to be 36 inches because there are 3 groups of 12. **Example**: (see table below) Students convert metric units of measure. Lesson 4-4 focuses on metric units measuring liquid amounts, such as milliliters and liters, while Lesson 4-7 focuses on metric units of mass, such as grams and kilograms. Both lessons incorporate the strategy of using extended multiplication facts to solve conversion problems.	**4.MD.A.3** **Activities and Tasks:** Using Equations to Find Area of Shapes

Example:

kg	g
1	1000
2	2000
3	3000

Connections/Notes	Additional Resources
Lesson 4-11 provides practice with another application of multiplication: the formula for finding the area of a rectangle In this lesson, students also find the areas of multiple rectangles composing a rectilinear figure. **4.MD.A.3** Students share strategies for finding area when the perimeter and only one side length are known. Students also find areas by subdividing rectilinear figures. **MCAP Evidence Statement:** The language of the standard should guide the creation of the tasks, including the ideas in the given examples**.** The intent of the standard is to apply the area and perimeter formulas for rectangles and the relationship between the two concepts**.** **Clarifications:** • Tasks that assess only area or perimeter should use grade 4 appropriate numbers (not all single digit values) **MCAP Sample Question:** Roberta has a rectangular shelf. The shelf has a length of 40 inches and a perimeter of 104 inches. Which expression **best** represents the area, in square inches, of the shelf? Select one answer. ○ A. 40×12 ○ B. 40×52 ○ C. $40 + 12 + 40 + 12$ ○ D. $40 + 52 + 40 + 52$	
Lesson 4-14 Unit 4 Progress Check	

<table>
<tr><th colspan="2">Grade 4 Unit Five
Fraction and Mixed Number Computation & Measurement</th></tr>
<tr><th>Connections/Notes</th><th>Additional Resources</th></tr>
<tr><td colspan="2">Lesson 5-1 Fraction Decomposition, Lesson 5-2 The Whole for Fractions

4.NF.B.3 Understand a fraction a/b with a > 1 as a sum of fractions 1/b.
a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.
b. Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model.</td></tr>
<tr><td>Students use fraction circles to decompose fractions and mixed numbers into sums of fractions with the same denominators and help them solve problems in which a part is given and they must find the whole.

Watch for students who struggle trying to understand the concept of mixed numbers. Display a number line with tick marks for common fractional parts. Demonstrate counting each interval on the number line to show the number of parts needed to arrive at a fraction that is greater than 1.

In Lesson 5-2 students find the "whole" for a fraction. A key concept for students to understand is that fractions by themselves say nothing about the size of the whole or the size of the parts. They only describe the relationship between the part and the whole. It is important to emphasize how fractions are meaningless unless they are thought of in reference to the whole. For instance, half of a glass of milk is not the same as half of a quart of milk, and half of a second is very different from half of an hour. Students use various models for fractions—including fraction circles, fraction strips, and number lines—to solve problems involving fractional pieces.

4.NF.B.3

MCAP Evidence Statement: This standard is instructional and must be taught as it develops important foundational understanding for adding and subtracting fractions. The standard may be used with the other standards in this cluster or as the content focus for reasoning and modeling tasks.

Suggested manipulatives to develop this concept: fraction strips, Cuisenaire rods, fraction towers, fraction fringes (AIMS), fraction squares, fraction circles, and pattern blocks.

Visual fraction models include tape diagrams, area models, number line diagrams, set diagrams (See Van de Walle pgs.162-166).</td><td><u>Teaching Student Centered Mathematics</u>
pg. 150 First Estimates Activity 5.13

<u>Lessons:</u>
Decompose Fractions as a Sum of Unit Fractions 1 & 2
Decompose Fractions Using Tape Diagrams
Decompose Fractions into Sums of Smaller Fractions

<u>Activities and Tasks:</u>
Pizza Share
Making 22 Seventeenths in Different Ways
Plastic Building Blocks
Writing a Mixed Number as an Equivalent Fraction
Fraction Missing Addends
Sense or Nonsense

<u>Search YouTube for the activity below:</u>
Add Fractions by Joining Parts</td></tr>
<tr><td colspan="2">Lesson 5-3 Adding Fractions, Lesson 5-4 Adding Mixed Numbers, Lesson 5-5 Adding Tenths and Hundredths, Lesson 5-6 Queen Arlene's Dilemma Open Response & Reengagement 2 Days, Lesson 5-7 Subtracting Fractions, Lesson 5-8 Subtracting Mixed Numbers</td></tr>
</table>

<table>
<tr><th colspan="2">Grade 4 Unit Five
Fraction and Mixed Number Computation & Measurement</th></tr>
<tr><th>Connections/Notes</th><th>Additional Resources</th></tr>
<tr><td colspan="2">**4.NF.A.1** Explain why a fraction *a*/*b* is equivalent to a fraction (*n* × *a*)/(*n* × *b*) by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions.
4.NF.B.3 Understand a fraction a/b with a > 1 as a sum of fractions 1/b.
a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.
b. Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model.
c. Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction.
d. Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem.
4.NF.C.5 Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100.2 For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100.
4.NF.C.6 Use decimal notation for fractions with denominators 10 or 100. For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram.
4.MD.A.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.</td></tr>
<tr><td>**MCAP Clarifications:**
• Only the answer is required for content.
• Tasks are limited to denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.
• Tasks may include fractions that equal whole numbers greater than 1 and no larger than 5.
• Linear fraction models such as bar models/tape diagrams and number lines or area models will be used in tasks.

Common Misconception
Watch for students who add both the numerator and denominator, thinking, for example, that
$\frac{3}{4}+\frac{3}{4}=\frac{(3+3)}{(4+4)}=\frac{6}{8}$.</td><td>**4.NF.B.3**

Lessons:
Add Mixed Numbers
Subtract Mixed Numbers
Add a Mixed Number and a Fraction
Subtract a Fraction from a Mixed Number
Subtract a Mixed Number from a Mixed Number
Add and Subtract Fractions
Adding Fractions on a Number Line
Lesson Use Visual Models to Add and Subtract Two Fractions with the Same Units
Lesson Use Visual Models to Add Two Fractions with Related Units</td></tr>
</table>

Grade 4 Unit Five
Fraction and Mixed Number Computation & Measurement

Connections/Notes

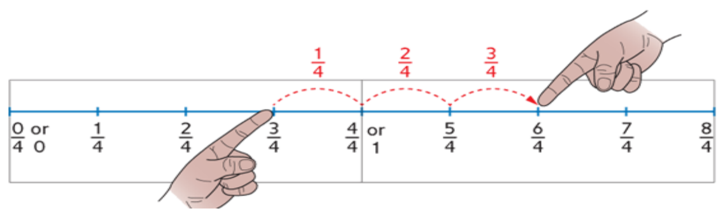
Have these students use manipulatives to represent the fractions. Also consider having them write the number models with fraction words.

Encourage strategies such as the following:

- Use fraction names. Just as 3 dogs + 3 dogs = 6 dogs, 3 fourths + 3 fourths = 6 fourths. The unit is *fourths*.
- Think about $\frac{3}{4}$ as the sum of unit fractions: $\frac{1}{4}+\frac{1}{4}+\frac{1}{4}$.

$$\text{So, } \frac{3}{4}+\frac{3}{4}=\overbrace{\frac{1}{4}+\frac{1}{4}+\frac{1}{4}}^{3}+\overbrace{\frac{1}{4}+\frac{1}{4}+\frac{1}{4}}^{3}=\frac{\overbrace{(1+1+1+1+1+1)}^{3+3}}{4}=\frac{6}{4}.$$

- Use the Number-Line Poster. Place a finger on $\frac{3}{4}$. Then, beginning at $\frac{3}{4}$, count up $\frac{3}{4}$ $(\frac{1}{4}+\frac{1}{4}+\frac{1}{4})$ to $\frac{6}{4}$.



Simone changed the mixed number $4\frac{1}{3}$ to a fraction. First, Simone changed the whole number 4 to the fraction $\frac{4}{3}$. Then she added the two fractions together. Her work is shown.

$$4\frac{1}{3}=4+\frac{1}{3}$$

$$=\frac{4}{3}+\frac{1}{3}$$

$$=\frac{5}{3}$$

Explain the error in Simone's reasoning. Find the correct equivalent fraction. Describe another method you can use to change the mixed number $4\frac{1}{3}$ to a fraction.

Additional Resources

Activities and Tasks:
Adding Mixed Numbers
Adding and Subtracting Like Fractions

Search YouTube for the activities below:
Adding Mixed Numbers by Creating Equivalent Fractions
Add Fractions with Like Denominators by Decomposing into Unit Fractions

Online:
Thinking Blocks - Fractions

Grade 4 Unit Five Fraction and Mixed Number Computation & Measurement	
Connections/Notes	**Additional Resources**
A student's work to add the mixed numbers $1\frac{3}{4}$ and $2\frac{3}{4}$ is shown. $1\frac{3}{4}+2\frac{3}{4}=\frac{4}{4}+\frac{3}{4}+\frac{8}{4}+\frac{3}{4}$ $=\frac{4+3+8+3}{4+4+4+4}$ $=\frac{18}{16}$ Explain any errors you see in the work. Find the correct solution. Show your work or explain your answer. Watch for students who subtract both the numerator and the denominator. Remind them that the denominator remains the same when subtracting, as it would with any other unit they use. Have students model a few subtraction problems with manipulatives to help them see that the denominator stays the same. **4.NF.B.3c** **MCAP Evidence Statement**: This standard addresses the language of the entire standard keeping in mind the essential understandings given in the first row for 4.NF.B.3a. **Clarifications:** • Tasks should include the examples given for this standard in the e.g. portion of the standard. • Tasks do not have a context. • Denominators are limited to grade 3 possibilities (2, 3, 4, 6, 8) to keep computational difficulty lower.	

Grade 4 Unit Five
Fraction and Mixed Number Computation & Measurement

Connections/Notes	Additional Resources

MCAP Sample Question:

Samuel had $1\frac{7}{8}$ cups of milk. He used $1\frac{5}{8}$ cups of milk to make biscuits.

What is the amount of milk, in cups, that Samuel had after he made biscuits?

Enter your answer as a fraction in the spaces provided.

4.NF.B.3.d,c:

An athlete needs to exercise $3\frac{5}{10}$ hours each week.

- The athlete exercised $\frac{6}{10}$ hour on Sunday.
- The athlete exercised $\frac{3}{10}$ hour on Monday.
- The athlete exercised $\frac{4}{10}$ hour each on Tuesday, Wednesday, and Thursday.

Create a solution path to find the time that the athlete needs to exercise the rest of the week.

Enter your answer and your work or explanation in the space provided. You may also use the drawing tool to help explain or support your answer.

4.NF.C.6

MCAP Evidence Statement: The language of the standard should guide the creation of the tasks, including the ideas in the given examples**.**

Clarifications:

• Understand that 0.62 and 62100 are different representations for the same number.

• See the example provided in the standard when using meters or centimeters on a number line when measuring length.

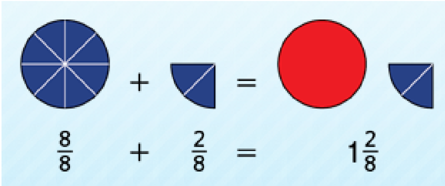
Grade 4 Unit Five
Fraction and Mixed Number Computation & Measurement

Connections/Notes	Additional Resources

Common Misconception
Some students may get confused and think that since 10 is smaller than 100, tenths are smaller than hundredths. Working with base-10 blocks may help these students visualize more appropriately.

4.MD.A.2
Evidence Statement: The language of the standard should guide the creation of the tasks.
Clarifications:
- Grade 4 expectations in MDCCRS are limited to whole numbers less than or equal to 1,000,000.
- Tasks with fractions are limited to denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.

.
A solid understanding of equivalent fractions is needed for comparison and computation. In Lessons 5-3 and 5-4, fractional relationships between models, such as fraction circles or fraction strips, are applied to solve simple fraction and mixed-number addition problems. Students use fraction models to develop strategies for solving addition problems involving fractions, particularly fractions with like denominators, and then extend these concepts to addition of mixed numbers.



Lesson 5-6

Day 1: Students decide how to divide an area of land into parts based on a number story and write a fraction addition.
Day 2: Students discuss some solutions and representations and revise their work.

The focus of this lesson is GMP2.2 Students represent the whole and fractional parts for the distribution of land described in the open response problem in different ways (e.g., fraction circles, drawings of rectangles or other shapes) and write a corresponding fraction addition equation. In the reengagement discussion, students make sense of other students' representations, which require interpreting the relationships between the parts and the whole.

Lesson 5-9 Line Plots: Fractional Units

4.NF.B.3 Understand a fraction a/b with a > 1 as a sum of fractions 1/b.
c. Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction.

Grade 4 Unit Five
Fraction and Mixed Number Computation & Measurement

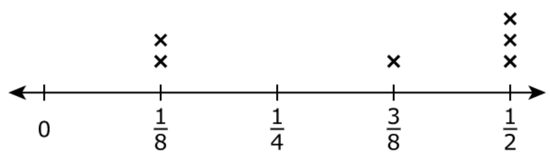
Connections/Notes	Additional Resources

4.MD.B.4 Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.

Graphical representation of data helps students see how graphs and charts are used to convey information. While students do construct line plots in Lesson 5-9, the focus of the lesson is on discussing and interpreting the data.

MCAP Sample Question:

There are six different pies left over after a party. Each of the pies has a fractional amount left at the end of the party. The line plot shows the fractions of pies leftover.



Each person who attended the party will receive an equal amount of the leftover pie.

Which piece of information is needed to determine how much pie each person should receive?

- ○ A. the types of pie that are left over
- ○ B. the type of pie each person likes most
- ○ C. the number of slices in each whole pie
- ○ D. the number of people who attended the party

Additional Resources – 4.MD.B.4

Lessons:
Line Plots
Measurement in Fraction Units
Msmt and Data Line Plots (Unit)
Fraction Line Plot Word Prob

Activities and Tasks:
Measuring & Showing
Length of Ants
Measure in Fractional Units

Search YouTube for the activity below:
Create a Line Plot Using a Data Set of Fractional Measures

Lesson 5-10 Rotations and Iterating Angles Lesson 5-11 Unit Iteration for Angles Lesson 5-12 Creating Symmetric Figures

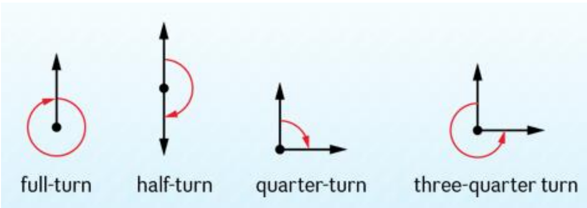
4.MD.C.5 Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint and understand concepts of angle measurement.

Grade 4 Unit Five
Fraction and Mixed Number Computation & Measurement

<table>
<tr><th>Connections/Notes</th><th>Additional Resources</th></tr>
<tr><td colspan="2">a. An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a “one-degree angle,” and can be used to measure angles.
b. An angle that turns through n one-degree angles is said to have an angle measure of n degrees.
4.G.A.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.
4.G.A.3 Recognize a line of symmetry for a two-dimensional figure as a line across the figure such t the figure can be folded along the line into matching parts. Identify line symmetric figures and draw lines of symmetry.</td></tr>
<tr><td>4.MD.C.5

Evidence Statement: This standard is instructional and must be taught as it develops important foundational understanding for angle measurement. The standard may be used as the content focus for tasks that will assess reasoning and modeling.

Angle measurement presents a challenge for students, who frequently misunderstand the attribute of angle size. The problem stems in part from the common practice of introducing protractors or other angle measurement tools without developing a conceptual understanding of both how they work and what their relationship is to the measure of an angle. It is critical for students to understand that an angle’s size depends on the spread of its rays. Representing angles by rotating one ray while the other is kept stationary helps develop understanding because the amount of rotation serves as an intuitive introduction to angle measure. In Lessons 5-10 and 5-11, students use straws to explore angle measures in the context of rotations.


</td><td>4.MD.C.5

<u>Teaching Student Centered Mathematics</u>
pg. 272 A Unit Angle Activity 9.12, Figure 9.13

<u>Lessons:</u>
Use a Circular Protractor to Understand a One-Degree Angle
Circles and Angles (Unit)

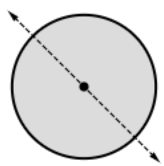
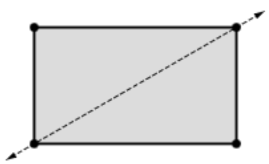
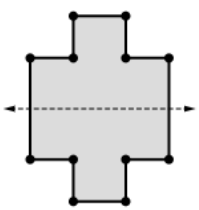
<u>Activities and Tasks:</u>
Angles on the Geoboard
Angle Explorer Tool</td></tr>
</table>

Connections/Notes	Additional Resources
4.G.A.3	

MCAP Sample Question:

Determine whether the dashed line in each shape appears to be a line of symmetry.

Select one box per row.

Shape	Appears to Be a Line of Symmetry	Does **Not** Appear to Be a Line of Symmetry
	☐	☐
	☐	☐
	☐	☐

Grade 4 Unit Five Fraction and Mixed Number Computation & Measurement	
Connections/Notes	**Additional Resources**
Lesson 5-13 More Multistep Multiplication Number Stories **4.OA.A.3** Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. **4.NBT.A.3** Use place value understanding to round multi-digit whole numbers to any place. **4.NBT.B.4** Fluently add and subtract multi-digit whole numbers using the standard algorithm**.** **4.NBT.B.5** Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.	
4.OA.A.3 **Evidence Statement**: 4.OA.A.3-1 Tasks focus on solving multistep word problems in which the remainder is not interpreted. **Clarifications:** • Multi-step is defined as three steps or processes. • Tasks should include a letter standing for the unknown. • Calculations must have at least three steps. • Tasks include all four operations. Division problems in which remainders are not interpreted. • For addition and subtraction, note standards 4.NBT.4-1 and 4.NBT.4-2 for limitations on the number of digits allowed. • For Multiplication and division, note standards 4.NBT.B.5-1, 4.NBT.B5-2, and 4.NBT.B.6 for limitation on the number of digits that can be used in problems. • For content tasks, the last sentence in the standard is not assessed. • Tasks include representing the problems using a variable for the unknown. Variables are lower case and italic font when typed.	
Lesson 5- 14 Unit 5 Progress Check	

<table>
<tr><th colspan="2">Grade 4 Unit Six
Division & Angles</th></tr>
<tr><th>Connections/Notes</th><th>Additional Resources</th></tr>
<tr><td colspan="2">Lesson 6-1 Extended Division Facts, Lesson 6-2 Area: Finding Missing Side Lengths, Lesson 6-3 Strategies for Division, Lesson 6-4 Partial Quotients Division, Part 1, Lesson 6-7 Partial Quotients Division, Part 2
4.OA.B.4 Find all factor pairs for a whole number in the range 1–100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1–100 is prime or composite.
4.NBT.A.1 Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right.
4.NBT.B.5 Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
4.NBT.B.6 Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.</td></tr>
<tr><td>4.NBT.A.1
For example, recognize that 700 ÷ 70 = 10 by applying concepts of place value and division.

4.NBT.B.6
MCAP Evidence Statement: The language of the standard should guide the creation of the tasks, including the ideas in the given examples.
Clarifications:
• Tasks should be written to enable students to explain (show) the strategies they use using words and or equations. The intent of the standard is more than finding the correct answer.
• Tasks find whole number quotients using three- or four-digit dividends and one-digit divisors.
• Tasks do not have a context.

In fourth grade, students build on their third-grade work with division within 100. Students need opportunities to develop their understandings by using problems in and out of context. Flexible methods of division computation involve taking apart numbers in a variety of ways, using models and strategies such as arrays, open area models, and partial quotients.

Using Base 10 Blocks: Students build 260 with base 10 blocks and distribute them into 4 equal groups. Some students may need to trade the 2 hundreds for tens but others may easily recognize that 200 divided by 4 is 50.

Using Place Value: 260 ÷ 4 = (200 ÷ 4) + (60 ÷ 4)</td><td>4.NBT.B.6
<u>Teaching Student-Centered Mathematics</u>
pg. 121-124

<u>Lessons:</u>
Division with remainders Using Arrays and Area Models
Two-Digit Dividends with Number Disks
Solve Division Problems Without Remainders Using Area Models

<u>Activities and Tasks:</u>
Division of the Day
Division Strategy: Partial Quotients 1
Division Strategy: Partial Quotients 2
Division Strategy: Partition the Dividend</td></tr>
</table>

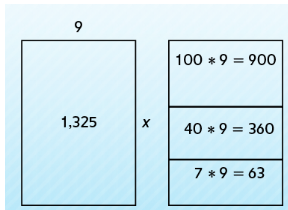
Grade 4 Unit Six
Division & Angles

Connections/Notes

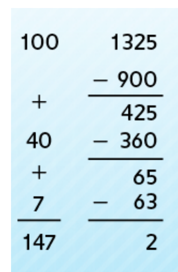
Using Multiplication:

4 x 50 = 200, 4 x 10 = 40, 4 x 5 = 20; 50 + 10 + 5 = 65; so 260 ÷ 4 = 65

The example below illustrates a model of the partial-quotients method for 1,325 ÷ 9. When students partition, or divide, the 1,325 into parts (900 + 360 + 63 + 2), it helps them develop their understanding of the algorithm.



The example below uses the partial-quotients method. The quotients for each step are added together to give the final answer. The partial-quotients division algorithm allows students to use numbers that are easy for them to work with.



MCAP Sample Question:

Which expression has the same value as $1435 \div 7$?

Select one answer.

- A. $(14 \div 7) + (35 \div 7)$
- B. $(14 \div 7) - (35 \div 7)$
- C. $(1400 \div 7) + (35 \div 7)$
- D. $(1400 \div 7) - (35 \div 7)$

Additional Resources

Search YouTube for the activities below:

Divide Two-Digit Dividends
Using Friendly Multiples
Divide Three-Digit Dividends
Divide Four-Digit Dividends

Online:

Rectangle Division *NLVM*

Templates and Visuals:

Division Anchor Chart Samples

Grade 4 Unit Six
Division & Angles

<table>
<tr><th>Connections/Notes</th><th>Additional Resources</th></tr>
<tr><td colspan="2">Lesson 6-5 Fruit Baskets Open Response & Reengagement 2 Days, Lesson 6-8 Expressing and Interpreting Remainders
4.OA.A.3 Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.
4.NBT.B.6 Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.</td></tr>
<tr><td>4.NBT.B.6
MCAP Evidence Statement: The language of the standard should guide the creation of the tasks, including the ideas in the given examples.
Clarifications:
• Tasks should be written to enable students to explain (show) the strategies they use using words and or equations. The intent of the standard is more than finding the correct answer.
• Tasks find whole number quotients using three- or four-digit dividends and one-digit divisors.
• Tasks do not have a context.
Lesson 6-5

Day 1: Students interpret remainders to decide how to package fruit for a fundraiser and explain their solutions.
Day 2: Students discuss solutions and explanations of the problem and revise their work.

The focus of this lesson is GMP6.3. The open response problem asks students to decide how to package oranges into baskets and then put the baskets into boxes. Using clear labels and units throughout the problem-solving process helps students keep track of what each number means. Using clear mathematical language helps students explain their thinking.

In some whole-number division problems it may be desirable to express the remainder as a fraction or decimal; for example, if 14 nutrition bars are shared by 4 students, each person’s share is better represented as $3\frac{1}{2}$ rather than 3 R2 nutrition bars.

Students consider the role of the remainder in a variety of division number stories and decide how to report the answer. They look at whether to ignore the remainder, report it as a fraction, or round the answer up.</td><td>4.NBT.B.6
<u>Teaching Student-Centered Mathematics</u>
pg. 93 How Close Can You Get? Activity 3.10

<u>Lessons:</u>
Division Word Problems with Remainders
Whole Number Quotients and Remainders
Solve Division Problems With Remainders Using Area Models

<u>Search YouTube for the activities below:</u>
Report Remainders as Fractions
Report Remainders as Whole Numbers by Drawing Pictures to Decide Whether to Round Up or Down</td></tr>
</table>

<table>
<tr><th>Connections/Notes</th><th>Additional Resources</th></tr>
<tr><td>

Remainder that becomes part of the answer

- A rope 14 feet long is cut into 4 pieces of equal length. How long is each piece? $3\frac{2}{4}$ feet, $3\frac{1}{2}$ feet, or 3 feet 6 inches.

Remainder that cannot be further split up

- Four children agree to divide a set of 14 toy cars equally. What is each child's share? 3 cars, with 2 left over that can't be split up

Remainder that is ignored

- Ann has $14 to buy notebooks that cost $4 each. How many notebooks can she buy? 3 notebooks, with $2 left over

Remainder that indicates the answer should be rounded up

- Joe has 14 photographs. He can fit 4 photos on a page in his photo album. How many pages must he use to include all 14 photos? 4 pages; 3 pages will hold only 12 photos, so he needs to use a fourth page.
-

</td><td></td></tr>
<tr><td colspan="2">

Lesson 6-6 Customary Units of Weight
4.NBT.B.5 Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
4.MD.A.1 Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table.

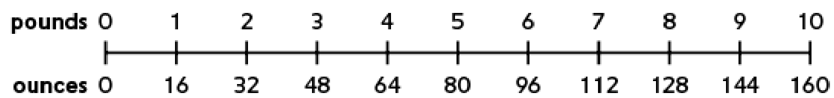
</td></tr>
<tr><td>Students will use measurement scales to solve measurement number stories.</td><td>

4.MD.A.1
Lessons:
Create Conversion Tables for Measurement and Use Tables to Solve Problems

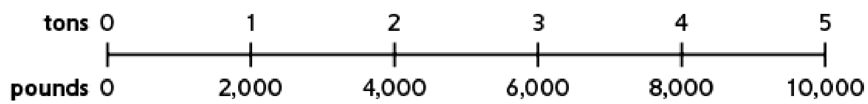
</td></tr>
</table>

Grade 4 Unit Six
Division & Angles

Connections/Notes	Additional Resources
We picked 4 bags of apples. Each bag weighed 2 pounds. How much do the 4 bags weigh? 8 pounds	**<u>Activities and Tasks:</u>** Equivalent Capacities Equivalent Capacities Graphic

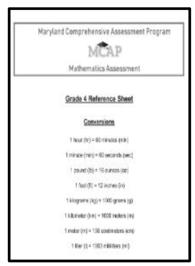


The elephant at our favorite zoo weighs 7 tons. A nearby hippopotamus weighs 4 tons. How many more pounds does the elephant weigh than the hippopotamus? 6,000 pounds



As students begin feeling comfortable using the scales, have them fill in tables converting tons to pounds and pounds to ounces.

Use the MCAP Grade 4 Reference Sheet during instruction.
Students will be allowed to reference this sheet during unit formative and summative assessments as well as MCAP Testing.



Lesson 6-9 Measuring Angles, Lesson 6-10 Using a Half-Circle Protractor, Lesson 6-11 Angle Measures as Additive
4.MD.C.5 Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint and understand concepts of angle management.
a. An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a “one-degree angle,” and can be used to measure angles.
b. An angle that turns through *n* one-degree angles is said to have an angle measure of n degrees.
4.MD.C.6 Measure angles in whole-number degrees using a protractor. Sketch angles of a specified measure.

Grade 4 Unit Six
Division & Angles

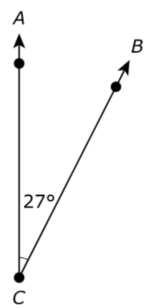
Connections/Notes	Additional Resources

4.MD.C.7 Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g. by using an equation with a symbol for the unknown angle measure.
4.G.A.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.

4.MD.C.5
MCAP Evidence Statement: This standard is instructional and must be taught as it develops important foundational understanding for angle measurement. The standard may be used as the content focus for tasks that will assess reasoning and modeling.

MCAP Sample Question:

The diagram shows angle ACB.



Which statement is true about angle ACB?

- A. The number of 1° angles that angle ACB turns through is twenty-seven.
- B. The number of 7° angles that angle ACB turns through is twenty.
- C. The number of 20° angles that angle ACB turns through is seven.
- D. The number of 90° angles that angle ACB turns through is twenty-seven.

Additional Resources

4.MD.C.6

Teaching Student Centered Mathematics
pgs. 272-274

Lessons:
Flagging Down Angles AIMS
Flight Paths AIMS
Using Protractors
Circles and Angles (Unit)

Activities and Tasks:
Using a Protractor
Angles in Triangles
Angles in Quadrilaterals
Predicting and Measuring Angles
I Have…Who Has…Angles
Angles in Names
Comparing Angles
Angle Explorer Tool
Student Angle Explorer

Videos:
Read a Protractor
Types of Angles

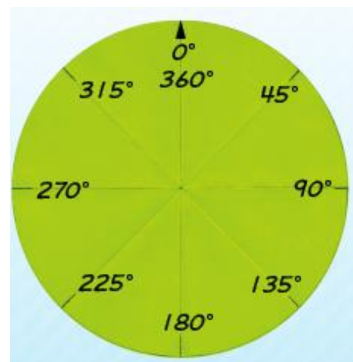
Grade 4 Unit Six
Division & Angles

Connections/Notes

Students build on their knowledge of measurement and angles and learn to use a protractor. To ensure that students become confident with its use, they first build a solid understanding of this often-misunderstood tool. In Lesson 6-9 students conclude that a tool for measuring angles must be made up of small angles, just as a tool for measuring length (such as a ruler) is made up of small units of length (such as inches).

Before students begin measuring angles with protractors, they need to have some experiences with benchmark angles. They transfer their understanding that a 360º rotation about a point makes a complete circle to recognize and sketch angles that measure approximately 90º and 180º. They extend this understanding and recognize and sketch angles that measure approximately 45º and 30º. They use appropriate terminology (acute, right, and obtuse) to describe angles and rays (perpendicular).

Because the increments are tiny and the angles are not visible on a protractor, students next make and use a simplified angle measurer with larger increments and visible angles.



Common Misconception

To address the confusion frequently caused by the clockwise and counterclockwise numbering on protractors, students first estimate an angle measure—both by describing it as acute or obtuse and by estimating a degree measure—to give them a sense of what a reasonable measure would be.

In Lesson 6-11 students build on the idea that when an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. They apply this idea to solve addition and subtraction problems to find unknown angle measures.

Additional Resources

4.MD.C.7

Lessons:
Decompose Angles Using Pattern Blocks

Activities and Tasks:
How Many Degrees?
Unknown Angle Word Problems
Finding an Unknown Angle
Pattern Block Angles
Angles in a Right Triangle
Additive Angles
Additive Angles #2
Additive Angles #3

Search YouTube for the activities below:
Understand that Angle Measure is Additive by Decomposing
Compose and Decompose Angles
Find Unknown Angles Using Angle Properties

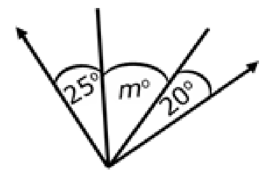
Online:
[Decomposing Angles]

Grade 4 Unit Six
Division & Angles

Connections/Notes	Additional Resources
4.MD.C.7	

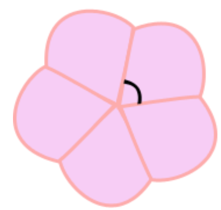
Examples:

- If the two rays are perpendicular, what is the value of m?



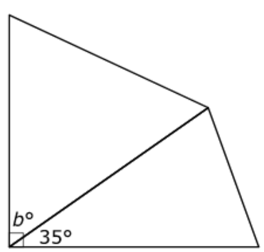
- Joey knows that when a clock's hands are exactly on 12 and 1, the angle formed by the clock's hands measures 30°. What is the measure of the angle formed when a clock's hands are exactly on the 12 and 4?

- The five sections in the diagram are the exact same size.
  Write an equation that will help you find the measure of the indicated angle.
  Find the angle measurement.



MCAP Sample Question:

A student drew a quadrilateral with one right angle. The student then divided the quadrilateral into two triangles. The student measured one angle in one of the triangles as shown in the figure.



Which solution path could the student use to find the value of b without measuring the angle?

- A. add 35 to 90
- B. divide 90 by 35
- C. multiply 35 by 90
- D. subtract 35 from 90

Connections/Notes	Additional Resources
Lesson 6-12 Number Stories with Fractions and Mixed Numbers **4.NF.B.3** Understand a fraction a/b with a > 1 as a sum of fractions 1/b. a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. b. Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. c. Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction. d. Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem.	
4.NF.B.3 **MCAP Evidence Statement**: This standard addresses the language of the entire standard keeping in mind the essential understandings given in the first row for 4.NF.B.3a. **Clarifications:** • Tasks are limited to denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100. • Addition and Subtraction Situations are found in the back of this document. Tasks that include these problem types are sampled equally. • Linear fraction models such as bar models/tape diagrams and number lines or area models will be used in tasks. • Problems may include mixed numbers with like denominators. • Denominators for mixed numbers are limited to 2,3,4,6,8 Ask students to write two different number models with unknowns to represent the problems. Discuss how there are often different ways to think about a problem. Ultimately, the solution is the same even though the ways to get there may differ. Word Problem Example: • Susan and Maria need 8 3/8 feet of ribbon to package gift baskets. Susan has 3 1/8 feet of ribbon and Maria has 5 3/8 feet of ribbon. How much ribbon do they have altogether? Will it be enough to complete the project? Explain why or why not. The student thinks: I can add the ribbon Susan has to the ribbon Maria has to find out how much ribbon they have altogether. Susan has 3 1/8 feet of ribbon and Maria has 5 3/8 feet of ribbon. I can write this as 3 1/8 + 5 3/8. I know they have 8 feet of ribbon by adding the 3 and 5. They also have 1/8 and 3/8 which makes a total of 4/8 more. Altogether they have 8 4/8 feet of ribbon. 8 4/8 is larger than 8 3/8 so they will have enough ribbon to complete the project. They will even have a little extra ribbon left, 1/8 foot.	**4.NF.B.3** **<u>Activities and Tasks:</u>** Mixed Number Word Problems

Grade 4 Unit Six
Division & Angles

Connections/Notes	Additional Resources

Lesson 6-13 Extending Understandings of Whole-Number Multiplication

4.NF.B.4 Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.
b. Understand a multiple of a/b as a multiple of 1/b, and use this understanding to multiply a fraction by a whole number. For example, use a visual fraction model to express 3 × (2/5) as 6 × (1/5), recognizing this product as 6/5. (In general, n × (a/b) = (n × a)/b.)
c. Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem.

4.NF.B.4

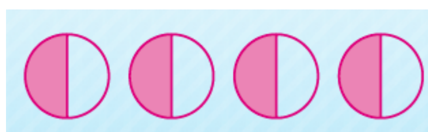
MCAP Evidence Statements: The evidence statement includes the language in 4.NF.B.4 and should be considered when developing a task for this standard. This standard involves multiplying a whole number times a multiple of a unit fraction.

Clarifications:
• Tasks are limited to denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.
• Linear models may be used in the tasks using models such as bar models/tape diagrams and number lines or area models
• Tasks should have thin context.

Students apply their knowledge of whole-number multiplication to explore multiplying a fraction by a whole number. Students see that a multiplication number story can be modeled using various representations. For example: Four students each want 1212 cup of juice. How much juice is needed in all? 2 cups of juice

Students explore representing the problem with:

- A picture or drawing:



- Words: 4 groups of $\frac{1}{2}$
- An addition equation: $\frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} = \frac{4}{2}$ or 2
- A multiplication equation: $4 * \frac{1}{2} = \frac{4}{2}$ or 2

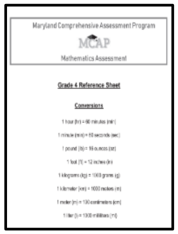
Lesson 6- 14 Unit 6 Progress Check

Grade 4 Unit Seven Multiplication of a Fraction by a Whole Number & Measurement	
Connections/Notes	**Additional Resources**
Lesson 7-1 Converting Liquid Measures: U.S. Customary Units, Lesson 7-10 Solving Multistep Fraction Number Stories, Lesson 7-11 Weights of State Birds, Lesson 7-12 Decimal Number Stories, Lesson 7-13 Displaying Insect Data 4.NF.A.1 Explain why a fraction a/b is equivalent to a fraction (n x a)/(n x b) by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principal to recognize and generate equivalent fractions. 4.NF.A.2 Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as ½. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols <, =, or >, and justify the conclusions, e.g., by using a visual fraction model. 4.NF.B.3 Understand a fraction a/b with a > 1 as a sum of fractions 1/b. a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. c. Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction. d. Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators 4.NF.B.4 Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. a. Understand a fraction a/b as a multiple of 1/b. For example, use a visual fraction model to represent 5/4 as the product 5 × (1/4), recording the conclusion by the equation 5/4 = 5 × (1/4). b. Understand a multiple of a/b as a multiple of 1/b, and use this understanding to multiply a fraction by a whole number. For example, use a visual fraction model to express 3 × (2/5) as 6 × (1/5), recognizing this product as 6/5. (In general, n × (a/b) = (n × a)/b.) c. Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. For example, if each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie? 4.NF.C.6 Use decimal notation for fractions with denominators 10 or 100. For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram. 4.MD.A.1 Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. 4.MD.A.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale. 4.MD.B.4 Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.	

Grade 4 Unit Seven
Multiplication of a Fraction by a Whole Number & Measurement

Connections/Notes

Use the MCAP Grade 4 Reference Sheet during instruction.
Students will be allowed to reference this sheet during unit formative and summative assessments as well as MCAP Testing.


Maryland Comprehensive Assessment Program
MCAP
Mathematics Assessment
Grade 4 Reference Sheet
Conversions

Units of measurement offer students practice in applying number concepts to real-world situations. Lesson 7-1 explores U.S. customary units of capacity. Students practice converting between cups, pints, quarts, and gallons and use these conversions to solve number stories.

Lessons 7-10 through 7-13 use multiple measurement units (time, money, length, and weight) involving fractions to solve problems in real-world contexts. In Lesson 7-10 students use their knowledge of fraction comparison, fraction operations, and equivalent intervals of time to solve multistep number stories. To further explore multiplying fractions by whole numbers in multistep number stories, students work with the U.S. customary system of weight and convert pounds and fractions of pounds to ounces in Lesson 7-11.

Fourth grade students are expected to understand decimal notation for fractions, translate between decimal notation and fractions with denominators of 10 or 100, and compare decimals, but not to perform operations with decimals. In Lesson 7-12 students convert decimal amounts to fractions to solve number stories involving money. Facilitating translation between fractions and decimals is key for success with decimal computation in fifth grade.

In Lesson 7-13 students use line plots to organize and display data. They create line plots and use them to analyze data and solve problems. Data are displayed in fractional units to give students an opportunity to practice and apply operations with fractions.

Additional Resources

4.MD.A.1

Lessons:
Create Conversion Tables for Measurement and Use Tables to Solve Problems

Activities and Tasks:
Equivalent Capacities
Capacity Creature
Measurement Conversion Problems
Equivalent Measure Tables
Customary Measurement Foldable

Templates and Visuals:
Equivalent Graphic
Measurement Signs

4.MD.A.2

Lessons:
Solve Word Problems with Measurements in Decimal Form
Solve Word Problems Involving Money

Activities and Tasks:
Money Word Problems
Decimal Place Value Mat

Templates and Visuals:
Line Plot Template

Grade 4 Unit Seven
Multiplication of a Fraction by a Whole Number & Measurement

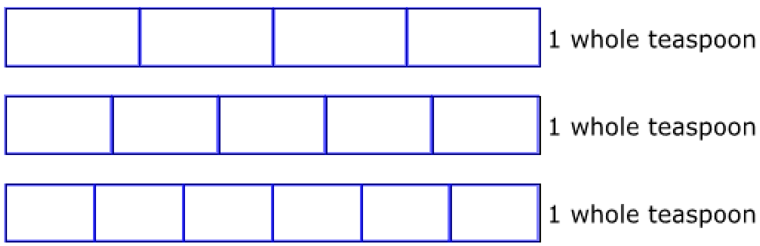
Connections/Notes	Additional Resources

4.NF.B.4

MCAP Sample Questions

A baker will make 3 pies. The baker needs $\frac{1}{4}$ teaspoon of salt for each pie.

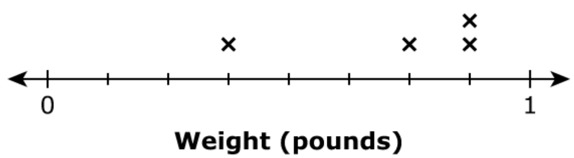
Select parts of one of the models to represent the fraction of a teaspoon of salt the baker needs for 3 pies.



4.MD.B.4

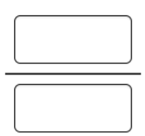
MCAP Sample Questions

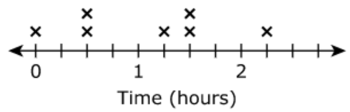
This line plot shows the weights, in pounds, of different objects in a student's backpack.



What is the difference, in pounds, between the greatest weight and the least weight?

Enter your answer as a fraction in the spaces provided.



Grade 4 Unit Seven Multiplication of a Fraction by a Whole Number & Measurement	
Connections/Notes	**Additional Resources**
Last week, a student kept track of how long he practiced soccer each day. The line plot shows the student's data.  Which three questions can be answered using the information in the line plot? Select the **three** correct answers. ☐ A. What was the greatest amount of time that the student practiced on any day last week? ☐ B. What was the total amount of time the student practiced last week? ☐ C. On which day last week did the student practice the longest? ☐ D. Did the student practice more last week or the week before? ☐ E. How many days last week did the student not practice?	

Lesson 7-2 Exploring Fraction Multiplication Situations, Lesson 7-4 Multiply Fractions by Whole Numbers, Lesson 7-5 Multiplying Mixed Numbers by Whole Numbers

4.NBT.B.5 Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

4.NF.A.2 Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as ½. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols <, =, or >, and justify the conclusions, e.g., by using a visual fraction model.

4.NF.B.3 Understand a fraction a/b with a > 1 as a sum of fractions 1/b.

a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.

c. Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction.

d. Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators

4.NF.B.4 Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.

a. Understand a fraction a/b as a multiple of 1/b. For example, use a visual fraction model to represent 5/4 as the product 5 × (1/4), recording the conclusion by the equation 5/4 = 5 × (1/4).

b. Understand a multiple of a/b as a multiple of 1/b, and use this understanding to multiply a fraction by a whole number. For example, use a visual fraction model to express 3 × (2/5) as 6 × (1/5), recognizing this product as 6/5. (In general, n × (a/b) = (n × a)/b.)

c. Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. For example, if each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?

Grade 4 Unit Seven Multiplication of a Fraction by a Whole Number & Measurement	
Connections/Notes	**Additional Resources**
4.MD.A.1 Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. **4.MD.A.2** Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.	
4.NF.B.4 **Evidence Statement**: This standard involves two operations. The standard is split for assessment for both operations. This will be adding multi-digit whole numbers using the standard algorithm. **Clarifications:** • The given addends are such as to require an efficient/standard algorithm (e.g., 7263 + 487) • Addends in the task do not suggest any obvious ad hoc or mental strategy (as would be present for example in a case such as 1,699 + 3,501) • Tasks do not have context. • For tasks that involve adding multi-digit numbers, each addend should be up to four-digit numbers. The progression of lessons in Unit 7 is designed to foster a meaningful conceptual understanding of the multiplication of a fraction by a whole number. Building upon informal strategies such as repeated addition and using a variety of representations allows students to see that multiplying a fraction by a whole number is conceptually the same as multiplying two whole numbers. For example, in the same way that $3 * 1$ can be thought of as finding the total amount in three groups, or copies, of 1, $3 * \frac{1}{4}$ can be thought of as finding the total amount in three groups, or copies, of $\frac{1}{4}$. The number of $\frac{1}{4}$ s in three sets of fourths is 3, for a total of $\frac{3}{4}$, just as the number of 1s in three sets of ones is 3, for a total of 3 ones, or 3. In previous lessons students used a variety of informal strategies to solve problems involving fraction multiplication. In Lesson 7-2 students formalize their understanding of fraction multiplication. First they think of non-unit fractions as multiples of unit fractions. Next they make the connection between unit fractions and fraction products by using multiplication equations and formal rules for fraction multiplication.	**4.NF.B.4** **<u>Teaching Student Centered Mathematics</u>** *pg. 167 - 169 Figure 6.6* **<u>Lessons:</u>** Introducing Multiplication of Fractions Product of Whole Number and a Mixed Number Multiplying Fractions Multiply Fraction by Whole Number (Unit) **<u>Activities and Tasks:</u>** Whole Number by Fraction Word Problems Visual Fractions by Whole Numbers Fraction as a Multiple of One Game Products of Fractions and Whole Numbers Animal Shelter Multiplying a Whole Number by a Fraction

Grade 4 Unit Seven
Multiplication of a Fraction by a Whole Number & Measurement

Connections/Notes	Additional Resources

For example, in the problem below, students use their knowledge of unit fractions and their multiples to change $\frac{5}{8}$ to $5 * \frac{1}{8}$. Students then multiply the whole numbers, and then the resulting whole number by the unit fraction, to reach the solution.

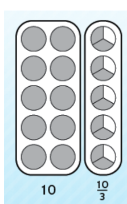
$$3 * \frac{5}{8} = 3 * (5 * \frac{1}{8})$$
$$=(3 * 5) * \frac{1}{8}$$
$$= 15 * \frac{1}{8}$$
$$= \frac{15}{8}$$

This formalization of multiplication strategies may be easy for some students, while providing new challenges to others' understanding. Do not assume all students understand fraction multiplication solely based on their ability to use it to solve problems. Understanding the concepts behind the formal rules for fraction multiplication is as important as the ability to apply the procedure.

In Lessons 7-4 and 7-5, students extend their understanding of fraction multiplication to multiplying any fraction, including fractions greater than one, by a whole number. To facilitate this work, students explore ways to change a fraction greater than one, such as $\frac{15}{8}$, to a mixed number. Ask guiding questions like these: How many groups of $\frac{5}{8}$ s are there? or How many groups of the unit fraction $\frac{1}{8}$ are there? Answering the questions helps students conceptualize the renaming process.

Students proceed to explore different strategies for multiplying a mixed number by a whole number. For example, in the problem $5 * 2\frac{2}{3}$, students might use the different methods described below:

Draw a picture.



Use repeated addition.

$$2\frac{2}{3} + 2\frac{2}{3} + 2\frac{2}{3} + 2\frac{2}{3} + 2\frac{2}{3}$$
$$= 2 + \frac{2}{3} + 2 + \frac{2}{3} + 2 + \frac{2}{3} + 2 + \frac{2}{3}$$
$$=(2 + 2 + 2 + 2 + 2) + (\frac{2}{3} + \frac{2}{3} + \frac{2}{3} + \frac{2}{3} + \frac{2}{3})$$
$$= 10 + \frac{10}{3} = 10 + 3\frac{1}{3} = 13\frac{1}{3}$$

Connections/Notes	Additional Resources

Change the mixed number to a fraction.

$$5 * 2\frac{2}{3} = 5 * \frac{8}{3} = 5 *(8 * \frac{1}{3}) = (5 * 8) * \frac{1}{3} = \frac{40}{3} = 13\frac{1}{3}$$

Use partial products to multiply the whole number by each part of the mixed number.

$$5 * (2 + \frac{2}{3}) = (5 * 2) + (5 * \frac{2}{3})$$
$$= 10 + \frac{10}{3}$$
$$= 10 + 3\frac{1}{3}$$
$$= 13\frac{1}{3}$$

MCAP Sample Question:

Mr. Reis made 5 batches of cookies. He used $\frac{3}{4}$ cup of sugar to make each batch.

What is the total amount of sugar, in cups, Mr. Reis used to make 5 batches of cookies?

Select one answer.

- ○ A. $\frac{3}{20}$
- ○ B. $\frac{15}{20}$
- ○ C. $\frac{8}{9}$
- ○ D. $\frac{15}{4}$

Lesson 7-5
Common Misconception
Watch for students who incorrectly reason that when multiplying a whole number by a fraction, they should multiply both the numerator and the denominator by the whole number. Use concrete objects to model the problem both ways: multiplying both the numerator and the denominator by the whole number and multiplying just the numerator by the whole number. Compare the differences between the two models.

Grade 4 Unit Seven
Multiplication of a Fraction by a Whole Number & Measurement

Connections/Notes	Additional Resources

Lesson 7-3 A Fraction as a Multiple of a Unit Fraction

4.NF.B.4   Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.
a. Understand a fraction a/b as a multiple of 1/b. For example, use a visual fraction model to represent 5/4 as the product 5 × (1/4), recording the conclusion by the equation 5/4 = 5 × (1/4).
b. Understand a multiple of a/b as a multiple of 1/b, and use this understanding to multiply a fraction by a whole number. For example, use a visual fraction model to express 3 × (2/5) as 6 × (1/5), recognizing this product as 6/5. (In general, n × (a/b) = (n × a)/b.)
c. Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. For example, if each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?

4.NF.B.4

Students may wish to use a multiplication/division diagram to help solve fraction multiplication number stories. Some students may benefit from organizing their thinking to visualize what they know and what they need to find out.

Number of Scouts	Oranges per Scout	Oranges in All
6	$\frac{1}{2}$	*m*

Number of Bags	Yards of Rope per Bag	Yards of Rope in All
b	$\frac{1}{2}$	4

Lesson 7-6   Three Fruit Salad Open Response & Reengagement 2 Days

4.NF.B.3   Understand a fraction a/b with a > 1 as a sum of fractions 1/b.
a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.

Day 1: Students use fraction tools to create fruit-salad recipes.
Day 2: Students discuss how others used tools to solve the recipe problem and revise their work.

The focus of this lesson is GMP5.2. Students show how they solved the problem by effectively using tools of their choice. Tools that students may choose include organized lists, number sentences, diagrams, fraction circles, or the Number-Line Poster. By using their selected tools to justify their solutions, students are making sense of their results.

Lesson 7-7 Multistep Division Number Stories, Lesson 7-8 Division Measurement Number Stories

4.OA.A.3 Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

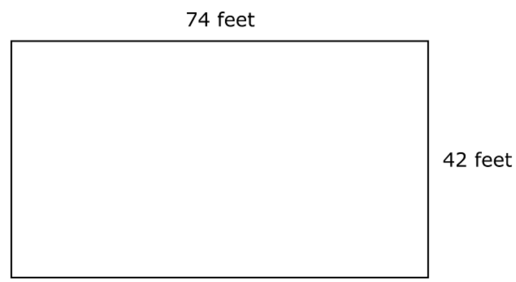
Grade 4 Unit Seven
Multiplication of a Fraction by a Whole Number & Measurement

Connections/Notes	Additional Resources

4.NBT.B.4 Fluently add and subtract multi-digit whole numbers using the standard algorithm.
4.NBT.B.6 Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

4.OA.A.3
MCAP Sample Question:

The figure represents a rectangular floor. A custodian is installing tiles on the floor. Each tile covers 2 square feet of area.



Which steps should the custodian take to find the number of tiles needed?

Select from the drop-down menus to correctly complete each sentence.

First, the custodian should [Choose... ▾] .

Next, the custodian should [Choose... ▾] .

4.NBT.B.6
MCAP Sub-Claim A:
- Tasks may include remainders of 0 in no more than 20% of the tasks.

Students apply prior knowledge to solve multistep division number stories. The problems in Lesson 7-7 are challenging for students because of the number of steps involved in finding the solution. In addition, students must decide what to do with remainders before answering the questions in each number story.

Lesson 7-8 allows students to practice solving number stories involving a variety of the measurement units they have studied this year. It also introduces measurement number stories involving the operation of division; previous measurement number stories used only addition, subtraction, and multiplication, as students were still developing skills with division. As you teach this lesson, be sure to differentiate between students who struggle doing conversions as opposed to students who struggle doing the division and other operations. Students struggling with conversions may simply need a reminder of the relationships between the various units used in this lesson.

Grade 4 Unit Seven Multiplication of a Fraction by a Whole Number & Measurement	
Connections/Notes	**Additional Resources**
Lesson 7-9 Generating and Identifying Patterns 4.OA.C.5 Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. **4.MD.A.3** Apply the area and perimeter formulas for rectangles in real world and mathematical problems. **4.NBT.B.6** Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.	
Rectangular numbers, which are the product of two consecutive counting numbers, are a type of figurate number. Figurate numbers are numbers that can be represented by a regular geometrical arrangement of equally spaced points. A square number, for example, can be represented by a square array. The emphasis in this lesson, however, is on generating and analyzing patterns. It is not important for students to obtain a firm grasp of the concepts of figurate or rectangular numbers, but rather to use them to hone their skills for generating and analyzing patterns. Students generate and analyze patterns in figurate numbers. Figurate numbers, such as square numbers, can be represented by a regular geometrical arrangement of equally spaced points. Rectangular numbers are the product of two consecutive numbers, such as 3 ∗ 4, and can be represented by a rectangular array of dots. It is not important that students obtain a firm grasp of the concepts of figurate or rectangular numbers. The emphasis in the lesson is on the processes involved in discovering and analyzing patterns, allowing students to predict what comes next, which is a key concept in mathematics.	4.OA.C.5 ***Teaching Student-Centered Mathematics*** *p. 299 What's Next & Why Activity 10.6 & 10.7* **Lessons:** Patterns on Charts Exploring Other Number Patterns Calendar Capers AIMS A Banquet at Tony's AIMS **Search YouTube for the activities below:** Machine Using a Vertical table Find Missing Elements in Growing Patterns Generate a Pattern Sequence Using a T-Chart
Lesson 7- 14 Unit 7 Progress Check	

Grade 4 Unit Eight Fraction Operations & Application	
Connections/Notes	**Additional Resources**
Lesson 8-1 Extending Multistep Number Stories **4.OA.A.3** Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. **4.NBT.B.4** Fluently add and subtract multi-digit whole numbers using the standard algorithm. **4.NBT.B.5** Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. **4.NBT.B.6** Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.	
Before You Begin The code your students crack in this lesson reveals the location of a prize in the library of a fictional elementary school. To enhance your students' interest in the lesson, you may wish to arrange with your school librarian to leave a prize or treat for your class in the library. When students crack the code, you can take them to the library to get their reward. Problems 1–7 on journal pages 270–271 are challenging and may take students more time than usual to understand and solve. Depending on the skill level of your class, you may wish to have small groups focus on solving only one or two problems. The groups can then share their answers to different problems so that the class has the chance to crack the code in Problem 8 during class time. Students should then go back and work on the problems they didn't have time to solve, as time allows.	
Lesson 8-2 Real-Life Angle Measures as Additive, Lesson 8-4 Extending Line Symmetry, Lesson 8-5 Line Plots: $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{1}{8}$ Inches **4.NBT.B.4** Fluently add and subtract multi-digit whole numbers using the standard algorithm. **4.MD.A.2** Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale. **4.MD.A.3** Apply the area and perimeter formulas for rectangles in real world and mathematical problems.	

Grade 4 Unit Eight **Fraction Operations & Application**
4.MD.B.4 Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection. 4.MD.C.6 Measure angles in whole-number degrees using a protractor. Sketch angles of a specified measure. 4.MD.C.7 Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g. by using an equation with a symbol for the unknown angle measure. 4.G.A.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. 4.G.A.3 Recognize a line of symmetry for a two-dimensional figure as a line across the figure such t the figure can be folded along the line into matching parts. Identify line symmetric figures and draw lines of symmetry. 4.NF.B.3 Understand a fraction a/b with a > 1 as a sum of fractions 1/b. c. Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction. d. Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators
An understanding of angles is essential in a broad range of disciplines, from sports to engineering to science. In Lesson 8-2 students use their knowledge of benchmark angles and their understanding of the additive nature of angle measures to solve problems in a variety of real-world contexts. Students solve problems involving angle measures in a broad spectrum of everyday objects and activities. They go on to consider how hockey players use an understanding of angles to pass the puck around an obstacle. Finally, students explore the angles that compose the field of vision and monocular and binocular vision for various animals.
Lesson 8-3 Pattern Block Angles Open Response & Reengagement 2 Days 4.MD.C.7 Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g. by using an equation with a symbol for the unknown angle measure.
Day 1: Students find measures of pattern-block angles and use known angle measures to find measures of other angles. **Day 2:** Students discuss others' work and then revise their own work to include written generalizations. The focus for this lesson is GMP8.1. On Day 1 students work with pattern blocks to use known angle measures to find the measures of other angles. After filling larger angles with smaller angles, students generate their own understanding that the measure of larger angles can be found by combining the known measures of smaller angles. On Day 2 students are introduced to generalizations and write their own by using expressions such as "every time," "always," and "if . . . , then . . . ."
Lesson 8-6 Fractions and Perimeter, Lesson 8-7 More Decimal Number Stories, Lesson 8-8 Area of rectangles with Fractional Side Lengths, Lesson 8-9 More Fraction Multiplication Number Stories, Lesson 8-10 Fractions and Liquid Measures, Lesson 8-11 Fractions and Measurement

Grade 4 Unit Eight Fraction Operations & Application
4.OA.A.3 Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. **4.NBT.B.5** Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. **4.NF.B.3** Understand a fraction a/b with a > 1 as a sum of fractions 1/b. a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. b. Decompose a fraction into a sum of fractions with the same denominator in more than one way while recording each decomposition by an equation. Justify decompositions. c. Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction. d. Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators **4.NF.B.4** Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. b. Understand a multiple of a/b as a multiple of 1/b, and use this understanding to multiply a fraction by a whole number. For example, use a visual fraction model to express 3 × (2/5) as 6 × (1/5), recognizing this product as 6/5. (In general, n × (a/b) = (n × a)/b.) **4.NF.C.5** Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100.2 For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100. **4.NF.C.6** Use decimal notation for fractions with denominators 10 or 100. For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram. **4.MD.A.1** Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. **4.MD.A.2** Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale. **4.MD.A.3** Apply the area and perimeter formulas for rectangles in real world and mathematical problems. **4.G.A.1** Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. **4.G.A.3** Recognize a line of symmetry for a two-dimensional figure as a line across the figure such t the figure can be folded along the line into matching parts. Identify line symmetric figures and draw lines of symmetry.
By this point, fourth grade students have learned to add and subtract fractions, as well as multiply a fraction by a whole number. In this unit students will apply their skills with fractions and mixed numbers to solve perimeter and area problems, and problems involving various units of measure. In Lesson 8-6 students are given measurements involving fractions (including a real-world situation that involves constructing a fence) and then are asked to find the missing side length(s). In Lesson 8-8 students examine a floor plan with some missing measurements and are asked to find the amount of paint needed to cover the walls. Students must rely on their knowledge of perimeter and area to find the missing measurements, the total area of the walls, and the amount of paint needed.

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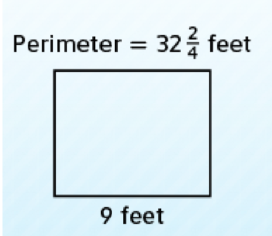
In the problem below the perimeter of a room is given along with the measurement of the length of the room. Students are asked to find the area.



Here is an example of how a student might respond to this problem:

"I know the perimeter, 32 $\frac{2}{4}$ feet. Perimeter is the same as adding all the sides together. In a rectangle opposite sides are the same length, and because I know one of the sides is 9 feet, I know the opposite side is also 9 feet. 32 $\frac{2}{4}$ – (9 ∗ 2) = 14 $\frac{2}{4}$ feet left for the other pair of sides, or the width. I know that 14 = 7 + 7 and $\frac{2}{4} = \frac{1}{4} + \frac{1}{4}$, so the width is 7 $\frac{1}{4}$ feet. To find the area, I used the formula length times width: 9 ∗ 7 $\frac{1}{4}$ = 63 + $\frac{9}{4}$ = 65 $\frac{1}{4}$. The area of the room is 65 $\frac{1}{4}$ square feet."

Students solve fraction number stories involving amounts of fabric needed for sewing projects in Lesson 8-9. In Lesson 8-10 they convert liquid measurement amounts to make punch, and in Lesson 8-11 students convert units of mass to determine the amount of food needed to feed puppies of various ages.

Lesson 8-12 Applying Understanding of lace Value and Operations, Lesson 8-13 Many Names for Numbers

4.NBT.B.4 Fluently add and subtract multi-digit whole numbers using the standard algorithm.
4.NBT.B.5 Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
4.NBT.B.6 Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
4. NF.B.3 Understand a fraction a/b with a > 1 as a sum of fractions 1/b.
a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.
b. Decompose a fraction into a sum of fractions with the same denominator in more than one way while recording each decomposition by an equation. Justify decompositions.
c. Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction.

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d. Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators **4. NF.B.4** Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. b. Understand a multiple of a/b as a multiple of 1/b, and use this understanding to multiply a fraction by a whole number. For example, use a visual fraction model to express 3 × (2/5) as 6 × (1/5), recognizing this product as 6/5. (In general, n × (a/b) = (n × a)/b.) **4.NF.C.5** Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100.2 For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100. **4. NF.C.6** Use decimal notation for fractions with denominators 10 or 100. For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram.
Lesson 8- 14 Unit 8 Progress Check