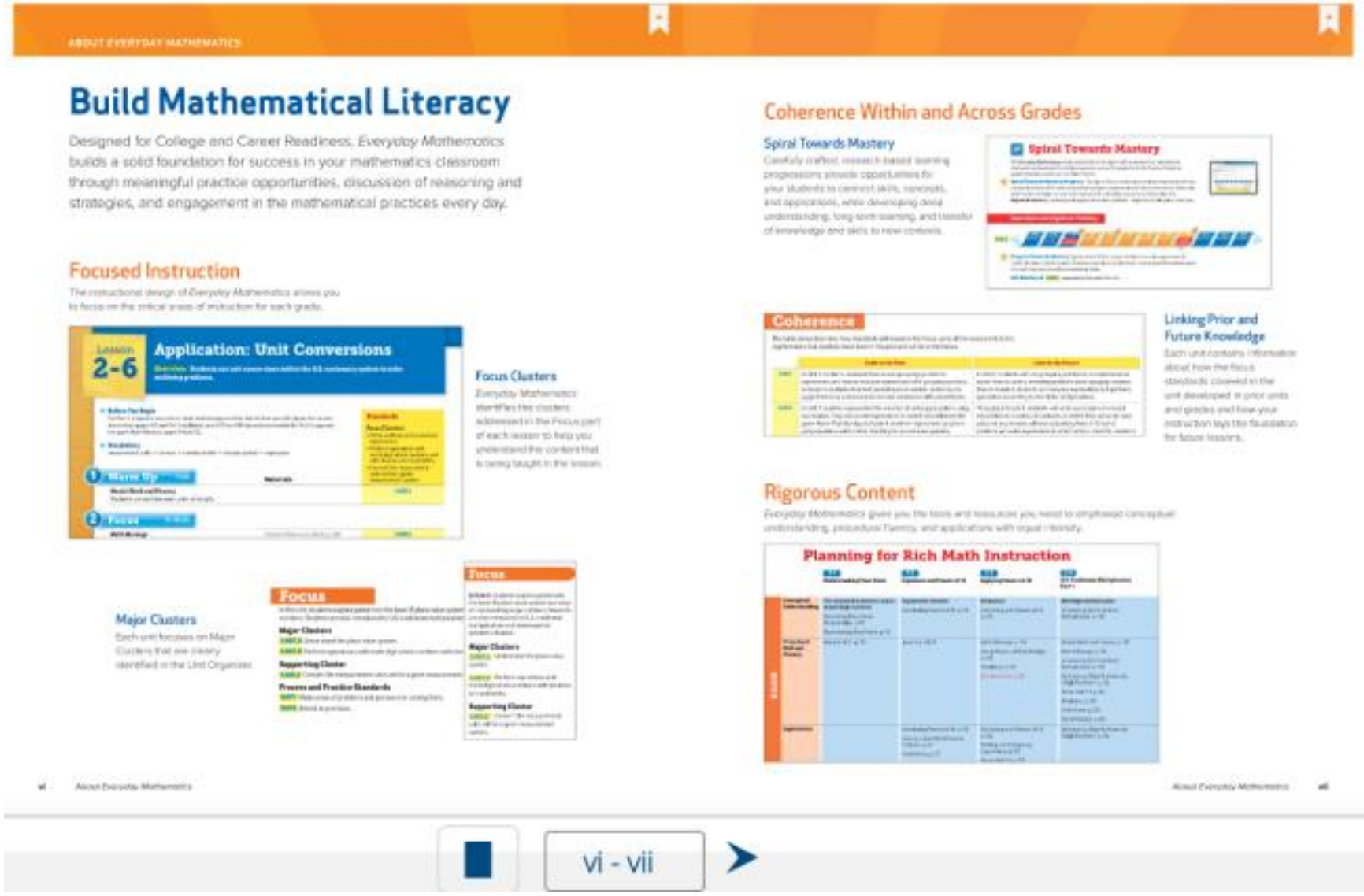
Grade 5
Mathematics Curriculum Resource
for the MD College and Career Ready Standards

Everyday Mathematics 4

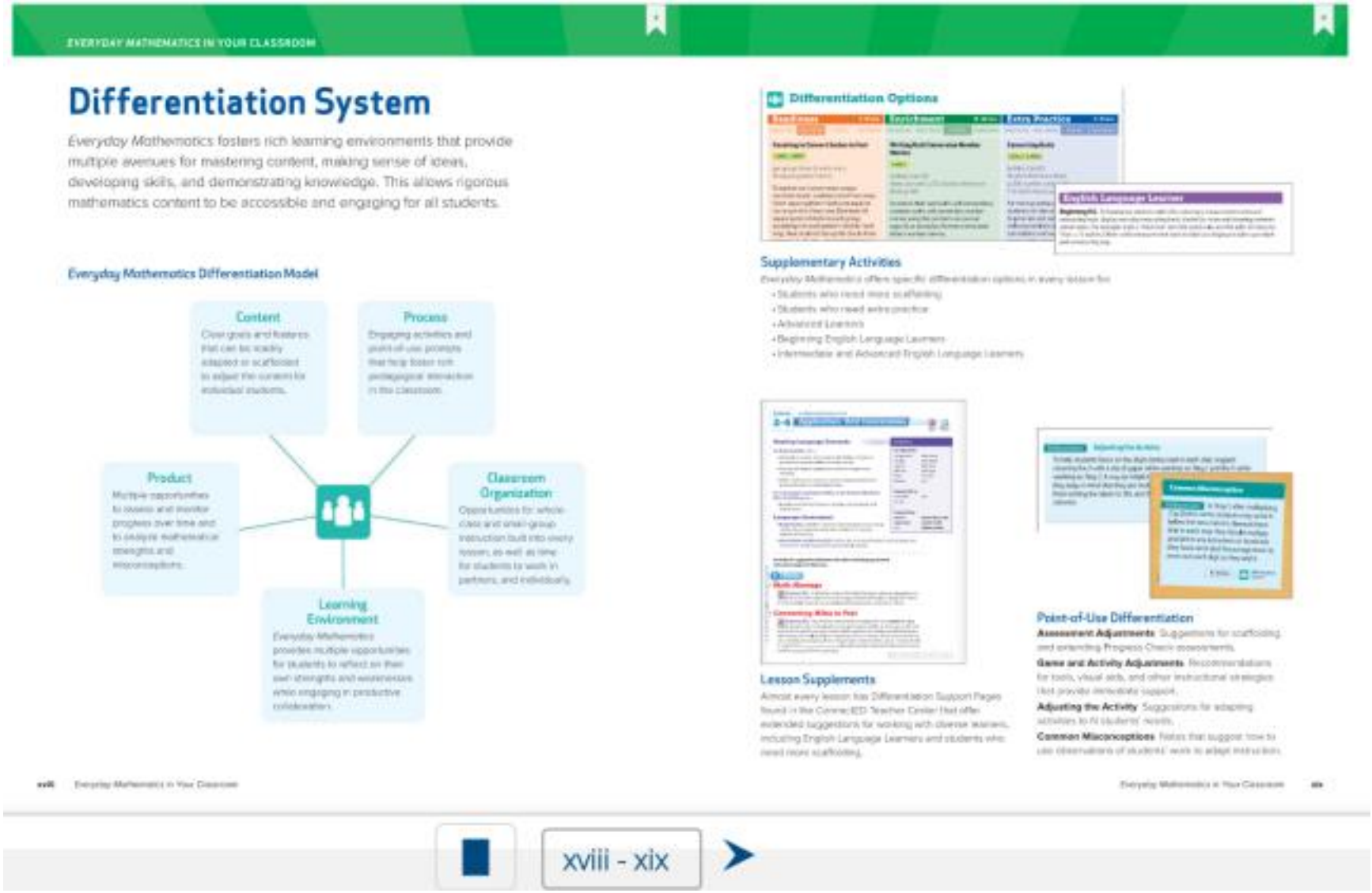
- EM4 strategically distributes instruction and practice in a spiral design format. Therefore, it is vital to follow the sequence of lessons and units.
- The goal is to complete three to four lessons per week utilizing the fifth day for reviewing concepts through EM 4 activities, differentiation, additional 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 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 student logins for the digital resources are distributed to students and parents in September.
- It is expected to continue the routines of Math Meetings and Number Talks in addition to the EM 4 lesson components. (See the Suggested 75-minute planning template).
- "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.
- The county expectation for **Dreambox** is 5 lessons per week.
- Continue to utilize the tasks from ES9 and Tackle the Task booklets, and Reasoning and Modeling item bank, which can be found on the google shared drive and/or eDoctrina.

Components for Focus, Coherence, 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.
- 

Components for Differentiation

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



WIN Time and Flex Day Clarification

WIN (What I Need) Time 25 Minutes Daily	Flex Days 1-2 Per Week
Use eDoctrina Unit Report, MAP reports, exit tickets, clipboard cruising, etc. to determine what you will focus on during both WIN time and flex days. **Dreambox can be utilized either day, but **usage should not exceed 60 minutes per week.	
• Meet with small groups based on data. • Different groups can focus on different skills. • Grade 5 Air Tutor groups meet on M/W/F. • *Do the Math* small groups meet. • Provide enrichment as well as intervention.	• 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 denominators.) • 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 BrainingCamp or Tang Math.

Possible Flex Day Activities: Intermediate

"Catch Up"	If you are behind in lessons according to the At-a-Glance Planner
EM4 Materials	Activities you may have not been able to use on the day of the lesson
Shared Drive Materials	Additional activities in unit folders
Differentiation	Reteach or enrich in small groups
Games	Review previous lessons or support the current unit
Tasks	Tackle the Task, ES9 Tasks, Modeling & Reasoning Tasks
Fact Fluency	Games, Assessing, Practice
MCAP	Released Items Giving students opportunities to work with problems in the format they will encounter on MCAP
Technology	Activities aligning with current unit including Brainingcamp and Tang Math
Activities to Promote Independence	Written or Task Type Activities completed without support with time limits

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 • Strategy focused basic fact discussion	Number Talk Book Quick Look Cards (K-3) Math Meeting Materials Brainingcamp Tang Math
Lesson Component	Time	EM4 Focus	Materials
Lesson Focus (Step 2) (2-4 activities) Practice (Step 3)	30 min	• Math Message • Share objective, essential questions, and success criteria • Focus Activities • Journal Pages/Tasks • Math Boxes – Math Boxes must be completed daily to give students sufficient opportunities to review skills and concepts. • Assessment Check-In	EM4 Modeling & Reasoning 3 Act Tasks Student Math Journals Tang Math Nearpod Brainingcamp
Lesson Component	Time	Activities	Materials
Supplemental Support	15-20 min	• Small Group Support/DreamBox	EM4 Tang Math
Lesson Component	Time	Activities	
Closure	5-10 min	• Review objective(s), essential question, and success criteria. • Students reflect on their learning and the success criteria	Formative assessment in eDoctrina Exit ticket

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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.

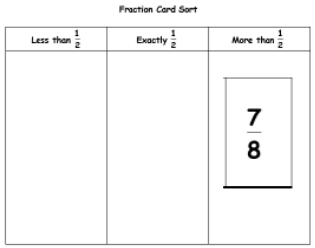
Elements of a Math Meeting:

- 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, facts 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 5 Suggested Math Meeting Activities:

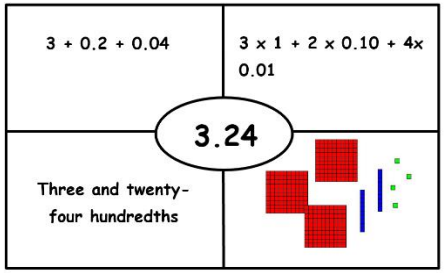
Fraction Sort

Students determine if the fraction is less than, equal to, or greater than $\frac{1}{2}$



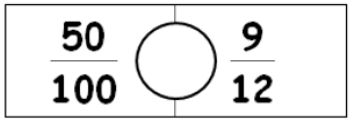
More Than One Way

Give students a number appropriate to fifth grade content and ask them to show the number in multiple representations.



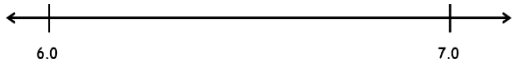
Comparing Fractions

Students use reasoning to compare fractions.

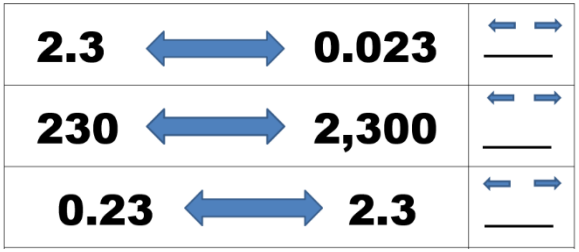


Number Line Activities

Provide students decimal numbers and fractions in which to place on the number line template. Students can also practice other skills such as rounding decimals, fraction operations, and decimal operations.



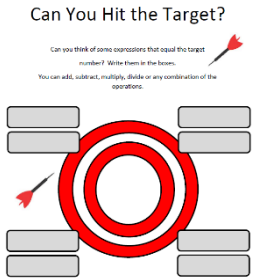
From Here to There



Example: 0.023 ⟷ **2.3**
What happened to 0.023 (beginning value) for it to go from "here" to a value of 2.3 ("there")? Did the value increase or decrease? What was it multiplied by? It was multiplied by 100 or 10^2. x 10^2 could be displayed as their answer on their whiteboard.

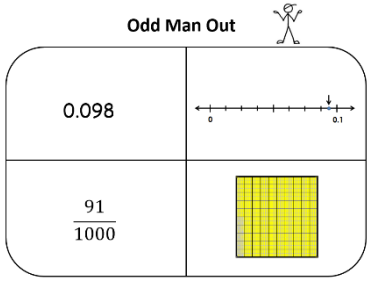
Can You Hit the Target?

Students should write expressions that equal the target number. They should use parentheses, brackets, and braces in their expressions.



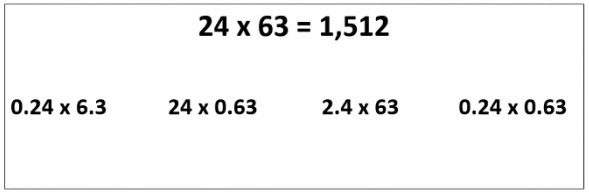
Odd Man Out

Provide students with four items in which they decide which one does not belong. They need to justify their answers.

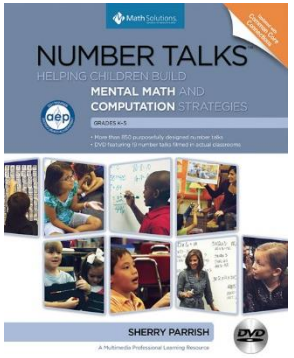


Where Does the Decimal Go?

Students use whole number products and estimation to give the exact answer to decimal multiplication problems.



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://safeshare.tv/v/o976_Nb3w8U

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 "doubling and halving" or "partial quotients." 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.

Wicomico County's Fact Fluency Expectations

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.)

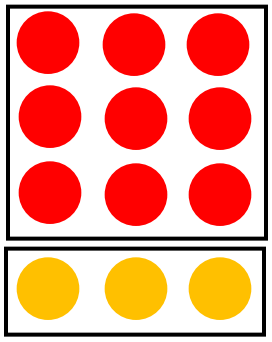
Students develop basic fact fluency through stages:

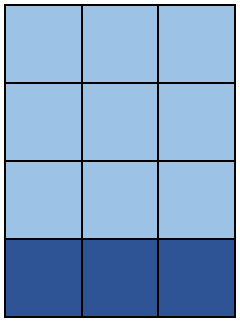
1. Introduce a strategy with concrete materials and pictorial representations.
2. Reinforcing the strategy through pictorial models and connecting it to the symbolic models.
3. Practice the strategy through a range of activities that are written and oral. This stage develops accuracy and speed of recall.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

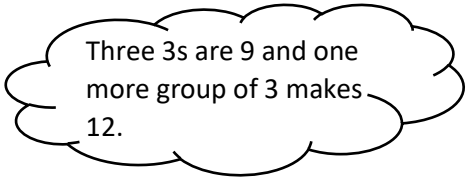
In grades 3-5 stage 1 and 2 utilize square tiles, counters, graph paper, arrays and equal grouping representations, and repeated addition. Then students should connect pictorial models to a written strategy first by orally explaining and then by writing.

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
Triangle Flashcards
Games which reinforce strategies – EM 4 Games, See folder in "V" drive for additional resources
Using 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, See folder in "V" drive for resources
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?

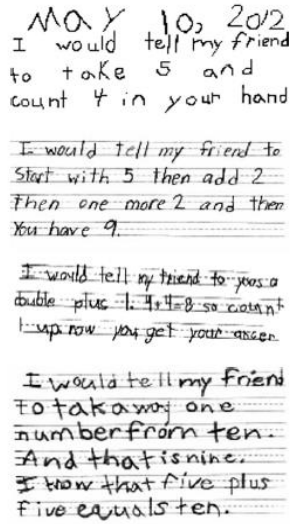


TABLE 3

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 5 Overview

Operations and Algebraic Thinking (OA)
- Write and interpret numerical expressions.
- Analyze patterns and relationships.

Number and Operations in Base Ten (NBT)
- Understand the place value system.
- Perform operations with multi-digit whole numbers and with decimals to hundredths.

Number and Operations—Fractions (NF)
- Use equivalent fractions as a strategy to add and subtract fractions.
- Apply and extend previous understandings of multiplication and division to multiply and divide fractions.

Measurement and Data (MD)
- Convert like measurement units within a given measurement system.
- Represent and interpret data.
- Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.

Geometry (G)
- Graph points on the coordinate plane to solve real-world and mathematical problems.
- Classify two-dimensional figures into categories based on their properties.

Major Cluster **Supporting Cluster** **Additional Cluster**

~~Any parts of the standard in the curriculum document with a line through them (like this) mean that this part of the standard is not addressed in this lesson.~~**

Standards for Mathematical Practice	
Standards	**Explanations and Examples**
1. Make sense of problems and persevere in solving them.	Students solve problems by applying their understanding of operations with whole numbers, decimals, and fractions including mixed numbers. They solve problems related to volume and measurement conversions. Students seek the meaning of a problem and look for efficient ways to represent and solve it. They may check their thinking by asking themselves, —What is the most efficient way to solve the problem? —"Does this make sense?", and —"Can I solve the problem in a different way?"
2. Reason abstractly and quantitatively.	Fifth graders should recognize that a number represents a specific quantity. They connect quantities 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 that record calculations with numbers and represent or round numbers using place value concepts.
3. Construct viable arguments and critique the reasoning of others.	In fifth grade, students may construct arguments using concrete referents, such as objects, pictures, and drawings. They explain calculations based upon models and properties of operations and rules that generate patterns. They demonstrate and explain the relationship between volume and multiplication. 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. Fifth graders should evaluate their results in the context of the situation and whether the results make sense. They also evaluate the utility of models to determine which models are most useful and efficient to solve problems.
5. Use appropriate tools strategically.	Fifth 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 unit cubes to fill a rectangular prism and then use a ruler to measure the dimensions. They use graph paper to accurately create graphs and solve problems or make predictions from real world data.
6. Attend to precision.	Students continue to refine their mathematical communication skills by using clear and precise language in their discussions with others and in their own reasoning. Students use appropriate terminology when referring to expressions, fractions, geometric figures, and coordinate grids. They are careful about specifying units of measure and state the meaning of the symbols they choose. For instance, when figuring out the volume of a rectangular prism they record their answers in cubic units.
7. Look for and make use of structure.	In fifth grade, students look closely to discover a pattern or structure. For instance, students use properties of operations as strategies to add, subtract, multiply and divide with whole numbers, fractions, and decimals. They examine numerical patterns and relate them to a rule or a graphical representation.
8. Look for and express regularity in repeated reasoning.	Fifth graders use repeated reasoning to understand algorithms and make generalizations about patterns. Students connect place value and their prior work with operations to understand algorithms to fluently multiply multi-digit numbers and perform all operations with decimals to hundredths. Students explore operations with fractions with visual models and begin to formulate generalizations.

GRADE 5 COMMON CORE INTRODUCTION

In Grade 5, instructional time should focus on three critical areas: (1) developing fluency with addition and subtraction of fractions, and developing understanding of the multiplication of fractions and of division of fractions in limited cases (unit fractions divided by whole numbers and whole numbers divided by unit fractions); (2) extending division to 2-digit divisors, integrating decimal fractions into the place value system and developing understanding of operations with decimals to hundredths, and developing fluency with whole number and decimal operations; and (3) developing understanding of volume.

1. Students apply their understanding of fractions and fraction models to represent the addition and subtraction of fractions with unlike denominators as equivalent calculations with like denominators. They develop fluency in calculating sums and differences of fractions and make reasonable estimates of them. Students also use the meaning of fractions, of multiplication and division, and the relationship between multiplication and division to understand and explain why the procedures for multiplying and dividing fractions make sense. (Note: this is limited to the case of dividing unit fractions by whole numbers and whole numbers by unit fractions.)

2. Students develop understanding of why division procedures work based on the meaning of base-ten numerals and properties of operations. They finalize fluency with multi-digit addition, subtraction, multiplication, and division. They apply their understandings of models for decimals, decimal notation, and properties of operations to add and subtract decimals to hundredths. They develop fluency in these computations and make reasonable estimates of their results. Students use the relationship between decimals and fractions, as well as the relationship between finite decimals and whole numbers (i.e., a finite decimal multiplied by an appropriate power of 10 is a whole number), to understand and explain why the procedures for multiplying and dividing finite decimals make sense. They compute products and quotients of decimals to hundredths efficiently and accurately.

3. Students recognize volume as an attribute of three-dimensional space. They understand that volume can be measured by finding the total number of same-size units of volume required to fill the space without gaps or overlaps. They understand that a 1-unit by 1-unit by 1-unit cube is the standard unit for measuring volume. They select appropriate units, strategies, and tools for solving problems that involve estimating and measuring volume. They decompose three-dimensional shapes and find volumes of right rectangular prisms by viewing them as decomposed into layers of arrays of cubes. They measure necessary attributes of shapes in order to determine volumes to solve real world and mathematical problems.

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.

Grade 5 MCAP 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

Grade 5 Math At-A-Glance 2022-2023		
Units	**Suggested Dates**	**Planning 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 1.1, 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	**Sept. 6-Sept. 16**	
Unit 1: Area & Volume Students build on their prior work with area and explore ways to find area of rectangles with fractional side lengths. Students also learn about volume as an attribute of solid figures. Using improvised units, they explore volume and build toward using cubic units and volume formulas.	**Sept. 19 – Oct. 14 20 Days (8 Flex Days)**	
Unit 2 : Whole Number Place Value and Operations Students explore patterns in the base-10 system and ways of representing large numbers. They apply their understanding of place value when estimating and computing with multi-digit whole numbers. Students are introduced to U.S. traditional multiplication and review partial-quotients division.	**Oct. 17 – Nov 22 23 days (8 Flex Days)**	October 20 Early Dismissal/PD i afternoon October 21 MSEA Convention November 7- Early Dismissal November 8- General Election November 23-25--Thanksgiving Holiday
Unit 3: Fractions and Decimals Students build on fraction concepts from previous grades to understand fraction division. They also use visual models to make estimates, add and subtract fractions and mixed numbers, and check the reasonableness of their answers. Students also explore strategies for solving fraction-of problems.	**Nov 28 – Jan 11 23 days (8 Flex Days)**	Winter Holiday–December 19-January 1
Unit 4: Decimal Concepts, Addition & Subtraction Students extend their understanding of the base-10 place value system to include decimals. They read, write, and represent decimals through thousandths in a variety of ways and learn strategies to compare, order, and round decimals. Students are also introduced to the first quadrant of the coordinate grid. They will also apply whole-number algorithms to add and subtract decimals.	**Jan 12 – Feb 16 24 days (8 Flex Days)**	January 16 MLK Day January 30 - Professional Day February 17-Early Dismissal/PD in afternoon

		February 20 - Presidents' Day
Unit 5: Operations with Fractions Students deepen their understanding of fractions and develop strategies for adding and subtracting fractions and mixed numbers with unlike denominators. They also connect fraction-of thinking to multiplication and generalize a fraction multiplication algorithm. Students are introduced to fraction division.	**Feb. 21 – Mar 24** **23 days** **(7 Flex Days)**	March 17 Early Dismissal /PD in afternoon
Unit 6: Investigations in Measurement: Decimal Multiplication & Division Students apply their understanding of place value to multiply and divide decimals by powers of ten. They investigate how patterns in powers of ten can be used to convert measurements in metric units, learn how line plots can be used to organize and analyze measurement data. Students also extend whole-number methods to multiply and divide decimals.	**Mar 27 – Apr 28** **21 days** **(5 Flex Days)**	April 5-Early Dismissal April 6-April 10 Spring Holiday
Unit 7: Multiplication of Mixed Numbers/Geometry/Graphs Students learn two methods for multiplying mixed numbers. They use these methods to find the areas of rectangles with fractional side lengths and to solve problems involving fractional data in line plots. Students review attributes of two-dimensional figures and classify shapes in a hierarchy based on properties. Students will graph points on coordinate grids to visualize numerical patterns and represent real-world problems.	**May 1 – May 26** **20 days** **(4 Flex Days)**	MCAP Testing
Unit 8: Applications of Measurement, Computation, and Graphing Students apply and extend many skills and concepts they have learned throughout the year to engaging, real-world contexts. Many of the activities in this unit can be extended over multiple days.	**May 30- Jun 14**	May 29 Memorial Day June 12-14 Early Dismissal Days

Grade 5 Math Standards Major Cluster Supporting Cluster Additional Cluster	Units							
The following standards will appear in the Curriculum Document in the Units as marked.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
5.OA.A.1. Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.	X	X						
5.OA.A.2. Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them.	X	X	X			X	X	
5.OA.B.3. Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane.				X			X	X
5.NBT.A.1. Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.	X	X		X		X		
5.NBT.A.2. Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.		X				X		X
5.NBT.A.3. Read, write, and compare decimals to thousandths. a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., 347.392 = 3 × 100 + 4 × 10 + 7 × 1 + 3 × (1/10) + 9 × (1/100) + 2 × (1/1000). b. Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.				X		X		
5.NBT.A.4. Use place value understanding to round decimals to any place				X				X
5.NBT.B.5. Fluently multiply multi-digit whole numbers using the standard algorithm.		X				X		X
5.NBT.B.6. Find whole-number quotients of whole numbers with up to four-digit dividends and two-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.		X	X			X		X
5.NBT.B.7. Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.				X		X		X
5.NF.A.1. Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators.			X		X	X	X	X

Grade 5 Math Standards Major Cluster Supporting Cluster Additional Cluster	Units							
The following standards will appear in the Curriculum Document in the Units as marked.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
5.NF.A.2. Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers.			X		X	X	X	
5.NF.B.3. Interpret a fraction as division of the numerator by the denominator ($a/b = a \div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem.			X		X		X	
5.NF.B.4. Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction. a. Interpret the product $(a/b) \times q$ as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$. b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles and represent fraction products as rectangular areas.	X		X		X		X	X
5.NF.B.5. Interpret multiplication as scaling (resizing), by: a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication. b. Explaining why multiplying a given number by a fraction greater than 1 result in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $a/b = (n \times a)/(n \times b)$ to the effect of multiplying a/b by 1.				X	X		X	
5.NF.B.6. Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.			X		X		X	X
5.NF.B.7. Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. a. Interpret division of a unit fraction by a non-zero whole number and compute such quotients. b. Interpret division of a whole number by a unit fraction and compute such quotients. c. Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem.					X		X	
5.MD.A.1. Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.	X	X				X	X	X

Grade 5 Math Standards Major Cluster Supporting Cluster Additional Cluster	Units							
The following standards will appear in the Curriculum Document in the Units as marked.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
5.MD.B.2. Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots.						X	X	
5.MD.C.3. Recognize volume as an attribute of solid figures and understand concepts of volume measurement. a. A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume. b. A solid figure which can be packed without gaps or overlaps using *n* unit cubes is said to have a volume of *n* cubic units.	X					X		X
5.MD.C.4. Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.	X					X		
5.MD.C.5. Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume. a. Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication. b. Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole number edge lengths in the context of solving real world and mathematical problems. c. Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.	X					X		X
5.G.A.1. Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate).				X			X	X
5.G.A.2. Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane and interpret coordinate values of points in the context of the situation.				X			X	X
5.G.B.3. Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category.							X	
5.G.B.4. Classify two-dimensional figures in a hierarchy based on properties.							X	

Grade 5 Unit One
Area and Volume

Connections/Notes	Additional Resources

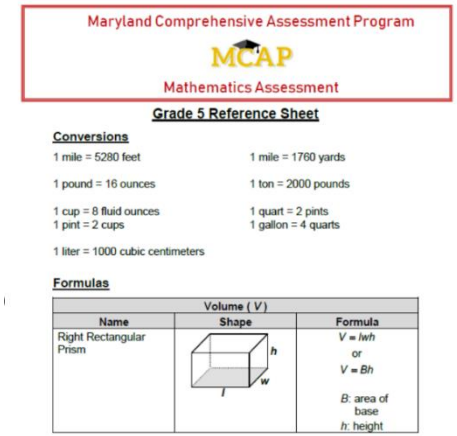
Lesson 1-1 Introducing the Student Reference Book

5.OA.A.1. Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.

5.NBT.A.1. Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.

5.MD.A.1. Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.

Use the **MCAP Grade 5 Reference Sheet (located in the grade level shared drive, in the MCAP folder)** during instruction as it applies to the content. 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 5 Reference Sheet

Conversions

1 mile = 5280 feet

1 mile = 1760 yards

1 pound = 16 ounces

1 ton = 2000 pounds

1 cup = 8 fluid ounces
1 pint = 2 cups

1 quart = 2 pints
1 gallon = 4 quarts

1 liter = 1000 cubic centimeters

Formulas

Volume (*V*)		
Name	**Shape**	**Formula**
Right Rectangular Prism	*h*, *w*, *l*	*V = lwh* or *V = Bh* *B*: area of base *h*: height

Students will explore the Student Reference Book. They will read about and practice using grouping symbols. The game "Name That Number" is introduced in this lesson.

5.OA.A.1 builds on the expectations of third grade where students are expected to start learning the conventional order (3.OA.D.8.). Students need experiences with multiple expressions that use grouping symbols throughout the year to develop understanding of when and how to use parentheses, brackets, and braces.

Examples:

- (26 + 18) ÷ 4 Answer: 11
- (24 ÷ 3) x 3 Answer 9

Lessons

Following the Order

Exploring Krypto

Activities and Tasks

Same or Different

Target Number Dash

Videos

Interpret-parentheses-as-do-this-first

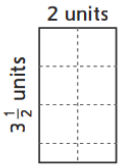
Online

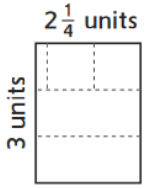
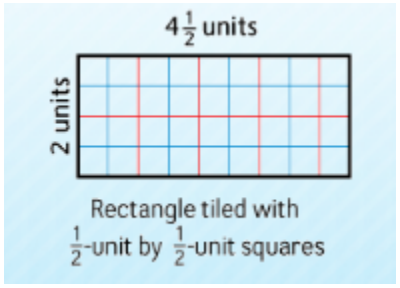
Pan Balance Numbers

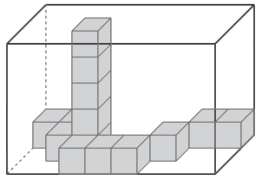
<table>
<tr><th colspan="2">Grade 5 Unit One
Area and Volume</th></tr>
<tr><th>Connections/Notes</th><th>Additional Resources</th></tr>
<tr><td>To further develop students' understanding of grouping symbols and facility with operations, students place grouping symbols in equations to make the equations true or they compare expressions that are grouped differently.

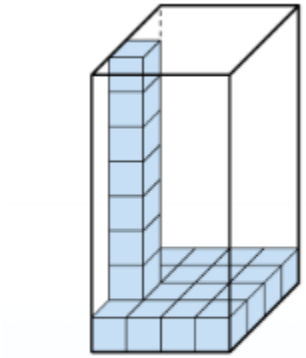
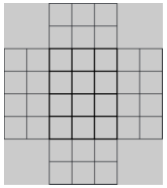
Examples:
• 15 - 7 – 2 = 6 → 15 - (7 – 2) = 10
• Compare 3 x 2 + 5 = 11 and 3 x (2 + 5) = 21
• Compare 15 – 6 + 7 = 16 and 15 – (6 + 7) = 2

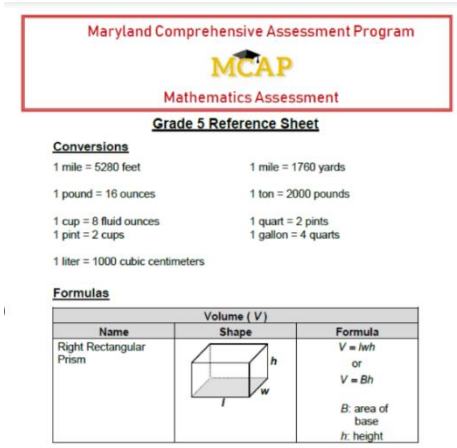
5.OA.A.1. <u>MCAP</u>
Evidence Statement: The language of the standard should guide the creation of assessment tasks, including the ideas in the given examples.
Clarifications:
• Expressions will not require the use of braces. (Will include parenthesis and brackets only).
• Tasks provide situations that model order of operations and make connections to the properties of the associative and distributive for addition and multiplication.
• Tasks could involve solving problems and equations using parenthesis
• Tasks could involve solving problems and equations that employ order of operations
• Tasks could require students to place parenthesis to represent a given scenario or math an expression to a scenario.</td><td></td></tr>
<tr><td colspan="2">Lesson 1-2 Area of a Rectangle, Part 1
5.NF.B.4. Apply and extend previous understandings of multiplication to multiply <s>a fraction or</s> whole number by a fraction.
<s>a. Interpret the product (a/b) × q as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations a × q ÷ b</s>.
b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.</td></tr>
<tr><td>Students review area concepts and explore strategies for finding areas of rectangles with fractional side lengths. Students explore two tiling strategies in this unit. This lesson focuses on the first strategy of counting whole and partial unit squares. Students are not expected to apply the area formula or multiply mixed numbers until later in the year.
Students practice multiplication facts by playing "Baseball Multiplication" in preparation for multi-digit multiplication in Unit 2.
Counting Whole and
Partial Unit Squares</td><td></td></tr>
</table>

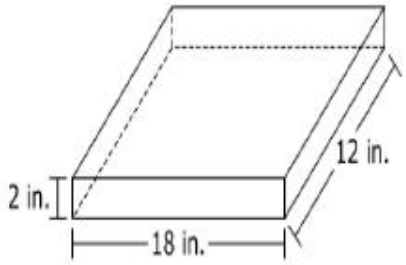
Grade 5 Unit One Area and Volume	
Connections/Notes	**Additional Resources**
Divide the rectangle into unit squares. Count the squares and partial squares.  6 whole squares plus 2 partial squares that are each $\frac{1}{2}$ square makes 7 squares in all. Area = 7 square units *A Common Misconception: Some students may think that any partial unit square is ½ unit square. Suggest that students label the lengths of the sides of the partial squares.* **5.NF.4.b MCAP Clarification:** **Evidence Statement:** This standard is instructional and must be taught as it develops important foundational understanding for multiplication with fractions. The standard may be assessed as the content focus for reasoning and modeling tasks.	
Lesson 1- 3 Quilt Area (Open Response and Reengagement 2-Day Lesson) and Lesson 1-4 Area of a Rectangle, Part 2 **5.NF.B.4. Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.** ~~**a. Interpret the product (*a*/*b*) × *q* as *a* parts of a partition of *q* into *b* equal parts; equivalently, as the result of a sequence of operations *a* × *q* ÷ *b*.**~~ **b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.** **5.MD.A.1. Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.**	
The second tiling strategy is explored in these two lessons. Students will practice tiling with squares with fractional side lengths. **Students are not expected to apply the area formula or multiply mixed numbers until later in the year.**	

Grade 5 Unit One Area and Volume	
Connections/Notes	**Additional Resources**
Day 1: Students make sense of two different answers to an area problem. How many square feet of fabric are needed to make a quilt? Day 2: Students reengage in the problem by analyzing and critiquing other students' work in pairs and in a whole group discussion. **(MP3)** Students will examine both a correct and incorrect answer to an area problem, consider the thinking behind each answer, and decide which they agree with. Think about using copies of a row or column to fill up the rectangle.  There are $2\frac{1}{4}$ squares in each row and 3 rows. $2\frac{1}{4} + 2\frac{1}{4} + 2\frac{1}{4} = 6\frac{3}{4}$ squares in all. Area $= 6\frac{3}{4}$ square units  **There are 4 ½ squares in each row and there are 2 rows. 4 ½ + 4 ½ = 7 squares in all.** **5.NF.B.4.b MCAP Clarification:** **Evidence Statement:** This standard is instructional and must be taught as it develops important foundational understanding for multiplication with fractions. The standard may be assessed as the content focus for reasoning and modeling tasks.	
Lesson 1-5 Introduction to Volume **Lesson 1-6 Exploring Nonstandard Volume Units** **Lesson 1-7 Measuring Volume by Counting cubes** **Lesson 1-8 Measuring Volume by Iterating Layers** **5.MD.C.3. Recognize volume as an attribute of solid figures and understand concepts of volume measurement.** **a. A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume.** **b. A solid figure which can be packed without gaps or overlaps using *n* unit cubes is said to have a volume of *n* cubic units.** **5.MD.C.4. Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.**	

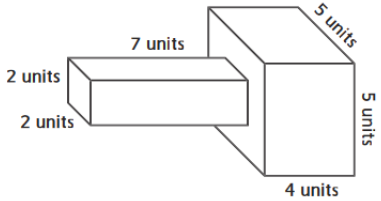
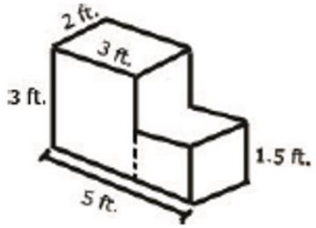
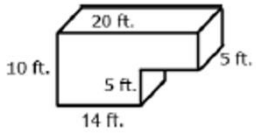
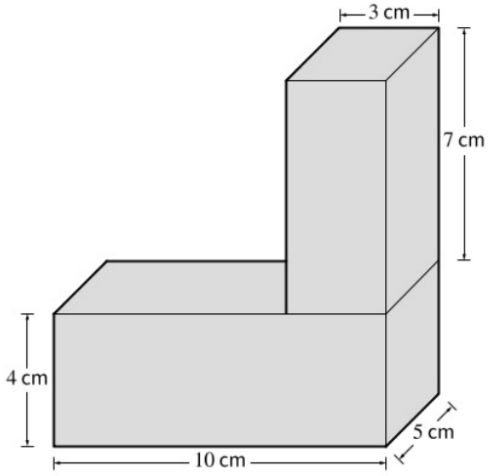
Grade 5 Unit One Area and Volume	
Connections/Notes	**Additional Resources**
This grouping of four consecutive lessons follows a progression of concepts which lead students to understand volume concepts. First, students explore the concept of volume as they informally compare volumes of 3-dimensional objects. Next, students will use nonstandard units to measure volumes of rectangular prisms. They discuss packing units without gaps or overlaps to obtain an accurate volume measurement. Then students will discuss the benefits of using unit cubes to measure volume. They measure volume by counting the number of cubes it takes to fill a rectangular prism. Finally, students relate volume to multiplication and addition by thinking about iterating layers to find the volume of prisms. Students' prior experiences with volume were restricted to liquid volume. As students develop their understanding of volume, they understand that a 1-unit by 1-unit by 1-unit cube is the standard unit for measuring volume. This cube has a length of 1 unit, a width of 1 unit and a height of 1 unit and is called a cubic unit. This cubic unit is written with an exponent of 3 (e.g., in^3, m^3). Students will connect this notation to their understanding of powers of 10 in our place value system. Models of cubic inches, centimeters, cubic feet, etc. are helpful in developing an image of a cubic unit. Student's estimate how many cubic yards would be needed to fill the classroom or how many cubic centimeters would be needed to fill a pencil box.  *A Common Misconception: When determining how many layers a prism contains, some students may count only the cubes that appear above the base layer. Suggest thinking about the layers as different floors in an apartment building. Suggest the phrase, "Don't forget the ground floor!" as a reminder for students to count all the layers.* **5.MD.C.3a & 5.MD.C.3b MCAP**: **Evidence Statement:** These two standards are instructional and must be taught as they develop important foundational understanding of volume. These standards may be assessed with 5.MD.C5a or as the context for reasoning and modeling tasks. **5.MD.C.4 Evidence Statement:** This standard is instructional and must be taught as it develops important foundational understanding of volume. This standard may be assessed with 5.MD.C5a, 5.MD.C.5b, and/or 5.MD.C.5c or within reasoning and modeling tasks.	**Activities and Tasks** What's the Volume? Building Rectangular Prisms with a Given Volume Candy Boxes Got Cubes – 3 Act Task Packing Sugar – 3 Act Task Volume of Shapes Composed of Right Rectangular Prisms **Online** You Can Multiply Three Numbers in Any Order Illuminations - Cubes Steve Wyborney's Cube Conversations **Templates and Visuals** Rectangular Prism Nets for Packing (cm^3)
Lesson 1-9 Two Formulas for Volume **5.MD.C.5. Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.**	

Grade 5 Unit One Area and Volume	
Connections/Notes	**Additional Resources**
a. Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication. **b. Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole number edge lengths in the context of solving real world and mathematical problems.** **c. Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.**	
Students explain and apply two different formulas for finding the volume of a rectangular prism. Students need multiple opportunities to measure volume by filling rectangular prisms with cubes and looking at the relationship between the total volume and the area of the base. They derive the volume formula (volume equals the area of the base times the height) and explore how this idea would apply to other prisms. Students use the associative property of multiplication and decomposition of numbers using factors to investigate rectangular prisms with a given number of cubic units. They have to be able to decompose a prism, understanding that it can be partitioned into layers, and each layer partitioned into rows, and each row into cubes. They also have to be able to compose such a structure, multiplicatively, back into higher units. That is, they eventually learn to conceptualize a layer as a unit that itself is composed of units of units—rows, each row composed of individual cubes—and they iterate that structure.  Thinking in layers to find volume **Examples:**  Students are given a net and asked to predict the number of cubes required to fill the container formed by the net. In such tasks, students may initially count single cubes or repeatedly add the number of cubes in a row to determine the number in each layer, and repeatedly add the number in each layer to find the	**Lessons** **Activities and Tasks** Roll a Rectangular Prism Volume of Solid Figures Box of Clay - IM Task NRich Task – Brush Loads **Videos** Find-the-volume-of-a-solid-figure-by-multiplying (need to set up a free account) Recognize that volume is additive (need to set up a free account) **Online** Cubes **Templates and Visuals** Rectangular Prism Nets for Packing (cm^3)

Connections/Notes	Additional Resources
total number of unit cubes. In folding the net to make the shape, students can see how the side rectangles fit together and determine the number of layers. Use the **MCAP Grade 5 Reference Sheet (located in the grade level shared drive, in the MCAP folder)** during instruction as it applies to the content. 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 5 Reference Sheet** **Conversions** 1 mile = 5280 feet 1 mile = 1760 yards 1 pound = 16 ounces 1 ton = 2000 pounds 1 cup = 8 fluid ounces 1 pint = 2 cups 1 quart = 2 pints 1 gallon = 4 quarts 1 liter = 1000 cubic centimeters **Formulas** Volume (*V*) Name: Right Rectangular Prism Shape: *h*, *w*, *l* Formula: *V = lwh* or *V = Bh*; *B*: area of base; *h*: height **5.MD.C.5a MCAP Clarification:** **Evidence Statement:** The language of the standard should guide the creation of assessment tasks, including the ideas in the given examples. **Clarifications:** • May include concepts from 5.MD.C.3a, 5.MD.C.3b, and/or 5.MD.C.4 • Tasks must include a right rectangular prism with whole number side lengths (no fractions). The right rectangular prism is only packed with unit cubes (cm or half-inch) that do not overlap or leave spaces. • No other filling (water, sand, etc.) should be used in tasks that fill the right rectangular prism. **5.MD.C.5b Evidence Statement:** The language of the standard provides the focus for this evidence statement. This standard deepens students' understanding of finding the volume of a rectangular prism. **Clarifications:** • Tasks may or may not have a context. • Tasks may require students to measure to find edge lengths to the nearest centimeter, millimeter, or inch. • The right rectangular prisms are NOT filled. This standard calls for students to apply their knowledge of packing the right rectangular prisms with unit cubes to determine the volume	

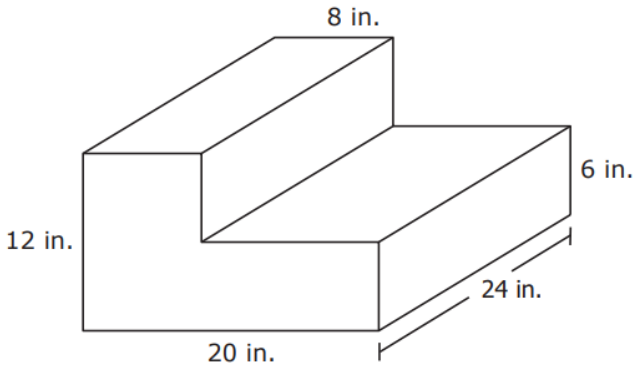
Grade 5 Unit One Area and Volume	
Connections/Notes	**Additional Resources**
Sample Question MD.C.5.b A rectangular prism is shown.  What is the volume, in cubic inches, of the rectangular prism? Enter your answer in the box. ☐ cubic inches	
Lesson 1-10 Visualizing Volume Units, Lesson 1-11 Volume Explorations and Lesson 1-12 Playing Prism Pile-Up **5.OA.A.1. Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.** **5.OA.A.2. Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them.** **5.MD.C.3, 4 and 5 All three volume standards.** **5.MD.A.1. Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.**	
Students explore units of volume and convert between them. Students find volumes of figures composed of rectangular prisms and solve real-world problems involving volume. Students practice finding multiples of numbers to prepare for multi-digit division in Unit 2. Finally, students play a game to practice finding volumes of rectangular prisms, and they write number models for the volumes.	**Activities and Tasks** Designing a Cereal Box Cutting Corners – AIMS NRich Task - Holes

Grade 5 Unit One
Area and Volume

Connections/Notes	Additional Resources
Find the volume of this figure. Name something that this figure could represent.  A homeowner is building a swimming pool and needs to calculate the volume of water needed to fill the pool. The design of the pools are shown in the illustrations on the right.   The following figure is made up of two rectangular prisms with the same width of 5 centimeters. Other dimensions of the prisms are given in centimeters.  What is the volume, in cubic centimeters, of the figure? Enter your answer in the space provided.	**Online** Steve Wyborney's Cube Conversations

Connections/Notes	Additional Resources

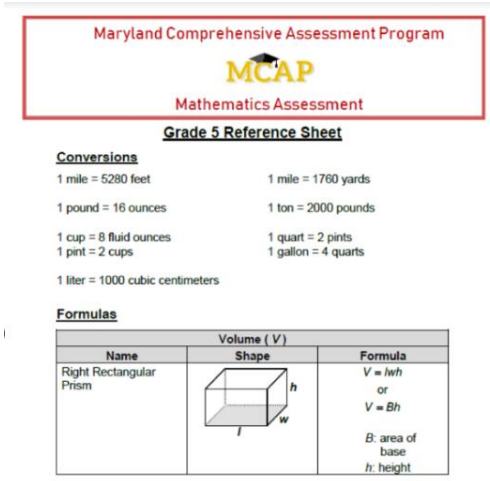
Bernard stacked two gift boxes that are each in the shape of a right rectangular prism. The dimensions of the resulting shape are shown.



What is the total volume, in cubic inches, of the gift boxes?

Enter your answer, and your work or explanation in the space provided.

Use the **MCAP Grade 5 Reference Sheet (located in the grade level shared drive, in the MCAP folder)** during instruction as it applies to the content. 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 5 Reference Sheet

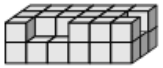
Conversions

1 mile = 5280 feet	1 mile = 1760 yards
1 pound = 16 ounces	1 ton = 2000 pounds
1 cup = 8 fluid ounces 1 pint = 2 cups	1 quart = 2 pints 1 gallon = 4 quarts
1 liter = 1000 cubic centimeters	

Formulas

Volume (V)		
Name	**Shape**	**Formula**
Right Rectangular Prism		$V = lwh$ or $V = Bh$ B: area of base h: height

Grade 5 Unit One Area and Volume	
Connections/Notes	**Additional Resources**
5.MD.C.5c MCAP Clarification: • **See Lessons 1-5 through 1-9 for MCAP Clarifications on Volume** **Evidence Statement:** The language of the standard provides the focus for this evidence statement. **Clarifications:** • Tasks may or may not have context. • Tasks may require students to measure to find edge lengths to the nearest cm, mm, or in, • Tasks require students to apply their knowledge of finding the volume of a right rectangular prism with two non-overlapping prisms. (This standard is an extension of finding the area of rectilinear figures in grade 3.) In grade 5, this involves finding the volume of three-dimensional figures. • The right rectangular prisms are NOT filled. This standard calls for students to apply their knowledge of packing the right rectangular prisms with unit cubes to finding the formula volume and adding the two volumes to find the total volume of the two figures.	

Grade 5 Unit One Area and Volume	
Connections/Notes	**Additional Resources**
Part A Jake built a figure out of centimeter cubes. **Jake's Figure**  What is the volume of Jake's figure? Enter your answer in the box. ☐ cubic centimeters **Part B** Tom also made a figure. The length of his figure is 9 centimeters, the width is 2 centimeters, and the height is 1 centimeter What is the volume of Tom's figure? Enter your answer in the box. ☐ cubic centimeters **Part C** What is the total volume for both Tom and Jake's figures?	

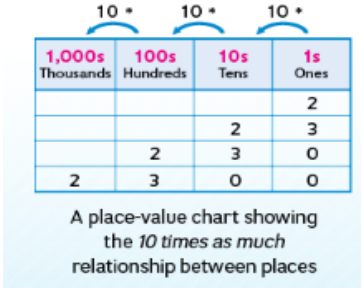
Grade 5 Unit Two Whole Number Place Value and Operations	
Connections/Notes	**Additional Resources**
Lesson 2-1 Understanding Place Value, Lesson 2-2 Exponents and Powers of 10, Lesson 2-3 Applying Powers of 10 **5.NBT.A.1. Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.** **5.NBT.A.2. Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.**	
In these three lessons, students first explore the multiplicative relationship between places in multi-digit numbers. Then they will explain patterns in the number of zeros when multiplying by powers of 10. They use whole number exponents to denote powers of 10. Finally, students will estimate with powers of 10 to solve multiplication problems and check the reasonableness of products. ***Students will extend the 10 times as much and 1/10 of patterns to decimals in units 4 and 6.*** In fourth grade, students examined the relationships of the digits in numbers for whole numbers. In grade 4, students 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.A.1). Students use base ten blocks, pictures of base ten blocks, and interactive images of base ten blocks to manipulate and investigate the place value relationships. When students explain patterns in the number of zeroes of the product when multiplying a number by powers of 10 (5.NBT.2), they have an opportunity to look for and express regularity in repeated reasoning. New at Grade 5 is the use of whole number exponents to denote powers of 10. Students understand why multiplying by a power of 10 shifts the digits of a whole number that many places to the left. Patterns in the number of 0s in products of a whole numbers and a power of 10 can be explained in terms of place value. Examples: Students might write: • 36 x 10 = 36 x 10^1 = 360 • 36 x 10 x 10 = 36 x 10^2 = 3600 • 36 x 10 x 10 x 10 = 36 x 10^3 = 36,000 • 36 x 10 x 10 x 10 x 10 = 36 x 10^4 = 360,000 Students might think and/or say: • I noticed that every time, I multiplied by 10 I added a zero to the end of the number. That makes sense because each digit's value became 10 times larger. To make a digit 10 times larger, I have to move it one place value to the left.	***Teaching Student Centered Mathematics*** A Two-Way Relationship pg. 184 **Lessons** Changing Places - AIMS Meaning of Place Value – MSDE Lesson Seed Use Exponents to Name Place Value Units **Activities and Tasks** Kipton's Scale – IM Task Marta's Multiplication Error – IM Task Comparing Digits Word Problems with Template **Videos** Learnzillion: Multiply/Divide By Powers of 10 (search site)

Connections/Notes	Additional Resources

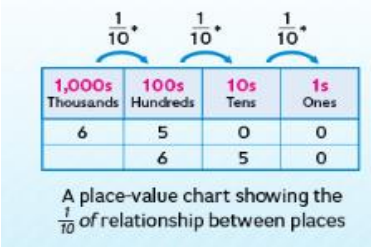
- When I multiplied 36 by 10, the 30 became 300. The 6 became 60 or the 36 became 360. So I had to add a zero at the end to have the 3 represent 3 one-hundreds (instead of 3 tens) and the 6 represents 6 tens (instead of 6 ones).

Students should be able to use the same type of reasoning as above to explain why the following multiplication and division problem by powers of 10 make sense.

- 523 x 10^3= 523,000 The place value of 523 is increased by three places.



A place-value chart showing the *10 times as much* relationship between places



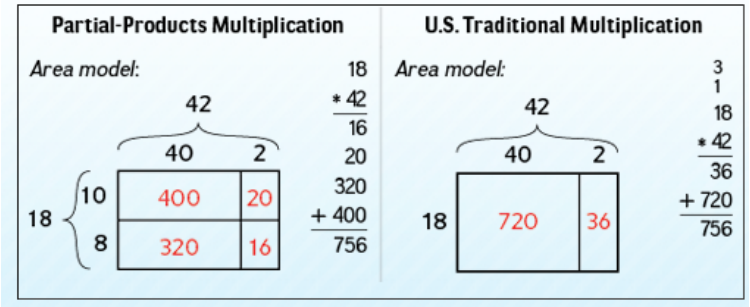
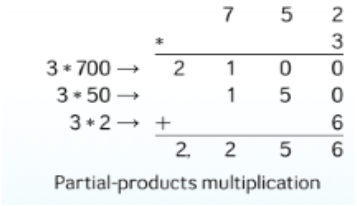
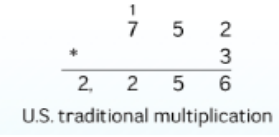
A place-value chart showing the $\frac{1}{10}$ of relationship between places

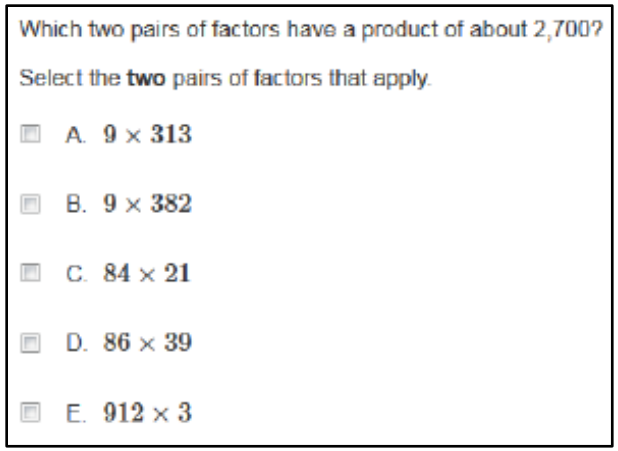
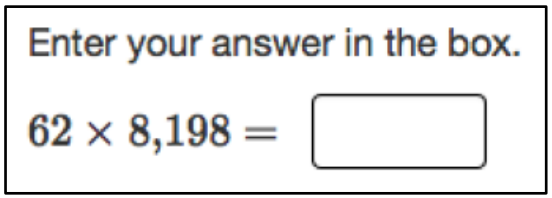
Common Misconception: Some students may misunderstand the meaning of the exponent, erroneously interpreting 10^5 as 10 x 5 rather than 10 x 10 x 10 x 10 x 10. Be sure to address this common misconception explicitly. Write both a correct and an incorrect interpretation of exponential notation, asking students to explain in their own words which interpretation is correct and how they know. It may also be helpful to have students evaluate both expressions to demonstrate that they represent very different numbers.

5.NBT.A.1 MCAP Clarification:
Evidence Statement: The language of the standard should guide the creation of assessment tasks, including the ideas in the given examples:
Clarifications:

- Tasks have “thin context” or no context
- Tasks involve the decimal point in a substantial way (e.g., by involving a comparison of a tenths digit to a thousandths digit or a tenths digit to a tens digit).
- Place value limit of decimals to the thousandths.

Grade 5 Unit Two Whole Number Place Value and Operations	
Connections/Notes	**Additional Resources**
5.NBT.A.2. Evidence Statement: The language of the standard should guide the creation of assessment tasks, including the ideas in the given examples. **Clarifications:** • Tasks should focus on the explanation or application of patterns rather than moving the decimal or adding zeros. **5.NBT.A.2 Assessment Sample Question:** About 100,000 people live in a town. The number 100,000 can be written as 10^n, where n is a whole number. What is the value of n? Enter your answer in the box. [ ]	
Lesson 2-4 U.S. Traditional Multiplication, Part 1 and Lesson 2-5 U.S. Traditional Multiplication, Part 2 **5.NBT.B.5. Fluently multiply multi-digit whole numbers using the standard algorithm.**	
Students will use the U.S. traditional multiplication to first multiply a 2-digit number by a 1-digit number and then multi-digit numbers by 1-digit numbers. Reinforce this standard through daily Number Talks. This standard will be revisited in Unit 6 as students work with multiplication of decimals. In prior grades, students used various strategies to multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers. Strategies were based on place value and the properties of operations and were illustrated and explained by using equations, rectangular arrays, and/or area models. Students can continue to use these different strategies as long as they are efficient but must also understand and be able to use the **standard algorithm**. In applying the standard algorithm, students recognize the importance of place value. The area model for multiplication is a pictorial way of representing multiplication. In the area model, the length and width of a rectangle represent factors, and the area of the rectangle represents their product. An area model not only helps to explain why the standard algorithm commonly taught in the United States for multiplication works, it is an efficient recording alternative. Some students (especially visual learners and those who have difficulty keeping numbers lined up in multiplication problems) may prefer it. Furthermore, this method has certain benefits. It illuminates	***Teaching Student Centered Mathematics*** Invented Strategies for Multiplication pgs. 113-115 Area Model Development pgs. 116-117 Traditional Algorithm for Multiplication pgs. 118-120 Expanded Lesson Area Model Multiplication pgs. 129-130 **Lessons** Using Partial Products and Visual Models for Multiplication **Online** Is This Claim Always True?

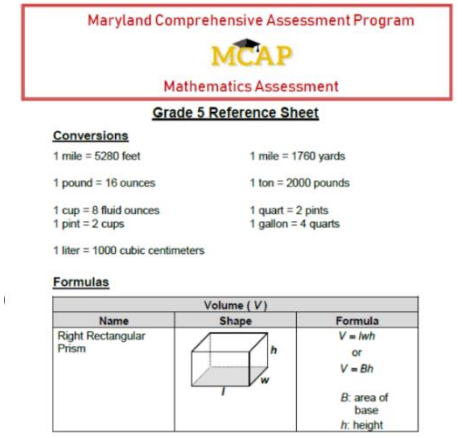
Connections/Notes	Additional Resources
important mathematical concepts (such as the distributive property), allows for computational flexibility (expanded notations allow students to use derived facts), and reinforces the concept of area. *Everyday Mathematics presents U.S. traditional multiplication alongside the partial products method. Students solve problems using both methods and compare the steps and results. While the two methods appear to be different, they both involve finding and adding partial products. Area models can illustrate connections between the partial products in each method.*   Partial-products multiplication  U.S. traditional multiplication **5.NBT.5 MCAP Clarification:** **Evidence Statement:** The language of the standard should guide the creation of assessment tasks, including the ideas in the given examples. Clarifications: • Tasks assess accuracy. The given factors are such as to require an efficient/standard algorithm (e.g., 26 x 4871).	**Templates and Visuals** Van de Walle Template Partial Products - #36 Partial Product Template

Connections/Notes	Additional Resources
• Factors in the task do not suggest any obvious ad hoc or mental strategy (as would be present for example in a case such as 7250 x 40). • Tasks do not have context. • For purposes of assessment, the possibilities are 1-digit x 2-digit, 1-digit x 3-digit, 2-digit x 2-digit, 2-digit x 3-digit, or 2-digit x 4-dgit • Tasks are not timed. **5.NBT.B.5. Assessment Sample Questions:**  Which two pairs of factors have a product of about 2,700? Select the **two** pairs of factors that apply. A. 9×313 B. 9×382 C. 84×21 D. 86×39 E. 912×3  Enter your answer in the box. $62 \times 8{,}198 =$	

Lesson 2-6 Application: Unit Conversions
5.OA.A.1. Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.
5.OA.A.2. Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them.
5.NBT.B.5. Fluently multiply multi-digit whole numbers using the standard algorithm.
5.MD.A.1. Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.

Grade 5 Unit Two
Whole Number Place Value and Operations

Connections/Notes	Additional Resources
Use the **MCAP Grade 5 Reference Sheet (located in the grade level shared drive, in the MCAP folder)** during instruction as it applies to the content. Students ***will*** be allowed to reference this sheet during unit formative and summative assessments as well as MCAP Testing.	**Lessons** Create Conversion Tables for Measurement and Use Tables to Solve Problems **Videos** Solve Real World Distance Problems with Unit Conversions **Activities and Tasks** Youcubed – The Four 4s Task



Maryland Comprehensive Assessment Program

MCAP

Mathematics Assessment

Grade 5 Reference Sheet

Conversions

1 mile = 5280 feet

1 mile = 1760 yards

1 pound = 16 ounces

1 ton = 2000 pounds

1 cup = 8 fluid ounces
1 pint = 2 cups

1 quart = 2 pints
1 gallon = 4 quarts

1 liter = 1000 cubic centimeters

Formulas

Volume (*V*)		
Name	**Shape**	**Formula**
Right Rectangular Prism		*V = lwh* or *V = Bh* *B*: area of base *h*: height

Students use unit conversions within the U.S. customary system to solve multi-step problems. Conversions among metric units are a focus in Unit 4.
Since the number of smaller units in a larger unit varies greatly in the U.S. customary system, converting between units is a good application of whole number multiplication and division.
To keep the focus on multiplication, this lesson emphasizes conversions from a larger unit to a smaller unit. Converting from smaller to larger units will be covered in ongoing practice following the division lessons later in Unit 2.

5.OA.A.1 **MCAP Clarification:**

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

Clarifications:

- Expressions will not require the use of braces. (Will include parenthesis and brackets only.)
- Tasks provide situations that model order of operations and make connections to the properties of the associative and distributive properties for addition and multiplication.
- Tasks could involve solving problems and equations using parentheses.
- Tasks could involve solving problems and equations that employ order of operations.

Connections/Notes	Additional Resources
• Tasks could require students to place parentheses to represent a given scenario or match an expression to a scenario. 5.OA.2 **Evidence Statement:** The language of the standard should guide the creation of assessment tasks, including the ideas in the given examples. **Clarifications:** • Expressions will not require the use of braces (will include parentheses and brackets only.) 5.OA.A.2. **Assessment Sample Questions**: What is the value of this expression? $100 - [5 \times (3 + 4)]$ Enter your answer in the box. Which expression represents the statement "12 divided by 3, then add 5"? A. $12 \div (3 + 5)$ B. $3 \div 12 + 5$ C. $12 \div 3 + 5$ D. $3 + 12 \div 5$	

Connections/Notes	Additional Resources
Which table shows expressions that represent these phrases? • 8 more than the product of 5 and 7 • 5 times the sum of 7 and 8 Select one answer.	

A

8 more than the product of 5 and 7	5 times the sum of 7 and 8
$(8 + 5) \times 7$	$5 \times 7 + 8$

B

8 more than the product of 5 and 7	5 times the sum of 7 and 8
$8 + 5 \times 7$	$5 \times 7 + 8$

C

8 more than the product of 5 and 7	5 times the sum of 7 and 8
$(8 + 5) \times 7$	$5 \times (7 + 8)$

D

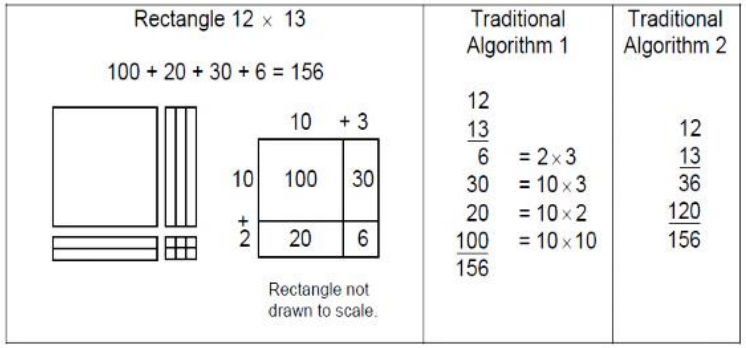
8 more than the product of 5 and 7	5 times the sum of 7 and 8
$8 + 5 \times 7$	$5 \times (7 + 8)$

Lesson 2-7 U. S. Traditional Multiplication, Part 3 and Lesson 2-8 U. S. Traditional Multiplication, Part 4
5.OA.A.2. Write simple expressions that record calculations with numbers and interpret numerical expressions without evaluating them.
5.NBT.B.5. Fluently multiply multi-digit whole numbers using the standard algorithm.

Connections/Notes	Additional Resources

Students use the U.S. traditional multiplication to first multiply 2-digit numbers by 2-digit numbers then multi-digit numbers. Make connections between the models and the algorithm prior to focusing on just the algorithm.

Examples:
123 x 34. When students apply the standard algorithm, they, decompose 34 into 30 + 4. Then they multiply 123 by 4, the value of the number in the ones place, and then multiply 123 by 30, the value of the 3 in the tens place, and add the two products.



Use the area model to justify a traditional algorithm.

Partial Product can also be set up in a grid format, which helps students be sure they have multiplied all of the combinations.

435 x 26

x	400	30	5	
20	8,000	600	100	= 8,700
6	2,400	180	30	= 2,610

8,700
+ 2,610
11,310

5.NBT.B.5 MCAP Clarification:
Evidence Statement: The language of the standard should guide the creation of assessment tasks, including the ideas in the given examples:

Lessons
Multiply by Multiples of Ten Using Patterns and Properties

Activities and Tasks
A Sequence of Events
Toss a Rectangle
Elmer's Multiplication Error – IM Task

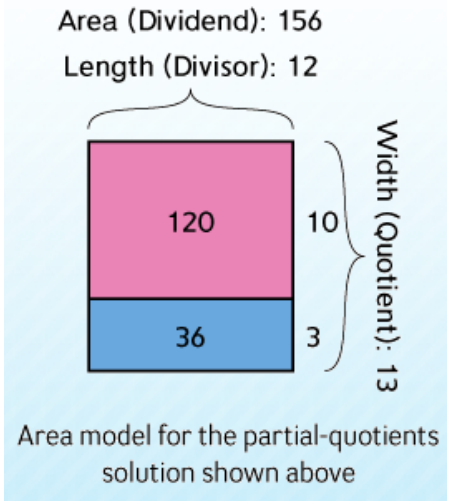
Videos

Area Models for Multiplication using Kidspiration

Grade 5 Unit Two Whole Number Place Value and Operations	
Connections/Notes	**Additional Resources**
Clarification: • Tasks assess accuracy. The given factors are such as to require an efficient/standard algorithm (e.g., 26 x 4871). • Factors in the task do not suggest any obvious ad hoc or mental strategy (as would be present for example in a case such as 7250 x 40). • Tasks do not have context. • For purposes of assessment, the possibilities are 1 x 2 digit, 1 x 3 digit, 2 x 2 digit, 2 x 3 digit, or 2 x 4 digit • Tasks are not timed. Assessment Sample Question: A fence post is in the shape of a rectangular prism. One side of the fence post measures 8 inches wide by 6 feet long. **Part A** What is the area, in square inches, of one side of the fence post? Enter your answer in the box. **Part B** Jose is building a fence using 18 fence posts, each with a width of 8 inches. What is the total width, in feet, of all the fence posts combined? Enter your answer in the box.	
Lesson 2-9 One Million Taps (Open Response and Reengagement 2- Day Lesson) **5.NBT.A.2. Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.** **5.NBT.B.5. Fluently multiply multi-digit whole numbers using the standard algorithm**	
Day 1: Students will estimate the amount of time it would take to tap their desks one million times based on the amount of time it takes to tap their desk 100 times. Day 2: Students discuss what a good response to the problem might include, examine other students' work, and revise their own work. **(MP6)** **5.NBT.A.2 MCAP Clarification:**	

Grade 5 Unit Two Whole Number Place Value and Operations	
Connections/Notes	**Additional Resources**
Evidence Statement: The language of the standard should guide the creation of assessment tasks, including the ideas in the given examples. **Clarifications:** • Tasks should focus on the explanation or application of patterns rather than moving the decimal or adding zeros. **Evidence Statement:** The language of the standard should guide the creation of assessment tasks, including the ideas in the given examples. **Clarifications:** • Tasks have "thin context" or no context • Tasks involve the decimal point in a substantial way (e.g., by involving a comparison of a tenths digit to a thousandths digit or a tenths digit to a tens digit). • Place value limit of decimals to the thousandths Which pairs of factors have a product between 2,000 and 3,000? Select the **three** pairs that apply. ☐ A. 8×200 ☐ B. 9×300 ☐ C. 70×30 ☐ D. 90×20 ☐ E. 700×3 ☐ F. 800×4	
Lesson 2-10 A Mental Division Strategy **5.NBT.A.2. Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.**	

Grade 5 Unit Two Whole Number Place Value and Operations	
Connections/Notes	**Additional Resources**
5.NBT.B.6. Find whole-number quotients of whole numbers with up to four-digit dividends and two-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.***	
Students use the relationship between multiplication and division to mentally divide multi-digit numbers. Continue making these connections with daily Number Talks. Students learn a strategy for mental division in which the dividend is broken into two or more easy-to-divide parts. **Mental Math with Division** You can often divide mentally by breaking the **dividend** into parts that are multiples of the **divisor.** Divide each part by the divisor and add the partial quotients to find the answer. **Example** 96 / 6 = **?** **Step 1** Find a multiple of the divisor that is less than the divisor and easy to use in mental math. — Try 60. It is a multiple of 6 that is easy to use in mental math for this problem. **Step 2** What do you need to add to the multiple to total the dividend? Is that number also an easy multiple of 6? If yes, rename the dividend as an addition number sentence. — You need to add 36 to 60 to get 96. 36 is also an easy multiple of 6. 60 + 36 = 96 NOTE: If the remaining part is not an easy multiple of the divisor, keep breaking it up. **Step 3** Divide each part of the dividend by the divisor. — 60 / 6 = 10 and 36 / 6 = 6 **Step 4** Find the sum of the partial quotients. The sum is the answer to the division problem. — 10 + 6 = 16, so 96 / 6 = **16.** **5.NBT.B.6 MCAP Clarification:** **Evidence Statement:** This standard is not only about calculating the correct answer. Some tasks should focus on the strategies used to find whole number quotients. **Clarifications:** • Some tasks should include the last sentence in the standard. **5.NBT. A.1 Evidence Statement:** The language of the standard should guide the creation of assessment tasks, including the ideas in the given examples. **Clarifications:** • Tasks have “thin context” or no context • Tasks involve the decimal point in a substantial way (e.g., by involving a comparison of a tenths digit to a thousandths digit or a tenths digit to a tens digit). • Place value limit of decimals to the thousandths	**Activities and Tasks** Division Strategy Multiplying Up Partition the Dividend

Grade 5 Unit Two Whole Number Place Value and Operations	
Connections/Notes	**Additional Resources**
Lesson 2-11 Reviewing Partial Quotient Division, Lesson 2-12 Strategies for Choosing Partial Quotients, and Lesson 2-13 Interpreting the Remainder **5.NBT.B.6. Find whole-number quotients of whole numbers with up to four-digit dividends and two-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.**	
In these three lessons students will review and practice strategies for using partial-quotients division to divide whole numbers. Next students will use lists of multiples to find and choose partial quotients. Finally students will solve division number stories and practice interpreting remainders. Lesson 2-11 reviews partial-quotients division, a method which was introduced in Grade 4. Students in Grade 5 extend this method to two-digit divisors. The U.S. traditional long division will be formally introduced in Grade 6. In fourth grade, students' experiences with division were limited to dividing by one-digit divisors. This standard extends students' prior experiences with strategies, illustrations, and explanations. Students began work with interpreting remainders in fourth grade. This work continues in Unit 3. 12)156 − 120 | 10 36 − 36 | 3 0 | 13 Partial-quotients division  Area model for the partial-quotients solution shown above When the two-digit divisor is a —familiar number, a student might decompose the dividend using place value.	***Teaching Student Centered Mathematics*** Invented Strategies for Division pgs. 121-123 **Lessons** Division Using the Area Model **Activities and Tasks** Interpret the Remainder Problems **Videos** Division (chunking) Divide-4digit-dividends-by-2-digit-divisors-by-setting-up-an-equation Interpret the Remainder in a Division Problem **Online** The Quotient Café (use in Firefox if link doesn't work in Chrome)

Connections/Notes	Additional Resources

Example:

- Using expanded notation ~ 2682 ÷ 25 =
  (2000 + 600 + 80 + 2) ÷ 25

Using his or her understanding of the relationship between 100 and 25, a student might think ~
I know that 100 divided by 25 is 4 so 200 divided by 25 is 8 and 2000 divided by 25 is 80. 600 divided by 25 has to be 24. Since 3 x 25 is 75, I know that 80 divided by 25 is 3 with a reminder of 5. (Note that a student might divide into 82 and not 80) I can't divide 2 by 25 so 2 plus the 5 leaves a remainder of 7. 80 + 24 + 3 = 107. So, the answer is 107 with a remainder of 7.

Division Strategy: Partition the Dividend

Materials: Division Equations Board

1. Choose a line of four problems from the board (vertically, horizontally or diagonally).
2. Solve each problem by partitioning the dividend into multiples of the divisor. Solve the easier problems and then add the two quotients together to get a final answer.

Example: 72÷5

72
50+22 (÷5)
10 + 4r2 = 14 R2

or

10 + 4 R2 =14 R2
5)50+22

3. Use the same strategy for problems with a 3-digit dividend.

Example: 256÷7

256
210+46 (÷7)
30 + 6r4 = 36 R4

or

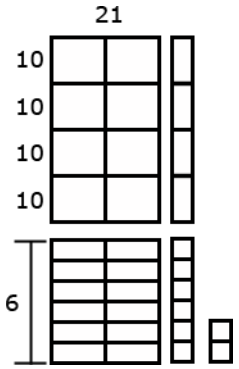
30 + 6 R4 = 36 R4
7) 210 + 46

Using an equation that relates division to multiplication, 25 x *n* = 2682, a student might estimate the answer to be slightly larger than 100 because s/he recognizes that 25 x 100 = 2500.

Examples:

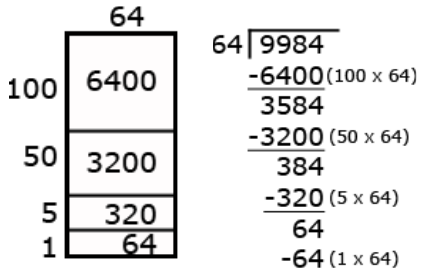
968 ÷ 21

- Using base ten models, a student can represent 962 and use the models to make an array with one dimension of 21. The student continues to make the array until no more groups of 21 can be made. Remainders are not part of the array.



Grade 5 Unit Two Whole Number Place Value and Operations	
Connections/Notes	**Additional Resources**

An area model for division is shown below. As the student uses the area model, s/he keeps track of how much of the 9984 is left to divide.



64 | 9984
-6400 (100 x 64)
3584
-3200 (50 x 64)
384
-320 (5 x 64)
64
-64 (1 x 64)
0

5.NBT.6 MCAP Clarifications

Evidence Statement: This standard is not only about calculating the correct answer. Some tasks should focus on the strategies used to find whole number quotients.

Clarifications:

- Some tasks should include the last sentence in the standard.

Each ticket for a concert cost $14. The total amount of ticket sales for the concert was $8,792. How many tickets were sold?

- A. 556
- B. 628
- C. 793
- D. 858

What is the remainder when 3,235 is divided by 20?

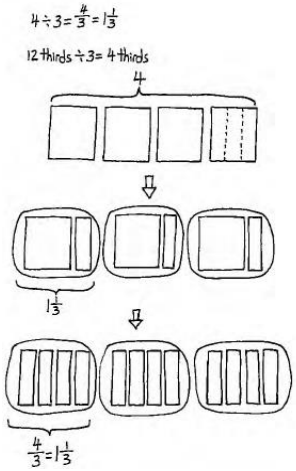
Enter your answer in the space provided.

Grade 5 Unit Three Fraction Concepts, Addition and Subtraction	
Connections/Notes	**Additional Resources**
Lesson 3-1 Connecting Fractions and Division, Part 1 and Lesson 3-2 Connecting Fractions and Division, Part 2 **5.NF.B.3. Interpret a fraction as division of the numerator by the denominator (*a*/*b* = *a* ÷ *b*). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem.** ***(For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?)***	
Students solve division number stories (using fraction circle pieces) that lead to fractional answers. Students will write number models to build an understanding of fractions as division. Students are expected to demonstrate their understanding using concrete materials, drawing models, and explaining their thinking when working with fractions in multiple contexts. They read 3/5 as three fifths and after many experiences with sharing problems, learn that 3/5 can also be interpreted as 3 divided by 5. Examples: • Ten team members are sharing 3 boxes of cookies. How much of a box will each student get? When working this problem, a student should recognize that the 3 boxes are being divided into 10 groups, so s/he is seeing the solution to the following equation, 10 x *n* = 3 (10 groups of some amount is 3 boxes) which can also be written as n = 3 ÷ 10. Using models or diagram, they divide each box into 10 groups, resulting in each team member getting 3/10 of a box. • Two afterschool clubs are having pizza parties. For the Math Club, the teacher will order 3 pizzas for every 5 students. For the student council, the teacher will order 5 pizzas for every 8 students. Since you are in both groups, you need to decide which party to attend. How much pizza would you get at each party? If you want to have the most pizza, which party should you attend? • The six fifth grade classrooms have a total of 27 boxes of pencils. How many boxes will each classroom receive? Students may recognize this as a whole number division problem but should	**Lessons** Use Tape Diagrams to Model Fractions as Division **Activities and Tasks** Converting Fractions of a Unit to a Smaller Unit How Much Pie? - IM Task Youcubed - Paper Folding Task **Videos**

Connections/Notes	Additional Resources

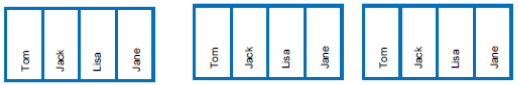
also express this equal sharing problem as $\frac{27}{6}$. They explain that each classroom gets $\frac{27}{6}$ boxes of pencils and can further determine that each classroom gets $4\frac{3}{6}$ or $4\frac{1}{2}$ boxes of pencils.

Examples:



Example: Tom, Jack, Lisa and Jane combine their money to buy three large pizzas. If they share the pizzas equally, what fraction of a whole pizza does each friend eat?

I need to find 3 pizzas ÷ 4 friends. I will draw a fraction model of 3 pizzas and divide each pizza into 4 equal parts.



Each friend eats $\frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{3}{4}$ of a pizza. $3 \div 4 = \frac{3}{4}$ ← The numerator represents the number of pizzas. The denominator represents the number of friends.

5.NF.B.3 MCAP Evidence Statement: The language of the standard should guide the creation of assessment tasks, including the ideas in the given examples.

Clarifications:

- Tasks should have context that includes the understanding of a fraction as division of the numerator by the denominator
- Fraction modules or equations can be used to represent the problem (linear fraction models such as bar models/tape diagrams and number lines or area models will be used in tasks.)
- Note example given in the standard

5.NF.B.3 Assessment Sample Question:

Which expression has a value that is equivalent to $\frac{7}{12}$?

A. $7 - 12$

B. $12 - 7$

C. $12 \div 7$

D. $7 \div 12$

Connections/Notes	Additional Resources
There are 18 students in Ms. Avila's reading class. Ms. Avila will assign an equal number of pages for each student to read aloud from a book that contains a total of 45 pages. What is the total number of pages that each student will read aloud? Select one answer. **A** $\frac{2}{5}$ **B** $2\frac{1}{2}$ **C** 27 **D** 63	

Lesson 3-3 Application: Interpreting Remainders

5.NBT.B.6. Find whole-number quotients of whole numbers with up to four-digit dividends and two-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.

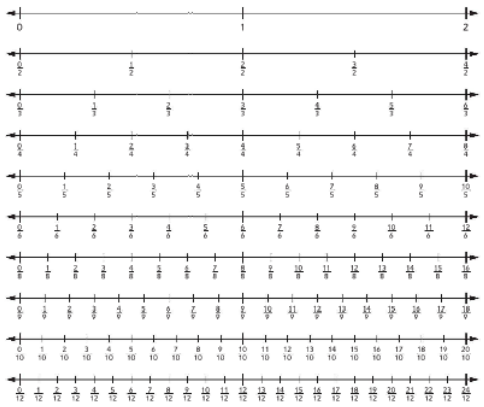
5.NF.B.3. Interpret a fraction as division of the numerator by the denominator (*a*/*b* = *a* ÷ *b*). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem.

(For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?)

Students apply their understanding of fractions as division to report remainders as fractions. **5.NF.B.3 MCAP Evidence Statement:** The language of the standard should guide the creation of assessment tasks, including the ideas in the given examples. **Clarifications:** • Tasks should have context that includes the understanding of a fraction as division of the numerator by the denominator • Fraction modules or equations can be used to represent the problem (linear fraction models such as bar models/tape diagrams and number lines or area models will be used in tasks.) • Note example given in the standard	**Lessons** Interpret a Fraction as Division Use Tape Diagrams to Model Fractions as Division **Activities and Tasks** Relating Fractions to Division Problems

Grade 5 Unit Three Fraction Concepts, Addition and Subtraction	
Connections/Notes	**Additional Resources**
Assessment Sample Questions: Robert is growing plants in 5 plant boxes. **Part A** Robert had 28 pounds of dirt to fill the plant boxes. He put the same amount of dirt in each of the 5 plant boxes so that no dirt was left. The number of pounds of dirt he used in each plant box is between what two consecutive whole numbers? Enter your answers in the boxes. between ☐ and ☐ **Part B** Robert had 4 seed packets that each contained the same number of seeds. He combined all the seeds together and then planted the same number of seeds in each of the 5 plant boxes so that no seeds were left. What fraction of the seeds in 1 packet went into each box? Enter your answer as a fraction in the boxes. ☐ — ☐	**Videos** Interpret the Remainder Division Problems
Lesson 3-4 Fractions on a Number Line **5.NF.A.2. Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers.** **5.NF.B.3. Interpret a fraction as division of the numerator by the denominator (*a*/*b* = *a* ÷ *b*). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem.** ***(For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?)***	

Grade 5 Unit Three
Fraction Concepts, Addition and Subtraction

Connections/Notes	Additional Resources
Students use number lines to represent, compare, and rename fractions and mixed numbers. Students will utilize the fractions on a number line poster. This will help build a foundation for addition and subtracting of fractions which begins in Lesson 3-6. Odd Man Out - This routine can be used throughout the year with any content. Students are shown four images (they could be numbers, shapes, expressions, words, and so on) and are asked to select one that is different from the others. At first, students' responses may be somewhat shallow and based on surface-level differences, however over time their rationales for selecting the image that does not belong become more insightful. For example: **Odd Man Out** $\frac{1}{2}$ $\frac{7}{14}$ $\frac{5}{3}$ $\frac{6}{12}$  Reasons that each fraction might be chosen: • ½ is the only unit fraction. • 7/14 is the only fraction with a denominator that is not a factor of 12. • 5/3 is the only fraction greater than 1; and also not equivalent to ½. • 6/12 is the only fraction with an even number as the numerator; and also the only fraction with an even number in the numerator and denominator. **5.NF.B.3 MCAP Evidence Statement:** The language of the standard should guide the creation of assessment tasks, including the ideas in the given examples. **Clarifications:** • Tasks should have context that includes the understanding of a fraction as division of the numerator by the denominator • Fraction modules or equations can be used to represent the problem (linear fraction models such as bar models/tape diagrams and number lines or area models will be used in tasks.) • Note example given in the standard	**Activities and Tasks** Add it Up, Version 1 and 2 – Beyond Invert and Multiply pg 11-14 Fractions Greater than 1 – Beyond Invert and Multiply pg 15 One Number, Many Names – Beyond Invert and Multiply pg 20 Odd Man Out GR 5 Fractions Addition and Subtraction with Cuisenaire Rods – Beyond Invert and Multiply pg 43 and 67

Grade 5 Unit Three Fraction Concepts, Addition and Subtraction	
Connections/Notes	**Additional Resources**
Lesson 3-5 Game Strategies (Open Response and Reengagement 2-Day Lesson) **5.NBT.B.6. Find whole-number quotients of whole numbers with up to four-digit dividends and two-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.** **5.NF.B.3. Interpret a fraction as division of the numerator by the denominator (*a*/*b* = *a* ÷ *b*). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem.** ***(For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?)***	
Day 1: Students apply their knowledge of fractions and division to play a fraction version of the game *Top-It* and devise a rule to make the largest possible fraction. Day 2: Students discuss whether other students' rules work and revise their own rules. The focus of this lesson is to create and justify rules, shortcuts, and generalizations. **(MP8)**	
Lesson 3-6 Fraction Estimation with Number Sense and Lesson 3-7 Fraction Estimation with Benchmarks **5.NF.A.2. Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers.**	
In these two lessons, students will first use fraction number sense to estimate and assess the reasonableness of answers to fraction addition and subtraction problems. Students will then use benchmarks to estimate sums and differences of fractions. *Learning to estimate is an important step in developing fraction number sense and understanding fraction operations. To make good estimates students must consider what a fraction means, how it relates to the whole, and where the fraction falls on a number line. Future lessons will include instruction on finding and using common denominators. For now encourage students to use number lines, fraction circle pieces, benchmarks, and other mental estimation strategies to help them develop fraction number sense.* Examples: Jerry was making two different types of cookies. One recipe needed 3/4 cup of sugar and the other needed 2/3 cup of sugar. How much sugar did he need to make both recipes?	**Lessons** Use Benchmark Numbers to Assess Reasonableness of Addition and Subtraction Equations Estimating Fraction Sums and Differences – MSDE Lesson Seed **Activities and Tasks** Closest to 25

Connections/Notes	Additional Resources

Mental estimation: A student may say that Jerry needs more than 1 cup of sugar but less than 2 cups. An explanation may compare both fractions to ½ and state that both are larger than ½ so the total must be more than 1. In addition, both fractions are slightly less than 1 so the sum cannot be more than 2.

5.NF.A.2 MCAP Evidence Statement: The language of the standard should guide the creation of assessment tasks, including the ideas in the given examples.

Clarifications:

- Tasks may use any of the situation types of problems as shown in the table, addition/subtraction situations in the front of this document
- Tasks could provide visual fraction models; or students may draw fraction models as a strategy.
- For assessment purposes, linear fraction models such as bar models/tape diagrams and number lines or area models will be used in tasks.
- Tasks may involve fractions greater than one, including mixed numbers.

Stella mixed $\frac{1}{2}$ gallon of blue paint with $\frac{3}{16}$ gallon of white paint.

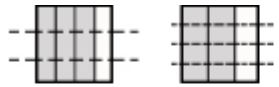
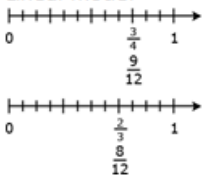
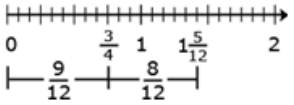
Show whether each fraction is a reasonable estimate or not a reasonable estimate of the total amount of paint after Stella mixed the two colors.

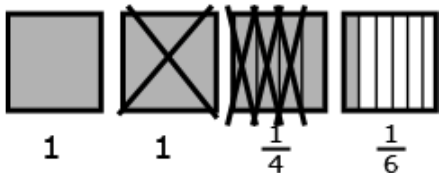
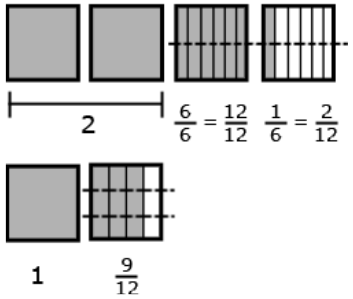
Select four correct boxes in the table.

	$\frac{5}{8}$	$\frac{2}{9}$	$\frac{11}{10}$	$\frac{3}{14}$
Reasonable Estimate	○	○	○	○
Not a Reasonable Estimate	○	○	○	○

Grade 5 Unit Three Fraction Concepts, Addition and Subtraction	
Connections/Notes	**Additional Resources**
Lesson 3-8 Renaming Fractions and Mixed Numbers **5.NF.B.3. Interpret a fraction as division of the numerator by the denominator (*a*/*b* = *a* ÷ *b*). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem.**	
Students rename mixed numbers and fractions greater than 1 by composing and breaking apart wholes. *In Lesson 3-1 and 3-2 students used an equal sharing interpretation of division. In this lesson students use an equal-grouping interpretation of division to connections between fractions and division. For example, they convert 21/5 to 4 1/5 by thinking: "How many groups of 5 fifths are in 21 fifths?" Students extend this reasoning to rename mixed numbers in multiple ways, which is a prerequisite skill for mixed number addition and subtraction.* Students are expected to demonstrate their understanding using concrete materials, drawing models, and explaining their thinking when working with fractions in multiple contexts. They read 3/5 as three fifths and after many experiences with sharing problems, learn that 3/5 can also be interpreted as 3 divided by 5. Examples: • Ten team members are sharing 3 boxes of cookies. How much of a box will each student get? When working this problem, a student should recognize that the 3 boxes are being divided into 10 groups, so s/he is seeing the solution to the following equation, 10 x *n* = 3 (10 groups of some amount is 3 boxes) which can also be written as n = 3 ÷ 10. Using models or diagram, they divide each box into 10 groups, resulting in each team member getting 3/10 of a box. • Two afterschool clubs are having pizza parties. For the Math Club, the teacher will order 3 pizzas for every 5 students. For the student council, the teacher will order 5 pizzas for every 8 students. Since you are in both groups, you need to decide which party to attend. How much pizza would you get at each party? If you want to have the most pizza, which party should you attend?	

Grade 5 Unit Three Fraction Concepts, Addition and Subtraction	
Connections/Notes	**Additional Resources**
5.NF.B.3 MCAP Evidence Statement: The language of the standard should guide the creation of assessment tasks, including the ideas in the given examples. **Clarifications:** • Tasks should have context that includes the understanding of a fraction as division of the numerator by the denominator • Fraction modules or equations can be used to represent the problem (linear fraction models such as bar models/tape diagrams and number lines or area models will be used in tasks.) • Note example given in the standard	
Lesson 3-9 Introduction to Adding and Subtracting Fractions and Mixed Numbers, Lesson 3-10 Exploring Addition and Subtraction with Unlike Denominators, and Lesson 3-11 Playing Fraction Capture **5.NF.A.1. Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators.** **5.NF.A.2. Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers.**	
To support the development of fraction number sense, Everyday Mathematics delays the introduction of formal procedures for finding common denominators and for adding and subtracting fractions until Unit 5.. In these lessons addition and subtracting with fractions and mixed numbers is explored with visual models. Students explore strategies and tools for adding and subtracting fractions and mixed numbers. Students will use fraction circle pieces to generate equivalent fractions and add fractions. Students learn a new game to practice breaking apart and adding fractions. Students will revisit these standards in Unit 5 as they will generalize strategies as they work with equivalent fractions, factors, and multiples. Students in Grade 4 added and subtracted fractions with like denominators. Fifth grade students should apply their understanding of equivalent fractions developed in fourth grade and their ability to rewrite fractions in an equivalent form to find common denominators. **Visual fraction models include tape diagrams, area models, bar models, number line diagrams, set diagrams (See Van de Walle pgs.162-166).**	***Teaching Student Centered Mathematics*** Addition and Subtraction pgs. 162-166 An Area Model Approach pgs. 155-156 **Lessons** Add Fractions Using Visual Models to Create Equivalent Fractions Subtract Fractions Using Visual Models to Create Equivalent Fractions Add and Subtract Whole and Mixed Numbers Using the Number Line Fraction Time - AIMS Delightfully Different Fractions

Grade 5 Unit Three Fraction Concepts, Addition and Subtraction	
Connections/Notes	**Additional Resources**
Area Model  $\frac{3}{4}$ cup of sugar $\frac{2}{3}$ cup of sugar $\frac{3}{4}-\frac{9}{12}$ $\frac{2}{3}-\frac{8}{12}$ $\frac{3}{4}+\frac{2}{3}=\frac{17}{12}=\frac{12}{12}+\frac{5}{12}=1\frac{5}{12}$ Linear Model ($\frac{3}{4}+\frac{2}{3}$) $\frac{3}{4}=\frac{9}{12}$ $\frac{2}{3}=\frac{8}{12}$ $\frac{3}{4}+\frac{2}{3}=\frac{17}{12}=\frac{12}{12}+\frac{5}{12}=1\frac{5}{12}$ Linear model  Solution: 	**Activities and Tasks** Adding Mixed Numbers Word Problems Making S'mores – IM Task **Videos** Using Pattern Blocks to Add Fractions Using Pattern Blocks to Subtract Fractions **Online** Equivalent Fractions (like denominators) **try Firefox if it won't work in Chrome** **Templates and Visuals** Fraction Spinners

Grade 5 Unit Three Fraction Concepts, Addition and Subtraction	
Connections/Notes	**Additional Resources**
Some problems should appear as multistep. Example: Using an area model to subtract • This model shows 1 ¾ subtracted from 3 $\frac{1}{6}$ leaving 1 + ¼ + $\frac{1}{6}$ which a student can then change to 1 + $\frac{3}{12}$ + $\frac{2}{12}$ = 1$\frac{5}{12}$.  • This diagram models a way to show how 3 $\frac{1}{6}$ and 1 $\frac{3}{4}$ can be expressed with a denominator of 12. Once this is accomplished, a student can complete the problem, 2 $\frac{14}{12}$ – 1 $\frac{9}{12}$ = 1 $\frac{5}{12}$.  **5.NF.A.1-3 MCAP Evidence Statement:** The standard includes two operations, addition and subtraction and two types of numbers, fractions and mixed numbers with unlike dominators. For the purpose of item development, this evidence statement focuses on adding fractions with unlike denominators 5.NF.A.1 will focus on adding fractions with unlike denominators **Clarifications:** • Tasks have no context. • Tasks ask for the answer or ask for an intermediate step that shows evidence of using equivalent fractions as a strategy • Note: Tasks do not include mixed numbers (see 5.NF.A.1-3, 5.NF.A.1-4) • Tasks may involve fractions greater than one (including fractions equal to whole numbers) • Prompts do not provide visual fraction models; students may draw fraction models as a strategy.	

Connections/Notes	Additional Resources

5.NF.A.1. Assessment Sample Questions:

Complete the equation to show equivalent fractions with common denominators.

Drag and drop the numbers into the empty boxes.

1	2	3	4	5	6	7	8	9	14	20	24	40	48

$$\frac{1}{8} + \frac{5}{6} = \frac{\square}{\square} + \frac{\square}{\square}$$

For which of the following sums could 30 be used as a common denominator to make equivalent fractions?

Select the **three** correct sums.

- ☐ A. $\frac{1}{3} + \frac{4}{15}$
- ☐ B. $\frac{4}{9} + \frac{1}{15}$
- ☐ C. $\frac{7}{18} + \frac{1}{30}$
- ☐ D. $\frac{1}{6} + \frac{7}{30}$
- ☐ E. $\frac{8}{15} + \frac{3}{20}$
- ☐ F. $\frac{2}{5} + \frac{5}{6}$

Connections/Notes	Additional Resources
Lesson 3-12 Solving Fraction Number Stories **5.NF.A.1. Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators.** **5.NF.A.2. Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers.** **5.NF.B.3. Interpret a fraction as division of the numerator by the denominator (*a/b = a ÷ b*). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem.**	
Students identify problem-solving strategies and solve a variety of fraction number stories. **5.NF.A.2** Assessment Sample Question A student started a project using a pencil with a length of $7\frac{1}{2}$ inches. After the student completed the project, the pencil had a length of $5\frac{7}{8}$ inches. How much shorter, in inches, was the pencil after the student completed the project than when the student started the project? **A** $1\frac{4}{8}$ **B** $1\frac{5}{8}$ **C** $2\frac{3}{8}$ **D** $2\frac{6}{8}$	**See Lessons 3-9 through 3-11 for additional resources.**

Grade 5 Unit Three Fraction Concepts, Addition and Subtraction	
Connections/Notes	**Additional Resources**
Lesson 3-13 Fraction-Of Problems, Part 1 and Lesson 3-14 Fraction-Of Problems, Part 2 **5.NF.B.4. Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.** **a. Interpret the product (a/b) × q as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$.** ~~**b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.**~~ **5.NF.B.6. Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.**	
In these lessons students solve fraction-of problems with fractional answers to build readiness for multiplying fractions by whole numbers. Students will explore these standards further in Units 4 and 5. In Unit 4 students will interpret multiplication as scaling and compare the size of the product. In Unit 5 students will work extensively with 5.NF.B.4,5 and 6. **5.NF.B.4a MCAP Evidence Statement:** The language of the standard should guide the creation of assessment tasks, including the ideas in the given examples. **Clarifications:** • Tasks have context in the prompt or solution • Tasks may use models to represent a situation in which students need to multiply a whole number by a fraction or a fraction by a fractions • For assessment purposes—linear fraction models such as bar models/tape diagrams and number lines, or area models may be used in tasks. **Circle models will not be accepted**.	**Lessons** Multiply any Whole Number by a Fraction Using Tape Diagrams Relate Fractions as Division to Fraction of a Set **Activities and Tasks** Cuisenaire Rods Fractions of a Number Tell Me All You Can – Beyond Invert and Multiply pg 103

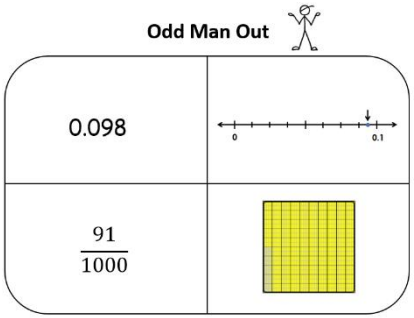
Grade 5 Unit Four
Decimal Concepts; Coordinate Grids

Connections/Notes	Additional Resources
Lesson 4-1 Decimal Place Value, Lesson 4-2 Representing Decimals through Thousandths, Lesson 4-3 Representing Decimals in Expanded Form, and Lesson 4-4 Comparing and Ordering Decimals. **5.NBT.A.1. Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.** **5.NBT.A.3. Read, write, and compare decimals to thousandths.** **a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., 347.392 = 3 × 100 + 4 × 10 + 7 × 1 + 3 × (1/10) + 9 × (1/100) + 2 × (1/1000).** **b. Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.**	
These four lessons follow a progression to the introduction of decimal numbers. Students begin by extending place-value patterns to decimals and practice reading and writing decimals to thousandths. Next, students represent decimals to the thousandths place using base-10 numerals, number names, fractions, and thousandths grids. Then students are introduced to expanded form decimals. Finally, students use place-value strategies to compare decimals to thousandths. Students build on the understanding they developed in fourth grade to read, write, and compare decimals to thousandths. They connect their prior experiences with using decimal notation for fractions and addition of fractions with denominators of 10 and 100. They use concrete models and number lines to extend this understanding to decimals to the thousandths. Models may include base ten blocks, place value charts, grids, pictures, drawings, manipulatives, technology-based, etc. They read decimals using fractional language and write decimals in fractional form, as well as in expanded notation as shown in the standard 3a. This investigation leads them to understanding equivalence of decimals (0.8 = 0.80 = 0.800). Students need to understand the size of decimal numbers and relate them to common benchmarks such as 0, 0.5 (0.50 and 0.500), and 1. Comparing tenths to tenths, hundredths to hundredths, and thousandths to thousandths is simplified if students use their understanding of fractions to compare decimals. Example: Some equivalent forms of 0.72 are: 72/100 70/100 + 2/100 0.720	***Teaching Student Centered Mathematics*** Activity 7.9 “Line ‘Em Up” pg. 191 Activity 7.10 “Close Nice Numbers” pg. 192 **Lessons** Compare Decimal Fractions to the Thousandths Show Me the Money - AIMS Decimal Detectives - AIMS Dealing with Decimals - AIMS **Activities and Tasks** Decimal of the Day Comparing Decimals QR Code Activity Are These Equivalent to 9.52? – IM Task Comparing Decimals on the Number Line – IM Task Decimal Review Game Cards Place Value Path Game Race to a Meter

Connections/Notes

7/10 + 2/100 7 x (1/10) + 2 x (1/100) 0.70 + 0.02	7 x (1/10) + 2 x (1/100) + 0 x (1/1000) 720/1000

Comparing 0.25 and 0.17, a student might think, 25 hundredths is more than 17 hundredths. They may also think that it is 8 hundredths more. They may write this comparison as 0.25 > 0.17 and recognize that 0.17 < 0.25 is another way to express this comparison.
Comparing 0.207 to 0.26, a student might think, both numbers have 2 tenths, so I need to compare the hundredths. The second number has 6 hundredths, and the first number has no hundredths so the second number must be larger. Another student might think while writing fractions, I know that 0.207 is 207 thousandths (and may write 207/1000). 0.26 is 26 hundredths (and may write 26/100) but I can also think of it as 260 thousandths (260/1000). So, 260 thousandths is more than 207 thousandths.



5.NBT.A.1 MCAP Evidence Statement: The language of the standard should guide the creation of assessment tasks, including the ideas in the given examples.
Clarifications:

- Tasks have “thin context” or no context.
- Tasks involve the decimal point in a substantial way (e.g., by involving a comparison of a tenths digit to a thousandths digit or a tenths digit to a tens digit).
- Place value limit of decimals to the thousandths.

Additional Resources

Decimal Place Value Matching Cards
Odd Man Out Decimal Representations
3 Act Task – The Final Lap

Videos
Write-decimals-in-expanded-form

Online
Number Line Worksheets with Decimals

Templates and Visuals
Decimal Square Sets
Large Thousandths Decimal Square
Place Value Mat
Decimal Arrow Cards

Connections/Notes	Additional Resources

5.NBT.A.1 Sample Assessment Question

In which number does the digit 8 have a value that is 10 times as great as the value of the digit 8 in the number 456.789?

A 567.894

B 678.945

C 789.456

D 894.567

Drag and drop an operation symbol and a number into the appropriate blanks to make a true statement.

× ÷ 1/10 1 1/100 10 100

$35 \square \square = 3.5$

5.NBT.A.3.a Assessment Sample Questions:

Identify the answer choices that represent the same value as "forty-two and nine hundred five thousandths."

Select the **two** correct answers.

- ☐ A. 42,905
- ☐ B. $4 \times 10 + 2 \times 1 + 9 \times \frac{1}{10} + 5 \times \frac{1}{100}$
- ☐ C. 42.095
- ☐ D. $4 \times 10 + 2 \times 1 + 9 \times \frac{1}{10} + 5 \times \frac{1}{1000}$
- ☐ E. 42.905
- ☐ F. $4 \times 10 + 2 \times 1 + 9 \times \frac{1}{100} + 5 \times \frac{1}{1000}$

Connections/Notes	Additional Resources

A number is shown in expanded form.

$$3 \times 10 + 6 \times 1 + 8 \times \frac{1}{1{,}000}$$

What is this number in standard form?

5.NBT.A.3.b Assessment Sample Questions:

Select the **two** values that are less than seven hundred three and forty-seven thousandths.

- 703.1
- 703.46
- seven hundred three and nine-tenths
- seven hundred three and one-hundredth
- $7 \times 100 + 2 \times 10 + 1 \times 1 + 0 \times \frac{1}{10} + 2 \times \frac{1}{100}$
- $7 \times 100 + 0 \times 10 + 3 \times 1 + 0 \times \frac{1}{10} + 1 \times \frac{1}{100} + 8 \times \frac{1}{1000}$

Connections/Notes	Additional Resources
Which comparison is true? **A** $15.347 > 15.374$ **B** $25.502 < 25.52$ **C** $35.716 < 35.671$ **D** $45.280 > 45.28$	
Lesson 4-5 Rounding Decimals **5.NBT.A.4. Use place value understanding to round decimals to any place**	
Students use number lines and place-value understanding to round decimals to a given place. This is the only unit in which rounding decimals is a focus. Continue to revisit through spiral reviews and Math Meeting activities. This standard is included in Lessons 4-11 through 4-14 **5.NBT.A.4 MCAP Evidence Statement:** The language of the standard provides the focus for this evidence statement. **Clarifications:** • Tasks have thin or no context. **5.NBT.A.4** Assessment Sample Question:	**Lessons** Rounding Decimals Using the Vertical Number Line **Activities and Tasks** Decimal Round Up Round Down Rounding to Tenths and Hundredths – IM Task **Templates** Decimal Number Lines

Connections/Notes	Additional Resources
Select the **two** statements that are **incorrect**. ☐ A. 0.1951 rounds to 0.19 ☐ B. 1.3976 rounds to 1.398 ☐ C. 2.8102 rounds to 2.7 ☐ D. 5.2547 rounds to 5.25 ☐ E. 6.0007 rounds to 6.001	

Grade 5 Unit Four
Decimal Concepts; Coordinate Grids

Connections/Notes	Additional Resources

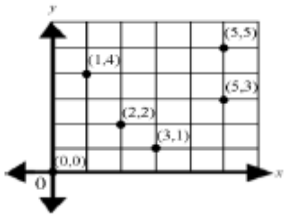
Lesson 4-6 Introduction to the Coordinate System and Lesson 4-7 Playing Hidden Treasure

5.G.A.1. Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate).

5.G.A.2. Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane and interpret coordinate values of points in the context of the situation.

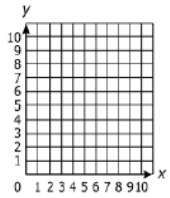
Students are introduced to the coordinate grid and use ordered pairs to plot and identify points. Students can use a classroom size coordinate system to physically locate the coordinate point (5,3) by starting at the origin point (0,0) by walking 5 units along the x axis to find the first number in the pair and then walking up 3 units for the second number in the pair.

5.G.A.2. *Assessment Sample Questions:*



- Graph and label the points below in a coordinate system.
  - A (0, 0)
  - B (5, 1)
  - C (0, 6)
  - D (2.5, 6)
  - E (6, 2)
  - F (4, 1)
  - G (3, 0)

A coordinate plane is shown.



Which of these is a correct process for plotting the point (3, 6) on the coordinate plane?

- A. Start at the origin. Move 3 units up the *y*-axis, and then move 6 units to the right. Plot the point there.
- B. Start at the top of the *y*-axis. Move 3 units down the *y*-axis, and then move 6 units to the right. Plot the point there.
- C. Start at the origin. Move 3 units to the right on the *x*-axis, and then move 6 units up. Plot the point there.
- D. Start at the top of the *y*-axis. Move 3 units to the right, and then move 6 units down. Plot the point there.

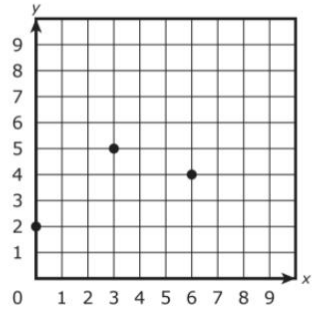
Teaching Student Centered Mathematics
Location Activities pg. 239

Lessons
Name Points Using Coordinate Pairs
Battleship
Construct a Coordinate System on a Plane

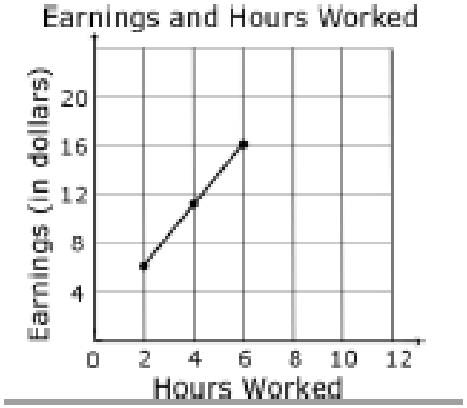
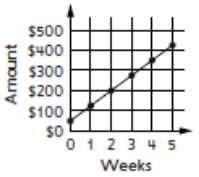
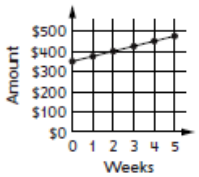
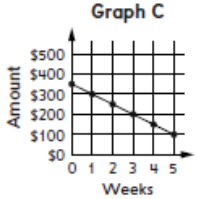
Activities and Tasks
Pieces of Eight
Coordinate Shapes
Geometric Shapes on a Coordinate Grid
Battleship Using Grid Paper – IM Task

Online
Geoboard – Coordinate (quadrant one only)
Printable Grid Sheets

Templates and Visuals
First Quadrant Grids

Grade 5 Unit Four Decimal Concepts; Coordinate Grids	
Connections/Notes	**Additional Resources**
5.GA.1 MCAP Evidence Statement: This evidence statement focuses more on the intent of 5.G.A.2 with the concepts described in 5.G.A.1 and the second part of 5.OA.B.3 **Clarifications:** • Tasks assess student understanding of the coordinate plane as a representation scheme, with essential features as articulated in standard 5.G.A.1. • For 5.G.A.1 only, tasks may involve only the plotting of points. • Coordinates must be whole numbers only. **5.GA.1** Assessment Sample Question: Three points are shown in the given coordinate plane.  Which **three** pairs of coordinates are the coordinates of the points shown? Select the **three** correct answers. **A** (0, 2) **B** (2, 0) **C** (3, 5) **D** (4, 6) **E** (5, 3) **F** (6, 4)	

Grade 5 Unit Four Decimal Concepts; Coordinate Grids	
Connections/Notes	**Additional Resources**
Lesson 4-8 Solving Problems on a Coordinate Grid, Part 1 and Lesson 4-9 Solving Problems on a Coordinate Grid, Part 2 **5.G.A.1. Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate).** **5.G.A.2. Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane and interpret coordinate values of points in the context of the situation.** **5.NF.B.5. Interpret multiplication as scaling (resizing), by:** **a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.** ~~**b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence *a*/*b* = (*n*×*a*)/(*n*×*b*) to the effect of multiplying *a*/*b* by 1.**~~ **5.OA.B.3. Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns and graph the ordered pairs on a coordinate plane.**	
Students represent mathematical problems on a coordinate grid by plotting points to form pictures and applying rules to ordered pairs. Students will form ordered pairs, graph them, and interpret coordinate values in context. The work as students discuss how the sailboat changes when multiplying and halving coordinates is a prerequisite for understanding multiplication as scaling. When students understand the idea of scaling, they can use it to estimate products before performing any actual calculations. For example, 4 x 3 we know the product will be greater than 4 because we're scaling up our value of 4 three times. So 4 x 1/3, we know that the product will be less than 4 because we're scaling down our original by 1/3. Although students can often "locate a point," these understandings are beyond simple skills. For example, initially, students often fail to distinguish between two different ways of viewing the point (2, 3), say, as instructions: "right 2, up 3"; and as the point defined by being a distance 2 from the x-axis and a distance 3 from the y-axis. In these two descriptions, the 2 is first associated with the x-axis, then with the y-axis. Examples: Sara has saved $20. She earns $8 for each hour she works. • If Sara saves all of her money, how much will she have after working 3 hours? 5 hours? 10 hours?	***Teaching Student Centered Mathematics*** Graphing Patterns pgs. 297-298 **Lessons** Describe the Graph (need NCTM membership) Use Coordinate Systems to Solve Real World Problems Draw Symmetric Figures on Coordinate Plane Compare the Size of the Product to the Size of the Factors **Activities and Tasks** Meerkat Coordinate Plane Task Reasoning About Multiplication – IM Task

Connections/Notes	Additional Resources
• Create a graph that shows the relationship between the hours Sara worked and the amount of money she has saved. Use the graph below to determine how much money Jack makes after working exactly 9 hours.  Draw a line matching each graph below to the number story that it best fits. SRB 55-56, 23 **a.** Juanita started with $350. She saved another $25 every week. **b.** Meredith received $350 for her birthday. She deposited the entire amount in the bank. Every week, she withdrew $50. **c.** Omar started a new savings account with $50. Every week after that, he deposited $75. **Graph A**  **Graph B**  **Graph C**  Explain how you decided which graph matches each number story.	**Templates and Visuals** Describe the Graph Activity recording Sheet for NCTM Lesson

Connections/Notes	Additional Resources

5.OA.B.3 **MCAP Evidence Statement:** This standard has multiple parts. The first two sentences ask students to **generate two numerical patterns using two GIVEN rules and to identify apparent relationships between the corresponding terms. Explain informally why this is so.**
Clarifications:

- Tasks should only include what is stated in the first two sentences and the last sentence in the standard (bold font above).
- The rest of this standard will be assessed along with 5.G.1 and 5.G.2

The following table shows the corresponding terms in two patterns. Both patterns continue to increase using the same addition rule.

Pattern G	3	7	11	15	19
Pattern H	9	13	17	21	25

What is the relationship between corresponding terms in the two patterns?

Select one answer.

A Each term in pattern H is 3 times the corresponding term in pattern G.

B Each term in pattern H is 6 times the corresponding term in pattern G.

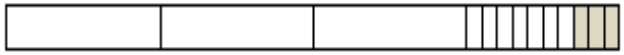
C Each term in pattern H is 4 more than the corresponding term in pattern G.

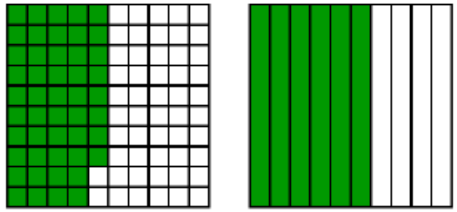
D Each term in pattern H is 6 more than the corresponding term in pattern G.

Lesson 4-10 Folder Art (Open Response and reengagement 2-Day Lesson)
5.G.A.1. Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate).
5.G.A.2. Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.

Grade 5 Unit Four Decimal Concepts; Coordinate Grids	
Connections/Notes	**Additional Resources**
Day 1: Students develop and apply a rule to enlarge a picture on a coordinate grid. Day 2: Student's discuss each other's rules and pictures and revise their own work. The focus is on students using tools effectively and making sense of their results. **(MP5)** **5.G.A.1 MCAP Evidence Statement:** This evidence statement focuses more on the intent of 5.G.A.2 with the concepts described in 5.G.A.1 and the second part of 5.OA.B.3 **Clarifications:** • Tasks assess student understanding of the coordinate plane as a representation scheme, with essential features as articulated in standard 5.G.A.1. • For 5.G.A.1 only, tasks may involve only the plotting of points. • Coordinates must be whole numbers only. Choose **three** statements that correctly describe the coordinate system. ☐ A. The *x*- and *y*-axes intersect at 10. ☐ B. The *x*- and *y*-axes intersect at the origin. ☐ C. The *x*- and *y*-axes are parallel number lines. ☐ D. The *x*- and *y*-axes are perpendicular number lines. ☐ E. The *x*- and *y*-coordinates are used to locate points in the coordinate plane.	
Lesson 4-11 Addition and Subtraction of Decimals with Hundredths Grids, Lesson 4-12 Decimal Addition Algorithms, Lesson 4-13 Decimal Subtraction Algorithms, Lesson 4-14 Addition and Subtraction of Money **5.NBT.A.3. Read, write, and compare decimals to thousandths.** **a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., 347.392 = 3 × 100 + 4 × 10 + 7 × 1 + 3 × (1/10) + 9 × (1/100) + 2 × (1/1000).** ~~**b. Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.**~~ **5.NBT.A.4. Use place value understanding to round decimals to any place**	

Grade 5 Unit Four Decimal Concepts; Coordinate Grids	
Connections/Notes	**Additional Resources**
5.NBT.B.7. Add, subtract, ~~multiply, and divide~~ decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.	
These four lessons develop a progression of addition and subtraction with decimal numbers. Students use hundredths grids and addition and subtraction algorithms to solve problems. Before students are asked to give exact answers, they should estimate based on their understanding of operations and the value of numbers (Rounding). *The activities in these lessons build readiness for working with decimal addition and subtraction algorithms.* **Common Misconceptions** 1. Students might compute the sum or difference of decimals by lining up the right-hand digits as they would whole number. For example, in computing the sum of 15.34 + 12.9, students will write the problem in this manner: 15.34 + 12.9 16.63 To help students add and subtract decimals correctly, have them first **estimate the sum or difference**. Providing students with a decimal-place value chart will enable them to place the digits in the proper place. **Addition and Subtraction:** Because of the uniformity of the structure of the base-ten system, students use the same place value understanding for adding and subtracting decimals that they used for adding and subtracting whole numbers. Instead of just computing answers, students reason about both the relationship between fraction and decimal operations and the relationship between whole number computation and fractional/decimal computation (MP.2, MP.3). This standard requires students to extend the models and strategies they developed for whole numbers in grades 1-4 to decimal values. Before students are asked to give exact answers, they should estimate answers based on their understanding of operations and the value of the numbers (Rounding **5.NBT.A.4). Some problems should appear as multistep.**	**Teaching Student Centered Mathematics** Computation with Decimals pgs.196-198 Activity 7.11 “Exact Sums and Differences” pg. 198 **Lessons** Add Decimals Using Place Value Strategies Subtracting Decimals Using Place Value Strategies **Activities and Tasks** Base Ten Decimal Bag Addition Base Ten Decimal Bag Subtraction Total Ten Race to 1 or Bust Race to 10 or Bust Magic Squares Decimal Addition Sum with Decimals Sum with Decimals 2 Extending the Great Wall – Math Learning Center (starts on page 7 of this document) **Videos** Search addition/subtraction to solve real world problems with decimals on Learnzillion **Online**

Connections/Notes	Additional Resources
Examples: • 3.6 + 1.7 A student might estimate the sum to be larger than 5 because 3.6 is more than 3 ½ and 1.7 is more than 1 ½. • 5.4 – 0.8 A student might estimate the answer to be a little more than 4.4 because a number less than 1 is being subtracted. Students should be able to express that when they add decimals, they add tenths to tenths and hundredths to hundredths. So, when they are adding in a vertical format (numbers beneath each other), it is important that they write numbers with the same place value beneath each other. This understanding can be reinforced by connecting addition of decimals to their understanding of addition of fractions. Adding fractions with denominators of 10 and 100 is a standard in fourth grade. Example: 4 - 0.3 3 tenths subtracted from 4 wholes. The wholes must be divided into tenths. The answer is 3 and 7/10 or 3.7.  Example: 1.7 – 0.8 = 17 tenths – 8 tenths = 9 tenths = 0.9 **5.NBT.B.7-1 MCAP Evidence Statement:** The language of the standard provides the focus for this evidence statement. **Clarifications:** • Tasks have “thin context” or no context **MCAP Evidence Statement:** This standard includes all four operations with decimals. For the purpose of item development, the evidence statement focuses on adding decimals. **Clarifications for both operations:** • Prompts may include visual models, or prompts may present the addends or subtrahend and minuend as numbers. The answer sought is a number, not a picture. **Adding decimals:** • Each addend is greater than or equal to 0.01 and less than, or equal to 99.99	**Templates and Visuals** Decimal Squares Sets

Grade 5 Unit Four Decimal Concepts; Coordinate Grids	
Connections/Notes	**Additional Resources**
Find the sum of 0.48 and 0.6. You may use the models shown to help find the sum.  A. 0.42 B. 0.54 C. 1.08 D. 1.80	

Grade 5 Unit 5 Operations with Fractions	
Connections/Notes	**Additional Resources**
Lesson 5-1 Using Equivalent Fractions to Find Common Denominators, Lesson 5-2 More Strategies for Finding Common Denominators, Lesson 5-3 Addition of Fractions and Mixed Numbers, and Lesson 5-4 Subtraction of Fractions and Mixed Numbers **5.NF.A.1. Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators.** **5.NF.A.2. Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers.**	
In Unit 3 students informally explored addition and subtraction with fractions. Students should continue to use estimation strategies to assess the reasonableness of their answers. **Lesson 5-1 through 5-4 return to these concepts and aim to help students generalize strategies particularly with unlike denominators. First, students use equivalent fractions using the multiplication rule for equivalent fractions. Next, students will explore more strategic methods for finding common denominators as they work with factors and multiples. Finally, students add and subtract mixed numbers.** ***Everyday Mathematics does not stress finding the least common multiple (LCM.)*** **Students explore strategies and tools for adding and subtracting fractions and mixed numbers. Students will use fraction circle pieces to generate equivalent fractions and add fractions. Students learn a new game to practice breaking apart and adding fractions.** **Students in Grade 4 added and subtracted fractions with like denominators. Fifth grade students should apply their understanding of equivalent fractions developed in fourth grade and their ability to rewrite fractions in an equivalent form to find common denominators. They should know that multiplying the denominators will always give a common denominator but may not result in the smallest denominator. Simplifying answers is not part of this standard, yet conversations should take place when an answer is 6/4 cup of flour, for example.** **Suggested manipulatives to develop this concept: fraction strips, Cuisenaire rods, fraction towers, fraction fringes (AIMS), fraction squares, fraction circles, two color counters, and pattern blocks.** **Visual fraction models include tape diagrams, area models, number line diagrams, set diagrams (See Van de Walle pgs.162-166).**	Addition and Subtraction pgs. 162-166 An Area Model Approach pgs. 155-156 **Activities and Tasks** Tell Me All You Can Addition and Subtraction – Beyond Invert and Multiply pg. 58 and 74 Get to the Whole – Beyond Invert and Multiply pg. 51 Royal Rugs – AIMS Adding Mixed Numbers Jog a Thon – IM Task **Videos** Using Pattern Blocks to Add Fractions Using Pattern Blocks to Subtract Fractions **Templates and Visuals** Fraction Spinners

Grade 5 Unit 5 Operations with Fractions	
Connections/Notes	**Additional Resources**
Examples: • $\frac{2}{5}+\frac{7}{8}=\frac{16}{40}+\frac{35}{40}=\frac{51}{40}$ • $3\frac{1}{4}-\frac{1}{6}=3\frac{3}{12}-\frac{2}{12}=3\frac{1}{12}$ **Some problems should appear as multistep.** **Examples:** **Jerry was making two different types of cookies. One recipe needed 3/4 cup of sugar and the other needed 2/3 cup of sugar. How much sugar did he need to make both recipes?** • **Mental estimation:** **A student may say that Jerry needs more than 1 cup of sugar but less than 2 cups. An explanation may compare both fractions to ½ and state that both are larger than ½ so the total must be more than 1. In addition, both fractions are slightly less than 1 so the sum cannot be more than 2.** **Example:** • **Sonia had 2 $\frac{1}{3}$ candy bars. She promised her brother that she would give him ½ of a candy bar. How much will she have left after she gives her brother the amount she promised?** • **If Mary ran 3 miles every week for 4 weeks, she would reach her goal for the month. The first day of the first week she ran 1 ¾ miles. How many miles does she still need to run the first week?** • **Using addition to find the answer: 1 ¾ + n = 3** • **A student might add 1 ¼ to 1 ¾ to get to 3 miles. Then he or she would add 1/6 more. Thus 1 ¼ miles + 1/6 of a mile is what Mary needs to run during that week.**	

Grade 5 Unit 5 Operations with Fractions	
Connections/Notes	**Additional Resources**

5.NF.A.1 MCAP Evidence Statement: This standard includes two operations, addition and subtraction and two types of numbers, fraction and mixed numbers with unlike dominators. For the purpose of item development, this evidence statement focuses on adding fractions with unlike denominators 5.NF.A.1-1 will focus on adding fractions with unlike denominators

Clarifications:

- Tasks have no context
- Tasks ask for the answer or ask for an intermediate step that shows evidence of using equivalent fractions as a strategy.
- Note: Tasks do not include mixed numbers. (See 5.NF.A.1-3 and 5.NF.A.1-4)
- Tasks may involve fractions greater than one (including fractions equal to whole numbers).
- Prompts do not provide visual fraction models; students may draw fraction models as a strategy.

MCAP Evidence Statement: 5.NF.A.1-2 will focus on subtracting fractions with unlike denominators

Assessment Sample Questions for 5.NF.A.2:

Leah incorrectly added the fractions $\frac{2}{3}$, $\frac{1}{2}$, and $\frac{5}{12}$. She said that to add fractions with different denominators, you use the common denominator and add the numerators. Leah's work is shown.

$$\frac{2}{3}+\frac{1}{2}+\frac{5}{12}$$

$$\frac{2+1+5}{12}$$

$$\frac{8}{12}$$

- What is Leah's mistake?
- Find the correct value of $\frac{2}{3}+\frac{1}{2}+\frac{5}{12}$.
- Show your work or explain your answer.

Connections/Notes	Additional Resources

For each fraction in the table, select the box to show if it is equivalent to $\frac{4}{9}$, $\frac{2}{6}$, or neither.

	$\frac{4}{12}$	$\frac{7}{12}$	$\frac{6}{18}$	$\frac{8}{18}$	$\frac{10}{18}$
$\frac{4}{9}$	○	○	○	○	○
$\frac{2}{6}$	○	○	○	○	○
Neither	○	○	○	○	○

A student found the value of the expression $10\frac{1}{4} - 6\frac{7}{8}$.

The student subtracted the whole numbers first and then subtracted the lesser fraction from the greater fraction to find the answer.

Which steps correct the error in the student's thinking?

A Step 1: subtract $\frac{2}{8}$ from $\frac{7}{8}$
Step 2: subtract 6 from 10

B Step 1: subtract $\frac{7}{8}$ from $\frac{10}{8}$
Step 2: subtract 6 from 10

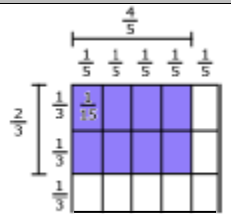
C Step 1: regroup the whole number
Step 2: subtract $\frac{2}{8}$ from $\frac{7}{8}$
Step 3: subtract 6 from 9

D Step 1: regroup the whole number
Step 2: subtract $\frac{7}{8}$ from $\frac{10}{8}$
Step 3: subtract 6 from 9

Grade 5 Unit 5 Operations with Fractions	
Connections/Notes	**Additional Resources**
Lesson 5-5 Connecting Fraction-Of Problems to Multiplication **Lesson 5-6 Multiplication of Fractions and Whole Numbers** **Lesson 5-7 Fractions of Fractions** **Lesson 5-8 Area Models for Fractions** **Lesson 5-9 Understanding an Algorithm for Fraction Multiplication** **5.NF.B.3. Interpret a fraction as division of the numerator by the denominator (*a*/*b* = *a* ÷ *b*). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem.** **5.NF.B.4. Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.** **a. Interpret the product (*a*/*b*) × *q* as *a* parts of a partition of *q* into *b* equal parts; equivalently, as the result of a sequence of operations *a* × *q* ÷ *b*.** **b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles and represent fraction products as rectangular areas.** **5.NF.B.5. Interpret multiplication as scaling (resizing), by:** **a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.** **b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence *a*/*b* = (*n*×*a*)/(*n*×*b*) to the effect of multiplying *a*/*b* by 1.** **5.NF.B.6. Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.**	
In Unit 3 students developed strategies to find unit fractions of whole numbers. In lessons 5-5 and 5-6, they extend these strategies to non-unit fractions of whole numbers. For example, to find 3/5 of 15 students think, 1/5 of 15 is 3. Three-fifths is 3 times as much as 1/5 of 15, or 9. Students generalize a second strategy for multiplying fractions by whole numbers. For example, to solve 12 x 2/3, evaluate (12 x 2) ÷ 3 to get 8. *Everyday Mathematics refers to the Commutative Property as the "turn-around rule for multiplication." Continue to utilize the correct vocabulary throughout the lessons.* In lessons 5-7 through 5-9 students develop a fraction multiplication algorithm. Students apply and extend their understanding of finding fractions of whole numbers to find fractions of fractions. Students	***Teaching Student Centered Mathematics*** Multiplication pgs. 167-172 **Lessons** Measure to Find the Area of Rectangles with Fractional Side Lengths

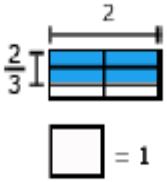
Grade 5 Unit 5 Operations with Fractions	
Connections/Notes	**Additional Resources**
will use area models to find fraction products. These area models will help students understand and apply an algorithm for fraction multiplication. Building the connection with multiplication of fractions with visual and concrete models from Unit 3 to an algorithm is fundamental to this unit in order for students to make sense of multiplying fractions by fractions (**MP.1**, **MP.4**). Students are expected to multiply fractions including proper fractions, improper fractions, and mixed numbers. **(Mixed numbers will be addressed in Unit 7.)** They multiply fractions efficiently and accurately as well as solve problems in both contextual and non-contextual situations. As they multiply fractions such as 3/5 x 6, they can think of the operation in more than one way. • 3 x (6 ÷ 5) or (3 x 6/5) • (3 x 6) ÷ 5 or 18 ÷ 5 (18/5) **Suggested manipulatives/visual models to develop this concept: area model templates (adapted from AIMS), pattern blocks, paper for folding, Cuisenaire rods, fraction squares, graph paper** Students create a story problem for 3/5 x 6 such as, • Isabel had 6 feet of wrapping paper. She used 3/5 of the paper to wrap some presents. How much does she have left? • Every day Tim ran 3/5 of mile. How far did he run after 6 days? (Interpreting this as 6 x 3/5) Examples: Building on previous understandings of multiplication • Rectangle with dimensions of 2 and 3 showing that 2 x 3 = 6.	**Activities and Tasks** Connor and Mikayla Discuss Multiplication – IM Task How Much Dew? 3 Act Task Using Area Models to Multiply Fractions Multiplication Patterns – Beyond Invert and Multiply pg. 96 Paper Folding – Beyond Invert and Multiply pg. 108 **Videos** Cuisenaire Rods to Model Multiplication of Whole Numbers by Fractions, Fractions by Fractions, and Mixed Numbers by Fractions Multiplication Patterns – Beyond Invert and Multiply pg. 96 Paper Folding – Beyond Invert and Multiply pg. 108 **Templates and Visuals** Area Model Template

Grade 5 Unit 5 Operations with Fractions	
Connections/Notes	**Additional Resources**



The area model and line segments show the area is the same quantity as the product of the side lengths.

Rectangle with dimensions of 2 and $\frac{2}{3}$ showing that 2 x $\frac{2}{3} = \frac{4}{3}$



5.NF.B.3 MCAP Evidence Statement: The language of the standard should guide the creation of assessment tasks, including the ideas in the given examples.

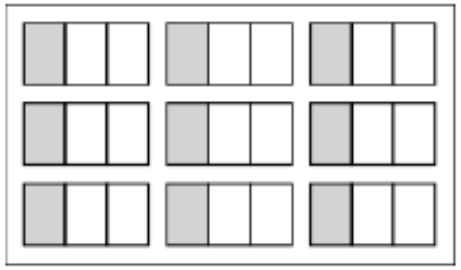
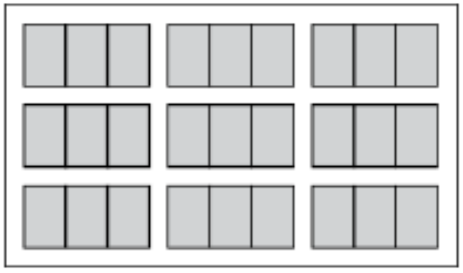
Clarifications:

- The tasks should have context that includes the understanding of a fraction as division of the numerator by the denominator.
- Fraction models or equations can be used to represent the problem. (linear fraction models such as bar models/tape diagrams and number lines or area models will be used in tasks.)
- Note the example given in the standard.

5.NF.B.4 MCAP Evidence Statement: The language of the standard should guide the creation of assessment tasks, including the ideas in the given examples.

Clarifications:

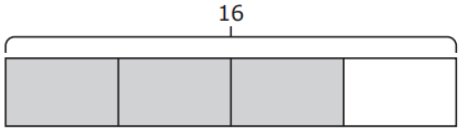
- Tasks have context in the prompt or solution.
- Tasks may use models to represent a situation in which students need to multiply a whole number by a fraction or a fraction by a fraction
- For assessment purposes—linear fraction models such as bar models/tape diagrams and number lines, or area models may be used in tasks. Circle models will not be accepted.

Grade 5 Unit 5 Operations with Fractions	
Connections/Notes	**Additional Resources**
5.NF.B.4 Assessment Sample Question: This model is shaded to show one whole.  Which set is shaded to represent the solution to $\frac{1}{3} \times 9$? A.  B.  C.  D. 	

Connections/Notes	Additional Resources

5.NF.B.6 Assessment Sample Questions

The given model can be used to show the solution to a word problem. The shaded counters in the model represent the solution to the word problem.



Which word problem can be modeled by the given model?

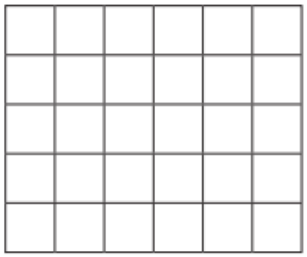
A Mike had 12 pennies. He gave Jada $\frac{3}{4}$ of the pennies he had. How many pennies did Mike give Jada?

B Each of 16 students in a class drank $\frac{4}{3}$ cup of water. How many cups of water did the students drink in all?

C A group of 16 students went to lunch. Of these students, $\frac{3}{4}$ of them bought milk. How many students bought milk?

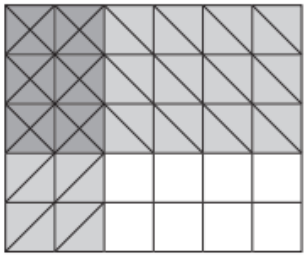
D Mike read 12 pages of a book. Jada read $\frac{4}{3}$ times the number of pages Mike read. How many pages did Jada read?

An artist is using a squared wooden panel to create a piece of art. The panel is divided in smaller squares as shown.



The artist paints $\frac{3}{5}$ of the squares in red, then draws golden circles on $\frac{1}{3}$ of the painted squares to decorate it.

The artist draws the model shown to represent the fraction of the whole wooden panel that is both painted and decorated.



Which statement is true about the model the artist drew?

A The model is correct because it represents the equation $\frac{3}{5} + \frac{2}{6} = \frac{6}{30}$.

B The model is correct because it represents the equation $\frac{3}{5} \times \frac{1}{3} = \frac{1}{5}$ and $\frac{1}{5}$ of 30 is 6.

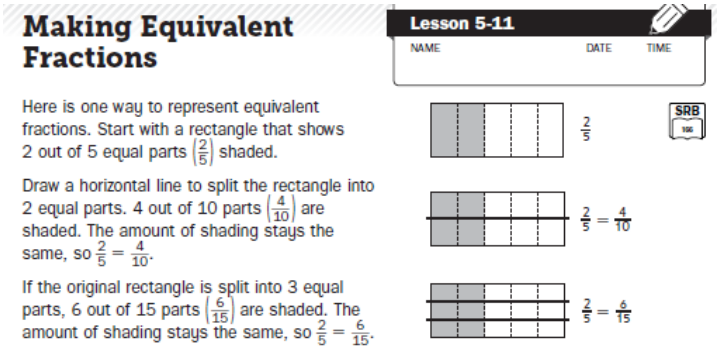
C The model is incorrect because 2 of the 6 columns are shaded and there should be 3 columns with 1 column shaded.

D The model is incorrect because $\frac{3}{5} \times \frac{1}{3} = \frac{1}{5}$ and $\frac{1}{5}$ of the model can only be represented by shading 1 row of squares.

Grade 5 Unit 5 Operations with Fractions	
Connections/Notes	**Additional Resources**
Lesson 5-10 Sharing Breakfast (Open Response and Reengagement 2-Day Lesson) **5.NF.B.4. Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.** **a. Interpret the product (a/b) × q as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$.** **b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.** **5.NF.B.6. Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.**	
Day 1: Students use a picture to solve a problem. Day 2: Students discuss each other's models and solutions. The focus of this lesson is to use mathematical models to solve problems and answer questions. **(MP4)**	
Lesson 5-11 Explaining the Equivalent Fraction Rule and Lesson 5-12 Fraction Multiplication Number Stories **5.NF.B.3. Interpret a fraction as division of the numerator by the denominator ($a/b = a \div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem.** **5.NF.B.4. Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.** **a. Interpret the product (a/b) × q as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$.** **b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.** **5.NF.B.5. Interpret multiplication as scaling (resizing), by:** **a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.** **b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $a/b = (n \times a)/(n \times b)$ to the effect of multiplying a/b by 1.** **5.NF.B.6. Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.**	
Students relate the multiplication rule for equivalent fractions to the effect of multiplying by 1. Students apply their understanding of fraction multiplication to real-world contexts. This lesson builds on students' work with fraction multiplication to illustrate why the multiplication rule for equivalent fractions works. For students to grasp the mathematics behind this rule, they must understand: • Any number multiplied by 1 equals itself.	**Lessons** Area Word Problems with Fractional Side Lengths

Connections/Notes	Additional Resources

- Fractions with the same numerator and denominator are equal to 1.
- Multiplying the numerator and denominator by the same number has the same effect as multiplying by a fraction equal to 1.



Making Equivalent Fractions

Lesson 5-11

NAME DATE TIME

SRB

Here is one way to represent equivalent fractions. Start with a rectangle that shows 2 out of 5 equal parts $\left(\frac{2}{5}\right)$ shaded.

$\frac{2}{5}$

Draw a horizontal line to split the rectangle into 2 equal parts. 4 out of 10 parts $\left(\frac{4}{10}\right)$ are shaded. The amount of shading stays the same, so $\frac{2}{5} = \frac{4}{10}$.

$\frac{2}{5} = \frac{4}{10}$

If the original rectangle is split into 3 equal parts, 6 out of 15 parts $\left(\frac{6}{15}\right)$ are shaded. The amount of shading stays the same, so $\frac{2}{5} = \frac{6}{15}$.

$\frac{2}{5} = \frac{6}{15}$

Addison wanted to find a fraction equivalent to $\frac{3}{8}$ with 16 in the denominator. He thought: "$8 * 2 = 16$, so I need to multiply $\frac{3}{8}$ by 2." He got an answer of $\frac{3}{16}$.

a. Is $\frac{3}{16}$ equivalent to $\frac{3}{8}$? How do you know?

5.NF.B.6 MCAP Evidence Statements: The language of the standard should guide the creation of assessment tasks, including the ideas in the given examples.

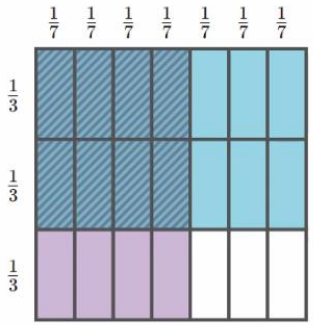
Clarifications:

- Tasks include word problems multiplying a fraction times a fraction, a fraction times a mixed number, and a mixed number times a mixed number
- When tasks involve multiplying two mixed numbers, the denominator of the product is less than or equal to 24.
- Tasks include area and comparison/times as much, with product unknown.
- Content tasks should provide a visual fraction model. If a model is used, numbers should be reasonable, so they do not impede finding the solution.
- Reasoning tasks should not include a model but should be open enough so that students can draw visual fraction models that align to the task using the draw tool. Numbers should be reasonable so as not to impede finding the solution

Connections/Notes	Additional Resources

5.NF.B.6 Sample Assessment Questions:

The area of the entire figure below is 1 square unit.



What is the area of the striped rectangle?

_____ of a square unit

Claire walked $2\frac{2}{5}$ miles. Jason walked $\frac{2}{3}$ as far as Claire. How many miles did Jason walk?

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

_____ miles

A contractor measured the length and the width of two rectangular pieces of land.

- The two pieces of land are adjacent and share the same width of 17 yards.
- The first piece of land has a length of $32\frac{1}{3}$ yards.
- The second piece of land has a length of $25\frac{1}{4}$ yards.

Which steps should the contractor use to determine the area, in square yards, of the two pieces of land altogether?

A Add $32\frac{1}{3}$ and $25\frac{1}{4}$ and then add the result by 17.

B Multiply $32\frac{1}{3}$ and $25\frac{1}{4}$ and then add the result by 17.

C Add $32\frac{1}{3}$ and $25\frac{1}{4}$ and then multiply the result by 17.

D Multiply $32\frac{1}{3}$ and $25\frac{1}{4}$ and then multiply the result by 17.

Grade 5 Unit 5 Operations with Fractions	
Connections/Notes	**Additional Resources**

Lesson 5-13 Fraction Division, Part 1 and Lesson 5-14 Fraction Division, Part 2

5.NF.B.3. Interpret a fraction as division of the numerator by the denominator (*a*/*b* = *a* ÷ *b*). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem.

5.NF.B.7. Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.

a. Interpret division of a unit fraction by a non-zero whole number and compute such quotients.

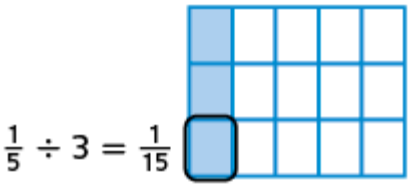
b. Interpret division of a whole number by a unit fraction and compute such quotients.

c. Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem.

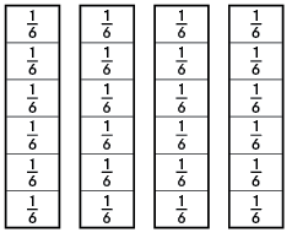
Students build conceptual understanding of fraction division. Fraction division problems in Grade 5 are limited to division of unit fractions by whole numbers and whole numbers by unit fractions. Students rely on visual models and informal reasoning to solve problems. Fair-sharing and equal-sharing division are explored in these lessons. Be sure to use consistent language like, "How many 1/4s are in 2? There are 8(1/4s) in 2."

Another strategy, using common denominators, will be addressed in Unit 7.

Students are not expected to use a generalized method of fraction division. Students will be introduced to an algorithm for fraction division in Grade 6.



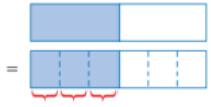
Fair-sharing division



4 ÷ 1/6 = 24

Equal-sharing division

Example: 1/2 ÷ 3 A jug of water is 1/2 full. If 3 children equally share the water, what fraction of the full jug does each child get?



To solve this problem I drew a rectangle and shaded 1/2. I drew a congruent rectangle and divided each half into 3 equal pieces. I shaded 3/6 of this rectangle to represent the 3 children. Each child will get one shaded piece or 1/6 of the full jug of water. 1/2 ÷ 3 = 1/6
I checked my work using the inverse operation: 1/6 x 3 = 3/6 = 1/2

Lessons

Divide a Unit Fraction by a Whole Number Lesson

Divide a Whole Number by a Unit Fraction

Activities and Tasks

Divide a Whole Number by Unit Fractions with Cuisenaire Rods

How Long? How Far? – Beyond Invert and Multiply pg.127

Connections/Notes	Additional Resources

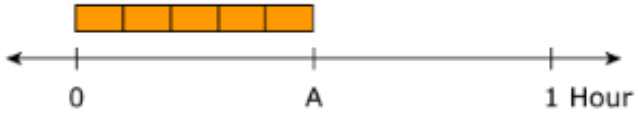
5.NF.B.7 MCAP Evidence Statements: This evidence statement focuses on the first part of the standard. Since this is the first exposure of dividing fractions, students should apply and extend concepts of whole number division to dividing a unit fraction by a non-zero whole number.

Clarifications:

- Tasks should have a variety of including a thin or no context
- Tasks should include computation of the quotient.
- Tasks could include the use of appropriate fraction models (linear fraction models such as bar models/tape diagrams and number lines or area models may be used in tasks.)
- An explanation of work is not required. Tasks could include matching a representation to a scenario.
- Explanation of work is not included.

5.NF.B.7. Assessment Sample Questions:

Cora has $\frac{1}{2}$ hour to do 5 chores. She plans to spend the same fraction of an hour on each chore. She wants to use the number line to help her determine what fraction of an hour she can spend on each chore.



- What is the correct number label for point A?
- Explain how to use this number line to help Cora solve her problem.
- What fraction of an hour will she spend on each chore?

Enter your answers and your explanation in the space provided.

Enter your answer in the box.

$6 \div \frac{1}{7} =$ ☐

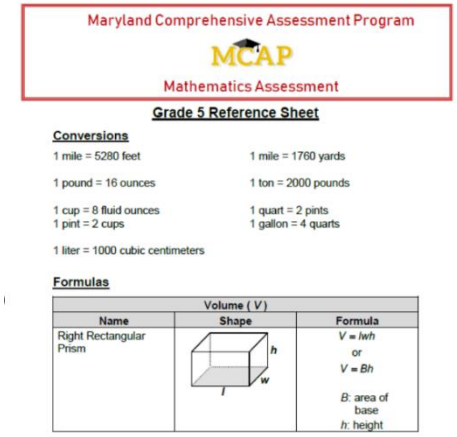
Connections/Notes	Additional Resources
Which **two** equations are correct? Select the **two** correct answers. **A** $\frac{1}{5} \div 4 = \frac{4}{5}$ **B** $\frac{1}{6} \div 2 = \frac{1}{3}$ **C** $\frac{1}{8} \div 3 = \frac{1}{24}$ **D** $\frac{1}{10} \div 4 = \frac{5}{2}$ **E** $\frac{1}{16} \div 2 = \frac{1}{32}$ Kasey will make as many servings of trail mix as possible with these ingredients: walnuts, pretzels, and apricots. • Each serving will have $\frac{1}{6}$ cup of walnuts, $\frac{1}{4}$ cup of pretzels, and $\frac{1}{8}$ cup of apricots. • Kasey has 10 cups of walnuts, 12 cups of pretzels, and 9 cups of apricots with which to make the trail mix. • Determine how many servings Kasey will make. • Determine which ingredient Kasey will completely use, **and** determine how much of the other ingredients she will have left over. • Show your work or explain how you determined your answers. Enter your answers and your work or explanation in the space provided.	

Grade 5 Unit 5 Operations with Fractions	
Connections/Notes	**Additional Resources**
A package contains $\frac{1}{3}$ pound of deli meat. The meat will be divided evenly among 4 sandwiches. How much deli meat, in pounds, will be in each sandwich? **A** $\frac{1}{12}$ **B** $\frac{3}{4}$ **C** $\frac{4}{3}$ **D** $\frac{12}{1}$	

Grade 5 Unit Six Investigations in Measurement; Decimal Multiplication and Division	
Connections/Notes	**Additional Resources**
Lesson 6-1 Multiplying and Dividing Decimals by Powers of 10, Lesson 6-2 Playing Exponent Ball, and Lesson 6-3 Application: Converting Measurements in the Metric System **5.OA.A.2. Write simple expressions that record calculations with numbers and interpret numerical expressions without evaluating them.** **5.NBT.A.1. Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.** **5.NBT.A.2. Explain patterns in the number of zeros of the product when multiplying a number by powers of 10 and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.** **5.NBT.A.3. Read, write, and compare decimals to thousandths.** **a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., 347.392 = 3 × 100 + 4 × 10 + 7 × 1 + 3 × (1/10) + 9 × (1/100) + 2 × (1/1000).** **b. Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.** **5.MD.A.1. Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.**	

Grade 5 Unit Six
Investigations in Measurement; Decimal Multiplication and Division

Use the **MCAP Grade 5 Reference Sheet (located in the grade level shared drive, in the MCAP folder)** during instruction as it applies to the content. 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 5 Reference Sheet

Conversions

1 mile = 5280 feet	1 mile = 1760 yards
1 pound = 16 ounces	1 ton = 2000 pounds
1 cup = 8 fluid ounces 1 pint = 2 cups	1 quart = 2 pints 1 gallon = 4 quarts
1 liter = 1000 cubic centimeters	

Formulas

Volume (*V*)		
Name	**Shape**	**Formula**
Right Rectangular Prism		$V = lwh$ or $V = Bh$ *B*: area of base *h*: height

Students begin Unit 6 by exploring patterns in the placement of the decimal point in products or quotients when decimals are multiplied or divided by powers of 10. Students apply the rules they discover in Lesson 6-1 to evaluate expressions while playing Exponent Ball in Lesson 6-2 and to convert metric units in Lesson 6-3.

In fourth grade, students examined the relationships of the digits in numbers for whole numbers. This standard extends this understanding to the relationship of decimal fractions to thousandths. In grade 4, students 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.A.1). Students use base ten blocks, pictures of base ten blocks, and interactive images of base ten blocks to manipulate and investigate the place value relationships.

They use their understanding of unit fractions to compare decimal places and fractional language to describe those comparisons. Before considering the relationship of decimal fractions, students express their understanding that in multi-digit whole numbers, a digit in one place represents 10 times what it represents in the place to its right and 1/10 of what it represents in the place to its left.

A student thinks —I know that in the number 5555, the 5 in the tens place (5555) represents 50 and the 5 in the hundreds place (5555) represents 500. So a 5 in the hundreds place is ten times as much as a 5 in the tens place or a 5 in the tens place is 1/10 of the value of a 5 in the hundreds place.

Teaching Student Centered Mathematics

A Two-Way Relationship pg. 184

Lessons

Use Exponents to Name Place Value Units
Changing Places - AIMS
Meaning of Place Value – MSDE Lesson Seed

Activities and Tasks

Patterns R Us – Georgia Unit
Marta's Multiplication Error mult decimals by powers of ten -IM Task

Videos

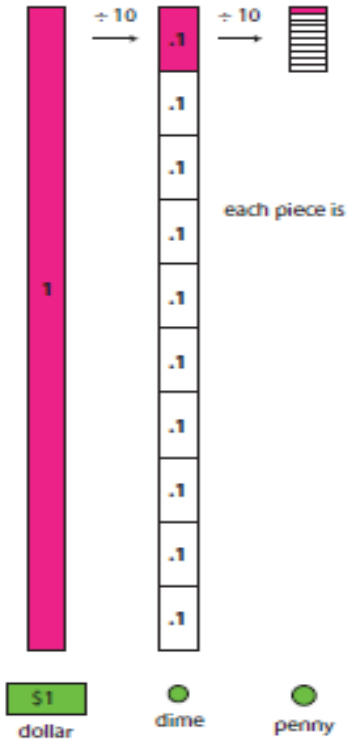
Search Learnzillion for: Multiply and divide with multiples of ten

Templates and Visuals

Decimal of the Day
Place Value Template

To extend this understanding of place value to their work with decimals, students
use a model of one unit; they cut it into 10 equal pieces, shade in, or describe
1/10 of that model using fractional language. (This is 1 out of 10 equal parts, so
it is 1/10. I can write this using 1/10 or 0.1). They repeat the process by finding
1/10 of a 1/10 (e.g., dividing 1/10 into 10 equal parts to arrive at 1/100 or 0.01)
and can explain their reasoning, 0.01 is 1/10 of 1/10 thus is 1/100 of the whole
unit.

Examples:
1(10,000) + 2(1,000) + 4(100) + 3(10) + 2(1) + 5(1/10) + 3(1/100).
What number is one-tenth of the expanded form above?



5.NBT.A.2 MCAP Evidence Statement: The language of the standard should guide the creation of assessment tasks, including the ideas in the given examples.

Clarifications:

- Tasks should focus on the explanation or application of patterns rather than moving the decimal or adding zeros.

Grade 5 Unit Six
Investigations in Measurement; Decimal Multiplication and Division

5.NBT.A.2 Sample Assessment Question

What exponent will make this equation true?

Enter your answer in the box.

$10^{?} = 1,000$

5.NBT.A.1. Sample Assessment Question

Which statement is true?

A. The value of 7 in 0.75 is $\frac{1}{10}$ the value of 7 in 0.075.

B. The value of 7 in 7.5 is $\frac{1}{100}$ the value of 7 in 0.75.

C. The value of 7 in 75 is 10 times the value of 7 in 7.5.

D. The value of 7 in 750 is 100 times the value of 7 in 75.

Lesson 6-4 Line Plots and Lesson 6-5 Working with Data in Line Plots

5.NF.A.1. Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators.

5.NF.A.2. Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers.

5.NBT.B.6. Find whole-number quotients of whole numbers with up to four-digit dividends and two-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.

5.MD.A.1. Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.

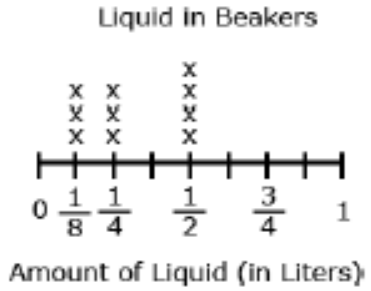
5.MD.B.2. Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots.

Grade 5 Unit Six
Investigations in Measurement; Decimal Multiplication and Division

Students create line plots to display measurement data in fractions of a unit. They use operations with fractions to solve problems based on the information in the line plots. Students use information presented in line plots to solve problems, including problems about redistributing measurement data.

This standard is included here so measurement line plots can be used as a context for students to apply fraction computation strategies from Units 3 and 5. Students use line plots and other tools/technology to reason about problem situations. Students attend to the underlying meaning of the quantities and operations when solving problems rather than just how to compute answers. Students should work with data in science and other subjects.
Work with displaying data in wholes, halves, and quarters began in Grade 3. Students in Grade 4 solved problems involving addition and subtraction of fractions by using information presented in line plots in fractions of a unit (1/2, ¼ and 1/8). The standard in this cluster provides an opportunity for solving real-world problems with all operations on fractions, connecting directly to both number and operations.

Examples:
Ten beakers, measured in liters, are filled with a liquid.



The line plot above shows the amount of liquid in liters in 10 beakers. If the liquid is redistributed equally, how much liquid would each beaker have? (This amount is the mean. Work in Grade 6 continues with line plots to calculate mean, median, mode and range.)
Students apply their understanding of operations with fractions. They use either addition and/or multiplication to determine the total number of liters in the beakers. Then the sum of the liters is shared evenly among the ten beakers.

Lessons
Measure Pencil Lengths and Construct Line Plots

Activities and Tasks
Fractions on a Line Plot – IM Task
Sacks of Flour
Dog Treats Line Plot Activity

Videos
Search Learnzillion-- Solve-multistep-problems-using-information-in-a-line-plot

Templates and Visuals
Line Plot Template

5.MD.B.2 MCAP Evidence Statement: The language of the standard should guide the creation of assessment tasks, including the ideas in the given examples.

Clarifications:

- Tasks include context
- Use the measurement units found in the MCAP Reference Sheet Table
- Operations need to align to the grade 5 expectations for computations of fractions with unlike denominators.
- Data should be represented with "x's"

5.MD.B.2 Sample Assessment Questions:

Elijah ate trail mix nine different times. Each X on the line plot represents an amount that he ate.

How much total trail mix, in cups, did Elijah eat?

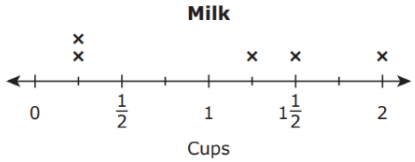
A. $\frac{9}{2}$

B. $\frac{15}{2}$

C. $\frac{9}{4}$

D. $\frac{15}{4}$

The amount of milk needed for each of 5 recipes is shown on the line plot.



What is the total amount of milk needed for the recipes?

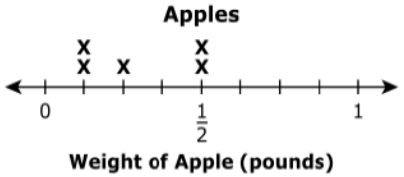
A 4

B 5

C $5\frac{1}{4}$

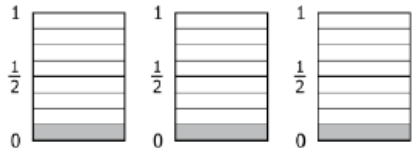
D $5\frac{1}{2}$

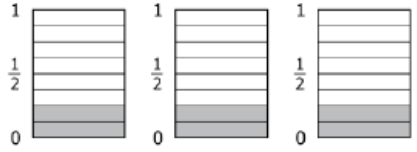
The line plot shows the weights, in pounds, of five apples.

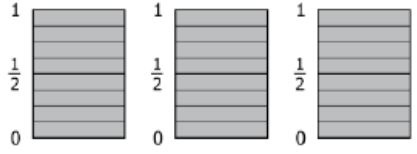


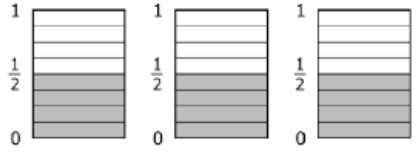
All five of these apples will be cut into pieces and placed in equal amounts, in pounds, into three containers for making applesauce. Each container holds 1 pound when full.

Select the diagram that shows the weight, in pounds, of apple pieces that should be placed in each container so that all three containers have the same weight.

A. 

B. 

C. 

D. 

Grade 5 Unit Six
Investigations in Measurement; Decimal Multiplication and Division

Lesson 6-6 Applying Volume Concepts and ~~Lesson 6-7 Measuring Volume by Displacement~~

5.MD.C.3. Recognize volume as an attribute of solid figures and understand concepts of volume measurement.

a. A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume.

b. A solid figure which can be packed without gaps or overlaps using *n* unit cubes is said to have a volume of *n* cubic units.

5.MD.C.4. Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.

5.MD.C.5. Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.

a. Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication.

b. Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole number edge lengths in the context of solving real world and mathematical problems.

c. Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.

Students apply their knowledge of volume concepts to calculate the volume of a building.

5.MD.5.c MCAP Evidence Statement: The language of the standard provides the focus for this evidence statement/
Clarifications:

- Tasks may or may not have context
- Tasks may require students to measure to find edge lengths to the nearest cm, mm, or in.
- Tasks require students to apply their knowledge of finding the volume of a right rectangular prism with two non-overlapping prisms. (This standard is an extension of finding the area of rectilinear figures in grade 3). In grade 5, involves finding the volume of three-dimensional figures.
- The right rectangular prisms are NOT filled. This standard calls for students to apply their knowledge of packing the right rectangular prisms with unit cubes to finding the formula volume and adding the two volumes to find the total volume of the two figures.

Lessons

Solve Word Problems Involving Volume

Apply Volume Concepts To Design a Sculpture

Activities and Tasks

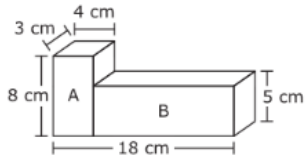
Joe's Buildings

3 Act Task – Fish Tank

Grade 5 Unit Six
Investigations in Measurement; Decimal Multiplication and Division

5.MD.5.c Sample Assessment Question:

Shari is building a toy. She has to attach right rectangular prism A to right rectangular prism B. A model of the toy is shown.



Part A

Create an equation to find the total volume of the toy. Numbers may be used more than once.

Drag and drop the correct number into each box.

5 8 3 4 14 18

$3 \times \square \times \square + 3 \times \square \times \square$

Part B

What is the total volume of the toy?

Enter your answer in the box.

☐ cubic centimeters

Lesson 6-8 Estimating Decimal Products and Quotients and 6-9 Multiplication of Decimals

5.OA.A.2. Write simple expressions that record calculations with numbers and interpret numerical expressions without evaluating them.

5.NBTA.2. Explain patterns in the number of zeros of the product when multiplying a number by powers of 10 and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.

5.NBT.B.5. Fluently multiply multi-digit whole numbers using the standard algorithm.

5.NBT.B.7. Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

Students continue their work from multiplying whole numbers from Unit 2 and decimal operations from Unit 4 to multiply decimal numbers. Students use estimation and number sense to predict the relative size of decimal products and quotients. Students will then learn two strategies for solving decimal multiplication problems. General methods used for computing products of whole numbers extend to products of decimals	***Teaching Student Centered Mathematics*** Computation with Decimals pgs. 198-201 Activity 7.12 "Where Does the Decimal Go? pg. 199 (Supplements Strategy 1)

Grade 5 Unit Six
Investigations in Measurement; Decimal Multiplication and Division

The **first strategy** has students multiply decimals as if they were whole numbers and use estimates to place the decimal points in products.

The **second strategy** has students multiply factors by powers of 10 to make whole numbers, then divide the product by powers of 10 to "undo" the multiplication.

In subsequent lessons students will use the estimation strategies practiced in these lessons to solve decimal multiplication and division problems. Students will learn to solve decimal problems by temporarily disregarding the decimal point. Students need a firm grasp of estimation to successfully multiply and divide decimals.

Strategy 1: Using an estimate

$12.6 * 2.75 = ?$

Estimate: $12 * 3 = 36$
Multiply, ignoring the decimal points: $126 * 275 = 34{,}650$

Place the decimal point: Since the estimate was about 36, the decimal point should go after the 4: $12.6 * 2.75 = 34.65$.

Strategy 2: Using powers of 10 to shift the decimal point

$12.6 * 2.75 = ?$
Multiply by powers of 10 to make whole numbers: $12.6 * 10^1 = 126$; $2.75 * 10^2 = 275$.

Multiply: $126 * 275 = 34{,}650$

Divide by powers of 10 to "undo" the initial change:
$34{,}650 \div 10^1 = 3{,}465$;
$3{,}465 \div 10^2 = 34.65$, so
$12.6 * 2.75 = 34.65$.

Following these lessons you may include additional strategies such as the area model with partial products and multiplying decimals by using fractions.

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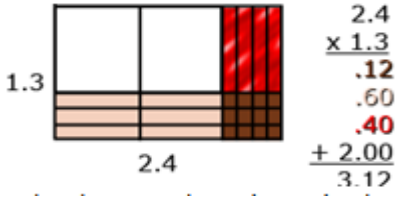
Because the expectations for decimals are limited to thousandths and expectations for factors are limited to hundredths at this grade level, students will multiply tenths with tenths and tenths with hundredths, but they need not multiply hundredths with hundredths. Before students are asked to give exact answers, they should estimate answers based on their understanding of operations and the value of the numbers. Some problems should appear as multistep.

Example: An area model can be useful for illustrating products.



Lessons

Multiplying Decimals to Hundredths – MSDE Lesson Seed
Relate Decimal and Fraction Multiplication

Activities and Tasks

Multiplication of Decimals with an Area Model

Videos

Search Learnzillion--Base ten blocks to multiply 1.3 x 2.2 AND
Multiply-decimals-to-the-hundredths-by-using-fractions

Templates and Visuals

Multiplying Decimals Poster
Modeling Decimal Multiplication
Decimal Squares Tenths for Multiplication

Students should be able to describe the partial products displayed by the area model. For example,

"3/10 times 4/10 is 12/100.
3/10 times 2 is 6/10 or 60/100.
1 group of 4/10 is 4/10 or 40/100.
1 group of 2 is 2."

Example: 6 x 2.4
A student might estimate an answer between 12 and 18 since 6 x 2 is 12 and 6 x 3 is 18.

To divide to find the number of groups, a student might:

- Draw a segment to represent 1.6 meters. In doing so, s/he would count in tenths to identify the 6 tenths and be able to identify the number of 2 tenths within 6 tenths. The student can then extend the idea of counting by tenths to divide the one meter into tenths and determine that there are 5 more groups of 2 tenths.
- Use their understanding of multiplication and think, "8 groups of 2 is 16, so 8 groups of 2/10 is 16/10 or 1 6/10."

5.NBT.B.7 MCAP Evidence Statement: This standard includes all four operations with decimals. For the purpose of item development, the evidence statement focuses on multiplying decimals.
Clarifications:

- Prompts may include visual models, but prompts must also present the factors or the dividend and divisor as numbers, and the answer sought is a number, not a picture.
- Each factor is greater than or equal to 0.01 and less than or equal to 99.99.
- The product must not have any non-zero digits beyond the thousandths place. (For example, 1.67 x 0.34 = 0.5678 is excluded because the product has an 8 beyond the thousandths place; cf.5.NBT.3,.)

  Problems are 2 x 2 digit or 1 by 3 or 4 digits (For example: 7.8 x 5.3 or 0.3 x 18.24).

5.NBT.B.7. Assessment Sample Question:

A teacher assigned a project to 5 students. Each student used 3.75 square feet of paper for the project.

What was the total amount of paper used for the project?

Select one answer.

A 1.25 square feet

B 8.75 square feet

C 16.25 square feet

D 18.75 square feet

Solve.

Enter your answer in the box.

$0.5 \times 1.24 =$

Lesson 6-10 Fundraising (Open Response and Reengagement 2-Day Lesson)
5.NBTA.2. Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.
5.NBT.B.5. Fluently multiply multi-digit whole numbers using the standard algorithm.
5.NBT.B.7. Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

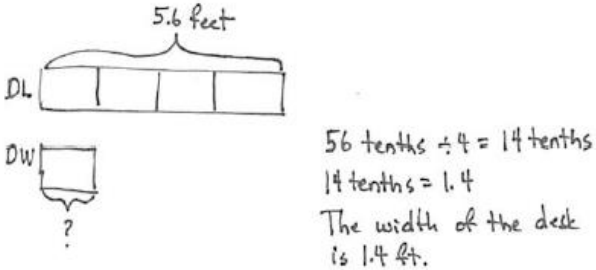
Day 1: Students solve a multistep number story using decimals and explain how they know their answers make sense.
Day 2: Students discuss some strategies and solutions and revise their work.

Lesson 6-11 Division of Decimals by Whole Numbers and Lesson 6-12 Division of Decimals by Decimals
5.NBT.B.6. Find whole-number quotients of whole numbers with up to four-digit dividends and two-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.
5.NBT.B.7. Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

Students discuss how estimation can be used to place the decimal point when dividing decimals by whole numbers. Then students create equivalent problems to help them solve division problems involving decimal dividends and divisors.

Another Strategy:
A gardener installed 42.6 meters of fencing in a week. He installed 13.45 meters on Monday and 9.5 meters on Tuesday. He installed the rest of the fence in equal lengths on Wednesday through Friday. How many meters of fencing did he install on each of the last three days?

Example using a Bar Model:
The top surface of a desk has a length of 5.6 feet. The length is 4 times its width. What is the width of the desk?



~~**Lesson 6-13 Application: Estimating Your Reaction Time**~~

Grade 5 Unit Seven Multiplication of Mixed Numbers; Geometry; Graphs	
Connections/Notes	**Additional Resources**
Lesson 7-1 Multiplication of Mixed Numbers Part 1, Lesson 7-2 Multiplication of Mixed Numbers Part 2, and Lesson 7-3 Rectangles with Fractional Side Lengths **5.OA.A.2. Write simple expressions that record calculations with numbers and interpret numerical expressions without evaluating them.** **5.NF.A.1. Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators.** **5.NF.B.3. Interpret a fraction as division of the numerator by the denominator ($a/b = a \div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem.** **5.NF.B.4. Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.** **a. Interpret the product (a/b) × q as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$.** **b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.** **5.NF.B.5. Interpret multiplication as scaling (resizing), by:** **a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.** **b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $a/b = (n \times a)/(n \times b)$ to the effect of multiplying a/b by 1.** **5.NF.B.6. Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.**	

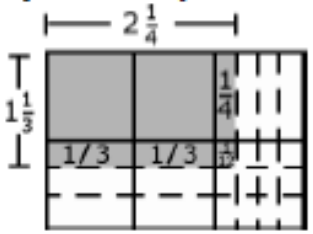
In these three lessons students will first use area models and partial products to multiply mixed numbers. In Part 2 students will multiply mixed numbers by renaming factors as fractions and using a fraction multiplication algorithm. Students will then multiply mixed numbers to find the areas of rectangles with fractional side lengths. They confirm areas by tiling with squares of unit fraction side lengths (Strategy from Unit 1)

In Unit 3, students multiplied fractions using visual fraction models or equations. In Unit 5 students worked with fraction by fraction multiplication.

These lessons extend that work to include mixed numbers.

Examples:

- Mary and Joe determined that the dimensions of their school flag needed to be $1\frac{1}{3}$ ft. by $2\frac{1}{4}$ ft. What will be the area of the school flag?
  - A student can draw an array to find this product and can also use his or her understanding of decomposing numbers to explain the multiplication. Thinking ahead a student may decide to multiply by $1\frac{1}{3}$ instead of $2\frac{1}{4}$.



The explanation may include the following:

- First, I am going to multiply $2\frac{1}{4}$ by 1 and then by $\frac{1}{3}$.
- When I multiply $2\frac{1}{4}$ by 1, it equals $2\frac{1}{4}$.
- Now I have to multiply $2\frac{1}{4}$ by $\frac{1}{3}$.
- $\frac{1}{3}$ times 2 is $\frac{2}{3}$.
- $\frac{1}{3}$ times $\frac{1}{4}$ is $\frac{1}{12}$.
- So the answer is $2\frac{1}{4} + \frac{2}{3} + \frac{1}{12}$ or $2\frac{3}{12} + \frac{8}{12} + \frac{1}{12} = 2\frac{12}{12} = 3$

Teaching Student Centered Mathematics

Factors Greater than One pg.171

Lessons

Area of Rectangles
Real World Problems
Real World Problems 2
Multiply Mixed Number Factors
Relate to the Distributive Property and the Area Model
Multiply mixed numbers by mixed numbers using visual representations

Activities and Tasks

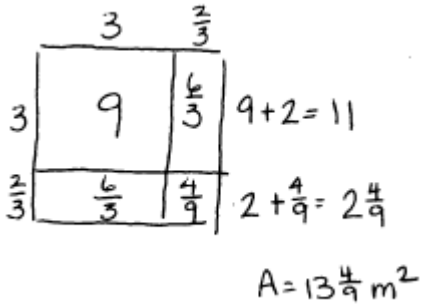
Fractions Multiplied by Mixed Numbers
3 Act Task – The Big Pad

Videos

Area Model to Multiply Mixed Numbers.

Understand how numbers scale using multiplication and visual representations

Multiplication of Mixed Numbers using the area model:
$3\frac{2}{3} \times 3\frac{2}{3} =$



Once understanding has been developed, move students to the algorithm:
$2\frac{1}{4} \times 1\frac{1}{3} = \frac{9}{4} \times \frac{4}{3} = \frac{36}{12} = 3$ sq ft

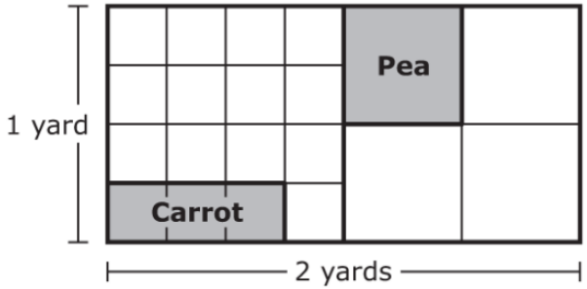
5.NF.B.6 MCAP Evidence Statements: The language of the standard should guide the creation of assessment tasks, including the ideas in the given examples.

Clarifications:

- Tasks include word problems multiplying a fraction times a fraction, a fraction times a mixed number, and a mixed number times a mixed number.
- When tasks involve multiplying two mixed numbers, the denominator of the product is less than or equal to 24.
- Tasks include area and comparison/times as much, with product unknown,
- Content tasks should provide a visual fraction model. If a model is used, numbers should be reasonable, so they do not impede finding the solution.
- Reasoning tasks should not include a model but should be open enough so that students can draw visual fraction models that align to the task using the draw tool. Numbers should be reasonable so as not to impede finding the solution.

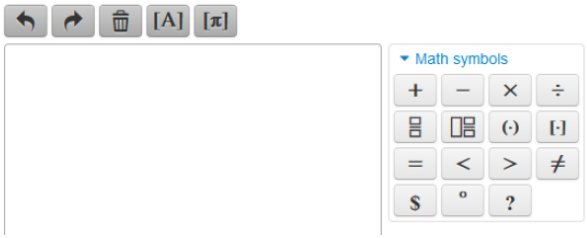
Sample Assessment Question:

Joshua planted carrots and peas in his garden.



Use the model to write and solve an equation that shows how much larger the pea section of the garden is than the carrot section of the garden.

Enter your equation and your solution in the space provided.



Tom travels $3\frac{2}{3}$ miles to school every day. Sara travels $\frac{3}{5}$ of Tom's distance.

How many miles does Sara travel to school?

A $2\frac{1}{5}$

B $3\frac{1}{15}$

C $3\frac{2}{5}$

D $6\frac{1}{9}$

Lesson 7-4 Using Common Denominators for Fraction Division

5.NF.B.5. Interpret multiplication as scaling (resizing), by:

a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.

b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence *a*/*b* = (*n*×*a*)/(*n*×*b*) to the effect of multiplying *a*/*b* by 1.

5.NF.B.7. Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.

a. Interpret division of a unit fraction by a non-zero whole number and compute such quotients.

b. Interpret division of a whole number by a unit fraction and compute such quotients.

c. Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem.

Students solve fraction division problems by renaming dividends and divisors with a common denominator. The common denominator method introduced in this lesson focuses students on the meaning of division with fractions. The standard algorithm that involves multiplying by the reciprocal will be introduced in Grade 6.

For example: to solve 3 ÷ 1/8, students rename 3 as 24/8. The problem then becomes 24/8 ÷ 1/8. Interpreting the problem as "How many eights are in 24 eights?" Students arrive at the answer 24. This is equivalent to dividing the numerators 24 ÷1 = 24.

5.NF.B.7b MCAP Evidence Statement: This evidence statement focuses on the first part of the standard. Since this is the first exposure of dividing fractions, students should apply and extend concepts of whole number division to dividing a non-zero whole number by a unit fraction.

Clarifications:

- Tasks should have a variety of including a thin or no context.
- Tasks should include computation of the quotient.
- Tasks could include the use of appropriate fraction models (linear fraction models such as bar models/tape diagrams and number lines or area models may be used in tasks.)
- An explanation of work is not required. Tasks could include matching a representation to a scenario.
- Explanation of work is not required.

What is the value of $7 \div \frac{1}{5}$?

A $\frac{1}{35}$

B $\frac{5}{7}$

C $\frac{7}{5}$

D $\frac{35}{1}$

Activities and Tasks

All's Fair at the Math Fair – Beyond Invert and Multiply pg.134

3 Act Task – The Nectarine

Videos

Search Learnzillion for: Divide Fractions Using Common Denominators

Lesson 7-5 A Hierarchy of Triangles, Lesson 7-6 A Hierarchy of Quadrilaterals, and Lesson 7-7 Playing Property Pandemonium
5.G.B.3. Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category.
5.G.B.4. Classify two-dimensional figures in a hierarchy based on properties.

Students classify triangles and then quadrilaterals in a hierarchy based on properties. Students will learn a game to practice naming and classifying quadrilaterals based on properties. Students have had many prior experiences classifying shapes using defining attributes.

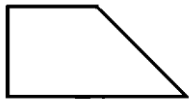
Geometric properties include properties of sides (parallel, perpendicular, congruent), properties of angles (type, measurement, congruent), and properties of symmetry (point and line).

If the opposite sides on a parallelogram are parallel and congruent, then rectangles are parallelograms

Examples:

- A parallelogram has 4 sides with both sets of opposite sides parallel. What types of quadrilaterals are parallelograms?
- Regular polygons have all of their sides and angles congruent. Name or draw some regular polygons.
- All rectangles have 4 right angles. Squares have 4 right angles so they are also rectangles. True or False?
- A trapezoid has 2 sides parallel so it must be a parallelogram. True or False?

IRC has die cuts for: circle, oval, square, 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.



Properties of figures may include:

- Properties of sides – parallel, perpendicular, congruent, number of sides
- Properties of angles – types of angles, congruent

Examples:

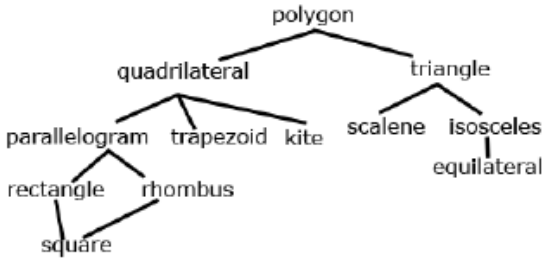
- A scalene triangle can be right, acute, and obtuse.
- A right triangle can be both scalene and isocoles, but not equilateral.

Teaching Student Centered Mathematics
Activity 8.7 Triangle Sort pg. 225
Activity 8.12 True or False pg 231

Lessons
Quadrilateral Characteristics Utah Education Network.
Parallelogram's Attributes
Rectangles and Rhombuses
Draw and Define Trapezoids Based on Attributes
Classify 2-D Figures
Draw 2D Figures from Given Attributes

Activities and Tasks
Sometimes, Always, Never
Types of Triangles A QRCode Activity
Quadrilateral Word Problems
NRich task – Stringy Quads
Youcubed – Trap the Zoid
NRich Task Always, Sometimes, or Never - Shapes

Templates
Frayer Model



5.G.B.3 Sample Assessment Questions:

Which explanation about figures is correct?

A. All rhombuses are parallelograms. Parallelograms have 2 pairs of parallel sides. Therefore, all rhombuses have 2 pairs of parallel sides.

B. All rhombuses are parallelograms. Parallelograms have exactly 1 pair of parallel sides. Therefore, all rhombuses have exactly 1 pair of parallel sides.

C. Only some rhombuses are parallelograms. Parallelograms have 2 pairs of parallel sides. Therefore, only some rhombuses have 2 pairs of parallel sides.

D. Only some rhombuses are parallelograms. Parallelograms have exactly 1 pair of parallel sides. Therefore, only some rhombuses have exactly 1 pair of parallel sides.

Which set of statements is true?

Select one answer.

A All rectangles are quadrilaterals.
All quadrilaterals have 4 sides.
Thus, all rectangles have 4 sides.

B All trapezoids are squares.
All squares have sides of equal length.
Thus, all trapezoids have sides of equal length.

C All rectangles are trapezoids.
All trapezoids have 4 right angles.
Thus, all rectangles have 4 right angles.

D All squares are quadrilaterals.
All quadrilaterals have acute angles.
Thus, all squares have acute angles.

Example Non-Example

Online
Shape Sorter Illuminations

5.G.B.4. **MCAP Evidence Statement:** This standard overlaps with 5.G.B.3. It focuses not only on the properties of polygons, but also to reason about the attributes of shapes.

Clarifications:

- Items could include a partially completed diagram showing the hierarchy of shapes to complete.
- Items could include questions that require students to reason about the shapes. For example, Why is a square always a rectangle? What are the ways to classify triangles?
- Note MCCRS uses this definition of a trapezoid: A trapezoid is defined as "A quadrilateral with at least one pair of parallel sides." Students will not be asked to define a trapezoid. The definition should be understood so that students may use it to classify shapes into subcategories to meet the standard.

Which of the figures are quadrilaterals but **not** rhombi?

Select the **three** correct figures.

☐ A. 

☐ B. 

☐ C. 

☐ D. 

☐ E. 

☐ F. 

Lesson 7-8 A Hierarchy of Polygons (Open Response and Reengagement 2-Day Lesson)

5.G.B.3. **Understand that attributes belonging to a category of two dimensional figures also belong to all subcategories of that category.**

5.G.B.4. **Classify two-dimensional figures in a hierarchy based on properties.**

Day1: Students create a new hierarchy with given polygons.

Day2: Students analyze and discuss other students' hierarchies, and then revise their work.

5.G.B.4. MCAP Evidence Statement: This standard overlaps with 5.G.B.3. It focuses not only on the properties of polygons, but also to reason about the attributes of shapes. **Clarifications:** • Items could include a partially completed diagram showing the hierarchy of shapes to complete. • Items could include questions that require students to reason about the shapes. For example, Why is a square always a rectangle? What are the ways to classify triangles? • Note MCCRS uses this definition of a trapezoid: A trapezoid is defined as "A quadrilateral with at least one pair of parallel sides." Students will not be asked to define a trapezoid. The definition should be understood so that students may use it to classify shapes into subcategories to meet the standard.	
Lesson 7- 9 Collecting and Using Fractional Data **5.NF.A.1. Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators.** **5.NF.A.2. Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers.** **5.NF.B.4. Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.** **a. Interpret the product (a/b) × q as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$.** **b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles and represent fraction products as rectangular areas.** **5.MD.B.2. Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots.**	
Students organize and represent fractional data on line plots. They use operations on fractions to solve problems. **5.MD.B.2 MCAP Evidence Statement:** The language of the standard should guide the creation of assessment tasks, including the ideas in the given examples. **Clarifications:** • Tasks include context • Use the measurement units found in the MCAP Reference Sheet Table • Operations need to align to the grade 5 expectations for computations of fractions with unlike denominators • Data should be represented with "X's"	

5.MD.B.2 Sample Assessment Question

The amount of milk needed for each of 5 recipes is shown on the line plot.

What is the total amount of milk needed for the recipes?

A 4

B 5

C $5\frac{1}{4}$

D $5\frac{1}{2}$

Lesson 7-10 Identifying and Visualizing Patterns, Lesson 7-11 Rules, Tables, and Graphs, Part 1, Lesson 7-12 Rules, Tables, and Graphs, Part 2, and Lesson 7-13 Old Faithful's Next Eruption

5.OA.B.3. Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns and graph the ordered pairs on a coordinate plane.

5.MD.A.1. Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.

5.G.A.1. Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate).

5.G.A.2. Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane and interpret coordinate values of points in the context of the situation.

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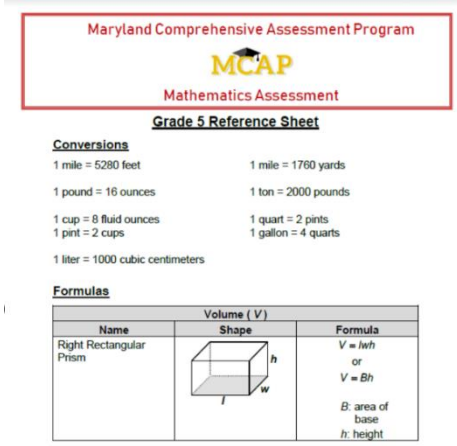

Maryland Comprehensive Assessment Program

MCAP

Mathematics Assessment

Grade 5 Reference Sheet

Conversions

1 mile = 5280 feet

1 mile = 1760 yards

1 pound = 16 ounces

1 ton = 2000 pounds

1 cup = 8 fluid ounces
1 pint = 2 cups

1 quart = 2 pints
1 gallon = 4 quarts

1 liter = 1000 cubic centimeters

Formulas

Volume (V)		
Name	**Shape**	**Formula**
Right Rectangular Prism		$V = lwh$ or $V = Bh$ B: area of base h: height

The last four lessons in this unit focus on mathematical patterns that students can analyze. Students will develop strategies to identify the relationship between two sequences and use rules, tables, graphs to extend patterns and solve real-world problems. They discover that each representation illuminates different aspects of a relationship, preparing students to explore functions in later grades. Functions are sets of ordered pairs in which one input is mapped to exactly one output.

Although students can often "locate a point," these understandings are beyond simple skills. For example, initially, students often fail to distinguish between two different ways of viewing the point (2, 3), say, as instructions: "right 2, up 3"; and as the point defined by being a distance 2 from the x-axis and a distance 3 from the y-axis. In these two descriptions, the 2 is first associated with the x-axis, then with the y-axis.

Examples:

Sara has saved $20. She earns $8 for each hour she works.

- If Sara saves all of her money, how much will she have after working 3 hours? 5 hours? 10 hours?
- Create a graph that shows the relationship between the hours Sara worked and the amount of money she has saved.

Lesson

Create a rule to generate a number pattern and plot the points.

Activities and Tasks

Youcubed – Patterns and Products
Youcubed – Seven Flipped
Youcubed – Checkerboards and More

Use the graph below to determine how much money Jack makes after working exactly 9 hours.

5.G.A.2. **MCAP Evidence Statement:** This evidence statement focuses more on the intent of 5.G.A.2 with the concepts described in 5.G.A.1 and the second part of 5.OA.B.3.

Clarifications:

- Tasks assess student understanding of the coordinate plane as a representation scheme, with essential features as articulated in standard 5. G.A. 1
- For 5.G.A.1 only, tasks may involve only the plotting of points
- Coordinates must be whole numbers only.

5.OA.B.3. **MCAP Evidence Statement:** This standard has multiple parts. The first two sentences ask students to generate two numerical patterns using two GIVEN rules and to identify apparent relationships between the corresponding terms.

Clarifications:

- Tasks should only include what is stated in the first two sentences and the last sentence in the standard (bold font)
- The rest of this standard will be assessed along with 5.G.1. and 5.G.2

Two rules for creating number patterns are given below. Each rule begins with a number called the *input* and creates a number called the *output*.

Rule 1
Multiply the input by 2. Then add 3 to the result to get the output.
Rule 2
Multiply the input by 3. Then add 1 to the result to get the output.

Which input and output table works for **both** rules?

A.

Input	Output
2	7

B.

Input	Output
3	10

C.

Input	Output
4	11

D.

Input	Output
5	13

Grade 5 Unit Eight Applications of Measurement, Computation, and Graphing	
Connections/Notes	**Additional Resources**
Lesson 8-1 Planning an Athletic Center, Lesson 8-2 Applying the Rectangle method for Area, Lesson 8-3 Planning and Aquarium **5.NBT.B.5. Fluently multiply multi-digit whole numbers using the standard algorithm.** **5.NBT.B.7. Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.** **5.NF.A.1. Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators.** **5.NF. B.4. Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.** **a. Interpret the product (a/b) × q as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$.** **b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles and represent fraction products as rectangular areas.** **5.NF.B.4. Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.** **a. Interpret the product (a/b) × q as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$.** **b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.** **5.NF.B.6. Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.** **5.MD.A.1. Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.** **5.MD.C.3. Recognize volume as an attribute of solid figures and understand concepts of volume measurement.** **a. A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume.** **b. A solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units.** **5.MD.C.5. Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.** **a. Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication.** **b. Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole number edge lengths in the context of solving real world and mathematical problems.**	

c. Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.

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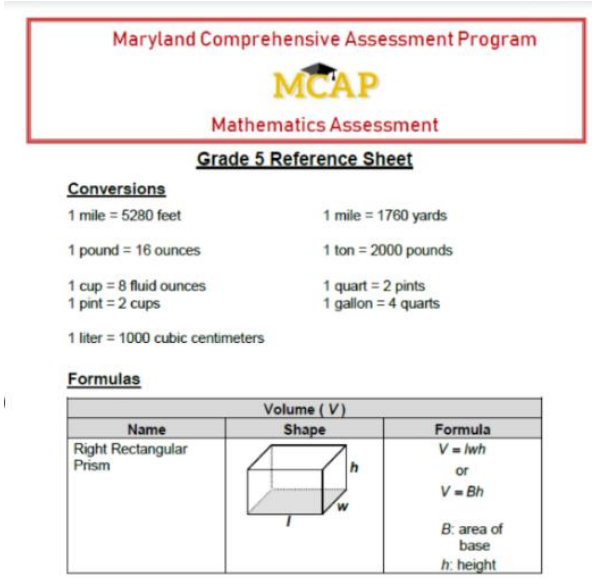

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Formulas

Volume (V)		
Name	**Shape**	**Formula**
Right Rectangular Prism		$V = lwh$ or $V = Bh$ B: area of base h: height

These lessons focus on applications of Area and Volume.

5.MD.A.1.Sample Assessment Question:

Monica has 4 boxes to place in an empty carton.

- The mass of each box is 4.5 kilograms.
- The mass of the carton is 500 **grams**.

What is the total mass, in **grams**, of the carton and the 4 boxes?

Enter your answer in the space provided.

Lessons

Design a Sculpture
Design a Sculpture 2
Design and Construct Boxes

Activities and Tasks

The Sky's the Limit
Youcubed – Painting Task

<table>
<tr><td colspan="2">Lesson 8-4 A Treasure Hunt (Open Response and Reengagement 2-Day Lesson)
5.MD.C.3. Recognize volume as an attribute of solid figures and understand concepts of volume measurement.
a. A cube with side length 1 unit, called a “unit cube,” is said to have “one cubic unit” of volume, and can be used to measure volume.
b. A solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units.
5.MD.C.5. Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.
a. Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication.
b. Apply the formulas V = l × w × h and V = b × h for rectangular prisms to find volumes of right rectangular prisms with whole number edge lengths in the context of solving real world and mathematical problems.
c. Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.</td></tr>
<tr><td>Day 1: Students use representations to solve a problem about the volume of a rectangular prism.
Day 2: Students discuss solutions and representations before revising their work.</td><td></td></tr>
<tr><td colspan="2">Lesson 8-5 Spending $1,000,000, Lesson 8-6 Earning $1,000,000, Lesson 8-7 Paying Off the national Debt, and Lesson 8-8 A Footstep Problem
5.NBTA.2. Explain patterns in the number of zeros of the product when multiplying a number by powers of 10 and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.
5.NBT.A.4. Use place value understanding to round decimals to any place
5.NBT.B.5. Fluently multiply multi-digit whole numbers using the standard algorithm.
5.NBT.B.6. Find whole-number quotients of whole numbers with up to four-digit dividends and two-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.
5.NBT.B.7. Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.
5.MD.A.1. Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.</td></tr>
<tr><td>These lessons focus on applications of whole-number and decimal computation.</td><td><u>Lessons</u>
Fluently Multiply Using the Standard Algorithm

<u>Activities and Tasks</u>
Use Your Head – AIMS
Batter Up Multiplication Game
Counting The Miles
The Value of education – IM Task</td></tr>
</table>

Lesson 8-9 Finding Your Heart Rate and Lesson 8-10 Finding Your Cardiac Output **5.OA.B.3. Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns and graph the ordered pairs on a coordinate plane.** **5.NBT.B.5. Fluently multiply multi-digit whole numbers using the standard algorithm.** **5.NBT.B.6. Find whole-number quotients of whole numbers with up to four-digit dividends and two-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.** **5.NBT.B.7. Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.** **5.MD.A.1. Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.** **5.G.A.1. Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate).** **5.G.A.2. Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.**	
In these lesson students collect data and learn how graphs can be used to illustrate how one variable affects another. These activities provide practice with forming ordered pairs and plotting and interpreting points in the coordinate plane.	
Lesson 8-11 Pendulums, Part 1 and Lesson 8-12 Pendulums, Part 2 **5.NBTA.2. Explain patterns in the number of zeros of the product when multiplying a number by powers of 10 and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.** **5.NBT.A.4. Use place value understanding to round decimals to any place** **5.G.A.1. Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate).** **5.G.A.2. Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane and interpret coordinate values of points in the context of the situation.**	
Students apply their knowledge of place value and coordinate grids to investigate the effects of pendulum length on pendulum swing time. Students use graphs to investigate the effect of arc size on a pendulum's swing time.	