



# Grade 4

## Maryland College and Career Ready Standards for Mathematics

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Companion Guide

**Mathematics Branch**

**Version 2, July 2026**

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## Purpose

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### PURPOSE OF COMPANION GUIDE

This document is designed to support a shared understanding of what each mathematics standard means, how it connects to other content, and how it can be authentically enacted in classrooms. It does not replace your high-quality instructional materials (HQIM) but instead works alongside them so that educators have a common interpretation of the mathematical expectations we set for students. Regardless of the HQIM in use, these documents provide clarity about the essence and intentions of the standards and illustrate how those expectations can be realized through instruction.

### DOCUMENT STRUCTURE

Each domain begins with a set of cluster connections to the Numeracy Development Framework (NDF). These connections identify the ways in which individual clusters either:

- **Contribute to milestones:** The cluster builds prerequisite knowledge, skills, or ways of reasoning that *support progress toward* a milestone in the NDF, even if the milestone itself is not fully realized at this stage.
- **Directly contribute to milestones:** The cluster includes content and practices that are *explicitly named within* an NDF milestone, meaning student proficiency with this cluster demonstrates attainment of that milestone.

### For each content standard, the companion document provides:

- **Content Progression:** A description of the content that comes before and after that standard to highlight how it fits within a coherent learning trajectory.
- **Examples and Clarifications:** Explanations and expansions of the standard language that provide additional detail about its intent. These may include illustrative examples, as well as common missteps to avoid that can narrow or distort the mathematical authenticity of the standard.
- **Student Opportunities for Mathematical Experience:** Statements describing the kinds of reasoning, modeling, problem solving, and sense-making students should have the chance to engage in as part of learning the content of the standard. Where relevant, these are connected to the Standards for Mathematical Practice (SMPs). Not every SMP is explicitly called out, but all can be present in any standard depending on how instruction is designed. What is included are non-exhaustive examples.

## Standards for Mathematical Practice

“The Standards for Mathematical Practice (SMPs) describe varieties of expertise that mathematics educators at all levels should seek to develop in their students” ([Common Core State Standards Initiative](#)). The SMPs develop along a continuum as students progress mathematically, with each grade’s content providing distinct opportunities for students to engage in and demonstrate the practices at an appropriate level of sophistication.

The SMPs should be integrated with content and not taught separately. As students participate in these practices on a regular basis, they become part of the mathematically productive habits of mind that support deep understanding. Intentionally incorporating opportunities to develop the SMPs enhances instruction and enriches students’ mathematical engagement. Students who learn to use these eight mathematical practices as they engage with mathematical concepts and skills have a greater chance of developing conceptual understanding (Van de Walle, et al, 2014).

The table below highlights opportunities to develop the SMPs in general across the given grade band, while the companion guides for individual standards provide more specific connections to the content of each grade. Educators should utilize this resource to assist in planning for opportunities when the SMPs can be emphasized in daily instructional practice. To facilitate the incorporation of SMPs within instruction, notations have been made in the Companion Guide to indicate when a specific SMP may be applicable for a particular standard. These examples should not limit educators from making additional meaningful connections to SMPs where appropriate.

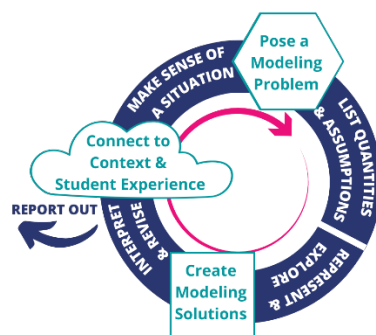
| Standard for Mathematical Practice                                  | What does it look like for Grades 3 – 5 students?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | How can Grades 3 – 5 teachers support this practice?                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Make sense of problems and persevere in solving them (SMP 1)</b> | Students make sense of problems such as multi-step word problems, equal sharing, or comparing quantities using operations, area models, fraction strips, or other visual models. They identify what is being asked, plan an approach (e.g., draw a diagram, make a table), and track if it’s working. They revise when needed and use mathematical reasoning to determine if an answer is reasonable (e.g., “If I’m sharing 12 among 4 people, each should get more than 2”). Students increasingly view perseverance and revising strategies as part of doing math. | Teachers provide contextual problems aligned to grade-level content (operations, fractions, measurement) and build in time for students to plan their approach, often beginning with estimation or sense making. Students are encouraged to consider multiple solution paths and representations. When students get stuck, teachers prompt re-engagement (“What’s another way to show this?”) rather than redirect to correctness. Recognition is given not only for the correct answer but for strategic effort. |

| Standard for Mathematical Practice                                             | What does it look like for Grades 3 – 5 students?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | How can Grades 3 – 5 teachers support this practice?                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Reason abstractly and quantitatively (SMP 2)</b>                            | Students interpret problem situations using numbers, diagrams, and equations and attend to what each quantity represents (e.g., “12 is how many students, not how many buses”). They reason about relationships (e.g., understanding $3 \times 4$ as 3 groups of 4) and check whether representations make sense in context. Increasingly, students choose representations that help them reason about the situation, not just carry out a calculation.                                                                                                                                                          | Teachers offer opportunities for students to select appropriate representations (e.g., arrays, tables, diagrams, equations) and ask “What does this number or step tell us in the situation?” They facilitate flexible movement between context and representation, and emphasize that understanding quantities and their meaning supports effective reasoning before, during, and after calculation.                                                                              |
| <b>Construct viable arguments and critique the reasoning of others (SMP 3)</b> | Students explain how and why their strategy works using models, numbers, words, or equations (e.g., “I multiplied because there were three equal groups”). They listen to other’s explanations, compare approaches, and ask clarifying questions to understand someone else’s reasoning. They begin to revise their own reasoning when a peer’s explanation reveals a clearer, more accurate, or more general way to make sense of the problem.                                                                                                                                                                  | Teachers create structured opportunities for students to share and compare strategies and use prompts such as, “Can you explain why this works?” or “What makes this approach make sense?” They establish norms that emphasize reasoning and justification as tools for understanding and encourage students to listen to, respond to, and build on one another’s explanations in respectful, constructive ways.                                                                   |
| <b>Model with mathematics (SMP 4)</b>                                          | Students ask questions that can be explored mathematically (“How many do we need?”, “How long will it take?”, “What’s the change?”) and identify the key quantities in the situation that need to be represented. They form a mathematical representation (e.g., diagram, table, number line, graph, or equation) to analyze what is happening. They interpret what their model shows and adjust the model when something doesn’t fit or when another choice provides clearer insight. Their modeling cycle becomes define quantities → represent → analyze → interpret → adjust in an increasingly mindful way. | Teachers design tasks where mathematics helps illuminate a real or mathematical situation and prompt students to identify important quantities (“What do we need to keep track of?”). They support students in forming models that match the situation and encourage checking for alignment (“Does your model fit the scenario?”). Multiple models may be compared, but the emphasis stays on how the model improves understanding, not on producing a variety of representations. |
| <b>Use appropriate tools strategically (SMP 5)</b>                             | Students select tools, including diagrams, rulers, protractors, number lines, area models, tables, graphs, and digital tools, to help investigate situations or support reasoning. They begin choosing tools purposefully (“A table helps me see the pattern”), not just because the tool is familiar. They recognize when a chosen tool isn’t giving the insight they need and switch to another that better fits the task.                                                                                                                                                                                     | Teachers introduce a variety of tools and help students discover what each tool can reveal about a situation. They ask reflective questions such as “Which tool could help you see this more clearly?” or “What does this representation show that another does not?” Teachers encourage evaluating the strengths and limitations of different tools and ensure tools are used to support, not replace, mathematical reasoning.                                                    |

| Standard for Mathematical Practice                                   | What does it look like for Grades 3 – 5 students?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | How can Grades 3 – 5 teachers support this practice?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Attend to precision (SMP 6)</b>                                   | Students use increasingly accurate mathematical language, notation, and units to communicate their thinking. They label representations (e.g., diagrams, number lines, tables, bar graphs, and line plots) to show what quantities or categories mean. They check calculations for accuracy and reasonableness in context, including in data displays (“Does this point belong here?”). Students notice when imprecision in language, diagrams, labels, or data representations leads to confusion and revise their work to make their thinking clearer.                                       | Teachers emphasize naming quantities, labeling representations (including axes and data categories), choosing appropriate scales, and using correct units. They prompt students to clarify what numbers, labels, and symbols represent (e.g., “ <i>What does this number describe?</i> ” or “ <i>What does this label tell the reader?</i> ”) and support students in checking that their representations and calculations are clear and accurate. Precision is reinforced as a habit of communicating mathematical ideas so others can understand them.                               |
| <b>Look for and make use of structure (SMP 7)</b>                    | Students use structure to understand operations more deeply. For example, seeing multiplication as equal groups or arrays, understanding division as sharing or grouping, and using place-value structure to support efficient reasoning. They apply structure to decompose numbers, expressions, and shapes (e.g., “ $24 \times 6$ is like $(20 \times 6) + (4 \times 6)$ ”), and they distinguish between additive and multiplicative situations. Students recognize when problems share a common structure and use that insight to choose strategies and explain why those strategies work. | Teachers emphasize structural relationships in arithmetic (arrays, area models, place-value relationships, and properties of operations). They guide students in articulating how the structure of numbers, shapes, or expressions supports a strategy and prompt them to contrast structurally different problem types. Representations are used to make underlying structure visible and to reinforce conceptual understanding rather than procedural repetition.                                                                                                                    |
| <b>Look for and express regularity in repeated reasoning (SMP 8)</b> | Students observe regularity in operations and repeated calculations. For example, noticing how products grow in predictable ways when one factor increases, or how repeated addition produces equal groups and eventually multiplication. They recognize stable place-value relationships (“Each shift to the left makes the value ten times larger”) and see how similar reasoning approaches reappear across different division or fraction problems. Students use these repeated behaviors to predict outcomes, check their work, or form generalizations about how operations behave.      | Teachers highlight repeated reasoning in multiplicative situations, place-value patterns, fraction equivalence, and strategies that rely on predictable changes (e.g., adding another equal group or repeatedly partitioning a shape or set). They prompt students to describe what repeats across cases (“What changes in the number each time you shift one place to the left?”) and use that insight to make or test conjectures. Teachers encourage students to explain <i>why</i> a shortcut or generalization holds by connecting it to the repeated reasoning that produced it. |

## Modeling

Mathematical modeling is the process of using mathematics to interpret and make sense of the world. Developing and engaging with the modeling cycle is a critical part of building students' mathematical proficiency. As students progress through the grades, they take on greater responsibility in all aspects of the modeling cycle. They more independently formulate questions, define constraints, and distinguish between assumptions that can be made and facts that must be verified. They are provided growing opportunities to choose models and tools that help them explore a situation and uncover the underlying mathematics. They also become more adept at evaluating the validity of their solutions and revisiting earlier stages of the cycle when initial assumptions prove invalid or incomplete. Participation in the mathematical modeling cycle nurtures mathematical creativity, fosters productive discourse, encourages persistence when solutions are not straightforward, and supports the development of positive mathematics identity.



Mathematical modeling is a significant aspect of MCAP Grades 3-8. Modeling is assessed in alignment to grade-level content. Modeling items are both machine scored and constructed response. The constructed response items are scored using [MCAP Mathematics Modeling Holistic Rubric](#). A calculator will be available for all Modeling assessment items.

Opportunities to connect modeling with content standards are identified within the Companion Guide. These opportunities are entry points for integration, but they should not limit educators from making additional meaningful connections to modeling where appropriate.

| Modeling Evidence Statements                                                                                                                                                                           | What does this look like for students in Grades 3 – 5?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>M.1</b> Formulate a question about a particular context that can be answered using mathematics.</p>                                                                                              | <p>Students examine real or imagined contexts and formulate questions that can be answered using mathematics. They move beyond general curiosity to identify specific quantities, comparisons, or relationships that can be measured, counted, or calculated.</p> <p>For example, given a situation about planning a school fundraiser, students might refine a broad question such as “Will we raise enough money?” into questions like “How much money will we raise if each student sells three items?” or “How many items need to be sold to reach the fundraising goal of \$500?”</p>                                                                                                                          |
| <p><b>M.2</b> Determine the information needed and what assumptions must be made to answer a mathematical question about a context.</p>                                                                | <p>Students examine a situation to decide what details matter when answering a mathematical question. They sort relevant from irrelevant information, identify what is already known and what still needs to be determined, and recognize when assumptions are necessary to proceed. At this grade band, assumptions are typically based on simplifying the context so it can be analyzed mathematically.</p> <p>For example, in a school fundraiser scenario, students may decide they need to know how many students are participating and the price of each item sold. They may assume that all items cost the same or that each student sells the same number of items to estimate the total amount raised.</p> |
| <p><b>M.3</b> Represent a context mathematically by selecting and applying appropriate concepts, tools, and representations to define variables, model relationships, and/or identify constraints.</p> | <p>Students organize information from a situation to show how quantities are connected. They use representations such as drawings, tables, diagrams, equations, and simple graphs to make relationships visible and support their thinking. As they work, students attend to limits or conditions in the situation that affect how the context can be represented.</p> <p>For example, when modeling a school fundraiser, students may create a table showing how many items are sold and the total money raised or write a relationship such as <i>total money = number of items × price</i> to represent how the quantities are related.</p>                                                                      |
| <p><b>M.4</b> Use a mathematical model to perform computations, make predictions, or answer the question posed about a context.</p>                                                                    | <p>Students engage with their models as tools for exploring how quantities in a situation are related and to support decisions/conclusions about the context. They use the model to compare scenarios, notice patterns, and test how changes to one part of the situation affects others. Their models are used to guide their thinking rather than used for a single calculation.</p> <p>For example, using a fundraiser model, students may explore how increasing the number of items sold changes the total amount raised and use that relationship to compare different sales scenarios or consider how adjusting the price per item would affect the total.</p>                                               |

| Modeling Evidence Statements                                                                                                                                                                                      | What does this look like for students in Grades 3 – 5?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>M.5</b> Interpret the results or conclusions of a mathematical model in terms of the original context or situation.                                                                                            | <p>Students reflect on what their model reveals about the situation and connect the outcomes of the model back to the original question. They explain what the numbers or comparisons produced by the model mean in context and what those results suggest about decisions or next steps.</p> <p>For example, after modeling a school fundraiser, students may explain whether the amount of money raised meets the goal, describe what comparisons between sales plans show, or explain what the model suggests about how changing price affects outcomes.</p>                                                                                                                                                                                                                                                                                       |
| <b>M.6</b> Critique the validity of a mathematical model and its conclusions. Revise assumptions, representations, or mathematical approaches based on the context, new understanding, or additional information. | <p>Students examine whether a mathematical model and its conclusions make sense for the situation being studied. Through sharing their thinking and comparing models with peers, students consider whether assumptions were reasonable, whether important details were overlooked, and whether the model reflects realistic constraints of the context. Based on new understanding, feedback, or additional information, students revise their assumptions or adjust their model to better represent the situation.</p> <p>For example, after sharing fundraising models, students may notice that another group included a limit on how many items a student could reasonably sell. Recognizing that this constraint changes the total amount raised, they revise their assumptions and adjust the model before reconsidering their conclusions.</p> |

## Reasoning

Students who become adept at reasoning in mathematics are better able to transfer their learning to new and novel contexts and build confidence in their mathematical abilities. Reasoning is both a foundational skill for students and a critical focus of instruction for mathematics educators. Opportunities to reason should be embedded throughout all grade levels and students must be invited to justify their solutions, use multiple representations and tools to support conclusions, and engage in meaningful reflection. They should frequently be called upon to evaluate their own reasoning and that of others, decide whether a solution path is valid, identify and correct errors, and strengthen arguments. As outlined below, mathematical reasoning is a cornerstone skill that should be integrated across all grade-level content.

Reasoning is a significant topic in the MCAP assessment. Reasoning is assessed in alignment to grade-level content. Reasoning items are both machine scored and constructed response. The constructed response items are scored using [MCAP Mathematics Reasoning Holistic Rubric](#). A calculator will be available for all Reasoning assessment items.

Opportunities to connect reasoning with content standards are identified within the Companion Guide. These opportunities are entry points for integration, but they should not limit educators from developing reasoning skills where appropriate.

| Reasoning Evidence Statements                                                                                                                        | What does this look like for students in Grades 3 – 5?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>R.1</b> Use visual, symbolic, or contextual representations to explain mathematical ideas.                                                        | <p>Students use representations to make their thinking visible and to build a more complete understanding of mathematical ideas. They connect multiple representations to show how the same relationship or idea can be expressed in different ways, and they explain how one representation supports or clarifies another.</p> <p>For example, a student may use an area model and an equation together to explain why two multiplication strategies result in the same product or connect a fraction strip and a number line to show how fractions with different denominators represent the same value.</p>                                                                                                                                                                                                                                                                            |
| <b>R.2</b> Identify and critique errors in reasoning, misapplied procedures, or invalid assumptions, and provide a mathematically valid alternative. | <p>Students use mathematical discussion to evaluate whether reasoning is sound and conclusions are justified. By listening to peers' explanations and asking clarifying or challenging questions, students learn to recognize when a claim depends on an unstated assumption or only works in certain cases. Through these exchanges, students revise their explanations to better reflect the mathematical idea.</p> <p>For example, during a class discussion comparing fractions, a student may claim that <math>\frac{3}{8}</math> is greater than <math>\frac{1}{2}</math> because 3 is greater than 1. Another student questions this reasoning by pointing out that the pieces are different sizes and asks how the fractions compare when the same whole is considered. As the discussion continues, the class revises the explanation to reflect a more accurate comparison.</p> |

| Reasoning Evidence Statements                                                                                                                                                                             | What does this look like for students in Grades 3 – 5?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>R.3</b> Construct coherent chains of reasoning that connect mathematical properties, ideas, and evidence, such as examples or counterexamples, to support or refute mathematical statements or claims. | <p>Students support mathematical claims by explicitly linking ideas so that their reasoning is clear and convincing. They connect definitions, properties, observations, or examples to show how multiple ideas work together to justify a conclusion. Rather than presenting isolated statements or answers, students explain how their ideas are connected to support or refute a claim.</p> <p>For example, when explaining why two fractions are equivalent, a student may connect the idea that both fractions represent the same amount of a whole with the observation that the whole is partitioned differently but the shaded portions cover the same area. They use both ideas together to justify why the fractions are equal.</p>                                                                                                                                                     |
| <b>R.4</b> Identify and extend patterns or regularities to form general rules and justify their validity using mathematical reasoning.                                                                    | <p>Students use repeated reasoning to move from noticing patterns to forming general rules. The focus is not on predicting the next term in a sequence, but on explaining <i>why the same relationship holds across many cases</i>. Students identify what remains consistent and connect that regularity to underlying mathematical ideas. This supports them in justifying a rule that applies beyond individual examples.</p> <p>For example, a student may notice that multiplying a whole number by 10 always changes the value in the same way. The student explains that each digit represents ten times as much as the digit to its right, so multiplying by 10 shifts every digit one place to the left, which increases the value of the number by a factor of ten. By applying this reasoning to several numbers, the student justifies that the rule holds for all whole numbers.</p> |

## Numeracy Development Framework

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Grade 4 strengthens and extends the multiplicative reasoning from Grade 3 as students work with larger numbers, fractions, and relationships between quantities. Students move beyond viewing multiplication as equal groups and begin using it to describe consistent relationships between quantities, such as situations where one quantity is a fixed multiple of another.

Within Number & Operation Sense, students expand their understanding of number magnitude by working with whole numbers through the millions and decimals to the hundredths. This expanded view of the number system supports more precise comparison of quantities and strengthens students' use of estimation to judge the reasonableness of results. Students continue developing fluency with the four operations as they solve addition and subtraction problems with large numbers and apply reasoning-based strategies to multiplication and division with multidigit numbers. Fractions become a more central focus as students generate equivalent fractions and add and subtract fractions with like denominator. This reinforces the idea that fractions represent quantities that can be compared and combined when they refer to the same whole.

In Algebraic Thinking, students represent situations involving combinations of operations with equations containing unknown quantities. They use these equations to reason through and solve multistep problems. They analyze patterns to distinguish between additive and multiplicative relationships and describe multiplicative relationships using explicitly defined rules. This work helps students reason about how one quantity changes in relation to another and express those relationships using symbols.

Geometric Reasoning & Measurement connects spatial reasoning with measurement and multiplicative thinking. Students classify two-dimensional shapes based on properties (e.g., parallel and perpendicular lines) and develop an understanding of angles and what their measures represent. Work with area and perimeter deepens as students determine missing dimensions of rectangles and explore how the area of a triangle relates to the area of a rectangle through decomposition. These experiences highlight how area can be structured, decomposed, and recomposed. This strengthens spatial reasoning as students analyze how the areas of shapes relate to one another.

In Reasoning with Data, Statistics, & Probability, students begin to analyze how data representations influence interpretation and the statistical story that is told. They examine how changes in scale, ordering, or type of visualization affect the conclusions that can be drawn from data. Within this domain, the focus is on encouraging students to attend critically to how information is presented and what claims are reasonable, accurate, or misleading.

The developmental milestones identified in the [Numeracy Development Framework](#) for Grade 4 reflect continued growth in multiplicative reasoning, fractional understanding, and relational thinking across domains. This companion document highlights how these ideas align with Grade 4 standards and identifies the understandings most critical to monitor as students continue building toward more advanced reasoning with fractions, quantitative relationships, and spatial reasoning.

## Number and Operation Sense (NOS)

| Number and Operation Sense (NOS) Clusters                                                                                            | Connections to the Numeracy Development Framework                                                                                                                                                         |
|--------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>4.NOS.A</b> Generalize place value understanding for multi-whole numbers.                                                         | Standards within this cluster <b>directly contribute*</b> to the Grade 4 Number and Operation Sense milestones within the <b>Numbers &amp; Number Sets strand</b> of the Numeracy Development Framework.  |
| <b>4.NOS.B</b> Use place value understanding and properties of operations to perform multi-digit arithmetic.                         | Standards within this cluster <b>directly contribute*</b> to the Grade 4 Number and Operation Sense milestones within the <b>Operations and Estimation strands</b> of the Numeracy Development Framework. |
| <b>4.NOS.C</b> Gain familiarity with factors and multiples.                                                                          | Standards within this cluster <b>contribute**</b> to the Grade 4 Number and Operation Sense milestones within the <b>Operations strand</b> of the Numeracy Development Framework.                         |
| <b>4.NOS.D</b> Extend understanding of fraction equivalence and ordering.                                                            | Standards within this cluster <b>directly contribute*</b> to the Grade 4 Number and Operation Sense milestones within the <b>Fractions &amp; Decimals strand</b> of the Numeracy Development Framework.   |
| <b>4.NOS.E</b> Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers. | Standards within this cluster <b>directly contribute*</b> to the Grade 4 Number and Operation Sense milestones within the <b>Fractions &amp; Decimals strand</b> of the Numeracy Development Framework.   |
| <b>4.NOS.F</b> Understand decimal notation for fractions and compare decimal fractions.                                              | Standards within this cluster <b>directly contribute*</b> to the Grade 4 Number and Operation Sense milestones within the <b>Numbers and Number Sets strand</b> of the Numeracy Development Framework.    |

**\*Directly contribute to milestones:** The cluster includes content and practices that are *explicitly named within* an NDF milestone, meaning student proficiency with this cluster demonstrates attainment of that milestone.

**\*\*Contribute to milestones:** The cluster builds prerequisite knowledge, skills, or ways of reasoning that *support progress toward* a milestone in the NDF, even if the milestone itself is not fully realized at this stage.

**4.NOS.A GENERALIZE PLACE VALUE UNDERSTANDING FOR MULTI-DIGIT WHOLE NUMBERS.****4.NOS.A.1: Apply and extend place value understanding to multi-digit whole numbers within 1,000,000.**

- Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form.**
- Estimate quantities by reasoning about their location on a number line, their relationship to benchmark numbers, and rounding to any place.**
- Compare two multi-digit numbers by reasoning about the values of the digits and the location of the numbers on a number line. Record the results of comparisons with the symbols  $>$ ,  $=$ , and  $<$ .**

| Content Progression                                                                                                                                                                                                                                                                                                                  | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Students should have the opportunity to...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
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| <p>Where are students coming from?</p> <ul style="list-style-type: none"> <li>Apply and extend place value understanding to whole numbers within 10,000 (3.NOS.A.1).</li> </ul> <p>Where are students going?</p> <ul style="list-style-type: none"> <li>Read, write, and compare decimals to the thousandths (5.NOS.A.3).</li> </ul> | <ul style="list-style-type: none"> <li><b>4.NOS.A.1a:</b> Use base-ten numerals (42,536), number names (forty-two thousand, five hundred thirty six), and expanded form (<math>40,000 + 2,000 + 500 + 30 + 6</math> or <math>(4 \times 10,000) + (2 \times 1,000) + (5 \times 100) + (3 \times 10) + (6 \times 1)</math>) flexibly.</li> <li><b>4.NOS.A.1b:</b> Estimation is flexible. The number line shown below helps a student to visualize 74,213 as a number between 70,000 and 80,000 but that is also close to 75,000. Using a benchmark number like 75,000 may be more useful in certain contexts, while rounding to 70,000 may be useful in others. <div> </div> <p>When rounding to the nearest ten-thousand, 74,213 rounds to 70,000 because 74,213 is closer to 70,000 as shown above. Ground experiences in conceptual understanding of number relationships and benchmark numbers. Avoid taking a procedural approach or using mnemonic tricks (e.g., "five and above, give it a shove.") until students have deep understanding of the concepts of rounding and estimation."</p> <li><b>4.NOS.A.1c:</b> Use number lines to visualize the relationship between numbers to compare. The number line shows that <math>11,460 &gt; 11,064</math> because 11,460 is further to the right than 11,064. <div> </div> </li> </li></ul> | <ul style="list-style-type: none"> <li>Extend their understanding of the place value to explore and recognize patterns, including 10 hundred thousands is equal to 1,000,000 as they begin to work with greater numbers (SMP 7).</li> <li>Use a variety of representations to read, write, and visualize numbers, making connections between the representations.</li> <li>Think flexibly about numbers and quantities, using estimation to reason about numerical relationships. Estimation should be frequently embedded into discussions and applied to authentic contexts, helping students to make sense of contexts and check reasonableness of results.</li> <li>Use vertical and horizontal number lines to justify and explain how to round a given number to any place or to compare a set of numbers. Discuss how rounding can impact precision.</li> <li>Discuss situations when the efficiency of estimation is useful and situations when accuracy and precision are necessary.</li> <li><b>Students must have multiple opportunities and varied ways to demonstrate mastery, as this standard constitutes key Grade 4 Number and Operation Sense milestones in the Numbers &amp; Number Sets strand of the Numeracy Development Framework.</b></li> </ul> |

Previously 4.NBT.A.2; 4.NBT.A.3

**4.NOS.A.2: Explain that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right (e.g., recognize that  $700 \div 70 = 10$  by applying concepts of place value and division).**

| Content Progression                                                                                                                                                                                                                                                                                                                                                                                                                                            | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Students should have the opportunity to...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
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| <p>Where are students coming from?</p> <ul style="list-style-type: none"> <li>Apply and extend place value understanding to whole numbers within 10,000 (3.NOS.A.1).</li> </ul> <p>Where are students going?</p> <ul style="list-style-type: none"> <li>Explain a digit in one place represents 10 times as much as it represents in the place to its right and <math>\frac{1}{10}</math> of what it represents in a place to its left (5.NOS.A.1).</li> </ul> | <ul style="list-style-type: none"> <li>Grade 4 students will work with whole numbers less than or equal to 1,000,000.</li> <li>Students apply their understanding of the value of a digit based on place value to make connections to multiplication and division by multiples of 10.</li> <li>A 7 in the ones place represents 7. However, when 7 is in the tens place, it represents 70, which is 10 times greater than 7. When 7 is in the hundreds place, it represents 700, which is 100 times greater than 70. This relationship can also be represented with equations.           <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div> <math>7 \times 10 = 70</math><br/> <math>70 \times 10 = 700</math><br/> <math>700 \times 10 = 7000</math> </div> <div> <math>7000 \div 10 = 700</math><br/> <math>700 \div 10 = 70</math><br/> <math>70 \div 10 = 7</math> </div> </div> </li> <li>Equations can also be used to compare the value of a digit in varying place values.           <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div> <math>4 \times 10 = 40</math><br/> <math>4 \times 100 = 400</math><br/> <math>4 \times 1000 = 4000</math> </div> <div> <math>4000 \div 4 = 1000</math><br/> <math>400 \div 4 = 100</math><br/> <math>40 \div 4 = 10</math> </div> </div> </li> <li>Focus on the value of digits and use precise language (e.g., “ten times greater,” “divided by 100”). Avoid teaching rules like “add a zero to the value of a digit when moving left,” as these can lead to misconceptions—especially when students begin working with decimals.</li> </ul> | <ul style="list-style-type: none"> <li>Identify the values of digits appearing in different place values to make sense of, compare, and explain the relationship. For example, a student may notice that the digit 6 in the number 4<b>16</b>,788 is 100 times greater than the digit <b>6</b> in the number 10,562, because <math>60 \times 100 = 6,000</math> or <math>6,000 \div 100 = 60</math>.</li> <li>Explore number sequences (e.g., 3, 30, 300, 3000) to identify patterns and the relationship between place values. Students should also form rules that can be applied to extend the pattern.</li> <li>Apply their understanding of the base-ten structure to explain why a digit in one place is ten times the value of the same digit in the place to its right (SMP 7).</li> </ul> |

Previously 4.NBT.A.1

**4.NOS.B USE PLACE VALUE UNDERSTANDING AND PROPERTIES OF OPERATIONS TO PERFORM MULTI-DIGIT ARITHMETIC.****4.NOS.B.3: Fluently add and subtract multi-digit whole numbers within 1,000,000.**

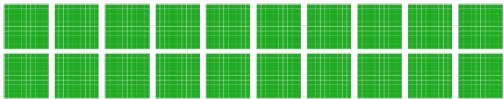
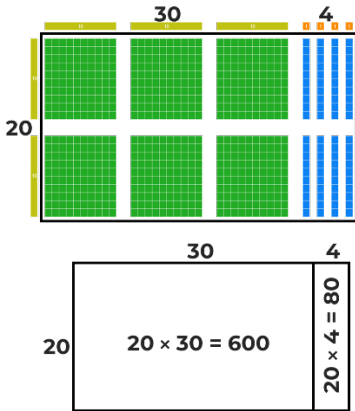
- a. Apply estimation strategies to estimate sums and differences.
- b. Use computational strategies (e.g., decomposition, partials sums) efficiently.
- c. Use a standard algorithm.
- d. Determine and explain when a strategy or algorithm is most efficient.

| Content Progression                                                                                                                                                                                                                                                                  | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Students should have the opportunity to...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
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| <p>Where are students coming from?</p> <ul style="list-style-type: none"> <li>Fluently add and subtract within 1,000 (3.NOS.D.7).</li> </ul> <p>Where are students going?</p> <ul style="list-style-type: none"> <li>Add and subtract decimals to hundredths (5.NOS.B.6).</li> </ul> | <ul style="list-style-type: none"> <li>Model various approaches and encourage flexibility. Avoid modeling or requiring a single approach.</li> <li>Identify the multi-digit addition and subtraction problems that encourage the use of specific strategies. This supports conceptual understanding and promotes efficient approaches rather than rote calculation. Avoid numbers that distract from mathematical focus by making computation unnecessarily cumbersome (e.g., <math>942,875 - 174,986</math> requires regrouping in every place except for hundred thousands).</li> <li><b>4.NOS.B.3b:</b> Partial sums involves decomposing addends by place value, adding like place values, and then adding the partial sums to find the total. For example, a student may show the steps shown below to solve <math>50,231 + 30,542</math>. Students may also be able to do this computation mentally.           <math display="block">50,000 + 200 + 30 + 1 = 50,231</math> <math display="block">30,000 + 500 + 40 + 2 = 30,542</math> <math display="block">1 + 2 = 3</math> <math display="block">30 + 40 = 70</math> <math display="block">200 + 500 = 700</math> <math display="block">50,000 + 30,000 = 80,000</math> <math display="block">80,000 + 700 + 70 + 3 = 80,773</math> </li> </ul> <p style="text-align: right;"><i>Continued on next page</i></p> | <ul style="list-style-type: none"> <li>Make explicit connections between different approaches.</li> <li>Use strategies flexibly, making decisions on which strategy or method to use based on the numbers or context of the given problem (SMP 5).</li> <li>Explain their reason for selecting a particular strategy. For example, a student may explain “when solving <math>200,000 - 99,995</math>, I used the use compensation because 99,995 is close to 100,000. It is easier for me to subtract 100,000 than subtracting 99,995 across zeros.”</li> <li>Engage in <a href="#">Number Talks</a> to promote flexible thinking and provide opportunities to explain their thinking and make connections to other strategies.</li> <li>Apply estimation strategies to assess the reasonableness of sums and differences.</li> <li><b>Students must have multiple opportunities and varied ways to demonstrate mastery, as this standard constitutes key Grade 4 Number and Operation Sense milestones in the Operations and Estimation strands of the Numeracy Development Framework.</b></li> </ul> |

| Content Progression | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Students should have the opportunity to... |
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|                     | <ul style="list-style-type: none"> <li><b>4.NOS.B.3b:</b> Compensation involves changing or adjusting numbers to make a “friendlier” problem. For example, when solving the problem <math>200,000 - 99,995</math>, a student may add 5 to both numbers to rewrite the problem as <math>200,005 - 100,000</math>. By adding the same amount to each number, the difference remains the same.</li> <li><b>4.NOS.B.3c:</b> When introducing the standard algorithm, make connections to other approaches (e.g., partial sums). <div style="text-align: center;"> <math display="block">\begin{array}{r} 7,561 \\ + 3,429 \\ \hline 10,990 \end{array}</math> <math display="block">\begin{array}{r} 7,561 \\ + 3,429 \\ \hline 10 \\ 80 \\ 900 \\ + 10,000 \\ \hline 10,990 \end{array}</math> </div> </li> <li><b>4.NOS.B.3d:</b> When determining efficiency, consider the quantities, their relationships to benchmark numbers, and how those relationships influence strategy choice. Use think-alouds to model this decision-making process.</li> </ul> |                                            |

Previously 4.NBT.B.4

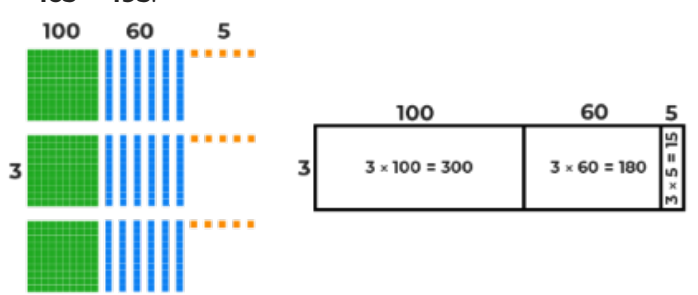
**4.NOS.B.4: Extend place value understanding and basic facts to multiply a multi-digit whole number by a multiple of ten.**

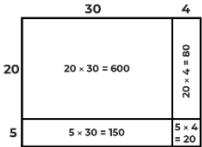
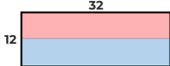
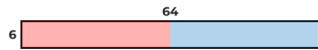
| Content Progression                                                                                                                                                                                                                                                                                                                                                    | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Students should have the opportunity to...                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
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| <p>Where are students coming from?</p> <ul style="list-style-type: none"> <li>Multiply one-digit whole numbers by multiples of 10 (3.NOS.D.8).</li> </ul> <p>Where are students going?</p> <ul style="list-style-type: none"> <li>Fluently multiply multi-digit whole numbers (5.NOS.B.4).</li> <li>Multiply and divide decimals to hundredths (5.NOS.B.7).</li> </ul> | <ul style="list-style-type: none"> <li>Students will apply their understanding of place value and basic facts to multiply multi-digit numbers by multiples of ten. Connect place value and equal groups. For example, <math>10 \times 200</math> can be thought of as 10 groups of 200 or 2 hundreds.</li> </ul>  <ul style="list-style-type: none"> <li>Use concrete models to extend to multiplication of a multi-digit whole number and a multiple of ten. However, as numbers become larger, the use of place value models will be cumbersome. Students will transition to using visual models, such as area models, to continue to explore multiplication by multiples of ten. For example, the place value model (top) and area model (bottom) represent <math>20 \times 34 = 680</math>.</li> </ul>  <ul style="list-style-type: none"> <li>Avoid teaching students that when multiplying by multiple of ten, a zero is added to the end of the number. This “rule” can promote misconceptions, especially as students begin working with decimals. For example, that “rule” does not apply when multiplying <math>1.2 \times 10</math>.</li> </ul> | <ul style="list-style-type: none"> <li>Engage in multiple hands-on and visual experiences to discover patterns when multiplying multi-digit whole numbers by a multiple of ten.</li> <li>Recognize and explain patterns noticed when multiplying a one-digit whole number by multiples of ten (SMP 7).</li> <li>Engage in <a href="#">Number Talks</a> to promote flexible thinking and provide opportunities to explain their thinking and make connections to other strategies.</li> </ul> |

Adopted 2025

**4.NOS.B.5: Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers.**

- Apply estimation strategies to estimate products.
- Use strategies based on place value (e.g., partial products) to multiply.
- Use properties of operations (e.g., use doubling and halving strategy to think of  $12 \times 32$  as  $6 \times 64$ ) to multiply.
- Represent and explain the computation by connecting rectangular arrays, area models, and/or equations to the meaning of multiplication.

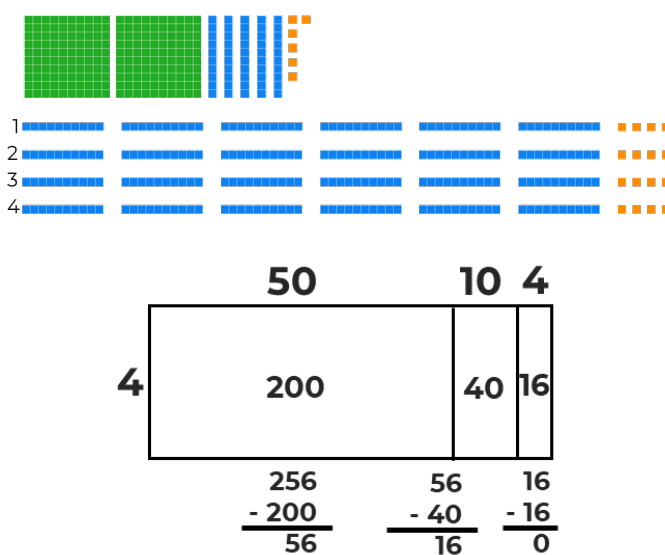
| Content Progression                                                                                                                                                                                                                                                                                                                                                                               | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Students should have the opportunity to...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
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| <p>Where are students coming from?</p> <ul style="list-style-type: none"> <li>Multiply one-digit whole numbers by multiples of 10 (3.NOS.D.8).</li> <li>Recall or quickly derive multiplication and division facts within 100 (3.NOS.E.9).</li> </ul> <p>Where are students going?</p> <ul style="list-style-type: none"> <li>Fluently multiply multi-digit whole numbers (5.NOS.B.4).</li> </ul> | <ul style="list-style-type: none"> <li>Students continue to build understanding of multiplication through a balance of concrete, semi-concrete, and abstract approaches. Model various approaches and encourage flexibility. Avoid modeling or requiring a single approach.</li> <li>Identify problems that encourage the use of specific strategies. This supports conceptual understanding and promotes efficient approaches rather than rote calculation.</li> <li><b>4.NOS.B.5b:</b> Begin using concrete models to multiply. Support students in making connections between concrete models and visual models, such as the area model, to promote efficiency. For example, the place value model (left) and area model (right) represent <math>3 \times 165 = 495</math>.</li> </ul>  <p style="text-align: right;"><i>Continued on next page</i></p> | <ul style="list-style-type: none"> <li>Make explicit connections between different approaches.</li> <li>Develop proficiency with multiplication strategies. Students should begin exploring strategies to problems involving 1-digit by 2-digit, 3-digit and 4-digit numbers. As students become more proficient, they will apply their understanding of these strategies to multiply two 2-digit numbers.</li> <li>Use strategies flexibly, making decisions on which strategy or method to use based on the numbers or context of the given problem (SMP 5).</li> <li>Explain their reason for selecting a particular strategy. For example, a student may explain “when solving <math>12 \times 32</math>, I used the doubling and halving strategy because both factors were multiples of 2 so it would be easy to double and halve. Then, I will have a 1-digit by 2-digit problem to solve which is easier.”</li> <li>Engage in <a href="#">Number Talks</a> to promote flexible thinking and provide opportunities to explain their thinking and make connections to other strategies.</li> <li>Apply estimation strategies to assess the reasonableness of products.</li> <li><b>Students must have multiple opportunities and varied ways to demonstrate mastery, as this standard constitutes key Grade 4 Number and Operation Sense milestones in the Operations and Estimation strands of the Numeracy Development Framework.</b></li> </ul> |

| Content Progression | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Students should have the opportunity to... |
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|                     | <ul style="list-style-type: none"> <li> <b>4.NOS.B.5b:</b> Apply understanding of these models to multiply two two-digit numbers. For example, the place value model (left) and area model (right) represent <math>25 \times 34 = 850</math>.           <div style="display: flex; justify-content: space-around; align-items: center;">   </div> </li> <li> <b>4.NOS.B.5b:</b> Apply the Distributive Property of Multiplication to use partial product strategy. Decompose factors by place value and then multiply. Then add the partial products to find the total. For example, a student may show the steps shown below to solve <math>165 \times 3</math> or <math>25 \times 34</math>.           <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <math display="block">  \begin{array}{r}  165 \\  \times 3 \\  \hline  15 \\  180 \\  + 300 \\  \hline  495  \end{array}  </math> <p> <math>(3 \times 5)</math><br/> <math>(3 \times 60)</math><br/> <math>(3 \times 100)</math> </p> </div> <div style="text-align: center;"> <math display="block">  \begin{array}{r}  34 \\  \times 25 \\  \hline  20 \\  150 \\  80 \\  + 600 \\  \hline  850  \end{array}  </math> <p> <math>(5 \times 4)</math><br/> <math>(5 \times 30)</math><br/> <math>(20 \times 4)</math><br/> <math>(20 \times 30)</math> </p> </div> </div> </li> <li> <b>4.NOS.B.5c:</b> Apply the Associative Property of Multiplication to use the doubling and halving strategy. For example, to solve <math>12 \times 32</math>, a student may half one factor and double the other factor.           <math display="block">12 \times 32 = (6 \times 2) \times 32 = 6 \times (2 \times 32) = 6 \times 64</math> <div style="display: flex; justify-content: center; align-items: center;">   </div> </li> <li> <b>4.NOS.B.5d:</b> Explain how a representation or strategy accurately represents multiplication. For example, if using the area model to multiply <math>3 \times 165</math>, a student may explain that the factor, 165 was decomposed into <math>100 + 60 + 5</math> and then used the distributive property to multiply 3 by each to get total product.           </li> </ul> |                                            |

Previously 4.NBT.B.5

**4.NOS.B.6: Divide whole numbers with up to four-digit dividends and one-digit divisors with and without remainders.**

- Apply estimation strategies to estimate quotients.
- Use strategies based on place value (e.g., partial quotients) to divide.
- Use properties of operations and/or the inverse relationship between multiplication and division to divide.
- Represent and explain the computation by connecting rectangular arrays, area models, and/or equations to the meaning of division.

| Content Progression                                                                                                                                                                                                                                                                                                                                                 | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Students should have the opportunity to...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
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| <p>Where are students coming from?</p> <ul style="list-style-type: none"> <li>Recall or quickly derive multiplication and division facts within 100 (3.NOS.E.9).</li> </ul> <p>Where are students going?</p> <ul style="list-style-type: none"> <li>Divide multi-digit whole numbers with up to four-digit dividends and two-digit divisors (5.NOS.B.5).</li> </ul> | <ul style="list-style-type: none"> <li>Students continue to build understanding of division through a balance of concrete, semi-concrete, and abstract approaches. Model various approaches and encourage flexibility. Avoid modeling or requiring a single approach.</li> <li><b>4.NOS.B.6b:</b> Students may begin using concrete models to divide. Support students in making connections between concrete models and visual models, such as the area model, to promote efficiency. For example, the place value model (top) and area model (bottom) represent <math>256 \div 4</math>.</li> </ul>  <p style="text-align: center;">Continued on next page</p> | <ul style="list-style-type: none"> <li>Make explicit connections between different approaches.</li> <li>Develop proficiency with division strategies. Students should begin exploring strategies to divide 2-digit dividends by one-digit divisors. As students become more proficient, they will apply their understanding of these strategies to 3- and 4-digit dividends.</li> <li>Use strategies flexibly, making decisions on which strategy or method to use based on the numbers or context of the given problem (SMP 5).</li> <li>Engage in <a href="#">Number Talks</a> to promote flexible thinking and provide opportunities to explain their thinking and make connections to other strategies.</li> <li>Apply estimation strategies to assess the reasonableness of quotients.</li> <li><b>Students must have multiple opportunities and varied ways to demonstrate mastery, as this standard constitutes key Grade 4 Number and Operation Sense milestones in the Operations strand of the Numeracy Development Framework.</b></li> </ul> |

| Content Progression | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Students should have the opportunity to... |
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|                     | <ul style="list-style-type: none"> <li> <b>4.NOS.B.6b:</b> Partial quotients involves subtracting groups of the divisor from the dividend to make computation more manageable. For example, a student may show the steps shown below to solve <math>256 \div 4</math>.           <div style="text-align: center;"> <math display="block">  \begin{array}{r}  4 \\  10 \\  50 \\  \hline  4 \overline{) 256} \\  \underline{- 200} \quad (4 \times 50 = 200) \\  56 \\  \underline{- 40} \quad (4 \times 10 = 40) \\  16 \\  \underline{- 16} \quad (4 \times 4 = 16) \\  0  \end{array}  </math> </div> </li> <li> <b>4.NOS.B.6c:</b> Students apply their understanding as multiplication and division as inverse operations to think of a division problem as multiplication problem with a missing factor. For example, when solving <math>1.435 \div 7</math>, a student can think of <math>7 \times ? = 1.435</math>. The student can use known facts to find the missing factor, <math>7 \times 200 = 1,400</math> and <math>7 \times 5 = 35</math> so <math>1.435 \div 7 = 205</math>.         </li> <li> <b>4.NOS.B.6d:</b> Students can explain how their representation or strategy accurately represents division. For example, if using a rectangular array to represent and solve <math>256 \div 4</math>, a student may explain that the rectangular array shows 256 divided equally into 4 equal groups, or rows, as shown in the rectangular array on previous page.         </li> </ul> |                                            |

Previously 4.NBT.B.6

**4.NOS.C GAIN FAMILIARITY WITH FACTORS AND MULTIPLES.**

**4.NOS.C.7: Recall or quickly derive multiplication and division facts within 100 (e.g., factors less than or equal to 10 and quotients less than or equal to 10).**

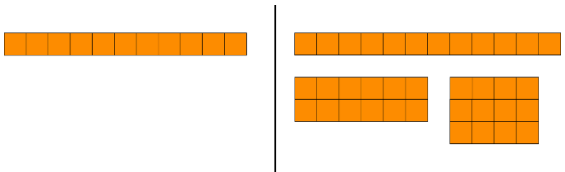
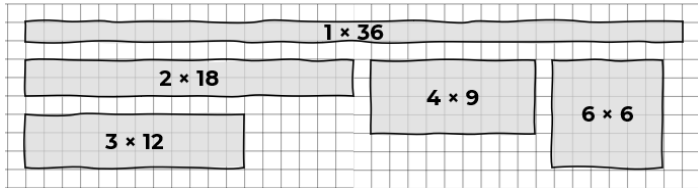
- Skip count (2s, 5s, 10s) and apply properties of operations (0s, 1s) to derive foundational facts.**
- Derive unknown facts from known facts using double facts (e.g., to solve  $4 \times 3$ , double 3 to get 6 and double 6 to get 12) to multiply and divide.**
- Use properties of operations (e.g., to solve  $8 \times 7$ , think of  $(5 \times 7 + (3 \times 7))$  to multiply.**
- Use the inverse relationship between multiplication and division (e.g., think of  $4 \times ? = 28$  to solve  $28 \div 4 = ?$ ) to multiply and divide.**

| Content Progression                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Students should have the opportunity to...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
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| <p>Where are students coming from?</p> <ul style="list-style-type: none"> <li>Recall or quickly derive multiplication and division facts within 100 (3.NOS.E.9).</li> </ul> <p>Where are students going?</p> <ul style="list-style-type: none"> <li>Fluently multiply multi-digit whole numbers (5.NOS.B.4).</li> </ul> <p>Note: 4.NOS.C.7 focuses on developing mastery of multiplication and division facts within 100, which builds directly on the foundational work from Grade 3 (3.NOS.E.9). Continued practice and application across contexts are essential for mastery.</p> | <ul style="list-style-type: none"> <li><b>4.NOS.C.7a:</b> Students may use skip counting as a strategy to solve multiplication and division facts.</li> <li><b>4.NOS.C.7a:</b> Students apply the Identity Property of Multiplication (the product of any number and 1 is that number) and the Zero Property of Multiplication (any number multiplied by 0 is 0) to derive facts. Students are expected to describe, explain, and apply the properties but are not required to name them.</li> <li><b>4.NOS.C.7b:</b> Model and encourage students to use more efficient strategies as they work toward mastery. For example, if a student does not know the product of <math>4 \times 7</math>, the student can use known facts to determine the unknown fact. The factor, 7, can be decomposed into <math>5 + 2</math>. Then, 4 can be multiplied by each addend separately and the two products can be added.<br/><br/><b><math>4 \times 7 = (4 \times 2) + (4 \times 5)</math></b></li> <li>Students are expected to recall multiplication and division facts within 100 (where the factors or quotient is 0-10) or to use an efficient strategy to quickly find the product or quotient of an unknown fact.</li> <li>Use equations with equal sign in varying positions (e.g., <math>6 = 2 \times 3</math>, <math>20 \div 5 = 4</math>, etc.).</li> <li>Provide a variety of opportunities for students to practice and demonstrate mastery. Avoid relying solely on timed tests and memorization.</li> </ul> | <ul style="list-style-type: none"> <li>Engage in explicit strategy instruction, that allows time for exploration and practice.</li> <li>Use strategies flexibly, making decisions on which strategy or method to use based on the numbers in the problem and what facts the student knows.</li> <li>Engage in <a href="#">Number Talks</a> to promote flexible thinking and provide opportunities to explain their thinking and make connections to other strategies.</li> <li>Construct coherent chains of reasoning to explain their strategy for finding a given product or quotient or proving their product or quotient is correct. Engaging in discussion around various strategies allows students still using counting strategies to make connections to more sophisticated strategies (SMP 2, SMP 3).</li> <li>Discuss patterns and structure they notice while multiplying or dividing, allowing students to make generalizations about how strategies can help in learning multiplication and division facts (SMP 7).</li> </ul> |

Adopted 2025

**4.NOS.C.8: Explain and apply concepts of factors, multiples, and prime and composite numbers for whole numbers in the range of 1-100.**

- Identify factor pairs for a whole number in the range of 1-100.**
- Determine whether a given whole number in the range of 1-100 is a multiple of a one-digit number.**
- Distinguish between factors and multiples and explain how they relate to a given number.**
- Determine whether a given whole number in the range of 1-100 is prime, composite, or neither.**

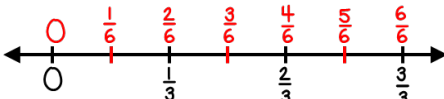
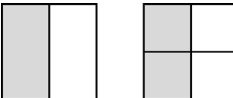
| Content Progression                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Students should have the opportunity to...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
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| <p>Where are students coming from?</p> <ul style="list-style-type: none"> <li>Explain the relationship between the factors and products (3.NOS.B.2).</li> <li>Recall or quickly derive multiplication and division facts within 100 (3.NOS.E.9)</li> </ul> <p>Where are students going?</p> <ul style="list-style-type: none"> <li>Identify the common factors and multiples of whole numbers (6.NOS.B.4).</li> <li>Apply properties of operations to generate and identify equivalent algebraic expressions (6.AT.B.7).</li> </ul> | <ul style="list-style-type: none"> <li>Factors are the numbers we multiply together to equal a product. A factor can also be thought of as a whole number that equally divides another whole number with no remainder (e.g., 1, 2, 3, 6, 9, 18 are factors of 18).</li> <li>A multiple is the product of multiplying two whole numbers. Skip counting by a given number is another way to identify multiples (e.g., 3, 6, 9, 12, 15... are multiples of 3).</li> <li><b>4.NOS.C.8a:</b> A factor pair is a set of two factors that are multiplied together and equal a given number. For example, the factor pairs of 36 are <math>1 \times 36</math>, <math>2 \times 18</math>, <math>3 \times 12</math>, <math>4 \times 9</math>, and <math>6 \times 6</math> and can be represented by the arrays shown to the right.</li> <li><b>4.NOS.C.8d:</b> Prime numbers have exactly two factors, the number itself and 1 (e.g., 17 is a prime number because its only factors are 1 and 17). Composite numbers have more than two factors (e.g., 18 is composite number because it has more than two factors, 1, 2, 3, 6, 9, 18).</li> <li><b>4.NOS.C.8d:</b> The concept of prime and composite numbers should be discovered through exploration of arrays and identification of patterns. For example, students may discuss the similarities and differences between the arrays for 11 and 12 shown below. Avoid providing definitions without student discovery.</li> </ul> <div style="text-align: center;">  </div> | <ul style="list-style-type: none"> <li>Use square tiles or grid paper to create arrays to explore and identify factors or factor pairs of a given number.</li> </ul>  <ul style="list-style-type: none"> <li>Explore arrays and factors of given numbers to identify and describe patterns, verbally and in writing. For example, a student may explain that they noticed that when creating arrays for prime numbers, only 1 array can be made but when creating arrays for composite number, at least two arrays can be made.</li> <li>Apply understanding prime and composite numbers to make predictions about a number before building an array or completing a calculation (SMP 8).</li> </ul> |

Previously 4.OA.B.4

**4.NOS.D EXTEND UNDERSTANDING OF FRACTION EQUIVALENCE AND ORDERING.**

(Limit to fractions with denominators 1, 2, 3, 4, 5, 6, 8, 10, 12 and 100)

**4.NOS.D.9: Understand and generate equivalent fractions.****a. Identify and generate equivalent fractions using representations and the Identity Property of Multiplication.****b. Explain why fractions are equivalent  $\left(\frac{c}{d} = \frac{n \times c}{n \times d}\right)$ .**

| Content Progression                                                                                                                                                                                                                                                                                                                                                                                          | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Students should have the opportunity to...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
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| <p>Where are students coming from?</p> <ul style="list-style-type: none"> <li>Represent, identify, and generate equivalent fractions using concrete materials, drawings, number lines, or equations (3.NOS.F.13).</li> </ul> <p>Where are students going?</p> <ul style="list-style-type: none"> <li>Use equivalent fractions to add and subtract fractions with unlike denominators (5.NOS.C.8).</li> </ul> | <ul style="list-style-type: none"> <li>Grade 4 students will work with denominators of 1, 2, 3, 4, 5, 6, 8, 10, 12 and 100, including fractions less than, equal to, or greater than 1 (including mixed numbers).</li> <li>Equivalent fractions represent the same quantity or same length on a number line.</li> <li>Students continue to build understanding of fraction equivalence through a balance of concrete, semi-concrete, and abstract representations. Avoid moving to abstract approaches too quickly without ensuring students have sufficient experience with concrete and semi-concrete approaches.</li> <li><b>4.NOS.D.9a:</b> Students use representations (e.g., concrete materials, area models, number lines) to identify or generate equivalent fractions.</li> </ul>  <ul style="list-style-type: none"> <li><b>4.NOS.D.9a:</b> Support students in making connections between representations and the Identity Property of Multiplication (the product of any number and 1 is that number) to promote efficiency.</li> </ul>  $\frac{1}{2} \times 1 = \frac{1}{2} \times \frac{2}{2} = \frac{2}{4}$ | <ul style="list-style-type: none"> <li>Use representations and the Identity Property of Multiplication flexibly, making decision on which representation/method to use based on context (SMP 5).</li> <li>Explore various examples of equivalent fractions to identify and extend patterns to form a rule for generating equivalent fractions. For example, a student may notice patterns when generating equivalent fractions, <math>\frac{1}{3} \times \frac{2}{2} = \frac{2}{6}</math> and <math>\frac{3}{4} \times \frac{3}{3} = \frac{9}{12}</math>. Encourage students to discuss what <math>\frac{2}{2}</math> and <math>\frac{3}{3}</math> have in common to make connections to the Identity Property of Multiplication.</li> <li>Use visual, symbolic, or contextual representations to explain why fractions are equivalent.</li> <li><b>Students must have multiple opportunities and varied ways to demonstrate mastery, as this standard constitutes key Grade 4 Number and Operation Sense milestones in the Fractions &amp; Decimals strand of the Numeracy Development Framework.</b></li> </ul> |

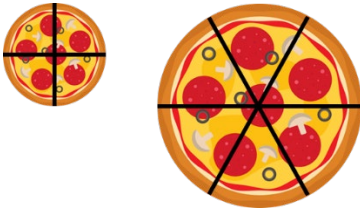
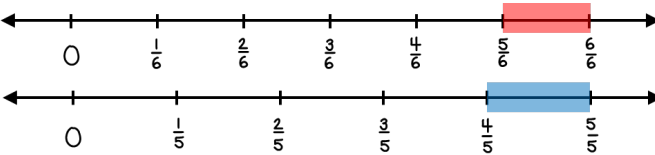
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| Content Progression | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                               | Students should have the opportunity to... |
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|                     | <ul style="list-style-type: none"><li>Students should use equivalent fractions strategically and flexibly. Students are not required to simplify fractions, however, they should be able to recognize equivalent fractions when necessary.</li><li>Use “fractions greater than 1.” Avoid using “improper fractions” as this phrase can be confusing/misleading.</li></ul> |                                            |

Previously 4.NF.A.1

**4.NOS.D.10: Compare two fractions with different numerators and different denominators, understanding that comparisons are valid only when the two fractions refer to the same whole.**

- Use benchmark numbers (e.g.,  $\frac{1}{2}$ , 1), common numerators, and common denominators to compare.
- Record comparisons with symbols  $>$ ,  $=$ , and  $<$ .
- Justify comparisons using representations and reasoning.

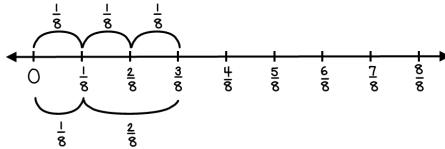
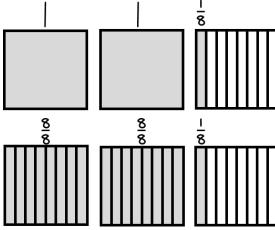
| Content Progression                                                                                                                                                                                                                                                                                                                         | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Students should have the opportunity to...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
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| <p>Where are students coming from?</p> <ul style="list-style-type: none"> <li>Compare fractions with same numerator or same denominator (3.NOS.F.13d).</li> </ul> <p>Where are students going?</p> <ul style="list-style-type: none"> <li>Solve problems in context involving addition and subtraction of fractions (5.NOS.C.9).</li> </ul> | <ul style="list-style-type: none"> <li>Grade 4 students will work with denominators of 1, 2, 3, 4, 5, 6, 8, 10, 12 and 100, including fractions less than, equal to, or greater than 1 (including mixed numbers).</li> <li>Use authentic contexts to support students in understanding why comparisons are only valid when the fractions refer to the same whole.</li> </ul>  <ul style="list-style-type: none"> <li><b>4.NOS.D.10a:</b> Students will use benchmarks, such as <math>\frac{1}{2}</math> or 1, to compare. For example, when comparing <math>\frac{3}{8}</math> and <math>\frac{9}{12}</math>, a student may recognize that <math>\frac{3}{8}</math> is less than <math>\frac{1}{2}</math> and <math>\frac{9}{12}</math> is greater than <math>\frac{1}{2}</math> so <math>\frac{3}{8}</math> must be less than <math>\frac{9}{12}</math>.</li> <li><b>4.NOS.D.10a:</b> When comparing fractions with the same numerator, students explain that since the number of pieces (numerator) is the same, the size of the pieces (denominator) is used to compare.</li> <li><b>4.NOS.D.10a:</b> When comparing fractions with the same denominator, students explain that since the size of pieces (denominator) is the same, the number of the pieces (numerator) is used to compare.</li> <li>Use “fractions greater than 1.” Avoid using “improper fractions” as this phrase can be confusing/misleading</li> </ul> | <ul style="list-style-type: none"> <li>Use strategies flexibly, making decisions on which strategy to use based on the numbers or context of the given problem (SMP 5).</li> <li>Use visual, symbolic, or contextual representations to justify comparisons. For example, when comparing <math>\frac{4}{5}</math> and <math>\frac{5}{6}</math>, student may recognize that each fraction is one part less than one whole. Since sixths are smaller pieces than fifths, <math>\frac{5}{6}</math> is closer to 1 than <math>\frac{4}{5}</math>, so <math>\frac{5}{6} &gt; \frac{4}{5}</math>.</li> </ul>  <p>A student could also consider a contextual representation to compare <math>\frac{4}{5}</math> and <math>\frac{5}{6}</math>. For example,</p> <p>Runner A ran <math>\frac{4}{5}</math> mile and Runner B ran <math>\frac{5}{6}</math> mile. The student may explain that each runner ran one part less than a full mile. However, Runner B ran the greater distance because sixths are smaller pieces than fifths so a smaller piece is missing from the whole.</p> <ul style="list-style-type: none"> <li>Apply understanding of fraction comparison to authentic contexts.</li> </ul> |

Previously 4.NF.A.2

**4.NOS.E BUILD FRACTIONS FROM UNIT FRACTIONS BY APPLYING AND EXTENDING PREVIOUS UNDERSTANDINGS OF OPERATIONS ON WHOLE NUMBERS.**

(Limit to fractions with denominators 1, 2, 3, 4, 5, 6, 8, 10, 12 and 100)

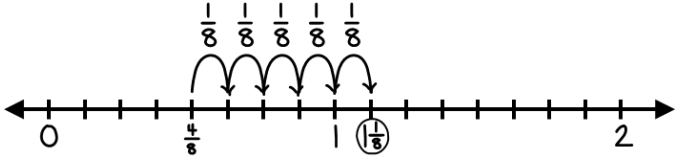
**4.NOS.E.11: Apply understanding of a fraction  $\frac{c}{d}$  with  $d > 1$  as a sum of unit fractions ( $\frac{1}{d}$ ) to decompose a fraction (including fractions greater than 1) into a sum of fractions with the same denominator in more than one way, recording each decomposition as an equation. Justify decompositions using visual fraction models and equations (e.g.,  $\frac{3}{8} = \frac{1}{8} + \frac{1}{8} + \frac{1}{8}$  or  $\frac{3}{8} = \frac{1}{8} + \frac{2}{8}$  or  $2\frac{1}{8} = 1 + 1 + \frac{1}{8}$  or  $2\frac{1}{8} = \frac{8}{8} + \frac{8}{8} + \frac{1}{8}$ ).**

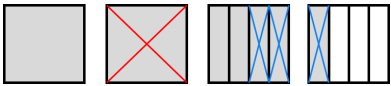
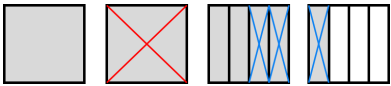
| Content Progression                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Students should have the opportunity to...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
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| <p>Where are students coming from?</p> <ul style="list-style-type: none"> <li>Explain that a fraction <math>\frac{1}{d}</math> represents one part of a whole that is divided into <math>d</math> equal parts, and that a fraction <math>\frac{c}{d}</math> represents <math>c</math> parts of size <math>\frac{1}{d}</math>. (3.NOS.F.10).</li> </ul> <p>Where are students going?</p> <ul style="list-style-type: none"> <li>Add and subtract fractions with unlike denominators (5.NOS.C.8).</li> </ul> | <ul style="list-style-type: none"> <li>Grade 4 students will work with denominators of 1, 2, 3, 4, 5, 6, 8, 10, 12 and 100, including fractions less than, equal to, or greater than 1 (including mixed numbers).</li> <li>A unit fraction represents one equal part of a whole that has been divided into equal parts. A unit fraction will always have a numerator of 1.</li> <li>Use “fractions greater than 1.” Avoid using “improper fractions” as this phrase can be confusing/misleading.</li> <li>Connect visual fraction models to equations to represent decomposition of various fractions. Avoid moving too quickly to abstract representations, without emphasis on conceptual understanding.</li> </ul> | <ul style="list-style-type: none"> <li>Compose and decompose fractions in a variety of ways, using both visual fraction models and equations.</li> <li>Discuss and justify why decompositions are accurate.</li> <li>Use visual, symbolic, or contextual representations to justify decompositions. For example, <math>\frac{3}{8} = \frac{1}{8} + \frac{1}{8} + \frac{1}{8}</math> and <math>\frac{3}{8} = \frac{1}{8} + \frac{2}{8}</math> can be represented on a number line.</li> </ul>  <p>The equations, <math>2\frac{1}{8} = 1 + 1 + \frac{1}{8}</math> and <math>2\frac{1}{8} = \frac{8}{8} + \frac{8}{8} + \frac{1}{8}</math>, can be represented with area models.</p>  |

Previously 4.NF.B.3

**4.NOS.E.12: Apply and extend previous understanding of addition and subtraction of whole numbers to add and subtract fractions with like denominators.**

- Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.
- Estimate sums and differences by reasoning about benchmark numbers and assess reasonableness of answers (e.g.,  $\frac{3}{4} + \frac{3}{4}$  will be greater than 1 because both fractions are greater than  $\frac{1}{2}$ ).
- Apply and extend whole number addition and subtraction strategies (e.g. counting on, making a whole, partial sums, compensation, properties of operations, the inverse relationship between addition and subtraction) to add and subtract fractions.
- Solve problems in context involving addition and subtraction of fractions using visual fraction models and equations to represent the problem.

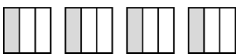
| Content Progression                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Students should have the opportunity to...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
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| <p>Where are students coming from?</p> <ul style="list-style-type: none"> <li>Fluently add and subtract with 1,000 (3.NOS.D.7).</li> <li>Explain that a fraction <math>\frac{1}{d}</math> represents one part of a whole that is divided into <math>d</math> equal parts, and that a fraction <math>\frac{c}{d}</math> represents <math>c</math> parts of size <math>\frac{1}{d}</math> (3.NOS.F.10).</li> </ul> <p>Where are students going?</p> <ul style="list-style-type: none"> <li>Add and subtract fractions with unlike denominators (5.NOS.C.8).</li> </ul> | <ul style="list-style-type: none"> <li>Grade 4 students will work with denominators of 2, 3, 4, 5, 6, 8, 10, 12 and 100, including fractions less than, equal to, or greater than 1 (including mixed numbers).</li> <li>Identify fractions that encourage the use of specific strategies. This supports conceptual understanding and promotes efficient approaches rather than rote calculation. Avoid fractions that distract from mathematical focus by making computation unnecessarily cumbersome.</li> <li>Use “fractions greater than 1.” Avoid using “improper fractions” as this phrase can be confusing/misleading</li> <li><b>4.NOS.E.12a:</b> It is important that students recognize that when joining or separating parts, all parts must refer to the same whole.</li> <li><b>4.NOS.E.12c:</b> Count on to add or subtract fractions. For example, a student may use a number line to show how to count on to find <math>\frac{4}{8} + \frac{5}{8}</math>.</li> </ul>  <p style="text-align: right;"><i>Continued on next page</i></p> | <ul style="list-style-type: none"> <li>Make explicit connections between different approaches.</li> <li>Use strategies flexibly, making decisions on which strategy to use based on the numbers or context of the given problem (SMP 5).</li> <li>Engage in <a href="#">Number Talks</a> to promote flexible thinking and provide opportunities to explain their thinking and make connections to other strategies.</li> <li>Apply estimation strategies to assess the reasonableness of sums and differences.</li> <li><b>Students must have multiple opportunities and varied ways to demonstrate mastery, as this standard constitutes key Grade 4 Number and Operation Sense milestones in the Fractions &amp; Decimals strand of the Numeracy Development Framework.</b></li> </ul> |

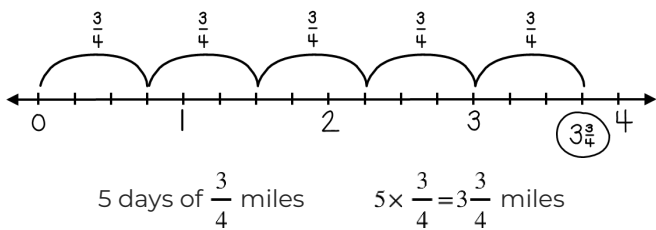
| Content Progression | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Students should have the opportunity to... |
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|                     | <ul style="list-style-type: none"> <li> <b>4.NOS.E.12c:</b> Use partial sums to add fractions. For example, a student may use partial sums to find <math>1\frac{1}{12} + 2\frac{3}{12}</math>.           <div style="text-align: center;"> <math display="block">\begin{array}{r} 1\frac{1}{12} + 2\frac{3}{12} \\ \hline 1\frac{1}{12} + 2\frac{3}{12} \\ \hline 3\frac{4}{12} = 3\frac{1}{3} \end{array}</math> </div> </li> <li> <b>4.NOS.E.12c:</b> Similar to partial sums, decomposition can be used to subtract fractions. For example, a student may use decomposition to find <math>3\frac{1}{4} - 1\frac{3}{4}</math>. Rewrite <math>3\frac{1}{4}</math> as <math>2\frac{5}{4}</math> because <math>2 + \frac{4}{4} + \frac{1}{4} = 2\frac{5}{4}</math> and <math>1\frac{3}{4}</math> as <math>1 + \frac{3}{4}</math> to subtract in parts.           <div style="text-align: center;">  </div> <math display="block">2\frac{5}{4} - 1\frac{3}{4} = 2\frac{5}{4} - \left(1 + \frac{3}{4}\right) = \left(2\frac{5}{4} - 1\right) - \frac{3}{4} = 1\frac{5}{4} - \frac{3}{4} = 1\frac{2}{4}</math> </li> <li> <b>4.NOS.E.12c:</b> Students may use inverse relationship between addition and subtraction to add and subtract fractions. For example, a student may think of <math>1\frac{1}{6} - \frac{5}{6}</math> as <math>\frac{5}{6} + ? = 1\frac{1}{6}</math>.           <math display="block">\frac{5}{6} + ? = 1\frac{1}{6}</math> </li> <li> <b>4.NOS.E.12d:</b> Context refers to the situation or setting that gives meaning to mathematical ideas, quantities, representations, or relationships. A context may arise from students' everyday experiences, other disciplines, or within mathematics itself and provides a basis for making sense of and reasoning about the mathematics involved. Refer to <a href="#">Addition and Subtraction Situations</a> for examples of addition and subtraction problem types.           <div style="text-align: center;">  </div> </li> </ul> |                                            |

Previously 4.NF.B.3

**4.NOS.E.13: Apply and extend previous understandings of multiplication to multiply a fraction by a whole number ( $b \times \frac{c}{d}$ ).**

- Estimate products by reasoning about benchmark numbers and assess reasonableness of answers (e.g.,  $4 \times \frac{1}{2}$  will be less than 4 because I have 4 groups of something less than 1).
- Use understanding of multiplication as equal groups to multiply a unit fraction by whole number (e.g., interpret  $b \times \frac{1}{d}$  as b groups of  $\frac{1}{d}$ ).
- Use understanding of multiplication as equal groups to multiply a fraction by whole number (e.g., interpret  $b \times \frac{c}{d}$  as b groups of  $\frac{c}{d}$  when  $\frac{c}{d}$  is greater than or less than 1).
- Solve problems in context involving multiplication of a fraction by a whole number, using visual fraction models and equations to represent the problem.

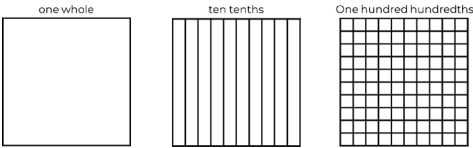
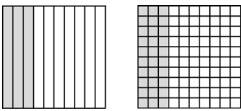
| Content Progression                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Students should have the opportunity to...                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Where are students coming from?</p> <ul style="list-style-type: none"> <li>Represent and interpret multiplication as equal groups or as composed unit that can be repeated/iterated (3.NOS.B.2).</li> </ul> <p>Where are students going?</p> <ul style="list-style-type: none"> <li>Multiply a whole number by a fraction (5.NOS.D.11).</li> <li>Multiply a fraction by a fraction, including one or both fractions greater than 1 (5.NOS.D.12; 5.NOS.D.13).</li> </ul> | <ul style="list-style-type: none"> <li>Grade 4 students will work with denominators of 2, 3, 4, 5, 6, 8, 10, 12 and 100. When multiplying, the fraction may be less than or greater than 1. The product may be less than, equal to, or greater than 1.</li> <li>Identify fractions that encourage the use of specific strategies. This supports conceptual understanding and promotes efficient approaches rather than rote calculation. Avoid fractions that distract from mathematical focus by making computation unnecessarily cumbersome.</li> <li>Use authentic contexts to support students in building conceptual understanding of multiplying a fraction by whole number.</li> <li><b>4.NOS.E.13b:</b> Use visual fraction models to help students visualize equal groups of unit fractions. For example, a student may use an area model to represent and solve the following problem.<br/> <b>The recipe calls for <math>\frac{1}{3}</math> cup of sugar. How much sugar is needed to make 4 batches of the recipe?</b><br/> <br/> <math>4 \text{ groups of } \frac{1}{3} \text{ cup} \qquad 4 \times \frac{1}{3} = \frac{4}{3} = 1\frac{1}{3} \text{ cups}</math></li> </ul> <p><i>Continued on next page</i></p> | <ul style="list-style-type: none"> <li>Make explicit connections between different approaches.</li> <li>Use strategies flexibly, making decisions on which strategy to use based on the numbers or context of the given problem (SMP 5).</li> <li>Engage in <a href="#">Number Talks</a> to promote flexible thinking and provide opportunities to explain their thinking and make connections to other strategies.</li> <li>Apply estimation strategies to assess the reasonableness of products.</li> </ul> |

| Content Progression                                | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Students should have the opportunity to... |
|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|
| <ul style="list-style-type: none"> <li></li> </ul> | <ul style="list-style-type: none"> <li> <b>4.NOS.E.13c:</b> Use visual fraction models to help students visualize equal groups of fractions. For example, a student may use a number line to represent and solve the following problem.<br/> <b>The runner plans to run <math>\frac{3}{4}</math> miles every weekday.</b><br/> <b>How many miles will the runner run in one week?</b><br/>  </li> <li> <b>4.NOS.E.13d:</b> Context refers to the situation or setting that gives meaning to mathematical ideas, quantities, representations, or relationships. A context may arise from students' everyday experiences, other disciplines, or within mathematics itself and provides a basis for making sense of and reasoning about the mathematics involved. Refer to <a href="#">Multiplication and Division Situations</a> for examples of multiplication problem types.         </li> </ul> |                                            |

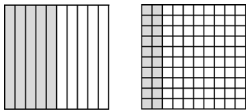
Previously 4.NF.B.4

**4.NOS.F UNDERSTAND DECIMAL NOTATION FOR FRACTIONS AND COMPARE DECIMAL FRACTIONS.**

**4.NOS.F.14: Express a fraction with a denominator of 10 as an equivalent fraction with a denominator of 100 to add two fractions with respective denominators of 10 and 100.**

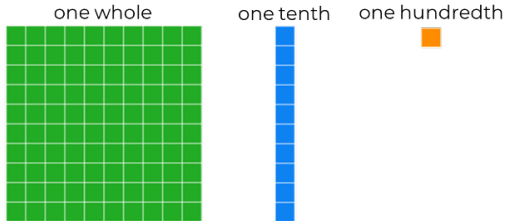
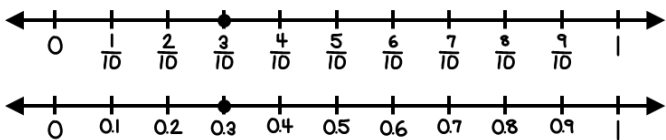
| Content Progression                                                                                                                                                                                                                                                                                                                                                                                                                | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Students should have the opportunity to...                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Where are students coming from?</p> <ul style="list-style-type: none"> <li>Understand and generate equivalent fractions (4.NOS.D.9).</li> </ul> <p>Where are students going?</p> <ul style="list-style-type: none"> <li>Read, write, and compare decimals to thousandths (5.NOS.A.3).</li> <li>Add and subtract decimals to hundredths (5.NOS.B.6).</li> <li>Multiply and divide decimals to hundredths (5.NOS.B.7).</li> </ul> | <ul style="list-style-type: none"> <li>Students apply their understanding of generating equivalent fractions to add fractions with denominators of 10 and 100, including fractions less than, equal to, or greater than 1 (expressed as both mixed numbers and fractions where the numerator is greater than the denominator).</li> <li>Use “fractions greater than 1.” Avoid using “improper fractions” as this phrase can be confusing/misleading.</li> <li>Use visual fractions models to represent fractions with denominators of 10 and 100. This supports students’ conceptual understanding and is foundational to their work with decimals. Avoid moving too quickly to abstract representations, without emphasis on conceptual understanding.</li> </ul> <div style="text-align: center;">  </div> <ul style="list-style-type: none"> <li>Use decimal grids to support students representing equivalent fractions with denominators of 10 and 100. For example, a student may use decimal grids to identify <math>\frac{3}{10} = \frac{30}{100}</math>.</li> </ul> <div style="text-align: center;">  </div> | <ul style="list-style-type: none"> <li>Use visual models to find equivalent fractions for fractions with denominators of 10 and 100.</li> <li>Use concrete and visual models to explore adding and subtracting fractions with denominators of 10 and 100.</li> <li>Identify patterns about fractions with denominators of 10 and 100.</li> <li>Make connections to dimes and pennies as <math>\frac{1}{10}</math> and <math>\frac{1}{100}</math> of a dollar, respectively.</li> </ul> |

*Continued on next page*

| Content Progression | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                               | Students should have the opportunity to...       |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|
|                     | <ul style="list-style-type: none"><li>Students will apply their understanding of equivalent fractions with denominators of 10 and 100 to add fractions with denominators of 10 and 100. For example, a student may use decimal grids to represent and find sum of <math>\frac{5}{10} + \frac{20}{100}</math>.</li></ul>  | <ul style="list-style-type: none"><li></li></ul> |

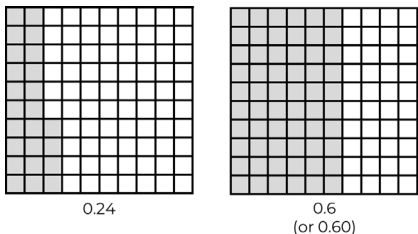
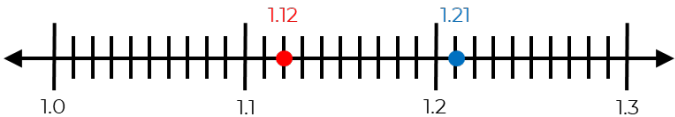
Previously 4.NF.C.5

**4.NOS.F.15: Use decimal notation for fractions with denominators 10 and 100 (e.g., rewrite 0.62 as  $\frac{62}{100}$  or describe a length as 0.62 meters or locate 0.62 on a number line).**

| Content Progression                                                                                                                                                                                                                                                                                                                                                                                                                | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Students should have the opportunity to...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Where are students coming from?</p> <ul style="list-style-type: none"> <li>Understand and generate equivalent fractions (4.NOS.D.9).</li> </ul> <p>Where are students going?</p> <ul style="list-style-type: none"> <li>Read, write, and compare decimals to thousandths (5.NOS.A.3).</li> <li>Add and subtract decimals to hundredths (5.NOS.B.6).</li> <li>Multiply and divide decimals to hundredths (5.NOS.B.7).</li> </ul> | <ul style="list-style-type: none"> <li>Decimal (including decimals greater than 1) notation should be introduced as an extension of the whole number place value system.</li> <li>Place value models, grid paper, and number lines can be used to create visual models to relate fractions with denominators of 10 and 100 to decimals. The use of visual models supports students' conceptual understanding and is foundational to their work with decimals. Avoid moving too quickly to abstract representations, without emphasis on conceptual understanding.</li> </ul> <div style="text-align: center;">  </div> <ul style="list-style-type: none"> <li>Use visual models to help students to understand that 0.3 and <math>\frac{3}{10}</math> are different representations for the same value, as both represent three equal parts of ten equal parts of a whole.</li> </ul> <div style="text-align: center;">  </div> <ul style="list-style-type: none"> <li>When reading decimals, make connections to how fractions with denominators of 10 and 100 are read. Model appropriate reading of decimals. For example, 0.62 is read as “sixty-two hundredths” and not “point six two” or 4.5 is read as “four and five tenths,” not “four point five.”</li> </ul> | <ul style="list-style-type: none"> <li>Extend their understanding of the place value (4.NOS.A.1) to explore and recognize patterns, as they begin to work with decimals to hundredths (SMP 7).</li> <li>Use visual models (e.g., place value models, decimal grids, and number lines) to explore and develop the concept of decimals.</li> <li>Use visual, symbolic, or contextual representations to explain that decimals and fractions with denominators of 10 and 100 are two different ways of representing the same quantity.</li> <li>Practice reading decimals to hundredths using precise language (SMP 6).</li> <li>Think flexibly decimals and fractions with denominators of 10 and 100. Estimation should be frequently embedded into discussions about numbers and their relationships.</li> <li>Make connections metric units and to dimes and pennies as <math>\frac{1}{10}</math> and <math>\frac{1}{100}</math> of a dollar, respectively.</li> <li><b>Students must have multiple opportunities and varied ways to demonstrate mastery, as this standard constitutes key Grade 4 Number and Operation Sense milestones in the Numbers &amp; Number Sets strand of the Numeracy Development Framework.</b></li> </ul> |

Previously 4.NF.C.6

**4.NOS.F.16: Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols  $>$ ,  $=$ , and  $<$  and justify the conclusions, (e.g. using a visual model).**

| Content Progression                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Students should have the opportunity to...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Where are students coming from?</p> <ul style="list-style-type: none"> <li>Compare whole numbers with 10,000 (3.NOS.A.1).</li> <li>Understand and generate equivalent fractions (4.NOS.D.9).</li> </ul> <p>Where are students going?</p> <ul style="list-style-type: none"> <li>Read, write, and compare decimals to thousandths (5.NOS.A.3).</li> <li>Add and subtract decimals to hundredths (5.NOS.B.6).</li> <li>Multiply and divide decimals to hundredths (5.NOS.B.7).</li> </ul> | <ul style="list-style-type: none"> <li>Use authentic contexts to support students in understanding why comparisons are only valid when the decimals refer to the same whole. For example, ask students to consider the difference between one-tenth of a centimeter and one-tenth of a meter.</li> <li>Present fractions with denominators of 10 and decimals to tenths together as students begin to compare decimals. The same should be done with fractions with denominator of 100 and decimals to hundredths. While students may begin comparing tenths and tenths, or hundredths and hundredths, they should transition to comparing tenths and hundredths.</li> <li>When comparing tenths and hundredths, it is helpful to write the tenths as the equivalent number of hundredths. For example, 0.6 is equal to 0.60.</li> <li>Use place value models or decimals grid to compare decimals. For example, the decimal grids below show that <math>0.24 &lt; 0.6</math> because more of the whole is shaded.</li> </ul> <div style="text-align: center;">  <p>0.24                      0.6<br/>(or 0.60)</p> </div> <ul style="list-style-type: none"> <li>Use number lines to visualize the relationship between decimals to compare. For example, the number line shows that <math>1.21 &gt; 1.12</math> because 1.21 is further to the right than 1.12.</li> </ul> <div style="text-align: center;">  <p>1.0                      1.1                      1.2                      1.3</p> </div> | <ul style="list-style-type: none"> <li>Use representations flexibly, making decisions on which representations to use based on the numbers or what makes sense to them (SMP 5).</li> <li>Use visual, symbolic, or contextual representations explain how to compare two decimals.</li> <li>Make connections metric units and to dimes and pennies as <math>\frac{1}{10}</math> and <math>\frac{1}{100}</math> of a dollar, respectively.</li> <li>Apply their comparison reasoning in different contexts, including ordering. Ordering decimals is a meaningful way to deepen understanding of place value and reinforce comparison skills.</li> <li><b>Students must have multiple opportunities and varied ways to demonstrate mastery, as this standard constitutes key Grade 4 Number and Operation Sense milestones in the Numbers &amp; Number Sets strand of the Numeracy Development Framework.</b></li> </ul> |

Previously 4.NF.C.6

# Algebraic Thinking (AT)

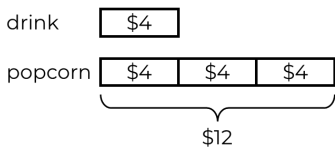
| Algebraic Thinking (AT) Clusters                                                  | Connections to the Numeracy Development Framework                                                                                                                                                                                                                                                     |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>4.AT.A</b> Represent and solve problems involving multiplication and division. | Standards within this cluster <b>directly contribute*</b> to the Grade 4 Algebraic Thinking milestones within the <b>Creating Equations &amp; Inequalities, Solving Equations &amp; Inequalities, Functional Reasoning, and Proportional Reasoning strands</b> of the Numeracy Development Framework. |

**\*Directly contribute to milestones:** The cluster includes content and practices that are *explicitly named within* an NDF milestone, meaning student proficiency with this cluster demonstrates attainment of that milestone.

**\*\*Contribute to milestones:** The cluster builds prerequisite knowledge, skills, or ways of reasoning that *support progress toward* a milestone in the NDF, even if the milestone itself is not fully realized at this stage.

**4.AT.A REPRESENT AND SOLVE PROBLEMS INVOLVING MULTIPLICATION AND DIVISION.**

**4.AT.A.1: Interpret a multiplication situation as a comparison (e.g., interpret  $35 = 5 \times 7$  as a statement that 35 is 5 times as many as 7 and 7 times as many as 5). Represent verbal statements of multiplicative comparisons as multiplication equations.**

| Content Progression                                                                                                                                                                                                                                                                                                                            | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Students should have the opportunity to...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Where are students coming from?</p> <ul style="list-style-type: none"> <li>Use multiplication and division within 100 to solve one-step problems in context (3.AT.A.1).</li> </ul> <p>Where are students going?</p> <ul style="list-style-type: none"> <li>Interpret multiplication as scaling (sizing) in context (5.NOS.D.14).</li> </ul> | <ul style="list-style-type: none"> <li>Multiplicative comparison situations describe one quantity as a multiple of another. These situations involve two sets that are being compared. The first set has a certain number of items and the second contains multiple copies of the first set.</li> <li>Multiplicative comparison is a new application for Grade 4 students. In Grade 3, students applied multiplication in equal groups and arrays.</li> <li>Multiplicative comparison problems should be presented in authentic contexts, to support students understanding. Context refers to the situation or setting that gives meaning to mathematical ideas, quantities, representations, or relationships. A context may arise from students' everyday experiences, other disciplines, or within mathematics itself and provides a basis for making sense of and reasoning about the mathematics involved. Refer to <a href="#">Multiplication and Division Situations</a> for examples of multiplicative comparison situations. Grade 4 students work with unknowns in all positions.</li> <li>Visual models, including bar diagrams can be used to represent multiplicative comparison situations.</li> </ul> <p><b>At the movie theater, a drink costs \$4. The jumbo bucket of popcorn costs three times as much.</b></p> <div style="text-align: center;">  <p>drink <span style="border: 1px solid black; padding: 2px;">\$4</span></p> <p>popcorn <span style="display: inline-block; border: 1px solid black; padding: 2px;">\$4</span> <span style="display: inline-block; border: 1px solid black; padding: 2px;">\$4</span> <span style="display: inline-block; border: 1px solid black; padding: 2px;">\$4</span></p> <p style="margin-left: 150px;">⏟</p> <p style="margin-left: 150px;">\$12</p> </div> <p><b>This situation can also be represented with the equation, <math>3 \times 4 = 12</math>, because the cost of the drink, \$4, is iterated 3 times to find the cost of the jumbo bucket of popcorn.</b></p> | <ul style="list-style-type: none"> <li>Interpret a variety of multiplicative comparison situations and describe what is happening in the situation in their own words (SMP 1).</li> <li>Discuss the meaning of quantities in multiplicative comparison situations, identifying which factor is telling how many times the other factor will be copied or iterated (SMP 2).</li> <li>Represent multiplicative comparison situations by selecting and applying appropriate representations (e.g., manipulatives, bar diagrams, equations). Students should develop flexibility in their use of various representations.</li> <li>Determine the information needed to answer the mathematical question.</li> <li>Examine various multiplication situations, including those involving multiplicative comparison, equal groups, and arrays to discuss similarities and differences.</li> <li><b>Students must have multiple opportunities and varied ways to demonstrate mastery, as this standard constitutes key Grade 4 Algebraic Thinking milestones in the Functional Reasoning strand of the Numeracy Development Framework.</b></li> </ul> |

Previously 4.OA.A.1

**4.AT.A.2: Multiply or divide to solve multiplicative comparison problems in context by using drawings and equations with a symbol for the unknown number to represent the problem.**

| Content Progression                                                                                                                                                                                                                                                                                                                            | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Students should have the opportunity to...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Where are students coming from?</p> <ul style="list-style-type: none"> <li>Use multiplication and division within 100 to solve one-step problems in context (3.AT.A.1).</li> </ul> <p>Where are students going?</p> <ul style="list-style-type: none"> <li>Interpret multiplication as scaling (sizing) in context (5.NOS.D.14).</li> </ul> | <ul style="list-style-type: none"> <li>Multiplicative comparison situations describe one quantity as a multiple of another. These situations involve two sets that are being compared. The first set has a certain number of items and the second contains multiple copies of the first set.</li> <li>Multiplicative comparison problems should be presented in authentic contexts, to support students understanding. Context refers to the situation or setting that gives meaning to mathematical ideas, quantities, representations, or relationships. A context may arise from students' everyday experiences, other disciplines, or within mathematics itself and provides a basis for making sense of and reasoning about the mathematics involved. Refer to <a href="#">Multiplication and Division Situations</a> for examples of problem types. Grade 4 students work with unknowns in all positions.</li> <li>Model appropriate vocabulary to describe multiplicative comparison situations (e.g., times as many, times fewer).</li> </ul> <p style="text-align: right;"><i>Continued on next page</i></p> | <ul style="list-style-type: none"> <li>Interpret a variety of multiplicative comparison situations and describe what is happening in the situation in their own words (SMP 1).</li> <li>Discuss the meaning of quantities in multiplicative comparison situations, identifying which factor tells the group size and which factor is the multiplier. As they make these distinctions, students should also represent the unknown quantity with a variable to express the comparison as an equation (SMP 2).</li> <li>Represent multiplicative comparison situations by selecting and applying appropriate representations (e.g., manipulatives, bar diagrams, equations). Students should develop flexibility in their use of various representations.</li> <li>Determine the information needed to answer the mathematical question.</li> <li>Engage in contexts that involve investment (e.g., An investment grows to be 4 times its original amount after 5 years. If the original amount was \$200, what is the amount after 5 years?). \$</li> <li><b>Students must have multiple opportunities and varied ways to demonstrate mastery, as this standard constitutes key Grade 4 Algebraic Thinking milestones in the Solving Equations &amp; Inequalities and Functional Reasoning strands of the Numeracy Development Framework.</b></li> </ul> |

| Content Progression | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Students should have the opportunity to... |         |         |         |         |         |         |   |   |   |   |   |   |   |         |   |   |  |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|---------|---------|---------|---------|---------|---------|---|---|---|---|---|---|---|---------|---|---|--|
|                     | <div><ul style="list-style-type: none"><li>Model how bar diagrams and equations can be used to represent a variety of multiplicative comparison situations, with unknowns in all positions.<br/><b>Product Unknown:</b> The walking trail is 3 miles. The biking trail is 6 times as long as the walking trail. How long is the biking trail?<br/><math display="block">3 \times 6 = b</math><br/><b>(b = length of biking trail)</b><br/><br/>walk <table border="1"><tr><td>3 miles</td></tr></table><br/><br/>bike <table border="1"><tr><td>3 miles</td><td>3 miles</td><td>3 miles</td><td>3 miles</td><td>3 miles</td><td>3 miles</td></tr></table><br/><div></div><br/><b>Factor Unknown (group size unknown):</b> The biking trail is 18 miles. That is 6 times as long as the walking trail. How long is the walking trail?<br/><math display="block">w \times 6 = 18</math><br/><b>(w = length of walking trail)</b><br/><br/>walk <table border="1"><tr><td>?</td></tr></table><br/><br/>bike <table border="1"><tr><td>?</td><td>?</td><td>?</td><td>?</td><td>?</td><td>?</td></tr></table><br/><div></div><br/><b>Factor Unknown (multiplier unknown):</b> The walking trail is 3 miles. The biking trail is 18 miles. How many times as long is the biking trail compared to the walking trail?<br/><math display="block">3 \times ? = 18</math><br/><b>(? = how many times longer)</b><br/><br/>walk <table border="1"><tr><td>3 miles</td></tr></table><br/><br/>bike <table border="1"><tr><td>?</td><td>?</td></tr></table><br/><div></div></li></ul></div> | 3 miles                                    | 3 miles | 3 miles | 3 miles | 3 miles | 3 miles | 3 miles | ? | ? | ? | ? | ? | ? | ? | 3 miles | ? | ? |  |
| 3 miles             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                            |         |         |         |         |         |         |   |   |   |   |   |   |   |         |   |   |  |
| 3 miles             | 3 miles                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 3 miles                                    | 3 miles | 3 miles | 3 miles |         |         |         |   |   |   |   |   |   |   |         |   |   |  |
| ?                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                            |         |         |         |         |         |         |   |   |   |   |   |   |   |         |   |   |  |
| ?                   | ?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | ?                                          | ?       | ?       | ?       |         |         |         |   |   |   |   |   |   |   |         |   |   |  |
| 3 miles             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                            |         |         |         |         |         |         |   |   |   |   |   |   |   |         |   |   |  |
| ?                   | ?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                            |         |         |         |         |         |         |   |   |   |   |   |   |   |         |   |   |  |

Previously 4.OA.A.2

**4.AT.A.3: Distinguish multiplicative comparison from additive comparison.**

| Content Progression                                                                                                                                                                                                                                                                                                                                                                                                                                             | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Students should have the opportunity to...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
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| <p>Where are students coming from?</p> <ul style="list-style-type: none"><li>Use addition and subtraction within 100 to solve one- and two-step problems in context (2.AT.A.1; 2.AT.A.2).</li><li>Use multiplication and division within 100 to solve one-step problems in context (3.AT.A.1).</li></ul> <p>Where are students going?</p> <ul style="list-style-type: none"><li>Interpret multiplication as scaling (sizing) in context (5.NOS.D.14).</li></ul> | <ul style="list-style-type: none"><li>Additive comparison situations focus on the difference between two quantities (how much more or less). Multiplicative comparison situations focus on describing one quantity as a multiple of another.<br/><b>Additive:</b> A small bag of dog food weighs 5 pounds and a large bag of dog food weighs 15 pounds. How many more pounds of dog food is in the large bag?<br/><div><div>small</div><div><div>5 lbs.</div><div>?</div></div></div><div><div>large</div><div><div>15 lbs.</div></div></div><br/><b>Multiplicative:</b> A small bag of dog food weighs 5 pounds and a large bag of dog food weighs 15 pounds. How many times heavier is the large bag than the small bag?<br/><div><div>small</div><div><div>5 lbs.</div></div></div><div><div>large</div><div><div>5 lbs.</div><div>5 lbs.</div><div>5 lbs.</div></div><div><div>15 lbs.</div></div></div></li><li>Provide examples of both additive and multiplicative comparison problems in context. Context refers to the situation or setting that gives meaning to mathematical ideas, quantities, representations, or relationships. A context may arise from students' everyday experiences, other disciplines, or within mathematics itself and provides a basis for making sense of and reasoning about the mathematics involved. Refer to <a href="#">Situation Types for Operations in Word Problems</a> for examples.</li><li>Support students in making sense of problems in context. Model and encourage students to retell, act it out, draw pictures, etc. Avoid using key word identification in problems (e.g., CUBES method) as this does not support students' problem solving and may lead to misconceptions.</li></ul> | <ul style="list-style-type: none"><li>Make sense and interpret comparison situations, both additive and multiplicative (SMP 1).</li><li>Discuss differences between additive and multiplicative comparison situations to identify structure of problems in context (SMP 7). Students consider language within the problems as well as models that can be used to represent situations (as shown to the left).</li><li>Explain the difference between additive and multiplicative comparison situations.</li><li>Create their own examples of additive and multiplicative comparison problems.</li><li><b>Students must have multiple opportunities and varied ways to demonstrate mastery, as this standard constitutes key Grade 4 Algebraic Thinking milestones in the Proportional Reasoning strand of the Numeracy Development Framework.</b></li></ul> |

Previously 4.OA.A.2

**4.AT.A.4: Solve multistep problems in context involving whole numbers and having whole number answers using the four operations, including problems in which remainders must be interpreted.**

- a. Represent these problems using equations with a letter standing for the unknown quantity.
- b. Assess the reasonableness of answers in terms of context, including interpreting remainders.

| Content Progression                                                                                                                                                                                                                                                                                                              | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Students should have the opportunity to...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
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| <p>Where are students coming from?</p> <ul style="list-style-type: none"> <li>Use the four operations to solve two-step problems in context (3.AT.A.2).</li> </ul> <p>Where are students going?</p> <ul style="list-style-type: none"> <li>Interpret and evaluate numerical expression with group symbols (5.AT.A.1).</li> </ul> | <ul style="list-style-type: none"> <li>Grade 4 students should solve problems involving whole numbers and having whole number solutions. Addition and subtraction should be within 1,000,000 (in alignment with 4.NOS.B.3). Multiplication should include up to four-digits by a one-digit whole number or two two-digit numbers. (in alignment with 4.NOS.B.5). Division should include up to four-digit dividends and one-digit divisors with and without remainders (in alignment with 4.NOS.B.6).</li> <li>Problems should be presented in authentic contexts. Context refers to the situation or setting that gives meaning to mathematical ideas, quantities, representations, or relationships. A context may arise from students' everyday experiences, other disciplines, or within mathematics itself and provides a basis for making sense of and reasoning about the mathematics involved. Refer to <a href="#">Situation Types for Operations in Word Problems</a> for examples of problem types. Grade 4 students work with unknowns in all positions.</li> <li>Support students in making sense of two-step problems in context. Model and encourage students to retell, act it out, draw pictures, etc. Avoid using key word identification in problems (e.g., CUBES method) as this does not support students' problem solving and may lead to misconceptions.</li> </ul> <p style="text-align: right;"><i>Continued on next page</i></p> | <ul style="list-style-type: none"> <li>Describe what is happening in a given context in their own words (SMP 1).</li> <li>Discuss the meaning of quantities in the presented contexts and how the quantities are related (SMP 2).</li> <li>Formulate a question about a particular context that can be answered using mathematics.</li> <li>Determine the information needed to answer the mathematical question.</li> <li>Represent situations mathematically by selecting and applying appropriate representations (e.g., manipulatives, drawings, number lines, equations, etc.). Develop flexibility in their use of various strategies.</li> <li>Use a variety of mental computation and estimation strategies to estimate before solving.</li> <li>Interpret the results in of their mathematical model in terms of the context to determine what the answer means in the situation.</li> <li>Revise their mathematical model if they determine their answer is not reasonable.</li> <li><b>Students must have multiple opportunities and varied ways to demonstrate mastery, as this standard constitutes key Grade 4 Algebraic Thinking milestones in the Creating Equations &amp; Inequalities and Solving Equations &amp; Inequalities strands of the Numeracy Development Framework.</b></li> </ul> |

| Content Progression | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Students should have the opportunity to... |
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|                     | <ul style="list-style-type: none"><li>• <b>4.AT.A.4a:</b> It is important for students to consider the order in which operations are performed. Discuss the appropriate order for completing the computations and what happens if they are completed in a different order. Model the use of grouping symbols, such as parentheses, to accurately record calculations based on the context of a multi-step problem. However, students are not required to use grouping symbols when writing equations.</li><li>• <b>4.AT.A.4a:</b> Grade 4 students will use a letter (or variable) to represent the unknown. When typed, variables are lower case and italic font. While students are not required to use the term, “variable,” this language can be modeled for students.</li><li>• <b>4AT.A.4b:</b> Model and encourage students to use mental computation and/or estimation strategies before solving to identify a reasonable answer. After solving, revisit estimate and context to ensure the answer is reasonable. as this may impact the accuracy and reasonableness of an answer.</li><li>• A variety of representations and strategies can be used to represent and solve two-step problems (in alignment with 4.NOS.B). Avoid modeling or requiring a specific representation or strategy.</li><li>• Intentionally select numbers that encourage the use of specific strategies. This promotes efficient approaches rather than rote calculation. Avoid numbers that distract from mathematical focus by making computation unnecessarily cumbersome.</li></ul> |                                            |

Previously 4.OA.A.3

## Geometric Reasoning and Measurement (GR)

| Geometric Reasoning Clusters                                                                                  | Connections to the Numeracy Development Framework                                                                                                                                                                          |
|---------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>4.GR.A</b> Solve problems involving measurement conversion, area, perimeter.                               | Standards within this cluster <b>directly contribute*</b> to the Grade 4 Geometric Reasoning and Measurement milestones within the <b>Reasoning with Geometric Structure strand</b> of the Numeracy Development Framework. |
| <b>4.GR.B</b> Understand concept of angle and measure angles.                                                 | Standards within this cluster <b>directly contribute*</b> to the Grade 3 Geometric Reasoning and Measurement milestones within the <b>Measurement strand</b> of the Numeracy Development Framework.                        |
| <b>4.GR.C</b> Draw and identify lines and angles and classify shapes by properties of their lines and angles. | Standards within this cluster <b>directly contribute*</b> to the Grade 3 Geometric Reasoning and Measurement milestones within the <b>Classifying Figures strand</b> of the Numeracy Development Framework.                |

**\*Directly contribute to milestones:** The cluster includes content and practices that are *explicitly named within* an NDF milestone, meaning student proficiency with this cluster demonstrates attainment of that milestone.

**\*\*Contribute to milestones:** The cluster builds prerequisite knowledge, skills, or ways of reasoning that *support progress toward* a milestone in the NDF, even if the milestone itself is not fully realized at this stage.

**4.GR.A SOLVE PROBLEMS INVOLVING MEASUREMENT CONVERSION, AREA, AND PERIMETER.**

**4.GR.A.1: Apply the relationship between measurement units within a given measurement system (customary: in, ft, yd, oz, lb, sec, min, hr; metric: cm, m, km, g, kg, mL, L) to convert measurements from a larger unit to smaller unit.**

| Content Progression                                                                                                                                                                                                                                                                                                                                                                                                                             | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Students should have the opportunity to... |      |   |   |   |   |   |   |   |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
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| <p>Where are students coming from?</p> <ul style="list-style-type: none"><li>Measure the length of an object to nearest half and quarter unit (3.GR.A.1).</li><li>Measure and estimate liquid volumes and masses (3.GR.A.3).</li></ul> <p>Where are students going?</p> <ul style="list-style-type: none"><li>Convert among different-sized standard measurement units and use conversions in solving multi-step problems (5.GR.A.1).</li></ul> | <ul style="list-style-type: none"><li>Grade 4 students convert measurements from a larger unit to smaller unit only. Students are not expected to convert from a smaller unit to a larger unit.</li><li>Grade 4 students convert measurements within the same measurement system (e.g., feet to inches, pounds to ounces). Students are not expected to convert across measurement systems (e.g., feet to centimeters).</li><li>Use measurement tools to introduce equivalent measurements. For example, students discover that 1 yard is equivalent to 3 feet by using rulers and yard sticks.</li><li>Number lines and tables can also be used to convert measurements and record equivalences.</li></ul> <div><div><div>yards</div><div><div>0</div><div>1</div><div>2</div><div>3</div><div>4</div></div></div><div><div>feet</div><div><div>0</div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div><div>6</div><div>7</div><div>8</div><div>9</div><div>10</div><div>11</div><div>12</div></div></div><table><tr><th>Yards</th><th>Feet</th></tr><tr><td>1</td><td>3</td></tr><tr><td>2</td><td>6</td></tr><tr><td>3</td><td>9</td></tr><tr><td>4</td><td>12</td></tr></table></div> | Yards                                      | Feet | 1 | 3 | 2 | 6 | 3 | 9 | 4 | 12 | <ul style="list-style-type: none"><li>Use measurement tools (e.g., meter sticks, graduated cylinders, balances, clocks) to explore and compare units of measurement.</li><li>Measure the same object using two different measuring units to reinforce the understanding that when using larger units, it will take less units.</li><li>Use unit labels appropriately to accurately communicate relationships between measurements units (SMP 6).</li><li>Apply understanding of multiplicative comparison (4.AT.A.1) to describe relationship between measurement units within a given measurement system (e.g., 1 yard is 3 times as long as 1 foot).</li><li>Make connections to place value understanding (4.NOS.A.1) and relationship between place values (4.NOS.A.2) to describe the relationship between metric units.</li></ul> |
| Yards                                                                                                                                                                                                                                                                                                                                                                                                                                           | Feet                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                            |      |   |   |   |   |   |   |   |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
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Previously 4.MD.A.1

**4.GR.A.2: Use the four operations to solve problems in context involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving common fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit.**

| Content Progression                                                                                                                                                                                                                                                                                                                                                                                                   | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Students should have the opportunity to...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
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| <p>Where are students coming from?</p> <ul style="list-style-type: none"> <li>Solve problems involving measurement and estimation of intervals of time, liquid, and masses of objects (3.GR.A).</li> </ul> <p>Where are students going?</p> <ul style="list-style-type: none"> <li>Convert among different-sized standard measurement units and use conversions in solving multi-step problems (5.GR.A.1).</li> </ul> | <ul style="list-style-type: none"> <li>Grade 4 students should solve problems involving whole numbers and/or common fractions (with denominators 2, 3, 4, 5, 6, 8, 10, 12 and 100) or decimals.</li> <li>Addition and subtraction should include whole numbers within 1,000,000 (in alignment with 4.NOS.B.3) or fractions with like denominators (in alignment with 4.NOS.E.12). Multiplication should include up to four-digits by a one-digit whole number or two two-digit numbers. (in alignment with 4.NOS.B.5). Division should include up to four-digit dividends and one-digit divisors with and without remainders (in alignment with 4.NOS.B.6). Problems involving decimals should be limited to addition and subtraction (in alignment with 4.NOS.F.14).</li> <li>Problems should be presented in authentic contexts. Context refers to the situation or setting that gives meaning to mathematical ideas, quantities, representations, or relationships. A context may arise from students' everyday experiences, other disciplines, or within mathematics itself and provides a basis for making sense of and reasoning about the mathematics involved. Refer to <a href="#">Situation Types for Operations in Word Problems</a> for examples of problem types. Grade 4 students work with unknowns in all positions.</li> <li>Measurement units should be within one system of units, not across systems.</li> <li>Number lines and tables can also be used to convert measurements and record equivalences.</li> </ul> <p style="text-align: right;"><i>Continued on next page</i></p> | <ul style="list-style-type: none"> <li>Describe what is happening in a given context in their own words (SMP 1).</li> <li>Discuss the meaning of quantities in the presented contexts and how the quantities are related (SMP 2).</li> <li>Formulate a question about a particular context that can be answered using mathematics.</li> <li>Determine the information needed to answer the mathematical question.</li> <li>Represent situations mathematically by selecting and applying appropriate representations (e.g., manipulatives, drawings, number lines, tables, equations, etc.). Develop flexibility in their use of various strategies.</li> <li>Use a variety of mental computation and estimation strategies to estimate before solving.</li> <li>Interpret the results of their mathematical model in terms of the context to determine what the answer means in the situation.</li> <li>Revise their mathematical model when they determine their answer is not reasonable.</li> <li>Use appropriate units to accurately communicate distances, intervals of time, liquid volumes, masses, and money amounts (SMP 6).</li> </ul> |

| Content Progression | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Students should have the opportunity to... |
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|                     | <ul style="list-style-type: none"><li>For problems involving decimals, students will apply their understanding of decimal and fraction equivalence to add or subtract. For example, a student may write decimals as equivalent fractions with denominators of 10 or 100 to represent and solve the following problem.<br/><b>A small fish tank holds 5.75 gallons of water. A large fish tank holds 20 gallons of water. How much more water does the large fish tank hold than the small fish tank?</b><br/><math display="block">20 - 5.75 = 20 - 5\frac{75}{100}</math></li><li>Identify numbers that encourage the use of specific strategies. This promotes efficient approaches rather than rote calculation. Avoid numbers that distract from mathematical focus by making computation unnecessarily cumbersome.</li></ul> |                                            |

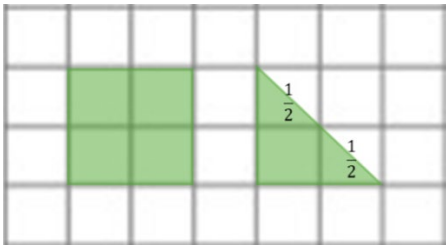
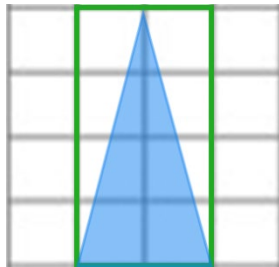
Previously 4.MD.A.2

**4.GR.A.3: Apply the area and perimeter formulas for rectangles in context, including rectangles with missing dimensions.**

| Content Progression                                                                                                                                                                                                                                                                                                                                                                                                        | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Students should have the opportunity to...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
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| <p>Where are students coming from?</p> <ul style="list-style-type: none"> <li>Relate area to multiplication and addition (3.GR.C.7).</li> <li>Solve problems in context involving perimeter of polygons (3.GR.C.9).</li> </ul> <p>Where are students going?</p> <ul style="list-style-type: none"> <li>Relate volume to the operations of multiplication and addition and solve problems in context (5.GR.C.5).</li> </ul> | <ul style="list-style-type: none"> <li>Area is the measure of space inside a figure or region and is measured in square units. Area of a rectangular space can be found by multiplying side lengths.<br/><b><math>Area = l \times w</math></b></li> <li>Perimeter is the measure around a figure or region and is measured in units. Perimeter can be found by using addition to add the lengths of each side of the figure.<br/><b><math>Perimeter = 2l + 2w</math> or <math>Perimeter = 2(l + w)</math></b></li> <li>Grade 4 students extend their understanding of area and perimeter from Grade 3 to use the area and perimeter formulas to calculate. Continue to connect formulas to the meaning of area and perimeter. Avoid requiring formula memorization without conceptual understanding.</li> <li>Use authentic contexts to support students in making sense of situations involving missing dimensions. Problems should be presented in authentic contexts. Context refers to the situation or setting that gives meaning to mathematical ideas, quantities, representations, or relationships. A context may arise from students' everyday experiences, other disciplines, or within mathematics itself and provides a basis for making sense of and reasoning about the mathematics involved. Refer to <a href="#">Situation Types for Operations in Word Problems</a> for examples of problem types. For example, students will find the width of a rectangular space given the area and the length, by viewing the area formulas as a multiplication equation with an unknown factor.<br/><b>A garden has an area of 273 square feet. The width of the garden is 9 feet. What is the length of the garden?</b></li> </ul> <div style="text-align: center;"> <p>?</p>  <p><math>273 = l \times 9</math></p> </div> | <ul style="list-style-type: none"> <li>Explore problems in context to make sense of and interpret problems with missing dimensions. Describe what is happening in a given context in their own words (SMP 1).</li> <li>Discuss the meaning of quantities in the presented contexts and how the quantities are related (SMP 2).</li> <li>Formulate a question about a particular context that can be answered using mathematics.</li> <li>Represent situations mathematically by selecting and applying appropriate representations (e.g., manipulatives, drawings, equations, etc.)</li> <li>Use appropriate units to accurately communicate missing dimensions, area, and perimeter (SMP 6).</li> <li><b>Students must have multiple opportunities and varied ways to demonstrate mastery, as this standard constitutes key Grade 4 Geometric Reasoning and Measurement milestones in the Reasoning with Geometric Structure strand of the Numeracy Development Framework.</b></li> </ul> |

Previously 4.MD.A.3

**4.GR.A.4: Relate the area of a triangle to the area of a rectangle using decomposition and visual models. Derive and apply the formula to solve problems in contexts involving triangles positioned within or formed from the decomposition of rectangles.**

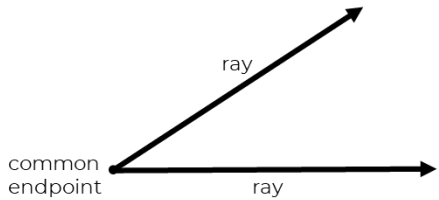
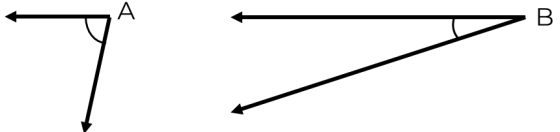
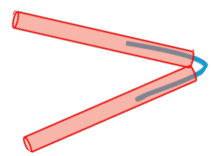
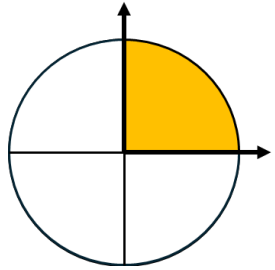
| Content Progression                                                                                                                                                                                                                                                                                                                                                                                     | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Students should have the opportunity to...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
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| <p>Where are students coming from?</p> <ul style="list-style-type: none"> <li>Relate area to multiplication and addition (3.GR.C.7).</li> </ul> <p>Where are students going?</p> <ul style="list-style-type: none"> <li>Find the area of triangles, quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and quadrilaterals to solve problems (6.GR.A.1).</li> </ul> | <ul style="list-style-type: none"> <li>Use visual models to explore how the area of a triangle relates to the area of a rectangle. This may include folding or cutting paper or using tangram shapes to create two congruent triangles.</li> </ul>  <ul style="list-style-type: none"> <li>Geoboards or grid paper can be used to help visually see the area of the rectangle and triangle.</li> </ul>  <p><b>The square has an area of 4 square units. The right triangle has an area of 2 square units (<math>1 + \frac{1}{2} + \frac{1}{2} = 2</math> square units).</b></p> <p><i>Note: Be mindful when using grid paper to show the relationship. Depending on the size of the shapes, counting many small fractional pieces can become cumbersome and make the relationship less apparent to students.</i></p> <ul style="list-style-type: none"> <li>As students notice patterns, encourage students to describe the relationship using mathematical language and/or symbols.</li> <li>Students may choose to represent this relationship symbolically. Others may describe it verbally (e.g., "It's half of the rectangle") or visually. The emphasis is on explaining the relationship, not on mastering symbolic notation.</li> </ul> <p><i>Continued on next page</i></p> | <ul style="list-style-type: none"> <li>Physically decompose rectangles into two congruent triangles to explore the relationship.</li> <li>Explain the relationship between the area of a triangle and the area of a rectangle, using concrete (e.g., folding/cutting, using manipulatives), to semi-concrete (e.g., drawings), or abstract (e.g., formula) representations.</li> <li>Use precise language when describing area (e.g., length, width, square units).</li> <li>Use visual or contextual representation to explain the formula for the area of a triangle.</li> <li>Extend their understanding to explore other ways to decompose rectangles into triangles. This exploration helps students deepen their geometric reasoning, recognize underlying area relationships, and build flexible strategies for visualizing and proving how to calculate the area of a triangle.</li> </ul>  <ul style="list-style-type: none"> <li><b>Students must have multiple opportunities and varied ways to demonstrate mastery, as this standard constitutes key Grade 4 Geometric Reasoning and Measurement milestones in the Reasoning with Geometric Structure strand of the Numeracy Development Framework.</b></li> </ul> |

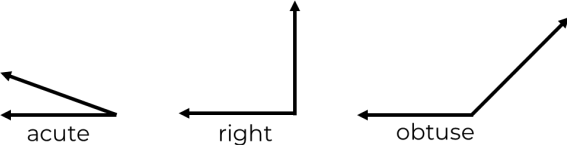
| Content Progression | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Students should have the opportunity to... |
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|                     | <ul style="list-style-type: none"> <li>Students may derive and test the formula (<math>Area = \frac{length \times width}{2}</math>) based on their understanding of the relationship. Avoid giving students the formula without student exploration and discovery.</li> <li>Some students may represent this relationship using the formula, <math>Area = \frac{1}{2}(length \times width)</math>. While it is accurate, it requires multiplication of a fraction. In Grade 4, students multiply a fraction by a whole number (<math>b \times \frac{c}{d}</math>) in alignment with 4.NOS.E.13. Multiplying a whole number by a fraction (<math>\frac{c}{d} \times b</math>) is a Grade 5 expectation (5.NOS.D.11). When using this formula, students may apply the Commutative Property of Multiplication to reorder factors or connect multiplying by one-half to dividing by 2. <b>However, instruction should prioritize reasoning about halves of rectangles rather than formal fraction multiplication procedures.</b></li> <li>Problems should be presented in authentic contexts. Context refers to the situation or setting that gives meaning to mathematical ideas, quantities, representations, or relationships. A context may arise from students' everyday experiences, other disciplines, or within mathematics itself and provides a basis for making sense of and reasoning about the mathematics involved. Refer to <a href="#">Situation Types for Operations in Word Problems</a> for examples of problem types.</li> </ul> |                                            |

Adopted 2025

**4.GR.B UNDERSTAND CONCEPTS OF ANGLE AND MEASURE ANGLES.**

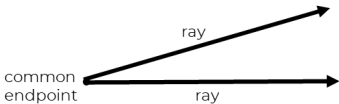
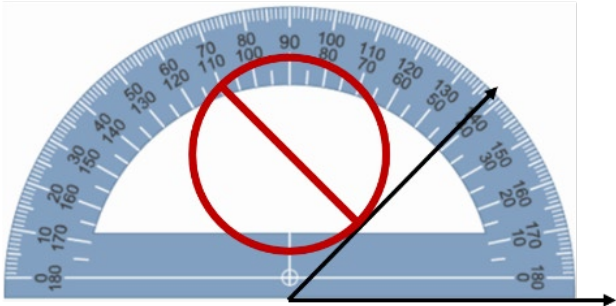
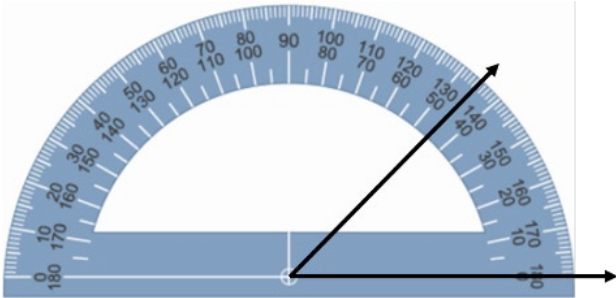
**4.GR.B.5: Identify angles as geometric figures formed by two rays that share a common endpoint and describe angle size as the amount of rotation between the two rays measured in degrees with reference to a circle.**

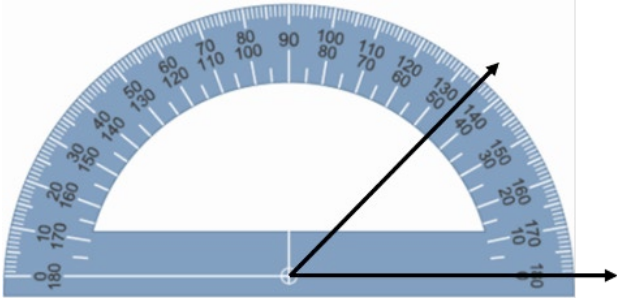
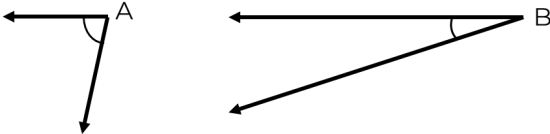
| Content Progression                                                                                                                                                                                                                                                                           | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Students should have the opportunity to...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
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| <p>Where are students coming from?</p> <ul style="list-style-type: none"> <li>This is the first formal introduction of angles.</li> </ul> <p>Where are students going?</p> <ul style="list-style-type: none"> <li>Classify two-dimensional figures based on properties (5.GR.B.3).</li> </ul> | <ul style="list-style-type: none"> <li>Angles are geometric shapes that are formed wherever two rays share a common endpoint.</li> </ul>  <ul style="list-style-type: none"> <li>Angles are measured by identifying how much of a circle the angle covers. A full circle has 360 equal parts. If an angle turns through one of those parts, it measures one degree.</li> <li>This standard focuses on developing conceptual understanding of angles. Students are not expected to measure angles using protractors. Avoid introducing protractors before students develop conceptual understanding.</li> <li>Present angles in a variety of orientations. Avoid presenting angles that only open to the right.</li> <li>Provide examples of angles with rays of different lengths. It is important that students focus on the space created between the two rays and not the length of the rays.</li> </ul>  <p><i>Continued on next page</i></p> | <ul style="list-style-type: none"> <li>Engage in hands-on experiences to explore the concept of angles. For example, a student may use straws and pipe cleaners or paper strips with brad fasteners to create angles.</li> </ul>  <ul style="list-style-type: none"> <li>Identify examples of angles in the classroom (e.g., hands on the clock).</li> <li>Use knowledge of a circle having 360 equal parts (or degrees) to partition circles into fractional parts to explore angle measures and identify benchmark angles. Students may use circular model (e.g., paper plates) to further explore this concept.</li> </ul> <p><b>A circle is partitioned into 4 equal parts. Since a circle has 360°, 360° can be divided by 4 to determine the angle measure, <math>360^\circ \div 4 = 90^\circ</math>.</b></p>  <ul style="list-style-type: none"> <li>Use movement to simulate rotation of specific angle measures (e.g., turn 180°).</li> </ul> |

| Content Progression | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Students should have the opportunity to... |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|
|                     | <div><ul style="list-style-type: none"><li>Angles can be described as right, acute, or obtuse.<br/>A <b>right angle</b> is an angle that equals one-fourth of a full rotation of a circle (<math>360^\circ</math>), which is equal to <math>90^\circ</math>.<br/>An <b>acute angle</b> is an angle that is less than a right angle (<math>90^\circ</math>).<br/>An <b>obtuse angle</b> is an angle that is more than a right angle (<math>90^\circ</math>).</li></ul></div> <div></div> |                                            |

Previously 4.MD.C.5

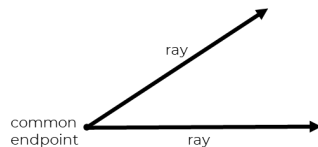
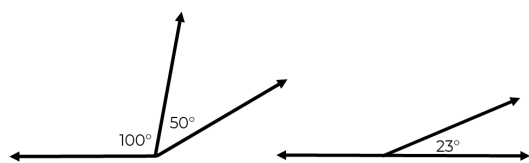
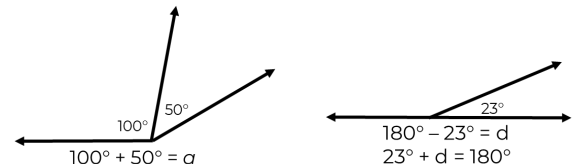
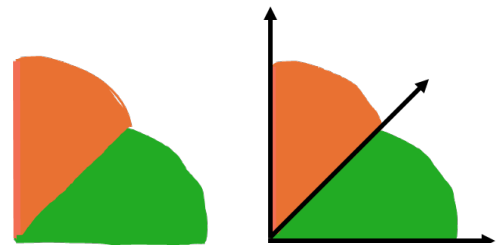
4.GR.B.6: Measure angles in whole-number degrees using a protractor. Estimate and sketch angles of specified measures.

| Content Progression                                                                                                                                                                                                                                                                                                                                              | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Students should have the opportunity to...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
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| <p>Where are students coming from?</p> <ul style="list-style-type: none"><li>Identify angles as geometric figures formed by two rays that share a common endpoint and describe angle size (4.GR.B.5)</li></ul> <p>Where are students going?</p> <ul style="list-style-type: none"><li>Classify two-dimensional figures based on properties (5.GR.B.3).</li></ul> | <ul style="list-style-type: none"><li>Angles are geometric shapes that are formed wherever two rays share a common endpoint.<br/></li><li>Angles are measured by identifying how much of a circle the angle covers. A full circle has 360 equal parts. If an angle turns through one of those parts, it measures one degree.</li><li>Model how to use a protractor correctly by aligning its origin with the angle's endpoint (or vertex) and positioning one ray along the baseline.</li></ul> <div></div> <p><i>Continued on next page</i></p> | <ul style="list-style-type: none"><li>Use protractors to measure angles found in everyday objects.</li><li>Practice accurate measurement by aligning protractor's origin with the endpoint (or vertex) and the baseline with one ray.</li><li>Use knowledge of benchmark angles to estimate an angle measure before measuring with a protractor.</li><li>Explain how they determined the appropriate scale to use on the protractor and why their measurement make sense.</li><li><b>Students must have multiple opportunities and varied ways to demonstrate mastery, as this standard constitutes key Grade 4 Geometric Reasoning and Measurement milestones in the Measurement strand of the Numeracy Development Framework.</b></li></ul> |

| Content Progression | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Students should have the opportunity to... |
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|                     | <ul style="list-style-type: none"><li>Model how to use the protractor to read an angle measure. The protractor shown includes two scales. Students will apply their understanding of acute and obtuse angles to determine which scale to use. In the example, the ray aligns to a measurement between <math>40^\circ</math> and <math>50^\circ</math> or <math>130^\circ</math> and <math>140^\circ</math>. Since this angle is acute, the measurement must be between <math>40^\circ</math> and <math>50^\circ</math>, meaning the angle measure is <math>45^\circ</math>. Emphasize the importance of the direction of the scale. In this case, the numbers on the scale increase from right to left. A student who assumes the scale increases from left to right may incorrectly identify the measure as <math>55^\circ</math>.</li></ul>  <ul style="list-style-type: none"><li>Present angles in a variety of orientations. Avoid presenting angles that only open to the right.</li><li>Provide examples of angles with rays of different lengths. It is important that students focus on the space created between the two rays and not the length of the rays.</li></ul>  |                                            |

Previously 4.MD.C.6

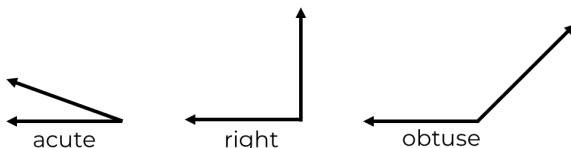
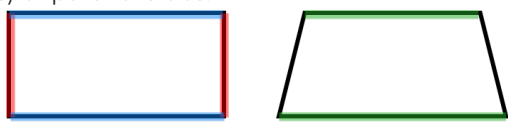
**4.GR.B.7: Explain that when an angle is decomposed into nonoverlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in context (e.g., by using an equation with a symbol for the unknown angle measure).**

| Content Progression                                                                                                                                                                                                                                                                                                       | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Students should have the opportunity to...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
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| <p>Where are students coming from?</p> <ul style="list-style-type: none"> <li>Estimate, measure, and sketch angles (4.GR.B.6).</li> </ul> <p>Where are students going?</p> <ul style="list-style-type: none"> <li>Determine volume of composite figured by decomposing into non-overlapping prisms (5.GR.C.5).</li> </ul> | <ul style="list-style-type: none"> <li>Angles are geometric shapes that are formed wherever two rays share a common endpoint.  </li> <li>Angles can be decomposed into two or more nonoverlapping parts as shown in the examples below.  </li> <li>Provide a variety of examples that involve the use of addition or subtraction. Model the use of equations with a symbol for the unknown when representing and solving problems.  </li> <li>Problems should be presented in authentic contexts. Context refers to the situation or setting that gives meaning to mathematical ideas, quantities, representations, or relationships. A context may arise from students' everyday experiences, other disciplines, or within mathematics itself and provides a basis for making sense of and reasoning about the mathematics involved. Refer to <a href="#">Situation Types for Operations in Word Problems</a> for examples of problem types.</li> </ul> | <ul style="list-style-type: none"> <li>Use concrete or visuals representations of angles to compose and decompose angles to explore the additive relationship between nonoverlapping parts of an angle. For example, students may use paper angles to combine angles to compose a larger angle.  <p><b>Two 45° angles can be joined to create a 90° angle.</b></p> </li> <li>Represent contexts involving joining or decomposing angles using equations.</li> <li>Use knowledge of benchmark angles to estimate and check reasonableness of answers.</li> <li>Make connections to other contexts that have additive relationships, such as length or area.</li> </ul> |

Previously 4.MD.C.7

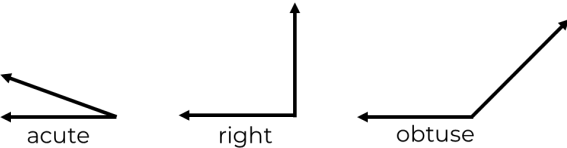
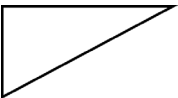
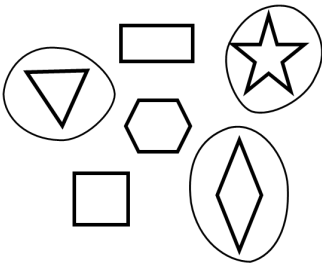
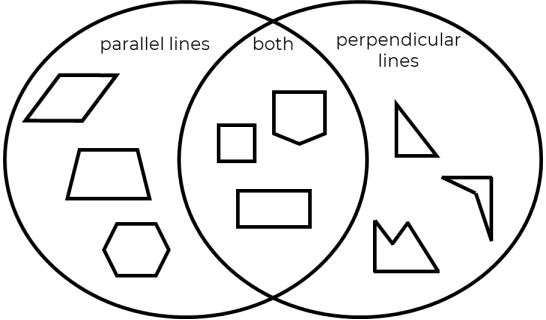
**4.GR.C DRAW AND IDENTIFY LINES AND ANGLES AND CLASSIFY SHAPES BY PROPERTIES OF THEIR LINES AND ANGLES.**

**4.GR.C.8: Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.**

| Content Progression                                                                                                                                                                                                                                                                                                                                                                                                                                   | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Students should have the opportunity to...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Where are students coming from?</p> <ul style="list-style-type: none"> <li>Explain that shapes in different categories may share attributes and that shared attributes define a larger category (3.GR.B.5).</li> </ul> <p>Where are students going?</p> <ul style="list-style-type: none"> <li>Explain that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category (5.GR.B.3).</li> </ul> | <ul style="list-style-type: none"> <li>Angles can be described as right, acute, or obtuse. A <b>right angle</b> is an angle that equals one-fourth of a full rotation of a circle (<math>360^\circ</math>), which is equal to <math>90^\circ</math>. An <b>acute angle</b> is an angle that is less than a right angle (<math>90^\circ</math>). An <b>obtuse angle</b> is an angle that is more than a right angle (<math>90^\circ</math>).</li> </ul>  <ul style="list-style-type: none"> <li><b>Parallel lines</b> are lines that always remain the same distance apart and never intersect.</li> <li><b>Perpendicular lines</b> are lines that intersect to form a right angle (<math>90^\circ</math>).</li> <li>Use familiar shapes to identify and describe points, lines (including perpendicular and parallel), line segments, rays, and angles. For example, students may recognize that rectangles and trapezoids have set(s) of parallel sides.</li> </ul>  <ul style="list-style-type: none"> <li>Present examples in a variety of orientations. Avoid presenting lines that are always positioned horizontally or vertically or angles that always open to the right.</li> </ul> | <ul style="list-style-type: none"> <li>Identify examples of points, lines (perpendicular and parallel), line segments, rays, and angles in everyday objects.</li> <li>Draw a variety of examples of points, lines, line segments, rays, angles, using rulers and protractors as needed.</li> <li>Examine examples and counter examples of a geometric element.</li> <li>Apply their knowledge of lines and angles to explain their thinking. For example, a student may explain how they know two lines are perpendicular or how they know that a given angle is obtuse.</li> <li>Create designs involving points, lines, line segments, rays, and angles. Students should be encouraged to use appropriate mathematical language to describe their designs.</li> </ul> |

Previously 4.G.A.1

**4.GR.C.9: Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category and identify right triangles.**

| Content Progression                                                                                                                                                                                                                                                                                                                                                                                                                               | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Students should have the opportunity to...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
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| <p>Where are students coming from?</p> <ul style="list-style-type: none"><li>Explain that shapes in different categories may share attributes and that shared attributes define a larger category (3.GR.B.5).</li></ul> <p>Where are students going?</p> <ul style="list-style-type: none"><li>Explain that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category (5.GR.B.3).</li></ul> | <ul style="list-style-type: none"><li><b>Parallel lines</b> are lines that always remain the same distance apart and never intersect.</li><li><b>Perpendicular lines</b> are lines that intersect to form a right angle (<math>90^\circ</math>).</li><li>Angles can be described as right, acute, or obtuse. A <b>right angle</b> is an angle that equals one-fourth of a full rotation of a circle (<math>360^\circ</math>), which is equal to <math>90^\circ</math>. An <b>acute angle</b> is an angle that is less than a right angle (<math>90^\circ</math>). An <b>obtuse angle</b> is an angle that is more than a right angle (<math>90^\circ</math>).</li></ul>  <ul style="list-style-type: none"><li>A right triangle is a triangle that has one right angle (<math>90^\circ</math>).</li></ul>  <ul style="list-style-type: none"><li>Given a set of two-dimensional shapes, students are expected to classify the shapes with and without parallel lines, perpendicular lines, or angles of a specified size. For example, if given the set below a student can identify the circled shapes as having acute angles.</li></ul>  | <ul style="list-style-type: none"><li>Explore of variety of sets of two-dimensional shapes in order to classify the shapes.</li><li>Use diagrams to classify and sort two-dimensional figures based on presence of lines or angles. For example, a student may use a Venn Diagram to show examples of shapes with parallel lines, perpendicular lines, or both.</li></ul>  <ul style="list-style-type: none"><li>Use appropriate mathematical language to explain why their classification is accurate (SMP3; SMP 6).</li><li>Use examples and counterexamples to support or refute mathematical statements or claims. For example, a student may provide a counterexample to refute the statement that triangles can only have right or acute angles.</li></ul>  <ul style="list-style-type: none"><li><b>Students must have multiple opportunities and varied ways to demonstrate mastery, as this standard constitutes key Grade 4 Geometric Reasoning and Measurement milestones in the Classifying Figures strand of the Numeracy Development Framework.</b></li></ul> |

Continued on next page

| Content Progression | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                       | Students should have the opportunity to... |
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|                     | <ul style="list-style-type: none"><li>A trapezoid is defined as “A quadrilateral with at least one pair of parallel sides.” Using this definition of a trapezoid, a student may explain that a shape is a trapezoid when it has at least one pair of parallel sides, so a parallelogram is also a trapezoid because it has two pairs of parallel sides.</li></ul> |                                            |

Previously 4.G.A.2

# Reasoning with Data and Statistics (DS)

| Reasoning with Data and Statistics Clusters | Connections to the Numeracy Development Framework                                                                                                                                                                                        |
|---------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>4.DS.A</b> Represent and interpret data. | Standards within this cluster <b>directly contribute*</b> to the Grade 4 Reasoning with Data, Statistics, and Probability milestones within the <b>Collecting &amp; Representing Data strands</b> of the Numeracy Development Framework. |

**\*Directly contribute to milestones:** The cluster includes content and practices that are *explicitly named within* an NDF milestone, meaning student proficiency with this cluster demonstrates attainment of that milestone.

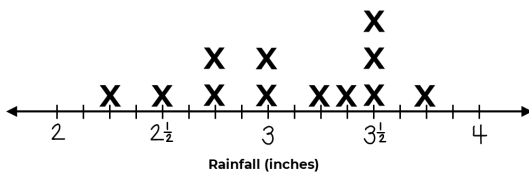
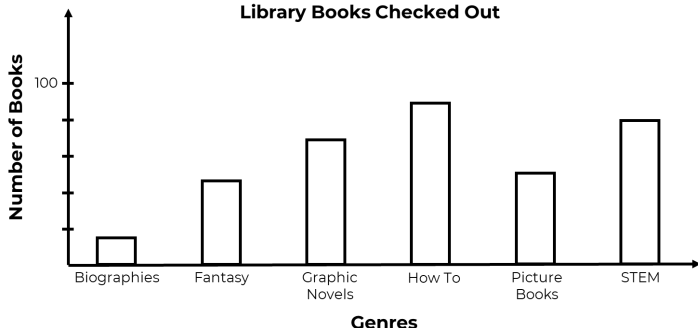
**\*\*Contribute to milestones:** The cluster builds prerequisite knowledge, skills, or ways of reasoning that *support progress toward* a milestone in the NDF, even if the milestone itself is not fully realized at this stage.

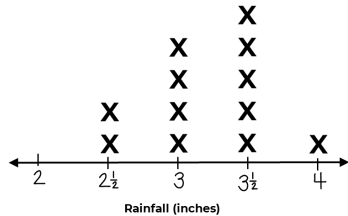
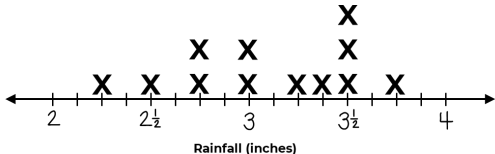
**4.DS.A REPRESENT AND INTERPRET DATA.**

**4.DS.A.1: Ask and answer questions by collecting, organizing and summarizing data, recognizing the importance of context when analyzing data.**

- Create scaled data visualization (e.g. bar graphs for categorical data; line plots with fraction units of halves, fourths, and eighths for numerical data) to display data to communicate an idea.**
- Summarize data presented in scaled data visualizations (e.g. bar graphs, line plots) and draw conclusions about the data.**
- Compare and contrast different data visualizations of the same data by varying attributes (e.g., reordering bars, changing the scale) and explain how changing the attributes affects the interpretation.**

| Content Progression                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Students should have the opportunity to...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
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| <p>Where are students coming from?</p> <ul style="list-style-type: none"> <li>Ask and answer questions by collecting, organizing (in picture graphs, bar graphs, and line plots), and summarizing data (3.DS.A.1).</li> </ul> <p>Where are students going?</p> <ul style="list-style-type: none"> <li>Ask and answer questions by creating bar graphs and line plots, summarizing data presented in bar graphs, circle graphs, line plots, and line graphs, and to evaluate whether a data visualization accurately represents a data set (5.DS.A.1).</li> </ul> | <ul style="list-style-type: none"> <li>Understanding data goes beyond making graphs—it involves engaging in the full statistical process: asking meaningful questions, collecting and organizing data, and interpreting results to make sense of the world. Authentic applications help students see data as a tool for inquiry and decision-making, not just representation.</li> <li>Categorical data refers to data that can be sorted into groups or categories (e.g., transportation to school or choice for class field trip, etc.).</li> <li>Numerical data refers to data that can be counted or measured and can be expressed as a number (e.g., heights of students, temperature). Numerical data can be represented as whole numbers and fractions.</li> <li>Consider the reasonableness of the number of categories (categorical data) and number of data points when selecting or designing problems and tasks.</li> <li><b>4.DS.A.1a:</b> A bar graph represents data using bars and labeled axes. Scales used in bar graphs should be reasonable and allow for manageable skip-counting. When using a scale other than 1, students will use estimation to represent data points that are not multiples of the scale. See example below.</li> </ul> <p style="text-align: right;"><i>Continued on next page</i></p> | <ul style="list-style-type: none"> <li>Create their own statistical questions based on their interests and develop a plan to collect data.</li> <li>Interpret data presented in a data visualization and formulate the statistical question it could have aimed to answer.</li> <li>Identify appropriate data visualization to use to present a collected or given data set (SMP 5).</li> <li>Determine what scale would be best to represent data and how a different scale might change how data is interpreted (SMP 5).</li> <li>Make justifications about the type of data visualization used to display a data set, understanding the various options and the limitations of each (SMP 3).</li> <li>Connect interpretations of and conclusions about the data to the context. Students should be encouraged to consider how the data or conclusions may answer questions and/or suggest solutions to problems (SMP 4).</li> <li>Apply their understanding of estimation, benchmark numbers, and rounding (4.NOS.A.1) to interpret data on bar graphs</li> <li>Apply their understanding of fractions (4.NOS.D; 4.NOS.E) to create line plots with fractional units.</li> </ul> <p style="text-align: right;"><i>Continued on next page</i></p> |

| Content Progression | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Students should have the opportunity to...                                                                                                                                                                                                                                                                                    |
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|                     | <ul style="list-style-type: none"> <li> <b>4.DS.A.1a:</b> A line plot represents data using symbols on a number line. Students will use whole numbers and fractions including halves, fourths, and eighths.           <p style="text-align: center;"><b>Monthly Rainfall (in inches)</b></p>  <p style="text-align: center;">Rainfall (inches)</p> </li> <li> <b>4.DS.A.1b:</b> Students analyze data presented in data visualizations to summarize the data and to draw conclusions. For example, when analyzing the bar graph below, a student may conclude that nonfiction books are most popular at the school because more Biographies, How To and STEM books combined were checked out than the other fiction genres. A student may also conclude that biographies are the least popular genre or that the biographies available are not of interest to the students at the school.           <p style="text-align: center;"><b>Library Books Checked Out</b></p>  <p style="text-align: center;">Genres</p> </li> </ul> <p style="text-align: right;"><i>Continued on next page</i></p> | <ul style="list-style-type: none"> <li> <b>Students must have multiple opportunities and varied ways to demonstrate mastery, as this standard constitutes key Grade 4 Reasoning with Data &amp; Statistics milestones in the Collecting &amp; Representing Data strand of the Numeracy Development Framework.</b> </li> </ul> |

| Content Progression | Examples and Clarifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Students should have the opportunity to... |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|
|                     | <ul style="list-style-type: none"> <li> <b>4.DS.A.1c:</b> Present a data set in two or more data visualizations (e.g., two graphs of the same type with differing scales, two different types of graphs). Students will compare and contrast the data visualizations. Students may observe similarities and differences in the visual features (e.g., scale, order of bars, color). However, students may also recognize that the way data is presented can lead to differences in how the data is interpreted. </li> </ul> <p style="text-align: center;"><b>Monthly Rainfall (in inches)</b></p>  <p style="text-align: center;"><b>Monthly Rainfall (in inches)</b></p>  <p>When comparing the line plots above, a student may notice that <math>3\frac{1}{2}</math> inches is the greatest amount of rainfall across both data visualizations. However, the student may notice that the least and greatest amounts of rainfall are different.</p> <ul style="list-style-type: none"> <li> <b>4.DS.A.1c:</b> Ask students questions that encourage them to consider how the differences between the data visualizations impacts how the data is interpreted. For example, how do the differences between the two line plots impact the statements you might make about the monthly rainfall? How does the scale impact your interpretation of the data? </li> </ul> |                                            |

Previously 4.MD.B.4

## References

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Hulbert, E. T., Petit, M. M., Ebby, C. B., Cunningham, E. P., & Laird, R. E. (2023). *A focus on multiplication and division: Bringing mathematics education research to the classroom* (2nd ed.). Routledge.

Van de Walle, J. A., Karp, K. S., & Bay-Williams, J. M. (2020). *Elementary and middle school mathematics: Teaching developmentally* (10th ed.). Pearson

Some graphics obtained from <https://www.flaticon.com>

## Provide Feedback

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Your feedback is essential in helping us understand how these resources are being used, their effectiveness in supporting instruction, and how they can be improved to better serve educators, students, and stakeholders across the state. If you are interested in providing feedback, please completed the [Feedback: PreK-8 Mathematics Standards Companion Guide](#) survey.

The survey includes general questions about your overall impressions of the companion guides, as well as opportunities to provide grade-level specific feedback. Your responses will inform future revisions and professional learning efforts to ensure the guides are clear, useful, and aligned with the needs of Maryland's diverse learning communities.