Important Prerequisite Math Standards (Tutorials - ☆)

This document is designed to be used across all curricula. However, if your curriculum includes coherence guidance similar to this (e.g., iReady prerequisite report), that guidance should take precedence, as it will be more tailored to the way that units and lessons are sequenced.

Now, more than ever, all students deserve access to engaging, challenging, grade-level math instruction. This is especially true for students who have been underserved such as students living in poverty, students from racially marginalized communities, students with learning differences, and students who are multilingual emergent. A commitment to equitable instruction requires that educators are intentional in identifying, celebrating, and building on knowledge that students have gained. It also requires that educators are strategic as they plan to address current and ongoing learning gaps. Starting the school year with weeks of review of prior-grade standards will result in a long-term loss of access to grade-level work that perpetuates inequities[1] for historically marginalized students. This resource demonstrates that **students who were impacted by interruptions to teaching and learning and subsequent learning losses are still able to access most grade-level standards this year without prior review,** and that missed content can usually be integrated in a minimally-invasive way.

- ☆ **What are the standards in this document?** This document highlights important prerequisites to standards in Kindergarten through Algebra II, as informed by the Coherence Map, high-quality instructional materials, and review by Student Achievement Partners and the Math & Science Collaborative. It is meant to support the *Understand*, *Diagnose*, *Take Action* approach to address unfinished learning, as described here.
- **How can these standards be used in planning for instruction?** Teachers can use this document to identify which standards in their grade have critical prerequisites from the **prior grade level** that may interfere with a student's ability to access grade-level content. In combination with **a diagnosis of student needs**, teachers can use this information to adjust long-range plans in anticipation of when more time will be needed to support students. This aligns with NCTM's push (pp. 3, 7-8) to determine necessary prior knowledge and "provide just-in-time interventions during the school day that do not replace daily, grade-level instruction and are designed on the basis of the results from effective formative assessments." Finally, suggestions are included for when to preserve or reduce instructional time in order to create space for instructional recovery to take place.
- **What should we make of standards that have an important prerequisite that needs to be addressed, but a reduction in instructional time is also recommended?** These considerations should be weighed together, along with the needs of your group of students. For example, the time spent on a standard might be reduced from five days to three days by de-emphasizing one part of the standard, but prior-grade needs might be addressed within the first lesson through strategic choice of tasks.

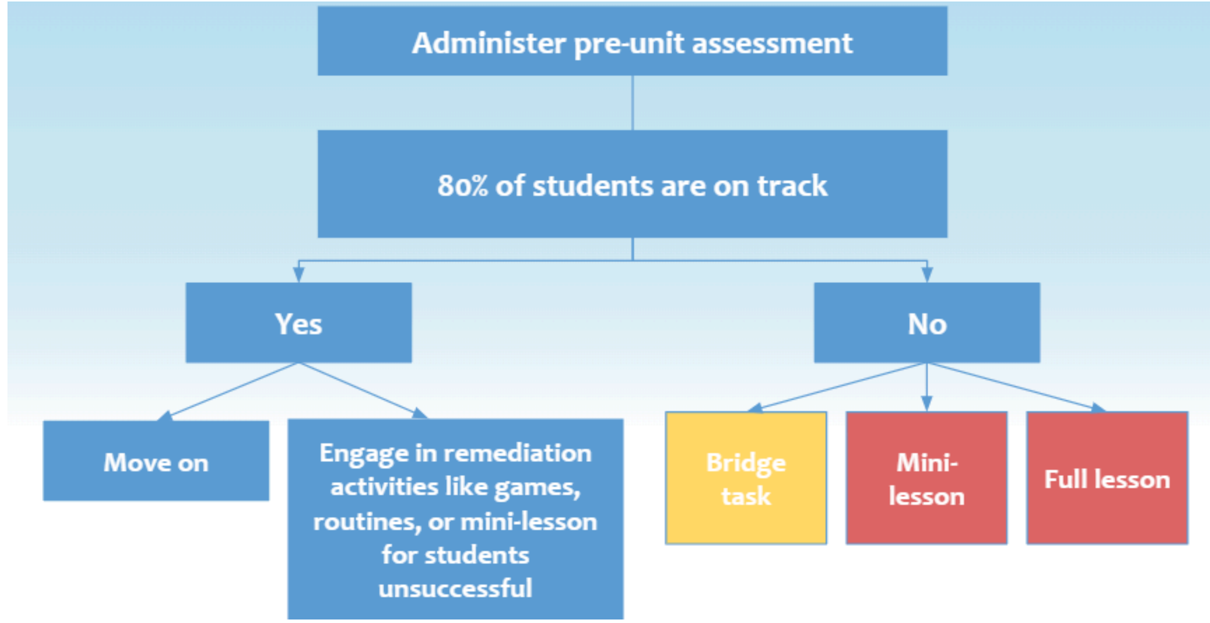
Term	Meaning	Example	Actions to take
"The bridge is up"	**Address *before* grade-level instruction.** Without this prior knowledge, students most likely do not have a way to access the grade-level standard.	A 7th-grader who has not learned how to divide positive fractions (6.NS.A.1) needs to build that understanding before beginning to divide negative fractions (7.NS.A.2c).	Students may require **dedicated instruction** on prerequisite standards before the grade level instruction is taught. (Not every standard needs its own full lesson; multiple standards may be addressed at once, or a standard might be taught as a short mini-lesson.)
"Heavy traffic"	**Address *within* grade-level instruction.** Students will have an entry point into grade-level content, but will benefit from instruction that weaves in this prior-grade content.	A 4th-grader who struggles with recalling multiplication facts (3.OA.C.7) can still access grade-level, multi-step application problems (4.OA.A.3) when given a multiplication table, but will need small doses of continued support to attain fluency.	**Individual tasks or strategies** from these standards can be incorporated into grade-level lessons to address important content that was missed in the prior grade. Look at the suggestions in parentheses for ideas of how to accomplish this.

[1]*Disclaimer: Some of these links take you to external organizations. It is your responsibility to ensure you comply with any copyright or permissions restrictions before using these materials.*

Links to Tutorials on how to use the tool are indicated with a ☆

☆ [How do I create the pre-unit assessment?]

- Before teaching an upcoming unit of instruction, look at all the prerequisite standards/AAs/EC related to the upcoming standards of instruction.
- Find a quality open-ended question(s) to assess their current level of understanding regarding the prerequisite content.
  - Use the Achieve the Core Coherence Map linked in the prerequisite content and look for an assessment item OR
  - Go to the SAS Assessment Center and choose *Build an Assessment* to find a good quality item(s) relating to the prerequisite standards/AAs/EC, preferably open ended or constructed response questions OR
  - Use more of an interview style or observation assessment for K-1 (Assessment tool specific to particular standards)
- Administer the item(s) to your students before the upcoming unit to assess their level of understanding



☆ How do I engage students in a Bridge Task?

- Look at the pre-assessment item results to see if the students mastered the prerequisite content
- If less than 80% of the students have mastered the content, look at the on-grade-level standard block.
  - Use the link to the coherence map and look for an on-grade-level task that weaves in the prerequisite content
  - There may also be a suggestion in parentheses for how you could teach on-grade-level content while still addressing prerequisite content

☆ Where can I find resources for mini or full lessons to address the prerequisite content?

- Use the Achieve the Core Coherence Map tasks hyperlinked to the red Common Core standards. Possibly use a task for a mini-lesson or a lesson for a full lesson.
- Go to the appropriate prior grade level under Pennsylvania Learns from pdesas.org to find tasks to remediate unfinished learning. The direct link is https://pdesas.org/Page/Viewer/ViewPage/30/
- For K-5 teachers, you may find helpful games or activities linked at www.k-5mathteachingresources.com.
- For 6-12 teachers, you may find helpful lessons at https://www.map.mathshell.org/lessons.php
- For grades 3-12, you may find helpful lessons at https://emergentmath.com/my-problem-based-curriculum-maps

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Kindergarten Math Important Prerequisites

PreK - K Note: There is a significant degree of overlap between Pre-K and Kindergarten standards. High-quality instructional materials embrace this overlap and provide teachers with resources to meet students where they are.

Prerequisite Standard	Standard Language (PA first and then CCSS) ■ *Major* ? *Supporting* ? *Additional* **PA standard in bold**, CCSS below	Instructional Time Preserve or reduce time as compared to a typical year, *per SAP guidance*
CC.2.1.PreK.A.1 Know number names and the count sequence.	**CC.2.1.K.A.1 Know number names and write and recite the count sequence.** ■K.CC.A.1 - Count to 100 by ones and by tens. ■K.CC.A.2 - Count forward beginning from a given number within the known sequence (instead of having to begin at 1). ■K.CC.A.3 - Write numbers from 0 to 20. Represent a number of objects with a written numeral 0-20 (with 0 representing a count of no objects).	*No special considerations for curricula well aligned to knowing number names, counting, and comparing numbers, as detailed in these clusters. Time spent on instruction and practice should NOT be reduced.*
CC.2.1.PreK.A.2 Count to tell the number of objects.	**CC.2.1.K.A.2 Apply one-to-one correspondence to count the number of objects.** ■K.CC.B.4 - Understand the relationship between numbers and quantities; connect counting to cardinality. K.CC.B.4.A - When counting objects, say the number names in the standard order, pairing each object with one and only one number name and each number name with one and only one object. K.CC.B.4.B - Understand that the last number name said tells the number of objects counted. The number of objects is the same regardless of their arrangement or the order in which they were counted. K.CC.B.4.C - Understand that each successive number name refers to a quantity that is one larger. ■K.CC.B.5 - Count to answer "how many?" questions about as many as 20 things arranged in a line, a rectangular array, or a circle, or as many as 10 things in a scattered configuration; given a number from 1-20, count out that many objects	*No special considerations for curricula well aligned to knowing number names, counting, and comparing numbers, as detailed in these clusters. Time spent on instruction and practice should NOT be reduced.*
CC.2.1.PreK.A.3 Compare numbers.	**CC.2.1.K.A.3 Apply the concept of magnitude to compare numbers and**	*No special considerations for*

	quantities. ■K.CC.C.6 - Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group, e.g., by using matching and counting strategies. ■K.CC.C.7 - Compare two numbers between 1 and 10 presented as written numerals.	*curricula well aligned to knowing number names, counting, and comparing numbers, as detailed in these clusters. Time spent on instruction and practice should NOT be reduced.*
	CC.2.1.K.B.1 Use place value to compose and decompose numbers within 19. ■K.NBT.A.1 - Compose and decompose numbers from 11 to 19 into ten ones and some further ones, e.g., by using objects or drawings, and record each composition or decomposition by a drawing or equation (such as 18 = 10 + 8); understand that these numbers are composed of ten ones and one, two, three, four, five, six, seven, eight, or nine ones.	*Combine lessons on numbers 11–19 to address key concepts in order to reduce the amount of time spent on this cluster. Limit the amount of required student practice.*
CC.2.2.PreK.A.1 Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.	**CC.2.2.K.A.1 Extend the concepts of putting together and taking apart to add and subtract within 10.** ■K.OA.A.1 - Represent addition and subtraction with objects, fingers, mental images, drawings1, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations. ■K.OA.A.2 - Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem. ■K.OA.A.3 - Decompose numbers less than or equal to 10 into pairs in more than one way, e.g., by using objects or drawings, and record each decomposition by a drawing or equation (e.g., 5 = 2 + 3 and 5 = 4 + 1). ■K.OA.A.4 - For any number from 1 to 9, find the number that makes 10 when added to the given number, e.g., by using objects or drawings, and record the answer with a drawing or equation.	*No special considerations for curricula well aligned to knowing number names, counting, and comparing numbers, as detailed in these clusters. Time spent on instruction and practice should NOT be reduced.*
CC.2.3.PreK.A.1 Identify and describe shapes.	**CC.2.3.K.A.1 Identify and describe two- and three dimensional shapes.** ?K.G.A.2 - Correctly name shapes regardless of their orientations or overall size. ?K.G.A.3 - Identify shapes as two-dimensional (lying in a plane, "flat") or three-dimensional ("solid").	*Combine lessons on identifying, describing, analyzing, comparing, and composing shapes to address key concepts across the clusters in this domain in order to reduce the amount of time spent on this cluster.*
CC.2.3.PreK.A.2 Analyze, compare, create, and compose	**CC.2.3.K.A.2 Analyze, compare, create, and compose two- and**	*Combine lessons on identifying,*

shapes.	**three-dimensional shapes.** K.G.B.4 - Analyze and compare two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices/"corners") and other attributes (e.g., having sides of equal length). K.G.B.5 - Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes. K.G.B.6 - Compose simple shapes to form larger shapes. For example, "Can you join these two triangles with full sides touching to make a rectangle?"	*describing, analyzing, comparing, and composing shapes to address key concepts across the clusters in this domain in order to reduce the amount of time spent on this cluster.*
CC.2.4.PreK.A.1 Describe and compare measurable attributes of length and weight of everyday objects.	**CC.2.4.K.A.1 Describe and compare attributes of length, area, weight, and capacity of everyday objects.** K.MD.A.1 - Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object. K.MD.A.2 - Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference. For example, directly compare the heights of two children and describe one child as taller/shorter.	*Combine lessons on describing and comparing measurable attributes to address key concepts across this cluster in order to reduce the amount of time spent on this cluster. Limit the amount of required student practice. (Note that standards in K.MD.A do not require use of measuring devices or measurement units.*
CC.2.4.PreK.A.4 Classify objects and count the number of objects in each category.	**CC.2.4.K.A.4 Classify objects and count the number of objects in each category.** K.MD.B.3 - Classify objects into given categories; count the numbers of objects in each category and sort the categories by count.	*Integrate classifying and counting objects (K.MD.B) with other counting and comparison work in the grade (K.CC.A, B, and C) in order to reduce the amount of time spent on this cluster.*

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1st Grade Math Important Prerequisites

K-1 note: There is a significant degree of overlap between kindergarten and 1st grade standards. High-quality instructional materials embrace this overlap and provide teachers with resources to meet students where they are. For this reason, when kindergarten standards are listed as "heavy traffic" below, this should be interpreted as an area where emphasis is needed on certain problems and/or strategies; additional tasks may not need to be added. For example, word problems within 10 (K.OA.A.2) are likely already addressed within 1st grade curricular materials before problems within 20 (1.OA.A.1).

Prerequisite Standard Bridge up or heavy traffic from previous grade **PA standard in bold**, CCSS below	**Standard Language (PA first and then CCSS)** ■ *Major* ? *Supporting* ? *Additional*	**Instructional Time** Preserve or reduce time as compared to a typical year, *per SAP guidance*
CC.2.2.K.A.1 - Extend concepts of putting together and taking apart to add and subtract within 10. K.OA.A.2 - Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem.	**CC.2.2.1.A.1 - Represent and solve problems involving addition and subtraction within 20.** ■ 1.OA.A.1 (*Application*) - Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem. (Use the Three Read protocol for students to be able to comprehend the word problem, represent the scenario with objects, draw a picture, and finally, represent it with an equation.)	*Emphasize problems that involve sums less than or equal to 10 and/or the related differences to keep the focus on making sense of different problem types; do not limit the range of addition and subtraction situations, but assign fewer problems with sums greater than 10 or related differences.*
	■ 1.OA.A.2 (*Application*) - Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.	*Reduce the amount of time spent on lessons and problems that call for addition of three whole numbers. Limit the amount of required student practice.*
	CC.2.2.1.A.2 - Understand and apply properties of operations and the relationship between addition and subtraction. ■ 1.OA.B.3 (*Conceptual*) - Apply properties of operations as strategies to add and subtract. *Examples: If 8 + 3 = 11 is known, then 3 + 8 = 11 is also known. (Commutative property of addition.) To add 2 + 6 + 4, the second two numbers can be added to make a ten, so 2 + 6 + 4 = 2 + 10 = 12. (Associative property of addition.)*	

	■ 1.OA.B.4 (*Conceptual*) - Understand subtraction as an unknown-addend problem. For example, subtract 10 - 8 by finding the number that makes 10 when added to 8.	
	■ 1.OA.C.5 (*Conceptual*) - Relate counting to addition and subtraction (e.g., by counting on 2 to add 2).	*Integrate counting into the work of the domain (OA), instead of separate lessons, in order to reduce the amount of time spent on this standard.*
K.OA.A.3 - Decompose numbers less than or equal to 10 into pairs in more than one way, e.g., by using objects or drawings, and record each decomposition by a drawing or equation (e.g., 5 = 2 + 3 and 5 = 4 + 1). K.OA.A.4 - For any number from 1 to 9, find the number that makes 10 when added to the given number, e.g., by using objects or drawings, and record the answer with a drawing or equation. K.OA.A.5 - Fluently add and subtract within 5.	**CC.2.2.1.A.1 - Represent and solve problems involving addition and subtraction within 20.** ■ 1.OA.C.6 (*Conceptual, Procedural*) - Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g., 8 + 6 = 8 + 2 + 4 = 10 + 4 = 14); decomposing a number leading to a ten (e.g., 13 - 4 = 13 - 3 - 1 = 10 - 1 = 9); using the relationship between addition and subtraction (e.g., knowing that 8 + 4 = 12, one knows 12 - 8 = 4); and creating equivalent but easier or known sums (e.g., adding 6 + 7 by creating the known equivalent 6 + 6 + 1 = 12 + 1 = 13). (Have students use the number rack tool, ten frames, or Splats to add and subtract, first focusing on combinations to 10 and progressing to combinations to 20.)	
	■ 1.OA.D.7 (*Conceptual, Procedural*) - Understand the meaning of the equal sign, and determine if equations involving addition and subtraction are true or false. *For example, which of the following equations are true and which are false? 6 = 6, 7 = 8 - 1, 5 + 2 = 2 + 5, 4 + 1 = 5 + 2.*	
	■ 1.OA.D.8 (*Procedural*) - Determine the unknown whole number in an addition or subtraction equation relating three whole numbers. *For example, determine the unknown number that makes the equation true in each of the equations 8 + ? = 11, 5 = _ - 3, 6 + 6 = _.*	
	CC.2.1.1.B.1 - Extend the counting sequence to read and write numerals to represent objects. ■ 1.NBT.A.1 (*Conceptual, Procedural*) - Count to 120, starting at any number less than 120. In this range, read and write numerals and represent a number of objects with a written numeral.	*Eliminate lessons that are solely about extending the count sequence in order to reduce the amount of time spent on this cluster. Incorporate extending the count sequence into other concepts including place value and addition and subtraction operations.*

CC.2.1.K.B.1 - Use place value to compose and decompose numbers within 19. K.NBT.A.1 - Compose and decompose numbers from 11 to 19 into ten ones and some further ones, e.g., by using objects or drawings, and record each composition or decomposition by a drawing or equation (such as 18 = 10 + 8); understand that these numbers are composed of ten ones and one, two, three, four, five, six, seven, eight, or nine ones.	**CC.2.1.1.B.2 - Use place value concepts to represent amounts of tens and ones** and to compare two digit numbers. ■ 1.NBT.B.2 *(Conceptual)* - Understand that the two digits of a two-digit number represent amounts of tens and ones. Understand the following as special cases: ■ 1.NBT.B.2a - 10 can be thought of as a bundle of ten ones — called a "ten." ■ 1.NBT.B.2b - The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones. ■ 1.NBT.B.2c - The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones). (Have students use the number rack tool or ten frames to visualize teen numbers being made up of a full ten and additional ones and connect that to place value cards demonstrating the digits' values.)	
CC.2.1.K.A.3 - Apply the concept of magnitude to compare numbers and quantities. K.CC.C.6 - Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group, e.g., by using matching and counting strategies. K.CC.C.7 - Compare two numbers between 1 and 10 presented as written numerals.	**CC.2.1.1.B.2 - Use place value concepts** to represent amounts of tens and ones and **to compare two digit numbers.** ■ 1.NBT.B.3 *(Conceptual)* - Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols >, =, and <.	
	CC.2.1.1.B.3 - Use place value concepts and properties of operations to add and subtract within 100. ■ 1.NBT.C.4 *(Conceptual, Procedural)* - Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten. ■ 1.NBT.C.5 *(Conceptual, Procedural)* - Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used.	

	CC.2.1.1.B.3 - Use place value concepts and properties of operations to add and subtract within 100. ■ 1.NBT.C.6 (*Conceptual, Procedural*) - Subtract multiples of 10 in the range 10-90 from multiples of 10 in the range 10-90 (positive or zero differences), using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.	
	CC.2.4.1.A.1 - Order lengths and measure them both indirectly and by repeating length units. ■ 1.MD.A.1 (*Conceptual, Procedural*) - Order three objects by length; compare the lengths of two objects indirectly by using a third object.	
	CC.2.4.1.A.1 - Order lengths and measure them both indirectly and by repeating length units. ■ 1.MD.A.2 (*Conceptual, Procedural*) - Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps.	
	CC.2.4.1.A.2- Tell and write time to the nearest half hour using both analog and digital clocks. 1.MD.B.3 (*Conceptual, Procedural*) - Tell and write time in hours and half-hours using analog and digital clocks.	*Eliminate lessons devoted to telling and writing time to the hour and half-hour. **
	CC.2.4.1.A.4 - Represent and interpret data using tables/charts. 1.MD.C.4 (*Procedural, Application*) - Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.	*Eliminate lessons devoted to representing and interpreting data. (Do not eliminate problems about using addition and subtraction to solve problems about the data.) **

CC.2.3.K.A.1 - Identify and describe two- and three-dimensional shapes. K.G.A.2 - Correctly name shapes regardless of their orientations or overall size. **CC.2.3.K.A.2 - Analyze, compare, create, and compose two- and three-dimensional shapes.** K.G.B.4 - Analyze and compare two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices/"corners") and other attributes (e.g., having sides of equal length).	**CC.2.3.1.A.1 - Compose and distinguish between two- and three-dimensional shapes based on their attributes.** ?1.G.A.1 (*Conceptual, Procedural)* - Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus non-defining attributes (e.g., color, orientation, overall size); build and draw shapes to possess defining attributes. (Engage the students in sorting activities with multiple shapes and use their classifications to discuss the different attributes of each group. See page 18-24 in the linked unit for possible lesson.)	*Combine lessons to address key concepts of defining attributes of shapes and composing shapes in order to reduce the amount of time spent.on this cluster.*
	CC.2.3.1.A.1 - Compose and distinguish between two- and three-dimensional shapes based on their attributes. ?1.G.A.2 (*Conceptual)* - Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape.	
	CC.2.3.1.A.2 - Use the understanding of fractions to partition shapes into halves and quarters. ?1.G.A.3 (*Conceptual, Procedural)* - Partition circles and rectangles into two and four equal shares, describe the shares using the words halves, fourths, and quarters, and use the phrases half of, fourth of, and quarter of. Describe the whole as two of, or four of the shares. Understand for these examples that decomposing into more equal shares creates smaller shares.	

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2nd Grade Math Important Prerequisites

Prerequisite Standard Bridge up or heavy traffic from previous grade **PA standard in bold**, CCSS below	Standard Language (PA first and then CCSS) ■ *Major* ? *Supporting* ? *Additional*	Instructional Time Preserve or reduce time as compared to a typical year, *per* *SAP guidance*
	CC.2.3.2.A.1 - Analyze and draw two- and three-dimensional shapes having specified attributes. ?2.G.A.1 (*Conceptual*)- Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces. Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.	*Combine lessons to address key concepts on reasoning with shapes and their attributes in order to reduce the amount of time spent on this cluster. Limit the amount of required student practice.*
	?2.G.A.2 (*Conceptual*) -Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.	
CC.2.3.1.A.2 - Use the understanding of fractions to partition shapes into halves and quarters. 1.G.A.3 - Partition circles and rectangles into two and four equal shares, describe the shares using the words halves, fourths, and quarters, and use the phrases half of, fourth of, and quarter of. Describe the whole as two of, or four of the shares. Understand for these examples that decomposing into more equal shares creates smaller shares.	**CC.2.3.2.A.2 - Use the understanding of fractions to partition shapes into halves, quarters, and thirds.** ?2.G.A.3 (*Conceptual*) - Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words halves, thirds, half of, a third of, etc., and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape.	
CC.2.4.1.A.1 - Order lengths and measure them both indirectly and by repeating length units. 1.MD.A.2 - Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps.	**CC.2.4.2.A.1 - Measure and estimate lengths in standard units using appropriate tools.** ■2.MD.A.1 (*Conceptual, Procedural*) - Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes. (Consider using the lesson from page 26-32 of the linked document to move students from measuring with one inch objects to using a ruler.)	*Integrate lessons and practice into the work of measuring length with tools (2.MD.A.1) in order to reduce the amount of time spent on this cluster. Limit the amount of required student practice.*
	■2.MD.A.2 (*Conceptual, Procedural*) - Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen.	

	CC.2.4.2.A.1 - Measure and estimate lengths in standard units using appropriate tools. ■ 2.MD.A.3 (*Conceptual*) - Estimate lengths using units of inches, feet, centimeters, and meters. ■ 2.MD.A.4 (*Application*) - Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard unit length.	
	CC.2.4.2.A.6 - Extend the concepts of addition and subtraction to problems involving length. ■ 2.MD.B.5 (*Application*) - Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem.	*Ensure word problems represent all grade 2 problem types, and refer to guidance for 2.OA.A.*
	■ 2.MD.B.6 (*Conceptual, Application*) - Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the number 0, 1, 2, ..., and represent whole-number sums and differences within 100 on a number line diagram.	
CC.2.4.1.A.2 - Tell and write time to the nearest half hour using both analog and digital clocks. 1.MD.B.3 - Tell and write time in hours and half-hours using analog and digital clocks.	**CC.2.4.2.A.2 - Tell and write time to the nearest five minutes using both analog and digital clocks.** 2.MD.C.7 (*Application*) - Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m.	*Combine lessons in order to reduce the amount of time spent. Emphasize denominations that support place value understanding such as penny-dime- dollar. Limit the amount of required student practice.*
	CC.2.4.2.A.3 - Solve problems and make change using coins and paper currency with appropriate symbols. 2.MD.C.8 (*Application*) - Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ and ¢ symbols appropriately. *Example: If you have 2 dimes and 3 pennies, how many cents do you have?*	
	CC.2.4.2.A.4 - Represent and interpret data using line plots, picture graphs, and bar graphs. 2.MD.D.9 (*Procedural, Application*) - Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object. Show the	*Eliminate lessons solely on these standards.* *Integrate data displays only as settings for addition & subtraction word problems (2.OA.A).**

	measurements by making a line plot, where the horizontal scale is marked off in whole-number units. 2.MD.D.10 (*Procedural, Application*) - Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph.	
CC.2.1.1.B.2 - Use place value concepts to represent amounts of tens and ones and to compare two digit numbers. 1.NBT.B.2 -Understand that the two digits of a two-digit number represent amounts of tens and ones. Understand the following as special cases: 1.NBT.B.2.a - 10 can be thought of as a bundle of ten ones — called a "ten." 1.NBT.B.2.b - The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones. 1.NBT.B.2.c - The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones).	**CC.2.1.2.B.1 - Use place value concepts to represent amounts of [hundreds], tens and ones-**and to compare three digit numbers**.** (Note: AIU-MSC believes this may be an error on PA-SAS and should include hundreds, tens, and ones.) ■ 2.NBT.A.1 (*Conceptual*) - Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones. ■ 2.NBT.A.1a (*Conceptual*) - 100 can be thought of as a bundle of ten tens called a hundred. ■ 2.NBT.A.1b (*Conceptual*) - The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).	
	CC.2.1.2.B.2 - Use place value concepts to read, write, and skip count to 1000. ■ 2.NBT.A.2 (*Procedural*) - Count within 1000; skip-count by 5s, 10s, and 100s.	
	CC.2.1.2.B.2 - Use place value concepts to read, write, and skip count to 1000. ■ 2.NBT.A.3 (*Conceptual*) - Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.	*Integrate lessons and practice on counting, reading and writing numbers into the work of place value. Limit the amount of required student practice on counting by ones, reading/writing, and comparing numbers.*
CC.2.1.1.B.2 - Use place value concepts to represent amounts of tens and ones and to compare two digit numbers. 1.NBT.B.3 - Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols >, =, and <.	**CC.2.1.2.B.1 - Use place value concepts** to represent amounts of tens and ones and**-to compare three digit numbers.** (Note: AIU-MSC believes this may be an error on PA-SAS and should include hundreds, tens, and ones.) ■ 2.NBT.A.4 (*Conceptual*) - Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.	

1.NBT.C.5 - Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used. 1.NBT.C.6 - Subtract multiples of 10 in the range 10-90 from multiples of 10 in the range 10-90 (positive or zero differences), using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.	■2.NBT.B.5 (*Conceptual, Procedural)* - Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.	*Prioritize strategies based on place value in written work to strengthen the progression toward fluency with multi-digit addition and subtraction.*
	■2.NBT.B.6 (*Conceptual, Procedural)* - Add up to four two-digit numbers using strategies based on place value and properties of operations.	
CC.2.1.1.B.3 - Use place value concepts and properties of operations to add and subtract within 100. 1.NBT.C.4 - Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten.	**CC.2.1.2.B.3 - Use place value understanding and properties of operations to add and subtract within 1000.** ■2.NBT.B.7 (*Conceptual, Procedural)* - Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds. (Have students use base ten blocks to add and subtract two-digit, then three-digit numbers while recording their process using expanded notation as shown in the linked video.)	
	■2.NBT.B.8 (*Procedural)*- Mentally add 10 or 100 to a given number 100 to 900, and mentally subtract 10 or 100 from a given number 100 to 900.	
	■2.NBT.B.9 (*Conceptual)* - Explain why addition and subtraction strategies work, using place value and the properties of operations.	

CC.2.2.1.A.1 - Represent and solve problems involving addition and subtraction within 20. [1.OA.A.1](#) - Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem. [1.OA.D.8](#) - Determine the unknown whole number in an addition or subtraction equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations 8 + ? = 11, 5 = _ - 3, 6 + 6 = _.	**CC.2.2.2.A.1 - Represent and solve problems involving addition and subtraction within 100.** ■ [2.OA.A.1](#) (*Application)* - Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. (Use the [Three Read protocol](#) for students to be able to comprehend the word problem, draw a picture of the scenario and finally, represent it with an equation.)	*Emphasize problems that involve sums less than or equal to 20 and/or the related differences to keep the focus on making sense of different problem types; assign fewer problems with sums greater than 20 or related differences.*
CC.2.2.1.A.2 - Understand and apply properties of operations and the relationship between addition and subtraction. [1.OA.C.6](#) - Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g., 8 + 6 = 8 + 2 + 4 = 10 + 4 = 14); decomposing a number leading to a ten (e.g., 13 - 4 = 13 - 3 - 1 = 10 - 1 = 9); using the relationship between addition and subtraction (e.g., knowing that 8 + 4 = 12, one knows 12 - 8 = 4); and creating equivalent but easier or known sums (e.g., adding 6 + 7 by creating the known equivalent 6 + 6 + 1 = 12 + 1 = 13).	**CC.2.2.2.A.2 - Use mental strategies to add and subtract within 20.** ■ [2.OA.B.2](#) (*Procedural*) - Fluently add and subtract within 20 using mental strategies. By the end of Grade 2, know from memory all sums of two one-digit numbers.	*Incorporate additional practice on the grade 1 fluency of adding and subtracting within 10 (1.OA.C.6) early in the school year to support the addition and subtraction work of grade 2 (2.OA).*
	⍰[2.OA.C.3](#) (*Conceptual*) - Determine whether a group of objects (up to 20) has an odd or even number of members, e.g., by pairing objects or counting them by 2s; write an equation to express an even number as a sum of two equal addends.	*Eliminate lessons on foundations for multiplication.**
	CC.2.2.2.A.3 - Work with equal groups of objects to gain foundations for multiplication. ⍰[2.OA.C.4](#) (*Conceptual*) - Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.	

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3rd Grade Math Important Prerequisites

Prerequisite Standard Bridge up or heavy traffic from previous grade **PA standard in bold**, CCSS below	Standard Language (PA first and then CCSS) ■ *Major* ? *Supporting* ? *Additional*	Instructional Time Preserve or reduce time as compared to a typical year, *per [SAP guidance](#)*
CC.2.3.2.A.1 - Analyze and draw two- and three-dimensional shapes having specified attributes. 2.G.A.1 - Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces.1 Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.	**M03.C-G.1.1.1 Explain that shapes in different categories may share attributes and that the shared attributes can define a larger category.** **Example 1: A rhombus and a rectangle are both quadrilaterals since they both have exactly four sides.** **Example 2: A triangle and a pentagon are both polygons since they are both multi-sided plane figures.** ?3.G.A.1 (*Conceptual*) - Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.	*Combine lessons on shapes and their attributes in order to reduce the amount of time spent on this standard.*
CC.2.3.2.A.2 - Use the understanding of fractions to partition shapes into halves, quarters, and thirds. 2.G.A.3 - Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.	**M03.C-G.1.1.3 Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole.** **Example 1: Partition a shape into 4 parts with equal areas.** **Example 2: Describe the area of each of 8 equal parts as 1/8 of the area of the shape.** ?3.G.A.2 (*Conceptual, Procedural*) - Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. *For example, partition a shape into 4 parts with equal area, and describe the area of each part as 1/4 of the area of the shape.*	*Eliminate separate geometry lessons on partitioning shapes. Combine this with work on expressing each section of the shape as a unit fraction of the whole.*

CC.2.4.2.A.2 - Tell and write time to the nearest five minutes using both analog and digital clocks. 2.MD.C.7 - Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m.	**M03.D-M.1.1.1 Tell, show, and/or write time (analog) to the nearest minute.** **M03.D-M.1.1.2 Calculate elapsed time to the minute in a given situation (total elapsed time limited to 60 minutes or less).** ■ 3.MD.A.1 (*Procedural, Application*) - Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram. (Use the clock manipulative and the activities on pages 69 - 75 of the linked document. Begin discussion of the nearest five minutes and move to the nearest minute. Use the same clock manipulative to calculate elapsed time.)	*Combine lessons in order to reduce the amount of time spent on time, volume, and mass. Reduce the amount of required student practice.*
	M03.D-M.1.2.1 Measure and estimate liquid volumes and masses of objects using standard units (cups [c], pints [pt], quarts [qt], gallons [gal], ounces [oz.], and pounds [lb]) and metric units (liters [l], grams [g], and kilograms [kg]). **M03.D-M.1.2.2 Add, subtract, multiply, and divide to solve one-step word problems involving masses or liquid volumes that are given in the same units.** ■ 3.MD.A.2 (*Application*) - Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.	
CC.2.4.2.A.3 - Solve problems and make change using coins and paper currency with appropriate symbols. 2.MD.C.8 - Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ and ¢ symbols appropriately. Example: If you have 2 dimes and 3 pennies, how many cents do you have?	**M03.D-M.1.3.1 Compare total values of combinations of coins (penny, nickel, dime, and quarter) and/or dollar bills less than $5.00.** **M03.D-M.1.3.2 Make change for an amount up to $5.00 with no more than $2.00 change given (penny, nickel, dime, quarter, and dollar).** **M03.D-M.1.3.3 Round amounts of money to the nearest dollar.**	*Combine lessons in order to reduce the amount of time spent on money. Reduce the amount of required student practice.*
	M03.D-M.2.1.1 Complete a scaled pictograph and a scaled bar graph to represent a data set with several categories (scales limited to 1, 2, 5, and	*Eliminate lessons on creating scaled graphs. Integrate a few problems with scaled graphs only*

	10). **M03.D-M.2.1.2 Solve one- and two-step problems using information to interpret data presented in scaled pictographs and scaled bar graphs (scales limited to 1, 2, 5, and 10).** **Example 1: (One-step) "Which category is the largest?"** **Example 2: (Two-step) "How many more are in category A than in category B?"** **M03.D-M.2.1.4 Translate information from one type of display to another. Limit to pictographs, tally charts, bar graphs, and tables.** **Example: Convert a tally chart to a bar graph.** 3.MD.B.3 (*Application)* - Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. *For example, draw a bar graph in which each square in the bar graph might represent 5 pets.*	*as settings for multiplication word problems (3.OA.A.3) and two-step word problems (3.OA.D.8). Scaled pictographs and scaled bar graphs as well as translation from one display to another are not included in the PA Focus of Instruction 2020-2021 Document.*
	M03.D-M.1.2.3 Use a ruler to measure lengths to the nearest quarter inch or centimeter. **M03.D-M.2.1.3 Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Display the data by making a line plot, where the horizontal scale is marked in appropriate units—whole numbers, halves, or quarters.** 3.MD.B.4 (*Procedural, Application)* - Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units - whole numbers, halves, or quarters.	*Eliminate any lessons or problems that do not strongly reinforce the fraction work of this grade (3.NF.A).*
CC.2.4.2.A.1 - Measure and estimate lengths in standard units using appropriate tools. 2.MD.A.1 - Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes. 2.G.A.2 - Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.	**M03.D-M.3.1.1 Measure areas by counting unit squares (square cm, square m, square in., square ft, and non-standard square units).** 3.MD.C.5 (*Conceptual)* - Recognize area as an attribute of plane figures and understand concepts of area measurement. 3.MD.C.5a (*Conceptual)* - A square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area. 3.MD.C.5b (*Conceptual)* - A plane figure which can be covered without gaps or overlaps by *n* unit squares is said to have an area	*Emphasize enduring concepts of geometric measurement (iterating a unit with no gaps or overlaps) (3.MD.C.5) and students using area models to support their mathematical explanations involving the distributive property for products (3.MD.C.7c). Combine lessons in order to reduce the amount of time spent on measuring area and limit the amount of required student practice.*

	of *n* square units. ■ 3.MD.C.6 (*Conceptual, Procedural)* - Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units). (Have students use the partial product finder to help visualize the area, count squares, and connect the area model to multiplication.)	
	M03.D-M.3.1.2 Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real-world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning. ■ 3.MD.C.7 (*Conceptual)* - Relate area to the operations of multiplication and addition. ■ 3.MD.C.7a (*Conceptual)* - Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths. ■ 3.MD.C.7b (*Procedural, Application)* - Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning. ■ 3.MD.C.7c (*Conceptual)* - Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and b + c is the sum of a × b and a × c. Use area models to represent the distributive property in mathematical reasoning. ■ 3.MD.C.7d (*Conceptual, Application)* - Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems.	
	M03.D-M.4.1.1 Solve real-world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side	*Integrate a few problems on perimeter into work on area (3.MD.C).*

	lengths, finding an unknown side length, exhibiting rectangles with the same perimeter and different areas, and exhibiting rectangles with the same area and different perimeters. Use the same units throughout the problem. 3.MD.D.8 (*Conceptual, Procedural, Application)* - Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.	
CC.2.3.2.A.2- Use the understanding of fractions to partition shapes into halves, quarters, and thirds. 2.G.A.3 - Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words halves, thirds, half of, a third of, etc., and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape. 2.MD.A.2 - Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen.	**M03.A-F.1.1.1 Demonstrate that when a whole or set is partitioned into y equal parts, the fraction 1/y represents 1 part of the whole and/or the fraction x/y represents x equal parts of the whole (limit denominators to 2, 3, 4, 6, and 8; limit numerators to whole numbers less than the denominator; and no simplification necessary).** ■ 3.NF.A.1 (*Conceptual)* - Understand a fraction 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size 1/b. (Use area models of fractions through the fraction app and connect those visuals to the numerical fraction.)	*Emphasize the concept of unit fraction as the basis for building fractions. Prioritize the number line as a representation to develop students' understanding of fractions as numbers by foregrounding the magnitude, location, and order of fractions among whole numbers (3.NF.A.2)*
2.MD.B.6 - Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, ..., and represent whole-number sums and differences within 100 on a number line diagram.	**M03.A-F.1.1.2 Represent fractions on a number line (limit denominators to 2, 3, 4, 6, and 8; limit numerators to whole numbers less than the denominator; and no simplification necessary).** ■ 3.NF.A.2 (*Conceptual)* - Understand a fraction as a number on the number line; represent fractions on a number line diagram. ■ 3.NF.A.2a (*Conceptual)* - Represent a fraction 1/b on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size 1/b and that the endpoint of the part based at 0 locates the number 1/b on the number line. ■ 3.NF.A.2b (*Conceptual)* - Represent a fraction a/b on a number line diagram by marking off a lengths 1/b from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line.	

	M03.A-F.1.1.3 Recognize and generate simple equivalent fractions (limit the denominators to 1, 2, 3, 4, 6, and 8 and limit numerators to whole numbers less than the denominator). **Example 1: 1/2 = 2/4 Example 2: 4/6 = 2/3** ■ 3.NF.A.3 (*Conceptual)* - Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. ■ 3.NF.A.3a (*Conceptual)* - Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line. ■ 3.NF.A.3b (*Conceptual)* - Recognize and generate simple equivalent fractions, e.g., 1/2 = 2/4, 4/6 = 2/3. Explain why the fractions are equivalent, e.g., by using a visual fraction model.	
	M03.A-F.1.1.4 Express whole numbers as fractions, and/or generate fractions that are equivalent to whole numbers (limit denominators to 1, 2, 3, 4, 6, and 8). Example 1: Express 3 in the form 3 = 3/1. Example 2: Recognize that 6/1 = 6. ■ 3.NF.A.3c (*Conceptual)* - Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. Examples: Express 3 in the form 3 = 3/1; recognize that 6/1 = 6; locate 4/4 and 1 at the same point of a number line diagram.	
	M03.A-F.1.1.5 Compare two fractions with the same denominator (limit denominators to 1, 2, 3, 4, 6, and 8), using the symbols >, =, or <, and/or justify the conclusions. ■ 3.NF.A.3d (*Conceptual)* - Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.	
CC.2.1.2.B.1 - Use place value concepts to represent amounts of [hundreds,] tens and ones and to compare three digit numbers. 2.NBT.A.1 - Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g.,	**M03.A-T.1.1.1 Round two- and three-digit whole numbers to the nearest ten or hundred, respectively.** 3.NBT.A.1 (*Conceptual, Procedural)* - Use place value understanding to round whole numbers to the nearest 10 or 100.	*Combine lessons on rounding in order to reduce the amount of time spent on rounding numbers. Limit the amount of required student practice.*

706 equals 7 hundreds, 0 tens, and 6 ones. Understand the following as special cases: 2.NBT.A.1.a 100 can be thought of as a bundle of ten tens — called a "hundred." 2.NBT.A.1.b - The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).		
CC.2.1.2.B.3 - Use place value understanding and properties of operations to add and subtract within 1000. 2.NBT.B.7 - Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds. 2.NBT.B.8 - Mentally add 10 or 100 to a given number 100-900, and mentally subtract 10 or 100 from a given number 100-900. 2.NBT.B.9 - Explain why addition and subtraction strategies work, using place value and the properties of operations. (Explanations may be supported by drawings or objects.) **CC.2.2.2.A.2 - Use mental strategies to add and subtract within 20.** 2.OA.B.2 - Fluently add and subtract within 20 using mental strategies. (See standard 1.OA.6 for a list of mental strategies.) By end of Grade 2, know from memory all sums of two one-digit numbers.	**M03.A-T.1.1.2 Add two- and three-digit whole numbers (limit sums from 100 through 1,000) and/or subtract two- and three-digit numbers from three-digit whole numbers.** 3.NBT.A.2 (*Conceptual, Procedural*) - Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. (Consider having students use base ten blocks connected to expanded notation (shown in this linked video) to help clarify any regrouping necessary.)	
	M03.A-T.1.1.3 Multiply one-digit whole numbers by two-digit multiples of 10 (from 10 through 90). 3.NBT.A.3 (*Conceptual, Procedural*) - Multiply one-digit whole numbers by multiples of 10 in the range 10-90 (e.g., 9 × 80, 5 × 60) using strategies based on place value and properties of operations.	*Combine lessons in order to reduce time spent multiplying by multiples of 10. Emphasize the connection to single-digit products and tens units.*

CC.2.1.2.B.1 - Use place value concepts to represent amounts of [hundreds,] tens and ones and to compare three digit numbers.	**M03.A-T.1.1.4 Order a set of whole numbers from least to greatest or greatest to least (up through 9,999, and limit sets to no more than four numbers).**	*Combine lessons in order to reduce the amount of time spent on ordering whole numbers. Emphasize the use of visual models for developing place value understanding.*
CC.2.1.2.B.2 - Use place value concepts to read, write, and skip count to 1000. **CC.2.2.2.A.3 - Work with equal groups of objects to gain foundations for multiplication.** 2.NBT.A.2 - Count within 1000; skip-count by 5s, 10s, and 100s. 2.OA.C.3 - Determine whether a group of objects (up to 20) has an odd or even number of members, e.g., by pairing objects or counting them by 2s; write an equation to express an even number as a sum of two equal addends. 2.OA.C.4 - Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.	**M03.B-O.1.1.1 Interpret and/or describe products of whole numbers (up to and including 10 × 10).** **Example 1: Interpret 35 as the total number of objects in 5 groups, each containing 7 objects.** **Example 2: Describe a context in which a total number of objects can be expressed as 5 × 7.** ■ 3.OA.A.1 (*Conceptual*) - Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. *For example, describe a context in which a total number of objects can be expressed as 5 × 7.*	*Students may need extra support to see row and column structure in arrays of objects.*
	M03.B-O.1.1.2 Interpret and/or describe whole-number quotients of whole numbers (limit dividends through 50 and limit divisors and quotients through 10). **Example 1: Interpret 48 ÷ 8 as the number of objects in each share when 48 objects are partitioned equally into 8 shares, or as a number of shares when 48 objects are partitioned into equal shares of 8 objects each.** **Example 2: Describe a context in which a number of shares or a number of groups can be expressed as 48 ÷ 8.** ■ 3.OA.A.2 (*Conceptual*) - Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. *For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8.*	
	M03.B-O.1.2.1 Use multiplication (up to and including 10 × 10) and/or division (limit dividends through 50 and limit divisors and quotients through 10) to solve word problems in situations involving equal groups, arrays, and/or measurement quantities. ■ 3.OA.A.3 (*Application*) - Use multiplication and division within 100 to	

	solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.	
	M03.B-O.1.2.2 Determine the unknown whole number in a multiplication (up to and including 10 × 10) or division (limit dividends through 50 and limit divisors and quotients through 10) equation relating three whole numbers. **Example: Determine the unknown number that makes an equation true.** ■3.OA.A.4 (*Procedural)* - Determine the unknown whole number in a multiplication or division equation relating three whole numbers. *For example, determine the unknown number that makes the equation true in each of the equations 8 × ? = 48, 5 = _ ÷ 3, 6 × 6 = ?.*	
2.NBT.B.5 - Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.	**M03.B-O.2.1.1 Apply the commutative property of multiplication (not identification or definition of the property).** **M03.B-O.2.1.2 Apply the associative property of multiplication (not identification or definition of the property).** ■3.OA.B.5 (*Conceptual)* - Apply properties of operations as strategies to multiply and divide. *Examples: If 6 × 4 = 24 is known, then 4 × 6 = 24 is also known. (Commutative property of multiplication.) 3 × 5 × 2 can be found by 3 × 5 = 15 then 15 × 2 = 30, or by 5 × 2 = 10 then 3 × 10 = 30. (Associative property of multiplication.) Knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56. (Distributive property.)*	
	M03.B-O.2.2.1 Interpret and/or model division as a multiplication equation with an unknown factor. Example: Find 32 ÷ 8 by solving 8 × ? = 32 ■3.OA.B.6 (*Conceptual)* - Understand division as an unknown-factor problem. *For example, find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8.*	
	■3.OA.C.7 (*Procedural)* - Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.	

CC.2.2.2.A.1 - Represent and solve problems involving addition and subtraction within 100. 2.OA.A.1 - Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.	**M03.B-O.3.1.1 Solve two-step word problems using the four operations (expressions are not explicitly stated). Limit to problems with whole numbers and having whole-number answers.** **M03.B-O.3.1.2 Represent two-step word problems using equations with a symbol standing for the unknown quantity. Limit to problems with whole numbers and having whole-number answers.** **M03.B-O.3.1.3 Assess the reasonableness of answers. Limit problems posed with whole numbers and having whole-number answers.** **M03.B-O.3.1.4 Solve two-step equations using order of operations (equation is explicitly stated with no grouping symbols).** ■ 3.OA.D.8 (*Application*) - Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.	
	M03.B-O.3.1.5 Identify arithmetic patterns (including patterns in the addition table or multiplication table) and/or explain them using properties of operations. **Example 1: Observe that 4 times a number is always even.** **Example 2: Explain why 6 times a number can be decomposed into three equal addends.** ■ 3.OA.D.9 (*Conceptual, Application*) - Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. *For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.*	*Reduce focus on arithmetic patterns.*
CC.2.2.2.A.1 **Represent and solve problems involving addition and subtraction within 100.**	**M03.B-O.3.1.6 Create or match a story to a given combination of symbols (+, –, ×, ÷, <, >, and =) and numbers.** **M03.B-O.3.1.7 Identify the missing symbol (+, –, ×, ÷, <, >, and =) that makes a number sentence true.**	*Integrate work on these standards with work on other word problem-related standards (e.g., M.03.B-O.3.1.1, and 2)*

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4th Grade Math Important Prerequisites

Prerequisite Standard Bridge up or heavy traffic from previous grade	Standard Language Grade-Level Standard ■ *Major* ? *Supporting* ? *Additional*	Instructional Time Preserve or reduce time as compared to a typical year, *per SAP guidance*
	M04.C-G.1.1.1 Draw points, lines, line segments, rays, angles (right, acute, and obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. ?4.G.A.1 *(Conceptual, Procedural)* - Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.	*Combine lessons on drawing and identifying lines and angles and classifying shapes by properties. Limit the amount of required student practice.*
	M04.C-G.1.1.2 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. ?4.G.A.2 *(Conceptual)* - 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.	
	M04.C-G.1.1.3 Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into mirroring parts. Identify line-symmetric figures and draw lines of symmetry (up to two lines of symmetry). ?4.G.A.3 *(Conceptual)* - Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.	
M03.D-M.1.2.1 Measure and estimate liquid volumes and masses of objects using standard units (cups [c], pints [pt], quarts [qt], gallons [gal], ounces [oz.], and pounds [lb]) and	**M04.D-M.1.1.1 Know relative sizes of measurement units within one system of units including standard units (in., ft, yd, mi; oz., lb; and c, pt, qt, gal), metric units (cm, m, km; g, kg; and mL, L), and time (sec, min,**	

metric units (liters [l], grams [g], and kilograms [kg]). 3.MD.A.2 - Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.	**hr, day, wk, mo, and yr). Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. A table of equivalencies will be provided.** **Example 1: Know that 1 kg is 1,000 times as heavy as 1 g.** **Example 2: Express the length of a 4-foot snake as 48 in.** 4.MD.A.1 - *(Conceptual, Procedural)* - Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. *For example: Know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ...*	
	M04.D-M.1.1.2 Use the four operations to solve word problems involving distances, intervals of time (such as elapsed time), liquid volumes, masses of objects; money, including problems involving simple fractions or decimals; and problems that require expressing measurements given in a larger unit in terms of a smaller unit. 4.MD.A.2 *(Application)* - Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.	*Combine lessons on problems involving measurement, except for those on measurement conversion (see 4.MD.A.1). Limit the amount of required student practice.*
M03.D-M.4.1.1 Solve real-world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, exhibiting rectangles with the same perimeter and different areas, and exhibiting rectangles with the same area and different perimeters. Use the same units throughout the problem. 3.MD.D.8 - Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.	**M04.D-M.1.1.3 Apply the area and perimeter formulas for rectangles in real-world and mathematical problems (may include finding a missing side length). Whole numbers only. The formulas will be provided.** 4.MD.A.3 *(Application, Procedural)* - Apply the area and perimeter formulas for rectangles in real world and mathematical problems. *For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.*	

M03.D-M.3.1.1 Measure areas by counting unit squares (square cm, square m, square in., square ft, and non-standard square units). 3.MD.C.7a - Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths. **M03.D-M.3.1.2 Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real-world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning** 3.MD.C.7b - Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning. 3.MD.C.7c - Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and b + c is the sum of a × b and a × c. Use area models to represent the distributive property in mathematical reasoning.		
	M04.D-M.1.1.4 Identify time (analog or digital) as the amount of minutes before or after the hour. **Example 1: 2:50 is the same as 10 minutes before 3:00.** **Example 2: Quarter past six is the same as 6:15.**	*Time is not included on the PA focus standards document from 2020-2021 so reduce focus on this topic.*
	M04.D-M.2.1.1 Make a line plot to display a data set of measurements in fractions of a unit (e.g., intervals of 1/2, 1/4, or 1/8). **M04.D-M.2.1.2 Solve problems involving addition and subtraction of fractions by using information presented in line plots (line plots must be labeled with common denominators, such as 1/4, 2/4, 3/4).** **M04.D-M.2.1.3 Translate information from one type of display to another (table, chart, bar graph, or pictograph).** 4.MD.B.4 *(Application)* - Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. *For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.*	*Eliminate lessons and problems that do not strongly reinforce the fraction work of this grade (4.NF).*

	4.MD.C.5 (*Conceptual*) - Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement: a) An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles. b) An angle that turns through n one-degree angles is said to have an angle measure of n degrees.	*Emphasize the foundational understanding of a one-degree angle as a unit of measure (4.MD.C.5a) and use that as the basis for measuring and drawing angles with protractors (4.MD.C.6).*
	M04.D-M.3.1.1 Measure angles in whole-number degrees using a protractor. With the aid of a protractor, sketch angles of specified measure. 4.MD.C.6 (*Procedural*) - Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.	
	M04.D-M.3.1.2 Solve addition and subtraction problems to find unknown angles on a diagram in real-world and mathematical problems. (Angles must be adjacent and non-overlapping.) 4.MD.C.7 (*Conceptual, Application, Procedural*) - Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.	*Eliminate lessons on recognizing angle measure as additive.*
M03.A-F.1.1.1 Demonstrate that when a whole or set is partitioned into y equal parts, the fraction 1/y represents 1 part of the whole and/or the fraction x/y represents x equal parts of the whole (limit denominators to 2, 3, 4, 6, and 8; limit numerators to whole numbers less than the denominator; and no simplification necessary). 3.NF.A.1 - Understand a fraction 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size 1/b. Formative Assessment Lesson	**M04.A-F.1.1.1 Recognize and generate equivalent fractions.** 4.NF.A.1 (*Conceptual*) - Explain why a fraction a/b is equivalent to a fraction (n x a)/(n x b) by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions.	*Incorporate some foundational work on the meaning of the unit fraction (3.NF.A.1 & 2), especially through partitioning the whole on a number line diagram.*

M03.A-F.1.1.2 Represent fractions on a number line (limit denominators to 2, 3, 4, 6, and 8; limit numerators to whole numbers less than the denominator; and no simplification necessary). 3.NF.A.2a- Represent a fraction 1/b on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size 1/b and that the endpoint of the part based at 0 locates the number 1/b on the number line. 3.NF.A.2b - Represent a fraction a/b on a number line diagram by marking off "a" lengths 1/b from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line. **M03.A-F.1.1.3 Recognize and generate simple equivalent fractions (limit the denominators to 1, 2, 3, 4, 6, and 8 and limit numerators to whole numbers less than the denominator). Example 1: 1/2 = 2/4 Example 2: 4/6 = 2/3** 3.NF.A.3a - Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line. 3.NF.A.3b - Recognize and generate simple equivalent fractions, e.g., 1/2 = 2/4, 4/6 = 2/3. Explain why the fractions are equivalent, e.g., by using a visual fraction model. **M03.A-F.1.1.4 Express whole numbers as fractions, and/or generate fractions that are equivalent to whole numbers (limit denominators to 1, 2, 3, 4, 6, and 8). Example 1: Express 3 in the form 3 = 3/1. Example 2: Recognize that 6/1 = 6.** 3.NF.A.3c - Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. Examples: Express 3 in the form 3 = 3/1; recognize that 6/1 = 6; locate 4/4 and 1 at the same point of a number line diagram. **M03.A-F.1.1.5 Compare two fractions with the same denominator (limit denominators to 1, 2, 3, 4, 6, and 8), using the symbols >, =, or <, and/or justify the conclusions.** 3.NF.A.3d - Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize	**M04.A-F.1.1.2 Compare two fractions with different numerators and different denominators (denominators limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100) using the symbols >, =, or < and justify the conclusions.** ■ 4.NF.A.2 (*Conceptual*) - Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.	

that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.		
	M04.A-F.2.1.1 Add and subtract fractions with a common denominator (denominators limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100; answers do not need to be simplified; and no improper fractions as the final answer). ■4.NF.B.3 (*Conceptual, Procedural*) - Understand a fraction *a*/*b* with *a* > 1 as a sum of fractions 1/*b*. ■4.NF.B.3a (*Conceptual*) - Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.	*Emphasize reasoning with unit fractions to determine sums and products, not committing calculation rules to memory or engaging in repetitive fluency exercises.*
	M04.A-F.2.1.2 Decompose a fraction or a mixed number into a sum of fractions with the same denominator (denominators limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100), recording the decomposition by an equation. Justify decompositions (e.g., by using a visual fraction model). **Example 1: 3/8 = 1/8 + 1/8 + 1/8 OR 3/8 = 1/8 + 2/8** **Example 2: 2 1/12 = 1 + 1 + 1/12 = 12/12 + 12/12 + 1/12** ■4.NF.B.3b (*Conceptual*) - Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. Examples: 3/8 = 1/8 + 1/8 + 1/8 ; 3/8 = 1/8 + 2/8 ; 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8.	
	M04.A-F.2.1.3 Add and subtract mixed numbers with a common denominator (denominators limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100; no regrouping with subtraction; fractions do not need to be simplified; and no improper fractions as the final answers). ■4.NF.B.3c (*Conceptual, Procedural*) - Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction.	
	M04.A-F.2.1.4 Solve word problems involving addition and subtraction of fractions referring to the same whole or set and having like denominators (denominators limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100).	

	■4.NF.B.3d (*Application)* - Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem.	
	M04.A-F.2.1.5 Multiply a whole number by a unit fraction (denominators limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100 and final answers do not need to be simplified or written as a mixed number). **Example: 5 × (1/4) = 5/4** ■4.NF.B.4 (*Conceptual, Procedural)* - Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. ■4.NF.B.4a (*Conceptual)* - Understand a fraction a/b as a multiple of 1/b. *For example, use a visual fraction model to represent 5/4 as the product 5 × (1/4), recording the conclusion by the equation 5/4 = 5 × (1/4).*	
	M04.A-F.2.1.6 Multiply a whole number by a non-unit fraction (denominators limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100 and final answers do not need to be simplified or written as a mixed number). **Example: 3 × (5/6) = 15/6** ■4.NF.B.4b (*Conceptual)* - Understand a multiple of a/b as a multiple of 1/b, and use this understanding to multiply a fraction by a whole number. *For example, use a visual fraction model to express 3 × (2/5) as 6 × (1/5), recognizing this product as 6/5. (In general, n × (a/b) = (n × a)/b.)*	
	M04.A-F.2.1.7 Solve word problems involving multiplication of a whole number by a fraction (denominators limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100). ■4.NF.B.4c (*Application)* - Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. *For example, if each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?*	
	M04.A-F.3.1.1 Add two fractions with respective denominators 10 and 100.	

	Example: Express 3/10 as 30/100, and add 3/10 + 4/100 = 30/100 + 4/100 = 34/100. ■4.NF.C.5 (*Procedural)* - Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100. *For example, express 3/10 as 30/100 and add 3/10 + 4/100 = 34/100.*	
	M04.A-F.3.1.2 Use decimal notation for fractions with denominators 10 or 100. **Example: Rewrite 0.62 as 62/100 and vice versa** ■4.NF.C.6 (*Procedural, Conceptual, Application)* - Use decimal notation for fractions with denominators 10 or 100. *For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram.*	
	M04.A-F.3.1.3 Compare two decimals to hundredths using the symbols >, =, or <, and justify the conclusions. ■4.NF.C.7 (*Conceptual)* - Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model.	
	M04.A-T.1.1.1 Demonstrate an understanding that in a multi-digit whole number (through 1,000,000), a digit in one place represents ten times what it represents in the place to its right. **Example: Recognize that in the number 770, the 7 in the hundreds place is ten times the 7 in the tens place.** ■4.NBT.A.1 (*Conceptual)* - Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. *For example, recognize that 700 ÷ 70 = 10 by applying concepts of place value and division.*	
	M04.A-T.1.1.2 Read and write whole numbers in expanded, standard, and word form through 1,000,000. **M04.A-T.1.1.3 Compare two multi-digit numbers through 1,000,000 based on meanings of the digits in each place, using >, =, and < symbols.**	

	■ 4.NBT.A.2 *(Conceptual, Procedural)* - Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.	
M03.A-T.1.1.1 Round two- and three-digit whole numbers to the nearest ten or hundred, respectively. 3.NBT.A.1 - Use place value understanding to round whole numbers to the nearest 10 or 100.	**M04.A-T.1.1.4 Round multi-digit whole numbers (through 1,000,000) to any place.** ■ 4.NBT.A.3 *(Conceptual, Procedural)* - Use place value understanding to round multi-digit whole numbers to any place.	*First tasks should involve rounding to tens and hundreds.*
M03.A-T.1.1.2 Add two- and three-digit whole numbers (limit sums from 100 through 1,000) and/or subtract two- and three-digit numbers from three-digit whole numbers. 3.NBT.A.2 - Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.	**M04.A-T.2.1.1 Add and subtract multi-digit whole numbers (limit sums and subtrahends up to and including 1,000,000).** ■ 4.NBT.B.4 *(Procedural)* - Fluently add and subtract multi-digit whole numbers using the standard algorithm.	*Emphasize problems with only one regrouping step.*
M03.D-M.3.1.1 Measure areas by counting unit squares (square cm, square m, square in., square ft, and non-standard square units). 3.MD.C.7a - Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths. **M03.D-M.3.1.2 Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real-world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning** 3.MD.C.7b - Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning. 3.MD.C.7c - Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and b + c is the sum of a × b and a × c. Use area models to represent the distributive property in mathematical reasoning.	**M04.A-T.2.1.2 Multiply a whole number of up to four digits by a one-digit whole number and multiply 2 two-digit numbers.** ■ 4.NBT.B.5 *(Conceptual, Procedural)* - Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.	

M03.A-T.1.1.3 Multiply one-digit whole numbers by two-digit multiples of 10 (from 10 through 90). 3.NBT.A.3. - Multiply one-digit whole numbers by multiples of 10 in the range 10-90 (e.g., 9 × 80, 5 × 60) using strategies based on place value and properties of operations. **M03.B-O.1.1.1 Interpret and/or describe products of whole numbers (up to and including 10 × 10).** **Example 1: Interpret 35 as the total number of objects in 5 groups, each containing 7 objects.** **Example 2: Describe a context in which a total number of objects can be expressed as 5 × 7.** 3.OA.A.1, - Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. For example, describe a context in which a total number of objects can be expressed as 5 × 7. **M03.B-O.2.1.1 Apply the commutative property of multiplication (not identification or definition of the property).** **M03.B-O.2.1.2 Apply the associative property of multiplication (not identification or definition of the property).** 3.OA.B.5, - Apply properties of operations as strategies to multiply and divide. Examples: If 6 × 4 = 24 is known, then 4 × 6 = 24 is also known. (Commutative property of multiplication.) 3 × 5 × 2 can be found by 3 × 5 = 15, then 15 × 2 = 30, or by 5 × 2 = 10, then 3 × 10 = 30. (Associative property of multiplication.) Knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56. (Distributive property.) 3.OA.C.7 - Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.		

M03.B-O.1.1.2 Interpret and/or describe whole-number quotients of whole numbers (limit dividends through 50 and limit divisors and quotients through 10). **Example 1: Interpret 48 ÷ 8 as the number of objects in each share when 48 objects are partitioned equally into 8 shares, or as a number of shares when 48 objects are partitioned into equal shares of 8 objects each.** **Example 2: Describe a context in which a number of shares or a number of groups can be expressed as 48 ÷ 8.** 3.OA.A.2 - Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8. **M03.B-O.2.1.1 Apply the commutative property of multiplication (not identification or definition of the property).** **M03.B-O.2.1.2 Apply the associative property of multiplication (not identification or definition of the property).** 3.OA.B.5. - Apply properties of operations as strategies to multiply and divide.2 Examples: If 6 × 4 = 24 is known, then 4 × 6 = 24 is also known. (Commutative property of multiplication.) 3 × 5 × 2 can be found by 3 × 5 = 15, then 15 × 2 = 30, or by 5 × 2 = 10, then 3 × 10 = 30. (Associative property of multiplication.) Knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56. (Distributive property.) **M03.B-O.2.2.1 Interpret and/or model division as a multiplication equation with an unknown factor.** **Example: Find 32 ÷ 8 by solving 8 × ? = 32.** 3.OA.B.6, - Understand division as an unknown-factor problem. For example, find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8. 3.OA.C.7 - Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8) or	**M04.A-T.2.1.3 Divide up to four-digit dividends by one-digit divisors with answers written as whole-number quotients and remainders.** ■ 4.NBT.B.6 (*Conceptual, Procedural*) - Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.	

properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.		
	M04.A-T.2.1.4 Estimate the answer to addition, subtraction, and multiplication problems using whole numbers through six digits (for multiplication, no more than 2 digits × 1 digit, excluding powers of 10).	
M03.B-O.1.1.1 Interpret and/or describe products of whole numbers (up to and including 10 × 10). **Example 1: Interpret 35 as the total number of objects in 5 groups, each containing 7 objects.** **Example 2: Describe a context in which a total number of objects can be expressed as 5 × 7.** 3.OA.A.1 - Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. For example, describe a context in which a total number of objects can be expressed as 5 × 7. **M03.B-O.1.1.2 Interpret and/or describe whole-number quotients of whole numbers (limit dividends through 50 and limit divisors and quotients through 10).** **Example 1: Interpret 48 ÷ 8 as the number of objects in each share when 48 objects are partitioned equally into 8 shares, or as a number of shares when 48 objects are partitioned into equal shares of 8 objects each.** **Example 2: Describe a context in which a number of shares or a number of groups can be expressed as 48 ÷ 8.** 3.OA.A.2 - Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8. **M03.B-O.1.2.2 Determine the unknown whole number in a multiplication (up to and including 10 × 10) or division (limit dividends through 50 and limit divisors and quotients through 10) equation relating three whole numbers. Example:**	**M04.B-O.1.1.1 Interpret a multiplication equation as a comparison. Represent verbal statements of multiplicative comparisons as multiplication equations.** **Example 1: Interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5.** **Example 2: Know that the statement 24 is 3 times as many as 8 can be represented by the equation 24 = 3 × 8 or 24 = 8 × 3.** ■4.OA.A.1 (*Conceptual*) - Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 x 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. **M04.B-O.1.1.2 Multiply or divide to solve word problems involving multiplicative comparison, distinguishing multiplicative comparison from additive comparison.** **Example: Know that 3 × 4 can be used to represent that Student A has 4 objects and Student B has 3 times as many objects, not just 3 more objects.** ■4.OA.A.2 (*Application*) - Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.	

Determine the unknown number that makes an equation true. 3.OA.A.4 - Determine the unknown whole number in a multiplication or division equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations 8 × ? = 48, 5 = _ ÷ 3, 6 × 6 = ? **M03.B-O.2.2.1 Interpret and/or model division as a multiplication equation with an unknown factor. Example: Find 32 ÷ 8 by solving 8 × ? = 32.** 3.OA.B.6 - Understand division as an unknown-factor problem. For example, find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8. 3.OA.C.7 - Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.		
M03.B-O.3.1.1 Solve two-step word problems using the four operations (expressions are not explicitly stated). Limit to problems with whole numbers and having whole-number answers. **M03.B-O.3.1.2 Represent two-step word problems using equations with a symbol standing for the unknown quantity. Limit to problems with whole numbers and having whole-number answers.** **M03.B-O.3.1.3 Assess the reasonableness of answers. Limit problems posed with whole numbers and having whole-number answers.** 3.OA.D.8 - Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.	**M04.B-O.1.1.3 Solve multi-step word problems posed with whole numbers using the four operations. Answers will be either whole numbers or have remainders that must be interpreted yielding a final answer that is a whole number. Represent these problems using equations with a symbol or letter standing for the unknown quantity.** ■ 4.OA.A.3 (*Application*) - Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.	
	M04.B-O.2.1.1 Find all factor pairs for a whole number in the interval 1 through 100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the interval 1	

	through 100 is a multiple of a given one digit number. Determine whether a given whole number in the interval 1 through 100 is prime or composite. 4.OA.B.4 (*Conceptual, Procedural*) - Find all factor pairs for a whole number in the range 1-100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1-100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1-100 is prime or composite.	
	M04.B-O.1.1.4 Identify the missing symbol (+, –, ×, ÷, =, <, and >) that makes a number sentence true (single-digit divisor only).	
M03.B-O.3.1.5 Identify arithmetic patterns (including patterns in the addition table or multiplication table) and/or explain them using properties of operations. **Example 1: Observe that 4 times a number is always even.** **Example 2: Explain why 6 times a number can be decomposed into three equal addends.** 3.OA.D.9 - Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.	**M04.B-O.3.1.1 Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself.** **Example 1: Given the rule "add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms alternate between odd and even numbers.** **Example 2: Given the rule "increase the number of sides by 1" and starting with a triangle, observe that the tops of the shapes alternate between a side and a vertex.** **M04.B-O.3.1.2 Determine the missing elements in a function table (limit to +, –, or × and to whole numbers or money).** **M04.B-O.3.1.3 Determine the rule for a function given a table (limit to +, –, or × and to whole numbers).** 4.OA.C.5 (*Conceptual, Procedural*) - Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. *For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.*	*Focus on generating and analyzing patterns with only one rule.*

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5th Grade Math Important Prerequisites

Prerequisite Anchor Bridge up or heavy traffic from previous grade	Grade-Level Assessment Anchor ■ *Major* ? *Supporting* ? *Additional*	Instructional Time Preserve or reduce time as compared to a typical year, *per* *SAP guidance*
	M05.C-G.1.1.1 Identify parts of the coordinate plane (x-axis, y-axis, and the origin) and the ordered pair (x-coordinate and y-coordinate). Limit the coordinate plane to quadrant I. ?5.G.A.1 (*Conceptual*) - Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate).	*Incorporate foundational understandings of number lines (such as found in the work of 4.NF) into the work of extending number lines to the coordinate plane, as detailed in this cluster. Emphasize interpreting coordinate values of points in the context of a situation.*
	M05.C-G.1.1.2 Represent real-world and mathematical problems by plotting points in quadrant I of the coordinate plane and interpret coordinate values of points in the context of the situation. ?5.G.A.2 (*Conceptual, Application,Procedural*) - Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.	
M04.C-G.1.1.1 Draw points, lines, line segments, rays, angles (right, acute, and obtuse), and perpendicular and parallel lines. Identify these in two dimensional figures. 4.G.A.1 -Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.	**M05.C-G.2.1.1 Classify two-dimensional figures in a hierarchy based on properties.** **Example 1: All polygons have at least three sides, and pentagons are polygons, so all pentagons have at least three sides.** **Example 2: A rectangle is a parallelogram, which is a quadrilateral, which is a polygon; so, a rectangle can be classified as a parallelogram, as a quadrilateral, and as a polygon.**	*Combine lessons on classifying two-dimensional figures into categories based on properties in order to reduce the amount of time spent on this topic.*

M04.C-G.1.1.2 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. 4.G.A.2 - 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.	5.G.B.3 (*Conceptual*) - Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. *For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.* 5.G.B.4 (*Conceptual*) - Classify two-dimensional figures in a hierarchy based on properties.	
M04.D-M.1.1.1 Know relative sizes of measurement units within one system of units including standard units (in., ft, yd, mi; oz., lb; and c, pt, qt, gal), metric units (cm, m, km; g, kg; and mL, L), and time (sec, min, hr, day, wk, mo, and yr). Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. A table of equivalencies will be provided. **Example 1: Know that 1 kg is 1,000 times as heavy as 1 g.** **Example 2: Express the length of a 4-foot snake as 48 in.** 4.MD.A.1 - Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ...	**M05.D-M.1.1.1 Convert between different-sized measurement units within a given measurement system. A table of equivalencies will be provided. Example: Convert 5 cm to meters.** 5.MD.A.1 (*Procedural, Application*) - Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step real world problems. (Encourage the use of tables to make conversions which highlights the relationship between the units.)	*Combine lessons on converting measurement units in order to reduce the amount of time spent on this topic.*
	M05.D-M.2.1.1 Solve problems involving computation of fractions by using information presented in line plots. 5.MD.B.2 (*Application*) - Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. *For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.*	*Eliminate lessons and problems on representing and interpreting data using line plots that do not strongly reinforce the fraction work of this grade (5.NF).*

	M05.D-M.2.1.2 Display and interpret data shown in tallies, tables, charts, pictographs, bar graphs, and line graphs, and use a title, appropriate scale, and labels. A grid will be provided to display data on bar graphs or line graphs.	
	M05.D-M.3 Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition. ■ 5.MD.C.3 (*Conceptual)* - A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume. ■ 5.MD.C.3a (*Conceptual)*A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume. ■ 5.MD.C.3b (*Conceptual)* - A solid figure which can be packed without gaps or overlaps using *n* unit cubes is said to have a volume of *n* cubic units. ■ 5.MD.C.4 (*Conceptual, Procedural)* - Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units. ■ 5.MD.C.5 (*Conceptual, Application, Procedural)* - Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume. ■ 5.MD.C.5a (*Conceptual)* - Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication.	
	M05.D-M.3.1.1 Apply the formulas V = l × w × h and V = B × h for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real-world and mathematical problems. Formulas will be provided. ■ 5.MD.C.5b (*Procedural, Application)* - Apply the formulas V = l x w x h and V = b x h for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems.	

	M05.D-M.3.1.2 Find volumes of solid figures composed of two non-overlapping right rectangular prisms. ■ 5.MD.C.5c (*Conceptual, Application)* - Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.	

M04.A-T.1.1.1 Demonstrate an understanding that in a multi-digit whole number (through 1,000,000), a digit in one place represents ten times what it represents in the place to its right. Example: Recognize that in the number 770, the 7 in the hundreds place is ten times the 7 in the tens place. 4.NBT.A.1 - Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. For example, recognize that 700 ÷ 70 = 10 by applying concepts of place value and division. **M04.A-F.3.1.1 Add two fractions with respective denominators 10 and 100. Example: Express 3/10 as 30/100, and add 3/10 + 4/100 = 30/100 + 4/100 = 34/100.** 4.NF.C.5 - Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100.2 For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100. **M04.A-F.3.1.2 Use decimal notation for fractions with denominators 10 or 100.** **Example: Rewrite 0.62 as 62/100 and vice versa.** 4.NF.C.6 - Use decimal notation for fractions with denominators 10 or 100. For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram. **M04.A-F.3.1.3 Compare two decimals to hundredths using the symbols >, =, or <, and justify the conclusions.** 4.NF.C.7 - Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model.	**M05.A-T.1.1.1 Demonstrate an understanding that in a multi-digit number, a digit in one place represents 1/10 of what it represents in the place to its left. Example: Recognize that in the number 770, the 7 in the tens place is 1/10 the 7 in the hundreds place.** ■ 5.NBT.A.1 (*Conceptual*) - Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.	*Allow for time to develop students' understanding on foundation work of decimal fractions (4.NF.C) to support entry into understanding the place value system with decimals (5.NBT.A.1, 3, and 4).*

<table>
<tr>
<td></td>
<td>M05.A-T.1.1.2 Explain patterns in the number of zeros of the product when multiplying a number by powers of 10 and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10. Example 1: 4 × 102 = 400 Example 2: 0.05 ÷ 103 = 0.00005

■ 5.NBT.A.2 (Conceptual, Procedural) - Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole number exponents to denote powers of 10.</td>
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<td rowspan="2">M04.A-T.1.1.2 Read and write whole numbers in expanded, standard, and word form through 1,000,000.
M04.A-T.1.1.3 Compare two multi-digit numbers through 1,000,000 based on meanings of the digits in each place, using >, =, and < symbols.
4.NBT.A.2 - Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.</td>
<td>M05.A-T.1.1.3 Read and write decimals to thousandths using base-ten numerals, word form, and expanded form.
Example: 347.392 = 300 + 40 + 7 + 0.3 + 0.09 + 0.002 = 3 × 100 + 4 × 10 + 7 × 1 + 3 × (0.1) + 9 × (0.01) + 2 × (0.001)

■ 5.NBT.A.3a (Conceptual, Procedura) - Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., 347.392 = 3 × 100 + 4 × 10 + 7 × 1 + 3 × (1/10) + 9 × (1/100) + 2 × (1/1000).</td>
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<td>M05.A-T.1.1.4 Compare two decimals to thousandths based on meanings of the digits in each place using >, =, and < symbols.

■ 5.NBT.A.3b (Conceptual) - Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.</td>
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<td>M04.A-T.1.1.4 Round multi-digit whole numbers (through 1,000,000) to any place.
4.NBT.A.3 - Use place value understanding to round multi-digit whole numbers to any place.</td>
<td>M05.A-T.1.1.5 Round decimals to any place (limit rounding to ones, tenths, hundredths, or thousandths place).

■ 5.NBT.A.4 (Conceptual, Procedural) - Use place value understanding to round decimals to any place.</td>
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M04.A-T.2.1.2 Multiply a whole number of up to four digits by a one-digit whole number and multiply 2 two-digit numbers. 4.NBT.B.5 - Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. 4.OA.A.3 - Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.	**M05.A-T.2.1.1 Multiply multi-digit whole numbers (not to exceed three-digit by three-digit).** ■ 5.NBT.B.5 (*Procedural*) - Fluently multiply multi-digit whole numbers using the standard algorithm. (Have student use the partial product finder to understand the relationship between the area model and partial products, then connect to the standard algorithm) (Engage students in the Three Reads Protocol to help comprehend the word problem)	*Incorporate foundational work on multiplying and dividing multi-digit whole numbers (4.NBT.B.5 & 6) to support students' work operating with multi-digit whole numbers and decimals (5.NBT.B).*
M04.A-T.2.1.3 Divide up to four-digit dividends by one-digit divisors with answers written as whole-number quotients and remainders. 4.NBT.B.6, - Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. 4.OA.A.3 - Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.	**M05.A-T.2.1.2 Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors.** ■ 5.NBT.B.6 (*Conceptual, Procedural*) - Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.	
M04.A-F.3.1.1 Add two fractions with respective denominators 10 and 100. **Example: Express 3/10 as 30/100, and add 3/10 + 4/100 = 30/100 + 4/100 = 34/100.** 4.NF.C.5 Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two	**M05.A-T.2.1.3 Add, subtract, multiply, and divide decimals to hundredths (no divisors with decimals).** ■ 5.NBT.B.7 (*Conceptual, Procedural*) - Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the	*Incorporate students' understanding of decimal fractions (4.NF.C) to support entry into the grade 5 work of operations with decimals.*

fractions with respective denominators 10 and 100.2 For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100. **M04.A-F.3.1.2 Use decimal notation for fractions with denominators 10 or 100.** **Example: Rewrite 0.62 as 62/100 and vice versa.** 4.NF.C.6 - Use decimal notation for fractions with denominators 10 or 100. For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram. **M04.A-F.3.1.3 Compare two decimals to hundredths using the symbols >, =, or <, and justify the conclusions.** 4.NF.C.7 - Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model. 4.OA.A.3- Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.	relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.	
M04.A-F.1.1.1 Recognize and generate equivalent fractions. 4.NF.A.1 - Explain why a fraction a/b is equivalent to a fraction (n × a)/(n × b) by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions. Formative Assessment Lesson **M04.A-F.2.1.1 Add and subtract fractions with a common denominator (denominators limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100; answers do not need to be simplified; and no improper fractions as the final answer).**	**M05.A-F.1.1.1 Add and subtract fractions (including mixed numbers) with unlike denominators. (May include multiple methods and representations.) Example: 2/3 + 5/4 = 8/12 + 15/12 = 23/12** ■ 5.NF.A.1 *(Procedural)* - Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. *For example, 2/3 + 5/4 = 8/12 + 15/12 = 23/12. (In general, a/b + c/d = (ad + bc)/bd.)*	*Incorporate foundational work on equivalent fractions (4.NF.A.1) and on the conceptual understanding underlying fraction addition (4.NF.B.3) and to support students' work on adding and subtracting fractions with unlike denominators (5.NF.A).*

4.NF.B.3.A - Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. **M04.A-F.2.1.2 Decompose a fraction or a mixed number into a sum of fractions with the same denominator (denominators limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100), recording the decomposition by an equation. Justify decompositions (e.g., by using a visual fraction model). Example 1: 3/8 = 1/8 + 1/8 + 1/8 OR 3/8 = 1/8 + 2/8 Example 2: 2 1/12 = 1 + 1 + 1/12 = 12/12 + 12/12 + 1/12** 4.NF.B.3.B - Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. Examples: 3/8 = 1/8 + 1/8 + 1/8 ; 3/8 = 1/8 + 2/8 ; 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8. **M04.A-F.2.1.3 Add and subtract mixed numbers with a common denominator (denominators limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100; no regrouping with subtraction; fractions do not need to be simplified; and no improper fractions as the final answers).** 4.NF.B.3.C - Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction. Card Sort in Desmos of adding and subtracting mixed numbers Mini-assessment of all Fractional topics Consider using Illustrative Math Grade 4 Unit 3 Lesson 8 for all of 4.NF.B.3		
	M05.A-F.1.1 Solve addition and subtraction problems involving fractions (straight computation or word problems). ■ 5.NF.A.2 *(Application)* - Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. *For example, recognize an incorrect result 2/5 + 1/2 = 3/7 by observing that 3/7 < 1/2.*	

	M05.A-F.2.1.1 Solve word problems involving division of whole numbers leading to answers in the form of fractions (including mixed numbers). ■ 5.NF.B.3 (*Conceptual, Application*) - Interpret a fraction as division of the numerator by the denominator (a/b = a ÷ b). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3 and that when 3 *wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?*	
M04.A-F.2.1.5 Multiply a whole number by a unit fraction (denominators limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100 and final answers do not need to be simplified or written as a mixed number). Example: 5 × (1/4) = 5/4 4.NF.B.4.A - Understand a fraction a/b as a multiple of 1/b. For example, use a visual fraction model to represent 5/4 as the product 5 × (1/4), recording the conclusion by the equation 5/4 = 5 × (1/4). **M04.A-F.2.1.6 Multiply a whole number by a non-unit fraction (denominators limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100 and final answers do not need to be simplified or written as a mixed number). Example: 3 × (5/6) = 15/6** 4.NF.B.4.B - Understand a multiple of a/b as a multiple of 1/b, and use this understanding to multiply a fraction by a whole number. For example, use a visual fraction model to express 3 × (2/5) as 6 × (1/5), recognizing this product as 6/5. (In general, n × (a/b) = (n × a)/b.)	**M05.A-F.2.1.2 Multiply a fraction (including mixed numbers) by a fraction.** ■ 5.NF.B.4 (*Procedural*) - Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction. ■ 5.NF.B.4.a (*Application*) - Interpret the product (*a*/*b*) × *q* as *a* parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations *a* × *q* ÷ *b*. *For example, use a visual fraction model to show (2/3) × 4 = 8/3, and create a story context for this equation. Do the same with (2/3) × (4/5) = 8/15. (In general, (a/b) × (c/d) = ac/bd.)* ■ 5.NF.B.4.b (*Conceptual, Application*) - Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.	
M04.B-O.1.1.1 Interpret a multiplication equation as a comparison. Represent verbal statements of multiplicative comparisons as multiplication equations. **Example 1: Interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5.**	**M05.A-F.2.1.3 Demonstrate an understanding of multiplication as scaling (resizing).** **Example 1: Comparing the size of a product to the size of one factor on the basis of the size of the other factor without performing the indicated multiplication.**	

Example 2: Know that the statement 24 is 3 times as many as 8 can be represented by the equation 24 = 3 × 8 or 24 = 8 × 3. 4.OA.A.1 - Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations. **M04.B-O.1.1.2 Multiply or divide to solve word problems involving multiplicative comparison, distinguishing multiplicative comparison from additive comparison. Example: Know that 3 × 4 can be used to represent that Student A has 4 objects and Student B has 3 times as many objects not just 3 more objects** 4.OA.A.2 - Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.	**Example 2: Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number.** ■ 5.NF.B.5 (*Conceptual)* - Interpret multiplication as scaling (resizing), by: ■ 5.NF.B.5a (*Conceptual)* - Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication. ■ 5.NF.B.5b (*Conceptual)* - Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence a/b = (n×a) / (n×b) to the effect of multiplying a/b by 1.	
	M05.A-F.2.1.2 Multiply a fraction (including mixed numbers) by a fraction. ■ 5.NF.B.6 (*Application)* - Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.	
	M05.A-F.2.1.4 Divide unit fractions by whole numbers and whole numbers by unit fractions. ■ 5.NF.B.7 (*Conceptual, Application, Procedural)* - Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. Students able to multiply fractions in general can develop strategies to divide fractions in general, by reasoning about the relationship between multiplication and division. But division of a fraction by a fraction is not a requirement at this grade. ■ 5.NF.B.7a (*Conceptual, Application)* - Interpret division of a unit fraction by a non-zero whole number, and compute such quotients.	

	For example, create a story context for (1/3) ÷ 4, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that (1/3) ÷ 4 = 1/12 because (1/12) × 4 = 1/3. ■5.NF.B.7b (*Conceptual, Application)* - Interpret division of a whole number by a unit fraction, and compute such quotients. *For example, create a story context for 4 ÷ (1/5), and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that 4 ÷ (1/5) = 20 because 20 × (1/5) = 4.* ■5.NF.B.7c (*Application)* - Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, how much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?*	
	M05.B-O.1.1.1 Use multiple grouping symbols (parentheses, brackets, or braces) in numerical expressions and evaluate expressions containing these symbols. 5.OA.A.1 (*Procedural)* - Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.	
	M05.B-O.1.1.2 Write simple expressions that model calculations with numbers and interpret numerical expressions without evaluating them. Example 1: Express the calculation "add 8 and 7, then multiply by 2" as 2 × (8 + 7). Example 2: Recognize that 3 × (18,932 + 921) is three times as large as 18,932 + 921 without having to calculate the indicated sum or product 5.OA.A.2 (*Conceptual)* - Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. *For example, express the calculation "add 8 and 7, then multiply by 2" as 2 × (8 + 7). Recognize that 3 × (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.*	*Combine lessons on writing and interpreting numerical expressions in order to reduce the amount of time spent on this topic.*
	M05.B-O.2.1.1 Generate two numerical patterns using two given rules. Example: Given the rule "add 3" and the starting number 0 and given the	*Reduce time spent on lessons and problems involving*

	rule "add 6" and the starting number 0, generate terms in the resulting sequences. **M05.B-O.2.1.2 Identify apparent relationships between corresponding terms of two patterns with the same starting numbers that follow different rules.** **Example: Given two patterns in which the first pattern follows the rule "add 8" and the second pattern follows the rule "add 2," observe that the terms in the first pattern are 4 times the size of the terms in the second pattern.** 5.OA.B.3 (*Conceptual, Procedural)* - Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. *For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.*	*analyzing relationships between numerical patterns.*

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6th Grade Math Important Prerequisites

Prerequisite Standard Bridge up or heavy traffic from previous grade **PA standard in bold**, CCSS below	Standard Language (PA first and then CCSS) ■ *Major* *Supporting* *Additional*	Instructional Time Preserve or reduce time as compared to a typical year, *per SAP guidance*
M05.A-T.1.1.2 Explain patterns in the number of zeros of the product when multiplying a number by powers of 10 and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10. Example 1: 4 × 10^2 = 400 Example 2: 0.05 ÷ 10^3 = 0.00005 5.NBT.A.2-Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.	**M06.B-E.1.1.1 Write and evaluate numerical expressions involving whole-number exponents.** ■ 6.EE.A.1 *(Procedural, Conceptual)* - Write and evaluate numerical expressions involving whole-number exponents.	
M05.B-O.1.1.1 Use multiple grouping symbols (parentheses, brackets, or braces) in numerical expressions and evaluate expressions containing these symbols. 5.OA.A.1-Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols. **M05.B-O.1.1.2 Write simple expressions that model calculations with numbers and interpret numerical expressions without evaluating them. Example 1: Express the calculation "add 8 and 7, then multiply by 2" as 2 × (8 + 7). Example 2: Recognize that 3 × (18,932 + 921) is three times as large as 18,932 + 921 without having to calculate the indicated sum or product.** 5.OA.A.2-Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. For example, express the calculation "add 8 and 7, then multiply by 2" as 2 × (8 + 7). Recognize that 3 × (18932 + 921) is	**M06.B-E.1.1.2 Write algebraic expressions from verbal descriptions. Example: Express the description "five less than twice a number" as 2y – 5.** ■ 6.EE.A.2a *(Conceptual)* - Write expressions that record operations with numbers and with letters standing for numbers. *For example, express the calculation "Subtract y from 5" as 5 - y.*	
	M06.B-E.1.1.3 Identify parts of an expression using mathematical terms (e.g., sum, term, product, factor, quotient, coefficient, quantity). Example: Describe the expression 2(8 + 7) as a product of two factors. ■ 6.EE.A.2b *(Conceptual)* - Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. *For example, describe the expression 2(8 + 7) as a product of two factors; view (8 + 7) as both a single entity and a sum of two terms.*	

three times as large as 18932 + 921, without having to calculate the indicated sum or product. **M05.B-O.2.1.1 Generate two numerical patterns using two given rules. Example: Given the rule "add 3" and the starting number 0 and given the rule "add 6" and the starting number 0, generate terms in the resulting sequences.** 5.OA.B.3-Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.	**M06.B-E.1.1.4 Evaluate expressions at specific values of their variables, including expressions that arise from formulas used in real-world problems. Example: Evaluate the expression $b^2 – 5$ when b = 4.** ■ 6.EE.A.2c *(Procedural, Application)* - Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). *For example, use the formulas V = s^3 and A = 6 s^2 to find the volume and surface area of a cube with sides of length s = 1/2.*	
	M06.B-E.1.1.5 Apply the properties of operations to generate equivalent expressions. Example 1: Apply the distributive property to the expression 3 (2 + x) to produce the equivalent expression 6 + 3x. Example 2: Apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6(4x + 3y). Example 3: Apply properties of operations to y + y + y to produce the equivalent expression 3y. ■ 6.EE.A.3 *(Procedural, Conceptual)* - Apply the properties of operations to generate equivalent expressions. *For example, apply the distributive property to the expression 3 (2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6 (4x + 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y.* ■ 6.EE.A.4 *(Conceptual)* - Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). *For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for.* (Consider using Algebra tiles to address these concepts using this guide for support.)	
M05.A-F.1.1.1 Add and subtract fractions (including mixed numbers) with unlike denominators. (May include multiple	**M06.B-E.2.1.1 Use substitution to determine whether a given number in a specified set makes an equation or inequality true.**	

methods and representations.) Example: 2/3 + 5/4 = 8/12 + 15/12 = 23/12 5.NF.A.1- Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. For example, 2/3 + 5/4 = 8/12 + 15/12 = 23/12. (In general, a/b + c/d = (ad + bc)/bd.) **M05.A-F.1.1.1 Add and subtract fractions (including mixed numbers) with unlike denominators. (May include multiple methods and representations.) Example: 2/3 + 5/4 = 8/12 + 15/12 = 23/12** 5.NF.A.2 -Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. For example, recognize an incorrect result 2/5 + 1/2 = 3/7, by observing that 3/7 < 1/2. **M05.A-F.2.1 Solve multiplication and division problems involving fractions and whole numbers (straight computation or word problems).** 5.NF.B.4a- Interpret the product (a/b) × q as *a* parts of a partition of *q* into *b* equal parts; equivalently, as the result of a sequence of operations a × q ÷ b. For example, use a visual fraction model to show (2/3) × 4 = 8/3, and create a story context for this equation. Do the same with (2/3) × (4/5) = 8/15. (In general, (a/b) × (c/d) = (ac)/(bd). **M05.A-F.2.1 Solve multiplication and division problems involving fractions and whole numbers (straight computation or word problems).** 5.NF.B.4b- Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side	■ 6.EE.B.5 *(Conceptual, Procedural)* - Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.	
	M06.B-E.2.1.2 Write algebraic expressions to represent real-world or mathematical problems. ■ 6.EE.B.6 *(Conceptual, Application)* - Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.	
	M06.B-E.2.1.3 Solve real-world and mathematical problems by writing and solving equations of the form x + p = q and px = q for cases in which p, q, and x are all non-negative rational numbers. ■ 6.EE.B.7 *(Application, Procedural)* - Solve real-world and mathematical problems by writing and solving equations of the form x + p = q and px = q for cases in which p, q and x are all nonnegative rational numbers. (Consider using Algebra tiles to address these concepts using this guide for support.)	

lengths to find areas of rectangles, and represent fraction products as rectangular areas. **M05.A-F.2.1.2 Multiply a fraction (including mixed numbers) by a fraction.** 5.NF.B.6 - Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.	**M06.B-E.2.1.4 Write an inequality of the form x > c or x < c to represent a constraint or condition in a real-world or mathematical problem and/or represent solutions of such inequalities on number lines.** ■ 6.EE.B.8 *(Conceptual, Application)* - Write an inequality of the form x > c or x < c to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form x > c or x < c have infinitely many solutions; represent solutions of such inequalities on number line diagrams.	
	M06.B-E.3.1.1 Write an equation to express the relationship between the dependent and independent variables. Example: In a problem involving motion at a constant speed of 65 units, write the equation d = 65t to represent the relationship between distance and time. **M06.B-E.3.1.2 Analyze the relationship between the dependent and independent variables using graphs and tables and/or relate these to an equation.** ■ 6.EE.C.9 - *(Application, Conceptual)* - Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of)as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. *For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation d = 65t to represent the relationship between distance and time.*	

	M06.C-G.1.1.1 Determine the area of triangles and special quadrilaterals (i.e., square, rectangle, parallelogram, rhombus, and trapezoid). Formulas will be provided. **M06.C-G.1.1.2 Determine the area of irregular or compound polygons. Example: Find the area of a room in the shape of an irregular polygon by composing and/or decomposing.** 6.G.A.1 (*Procedural, Application*) - Find area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.	*Emphasize understanding of the reasoning leading to the triangle area formula. Instead of teaching additional area formulas as separate topics, emphasize problems that focus on finding areas in real-world problems by decomposing figures into triangles and rectangles.*
M05.D-M.3.1.1 Apply the formulas V = l × w × h and V = B × h for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real-world and mathematical problems. Formulas will be provided. 5.MD.C.4- Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units. 5.MD.C.5a- Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication. 5.MD.C.5b- Apply the formulas V = l × w × h and V = b × h for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems. **M05.D-M.3.1.2 Find volumes of solid figures composed of two non-overlapping right rectangular prisms**. 5.MD.C.5c-Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular	**M06.C-G.1.1.3 Determine the volume of right rectangular prisms with fractional edge lengths. Formulas will be provided.** 6.G.A.2 (*Conceptual, Procedural, Application*) - Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas V = l w h and V = b h to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems. (When working on volume, be sure to emphasize the concept of multiplying the area of the base times the height as a means of incorporating area concepts from prior grades.)	*Emphasize contextual problems, as detailed in the second sentence of the standard; eliminate lessons focused on the first sentence of the standard (finding the volume of a rectangular prism with fractional edge lengths by packing it with unit cubes).*

prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.		
M05.C-G.1.1.1 Identify parts of the coordinate plane (x-axis, y-axis, and the origin) and the ordered pair (x-coordinate and y-coordinate). Limit the coordinate plane to quadrant I. 5.G.A.1- Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate). **M05.C-G.1.1.2 Represent real-world and mathematical problems by plotting points in quadrant I of the coordinate plane and interpret coordinate values of points in the context of the situation.** 5.G.A.2- Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.	**M06.C-G.1.1.4 Given coordinates for the vertices of a polygon in the plane, use the coordinates to find side lengths and area of the polygon (limited to triangles and special quadrilaterals). Formulas will be provided.** 6.G.A.3 *(Application, Procedural)* - Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.	*Eliminate lessons and problems involving polygons on the coordinate plane. This is not a focus standard in the PA Focus of Instruction Document 2020-2021.*
	M06.C-G.1.1.5 Represent three-dimensional figures using nets made of rectangles and triangles. **M06.C-G.1.1.6 Determine the surface area of triangular and rectangular prisms (including cubes). Formulas will be provided.** 6.G.A.4 *(Conceptual, Application, Procedural)* - Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.	*Eliminate lessons and problems on constructing three-dimensional figures from nets and determining if nets can be constructed into three- dimensional figures during the study of nets and surface area. This is not a focus standard in the PA Focus of Instruction Document 2020-2021.*

M05.A-F.2.1.4 Divide unit fractions by whole numbers and whole numbers by unit fractions. 5.NF.B.7a- Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. *For example, create a story context for (1/3) ÷ 4, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that (1/3) ÷ 4 = 1/12 because (1/12) × 4 = 1/3.* 5.NF.B.7b-Interpret division of a whole number by a unit fraction, and compute such quotients. *For example, create a story context for 4 ÷ (1/5), and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that 4 ÷ (1/5) = 20 because 20 × (1/5) = 4.* Formative Assessment Lesson	**M06.A-N.1.1.1 Interpret and compute quotients of fractions (including mixed numbers), and solve word problems involving division of fractions by fractions. Example 1: Given a story context for (2/3) ÷ (3/4), explain that (2/3) ÷ (3/4) = 8/9 because 3/4 of 8/9 is 2/3. (In general, (a/b) ÷ (c/d) = (a/b) × (d/c) = ad/bc.) Example 2: How wide is a rectangular strip of land with length 3/4 mi and area 1/2 square mi? Example 3: How many 2 1/4-foot pieces can be cut from a 15 1/2-foot board?** ■ 6.NS.A.1 *(Conceptual, Procedural, Application)* - Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, create a story context for (2/3) ÷ (3/4) and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that (2/3) ÷ (3/4) = 8/9 because 3/4 of 8/9 is 2/3. [In general, (a/b) ÷ (c/d) = ad/bc.] How much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 3/4-cup servings are in 2/3 of a cup of yogurt? How wide is a rectangular strip of land with length 3/4 mi and area 1/2 square mi?*	
M05.A-T.2.1.2 Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors. 5.NBT.B.6- Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.	**M06.A-N.2.1.1 Solve problems involving operations (+, –, ×, and ÷) with whole numbers, decimals (through thousandths), straight computation, or word problems.** 6.NS.B.2 *(Procedural)* - Fluently divide multi-digit numbers using the standard algorithm.	*Eliminate lessons on computing fluently by integrating these problems into spiraled practice throughout the year. Time should not be spent remediating multi- digit calculation algorithms.*
M05.A-T.2.1.3 Add, subtract, multiply, and divide decimals to hundredths (no divisors with decimals). 5.NBT.B.7- Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.	**M06.A-N.2.1.1 Solve problems involving operations (+, –, ×, and ÷) with whole numbers, decimals (through thousandths), straight computation, or word problems.** 6.NS.B.3 *(Procedural)* - Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.	

	M06.A-N.2.2.1 Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. **M06.A-N.2.2.2 Apply the distributive property to express a sum of two whole numbers, 1 through 100, with a common factor as a multiple of a sum of two whole numbers with no common factor. Example: Express 36 + 8 as 4(9 + 2).** 6.NS.B.4 *(Conceptual, Procedural)* - Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1-100 with a common factor as a multiple of a sum of two whole numbers with no common factor. *For example, express 36 + 8 as 4 (9 + 2).*	
	M06.A-N.3.1.1 Represent quantities in real-world contexts using positive and negative numbers, explaining the meaning of 0 in each situation (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge). ■ 6.NS.C.5 *(Conceptual, Application)* - Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.	
	M06.A-N.3.1.2 Determine the opposite of a number and recognize that the opposite of the opposite of a number is the number itself (e.g., – (– 3) = 3; 0 is its own opposite). **M06.A-N.3.1.3 Locate and plot integers and other rational numbers on a horizontal or vertical number line; locate and plot pairs of integers and other rational numbers on a coordinate plane.** ■ 6.NS.C.6 *(Conceptual)* - Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar	

	from previous grades to represent points on the line and in the plane with negative number coordinates. ■ 6.NS.C.6a *(Conceptual)* - Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., $-(-3) = 3$, and that 0 is its own opposite. ■ 6.NS.C.6b *(Conceptual)* - Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes. ■ 6.NS.C.6c *(Procedural)* - Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.	
	M06.A-N.3.2.1 Write, interpret, and explain statements of order for rational numbers in real-world contexts. Example: Write – 3°C > – 7°C to express the fact that – 3°C is warmer than – 7°C. ■ 6.NS.C.7a *(Conceptual)* - Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. *For example, interpret -3 > -7 as a statement that -3 is located to the right of -7 on a number line oriented from left to right.* ■ 6.NS.C.7b *(Conceptual, Application)* - Write, interpret, and explain statements of order for rational numbers in real-world contexts. *For example, write -3C > -7C to express the fact that -3C is warmer than -7C.*	
	M06.A-N.3.2.2 Interpret the absolute value of a rational number as its distance from 0 on the number line and as a magnitude for a positive or negative quantity in a real-world situation. Example: For an account balance of – 30 dollars, write |– 30| = 30 to describe the size of the debt in dollars, and recognize that an account balance less than – 30 dollars represents a debt greater than 30 dollars. ■ 6.NS.C.7c *(Conceptual, Application)* - Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a	

	real-world situation. *For example, for an account balance of -30 dollars, write |-30| = 30 to describe the size of the debt in dollars.* ■ 6.NS.C.7d *(Conceptual)* - Distinguish comparisons of absolute value from statements about order. *For example, recognize that an account balance less than –30 dollars represents a debt greater than 30 dollars.*	
M05.C-G.1.1.1 Identify parts of the coordinate plane (x-axis, y-axis, and the origin) and the ordered pair (x-coordinate and y-coordinate). Limit the coordinate plane to quadrant I. 5.G.A.1- Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate). **M05.C-G.1.1.2 Represent real-world and mathematical problems by plotting points in quadrant I of the coordinate plane and interpret coordinate values of points in the context of the situation.** 5.G.A.2-Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.5.G.A.2	**M06.A-N.3.2.3 Solve real-world and mathematical problems by plotting points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.** ■ 6.NS.C.8 *(Application, Conceptual, Procedural)* - Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.	

M05.A-F.2.1.3 Demonstrate an understanding of multiplication as scaling (resizing). Example 1: Comparing the size of a product to the size of one factor on the basis of the size of the other factor without performing the indicated multiplication. Example 2: Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number 5.NF.B.5a-Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.\\ 5.NF.B.5b- Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence a/b = (n × a)/(n × b) to the effect of multiplying a/b by 1.	**M06.A-R.1.1.1 Use ratio language and notation (such as 3 to 4, 3:4, 3/4) to describe a ratio relationship between two quantities. Example 1: "The ratio of girls to boys in a math class is 2:3 because for every 2 girls there are 3 boys." Example 2: "For every five votes candidate A received, candidate B received four votes."** ■ 6.RP.A.1 *(Conceptual)* - Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. *For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes."*	
M05.A-F.2.1.1 Solve word problems involving division of whole numbers leading to answers in the form of fractions (including mixed numbers). 5.NF.B.3-Interpret a fraction as division of the numerator by the denominator (*a/b = a ÷ b*). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. *For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?*	**M06.A-R.1.1.2 Find the unit rate a/b associated with a ratio a:b (with b ≠ 0) and use rate language in the context of a ratio relationship. Example 1: "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar." Example 2: "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger."** ■ 6.RP.A.2 *(Conceptual)* - Understand the concept of a unit rate a/b associated with a ratio a:b with b not equal to 0, and use rate language in the context of a ratio relationship. *For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar" "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger."*	

M05.C-G.1.1.1 Identify parts of the coordinate plane (x-axis, y-axis, and the origin) and the ordered pair (x-coordinate and y-coordinate). Limit the coordinate plane to quadrant I. 5.G.A.1-Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate). **M05.C-G.1.1.2 Represent real-world and mathematical problems by plotting points in quadrant I of the coordinate plane and interpret coordinate values of points in the context of the situation.** 5.G.A.2- Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.	**M06.A-R.1.1 Represent and/or solve real world and mathematical problems using rates, ratios, and/or percents.** ■ 6.RP.A.3 *(Application, Conceptual, Procedural)* - Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. **M06.A-R.1.1.3 Construct tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and/or plot the pairs of values on the coordinate plane. Use tables to compare ratios.** ■ 6.RP.A.3a *(Conceptual, Procedural)* - Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.	
	M06.A-R.1.1.4 Solve unit rate problems including those involving unit pricing and constant speed. Example: If it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed? ■ 6.RP.A.3b *(Application)* - Solve unit rate problems including those involving unit pricing and constant speed. *For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?*	
	M06.A-R.1.1.5 Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percentage.	

	■ [6.RP.A.3c](#) *(Conceptual, Procedural, Application)* - Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.	
	No Match ?6.SP.A.1 *(Conceptual)* - Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. *For example, "How old am I?" is not a statistical question,but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages.* ?6.SP.A.2 *(Conceptual)* - Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape. ?6.SP.A.3 *(Conceptual)* - Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.	*Combine lessons about introductory statistical concepts so as to proceed more quickly to applying and reinforcing these concepts in context.*
	M06.D-S.1.1.1 Display numerical data in plots on a number line, including line plots, histograms, and box-and whisker plots. ?6.SP.B.4 *(Application, Conceptual, Procedural)* - Display numerical data in plots on a number line, including dot plots, histograms, and box plots.	*Reduce the amount of required student practice in calculating measures of center and measures of variation by hand, to emphasize the concept of a distribution and the usefulness of summary measures. Reduce the amount of time spent creating data displays by hand.*
	M06.D-S.1.1.2 Determine quantitative measures of center (e.g., median, mean, mode) and variability (e.g., range, interquartile range, mean absolute deviation). **M06.D-S.1.1.3 Describe any overall pattern and any deviations from the overall pattern with reference to the context in which the data were gathered.** ?6.SP.B.5 *(Application, Conceptual)* - Summarize numerical data sets in relation to their context.	

	6.SP.B.5a (*Application, Conceptual)* - Summarize numerical data sets in relation to their context by reporting the number of observations. 6.SP.B.5b (*Application, Conceptual)* - Summarize numerical data sets in relation to their context by describing the nature of the attribute under investigation, including how it was measured and its units of measurement. 6.SP.B.5c (*Application, Conceptual, Procedural)* - Summarize numerical data sets in relation to their context by giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.	
	M06.D-S.1.1.4 Relate the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered. 6.SP.B.5d *(Application, Conceptual)* - Summarize numerical data sets in relation to their context by relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.	

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7th Grade Math Important Prerequisites

Prerequisite Standard Bridge up or heavy traffic from previous grade	Standard Language ■ Major ? Supporting ? Additional	Instructional Time Preserve or reduce time as compared to a typical year, per SAP guidance
M06.B-E.1.1.2 Write algebraic expressions from verbal descriptions. Example: Express the description "five less than twice a number" as 2y – 5. 6.EE.A.2.a - Write expressions that record operations with numbers and with letters standing for numbers. For example, express the calculation "Subtract y from 5" as 5 - y. **M06.B-E.1.1.3 Identify parts of an expression using mathematical terms (e.g., sum, term, product, factor, quotient, coefficient, quantity). Example: Describe the expression 2(8 + 7) as a product of two factors.** 6.EE.A.2.b - Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. For example, describe the expression 2 (8 + 7) as a product of two factors; view (8 + 7) as both a single entity and a sum of two terms. **M06.B-E.1.1.5 Apply the properties of operations to generate equivalent expressions. Example 1: Apply the distributive property to the expression 3 (2 + x) to produce the equivalent expression 6 + 3x. Example 2: Apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6(4x + 3y). Example 3: Apply properties of operations to y + y + y to produce the equivalent expression 3y.** 6.EE.A.3 - Apply the properties of operations to generate equivalent expressions. For example, apply the distributive property to the expression 3 (2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6 (4x	**M07.B-E.1.1.1 Apply properties of operations to add, subtract, factor, and expand linear expressions with rational coefficients.** **Example 1: The expression 1/2 ● (x + 6) is equivalent to 1/2 ● x + 3.** **Example 2: The expression 5.3 – y + 4.2 is equivalent to 9.5 – y (or – y + 9.5).** **Example 3: The expression 4w – 10 is equivalent to 2(2w – 5).** ■ 7.EE.A.1 (*Conceptual, Procedural*) - Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. (Consider using Algebra tiles to address this concept to review this concept with integers concepts before moving to rational coefficients using this guide for support.)	
	■ 7.EE.A.2 (*Conceptual*) - Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. *For example, a + 0.05a = 1.05a means that "increase by 5%" is the same as "multiply by 1.05."*	

+ 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y. 6.EE.A.4 - Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for..		
	M07.B-E.2.1 Solve multi-step real-world and mathematical problems posed with positive and negative rational numbers. **M07.B-E.2.1.1 Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate.** **Example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50 an hour (or 1.1 × $25 = $27.50).** ■ 7.EE.B.3 (*Procedural, Application)* - Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations as strategies to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. *For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.*	
	M07.B-E.2.2 Use variables to represent quantities in a real-world or mathematical problem and construct simple equations and inequalities to solve problems. ■ 7.EE.B.4 (*Conceptual, Procedural, Application)* - Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.	*Emphasize equations (7.EE.B.4a) relative to inequalities (7.EE.B.4b).*

M06.B-E.2.1.1 Use substitution to determine whether a given number in a specified set makes an equation or inequality true. 6.EE.B.5 - Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true. **M06.B-E.2.1.2 Write algebraic expressions to represent real-world or mathematical problems.** 6.EE.B.6 - Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. **M06.B-E.2.1.3 Solve real-world and mathematical problems by writing and solving equations of the form x + p = q and px = q for cases in which p, q, and x are all non-negative rational numbers.** 6.EE.B.7 - Solve real-world and mathematical problems by writing and solving equations of the form x + p = q and px = q for cases in - which p, q and x are all nonnegative rational numbers.	**M07.B-E.2.2.1 Solve word problems leading to equations of the form px + q = r and p(x + q) = r, where p, q, and r are specific rational numbers. Example: The perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?** ■ 7.EE.B.4a (*Conceptual, Procedural, Application)* - Solve word problems leading to equations of the form px + q = r and p(x + q) = r, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. *For example, The perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?* (Consider using Algebra tiles to address this concept reviewing one step equations before progressing to two-step equations using this guide for support.)	
M06.B-E.2.1.4 Write an inequality of the form x > c or x < c to represent a constraint or condition in a real-world or mathematical problem and/or represent solutions of such inequalities on number lines. 6.EE.B.8 Write an inequality of the form x > c or x < c to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form x > c or x < c have infinitely many solutions; represent solutions of such inequalities on number line diagrams.	**M07.B-E.2.2.2 Solve word problems leading to inequalities of the form px + q > r or px + q < r, where p, q, and r are specific rational numbers, and graph the solution set of the inequality. Example: A salesperson is paid $50 per week plus $3 per sale. This week she wants her pay to be at least $100. Write an inequality for the number of sales the salesperson needs to make and describe the solutions.** ■ 7.EE.B.4b *(Conceptual, Procedural, Application)* - Solve word problems leading to inequalities of the form px + q > r or px + q < r, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. *For example, As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions.*	

M06.C-G.1.1.1 Determine the area of triangles and special quadrilaterals (i.e., square, rectangle, parallelogram, rhombus, and trapezoid). Formulas will be provided. **M06.C-G.1.1.2 Determine the area of irregular or compound polygons. Example: Find the area of a room in the shape of an irregular polygon by composing and/or decomposing.** 6.G.A.1 -Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems. **M06.C-G.1.1.4 Given coordinates for the vertices of a polygon in the plane, use the coordinates to find side lengths and area of the polygon (limited to triangles and special quadrilaterals). Formulas will be provided.** 6.G.A.3 -Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.	**M07.C-G.1.1.1 Solve problems involving scale drawings of geometric figures, including finding length and area.** 7.G.A.1(*Procedural, Application)* - Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.	*Reduce time spent creating scale drawings by hand.*
	7.G.A.2 (*Conceptual, Procedural)* Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.	*Eliminate lessons on drawing and constructing triangles as detailed in this standard.*
	M07.C-G.1.1.4 Describe the two-dimensional figures that result from slicing three-dimensional figures. Example: Describe plane sections of right rectangular prisms and right rectangular pyramids. 7.G.A.3 (*Conceptual)* - Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.	*Reduce focus on analyzing figures that result from slicing three-dimensional figures as detailed in this standard.*
	M07.C-G.2.2.1 Find the area and circumference of a circle. Solve problems involving area and circumference of a circle(s). Formulas will be provided.	*Combine lessons on knowing and using the formulas for the area and circumference of a circle in order to reduce the amount of time spent on this*

	7.G.B.4 (*Conceptual, Procedural, Application)* - Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.	*topic. Limit the amount of required student practice.*
	M07.C-G.2.1.1 Identify and use properties of supplementary, complementary, and adjacent angles in a multistep problem to write and solve simple equations for an unknown angle in a figure. 7.G.B.5 (*Conceptual, Procedural)* - Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.	
	M07.C-G.2.1.2 Identify and use properties of angles formed when two parallel lines are cut by a transversal (e.g., angles may include alternate interior, alternate exterior, vertical, corresponding).	
M06.C-G.1.1.1 Determine the area of triangles and special quadrilaterals (i.e., square, rectangle, parallelogram, rhombus, and trapezoid). Formulas will be provided. **M06.C-G.1.1.2 Determine the area of irregular or compound polygons. Example: Find the area of a room in the shape of an irregular polygon by composing and/or decomposing.** 6.G.A.1 - Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems. **M06.C-G.1.1.3 Determine the volume of right rectangular prisms with fractional edge lengths. Formulas will be provided.** 6.G.A.2 - Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas V = l w h and V = b h to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.	**M07.C-G.2.2.2 Solve real-world and mathematical problems involving area, volume, and surface area of two and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. Formulas will be provided.** 7.G.B.6 (*Procedural, Application) -* Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.	*Combine lessons to address key concepts and skills of unknown angles, area, volume, and surface area (7.G.B.5, 7.G.B.6). Reduce the amount of required student practice. Do not require students to use or draw nets to determine surface area.*

M06.C-G.1.1.5 Represent three-dimensional figures using nets made of rectangles and triangles. **M06.C-G.1.1.6 Determine the surface area of triangular and rectangular prisms (including cubes). Formulas will be provided.** 6.G.A.4 -Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.		
6.NS.B.3 - Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation., **M06.A-N.3.1.2 Determine the opposite of a number and recognize that the opposite of the opposite of a number is the number itself (e.g., – (– 3) = 3; 0 is its own opposite).** 6.NS.C.6a - Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., -(-3) = 3, and that 0 is its own opposite. **M06.A-N.3.1.3 Locate and plot integers and other rational numbers on a horizontal or vertical number line; locate and plot pairs of integers and other rational numbers on a coordinate plane.** 6.NS.C.6c - Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane. **M06.A-N.3.2.1 Write, interpret, and explain statements of order for rational numbers in real-world contexts. Example: Write – 3°C > – 7°C to express the fact that – 3°C is warmer than – 7°C.** 6.NS.C.7a - Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. *For example, interpret -3 > -7 as a statement that -3 is located to the right of -7 on a number line oriented from left to right.*	**M07.A-N.1.1.1 Apply properties of operations to add and subtract rational numbers, including real-world contexts.** **M07.A-N.1.1.2 Represent addition and subtraction on a horizontal or vertical number line.** ■ 7.NS.A.1 (*Conceptual, Procedural*) - Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. ■ 7.NS.A.1a (*Conceptual, Application*) - Describe situations in which opposite quantities combine to make 0. *For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.* ■ 7.NS.A.1b (*Conceptual, Application*) - Understand p + q as the number located a distance |q| from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts. ■ 7.NS.A.1c (*Conceptual, Application*) - Understand subtraction of rational numbers as adding the additive inverse, p - q = p + (-q). Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts. ■ 7.NS.A.1d (*Conceptual, Procedural*) - Apply properties of operations as strategies to add and subtract rational numbers. (Consider using Algebra tiles to address these concepts using this guide for support.)	

6.NS.C.7b - Write, interpret, and explain statements of order for rational numbers in real-world contexts. *For example, write -3C > -7C to express the fact that -3C is warmer than -7C.* **M06.A-N.3.2.2 Interpret the absolute value of a rational number as its distance from 0 on the number line and as a magnitude for a positive or negative quantity in a real-world situation. Example: For an account balance of – 30 dollars, write |– 30| = 30 to describe the size of the debt in dollars, and recognize that an account balance less than – 30 dollars represents a debt greater than 30 dollars.** 6.NS.C.7c *(Conceptual, Application)* - Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. *For example, for an account balance of -30 dollars, write |-30| = 30 to describe the size of the debt in dollars.* 6.NS.C.7d *(Conceptual)* - Distinguish comparisons of absolute value from statements about order. *For example, recognize that an account balance less than –30 dollars represents a debt greater than 30 dollars.*		

M06.A-N.1.1.1 Interpret and compute quotients of fractions (including mixed numbers), and solve word problems involving division of fractions by fractions. Example 1: Given a story context for (2/3) ÷ (3/4), explain that (2/3) ÷ (3/4) = 8/9 because 3/4 of 8/9 is 2/3. (In general, (a/b) ÷ (c/d) = (a/b) × (d/c) = ad/bc.) Example 2: How wide is a rectangular strip of land with length 3/4 mi and area 1/2 square mi? Example 3: How many 2 1/4-foot pieces can be cut from a 15 1/2-foot board? 6.NS.A.1 - Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, create a story context for (2/3) ÷ (3/4) and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that (2/3) ÷ (3/4) = 8/9 because 3/4 of 8/9 is 2/3. [In general, (a/b) ÷ (c/d) = ad/bc.] How much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 3/4-cup servings are in 2/3 of a cup of yogurt? How wide is a rectangular strip of land with length 3/4 mi and area 1/2 square mi?.* **M06.A-N.2.1.1 Solve problems involving operations (+, −, ×, and ÷) with whole numbers, decimals (through thousandths), straight computation, or word problems.** 6.NS.B.3 - Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.	**M07.A-N.1.1.3 Apply properties of operations to multiply and divide rational numbers, including real-world contexts; demonstrate that the decimal form of a rational number terminates or eventually repeats.** ■ 7.NS.A.2 (*Conceptual, Procedural*) - Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. ■ 7.NS.A.2a (*Conceptual, Application*) - Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (-1)(-1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts. ■ 7.NS.A.2b (*Conceptual, Application*) - Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then -(p/q) = (-p)/q = p/(-q). Interpret quotients of rational numbers by describing real-world contexts. ■ 7.NS.A.2c (*Conceptual, Procedural*) - Apply properties of operations as strategies to multiply and divide rational numbers. ■ 7.NS.A.2d (*Conceptual, Procedural*) - Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.	
	M07.A-N.1.1 Solve real-world and mathematical problems involving the four operations with rational numbers. ■ 7.NS.A.3 (*Procedural, Application*) - Solve real-world and mathematical problems involving the four operations with rational numbers.	
M06.B-E.3.1.1 Write an equation to express the relationship between the dependent and independent variables. Example: In a problem involving motion at a constant speed of 65 units, write the equation d = 65t to represent the relationship between distance and time.	**M07.A-R.1.1.1 Compute unit rates associated with ratios of fractions, including ratios of lengths, areas, and other quantities measured in like or different units. Example: If a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2 / 1/4 miles per hour, equivalently 2 miles per hour.**	

M06.B-E.3.1.2 Analyze the relationship between the dependent and independent variables using graphs and tables and/or relate these to an equation. 6.EE.C.9 - Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. *For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation d = 65t to represent the relationship between distance and time.* **M06.A-R.1.1.1 Use ratio language and notation (such as 3 to 4, 3:4, 3/4) to describe a ratio relationship between two quantities. Example 1: "The ratio of girls to boys in a math class is 2:3 because for every 2 girls there are 3 boys." Example 2: "For every five votes candidate A received, candidate B received four votes."** 6.RP.A.1 - Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. *For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes."* **M06.A-R.1.1.2 Find the unit rate a/b associated with a ratio a:b (with b ≠ 0) and use rate language in the context of a ratio relationship. Example 1: "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar." Example 2: "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger."** 6.RP.A.2- Understand the concept of a unit rate a/b associated with a ratio a:b with b not equal to 0, and use rate language in the context of a ratio relationship. *For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger."*	■7.RP.A.1 (*Procedural, Application*) - Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. *For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction (1/2)/(1/4) miles per hour, equivalently 2 miles per hour.*	
	M07.A-R.1.1 Analyze, recognize, and represent proportional relationships and use them to solve real-world and mathematical problems. ■7.RP.A.2 (*Conceptual, Application*) - Recognize and represent proportional relationships between quantities.	
	M07.A-R.1.1.2 Determine whether two quantities are proportionally related (e.g., by testing for equivalent ratios in a table, graphing on a coordinate plane and observing whether the graph is a straight line through the origin). ■7.RP.A.2a (*Conceptual*) - Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.	
	M07.A-R.1.1.3 Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. ■7.RP.A.2b (*Conceptual, Procedural, Application*) - Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.	
	M07.A-R.1.1.4 Represent proportional relationships by equations. Example: If total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as t = pn. ■7.RP.A.2c (*Conceptual, Procedural, Application*) - Represent proportional relationships by equations. *For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as t = pn.*	

M06.A-R.1.1 Represent and/or solve real world and mathematical problems using rates, ratios, and/or percents. 6.RP.A.3 - Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. **M06.A-R.1.1.3 Construct tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and/or plot the pairs of values on the coordinate plane. Use tables to compare ratios.** 6.RP.A.3a - Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios. **M06.A-R.1.1.4 Solve unit rate problems including those involving unit pricing and constant speed. Example: If it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?** 6.RP.A.3b - Solve unit rate problems including those involving unit pricing and constant speed. *For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?* **M06.A-R.1.1.5 Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percentage.** 6.RP.A.3c - Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent. 6.RP.A.3.d - Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.	**M07.A-R.1.1.5 Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, r), where r is the unit rate.** ■ 7.RP.A.2d (*Conceptual)* - Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, r) where r is the unit rate.	

	M07.A-R.1.1.6 Use proportional relationships to solve multi-step ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease. ■ 7.RP.A.3 (*Application)* - Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.	
6.SP.A.1 - Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. *For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages.*	**M07.D-S.1.1.1 Determine whether a sample is a random sample given a real-world situation.** 7.SP.A.1 (*Conceptual)* - Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences. **M07.D-S.1.1.2 Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Example 1: Estimate the mean word length in a book by randomly sampling words from the book. Example 2: Predict the winner of a school election based on randomly sampled survey data.** 7.SP.A.2 (*Conceptual, Application)* - Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. *For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.*	*Combine lessons on using random sampling to draw inferences about a population and using measures of center and variability to draw comparative inferences about two populations in order to reduce the amount of time spent on this topic. Limit the amount of required student practice.*
6.SP.A.1 - Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. *For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages.*	**M07.D-S.2.1.1 Compare two numerical data distributions using measures of center and variability.** **Example 1: The mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team. This difference is equal to approximately twice the variability (mean absolute**	

6.SP.A.2 - Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.	**deviation) on either team. On a line plot, note the difference between the two distributions of heights.** **Example 2: Decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth grade science book.** 7.SP.B.4 (*Conceptual, Application)* - Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. *For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.*	
	M07.D-S.3.1.1 Predict or determine whether some outcomes are certain, more likely, less likely, equally likely, or impossible (i.e., a probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event). 7.SP.C.5 (*Conceptual)* - Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.	*Combine lessons on developing, using and evaluating probability models in order to emphasize foundational concepts and reduce the amount of time spent on this topic. Limit the amount of required student practice.*
	M07.D-S.3.2.1 Determine the probability of a chance event given relative frequency. Predict the approximate relative frequency given the probability. Example: When rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times but probably not exactly 200 times. 7.SP.C.6 *(Conceptual, Application)* - Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. *For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times.*	

	M07.D-S.3.2.2 Find the probability of a simple event, including the probability of a simple event not occurring. Example: What is the probability of not rolling a 1 on a number cube? 7.SP.C.7 (*Conceptual, Application)* - Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. 7.SP.C.7a (*Application)* - Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. *For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected.* 7.SP.C.7b (*Application)* - Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. *For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?*	
	M07.D-S.3.2.3 Find probabilities of independent compound events using organized lists, tables, tree diagrams, and simulation. 7.SP.C.8 (*Procedural, Application)* - Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. 7.SP.C.8a (*Conceptual)* - Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. 7.SP.C.8b (*Conceptual, Application)* - Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event. 7.SP.C.8c (*Application)* - Design and use a simulation to generate frequencies for compound events. *For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?*	*Reduce focus on finding probabilities of compound events as detailed in this standard.*

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8th Grade Math Important Prerequisites

Prerequisite Assessment Anchor/Eligible Content Bridge up or heavy traffic from previous grade	Grade-Level Assessment Anchor/Eligible Content ■ *Major* ? *Supporting* ? *Additional*	Instructional Time Preserve or reduce time as compared to a typical year, *per* *SAP guidance*
	M08.B-E.1.1.1 Apply one or more properties of integer exponents to generate equivalent numerical expressions without a calculator (with final answers expressed in exponential form with positive exponents). Properties will be provided. Example: $3^{12} \times 3^{-15} = 3^{-3} = 1/(3^3)$ ■ 8.EE.A.1 (*Procedural)* - Know and apply the properties of integer exponents to generate equivalent numerical expressions. *For example, 3^2 × 3^-5 = 3^-3 = 1/3^3 = 1/27.*	
	M08.B-E.1.1.2 Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of perfect squares (up to and including 12^2) and cube roots of perfect cubes (up to and including 5^3) without a calculator. Example: If $x^2 = 25$ then $x = \pm\sqrt{25}$. ■ 8.EE.A.2 (*Conceptual, Procedural)* - Use square root and cube root symbols to represent solutions to equations of the form x^2 = p and x^3 = p, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that sqrt(2) is irrational.	*Reduce focus on lessons and problems about cube roots.*
	M08.B-E.1.1.3 Estimate very large or very small quantities by using numbers expressed in the form of a single digit times an integer power of 10 and express how many times larger or smaller one number is than another. Example: Estimate the population of the United States as 3×10^8 and the population of the world as 7×10^9 and determine that the world population is more than 20 times larger than the United States' population.	*Eliminate lessons and practice dedicated to calculating with scientific notation, but include examples of numbers expressed in scientific notation in lessons about integer exponents, as examples of how integer exponents are applicable outside of mathematics classes (8.EE.A.1).**

	■[8.EE.A.3](#) (*Conceptual, Application*) - Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. *For example, estimate the population of the United States as 3 × 10^8 and the population of the world as 7 × 10^9, and determine that the world population is more than 20 times larger.*	
M07.B-E.2.1 Solve multi-step real-world and mathematical problems posed with positive and negative rational numbers. M07.B-E.2.1.1 Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate. Example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50 an hour (or 1.1 × $25 = $27.50). [7.EE.B.3](#) - Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. *For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.*	**M08.B-E.1.1.4 Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Express answers in scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology (e.g., interpret 4.7EE9 displayed on a calculator as 4.7 × 10^9).** ■[8.EE.A.4](#) (*Conceptual, Procedural*) - Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.	
M07.A-R.1.1.1 Compute unit rates associated with ratios of fractions, including ratios of lengths, areas, and other quantities measured in like or different units. Example: If a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2 / 1/4 miles per hour, equivalently 2 miles per hour. [7.RP.A.1](#) - Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2/1/4 miles per hour, equivalently 2 miles per hour.	**M08.B-E.2.1.1 Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. Example: Compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.** ■[8.EE.B.5](#) (*Conceptual, Application*) - Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. *For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.*	

M07.A-R.1.1 Analyze, recognize, and represent proportional relationships and use them to solve real-world and mathematical problems. 7.RP.A.2 - Recognize and represent proportional relationships between quantities. **M07.A-R.1.1.2 Determine whether two quantities are proportionally related (e.g., by testing for equivalent ratios in a table, graphing on a coordinate plane and observing whether the graph is a straight line through the origin).** 7.RP.A.2.a - Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin. **M07.A-R.1.1.3 Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.** 7.RP.A.2.b - Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. **M07.A-R.1.1.4 Represent proportional relationships by equations. Example: If total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as t = pn.** 7.RP.A.2.c - Represent proportional relationships by equations. For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as t = pn. **M07.A-R.1.1.5 Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, r), where r is the unit rate.** 7.RP.A.2.d. - Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with		

special attention to the points (0, 0) and (1, r) where r is the unit rate		
M07.C-G.1.1.1 Solve problems involving scale drawings of geometric figures, including finding length and area. 7.G.A.1 - Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale. **M07.A-R.1.1.1 Compute unit rates associated with ratios of fractions, including ratios of lengths, areas, and other quantities measured in like or different units. Example: If a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2 / 1/4 miles per hour, equivalently 2 miles per hour.** 7.RP.A.1 - Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2/1/4 miles per hour, equivalently 2 miles per hour. **M07.A-R.1.1 Analyze, recognize, and represent proportional relationships and use them to solve real-world and mathematical problems.** 7.RP.A.2 - Recognize and represent proportional relationships between quantities. **M07.A-R.1.1.2 Determine whether two quantities are proportionally related (e.g., by testing for equivalent ratios in a table, graphing on a coordinate plane and observing whether the graph is a straight line through the origin).** 7.RP.A.2.a - Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin. **M07.A-R.1.1.3 Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.**	**M08.B-E.2.1.2 Use similar right triangles to show and explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane.** **M08.B-E.2.1.3 Derive the equation y = mx for a line through the origin and the equation y = mx + b for a line intercepting the vertical axis at b.** ■ 8.EE.B.6 (*Conceptual, Procedural*) - Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation y = mx for a line through the origin and the equation y = mx + b for a line intercepting the vertical axis at b.	

7.RP.A.2.b - Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. **M07.A-R.1.1.4 Represent proportional relationships by equations. Example: If total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as t = pn.** 7.RP.A.2.c - Represent proportional relationships by equations. For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as t = pn. **M07.A-R.1.1.5 Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, r), where r is the unit rate.** 7.RP.A.2.d. - Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, r) where r is the unit rate		
M07.B-E.1.1.1 Apply properties of operations to add, subtract, factor, and expand linear expressions with rational coefficients. Example 1: The expression 1/2 • (x + 6) is equivalent to 1/2 • x + 3. Example 2: The expression 5.3 – y + 4.2 is equivalent to 9.5 – y (or – y + 9.5). **Example 3: The expression 4w – 10 is equivalent to 2(2w – 5).** 7.EE.A.1 - Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.	**08.B-E.3.1.1 Write and identify linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms until an equivalent equation of the form x = a, a = a, or a = b results (where a and b are different numbers).** ■ 8.EE.C.7a (*Conceptual)* - Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form x = a, a = a, or a = b results (where a and b are different numbers).	

M07.B-E.2.2.1 Solve word problems leading to equations of the form px + q = r and p(x + q) = r, where p, q, and r are specific rational numbers. Example: The perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width? 7.EE.B.4a - Solve word problems leading to equations of the form px + q = r and p(x + q) = r, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width? Formative Assessment Lesson	**M08.B-E.3.1.2 Solve linear equations that have rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.** ■ 8.EE.C.7b (*Procedural*) - Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms. (Consider using Algebra tiles to address these concepts using this guide for support. Or use Splats working up from "two-step equations" to "fraction equations")	
M07.B-E.2.2.1 Solve word problems leading to equations of the form px + q = r and p(x + q) = r, where p, q, and r are specific rational numbers. Example: The perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width? 7.EE.B.4a - Solve word problems leading to equations of the form px + q = r and p(x + q) = r, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?	**M08.B-E.3.1.3 Interpret solutions to a system of two linear equations in two variables as points of intersection of their graphs because points of intersection satisfy both equations simultaneously.** ■ 8.EE.C.8a (*Conceptual*) - Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.	
	M08.B-E.3.1.4 Solve systems of two linear equations in two variables algebraically and estimate solutions by graphing the equations. Solve simple cases by inspection. Example: 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6. ■ 8.EE.C.8b (*Conceptual, Procedural*) - Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. *For example, 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6.*	*Limit the amount of required student practice in solving systems algebraically.*
	M08.B-E.3.1.5 Solve real-world and mathematical problems leading to two linear equations in two variables. Example: Given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair. ■ 8.EE.C.8c (*Procedural, Application*) - Solve real-world and mathematical problems leading to two linear equations in two variables. *For example,*	

	given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.	
	M08.B-F.1.1.1 Determine whether a relation is a function. ■8.F.A.1 (*Conceptual)* - Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.	
	M08.B-F.1.1.2 Compare properties of two functions, each represented in a different way (i.e., algebraically, graphically, numerically in tables, or by verbal descriptions). Example: Given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change. ■8.F.A.2 (*Conceptual)* - Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.*	
	M08.B-F.1.1.3 Interpret the equation y = mx + b as defining a linear function whose graph is a straight line; give examples of functions that are not linear. ■8.F.A.3 (*Conceptual)* - Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. *For example, the function A = s^2 giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.*	
	M08.B-F.2.1.1 Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models and in terms of its graph or a table of values. ■8.F.B.4 (*Conceptual, Application)* - Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from	

	two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.	
	M08.B-F.2.1.2 Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch or determine a graph that exhibits the qualitative features of a function that has been described verbally. ■ 8.F.B.5 (*Conceptual, Application)* - Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.	
	M08.C-G.1.1.1 Identify and apply properties of rotations, reflections, and translations. Example: Angle measures are preserved in rotations, reflections, and translations. ■ 8.G.A.1 (*Conceptual, Application)* -Verify experimentally the properties of rotations, reflections, and translations: a. Lines are taken to lines, and line segments to line segments of the same length. b. Angles are taken to angles of the same measure. c. Parallel lines are taken to parallel lines.	*Combine lessons to address key concepts in congruence and combine lessons to address key concepts in similarity of two-dimensional figures in order to reduce the amount of time on this topic.*
	M08.C-G.1.1.2 Given two congruent figures, describe a sequence of transformations that exhibits the congruence between them. ■ 8.G.A.2 (*Conceptual)* - Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.	
	M08.C-G.1.1.3 Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. ■ 8.G.A.3 (*Conceptual)* - Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.	
	M08.C-G.1.1.4 Given two similar two-dimensional figures, describe a sequence of transformations that exhibits the similarity between them.	

	■8.G.A.4 (*Conceptual*) - Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.	
	M08.C-G.2.1.1 Apply the converse of the Pythagorean theorem to show a triangle is a right triangle. ■8.G.B.6 (*Conceptual*) - Explain a proof of the Pythagorean Theorem and its converse.	
M07.C-G.2.2.2 Solve real-world and mathematical problems involving area, volume, and surface area of two and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. Formulas will be provided. 7.G.B.6 - Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.	**M08.C-G.2.1.2 Apply the Pythagorean theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. (Figures provided for problems in three dimensions will be consistent with Eligible Content in grade 8 and below.)** ■8.G.B.7 (*Procedural, Application*) - Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.	
	M08.C-G.2.1.3 Apply the Pythagorean theorem to find the distance between two points in a coordinate system. ■8.G.B.8 (*Procedural, Application*) - Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.	*Reduce focus on problems dedicated to applying the Pythagorean Theorem to find the distance between two points in a coordinate system.*
M07.C-G.2.2.1 Find the area and circumference of a circle. Solve problems involving area and circumference of a circle(s). Formulas will be provided. 7.G.B.4 - Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle. **M07.C-G.2.2.2 Solve real-world and mathematical problems involving area, volume, and surface area of two and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. Formulas will be provided.** 7.G.B.6 - Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional	**M08.C-G.3.1.1 Apply formulas for the volumes of cones, cylinders, and spheres to solve real-world and mathematical problems. Formulas will be provided.** 8.G.C.9 (*Conceptual, Procedural, Application*) - Know the formulas for the volume of cones, cylinders, and spheres and use them to solve real world and mathematical problems.	*Combine lessons to address key concepts with volume, with an emphasis on cylinders, in order to reduce the amount of time on this topic.*

objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.		
M07.A-N.1.1.1 Apply properties of operations to add and subtract rational numbers, including real-world contexts. **M07.A-N.1.1.3 Apply properties of operations to multiply and divide rational numbers, including real-world contexts; demonstrate that the decimal form of a rational number terminates or eventually repeats.** 7.NS.A.2 - Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. 7.NS.A.2.a - Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (-1)(-1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts. 7.NS.A.2.b - Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then -(p/q) = (-p)/q = p/(-q). Interpret quotients of rational numbers by describing real-world contexts. 7.NS.A.2.c - Apply properties of operations as strategies to multiply and divide rational numbers. 7.NS.A.2.d - Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats. **M.07.A-N.1.1.1 Apply properties of operations to add and subtract rational numbers, including real-world contexts.** **M07.A-N.1.1.2 Represent addition and subtraction on a horizontal or vertical number line.** 7.NS.A.1 - Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent	**M08.A-N.1.1.1 Determine whether a number is rational or irrational. For rational numbers, show that the decimal expansion terminates or repeats (limit repeating decimals to thousandths).** **M08.A-N.1.1.2 Convert a terminating or repeating decimal to a rational number (limit repeating decimals to thousandths).** 8.NS.A.1 (*Conceptual, Procedural*) - Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.	*Integrate irrational numbers with students' work on square roots (8.EE.A.2) and the Pythagorean Theorem (8.G.B.7).*
	M08.A-N.1.1.3 Estimate the value of irrational numbers without a calculator (limit whole number radicand to less than 144). Example: √5 is between 2 and 3 but closer to 2. **M08.A-N.1.1.4 Use rational approximations of irrational numbers to compare and order irrational numbers.** **M08.A-N.1.1.5 Locate/identify rational and irrational numbers at their approximate locations on a number line.** 8.NS.A.2 (*Conceptual*) - Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., pi^2). *For example, by truncating the decimal expansion of sqrt(2), show that sqrt(2) is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.*	

addition and subtraction on a horizontal or vertical number line diagram. [7.NS.A.1.a](#) - Describe situations in which opposite quantities combine to make 0. For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged. [7.NS.A.1.b](#) - Understand p + q as the number located a distance |q| from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts. [7.NS.A.1.c](#) - Understand subtraction of rational numbers as adding the additive inverse, p - q = p + (-q). Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts. [7.NS.A.1.d](#) - Apply properties of operations as strategies to add and subtract rational numbers.		
	M08.D-S.1.1.1 Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative correlation, linear association, and nonlinear association. 8.SP.A.1 (*Conceptual, Application)* - Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.	*Combine lessons for 8.SP.A.1, 2, and 4 to address key statistical concepts in order to reduce the amount of time on this topic. Limit the amount of required student practice.*
	M08.D-S.1.1.2 For scatter plots that suggest a linear association, identify a line of best fit by judging the closeness of the data points to the line. 8.SP.A.2 (*Conceptual, Application)* - Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and	

	informally assess the model fit by judging the closeness of the data points to the line.	
	M08.D-S.1.1.3 Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. Example: In a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height. 8.SP.A.3 (*Application)* - Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. *For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.*	*Emphasize using linear functions to model association in bivariate measurement data that suggest a linear association, using the functions to answer questions about the data.*
	M08.D-S.1.2.1 Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible associations between the two variables. Example: Given data on whether students have a curfew on school nights and whether they have assigned chores at home, is there evidence that those who have a curfew also tend to have chores? 8.SP.A.4 (*Conceptual, Application)* - Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. *For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?*	*Combine lessons for 8.SP.A.1, 2, and 4 to address key statistical concepts in order to reduce the amount of time on this topic. Limit the amount of required student practice.*

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Algebra I Important Prerequisites

Statistics standards listed separately below.

Prerequisite Eligible Content Bridge up or heavy traffic from previous grade	Assessment Anchor/Eligible Content	Instructional Time Preserve or reduce time as compared to a typical year, *per* *SAP guidance*
	A1.1.1.1 Represent and/or use numbers in equivalent forms (e.g., integers, fractions, decimals, percents, square roots, and exponents). • **A1.1.1.1.1 Compare and/or order any real numbers. Note: Rational and irrational may be mixed.** • **A1.1.1.1.2 Simplify square roots (e.g., √24 = 2√6).**	*Reduce the number of repetitious practice problems that would normally be assigned to students for this topic.*
M07.B-E.1.1.1 Apply properties of operations to add, subtract, *factor*, and expand linear expressions with rational coefficients. 7.EE.A.1 - Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.	**A1.1.1.2 Apply number theory concepts to show relationships between real numbers in problem solving settings.** • **A1.1.1.2.1 Find the Greatest Common Factor (GCF) and/or the Least Common Multiple (LCM) for sets of monomials.**	
M08.B-E.1.1.1 Apply one or more properties of integer exponents to generate equivalent numerical expressions without a calculator (with final answers expressed in exponential form with positive exponents). Properties will be provided. 8.EE.A.1 - Know and apply the properties of integer exponents to generate equivalent numerical expressions. *For example, 3^2 × 3^-5 = 3^-3 = 1/3^3 = 1/27.* **M08.B-E.1.1.2 Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of perfect squares (up to and including 12^2) and cube roots of perfect cubes (up to and including 5^3) without a calculator.** ***Example: If $x^2 = 25$ then $x = \pm\sqrt{25}$***	**A1.1.1.3 Use exponents, roots, and/or absolute values to solve problems.** • **A1.1.1.3.1 Simplify/evaluate expressions involving properties/laws of exponents, roots, and/or absolute values to solve problems. Note: Exponents should be integers from −10 to 10**	

8.EE.A.2 - Use square root and cube root symbols to represent solutions to equations of the form x^2 = p and x^3 = p, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that sqrt(2) is irrational.		
	A1.1.1.4 Use estimation strategies in problem-solving situations • **A1.1.1.4.1 Use estimation to solve problems.**	
M07.B-E.1.1.1 Apply properties of operations to add, subtract, factor, and expand linear expressions with rational coefficients. 7.EE.A.1 - Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. **M08.B-E.1.1.1 Apply one or more properties of integer exponents to generate equivalent numerical expressions without a calculator (with final answers expressed in exponential form with positive exponents). Properties will be provided.** ***Example:*** $3^{12} \times 3^{-15} = 3^{-3} = 1/(3^3)$ 8.EE.A.1 - Know and apply the properties of integer exponents to generate equivalent numerical expressions. *For example, 3^2 × 3^-5 = 3^-3 = 1/3^3 = 1/27.*	**A1.1.1.5 Simplify expressions involving polynomials.** • **A1.1.1.5.1 Add, subtract, and/or multiply polynomial expressions (express answers in simplest form). Note: Nothing larger than a binomial multiplied by a trinomial.** • **A1.1.1.5.2 Factor algebraic expressions, including difference of squares and trinomials. Note: Trinomials are limited to the form** $ax^2 + bx + c$ **where a is equal to 1 after factoring out all monomial factors.** • **A1.1.1.5.3 Simplify/reduce a rational algebraic expression.**	*Less emphasis on adding/subtracting and prioritize multiplying.*
M08.B-E.3.1.2 Solve linear equations that have rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms. 8.EE.C.7b - Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.	**A1.1.2.1 Write, solve, and/or graph linear equations using various methods.** • **A1.1.2.1.1 Write, solve, and/or apply a linear equation (including problem situations).** • **A1.1.2.1.2 Use and/or identify an algebraic property to justify any step in an equation-solving process. Note: Linear equations only.** • **A1.1.2.1.3 Interpret solutions to problems in the context of the problem situation. Note: Linear equations only.**	*Reduce the number of repetitious practice problems that would normally be assigned to students for solving equations.*

M08.B-E.3.1.3 Interpret solutions to a system of two linear equations in two variables as points of intersection of their graphs, because points of intersection satisfy both equations simultaneously. 8.EE.C.8a - Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously. **M08.B-E.3.1.4 Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection.** ***Example: 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6.*** 8.EE.C.8b - Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. *For example, 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6.* **M08.B-E.3.1.5 Solve real-world and mathematical problems leading to two linear equations in two variables.** **Example: Given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.** 8.EE.C.8c - Solve real-world and mathematical problems leading to two linear equations in two variables. *For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.*	**A1.1.2.2 Write, solve, and/or graph systems of linear equations using various methods.** • **A1.1.2.2.1 Write and/or solve a system of linear equations (including problem situations) using graphing, substitution, and/or elimination. Note: Limit systems to two linear equations.** • **A1.1.2.2.2 Interpret solutions to problems in the context of the problem situation. Note: Limit systems to two linear equations.**	

M07.B-E.2.2.2 Solve word problems leading to inequalities of the form px + q > r or px + q < r, where p, q, and r are specific rational numbers, and graph the solution set of the inequality. 7.EE.B.4b - Solve word problems leading to inequalities of the form px + q > r or px + q < r, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. *For example, As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions.*	**A1.1.3.1 Write, solve, and/or graph linear inequalities using various methods.** • **A1.1.3.1.1 Write or solve compound inequalities and/or graph their solution sets on a number line (may include absolute value inequalities).** • **A1.1.3.1.2 Identify or graph the solution set to a linear inequality on a number line.** • **A1.1.3.1.3 Interpret solutions to problems in the context of the problem situation. Note: Linear inequalities only.**	
	A1.1.3.2 Write, solve, and/or graph systems of linear inequalities using various methods. • **A1.1.3.2.1 Write and/or solve a system of linear inequalities using graphing. Note: Limit systems to two linear inequalities.** • **A1.1.3.2.2 Interpret solutions to problems in the context of the problem situation. Note: Limit systems to two linear inequalities.**	
8.F.A.1 **-** Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.* *Function notation is not required in Grade 8.	**A1.2.1.1 Analyze and/or use patterns or relations.** • **A1.2.1.1.1 Analyze a set of data for the existence of a pattern and represent the pattern algebraically and/or graphically.** • **A1.2.1.1.2 Determine whether a relation is a function, given a set of points or a graph.** • **A1.2.1.1.3 Identify the domain or range of a relation (may be presented as ordered pairs, a graph, or a table).** HS.F.IF.A.1 - Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range.	
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M08.B-F.2.1.1 Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models and in terms of its graph or a table of values. 8.F.B.4 - Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.	**A1.2.1.2 Interpret and/or use linear functions and their equations, graphs, or tables.** • **A1.2.1.2.1 Create, interpret, and/or use the equation, graph, or table of a linear function.** • **A1.2.1.2.2 Translate from one representation of a linear function to another (i.e., graph, table, and equation).**	
M08.B-F.2.1.1 Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models and in terms of its graph or a table of values. 8.F.B.4 - Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values. **M08.B-E.2.1.3 Derive the equation y = mx for a line through the origin and the equation y = mx + b for a line intercepting the vertical axis at b.** 8.F.A.3 - Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. *For example, the function A = s^2 giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.*	**A1.2.2.1 Describe, compute, and/or use the rate of change (slope) of a line.** • **A1.2.2.1.1 Identify, describe, and/or use constant rates of change.** • **A1.2.2.1.2 Apply the concept of linear rate of change (slope) to solve problems.** • **A1.2.2.1.3 Write or identify a linear equation when given • the graph of the line, • two points on the line, or • the slope and a point on the line. Note: Linear equations may be in point-slope, standard, and/or slope-intercept form.** • **A1.2.2.1.4 Determine the slope and/or y-intercept represented by a linear equation or graph.**	

M08.D-S.1.1.2 For scatter plots that suggest a linear association, identify a line of best fit by judging the closeness of the data points to the line. 8.SP.A.2 - Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.	**A1.2.2.2 Analyze and/or interpret data on a scatter plot.** • **A1.2.2.2.1 Draw, identify, find, and/or write an equation for a line of best fit for a scatter plot.**	
	A1.2.3.1 Use measures of dispersion to describe a set of data. • **A1.2.3.1.1 Calculate and/or interpret the range, quartiles, and interquartile range of data.**	
	A1.2.3.2 Use data displays in problem solving settings and/or to make predictions. • **A1.2.3.2.1 Estimate or calculate to make predictions based on a circle, line, bar graph, measure of central tendency, or other representation.** • **A1.2.3.2.2 Analyze data, make predictions, and/or answer questions based on displayed data (box-and-whisker plots, stem-and-leaf plots, scatter plots, measures of central tendency, or other representations).**	*Focus on analysis, not creation of these data displays*
M08.D-S.1.1.3 Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. ***Example: In a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.*** 8.SP.A.3 - Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. *For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.*	• **A1.2.3.2.3 Make predictions using the equations or graphs of best-fit lines of scatter plots.**	
	A1.2.3.3 Apply probability to practical situations. • **A1.2.3.3.1 Find probabilities for compound events (e.g., find probability of red and blue, find probability of red or blue) and represent as a fraction, decimal, or percent.**	*Reduce emphasis on this concept*

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Geometry Important Prerequisites

Statistics standards listed separately below.

Prerequisite Eligible Content Bridge up or heavy traffic from previous grade	Assessment Anchor/Eligible Content	Instructional Time Preserve or reduce time as compared to a typical year, *per SAP guidance*
	G.1.1.1 Identify and/or use parts of circles and segments associated with circles, spheres, and cylinders. • **G.1.1.1.1 Identify, determine, and/or use the radius, diameter, segment, and/or tangent of a circle.** • **G.1.1.1.2 Identify, determine, and/or use the arcs, semicircles, sectors, and/or angles of a circle.** • **G.1.1.1.3 Use chords, tangents, and secants to find missing arc measures or missing segment measures.** • **G.1.1.1.4 Identify and/or use the properties of a sphere or cylinder.** G.C.A.2 (*Conceptual*) - Identify and describe relationships among inscribed angles, radii, and chords. *Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.*	*Emphasize primarily the concept of perpendicularity between the radius and any tangent to the circle.*
8.G.A.5 - Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.	**G.1.2.1 Recognize and/or apply properties of angles, polygons, and polyhedra.** • **G.1.2.1.1 Identify and/or use properties of triangles.** • **G.1.2.1.2 Identify and/or use properties of quadrilaterals.** • **G.1.2.1.3 Identify and/or use properties of isosceles and equilateral triangles.** • **G.1.2.1.4 Identify and/or use properties of regular polygons.** • **G.1.2.1.5 Identify and/or use properties of pyramids and prisms.**	
M07.A-R.1.1.2 Determine whether two quantities are proportionally related (e.g., by testing for equivalent ratios in a	**G.1.3.1 Use properties of congruence, correspondence, and similarity in problem-solving settings involving two- and three- dimensional figures.** • **G.1.3.1.1 Identify and/or use properties of congruent and similar**	

table, graphing on a coordinate plane and observing whether the graph is a straight line through the origin). 7.RP.A.2a (*Conceptual)* - Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin. **M08.C-G.1.1.1 Identify and apply properties of rotations, reflections, and translations.** **Example: Angle measures are preserved in rotations, reflections, and translations.** **M08.C-G.1.1.2 Given two congruent figures, describe a sequence of transformations that exhibits the congruence between them.** **M08.C-G.1.1.3 Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.** **M08.C-G.1.1.4 Given two similar two-dimensional figures, describe a sequence of transformations that exhibits the similarity between them.** 8.G.A.4 (*Conceptual)* - Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.	**polygons or solids.** • **G.1.3.1.2 Identify and/or use proportional relationships in similar figures.** G.CO.B.7 (*Conceptual)* - Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent. G.SRT.A.2 (*Conceptual, Procedural)* - Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides. G.SRT.B.5 (*Conceptual)* - Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.	
M07.C-G.1.1.2 Identify or describe the properties of all types of triangles based on angle and side measures. **M07.C-G.1.1.3 Use and apply the triangle inequality theorem.** **M07.C-G.2.1.1 Identify and use properties of supplementary, complementary, and adjacent angles in a multistep problem to**	**G.1.3.2 Write formal proofs and/or use logic statements to construct or validate arguments.** • **G.1.3.2.1 Write, analyze, complete, or identify formal proofs (e.g., direct and/or indirect proofs/proofs by contradiction).** G.CO.C.9 (*Conceptual, Procedural)* - Prove theorems about lines and angles. *Theorems include: vertical angles are congruent; when a transversal crosses*	*Reduce overall time spent on proving theorems.*

write and solve simple equations for an unknown angle in a figure. **M07.C-G.2.1.2 Identify and use properties of angles formed when two parallel lines are cut by a transversal (e.g., angles may include alternate interior, alternate exterior, vertical, corresponding).** 8.G.A.5 **-** Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.	*parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.* G.CO.C.10 (*Conceptual, Procedural*) - Prove theorems about triangles. *Theorems include: measures of interior angles of a triangle sum to 180°; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.* G.CO.C.11 (*Conceptual, Procedural*) - Prove theorems about parallelograms. *Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.* G.SRT.B.4 (*Conceptual, Procedural*) - Prove theorems about triangles. *Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity.*	
M08.C-G.2.1.1 Apply the converse of the Pythagorean theorem to show a triangle is a right triangle. 8.G.B.6 (*Conceptual*) - Explain a proof of the Pythagorean Theorem and its converse. **M08.C-G.2.1.2 Apply the Pythagorean theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. (Figures provided for problems in three dimensions will be consistent with Eligible Content in grade 8 and below.)** 8.G.B.7 (*Procedural, Application*) - Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.	**G.2.1.1 Solve problems involving right triangles.** • **G.2.1.1.1 Use the Pythagorean theorem to write and/or solve problems involving right triangles.** • **G.2.1.1.2 Use trigonometric ratios to write and/or solve problems involving right triangles.** G.SRT.C.8 (*Application*) - Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.	*Reduce the number of repetitious practice problems that would normally be assigned to students for this topic.*
M08.C-G.2.1.3 Apply the Pythagorean theorem to find the distance between two points in a coordinate system. 8.G.B.8 (*Procedural, Application*) - Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.	**G.2.1.2 Solve problems using analytic geometry.** • **G.2.1.2.1 Calculate the distance and/or midpoint between two points on a number line or on a coordinate plane.** • **G.2.1.2.2 Relate slope to perpendicularity and/or parallelism (limit to linear algebraic equations).**	*Reduce the number of repetitious practice problems that would normally be assigned to students for this topic.*

A1.1.2.1 Write, solve, and/or graph linear equations using various methods. • **A1.1.2.1.1 Write, solve, and/or apply a linear equation (including problem situations).** • **A1.1.2.1.2 Use and/or identify an algebraic property to justify any step in an equation-solving process. Note: Linear equations only.** • **A1.1.2.1.3 Interpret solutions to problems in the context of the problem situation. Note: Linear equations only.** **A1.2.1.2 Interpret and/or use linear functions and their equations, graphs, or tables.** • **A1.2.1.2.1 Create, interpret, and/or use the equation, graph, or table of a linear function.** • **A1.2.1.2.2 Translate from one representation of a linear function to another (i.e., graph, table, and equation).** F.LE.A.2 - Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).	• **G.2.1.2.3 Use slope, distance, and/or midpoint between two points on a coordinate plane to establish properties of a two-dimensional shape.** G.GPE.B.4 (*Procedural*) - Use coordinates to prove simple geometric theorems algebraically. *For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point (1, √3) lies on the circle centered at the origin and containing the point (0, 2).* G.GPE.B.5 (*Procedural*) - Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point). G.GPE.B.6 (*Procedural*) - Find the point on a directed line segment between two given points that partitions the segment in a given ratio.	
M07.C-G.2.1.1 Identify and use properties of supplementary, complementary, and adjacent angles in a multistep problem to write and solve simple equations for an unknown angle in a figure. **M07.C-G.2.1.2 Identify and use properties of angles formed when two parallel lines are cut by a transversal (e.g., angles may include alternate interior, alternate exterior, vertical, corresponding).** 8.G.A.5 - Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.	**G.2.2.1 Use and/or compare measurements of angles.** • **G.2.2.1.1 Use properties of angles formed by intersecting lines to find the measures of missing angles.** • **G.2.2.1.2 Use properties of angles formed when two parallel lines are cut by a transversal to find the measures of missing angles.**	
M08.C-G.2.1.3 Apply the Pythagorean theorem to find the distance between two points in a coordinate system.	**G.2.2.2 Use and/or develop procedures to determine or describe measures of perimeter, circumference, and/or area. (May require**	*Emphasize understanding the formulas conceptually, use*

8.G.B.8 - Apply the Pythagorean Theorem to find the distance between two points in a coordinate system. **M07.C-G.2.2.1 Find the area and circumference of a circle. Solve problems involving area and circumference of a circle(s). Formulas will be provided.** 7.G.B.4 - Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle. **M07.C-G.2.2.2 Solve real-world and mathematical problems involving area, volume, and surface area of two and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. Formulas will be provided.** 7.G.B.6 - Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.	**conversions within the same system.)** • **G.2.2.2.1 Estimate area, perimeter, or circumference of an irregular figure.** • **G.2.2.2.2 Find the measurement of a missing length, given the perimeter, circumference, or area.** • **G.2.2.2.3 Find the side lengths of a polygon with a given perimeter to maximize the area of the polygon.** • **G.2.2.2.4 Develop and/or use strategies to estimate the area of a compound/composite figure.** • **G.2.2.2.5 Find the area of a sector of a circle.** G.GPE.B.7 (*Procedural*)- Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula. G.GMD.A.1 (*Conceptual*) - Give an informal *argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. Use dissection arguments, Cavalieri's principle, and informal limit arguments.*	*them to solve real world problems, and reduce the number of repetitious practice problems that would normally be assigned to students for this topic.*
M07.C-G.2.2.2 Solve real-world and mathematical problems involving area, volume, and surface area of two and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. Formulas will be provided. 7.G.B.6 - Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.	**G.2.2.3 Describe how a change in one dimension of a two- dimensional figure affects other measurements of that figure.** • **G.2.2.3.1 Describe how a change in the linear dimension of a figure affects its perimeter, circumference, and area (e.g., How does changing the length of the radius of a circle affect the circumference of the circle?).**	
M07.D-S.3.2.3 Find probabilities of independent compound events using organized lists, tables, tree diagrams, and simulation. 7.SP.C.8 - Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. 7.SP.C.8a (*Conceptual*) - Understand that, just as with simple events, the probability of a compound event is the fraction	**G.2.2.4 Apply probability to practical situations.** • **G.2.2.4.1 Use area models to find probabilities.**	*Reduce the number of repetitious practice problems that would normally be assigned to students for this topic.*

of outcomes in the sample space for which the compound event occurs. 7.SP.C.8b (*Conceptual, Application)* - Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event. 7.SP.C.8c (*Application)* - Design and use a simulation to generate frequencies for compound events. *For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?* **A1.2.3.3 Apply probability to practical situations.** **A1.2.3.3.1 Find probabilities for compound events (e.g., find probability of red and blue, find probability of red or blue) and represent as a fraction, decimal, or percent.**		
M08.C-G.3.1.1 Apply formulas for the volumes of cones, cylinders, and spheres to solve real-world and mathematical problems. Formulas will be provided. 8.G.C.9 - Know the formulas for the volume of cones, cylinders, and spheres and use them to solve real world and mathematical problems. **M07.C-G.2.2.2 Solve real-world and mathematical problems involving area, volume, and surface area of two and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. Formulas will be provided.** 7.G.B.6 - Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.	**G.2.3.1 Use and/or develop procedures to determine or describe measures of surface area and/or volume. (May require conversions within the same system.)** • **G.2.3.1.1 Calculate the surface area of prisms, cylinders, cones, pyramids, and/or spheres. Formulas are provided on a reference sheet.** • **G.2.3.1.2 Calculate the volume of prisms, cylinders, cones, pyramids, and/or spheres. Formulas are provided on a reference sheet.** • **G.2.3.1.3 Find the measurement of a missing length given the surface area or volume.** G.GMD.A.3 (*Procedural, Application)* - Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems	*Emphasize understanding the formulas conceptually, use them to solve real world problems, and reduce the number of repetitious practice problems that would normally be assigned to students for this topic.*
M07.C-G.2.2.2 Solve real-world and mathematical problems involving area, volume, and surface area of two and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. Formulas will be provided.	**G.2.3.2 Describe how a change in one dimension of a three- dimensional figure affects other measurements of that figure.** • **G.2.3.2.1 Describe how a change in the linear dimension of a figure affects its surface area or volume (e.g., How does changing the length of the edge of a cube affect the volume of the cube?).**	

7.G.B.6 - Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.		

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Algebra II Important Prerequisites

Statistics standards listed separately below.

Prerequisite Eligible Content Bridge up or heavy traffic from previous grade	Assessment Anchor/Eligible Content	Instructional Time Preserve or reduce time as compared to a typical year, per *SAP guidance*
A1.1.1.1.2 Simplify square roots (e.g., √24 = 2√6).	**A2.1.1.1 Represent and/or use imaginary numbers in equivalent forms (e.g., square roots and exponents).** • **A2.1.1.1.1 Simplify/write square roots in terms of i (e.g., √-24 = 2i√6).** • **A2.1.1.1.2 Simplify/evaluate expressions involving powers of i (e.g., $i^6 + i^3 = -1 - i$).**	*Combine lessons with A2.1.3.1.1 to address key concepts and reduce the amount of time spent on this standard.*
A1.1.1.5.1 Add, subtract, and/or multiply polynomial expressions (express answers in simplest form). Note: Nothing larger than a binomial multiplied by a trinomial.	**A2.1.1.2 Apply the order of operations in computation and in problem solving situations.** • **A2.1.1.2.1 Add and subtract complex numbers (e.g., (7 – 3i) – (2 + i) = 5 – 4i).** • **A2.1.1.2.2 Multiply and divide complex numbers. (e.g., (7 – 3i)(2 + i) = 17 + i).**	*Reduce the number of repetitious practice problems that would normally be assigned to students for this topic.*
M08.B-E.1.1.1 Apply one or more properties of integer exponents to generate equivalent numerical expressions without a calculator (with final answers expressed in exponential form with positive exponents). Properties will be provided. Example: $3^{12} \times 3^{-15} = 3^{-3} = 1/(3^3)$ 8.EE.A.1 - Know and apply the properties of integer exponents to generate equivalent numerical expressions. *For example, 3^2 × 3^-5 = 3^-3 = 1/3^3 = 1/27.*	**A2.1.2.1 Use exponents, roots, and/or absolute values to represent equivalent forms or to solve problems.** • **A2.1.2.1.1 Use exponential expressions to represent rational numbers.** • **A2.1.2.1.2 Simplify/evaluate expressions involving positive and negative exponents and/or roots (may contain all types of real numbers— exponents should not exceed power of 10).** • **A2.1.2.1.3 Simplify/evaluate expressions involving multiplying with exponents (e.g., $x^6 \bullet x^7 = x^{13}$), powers of powers (e.g., $(x^6)^7 = x^{42}$), and powers of products (e.g., $(2x^2)^3 = 8x^6$). Note: Limit to rational exponents.** • **A2.1.2.1.4 Simplify or evaluate expressions involving logarithms and exponents (e.g., $\log_2 8 = 3$ or $\log_4 2 = ½$).**	*Reduce the number of repetitious practice problems that would normally be assigned to students for this topic.*
A1.1.1.5.2 Factor algebraic expressions, including difference of squares and trinomials. Note: Trinomials are limited to the form $ax^2 + bx + c$ where a is equal to 1 after factoring out all	**A2.1.2.2 Simplify expressions involving polynomials.** • **A2.1.2.2.1 Factor algebraic expressions, including difference of squares and trinomials. Note: Trinomials limited to the form ax^2**	*Reduce the number of repetitious practice problems related to factoring trinomials over the integers, and*

monomial factors. **A1.1.1.5.3 Simplify/reduce a rational algebraic expression.**	**+bx+c where a is not equal to 0.** • **A2.1.2.2.2 Simplify rational algebraic expressions.**	*emphasize using the factored form to draw conclusions.*
	A2.1.3.1 Write and/or solve non-linear equations using various methods. • **A2.1.3.1.1 Write and/or solve quadratic equations (including factoring and using the Quadratic Formula).** • **A2.1.3.1.2 Solve equations involving rational and/or radical expressions (e.g., 10/(x + 3) + 12/(x – 2) = 1 or $\sqrt{x^2 + 21x} = 14$).** • **A2.1.3.1.3 Write and/or solve a simple exponential or logarithmic equation (including common and natural logarithms).** • **A2.1.3.1.4 Write, solve, and/or apply linear or exponential growth or decay (including problem situations).**	*Lessen the emphasis on completing the square and emphasize solving by inspection, taking square roots, quadratic formula, and factoring; recognize when quadratic formula gives non-real solutions but reduce emphasis on this case.*
	A2.1.3.2 Describe and/or determine change. • **A2.1.3.2.1 Determine how a change in one variable relates to a change in a second variable (e.g., y = 4/x; if x doubles, what happens to y?).** • **A2.1.3.2.2 Use algebraic processes to solve a formula for a given variable (e.g., solve d = rt for r).**	*Reduce the number of repetitious practice problems that would normally be assigned to students for this topic.*
A1.2.1.1.1 Analyze a set of data for the existence of a pattern and represent the pattern algebraically and/or graphically. **A1.2.1.1.3 Identify the domain or range of a relation (may be presented as ordered pairs, a graph, or a table).** **M08.B-F.2.1.2 Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch or determine a graph that exhibits the qualitative features of a function that has been described verbally.** 8.F.B.5 - Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.	**A2.2.1.1 Analyze and/or use patterns or relations.** • **A2.2.1.1.1 Analyze a set of data for the existence of a pattern, and represent the pattern with a rule algebraically and/or graphically.** • **A2.2.1.1.2 Identify and/or extend a pattern as either an arithmetic or geometric sequence (e.g., given a geometric sequence, find the 20th term).** • **A2.2.1.1.3 Determine the domain, range, or inverse of a relation.** • **A2.2.1.1.4 Identify and/or determine the characteristics of an exponential, quadratic, or polynomial function (e.g., intervals of increase/decrease, intercepts, zeros, and asymptotes).**	

	A2.2.2.1 Create, interpret, and/or use polynomial, exponential, and/or logarithmic functions and their equations, graphs, or tables. • **A2.2.2.1.1 Create, interpret, and/or use the equation, graph, or table of a polynomial function (including quadratics).** • **A2.2.2.1.2 Create, interpret, and/or use the equation, graph, or table of an exponential or logarithmic function (including common and natural logarithms).** • **A2.2.2.1.3 Determine, use, and/or interpret minimum and maximum values over a specified interval of a graph of a polynomial, exponential, or logarithmic function.** • **A2.2.2.1.4 Translate a polynomial, exponential, or logarithmic function from one representation of a function to another (graph, table, and equation).**	
A1.2.1.2.1 Create, interpret, and/or use the equation, graph, or table of a linear function.	**A2.2.2.2 Describe and/or determine families of functions.** • **A2.2.2.2.1 Identify or describe the effect of changing parameters within a family of functions (e.g., $y = x^2$ and $y = x^2 + 3$, or $y = x^2$ and $y = 3x^2$).**	
M08.D-S.1.1.1 Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative correlation, linear association, and nonlinear association. 8.SP.A.1 - Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association. **M08.D-S.1.1.2 For scatter plots that suggest a linear association, identify a line of best fit by judging the closeness of the data points to the line.** 8.SP.A.2 - Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.	**A2.2.3.1 Analyze and/or interpret data on a scatter plot and/or use a scatter plot to make predictions.** • **A2.2.3.1.1 Draw, identify, find, interpret, and/or write an equation for a regression model (lines and curves of best fit) for a scatter plot.** • **A2.2.3.1.2 Make predictions using the equations or graphs of regression models (lines and curves of best fit) of scatter plots.**	

	A2.2.3.2 Apply probability to practical situations. • **A2.2.3.2.1 Use combinations, permutations, and the fundamental counting principle to solve problems involving probability.** • **A2.2.3.2.2 Use odds to find probability and/or use probability to find odds.** • **A2.2.3.2.3 Use probability for independent, dependent, or compound events to predict outcomes.**	*Reduce the number of repetitious practice problems that would normally be assigned to students for this topic.*

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High School Statistics Important Prerequisites

Prerequisite Standard Bridge up or heavy traffic from previous grade	Grade-Level Standard	Standard Language	Instructional Time Preserve or reduce time as compared to a typical year, per SAP guidance
	S.CP.A.1 *Conceptual*	Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not").	
	S.CP.A.2 *Conceptual*	Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent.	*Combine with lessons on other S-CP.A standards to address key concepts and reduce the amount of time spent on this standard. Reduce the number of repetitious practice problems that would normally be assigned to students for this topic.*
	S.CP.A.3 *Application*	Understand the conditional probability of A given B as P(A and B)/P(B), and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B.	*Combine with lessons on other S-CP.A standards to address key concepts and reduce the amount of time spent on this standard. Reduce the number of repetitious practice problems that would normally be assigned to students for this topic.*
8.SP.A.4	S.CP.A.4 *Application*	Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. *For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results.*	
	S.CP.A.5 *Conceptual*	Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. *For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.*	
	S.CP.B.6 *Procedural*	Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model. Note: Reduce the number of repetitious practice problems that would normally be assigned to students for this topic.	*Reduce the number of repetitious practice problems that would normally be assigned to students for this topic.*

	S.CP.B.7 *Application*	Apply the Addition Rule, P(A or B) = P(A) + P(B) - P(A and B), and interpret the answer in terms of the model. Note: Reduce the number of repetitious practice problems that would normally be assigned to students for this topic.	*Reduce the number of repetitious practice problems that would normally be assigned to students for this topic.*
	S.IC.A.1 *Conceptual*	Understand statistics as a process for making inferences about population parameters based on a random sample from that population.	
	S.IC.A.2 *Conceptual, Application*	Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. *For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model?*	
7.SP.A.1	S.IC.B.3 *Conceptual, Application*	Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.	*Combine lessons with S-IC.B.4 and S-IC.B.5 to address key concepts and reduce the amount of time spent on this standard. Reduce the number of repetitious practice problems that would normally be assigned to students for this topic.*
7.SP.A.2	S.IC.B.4 *Application*	Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.	*Combine lessons with S-IC.B.3 and S-IC.B.5 to address key concepts and reduce the amount of time spent on this standard. Reduce the number of repetitious practice problems that would normally be assigned to students for this topic.*
	S.IC.B.5 *Application*	Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.	*Combine lessons with S-IC.B.3 and S-IC.B.4 to address key concepts and reduce the amount of time spent on this standard. Reduce the number of repetitious practice problems that would normally be assigned to students for this topic.*
	S.IC.B.6 *Conceptual*	Evaluate reports based on data.	*Reduce the normal emphasis.*
	S.ID.A.1 *Procedural*	Represent data with plots on the real number line (dot plots, histograms, and box plots).	*Eliminate content to save time*

	S.ID.A.2 *Conceptual, Procedural*	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.	
	S.ID.A.3 *Conceptual, Application*	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).	
S.ID.A.1 S.ID.A.2 *(Algebra I)*	S.ID.A.4 *Conceptual, Procedural, Application*	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.	
8.SP.A.4	S.ID.B.5 *Conceptual, Procedural, Application*	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.	
8.SP.A.1, 8.SP.A.2	S.ID.B.6 *Conceptual, Procedural, Application*	Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.	
	S.ID.B.6a *Conceptual, Procedural, Application*	Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.	
	S.ID.B.6b *Conceptual, Procedural*	Informally assess the fit of a function by plotting and analyzing residuals.	
	S.ID.B.6c *Procedural*	Fit a linear function for a scatter plot that suggests a linear association.	
8.SP.A.3	S.ID.C.7 *Conceptual, Application*	Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.	
	S.ID.C.8 *Conceptual, Procedural*	Compute (using technology) and interpret the correlation coefficient of a linear fit	*Reduce the normal emphasis*
	S.ID.C.9 *Conceptual*	Distinguish between correlation and causation.	

About ANet ANet is a nonprofit that partners with school and district leaders to support great teaching - teaching that is grounded in standards, shaped by data, and built upon the practices of great educators across the country. Founded as a collaborative improvement effort among seven schools in 2005, ANet is dedicated to educational equity for all students. To learn more about ANet, visit us at www.achievementnetwork.org.