

2021 Oregon Draft Mathematics Standards

**K-8 Mathematics**

January 2021 Draft for Public Review

**Table of Contents**

[SECTION ONE: Introduction 4](#_Toc61845880)

[1A: Letter to Educators 4](#_Toc61845881)

[1B: Overview of 2019-21 Math Standards Review and Revision 4](#_Toc61845882)

[1C: Acknowledgements 6](#_Toc61845883)

[1D: How to Read the Document 7](#_Toc61845884)

[SECTION TWO: Mathematical Practices and Modeling 12](#_Toc61845885)

[2A: Standards for Mathematical Practices 12](#_Toc61845886)

[2D: Mathematical Modeling 14](#_Toc61845887)

[SECTION THREE: Draft Kindergarten Standards 16](#_Toc61845888)

[3A: Introduction 16](#_Toc61845889)

[3B: Draft Standards Statements - Kindergarten 18](#_Toc61845890)

[3C: Kindergarten Crosswalk with Clarifying Guidance 21](#_Toc61845891)

[SECTION FOUR: Draft 1st Grade Standards 29](#_Toc61845892)

[4A: Introduction 29](#_Toc61845893)

[4B: Draft Standards Statements – Grade 1 31](#_Toc61845894)

[4C: Grade 1 Crosswalk with Clarifying Guidance 34](#_Toc61845895)

[SECTION FIVE: Draft 2nd Grade Standards 44](#_Toc61845896)

[5A: Introduction 44](#_Toc61845897)

[5B: Draft Standards Statements – Grade 2 46](#_Toc61845898)

[5C: Grade 2 Crosswalk with Clarifying Guidance 49](#_Toc61845899)

[SECTION SIX: Draft 3rd Grade Standards 59](#_Toc61845900)

[6A: Introduction 59](#_Toc61845901)

[6B: Draft Standards Statements – Grade 3 61](#_Toc61845902)

[6C: Grade 3 Crosswalk with Clarifying Guidance 64](#_Toc61845903)

[SECTION SEVEN: Draft 4th Grade Standards 79](#_Toc61845904)

[7A: Introduction 79](#_Toc61845905)

[7B: Draft Standards Statements – Grade 4 81](#_Toc61845906)

[7C: Grade 4 Crosswalk with Clarifying Guidance 84](#_Toc61845907)

[SECTION EIGHT: Draft 5th Grade Standards 100](#_Toc61845908)

[8A: Introduction 100](#_Toc61845909)

[8B: Draft Standards Statements – Grade 5 102](#_Toc61845910)

[8C: Grade 5 Crosswalk with Clarifying Guidance 105](#_Toc61845911)

[SECTION NINE: Draft 6th Grade Standards 120](#_Toc61845912)

[9A: Introduction 120](#_Toc61845913)

[9B: Draft Standards Statements – Grade 6 123](#_Toc61845914)

[9C: Grade 6 Crosswalk with Clarifying Guidance 127](#_Toc61845915)

[SECTION TEN: Draft 7th Grade Standards 143](#_Toc61845916)

[10A: Introduction 143](#_Toc61845917)

[10B: Draft Standards Statements – Grade 6 145](#_Toc61845918)

[10C: Grade 7 Crosswalk with Clarifying Guidance 148](#_Toc61845919)

[SECTION ELEVEN: Draft 8th Grade Standards 162](#_Toc61845920)

[11A: Introduction 162](#_Toc61845921)

[11B: Draft Standards Statements – Grade 8 164](#_Toc61845922)

[11C: Grade 8 Crosswalk with Clarifying Guidance 167](#_Toc61845923)

# SECTION ONE: Introduction

## 1A: Letter to Educators

The work in this draft document is the result of an incredible investment of time and knowledge from Oregon educators to review, comment, and draft an updated version of Oregon K-12 mathematics expectations. Recruitment of panelists began in April 2019, when interested panelists were given a chance to learn about the work before they committed.

Nominations remained open that summer—with an additional cohort added in September 2019—with a total of 118 educators divided into 12 grade level teams committing to the work. Over the course of the school year, several panelists had to drop out of the panel work, with 89 active panelists working on the project by spring 2020. Of these panelists, 28 educators accepted the role as a team co-chair to assist in the review of the content standards and participate at in-person events in August 2019 and March 2020.

### Oregon Vision

The Oregon Math Advisory Panel advances mathematics education in our state by cultivating a network of educators that promote equitable math experiences for all students through guidance and support of policies, standards, curricula, assessments, and instructional best practices.

The math panel is committed to ensure that all students attain mathematics proficiency by having access to high-quality mathematics instruction that includes challenging and coherent mathematics content in a learning environment where each student receives the necessary support they need to succeed in mathematics.

Values that guide panel work in helping transform this vision into reality include Equity in Mathematics, Mathematical Growth Mindsets, Problem Solving Relevance, Effective Communication, and Instructional Excellence.

## 1B: Overview of 2019-21 Math Standards Review and Revision

### Phase 1 (April-September 2019)

**Goal:** Ensure the **Commitment of Shared Learning** of the standards and the [Oregon Equity Lens](https://www.oregon.gov/ode/students-and-family/equity/equityinitiatives/Documents/OregonEquityLens.pdf) for all panelists

* Primary Task: Participate in online learning opportunities in spring/summer 2019 and engage in conversations in a Canvas course set up for the content panel

The first phase of the project included grounding our work in a shared learning experience on the Canvas learning management system so that travel could be minimized by taking advantage of available technologies. Learning sessions were recorded and can be found on the [Oregon Math Project YouTube channel](http://bit.ly/OMPvideos).

### Phase 2 (October 2019-March 2020)

**Goal:** Ensure the **Language** of the standards is accessible to a wide audience

* Primary Task: Review standards and draft content into (1) a standards statement, and (2) Clarifying Guidance(s)
* Additional HS Task: Propose core two credit content for all students

Work in Phase 2 was done primarily in grade level teams meeting virtually through video conferences, sharing documents online. Each team was tasked with creating a version 1.0 document by January 2020. This draft was then shared with all groups for feedback and use at the in-person co-chair meeting on March 2-3, 2020, in Portland, OR.

Additional guests at the March meeting included **Shebi Cole and Jason Zimba from Student Achievement Partners**, **Robert Berry from the National Council of Teachers of Mathematics**, and **Ted Coe from Achieve**. Guest speakers were on site to provide additional guidance to our panelists in drafting the version 2.0 document that is being shared now.

### Phase 3 (November-December 2020)

**Goal:** Ensure the **Commitment to the Focus and Coherence** of the standards is maintained or improved

* Primary Task: Review the March 2020 draft (version 2.0) through the lens of focus (e.g., clarity, prioritization) and coherence (e.g., learning within established progressions)
* Create version 3.0 based on content panel feedback

The COVID-19 pandemic significantly disrupted all our lives in a number of ways, including statewide school closures starting mid-March, just after we were able to have our in-person content panel meeting. This impacted our work on math standards, which was put on hold. Work with math standards feedback will move to online only options starting in November 2020.

### Phase 4 (January-February 2021)

**Goal:** Ensure the **Commitment to Expand the Conversation** beyond the content panel through a public review process

* Primary Task: Public review of version 3.0 - January 2021
* Coordinate with Oregon Education Service Districts (ESDs) to schedule virtual webinar options for feedback. Separate sessions for K-8 and High School standards will be provided and sign-ups should be done with the hosting ESDs. Dates, times, and registration links can be found on the [ODE math standards page](https://www.oregon.gov/ode/educator-resources/standards/mathematics/Pages/default.aspx).

### Phase 5 (March-April 2021)

**Goal:** Ensure the **Commitment to Incorporate Feedback** collected to inform and improve the quality of the standards

* Primary Task: Review feedback from the winter public feedback sessions and incorporate changes as needed
* Connections will also be made to work happening nationally to inform standards work in Oregon. Significant potential changes will be shared with educators and the State Board for possible inclusion in our state standards work (version 4.0).

### Phase 6 (Spring/Summer 2021)

**Goal:** Ensure the **Commitment to Alignment to the Vision** of mathematics education in Oregon and ensure standards support this vision

* Primary Task: Present standards to the State Board of Education for adoption, or update timeline if additional time is needed to incorporate feedback and alignment to national work in math education

## 1C: Acknowledgements

It is with tremendous gratitude that the staff at the Oregon Department of Education (ODE) recognizes the work of the math content panel and the countless hours invested to produce this draft document. This work will continue to be reviewed in spring and summer 2020, with the goal of a public review in fall 2020. Please join us in thanking the content panelists and co-chairs (indicated in bold) for their efforts to support the review of our math standards.

### Kindergarten Team

* **Apryll Hammers, Medford School District**
* **Gloria Pereyra-Robertson, Medford School District**
* Tamara Carpenito, Siuslaw Elementary School

### 1st Grade Team

* **Brian Baker, Greater Albany Public Schools**
* **Marcy Doyle, Lincoln County School District**
* Jennifer Botenhagen, Newberg School District
* Andrea Kapphahn, Medford School District

### 2nd Grade Team

* **Kelsey Harris, Salem Keizer School District**
* **Jaimee Massie, Eugene School District**
* Lindsay Gates, Ashland School District
* Kerry Morton, Bend-LaPine Schools

### 3rd Grade Team

* **Kayla Hull, Wallowa Education Service District**
* **Jane Osborne, Hood River County School District**
* Samantha Salvitelli, Gresham-Barlow School District

### 4th Grade Team

* **Leslie McGraw, North Clackamas School District**
* **Nicole Rigelman, Portland State University**
* Tim Crider, North Bend School District

### 5th Grade Team

* **Christine Campanella, Portland Public Schools**
* **Kathy Few, Sisters School District**
* Shereen Horton, Hillsboro School District
* Carla Montoya, David Douglas School District
* Natalie Wolf, Gresham-Barlow School District

### 6th Grade Team

* **Melinda Knapp, Oregon State University-Cascades**
* **Tabatha Roderick, Camas Valley Charter School**
* Kara Allan, Lincoln County School District
* Paulie Lime, North Santiam School District
* Christy Toliver, Corvallis School District

### 7th Grade Team

* **Jennifer Bell, Oregon City School District**
* **Evalena Leitz, Gresham-Barlow School District**
* Kama Almasi, Lincoln County School District
* Elizabeth Warren, Estacada School District

### 8th Grade Team

* **Sarah Goehler, Lake Oswego School District**
* **Roger Hunter, Nyssa School District**
* Rachel Aazzerah, Portland Public Schools
* Jon Bennett, South Umpqua School District
* Shannon Parvankin, Gresham-Barlow School District
* Andrea Young, Klamath County School District

### Oregon Department of Education Staff

* Colt Gill, Director of the Oregon Department of Education
* Jennifer Patterson, Assistant Superintendent of Teaching, Learning and Assessment
* Alexa Pearson, Director of Standards and Instructional Supports
* Mark Freed, Math Education Specialist
* Andy Byerley, Math Assessment Specialist
* Tom Thompson, STEM Education Specialist
* Aujalee Moore, Administrative Specialist

## 1D: How to Read the Document

The 2021 draft K-8 mathematics standards is organized into grade level content standards within sections of this document. High school standards are presented in a separate document that can be found on the Oregon Department of Education [mathematics standards webpage](https://www.oregon.gov/ode/educator-resources/standards/mathematics/Pages/default.aspx); public feedback webinar opportunities and survey forms will also be found on this page.

Table 1: Overview of Grade Level Standards and 2021 sections

| Grade Level Standards | 2021 Draft section | Page Numbers |
| --- | --- | --- |
| Math Practices and Math Modeling | Section 2 | Pages 8-11 |
| Kindergarten Standards | Section 3 | Pages 12-24 |
| Grade 1 Standards | Section 4 | Pages 25-39 |
| Grade 2 Standards | Section 5 | Pages 40-54 |
| Grade 3 Standards | Section 6 | Pages 55-74 |
| Grade 4 Standards | Section 7 | Pages 75-95 |
| Grade 5 Standards | Section 8 | Pages 96-115 |
| Grade 6 Standards | Section 9 | Pages 116-138 |
| Grade 7 Standards | Section 10 | Pages 139-158 |
| Grade 8 Standards | Section 11 | Pages 159-178 |

Each grade level section is divided into three subsections: (1) an introduction, (2) draft standards statements, and (3) crosswalk with CCSS (2010) with draft clarifying guidance. Additional information about what to find in these sections can be found below.

### Part A – Introduction

#### Critical Areas for Grade Level Mathematics

For each grade level from kindergarten through grade 8, the Critical Areas outline the essential mathematical ideas for each grade level. The critical areas are designed to bring focus to the standards at each grade level by describing the big ideas that educators can use to build their curriculum and to guide instruction. For each grade, kindergarten through grade 8, there are two, three, or four critical areas which can be found first in each introduction section.

#### Grade Level Overview

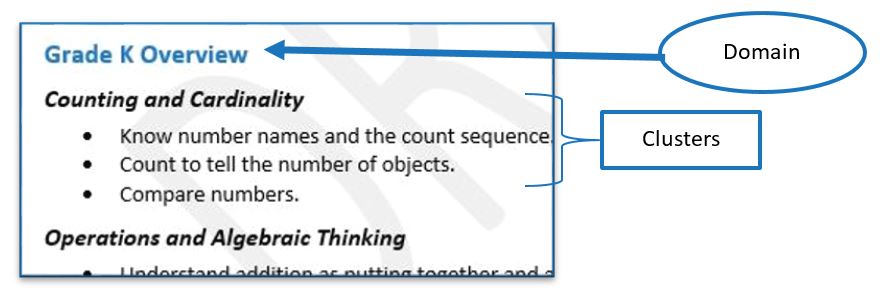
Following the critical areas for each grade will be an overview of the grade level domains and clusters. This content is presented unedited from the CCSS (2010), and is proposed to remain the same for the K-8 standards to assist in providing continuity to the Oregon draft 2021 math standards. In general, these terms refer to:

**Standards** define what students should understand and be able to do.

**Clusters** summarize groups of related standards. Note that standards from different clusters may sometimes be closely related, because mathematics is a connected subject.

**Domains** are larger groups of related standards. Standards from different domains may sometimes be closely related.

Figure 1: Domain and cluster headings within Part A: Introduction



#### Additional Introduction Elements

Each grade level introduction will also include the eight mathematical practices, which can be found in Section two of this document.

Highlights of the major work of the grade, and grade level fluencies, are also presented in the introduction. This information came from the major work of the grade documents created by Student Achievement Partners (SAP), and included in the grade introductions to provide continuity between the Oregon standards and work done by SAP. Grade level fluencies are just an overview in the introduction, and specific wording of the grade level expectations can be found in the standards statement tables in the following section.

### Part B – Draft Statements

The 2021 review and revision of K-8 math standards includes efforts to improve readability and access to a wide range of potential readers. The standards document itself is one of the most downloaded documents on the state website and provides an opportunity to share important information to not only educators, but additional audiences—such as parents and community members—as well.

Many of the CCSS (2010) standards were long and technical, and presented barriers to access for many readers interested in grade level expectations. For the 2021 review, the original standards were divided into two parts:

1. Standards statements that will be adopted by the State Board of Education
2. Clarifying guidance that will be used in supporting documents for use by educators to understand the boundaries and examples of a given standard

Figure 2: Domain, Clusters, and Standards Statements within Part B

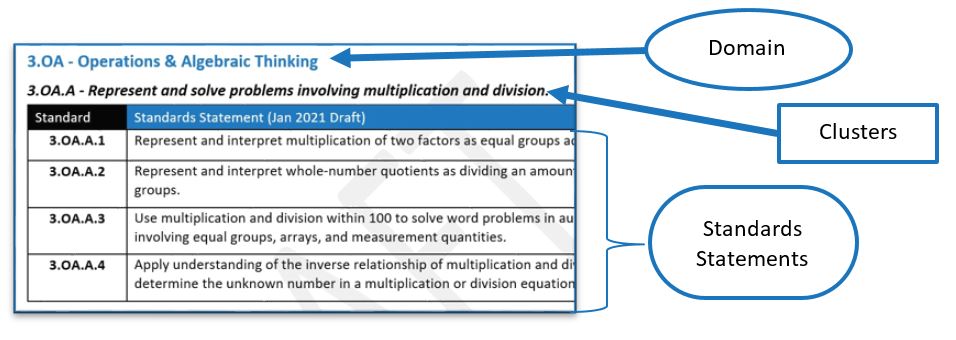


Table 2: Overview of Standards Statements

| Audience | Everyone |
| --- | --- |
| Definition | A standard is a statement of what a student should know, understand, or do. |
| Description | Standards statements need to be written as stand-alone statement(s) in the final document. They could include more than one sentence, but overall word count needs to remain below approximately 40-50 words. |
| Considerations | * Lead with clarity   + Start with key ideas   + First Sentence approximately 10-20 words   + Minimize use of conjunctions (and/or) * Include information from CCSSM   + Total word count approximately 40-50 words * No Parentheticals   + Examples moved to clarifying statements * Technical Considerations   + Size (word count, character count, number of paragraphs)   + Complexity (words per sentence, characters per word)   + Readability (Flesch Reading Ease, Flesh-Kincaid Grade Level) |

### Part C – Crosswalk with Clarifying Guidance

A crosswalk between the CCSS (2010) text and the draft Oregon 2021 standards statements is provided in section C for each grade level. Additionally, clarifying guidance is provided that will be included in supporting documents, but not presented to the State Board for adoption. This will allow guidance to be revised and updated as needed without board adoption. Guidance is provided for educators to better understand the scope and boundaries of a given content standard.

Figure 3: Domain and cluster headings within Part C: Crosswalk with Clarifying Guidance

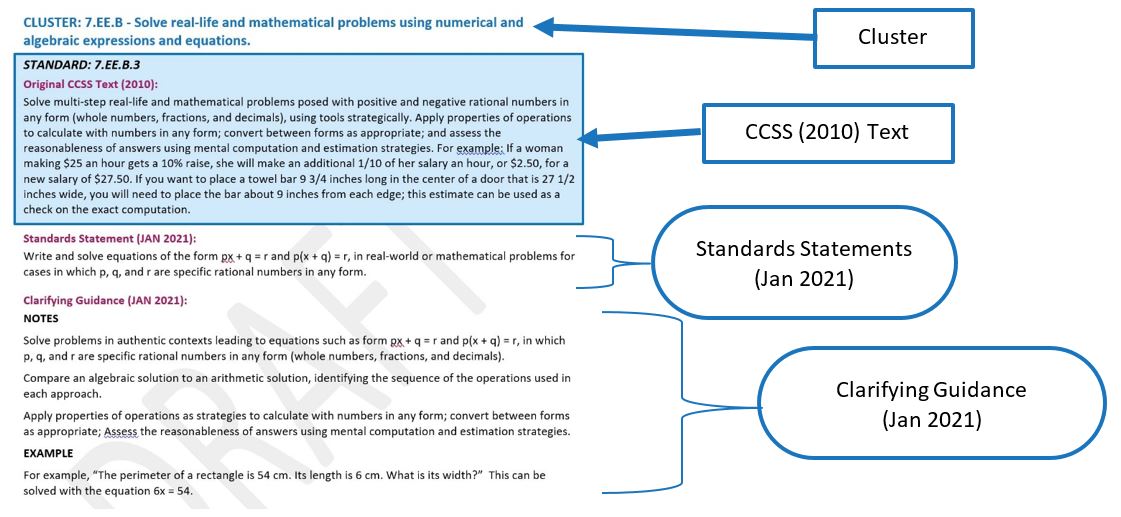


Table 3: Overview of Clarifying Guidance

| Audience | Teachers, Administrators, Test & Curriculum Developers |
| --- | --- |
| Definition | Clarifying statements extend expectations within standards to decrease possible confusion or ambiguity. |
| Description | The intent of clarifying statements is to provide additional guidance for educators to communicate the intent of the standard as supporting resources are developed. Clarifying statements can be in the form of succinct sentences or paragraphs that attend to one of four types of clarifications: (1) Student Experiences; (2) Examples; (3) Boundaries; and (4) Connection to Math Practices. |
| Considerations | Clarifying statements are encouraged to draft, but are optional so they could potentially be left blank. The use of sentence frames and titles is also encouraged to indicate the type of clarifying statement. Information could be used in the development of assessments and instructional materials, but it is not a requirement in that all students have the identical experience. They are guideposts that help reduce potential confusion and increase fidelity as educators implement the standards.   * Examples found within the current CCSS document in the form of "i.e." or "e.g." statements should be moved to clarifying statements or removed. * Standards with an additional level, such as a "4a", "4b", or "4c" statement, should include relevant content in the standards statement, incorporate into the clarifying paragraphs, or be removed. |

Example sentence frames for clarifying statements could include, but are not limited to:

* Student Experiences
  + "Students should have the opportunity to \_\_\_\_"
  + "Build conceptual understanding by \_\_\_\_"
* Examples
  + "Some examples include \_\_\_\_"
* Boundary Statements
  + "Students are not expected to \_\_\_\_\_"
  + "Expectations of the standard include \_\_\_\_"
* Math Practices
  + "Opportunities to engage in math practices include \_\_\_\_"

Future work of the clarifying guidance could pull from additional sources outside of Oregon to create supporting documents to guide implementation of the adopted standards.

At this time, please provide feedback on the balance between adopted content standards and clarifying guidance using the provided forms on the Oregon Department of Education [mathematics standards webpage](https://www.oregon.gov/ode/educator-resources/standards/mathematics/Pages/default.aspx), or contact [Mark Freed](mailto:mark.freed@state.or.us), ODE Math Education Specialist, if you have additional questions or comments about the 2021 draft standards document.

# SECTION TWO: Mathematical Practices and Modeling

## 2A: Standards for Mathematical Practices

### Make sense of problems and persevere in solving them.

Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.

### Reason abstractly and quantitatively.

Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.

### Construct viable arguments and critique the reasoning of others.

Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.

### Model with mathematics.

Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

### Use appropriate tools strategically.

Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.

### Attend to precision.

Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.

### Look for and make use of structure.

Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression x2 + 9x + 14, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 - 3(x - y)2 as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.

### Look for and express regularity in repeated reasoning

Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation (y - 2)/(x - 1) = 3. Noticing the regularity in the way terms cancel when expanding (x - 1)(x + 1), (x - 1)(x2 + x + 1), and (x - 1)(x3 + x2 + x + 1) might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.

## 2B: Mathematical Modeling

Modeling links classroom mathematics and statistics to everyday life, work, and decision-making. Modeling is the process of choosing and using appropriate mathematics and statistics to analyze empirical situations, to understand them better, and to improve decisions. Quantities and their relationships in physical, economic, public policy, social, and everyday situations can be modeled using mathematical and statistical methods. When making mathematical models, technology is valuable for varying assumptions, exploring consequences, and comparing predictions with data.

A model can be very simple, such as writing total cost as a product of unit price and number bought, or using a geometric shape to describe a physical object like a coin. Even such simple models involve making choices. It is up to us whether to model a coin as a three-dimensional cylinder, or whether a two-dimensional disk works well enough for our purposes. Other situations—modeling a delivery route, a production schedule, or a comparison of loan amortizations—need more elaborate models that use other tools from the mathematical sciences. Real-world situations are not organized and labeled for analysis; formulating tractable models, representing such models, and analyzing them is appropriately a creative process. Like every such process, this depends on acquired expertise as well as creativity.

Some examples of such situations might include:

• Estimating how much water and food is needed for emergency relief in a devastated city of 3 million people, and how it might be distributed.

• Planning a table tennis tournament for 7 players at a club with 4 tables, where each player plays against each other player.

• Designing the layout of the stalls in a school fair so as to raise as much money as possible.

• Analyzing stopping distance for a car.

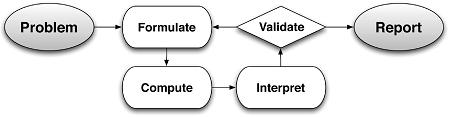
• Modeling savings account balance, bacterial colony growth, or investment growth.

• Engaging in critical path analysis, e.g., applied to turnaround of an aircraft at an airport.

• Analyzing risk in situations such as extreme sports, pandemics, and terrorism.

• Relating population statistics to individual predictions.

In situations like these, the models devised depend on a number of factors: How precise an answer do we want or need? What aspects of the situation do we most need to understand, control, or optimize? What resources of time and tools do we have? The range of models that we can create and analyze is also constrained by the limitations of our mathematical, statistical, and technical skills, and our ability to recognize significant variables and relationships among them. Diagrams of various kinds, spreadsheets and other technology, and algebra are powerful tools for understanding and solving problems drawn from different types of real-world situations.

****One of the insights provided by mathematical modeling is that essentially the same mathematical or statistical structure can sometimes model seemingly different situations. Models can also shed light on the mathematical structures themselves, for example, as when a model of bacterial growth makes more vivid the explosive growth of the exponential function.

The basic modeling cycle is summarized in the diagram. It involves (1) identifying variables in the situation and selecting those that represent essential features, (2) formulating a model by creating and selecting geometric, graphical, tabular, algebraic, or statistical representations that describe relationships between the variables, (3) analyzing and performing operations on these relationships to draw conclusions, (4) interpreting the results of the mathematics in terms of the original situation, (5) validating the conclusions by comparing them with the situation, and then either improving the model or, if it is acceptable, (6) reporting on the conclusions and the reasoning behind them. Choices, assumptions, and approximations are present throughout this cycle.

In descriptive modeling, a model simply describes the phenomena or summarizes them in a compact form. Graphs of observations are a familiar descriptive model— for example, graphs of global temperature and atmospheric CO2 over time.

Analytic modeling seeks to explain data on the basis of deeper theoretical ideas, albeit with parameters that are empirically based; for example, exponential growth of bacterial colonies (until cut-off mechanisms such as pollution or starvation intervene) follows from a constant reproduction rate. Functions are an important tool for analyzing such problems.

Graphing utilities, spreadsheets, computer algebra systems, and dynamic geometry software are powerful tools that can be used to model purely mathematical phenomena (e.g., the behavior of polynomials) as well as physical phenomena.

# SECTION THREE: Draft Kindergarten Standards

## 3A: Introduction

### Critical Areas for Kindergarten Mathematics

In Kindergarten, instructional time should focus on two critical areas: (1) representing and comparing whole numbers, initially with sets of objects; (2) describing shapes and space. More learning time in Kindergarten should be devoted to number than to other topics.

1. Students use numbers, including written numerals, to represent quantities and to solve quantitative problems, such as counting objects in a set; counting out a given number of objects; comparing sets or numerals; and modeling simple joining and separating situations with sets of objects, or eventually with equations such as 5 + 2 = 7 and 7 – 2 = 5. (Kindergarten students should see addition and subtraction equations, and student writing of equations in kindergarten is encouraged, but it is not required.) Students choose, combine, and apply effective strategies for answering quantitative questions, including quickly recognizing the cardinalities of small sets of objects, counting and producing sets of given sizes, counting the number of objects in combined sets, or counting the number of objects that remain in a set after some are taken away..
2. Students describe their physical world using geometric ideas (e.g., shape, orientation, spatial relations) and vocabulary. They identify, name, and describe basic two-dimensional shapes, such as squares, triangles, circles, rectangles, and hexagons, presented in a variety of ways (e.g., with different sizes and orientations), as well as three-dimensional shapes such as cubes, cones, cylinders, and spheres. They use basic shapes and spatial reasoning to model objects in their environment and to construct more complex shapes.

### Grade K Overview

#### Counting and Cardinality

* Know number names and the count sequence.
* Count to tell the number of objects.
* Compare numbers.

#### Operations and Algebraic Thinking

* Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.

#### Number and Operations in Base Ten

* Work with numbers 11-19 to gain foundations for place value.

#### Measurement and Data

* Describe and compare measurable attributes.
* Classify objects and count the number of objects in each category

#### Geometry

* Identify and describe shapes.
* Analyze, compare, create, and compose shapes.

### Mathematical Practices

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

### Highlights of Major Work in Grades K-8

K-2: Addition and subtraction – concepts, skills, and problem solving; place value

3-5: Multiplication and division of whole numbers and fractions – concepts, skills, and problem solving

6: Ratios and proportional relationships; early expressions and equations

7: Ratios and proportional relationships; arithmetic of rational numbers

8: Linear algebra and linear functions

### Kindergarten Fluency Standard(s)

K.OA.A.5 Add/subtract within 5

## 3B: Draft Standards Statements - Kindergarten

The standards listed in the tables below list both core standards statements and cluster prioritization for K-8 mathematics. Not all content in a given grade is emphasized equally in the Standards. Some clusters require greater emphasis than others based on the depth of the ideas, the time that they take to master, and/or their importance to future mathematics or the demands of college and career readiness. (Link to [Focus by Grade Level documents](https://achievethecore.org/category/774/mathematics-focus-by-grade-level))

Students should spend the large majority of their time on the major work of the grade ( ). Supporting work ( ) and, where appropriate, additional work () can engage students in the major work of the grade.

### K.CC - Counting & Cardinality Standards Statements

#### K.CC.A - Know number names and the count sequence.

| Standard | Standard Statements (Jan 2021 Draft) | |
| --- | --- | --- |
| **K.CC.A.1** | Orally count to 100 by ones and by tens in sequential order. |
| **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** | Know number names and the count sequence. Write numbers from 0-20 and represent a number of objects with a written number 0-20. |

#### K.CC.B - Count to tell the number of objects.

| Standard | Standard Statements (Jan 2021 Draft) | |
| --- | --- | --- |
| **K.CC.B.4** | Understand the relationship between numbers and quantities; connect counting to cardinality. |
| **K.CC.B.5** | Count to answer “how many?” questions using as many as 20 objects arranged in a variety of configurations or as 10 objects in a scattered configuration. Given a number from 1-20, count out that many objects. |

#### K.CC.C – Compare numbers.

| Standard | Standard Statements (Jan 2021 Draft) | |
| --- | --- | --- |
| **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. |
| **K.CC.C.7** | Compare two numbers between 1 and 10 presented as written numerals. |

### K.OA - Operations & Algebraic Thinking Standards Statements

#### K.OA.A - Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.

| Standard | Standard Statements (Jan 2021 Draft) | |
| --- | --- | --- |
| **K.OA.A.1** | Represent addition and subtraction with concrete objects, pictorial drawings, physical expressions, or equations. |
| **K.OA.A.2** | Add and subtract within 10. Model authentic contexts and solve problems that use addition and subtraction within 10. |
| **K.OA.A.3** | Using objects or drawings, and equations, decompose numbers less than or equal to 10 into pairs in more than one way. |
| **K.OA.A.4** | By using objects, drawings, or equations, find the unknown number that makes 10 when added to a given number from 1 - 9. |
| **K.OA.A.5** | Demonstrate fluency with addition and subtraction within 5 with accurate, efficient, and flexible strategies. |

### K.NBT - Number & Operations in Base Ten Standards Statements

#### ***K.NBT.A - Work with numbers 11–19 to gain foundations for place value.***

| Standard | Standard Statements (Jan 2021 Draft) | |
| --- | --- | --- |
| **K.NBT.A.1** | Understand numbers from 11 to 19 as groups with ten ones and some further ones remaining. Compose and decompose these numbers using concrete objects, pictorial drawings, or equations. |

### K.MD - Measurement & Data Standards Statements

#### K.MD.A - Describe and compare measureable attributes.

| Standard | Standard Statements (Jan 2021 Draft) | |
| --- | --- | --- |
| **K.MD.A.1** | Describe several measurable attributes of a single object an object using measurable terms, such as length or weight. |
| **K.MD.A.2** | Directly compare two objects with a measurable attribute in common, and describe which object has “more” or “less” of the attribute. |

#### K.MD.B - Classify objects and count the number of objects in categories.

| Standard | Standard Statements (Jan 2021 Draft) | |
| --- | --- | --- |
| **K.MD.B.3** | Classify objects into given categories; count the numbers of objects in each category and sort the categories by count. |

### K.G – Geometry Standards Statements

#### K.G.A - Identify and describe shapes.

| Standard | Standard Statements (Jan 2021 Draft) | |
| --- | --- | --- |
| **K.G.A.1** | Describe objects in the environment using names of shapes and describe the relative positions of these objects. |
| **K.G.A.2** | Correctly name basic two-dimensional and three-dimensional geometric shapes regardless of their orientations or overall size. |
| **K.G.A.3** | Identify shapes as two-dimensional or three-dimensional. |

#### K.G.B - Analyze, compare, create, and compose shapes.

| Standard | Standard Statements (Jan 2021 Draft) | |
| --- | --- | --- |
| **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 and attributes. |
| **K.G.B.5** | Represent shapes in the world by building shapes from components and drawing shapes. |
| **K.G.B.6** | Compose simple shapes to form larger shapes. |

## 3C: Kindergarten Crosswalk with Clarifying Guidance

### CLUSTER: K.CC.A - Know number names and the count sequence.

#### STANDARD: K.CC.A.1

##### DRAFT Standards Statement (JAN 2021):

Orally count to 100 by ones and by tens in sequential order.

##### DRAFT Clarifying Guidance (JAN 2021):

Beginning at number zero students can orally count in sequential order without skipping or repeating numbers to 100

##### *Original CCSS Text (2010):*

*Count to 100 by ones and by tens.*

#### STANDARD: K.CC.A.2

##### DRAFT Standards Statement (JAN 2021):

Count forward beginning from a given number within the known sequence (instead of having to begin at 1).

##### DRAFT Clarifying Guidance (JAN 2021):

Content limit: The “known sequence” for this standard can be within 20.

Counting forward can be demonstrated using manipulatives, or oral response. In written form would be beyond the intent of this standard. The intent is to build toward addition and subtraction in first grade.

##### *Original CCSS Text (2010):*

*Count forward beginning from a given number within the known sequence (instead of having to begin at 1).*

#### STANDARD: K.CC.A.3

##### DRAFT Standards Statement (JAN 2021):

Know number names and the count sequence. Write numbers from 0-20 and represent a number of objects with a written number 0-20.

##### DRAFT Clarifying Guidance (JAN 2021):

Common errors include transposing, reversing or skipping a written number. Example of transposing 13 in writing to 31 Students will know that 0 represents a count of no objects.

##### *Original CCSS Text (2010):*

*Know number names and the count sequence. Write numbers from 0 to 20. Represent a number of objects with a written number 0-20 (with 0 representing a count of no objects).*

### CLUSTER: K.CC.B - Count to tell the number of objects.

#### STANDARD: K.CC.B.4

##### DRAFT Standards Statement (JAN 2021):

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.

##### DRAFT Clarifying Guidance (JAN 2021):

Understand that objects are counted using 1:1 correspondence in sequential order to determine quantity with last number representing the total objects counted.

##### *Original CCSS Text (2010):*

*Understand the relationship between numbers and quantities; connect counting to cardinality.*

*K.CC.B.4a 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.4b 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.4c Understand that each successive number name refers to a quantity that is one larger.*

#### STANDARD: K.CC.B.5

##### DRAFT Standards Statement (JAN 2021):

Count to answer “how many?” questions using as many as 20 objects arranged in a variety of configurations or as 10 objects in a scattered configuration.

Given a number from 1-20, count out that many objects.

##### DRAFT Clarifying Guidance (JAN 2021):

Count from 1 to 20 objects in sequential order in a variety of configurations. Configurations can include ten frames, arrays, circles or a line

##### *Original CCSS Text (2010):*

*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.*

### CLUSTER: K.CC.C - Compare numbers.

#### STANDARD: K.CC.C.6

##### DRAFT Standards Statement (JAN 2021):

Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group.

##### DRAFT Clarifying Guidance (JAN 2021):

Understand the intent is to use matching and counting strategies to reinforce vocabulary of greater than, less than or equal to.

Content limit: Group sizes limited to at most 10 objects each

##### *Original CCSS Text (2010):*

*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. (Include groups with up to ten objects.)*

#### STANDARD: K.CC.C.7

##### DRAFT Standards Statement (JAN 2021):

Compare two numbers between 1 and 10 presented as written numerals.

##### DRAFT Clarifying Guidance (JAN 2021):

Compare numbers in a written format without manipulatives or visuals.

##### *Original CCSS Text (2010):*

*Compare two numbers between 1 and 10 presented as written numerals.*

### CLUSTER: K.OA.A - Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.

#### STANDARD: K.OA.A.1

##### DRAFT Standards Statement (JAN 2021):

Represent addition and subtraction with concrete objects, pictorial drawings, physical expressions, or equations.

##### DRAFT Clarifying Guidance (JAN 2021):

Representation can include objects, fingers, mental images, drawings, sounds, acting out, verbal explanations, expressions or equations. An example of representational sounds can be clapping.

##### *Original CCSS Text (2010):*

*Represent addition and subtraction with objects, fingers, mental images, drawings (drawings need not show details, but should show the mathematics in the problem), sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations.*

#### STANDARD: K.OA.A.2

##### DRAFT Standards Statement (JAN 2021):

Add and subtract within 10. Model authentic contexts and solve problems that use addition and subtraction within 10.

##### DRAFT Clarifying Guidance (JAN 2021):

Use objects and drawings to represent the word problem.  In order to solve word problems within 10, use numbers 0-9

##### *Original CCSS Text (2010):*

*Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem.*

#### STANDARD: K.OA.A.3

##### DRAFT Standards Statement (JAN 2021):

Using objects or drawings, and equations, decompose numbers less than or equal to 10 into pairs in more than one way.

##### DRAFT Clarifying Guidance (JAN 2021):

Use objects or drawings to decompose numbers in at least two different ways. Record each decomposition with a drawing, number bond, or equation. Decomposition is the process of breaking apart a number into a variety of parts that all equal the same whole. Example 9 = 6 +3; 9 = 5 + 4 both equations equal 9.

##### *Original CCSS Text (2010):*

*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).*

#### STANDARD: K.OA.A.4

##### DRAFT Standards Statement (JAN 2021):

By using objects, drawings, or equations, find the unknown number that makes 10 when added to a given number from 1 - 9.

##### DRAFT Clarifying Guidance (JAN 2021):

Use objects, number bonds or drawings to record the answer or equation. The intention is to build fluency toward making a ten.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: K.OA.A.5

##### DRAFT Standards Statement (JAN 2021):

Demonstrate fluency with addition and subtraction within 5 with accurate, efficient, and flexible strategies.

##### DRAFT Clarifying Guidance (JAN 2021):

Record the sum or difference with a drawing oral response, visual cue or equation. Can use an oral response to a verbal or visual cue to demonstrate fluency.

##### *Original CCSS Text (2010):*

*Fluently add and subtract within 5.*

### CLUSTER: K.NBT.A - Work with numbers 11-19 to gain foundations for place value.

#### STANDARD: K.NBT.A.1

##### DRAFT Standards Statement (JAN 2021):

Understand numbers from 11 to 19 as groups with ten ones and some further ones remaining. Compose and decompose these numbers using concrete objects, pictorial drawings, or equations.

##### DRAFT Clarifying Guidance (JAN 2021):

To compose and decompose numbers from 11 to 19 into ***ten, single ones (not “a ten;” this is in first grade) with some more ones***  by using objects, or drawings to record each composition or decomposition.  An example would be a student recognizing that the number 13 is made up of ten single ones and three more. ***This is specific to teen numbers only.***

**For example,** 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.

##### *Original CCSS Text (2010):*

*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.*

### CLUSTER: K.MD.A - Describe and compare measurable attributes.

#### STANDARD: K.MD.A.1

##### DRAFT Standards Statement (JAN 2021):

Describe several measurable attributes of a single object an object using measurable terms, such as length or weight.

##### DRAFT Clarifying Guidance (JAN 2021):

Measurable attributes can be vocabulary words that describe the length, weight or shape of an object. Example would be the clock is round or the box is heavy.

##### *Original CCSS Text (2010):*

*Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.*

#### STANDARD: K.MD.A.2

##### DRAFT Standards Statement (JAN 2021):

Directly compare two objects with a measurable attribute in common, and describe which object has “more” or “less” of the attribute.

##### DRAFT Clarifying Guidance (JAN 2021):

Use comparative vocabulary to directly compare two objects. Example one child is shorter than the other child. Shorter being the identified attribute.

##### *Original CCSS Text (2010):*

*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.*

### CLUSTER: K.MD.B - Classify objects and count the number of objects in each category.

#### STANDARD: K.MD.B.3

##### DRAFT Standards Statement (JAN 2021):

Classify objects into given categories; count the numbers of objects in each category and sort the categories by count.

##### DRAFT Clarifying Guidance (JAN 2021):

Limit category counts to be less than or equal to 10. The category can be determined by teacher or student prior to count.

Connect to K.CC.C.6 to reinforce comparison of group sizes.

##### *Original CCSS Text (2010):*

*Classify objects into given categories; count the numbers of objects in each category and sort the categories by count. (Limit category counts to be less than or equal to 10.)*

### CLUSTER: K.G.A - Identify and describe shapes.

#### STANDARD: K.G.A.1

##### DRAFT Standards Statement (JAN 2021):

Describe objects in the environment using names of shapes and describe the relative positions of these objects.

##### DRAFT Clarifying Guidance (JAN 2021):

Use positional terms such as above, below, beside, in front of, behind, and next to when describing position of an object. For example, the box is under the chair or the bear is next to the table.

##### *Original CCSS Text (2010):*

*Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as above, below, beside, in front of, behind, and next to.*

#### STANDARD: K.G.A.2

##### DRAFT Standards Statement (JAN 2021):

Correctly name basic two-dimensional and three-dimensional geometric shapes regardless of their orientations or overall size.

##### DRAFT Clarifying Guidance (JAN 2021):

Can name the following 2-D and 3-D geometric shapes: square; circle; triangle; rectangle; hexagon; oval; rhombus; cube; cone; cylinder; and sphere.

##### *Original CCSS Text (2010):*

*Correctly name shapes regardless of their orientations or overall size.*

#### STANDARD: K.G.A.3

##### DRAFT Standards Statement (JAN 2021):

Identify shapes as two-dimensional or three-dimensional.

##### DRAFT Clarifying Guidance (JAN 2021):

Students will name flat shapes as two-dimensional or solid shapes as three-dimensional. Example would be a square is flat but a cube is a solid.

##### *Original CCSS Text (2010):*

*Identify shapes as two-dimensional (lying in a plane, “flat”) or three-dimensional (“solid”).*

### CLUSTER: K.G.B - Analyze, compare, create, and compose shapes.

#### STANDARD: K.G.B.4

##### DRAFT Standards Statement (JAN 2021):

Analyze and compare two and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts and attributes.

##### DRAFT Clarifying Guidance (JAN 2021):

Example a square has 4 equal sides and 4 corners/vertices and a cube has 8 equal sides with 8 corners/vertices and 6 faces. The intent is not for students to yet have the formal language, but teachers can start to guide the transition from informal to formal mathematical language.

##### *Original CCSS Text (2010):*

*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).*

#### STANDARD: K.G.B.5

##### DRAFT Standards Statement (JAN 2021):

Represent shapes in the world by building shapes from components and drawing shapes.

##### DRAFT Clarifying Guidance (JAN 2021):

Can build 2 dimensional shapes or  3 dimensional shapes using manipulatives and other components. Example building a house using marshmallows and toothpicks or Legos.

##### *Original CCSS Text (2010):*

*Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.*

#### STANDARD: K.G.B.6

##### DRAFT Standards Statement (JAN 2021):

Compose simple shapes to form larger shapes.

##### DRAFT Clarifying Guidance (JAN 2021):

Use more than one shape to build a larger shape. Example two triangles make a rhombus or two trapezoids to make a hexagon.

##### *Original CCSS Text (2010):*

*Compose simple shapes to form larger shapes. For example, "can you join these two triangles with full sides touching to make a rectangle?”*

# SECTION FOUR: Draft 1st Grade Standards

## 4A: Introduction

**Critical Areas for Grade 1 Mathematics**

In Grade 1, instructional time should focus on four critical areas: (1) developing understanding of addition, subtraction, and strategies for addition and subtraction within 20; (2) developing understanding of whole number relationships and place value, including grouping in tens and ones; (3) developing understanding of linear measurement and measuring lengths as iterating length units; and (4) reasoning about attributes of, and composing and decomposing geometric shapes.

1. Students develop strategies for adding and subtracting whole numbers based on their prior work with small numbers. They use a variety of models, including discrete objects and length-based models (e.g., cubes connected to form lengths), to model add-to, take-from, put-together, take-apart, and compare situations to develop meaning for the operations of addition and subtraction, and to develop strategies to solve arithmetic problems with these operations. Students understand connections between counting and addition and subtraction (e.g., adding two is the same as counting on two). They use properties of addition to add whole numbers and to create and use increasingly sophisticated strategies based on these properties (e.g., “making tens”) to solve addition and subtraction problems within 20. By comparing a variety of solution strategies, children build their understanding of the relationship between addition and subtraction.
2. Students develop, discuss, and use efficient, accurate, and generalizable methods to add within 100 and subtract multiples of 10. They compare whole numbers (at least to 100) to develop understanding of and solve problems involving their relative sizes. They think of whole numbers between 10 and 100 in terms of tens and ones (especially recognizing the numbers 11 to 19 as composed of a ten and some ones). Through activities that build number sense, they understand the order of the counting numbers and their relative magnitudes.
3. Students develop an understanding of the meaning and processes of measurement, including underlying concepts such as iterating (the mental activity of building up the length of an object with equal-sized units) and the transitivity principle for indirect measurement.1
4. Students compose and decompose plane or solid figures (e.g., put two triangles together to make a quadrilateral) and build understanding of part-whole relationships as well as the properties of the original and composite shapes. As they combine shapes, they recognize them from different perspectives and orientations, describe their geometric attributes, and determine how they are alike and different, to develop the background for measurement and for initial understandings of properties such as congruence and symmetry.

### Grade 1 Overview

#### Operations and Algebraic Thinking

* Represent and solve problems involving addition and subtraction.
* Understand and apply properties of operations and the relationship between addition and subtraction.
* Add and subtract within 20.
* Work with addition and subtraction equations.

#### Number and Operations in Base Ten

* Extend the counting sequence.
* Understand place value.
* Use place value understanding and properties of operations to add and subtract.

#### Measurement and Data

* Measure lengths indirectly and by iterating length units.
* Tell and write time.
* Represent and interpret data.

#### Geometry

* Reason with shapes and their attributes.

### Mathematical Practices

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

### Highlights of Major Work in Grades K-8

K-2: Addition and subtraction – concepts, skills, and problem solving; place value

3-5: Multiplication and division of whole numbers and fractions – concepts, skills, and problem solving

6: Ratios and proportional relationships; early expressions and equations

7: Ratios and proportional relationships; arithmetic of rational numbers

8: Linear algebra and linear functions

### Grade 1 Fluency Standard(s)

1.OA.C.6 Add/subtract within 10

## 4B: Draft Standards Statements – Grade 1

The standards listed in the tables below list both core standards statements and cluster prioritization for K-8 mathematics. Not all content in a given grade is emphasized equally in the Standards. Some clusters require greater emphasis than others based on the depth of the ideas, the time that they take to master, and/or their importance to future mathematics or the demands of college and career readiness. (Link to [Focus by Grade Level documents](https://achievethecore.org/category/774/mathematics-focus-by-grade-level))

Students should spend the large majority of their time on the major work of the grade ( ). Supporting work ( ) and, where appropriate, additional work () can engage students in the major work of the grade.

### 1.OA - Operations & Algebraic Thinking

#### 1.OA.A - Represent and solve problems involving addition and subtraction.

| Standard | Standard Statements (Jan 2021 Draft) |
| --- | --- |
| **1.OA.A.1** | Use addition and subtraction within 20 to solve and represent word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions. |
| **1.OA.A.2** | Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20. |

#### 1.OA.B - Understand and apply properties of operations and the relationship between addition and subtraction.

| Standard | Standard Statements (Jan 2021 Draft) |
| --- | --- |
| **1.OA.B.3** | Apply properties of operations as strategies to add and subtract. |
| **1.OA.B.4** | Understand subtraction as an unknown-addend problem. |

#### 1.OA.C - Add and subtract within 20.

| Standard | Standard Statements (Jan 2021 Draft) |
| --- | --- |
| **1.OA.C.5** | Relate counting to addition and subtraction. |
| **1.OA.C.6** | Add and subtract within 20, demonstrating fluency for addition and subtraction within 10 with accurate, efficient, and flexible strategies. |

#### 1.OA.D - Work with addition and subtraction equations.

| Standard | Standard Statements (Jan 2021 Draft) |
| --- | --- |
| **1.OA.D.7** | Understand the meaning of the equal sign, and determine if equations involving numbers and operations typical for first grade are true or false. |
| **1.OA.D.8** | Determine the unknown whole number in an addition or subtraction equation containing three whole numbers. |

### 1.NBT - Number & Operations in Base Ten

#### 1.NBT.A - Extend the counting sequence.

| Standard | Standard Statements (Jan 2021 Draft) |
| --- | --- |
| **1.NBT.A.1** | Count on from any number less than 120. Read, write, and represent any number 0-120. |

#### 1.NBT.B - Understand place value.

| Standard | Standard Statements (Jan 2021 Draft) |
| --- | --- |
| **1.NBT.B.2** | Understand that the two digits of a two-digit number represent amounts of tens and ones. |
| **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 <. |

#### 1.NBT.C - Use place value understanding and properties of operations to add and subtract.

| Standard | Standard Statements (Jan 2021 Draft) |
| --- | --- |
| **1.NBT.C.4** | Add within 100 using concrete models or drawings 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. |
| **1.NBT.C.5** | Without having to count, mentally find 10 more or 10 less than a two-digit number and 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 various strategies. Relate the strategy and model used to a written method and explain the reasoning used. |

### 1.MD - Measurement & Data

#### 1.MD.A - Measure lengths indirectly and by iterating length units.

| Standard | Standard Statements (Jan 2021 Draft) |
| --- | --- |
| **1.MD.A.1** | Order three objects by length; compare the lengths of two objects indirectly by using a third object. |
| **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. |

#### 1.MD.B - Measure lengths indirectly and by iterating length units.

| Standard | Standard Statements (Jan 2021 Draft) |
| --- | --- |
| **1.MD.B.3** | Tell and write time in hours and half-hours using analog and digital clocks. |

#### 1.MD.C - Measure lengths indirectly and by iterating length units.

| Standard | Standard Statements (Jan 2021 Draft) |
| --- | --- |
| **1.MD.C.4** | 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. |

### 1.G - Geometry

#### 1.G.A - Reason with shapes and their attributes.

| Standard | Standard Statements (Jan 2021 Draft) |
| --- | --- |
| **1.G.A.1** | Distinguish between defining attributes versus non-defining attributes for a wide variety of shapes. Build and draw shapes to possess defining attributes. |
| **1.G.A.2** | Compose two-dimensional shapes or three-dimensional shapes to create a composite shape, and compose new shapes from the composite shape. |
| **1.G.A.3** | Partition circles and rectangles into and describe two and four equal shares. Understand for these examples that decomposing into more equal shares creates smaller shares and vice versa. |

## 4C: Grade 1 Crosswalk with Clarifying Guidance

### CLUSTER: 1.OA.A - Represent and solve problems involving addition and subtraction.

#### STANDARD: 1.OA.A.1

##### DRAFT Standards Statement (JAN 2021):

Use addition and subtraction within 20 to solve and represent word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions.

##### DRAFT Clarifying Guidance (JAN 2021):

Represent addition and subtraction word problems using objects, drawings, and equations. Write an addition or subtraction equation with a symbol for the unknown number in different positions. For example,

13 + 5 = n, 13 - 5 = n, 13 + n= 18, 18 - n= 13.

Recognize and represent adding to and putting together situations as addition.

Recognize and represent taking from, taking apart, and comparing situations as either subtraction or addition with a missing addend.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 1.OA.A.2

##### DRAFT Standards Statement (JAN 2021):

Use addition and subtraction within 20 to solve and represent word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions.

##### DRAFT Clarifying Guidance (JAN 2021):

Represent addition and subtraction word problems using objects, drawings, and equations. Write an addition or subtraction equation with a symbol for the unknown number in different positions. For example,

13 + 5 = *n*, 13 - 5 = *n*, 13 + *n*= 18, 18 - *n*= 13.

Recognize and represent adding to and putting together situations as addition.

Recognize and represent taking from, taking apart, and comparing situations as either subtraction or addition with a missing addend.

##### *Original CCSS Text (2010):*

*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.*

### CLUSTER: 1.OA.B - Understand and apply properties of operations and the relationship between addition and subtraction.

#### STANDARD: 1.OA.B.3

##### DRAFT Standards Statement (JAN 2021):

Apply properties of operations as strategies to add and subtract.

##### DRAFT Clarifying Guidance (JAN 2021):

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.) (Students need not use formal terms for these properties.)

Understand that numbers can be added flexibly.

##### *Original CCSS Text (2010):*

*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.) (Students need not use formal terms for these properties.)*

#### STANDARD: 1.OA.B.4

##### DRAFT Standards Statement (JAN 2021):

Understand subtraction as an unknown-addend problem.

##### DRAFT Clarifying Guidance (JAN 2021):

For example, subtract 10 – 8 by finding the number that makes 10 when added to 8.

Understand that subtraction is equivalent to an unknown-addend problem because both ask for the unknown part in a situation where the total and another part are known.

##### *Original CCSS Text (2010):*

*Understand subtraction as an unknown-addend problem. For example, subtract 10 – 8 by finding the number that makes 10 when added to 8.*

### CLUSTER: 1.OA.C - Add and subtract within 20.

#### STANDARD: 1.OA.C.5

##### DRAFT Standards Statement (JAN 2021):

Relate counting to addition and subtraction.

##### DRAFT Clarifying Guidance (JAN 2021):

Relate counting on to addition. For example, recognize counting on two after 15 as solving 15+2.

Relate counting back to subtraction. For example, recognize counting back two from 15 as solving 15-2

Relate counting between two numbers finds their difference. For example, recognize counting two number between 15 and 17 as solving 17-15.

##### *Original CCSS Text (2010):*

*Relate counting to addition and subtraction (e.g., by counting on 2 to add 2).*

#### STANDARD: 1.OA.C.6

##### DRAFT Standards Statement (JAN 2021):

Add and subtract within 20, demonstrating fluency for addition and subtraction within 10 with accurate, efficient, and flexible strategies.

##### DRAFT Clarifying Guidance (JAN 2021):

Use strategies such as counting on; making ten, for example 8 + 6 = 8 + 2 + 4 = 10 + 4 = 14; decomposing a number leading to a ten for example, 13 – 4 = 13 – 3 – 1 = 10 – 1 = 9; using the relationship between addition and subtraction, for example, knowing that 8 + 4 = 12, one knows 12 – 8 = 4; and creating equivalent but easier or known sums, for example, adding 6 + 7 by creating the known equivalent 6 + 6 + 1 = 12 + 1 = 13.

##### *Original CCSS Text (2010):*

*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).*

### CLUSTER: 1.OA.D - Work with addition and subtraction equations.

#### STANDARD: 1.OA.D.7

##### DRAFT Standards Statement (JAN 2021):

Understand the meaning of the equal sign, and determine if equations involving numbers and operations typical for first grade are true or false.

##### DRAFT Clarifying Guidance (JAN 2021):

Use the meaning of the equal sign (“is the same as”) to determine if two expressions involving a whole number and/or addition or subtraction expressions are equivalent. In other words, determine if the equation is true or false, for example determining that 3-1 = 2+3 is false because the expressions do not have equal values.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 1.OA.D.8

##### DRAFT Standards Statement (JAN 2021):

Determine the unknown whole number in an addition or subtraction equation containing three whole numbers.

##### DRAFT Clarifying Guidance (JAN 2021):

Students should be given the opportunity to find missing part given a known part and total, such as:

A missing addend in an addition equation, for example 3+\_=5.

A missing subtrahend in a subtraction equation, for example 5-\_=2.

A missing difference in a subtraction equation, for example 5-3=\_

Students should be given the opportunity to find missing totals given known parts, such as:

A missing sum in an addition equation, for example 3+2=\_.

A missing minuend in a subtraction equation, for example \_-2=3.

##### *Original CCSS Text (2010):*

*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 = ＿.*

### CLUSTER: 1.NBT.A - Extend the counting sequence.

#### STANDARD: 1.NBT.A.1

##### DRAFT Standards Statement (JAN 2021):

Count to 120, starting at any number less than 120. Read, write, and represent any number in this range.

##### DRAFT Clarifying Guidance (JAN 2021):

Understand that two digit numbers are composed of tens and ones.

Understand that 3 digit numbers are composed of hundreds, tens, and ones.

Understand that numbers increase in consistent patterns because of the place value system.

##### *Original CCSS Text (2010):*

*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.*

### CLUSTER: 1.NBT.B - Understand place value.

#### STANDARD: 1.NBT.B.2

##### DRAFT Standards Statement (JAN 2021):

Understand that the two digits of a two-digit number represent amounts of tens and ones.

##### DRAFT Clarifying Guidance (JAN 2021):

Understand the following as special cases:

10 can be thought of as a bundle of ten ones — called a “ten.”

The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones.

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).

##### *Original CCSS Text (2010):*

*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).*

#### STANDARD: 1.NBT.B.3

##### DRAFT Standards Statement (JAN 2021):

Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols >, =, and <.

##### DRAFT Clarifying Guidance (JAN 2021):

Students should be given the opportunity to provide explanations of their results based on their understanding of place value.

For example:

-2 tens + 9 ones < 3 tens + 2 ones

-2 tens and 9 ones < 92

Understand that a greater value in a given place supersedes any amount in a place with a smaller value.

##### *Original CCSS Text (2010):*

*Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols >, =, and <.*

### CLUSTER: 1.NBT.C - Use place value understanding and properties of operations to add and subtract.

#### STANDARD: 1.NBT.C.4

##### DRAFT Standards Statement (JAN 2021):

Add within 100 using concrete models or drawings 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.

##### DRAFT Clarifying Guidance (JAN 2021):

Includes:

Adding a two-digit number and a one-digit number adding a two-digit number and a multiple of 10 adding two two-digit numbers.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 1.NBT.C.5

##### DRAFT Standards Statement (JAN 2021):

Without having to count, mentally find 10 more or 10 less than a two-digit number and explain the reasoning used.

##### DRAFT Clarifying Guidance (JAN 2021):

Find 10 more than a given two digit number, for example 34 + 10.

Find 10 less than a given two digit number, for example 34-10.

Understand that adding or subtracting multiples of 10 from a number changes only the tens digit because the addition or subtraction changes only the quantity of tens.

##### *Original CCSS Text (2010):*

*Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used.*

#### STANDARD: 1.NBT.C.6

##### DRAFT Standards Statement (JAN 2021):

Subtract multiples of 10 in the range 10-90 from multiples of 10 in the range 10-90 (positive or zero differences) using various strategies. Relate the strategy and model used to a written method and explain the reasoning used.

##### DRAFT Clarifying Guidance (JAN 2021):

Represent subtraction of multiples of 10 with concrete and/or visual models based on place value. For example, represent 30 as 3 groups of ten and no ones.

Understand that the inverse relationship between subtraction and addition exists because both are different representations of the same part-part-whole relationship. For example, understand that both 20+30=50 and 50-20=30 represent the same parts and whole.

##### *Original CCSS Text (2010):*

*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.*

### CLUSTER: 1.MD.A - Measure lengths indirectly and by iterating length units.

#### STANDARD: 1.MD.A.1

##### DRAFT Standards Statement (JAN 2021):

Order three objects by length; compare the lengths of two objects indirectly by using a third object.

##### DRAFT Clarifying Guidance (JAN 2021):

Determine when an object is longer or shorter than another object.

Compare two objects to a third and use those comparisons against the third object to compare the two objects.

##### *Original CCSS Text (2010):*

*Order three objects by length; compare the lengths of two objects indirectly by using a third object.*

#### STANDARD: 1.MD.A.2

##### DRAFT Standards Statement (JAN 2021):

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.

##### DRAFT Clarifying Guidance (JAN 2021):

Use a shorter object to measure the length of a longer object.

Record the length of an object as the total number of shorter objects it takes to span the longer object without gaps or overlaps.

Limited to contexts that result in a whole number length.

##### *Original CCSS Text (2010):*

*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.*

### CLUSTER: 1.MD.B - Tell and write time.

#### STANDARD: 1.MD.B.3

##### DRAFT Standards Statement (JAN 2021):

Tell and write time in hours and half-hours using analog and digital clocks.

##### DRAFT Clarifying Guidance (JAN 2021):

Tell time in hours and half hours using an analog clock.

Tell time in hours and half hours using a digital clock.

Write time in hours and half-hours.

##### *Original CCSS Text (2010):*

*Tell and write time in hours and half-hours using analog and digital clocks.*

### CLUSTER: 1.MD.C - Represent and interpret data.

#### STANDARD: 1.MD.C.4

##### DRAFT Standards Statement (JAN 2021):

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.

##### DRAFT Clarifying Guidance (JAN 2021):

Understand that the sum of the data points in all categories is the total number of data points.

Understand that data representations make data points easier to read, count, and compare.

Understand that the number of data points in different categories can be compared using subtraction, counting on, or counting back between the quantities.

##### *Original CCSS Text (2010):*

*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.*

### CLUSTER: 1.G.A - Reason with shapes and their attributes.

#### STANDARD: 1.G.A.1

##### DRAFT Standards Statement (JAN 2021):

Distinguish between defining attributes versus non-defining attributes for a wide variety of shapes. Build and draw shapes to possess defining attributes.

##### DRAFT Clarifying Guidance (JAN 2021):

For example, defining attributes are sides, angles, and faces (triangles are closed and three-sided). For example, non-defining attributes color, orientation, and overall size.

##### *Original CCSS Text (2010):*

*Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus non-defining attributes (e.g., color, orientation, overall size); for a wide variety of shapes; build and draw shapes to possess defining attributes.*

#### STANDARD: 1.G.A.2

##### DRAFT Standards Statement (JAN 2021):

Compose two-dimensional shapes or three-dimensional shapes to create a composite shape, and compose new shapes from the composite shape.

##### DRAFT Clarifying Guidance (JAN 2021):

Identify & compose two-dimensional shapes: rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles

Identify & compose three-dimensional shapes: cubes, right rectangular prisms, right circular cones, and right circular cylinders. Keep in mind that students do not need to learn formal names such as “right rectangular prism”.

##### *Original CCSS Text (2010):*

*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. (Students do not need to learn formal names such as “right rectangular prism.”)*

#### STANDARD: 1.G.A.3

##### DRAFT Standards Statement (JAN 2021):

Partition circles and rectangles into and describe two and four equal shares. Understand for these examples that decomposing into more equal shares creates smaller shares and vice versa.

##### DRAFT Clarifying Guidance (JAN 2021):

Describe the equal shares created using the words halves, fourths, and quarters. Relate the equal shares to the whole using the phrases half of, fourth of, and quarter of. Describe the whole as two of, or four of the shares. Understand that halves and fourths are equal parts of a partitioned whole.

##### *Original CCSS Text (2010):*

*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.*

# SECTION FIVE: Draft 2nd Grade Standards

## 5A: Introduction

**Critical Areas for Grade 2 Mathematics**

In Grade 2, instructional time should focus on four critical areas: (1) extending understanding of base-ten notation; (2) building fluency with addition and subtraction; (3) using standard units of measure; and (4) describing and analyzing shapes.

1. Students extend their understanding of the base-ten system. This includes ideas of counting in fives, tens, and multiples of hundreds, tens, and ones, as well as number relationships involving these units, including comparing. Students understand multi-digit numbers (up to 1000) written in base-ten notation, recognizing that the digits in each place represent amounts of thousands, hundreds, tens, or ones (e.g., 853 is 8 hundreds + 5 tens + 3 ones).
2. Students use their understanding of addition to develop fluency with addition and subtraction within 100. They solve problems within 1000 by applying their understanding of models for addition and subtraction, and they develop, discuss, and use efficient, accurate, and generalizable methods to compute sums and differences of whole numbers in base-ten notation, using their understanding of place value and the properties of operations. They select and accurately apply methods that are appropriate for the context and the numbers involved to mentally calculate sums and differences for numbers with only tens or only hundreds.
3. Students recognize the need for standard units of measure (centimeter and inch) and they use rulers and other measurement tools with the understanding that linear measure involves an iteration of units. They recognize that the smaller the unit, the more iterations they need to cover a given length.
4. Students describe and analyze shapes by examining their sides and angles. Students investigate, describe, and reason about decomposing and combining shapes to make other shapes. Through building, drawing, and analyzing two- and three-dimensional shapes, students develop a foundation for understanding area, volume, congruence, similarity, and symmetry in later grades.

### Grade 2 Overview

#### Operations and Algebraic Thinking

* Represent and solve problems involving addition and subtraction.
* Add and subtract within 20.
* Work with equal groups of objects to gain foundations for multiplication.

#### Number and Operations in Base Ten

* Understand place value.
* Use place value understanding and properties of operations to add and subtract.

#### Measurement and Data

* Measure and estimate lengths in standard units.
* Relate addition and subtraction to length.
* Work with time and money.
* Represent and interpret data.

#### Geometry

* Reason with shapes and their attributes.

### Mathematical Practices

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

### Highlights of Major Work in Grades K-8

K-2: Addition and subtraction – concepts, skills, and problem solving; place value

3-5: Multiplication and division of whole numbers and fractions – concepts, skills, and problem solving

6: Ratios and proportional relationships; early expressions and equations

7: Ratios and proportional relationships; arithmetic of rational numbers

8: Linear algebra and linear functions

### Grade 2 Fluency Standard(s)

2.OA.B.2 Single-digit sums and differences (sums from memory by end of Grade 2)

2.NBT.B.5 Add/subtract within 100

## 5B: Draft Standards Statements – Grade 2

The standards listed in the tables below list both core standards statements and cluster prioritization for K-8 mathematics. Not all content in a given grade is emphasized equally in the Standards. Some clusters require greater emphasis than others based on the depth of the ideas, the time that they take to master, and/or their importance to future mathematics or the demands of college and career readiness. (Link to [Focus by Grade Level documents](https://achievethecore.org/category/774/mathematics-focus-by-grade-level))

Students should spend the large majority of their time on the major work of the grade ( ). Supporting work ( ) and, where appropriate, additional work () can engage students in the major work of the grade.

### 2.OA - Operations & Algebraic Thinking

#### 2.OA.A - Represent and solve problems involving addition and subtraction.

| Standard | Standards Statement |
| --- | --- |
| **2.OA.A.1** | Use addition and subtraction within 100 to solve one- and two-step word problems in authentic contexts by using drawings and equations with a symbol for the unknown number to represent the problem. |

#### 2.OA.B - Add and subtract within 20.

| Standard | Standards Statement |
| --- | --- |
| **2.OA.B.2** | Demonstrate fluency with addition and subtraction within 20 using accurate, efficient, and flexible mental strategies. By the end of Grade 2, know from memory all sums of two one-digit numbers. |

#### 2.OA.C - Work with equal groups of objects to gain foundations for multiplication.

| Standard | Standards Statement |
| --- | --- |
| **2.OA.C.3** | Determine whether a set within 20 has an odd or even number by pairing objects or counting them by 2s, and record using drawings and equations. |
| **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. |

### 2.NBT - Number & Operations in Base Ten

#### 2.NBT.A - Understand place value.

| Standard | Standards Statement |
| --- | --- |
| **2.NBT.A.1** | Understand 100 as a bundle of ten tens and that the three digits of a three-digit number represent amounts of hundreds, tens, and ones. |
| **2.NBT.A.2** | Count within 1000; skip-count by 5's, 10's, and 100's. |
| **2.NBT.A.3** | Read and write numbers to 1000 using base-ten numerals, number names, and expanded form. |
| **2.NBT.A.4** | Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons. |

#### 2.NBT.B - Use place value understanding and properties of operations to add and subtract.

| Standard | Standards Statement |
| --- | --- |
| **2.NBT.B.5** | Demonstrate fluency of addition and subtraction within 100 with accurate, efficient, and flexible strategies based on place value, properties of operations, and/or the relationship between addition and subtraction. |
| **2.NBT.B.6** | Add up to four two-digit numbers using strategies based on place value and properties of operations and describe how two different strategies result in the same sum. |
| **2.NBT.B.7** | Add and subtract within 1000 using concrete or visual representations 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 why sometimes it is necessary to compose or decompose tens or hundreds. |
| **2.NBT.B.8** | Add and subtract within 1000 using properties of operations and/or the relationship between addition and subtraction, including mentally adding or subtracting 10 or 100 to a given number. |
| **2.NBT.B.9** | Explain why strategies to add and subtract using properties of operations and the relationship between addition and subtraction work. |

### 2.MD - Measurement & Data

#### 2.MD.A - Measure and estimate lengths in standard units.

| Standard | Standards Statement |
| --- | --- |
| **2.MD.A.1** | Measure the length of an object by selecting and using appropriate measurement tools. |
| **2.MD.A.2** | Measure the length of an object using two different length units and describe how the unit lengths relate to the size of the object. |
| **2.MD.A.3** | Estimate lengths using units of inches, feet, centimeters, and meters. |
| **2.MD.A.4** | Measure two objects to determine the length difference in terms of a standard length unit. |

#### 2.MD.B - Relate addition and subtraction to length.

| Standard | Standards Statement |
| --- | --- |
| **2.MD.B.5** | Use addition and subtraction within 100 to solve word problems in authentic contexts involving lengths that are given in the same units. |
| **2.MD.B.6** | Represent whole number lengths on a number line diagram; use number lines to find sums and differences within 100. |

#### 2.MD.C - Work with time and money.

| Standard | Standards Statement |
| --- | --- |
| **2.MD.C.7** | Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m. |
| **2.MD.C.8** | Solve word problems in authentic contexts involving dollar bills, quarters, dimes, nickels, and pennies, using $ (dollars) and c (cents) symbols appropriately. |

#### 2.MD.D - Represent and interpret data.

| Standard | Standards Statement |
| --- | --- |
| **2.MD.D.9** | Generate measurement data and display the data on a line plot using whole-number units. |
| **2.MD.D.10** | Create a picture graph and a bar graph with a single-unit scale and solve simple problems using information. |

### 2.G - Geometry

#### 2.G.A - Reason with shapes and their attributes.

| Standard | Standards Statement |
| --- | --- |
| **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. |
| **2.G.A.2** | Partition a rectangle into rows and columns of same-size squares and count to find the total number of them. |
| **2.G.A.3** | Partition circles and rectangles into two, three, or four equal parts. Recognize that equal parts of identical wholes need not have the same shape. |

## 5C: Grade 2 Crosswalk with Clarifying Guidance

### CLUSTER: 2.OA.A - Represent and solve problems involving addition and subtraction.

#### STANDARD: 2.OA.A

##### DRAFT Standards Statement (JAN 2021):

Use addition and subtraction within 100 to solve one- and two-step word problems in authentic contexts by using drawings and equations with a symbol for the unknown number to represent the problem.

##### DRAFT Clarifying Guidance (JAN 2021):

Opportunities to engage with problem types should include adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions. Equations should use a symbol for the unknown number to represent the problem. (See Problem Type Table in Glossary)

##### *Original CCSS Text (2010):*

*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.*

### CLUSTER: 2.OA.B - Add and subtract within 20.

#### STANDARD: 2.OA.B.2

##### DRAFT Standards Statement (JAN 2021):

Demonstrate fluency with addition and subtraction within 20 using accurate, efficient, and flexible mental strategies. By the end of Grade 2, know from memory all sums of two one-digit numbers.

##### DRAFT Clarifying Guidance (JAN 2021):

Students bring mental strategies and fluency within 10 from first grade to build towards fluency to 20. This standard does not require timed assessments. Ample opportunity to develop efficient, accurate, and flexible understanding is essential for operating with larger numbers.

##### *Original CCSS Text (2010):*

*Fluently add and subtract within 20 using mental strategies. By end of Grade 2, know from memory all sums of two one-digit numbers.*

### CLUSTER: 2.OA.C - Work with equal groups of objects to gain foundations for multiplication.

#### STANDARD: 2.OA.C.3

##### DRAFT Standards Statement (JAN 2021):

Determine whether a set within 20 has an odd or even number by pairing objects or counting them by 2s, and record using drawings and equations.

##### DRAFT Clarifying Guidance (JAN 2021):

Students should explore strategies such as pairing objects, counting by 2s, and drawing arrays to express doubles. Students should write an equation to express an even number as a sum of equal addends and as a sum of repeated pairings.

For example, 12 is even because 6+6= 12 and also because 2+2+2+2+2+2=12 so that 12 is being represented as two groups of six or six groups of two.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 2.OA.C.4

##### DRAFT Standards Statement (JAN 2021):

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.

##### DRAFT Clarifying Guidance (JAN 2021):

Students should have the opportunity to recognize that the total in the array is the same whether adding by row or adding by column. For example, an array with 5 rows and 4 columns could be represented as 5+5+5+5 and 4+4+4+4+4 and results in the same total of 20.

The intent of the standard is to provide students the opportunities to work with arrays and connect them to repeated addition and equal groupings as a foundation to multiplication.

##### *Original CCSS Text (2010):*

*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.*

### CLUSTER: 2.NBT.A - Understand place value.

#### STANDARD: 2.NBT.A.1

##### DRAFT Standards Statement (JAN 2021):

Understand 100 as a bundle of ten tens and that the three digits of a three-digit number represent amounts of hundreds, tens, and ones.

##### DRAFT Clarifying Guidance (JAN 2021):

Students should be given the opportunity to discover base-ten units can be broken down and built back up in different ways. For example, understand the number 706 can be represented as:

-7 hundreds, 0 tens, and 6 ones where a 0 is used as a placeholder.

-70 tens and 6 ones.

-706 ones.

##### *Original CCSS Text (2010):*

*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. Understand the following as special cases:*

*2.NBT.A.1a 100 can be thought of as a bundle of ten tens — called a “hundred.”*

*2.NBT.A.1b 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).*

#### STANDARD: 2.NBT.A.2

##### DRAFT Standards Statement (JAN 2021):

Count within 1000; skip-count by 5's, 10's, and 100's.

##### DRAFT Clarifying Guidance (JAN 2021):

Students need to be provided the opportunity to count and skip count both forward and backward starting from any number within 1000 to notice patterns within the number system.

##### *Original CCSS Text (2010):*

*Count within 1000; skip-count by 5s, 10s, and 100s.*

#### STANDARD: 2.NBT.A.3

##### DRAFT Standards Statement (JAN 2021):

Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.

##### DRAFT Clarifying Guidance (JAN 2021):

For example, the number 706 in base-ten numerals is represented as 7 hundreds, 0 tens, and 6 ones, in number names is represented as "seven hundred six" and in expanded form is represented as 700 + 6.

##### *Original CCSS Text (2010):*

*Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.*

#### STANDARD: 2.NBT.A.4

##### DRAFT Standards Statement (JAN 2021):

Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.

##### DRAFT Clarifying Guidance (JAN 2021):

Students should be given the opportunity to provide explanations of their results based on their understanding of place value.

For example:

-2 hundreds + 3 ones > 5 tens + 9 ones

-9 tens + 2 hundreds + 4 ones < 924

-456 < 5 hundreds

##### *Original CCSS Text (2010):*

*Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.*

### CLUSTER: 2.NBT.B - Use place value understanding and properties of operations to add and subtract.

#### STANDARD: 2.NBT.B.5

##### DRAFT Standards Statement (JAN 2021):

Demonstrate fluency of addition and subtraction within 100 with accurate, efficient, and flexible strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.

##### DRAFT Clarifying Guidance (JAN 2021):

Students should move from count all toward strategies that are efficient, accurate, and flexible based on the math situation presented.

For example: -56+48=50+40+6+8=90+14=104 -56+48=54+2+48=54+50=104

-56-48 can be thought of as 48+x=56

##### Original CCSS Text (2010):

Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.

#### STANDARD: 2.NBT.B.6

##### DRAFT Standards Statement (JAN 2021):

Add up to four two-digit numbers using strategies based on place value and properties of operations and describe how two different strategies result in the same sum.

##### DRAFT Clarifying Guidance (JAN 2021):

Students should be given the opportunity to connect representations.

Examples:

-42 + 31 + 12 + 83 may be decomposed into tens and ones to add 40 + 30 + 10 + 80 and then 2 + 1 + 2 + 3.

-42+31= 73 and 12+83= 95 so 73+95= 168.

##### *Original CCSS Text (2010):*

*Add up to four two-digit numbers using strategies based on place value and properties of operations.*

#### STANDARD: 2.NBT.B.7

##### DRAFT Standards Statement (JAN 2021):

Add and subtract within 1000 using concrete or visual representations 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 why sometimes it is necessary to compose or decompose tens or hundreds.

##### DRAFT Clarifying Guidance (JAN 2021):

Students should be encouraged to use place value language such as hundreds, tens and ones, when connecting their representation to their explanation.

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.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 2.NBT.B.8

##### DRAFT Standards Statement (JAN 2021):

Add and subtract within 1000 using properties of operations and/or the relationship between addition and subtraction, including mentally adding or subtracting 10 or 100 to a given number.

##### DRAFT Clarifying Guidance (JAN 2021):

Add and subtract within 1000 using properties of operations and/or the relationship between addition and subtraction, including mentally adding or subtracting 10 or 100 to a given number; relate the strategy to a written method.

##### *Original CCSS Text (2010):*

*Mentally add 10 or 100 to a given number 100-900, and mentally subtract 10 or 100 from a given number 100-900.*

#### STANDARD: 2.NBT.B.9

##### DRAFT Standards Statement (JAN 2021):

Explain why strategies to add and subtract using properties of operations and the relationship between addition and subtraction work.

##### DRAFT Clarifying Guidance (JAN 2021):

Explanations may be supported by drawings or objects.

##### *Original CCSS Text (2010):*

*Explain why addition and subtraction strategies work, using place value and the properties of operations. (Explanations may be supported by drawings or objects.)*

### CLUSTER: 2.MD.A - Describe and compare measurable attributes.

#### STANDARD: 2.MD.A.1

##### Original CCSS Text (2010):

Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.

##### DRAFT Standards Statement (JAN 2021):

Measure the length of an object by selecting and using appropriate measurement tools.

##### DRAFT Clarifying Guidance (JAN 2021):

Appropriate standardized measurement tools include rulers, yardsticks, meter sticks, and measuring tapes. Students should determine which measuring tool is appropriate for a given object.

#### STANDARD: 2.MD.A.2

##### DRAFT Standards Statement (JAN 2021):

Measure the length of an object using two different length units and describe how the unit lengths relate to the size of the object.

##### DRAFT Clarifying Guidance (JAN 2021):

Students may use objects but tools from different systems of measurement, such as inches and centimeters, will allow them to begin to compare these systems.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 2.MD.A.3

##### DRAFT Standards Statement (JAN 2021):

Estimate lengths using units of inches, feet, centimeters, and meters.

##### DRAFT Clarifying Guidance (JAN 2021):

Students should be encouraged to use real world objects and body benchmarks for estimations.

##### *Original CCSS Text (2010):*

*Estimate lengths using units of inches, feet, centimeters, and meters.*

#### STANDARD: 2.MD.A.4

##### DRAFT Standards Statement (JAN 2021):

Measure two objects to determine the length difference in terms of a standard length unit.

##### DRAFT Clarifying Guidance (JAN 2021):

Comparisons in length are recorded in standard length units such as inches, feet or yards, as well as metric length units such as meters, centimeters, or millimeters.

##### *Original CCSS Text (2010):*

*Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.*

### CLUSTER: 2.MD.B - Relate addition and subtraction to length.

#### STANDARD: 2.MD.B.5

##### DRAFT Standards Statement (JAN 2021):

Use addition and subtraction within 100 to solve word problems in authentic contexts involving lengths that are given in the same units.

##### DRAFT Clarifying Guidance (JAN 2021):

Students should represent the problem using drawings and equations with a symbol for the unknown number.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 2.MD.B.6

##### DRAFT Standards Statement (JAN 2021):

Represent whole number lengths on a number line diagram; use number lines to find sums and differences within 100.

##### DRAFT Clarifying Guidance (JAN 2021):

Students should understand length as the distance on a number line where equally spaced points correspond to the numbers 0, 1, 2 and so on. The length of an object is the amount of space on this diagram. Students will use a number line to show how to move up and down the number system while representing sums and difference (100-28 means you would jump down 20 and 8 to land on 72).

##### *Original CCSS Text (2010):*

*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.*

### CLUSTER: 2.MD.C - Work with time and money.

#### STANDARD: 2.MD.C.7

##### DRAFT Standards Statement (JAN 2021):

Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m.

##### DRAFT Clarifying Guidance (JAN 2021):

[no additional guidance proposed at this time]

##### *Original CCSS Text (2010):*

*Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m.*

#### STANDARD: 2.MD.C.8

##### DRAFT Standards Statement (JAN 2021):

Solve word problems in authentic contexts involving dollar bills, quarters, dimes, nickels, and pennies, using $ (dollars) and c (cents) symbols appropriately.

##### DRAFT Clarifying Guidance (JAN 2021):

For example, if you have 2 dimes and 3 pennies, how many cents do you have?

##### *Original CCSS Text (2010):*

*Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ (dollars) and ¢ (cents) symbols appropriately. Example: If you have 2 dimes and 3 pennies, how many cents do you have?*

### CLUSTER: 2.MD.D - Represent and interpret data.

#### STANDARD: 2.MD.D.9

##### DRAFT Standards Statement (JAN 2021):

Generate measurement data and display the data on a line plot using whole-number units.

##### DRAFT Clarifying Guidance (JAN 2021):

Measurement data is collected by measuring several objects to the nearest whole unit, or my making repeated measurements of the same object.

Students should display data set with up to four categories and solve problems that put-together, take-apart, and compare the information presented in the graph.

##### *Original CCSS Text (2010):*

*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 measurements by making a line plot, where the horizontal scale is marked off in whole-number units.*

#### STANDARD: 2.MD.D.10

##### DRAFT Standards Statement (JAN 2021):

Create a picture graph and a bar graph with a single-unit scale and solve simple problems using information.

##### DRAFT Clarifying Guidance (JAN 2021):

Students should display data set with up to four categories and solve problems that put-together, take-apart, and compare the information presented in the graph.

##### *Original CCSS Text (2010):*

*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.*

### CLUSTER: 2.G.A - Relate addition and subtraction to length.

#### STANDARD: 2.G.A.1

##### DRAFT Standards Statement (JAN 2021):

Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces.

##### DRAFT Clarifying Guidance (JAN 2021):

Identify triangles, quadrilaterals, pentagons, hexagons, and cubes. Sizes are compared directly or visually, not compared by measuring.

##### *Original CCSS Text (2010):*

*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. (Sizes are compared directly or visually, not compared by measuring.)*

#### STANDARD: 2.G.A.2

##### DRAFT Standards Statement (JAN 2021):

Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.

##### DRAFT Clarifying Guidance (JAN 2021):

As a foundation for multiplication and meaning of area, students should draw and build these arrays.

##### Original CCSS Text (2010):

Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.

#### STANDARD: 2.G.A.3

##### DRAFT Standards Statement (JAN 2021):

Partition circles and rectangles into two, three, or four equal parts. Recognize that equal parts of identical wholes need not have the same shape.

##### DRAFT Clarifying Guidance (JAN 2021):

As a foundation of the meaning of fractions, student should describe the shares using the words halves, thirds, fourths, half of, a third of, a fourth of and describe the whole as two halves, three thirds, four fourths.

##### *Original CCSS Text (2010):*

*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.*

# SECTION SIX: Draft 3rd Grade Standards

## 6A: Introduction

**Critical Areas for Grade 3 Mathematics**

In Grade 3, instructional time should focus on four critical areas: (1) developing understanding of multiplication and division and strategies for multiplication and division within 100; (2) developing understanding of fractions, especially unit fractions (fractions with numerator 1); (3) developing understanding of the structure of rectangular arrays and of area; and (4) describing and analyzing two-dimensional shapes.

1. Students develop an understanding of the meanings of multiplication and division of whole numbers through activities and problems involving equal-sized groups, arrays, and area models; multiplication is finding an unknown product, and division is finding an unknown factor in these situations. For equal-sized group situations, division can require finding the unknown number of groups or the unknown group size. Students use properties of operations to calculate products of whole numbers, using increasingly sophisticated strategies based on these properties to solve multiplication and division problems involving single-digit factors. By comparing a variety of solution strategies, students learn the relationship between multiplication and division.
2. Students develop an understanding of fractions, beginning with unit fractions. Students view fractions in general as being built out of unit fractions, and they use fractions along with visual fraction models to represent parts of a whole. Students understand that the size of a fractional part is relative to the size of the whole. For example, 1/2 of the paint in a small bucket could be less paint than 1/3 of the paint in a larger bucket, but 1/3 of a ribbon is longer than 1/5 of the same ribbon because when the ribbon is divided into 3 equal parts, the parts are longer than when the ribbon is divided into 5 equal parts. Students are able to use fractions to represent numbers equal to, less than, and greater than one. They solve problems that involve comparing fractions by using visual fraction models and strategies based on noticing equal numerators or denominators.
3. Students recognize area as an attribute of two-dimensional regions. They measure the area of a shape by finding the total number of same-size units of area required to cover the shape without gaps or overlaps, a square with sides of unit length being the standard unit for measuring area. Students understand that rectangular arrays can be decomposed into identical rows or into identical columns. By decomposing rectangles into rectangular arrays of squares, students connect area to multiplication, and justify using multiplication to determine the area of a rectangle.
4. Students describe, analyze, and compare properties of two-dimensional shapes. They compare and classify shapes by their sides and angles, and connect these with definitions of shapes. Students also relate their fraction work to geometry by expressing the area of part of a shape as a unit fraction of the whole.

### Grade 3 Overview

#### Operations and Algebraic Thinking

* Represent and solve problems involving multiplication and division.
* Understand properties of multiplication and the relationship between multiplication and division.
* Multiply and divide within 100.
* Solve problems involving the four operations, and identify and explain patterns in arithmetic.

#### Number and Operations in Base Ten

* Use place value understanding and properties of operations to perform multi-digit arithmetic.
* Number and Operations—Fractions
* Develop understanding of fractions as numbers.

#### Measurement and Data

* Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.
* Represent and interpret data.
* Geometric measurement: understand concepts of area and relate area to multiplication and to addition.
* Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.

#### Geometry

* Reason with shapes and their attributes.

### Mathematical Practices

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

### Highlights of Major Work in Grades K-8

K-2: Addition and subtraction – concepts, skills, and problem solving; place value

3-5: Multiplication and division of whole numbers and fractions – concepts, skills, and problem solving

6: Ratios and proportional relationships; early expressions and equations

7: Ratios and proportional relationships; arithmetic of rational numbers

8: Linear algebra and linear functions

### Grade 3 Fluency Standard(s)

3.OA.C.7 Single-digit products and quotients (Products from memory by end of Grade 3)

3.NBT.A.2 Add/subtract within 1000

## 6B: Draft Standards Statements – Grade 3

The standards listed in the tables below list both core standards statements and cluster prioritization for K-8 mathematics. Not all content in a given grade is emphasized equally in the Standards. Some clusters require greater emphasis than others based on the depth of the ideas, the time that they take to master, and/or their importance to future mathematics or the demands of college and career readiness. (Link to [Focus by Grade Level documents](https://achievethecore.org/category/774/mathematics-focus-by-grade-level))

Students should spend the large majority of their time on the major work of the grade ( ). Supporting work ( ) and, where appropriate, additional work () can engage students in the major work of the grade.

### 3.OA - Operations & Algebraic Thinking

#### 3.OA.A - Represent and solve problems involving multiplication and division.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **3.OA.A.1** | Represent and interpret multiplication of two factors as equal groups added together. |
| **3.OA.A.2** | Represent and interpret whole-number quotients as dividing an amount into equal sized groups. |
| **3.OA.A.3** | Use multiplication and division within 100 to solve word problems in authentic contexts involving equal groups, arrays, and measurement quantities. |
| **3.OA.A.4** | Apply understanding of the inverse relationship of multiplication and division to determine the unknown number in a multiplication or division equation. |

#### 3.OA.B - Understand properties of multiplication and the relationship between multiplication and division.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **3.OA.B.5** | Apply properties of operations as strategies to multiply and divide. |
| **3.OA.B.6** | Understand division as an unknown-factor problem. |

#### 3.OA.C -Multiply and divide within 100.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **3.OA.C.7** | Demonstrate fluency with multiplication and division within 100 using accurate, efficient, and flexible strategies and algorithms based on place value and properties of operations. |

#### 3.OA.D -Solve problems involving the four operations, and identify and explain patterns in arithmetic.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **3.OA.D.8** | Solve two-step word problems in authentic contexts that use addition, subtraction, multiplication, and division. |
| **3.OA.D.9** | Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. |

### 3.NBT - Number & Operations in Base Ten

#### 3.NBT.A -Use place value understanding and properties of operations to perform multi-digit arithmetic.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **3.NBT.A.1** | Use place value understanding to round whole numbers to the nearest 10 or 100. |
| **3.NBT.A.2** | Demonstrate fluency with addition and subtraction within 1000 using accurate, efficient, and flexible strategies and algorithms based on place value and properties of operations. |
| **3.NBT.A.3** | Find the product of one-digit whole numbers by multiples of 10 in the range 10-90, such as 9 x 80. Students use a range of strategies and algorithms based on place value and properties of operations. |

### 3.NF - Number & Operations - Fractions

#### 3.NF.A - Develop understanding of fractions as numbers.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **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. |
| **3.NF.A.2** | Explain equivalence of fractions with denominators 2, 3, 4, 6, and 8. Compare fractions by reasoning about their size. |
| **3.NF.A.3** | Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. |

### 3.MD - Measurement & Data

#### 3.MD.A - Solve problems involving measurement and estimation.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **3.MD.A.1** | Tell, write, and measure time to the nearest minute. Solve word problems in authentic contexts that involve addition and subtraction of time intervals in minutes. |
| **3.MD.A.2** | Measure, estimate and solve problems in authentic contexts that involve liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). |

#### 3.MD.B - Represent and interpret data.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **3.MD.B.3** | Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve problems using information presented in these graphs. |
| **3.MD.B.4** | Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. |

#### 3.MD.C - Geometric measurement: understand concepts of area and relate area to multiplication and to addition.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **3.MD.C.5** | Recognize area as an attribute of plane figures and understand concepts of area measurement, such as area is measured with unit squares tiling a plane without gaps or overlaps. |
| **3.MD.C.6** | Measure areas by counting standard and non-standard unit squares. |
| **3.MD.C.7** | Relate area to multiplication and addition. Use relevant representations to solve problems in authentic contexts. |

#### 3.MD.D - Geometric measurement: recognize perimeter.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **3.MD.D.8** | Solve problems involving authentic contexts for perimeters of polygons. |

### 3.G - Geometry

#### 3.G.A - Reason with shapes and their attributes.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **3.G.A.1** | Understand that shapes in different categories may share attributes and that shared attributes can define a larger category. |
| **3.G.A.2** | Partition shapes into parts with equal areas and express the area of each part as a unit fraction of the whole. |

## 6C: Grade 3 Crosswalk with Clarifying Guidance

### CLUSTER: 3.OA.A - Represent and solve problems involving multiplication and division.

#### STANDARD: 3.OA.A

##### DRAFT Standards Statement (JAN 2021):

Represent and interpret multiplication of two factors as equal groups added together.

##### DRAFT Clarifying Guidance (JAN 2021):

Note: Interpret the factors as representing the number of equal groups and the number of objects in each group. Describe a context in which a total number of objects can be expressed as \_\_ x \_\_.

This standard does not include calculating products. It is about understanding the meaning of each of the factors in 5 x 7, not the product of 5 x 7.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 3.OA.A.2

##### DRAFT Standards Statement (JAN 2021):

Represent and interpret whole-number quotients as dividing an amount into equal sized groups.

##### DRAFT Clarifying Guidance (JAN 2021):

**Notes:**

This standard focuses on two models of division: partition models and measurement (repeated subtraction) models.

* Partition models focus on "How many in each equal-sized group?"
* Measurement (repeated subtraction) models focus on "How many groups can you make?".

This standard does not include calculating. It is about understanding the meaning of what does 56 ÷ 8 mean, not the quotient of what does 56 ÷ 8 equal.

**Example:**

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

Connections to MPs:

Students will have an opportunity to use modeling and repeated reasoning to show conceptual understanding of partition and measurement models. (MP 4, 8)

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 3.OA.A.3

##### DRAFT Standards Statement (JAN 2021):

Use multiplication and division within 100 to solve word problems in authentic contexts involving equal groups, arrays, and measurement quantities.

##### DRAFT Clarifying Guidance (JAN 2021):

Students should use a variety of representations for creating and solving one-step word problems, including using drawings and equations with a symbol for the unknown number.

**Boundaries:**

Solve multiplication word problems with factors up to and including 10.Solve division word problems with a divisor and quotient up to and including 10.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 3.OA.A.4

##### DRAFT Standards Statement (JAN 2021):

Apply understanding of the inverse relationship of multiplication and division to determine the unknown number in a multiplication or division equation.

##### DRAFT Clarifying Guidance (JAN 2021):

**Example:** Determine the unknown number that makes the equation true in each of the equations 8 × ? = 48, 5 = \_\_÷ 3, 6 × 6 = ?.

**Note:** The focus of 3.OA.4 goes beyond the traditional notion of fact families by having students explore the inverse relationship of multiplication and division.

##### *Original CCSS Text (2010):*

*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 = ?.*

### CLUSTER: 3.OA.B - Understand properties of multiplication and the relationship between multiplication and division.

#### STANDARD: 3.OA.B.5

##### DRAFT Standards Statement (JAN 2021):

Apply properties of operations as strategies to multiply and divide.

##### DRAFT Clarifying Guidance (JAN 2021):

**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.)

**Note:** Students need not use formal terms for these properties.

##### *Original CCSS Text (2010):*

*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.) (Students need not use formal terms for these properties.)*

#### STANDARD: 3.OA.B.6

##### DRAFT Standards Statement (JAN 2021):

Understand division as an unknown-factor problem.

##### DRAFT Clarifying Guidance (JAN 2021):

Solve an unknown factor problem, by using division strategies or changing the division problem to an equivalent multiplication problem.

Since multiplication and division are inverse operations, students are expected to solve problems and explain their processes of solving division problems that can also be represented as unknown factor multiplication problems.

**Example:** Divide 32 ÷ 8 by finding the number that makes 32 when multiplied by 8.

##### *Original CCSS Text (2010):*

*Understand division as an unknown-factor problem. For example, divide 32 ÷ 8 by finding the number that makes 32 when multiplied by 8.*

### CLUSTER: 3.OA.C - Multiply and divide within 100.

#### STANDARD: 3.OA.C.7

##### DRAFT Standards Statement (JAN 2021):

Demonstrate fluency with multiplication and division within 100 using accurate, efficient, and flexible strategies and algorithms based on place value and properties of operations.

##### DRAFT Clarifying Guidance (JAN 2021):

Note: This standard uses the word fluently, which means accuracy, efficiency (using a reasonable amount of steps and time), and flexibility (using strategies such as the distributive property).

By the end of Grade 3, know from memory all products of one-digit numbers. “Know from memory” should not focus only on timed tests and repetitive practice, but ample experiences working with manipulatives, pictures, arrays, word problems, and numbers to internalize the basic facts (up to 9 x 9).

This standard does not require timed assessments. Ample opportunity to develop efficient, accurate, and flexible strategies is essential.

##### *Original CCSS Text (2010):*

*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 one-digit numbers.*

### CLUSTER: 3.OA.D - Solve problems involving the four operations, and identify and explain patterns in arithmetic.

#### STANDARD: 3.OA.D.8

##### DRAFT Standards Statement (JAN 2021):

Solve two-step word problems in authentic contexts that use addition, subtraction, multiplication, and division.

##### DRAFT Clarifying Guidance (JAN 2021):

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.

**Note:** This standard is limited to problems posed with whole numbers and having whole-number answers; students should know how to perform operations in the conventional order when there are no parentheses to specify a particular order (Order of Operations).

##### *Original CCSS Text (2010):*

*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. (This standard is limited to problems posed with whole numbers and having whole-number answers; students should know how to perform operations in the conventional order when there are no parentheses to specify a particular order (Order of Operations).)*

#### STANDARD: 3.OA.D.9

##### DRAFT Standards Statement (JAN 2021):

Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations.

##### DRAFT Clarifying Guidance (JAN 2021):

Opportunities for students to examine numerical patterns. The ability to recognize and explain patterns in mathematics leads students to developing the ability to make generalizations, a foundational concept in algebraic thinking.

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.

**Example:** Students investigate multiplication tables in search of patterns and explain why these patterns make sense mathematically.

* The multiples of 4, 6, 8, and 10 are all even because they can all be decomposed into two equal groups.
* The doubles (multiples of 2) in a multiplication table fall on horizontal and vertical lines.
* On a multiplication chart, the products in each row and column increase by the same amount (skip counting).
* The multiples of any number fall on a horizontal and a vertical line due to the commutative property.
* All the multiples of 5 end in a 0 or 5 while all the multiples of 10 end with 0. Every other multiple of 5 is a multiple of 10.

##### *Original CCSS Text (2010):*

*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.*

### CLUSTER: 3.NBT.A - Use place value understanding and properties of operations to perform multi-digit arithmetic.

#### STANDARD: 3.NBT.A.1

##### DRAFT Standards Statement (JAN 2021):

Use place value understanding to round whole numbers to the nearest 10 or 100.

##### DRAFT Clarifying Guidance (JAN 2021):

[no additional guidance proposed at this time]

##### *Original CCSS Text (2010):*

*Use place value understanding to round whole numbers to the nearest 10 or 100.*

#### STANDARD: 3.NBT.A.2

##### DRAFT Standards Statement (JAN 2021):

Demonstrate fluency with addition and subtraction within 1000 using accurate, efficient, and flexible strategies and algorithms based on place value and properties of operations.

##### DRAFT Clarifying Guidance (JAN 2021):

Students will have opportunities to use strategies based on place value and properties of operations. Students will use estimation strategies to assess reasonableness of answers.

Example:

* Use the relationship between addition and subtraction can be applied to solve addition and subtraction problems.
* Use expanded form to decompose numbers and then find sums and differences

This standard uses the word fluently, which means accuracy, efficiency (using a reasonable amount of steps and time), and flexibility (using strategies).

This standard does not require timed assessments. Ample opportunity to develop efficient, accurate, and flexible strategies is essential.

##### *Original CCSS Text (2010):*

*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. (A range of algorithms may be used.)*

#### STANDARD: 3.NBT.A.3

##### DRAFT Standards Statement (JAN 2021):

Find the product of one-digit whole numbers by multiples of 10 in the range 10-90, such as 9 x 80. Students use a range of strategies and algorithms based on place value and properties of operations.

##### DRAFT Clarifying Guidance (JAN 2021):

Students extend their work in multiplication by applying understanding of place value. The special role of 10 in the base-ten system is important in understanding multiplication of one-digit numbers with multiples of 10. Using the properties of operations (commutative, associative, and distributive) and place value, students are able to explain their reasoning.

Use concrete and pictorial models, based on place value and the properties of operations, to find the product of a one-digit whole number by a multiple of 10 in the range 10–90.

##### *Original CCSS Text (2010):*

*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. (A range of algorithms may be used.)*

### CLUSTER: 3.NF.A - Develop understanding of fractions as numbers.

#### STANDARD: 3.NF.A.1

##### DRAFT Standards Statement (JAN 2021):

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.

##### DRAFT Clarifying Guidance (JAN 2021):

**Note:** Represent and identify unit fractions using visual models.

**Example:** If there are six equal parts, one of those parts is ⅙. The unit fraction is 1/6.

**Boundaries:** Grade 3 expectations are limited to denominators of 2, 3, 4, 6, and 8 as quantities formed when a whole is partitioned into equal parts.

##### *Original CCSS Text (2010):*

*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. (Grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6, and 8.)*

#### STANDARD: 3.NF.A.2

##### DRAFT Standards Statement (JAN 2021):

Explain equivalence of fractions with denominators 2, 3, 4, 6, and 8. Compare fractions by reasoning about their size.

##### DRAFT Clarifying Guidance (JAN 2021):

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.

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.

**Boundaries:** Grade 3 expectations are limited to fractions with denominators 2, 3, 4, 6, and 8.

##### *Original CCSS Text (2010):*

*Understand a fraction as a number on the number line; represent fractions on a number line diagram. (Grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6, and 8.)*

*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. (Grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6, and 8.)*

*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. (Grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6, and 8.)*

#### STANDARD: 3.NF.A.3

##### DRAFT Standards Statement (JAN 2021):

Explain equivalence of fractions with denominators 2, 3, 4, 6, and 8. Compare fractions by reasoning about their size.

##### DRAFT Clarifying Guidance (JAN 2021):

Student should have opportunity to :

* Represent equivalent fractions with visual models.
* Compose and decompose fractions into equivalent fractions using related fractions: halves, fourths and eighths; thirds and sixths.
* Explain that a fraction with the same numerator and denominator equals one whole.
* Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers.
* Recognize that valid comparisons rely on the two fractions referring to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions.

##### *Original CCSS Text (2010):*

*Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. (Grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6, and 8.)*

*3.NF.A.3a Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line. (Grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6, and 8.)*

*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. (Grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6, and 8.)*

*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. (Grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6, and 8.)*

*3.NF.A.3d Compare two fractions with the same numerator or the same denominator, by reasoning about their size, Recognize that valid comparisons rely on the two fractions referring 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. (Grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6, and 8.)*

### CLUSTER: 3.MD.A - Solve problems involving measurement and estimation.

#### STANDARD: 3.MD.A.1

##### DRAFT Standards Statement (JAN 2021):

Tell, write, and measure time to the nearest minute. Solve word problems in authentic contexts that involve addition and subtraction of time intervals in minutes.

##### DRAFT Clarifying Guidance (JAN 2021):

Students will have opportunities to representing the problems in different ways, including using a number line diagram.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 3.MD.A.2

##### DRAFT Standards Statement (JAN 2021):

Measure, estimate and solve problems in authentic contexts that involve liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l).

##### DRAFT Clarifying Guidance (JAN 2021):

**Note:**

Add, subtract, multiply or divide to solve one-step word problems involving masses or volumes that are given in the same units.

**Boundaries:**

Excludes compound units such as cm^3 and finding the geometric volume of a container.

Excludes multiplicative comparison problems (problems involving notions of “times as much”).

##### *Original CCSS Text (2010):*

*Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). (Excludes compound units such as cm^3 and finding the geometric volume of a container.) 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. (Excludes multiplicative comparison problems (problems involving notions of “times as much.”)*

### CLUSTER: 3.MD.B - Represent and interpret data.

#### STANDARD: 3.MD.B.3

##### DRAFT Standards Statement (JAN 2021):

Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve problems using information presented in these graphs.

##### DRAFT Clarifying Guidance (JAN 2021):

Collect data by asking a question that yields data in up to four categories.

* Represent and interpret data in a scaled picture graph, and/or scaled bar graph with axes provided
* Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs.

**Example:** Draw a bar graph in which each square in the bar graph might represent 5 pets.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 3.MD.B.4

##### DRAFT Standards Statement (JAN 2021):

Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch.

##### DRAFT Clarifying Guidance (JAN 2021):

Show the data by making a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters.

##### Original CCSS Text (2010):

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.

### CLUSTER: 3.MD.C - Geometric measurement: understand concepts of area and relate area to multiplication and to addition.

#### STANDARD: 3.MD.C.5

##### DRAFT Standards Statement (JAN 2021):

Recognize area as an attribute of plane figures and understand concepts of area measurement, such as area is measured with unit squares tiling a plane without gaps or overlaps.

##### DRAFT Clarifying Guidance (JAN 2021):

**Note:**

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.

A plane figure which can be covered without gaps or overlaps by n unit squares is said to have an area of n square units.

##### *Original CCSS Text (2010):*

*Recognize area as an attribute of plane figures and understand concepts of area measurement.*

*3.MD.C.5a 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 A plane figure which can be covered without gaps or overlaps by n unit squares is said to have an area of n square units.*

#### STANDARD: 3.MD.C.6

##### DRAFT Standards Statement (JAN 2021):

Measure areas by counting standard and non-standard unit squares.

##### DRAFT Clarifying Guidance (JAN 2021):

**Note:** Area can be counted in square cm, square m, square in, square ft, and improvised units.

##### *Original CCSS Text (2010):*

*Measure areas by counting unit squares (square cm, square m, square in, square ft., and improvised units).*

#### STANDARD: 3.MD.C.7

##### DRAFT Standards Statement (JAN 2021):

Relate area to multiplication and addition. Use relevant representations to solve problems in authentic contexts.

##### DRAFT Clarifying Guidance (JAN 2021):

Student will have the opportunity to:

* 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.
* multiply side lengths to find areas of rectangles with whole number side lengths in the context of solving problems, and represent whole-number products as rectangular areas in mathematical reasoning.
* use tiles and/or arrays to illustrate and explain that the area of a rectangle can be found by partitioning it into two smaller rectangles and that the area of the larger rectangle is the sum of the two smaller rectangles.
* recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding.

##### *Original CCSS Text (2010):*

*Relate area to the operations of multiplication and addition.*

*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.*

*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.*

*3.MD.C.7d 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.*

### CLUSTER: 3.MD.D – Geometric measurement: recognize perimeter.

#### STANDARD: 3.MD.D.8

##### DRAFT Standards Statement (JAN 2021):

Solve problems involving authentic contexts for perimeters of polygons.

##### DRAFT Clarifying Guidance (JAN 2021):

**Note:** Students should have the opportunity to solve problems involving:

* finding the perimeter given the side lengths;
* finding an unknown side length;
* showing rectangles with the same perimeter and different area;
* showing rectangles with the same area and different perimeters.

##### *Original CCSS Text (2010):*

*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 area or with the same area and different perimeter.*

### CLUSTER: 3.G.A - Reason with shapes and their attributes.

#### STANDARD: 3.G.A.1

##### DRAFT Standards Statement (JAN 2021):

Understand that shapes in different categories may share attributes and that shared attributes can define a larger category.

##### DRAFT Clarifying Guidance (JAN 2021):

**Note:** 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.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 3.G.A.2

##### DRAFT Standards Statement (JAN 2021):

Partition shapes into parts with equal areas and express the area of each part as a unit fraction of the whole.

##### DRAFT Clarifying Guidance (JAN 2021):

**Example:** This could include partitioning a shape into 4 parts with equal area and describe each part as 1/4 of the area of the total shape.

##### Original CCSS Text (2010):

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 is 1/4 of the area of the shape.

# SECTION SEVEN: Draft 4th Grade Standards

## 7A: Introduction

### Critical Areas for Grade 4 Mathematics

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

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

### Grade K Overview

#### Operations and Algebraic Thinking

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

#### Number and Operations in Base Ten

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

#### Number and Operations—Fractions

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

#### Measurement and Data

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

#### Geometry

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

### Mathematical Practices

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

### Highlights of Major Work in Grades K-8

K-2: Addition and subtraction – concepts, skills, and problem solving; place value

3-5: Multiplication and division of whole numbers and fractions – concepts, skills, and problem solving

6: Ratios and proportional relationships; early expressions and equations

7: Ratios and proportional relationships; arithmetic of rational numbers

8: Linear algebra and linear functions

### Grade 4 Fluency Standard(s)

4.NBT.B.4 Add/subtract within 1,000,000

## 7B: Draft Standards Statements – Grade 4

The standards listed in the tables below list both core standards statements and cluster prioritization for K-8 mathematics. Not all content in a given grade is emphasized equally in the Standards. Some clusters require greater emphasis than others based on the depth of the ideas, the time that they take to master, and/or their importance to future mathematics or the demands of college and career readiness. (Link to [Focus by Grade Level documents](https://achievethecore.org/category/774/mathematics-focus-by-grade-level))

Students should spend the large majority of their time on the major work of the grade ( ). Supporting work ( ) and, where appropriate, additional work () can engage students in the major work of the grade.

### 4.OA - Operations & Algebraic Thinking

#### 4.OA.A - Use the four operations with whole numbers to solve problems.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **4.OA.A.1** | Interpret a multiplication equation as a comparison of quantities. Represent verbal statements of multiplicative comparisons as equations. |
| **4.OA.A.2** | Multiply or divide to solve word problems in authentic contexts involving multiplicative comparison, distinguishing multiplicative comparison from additive comparison. |
| **4.OA.A.3** | Solve multistep word problems in authentic contexts using whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. |

#### 4.OA.B - Gain familiarity with factors and multiples.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **4.OA.B.4** | Find all factor pairs for a whole number in the range 1-100. Determine whether a given whole number in the range of 1-100 is a multiple of a given one-digit number, and prime or composite. |

#### 4.OA.C - Generate and analyze patterns.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **4.OA.C.5** | Analyze a number, visual, or contextual pattern that follows a given rule. |

### 4.NBT - Number & Operations in Base Ten

#### 4.NBT.A - Generalize place value understanding for multi-digit whole numbers.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **4.NBT.A.1** | Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. |
| **4.NBT.A.2** | Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Use understandings of place value within these forms to compare two multi-digit numbers using >, =, and < symbols. |
| **4.NBT.A.3** | Use place value understanding to round multi-digit whole numbers to any place. |

#### 4.NBT.B - Use place value understanding and properties of operations to perform multi-digit arithmetic.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **4.NBT.B.4** | Demonstrate fluency with addition and subtraction of multi-digit whole numbers using accurate, efficient, and flexible strategies and algorithms based on place value and properties of operations. |
| **4.NBT.B.5** | Use various representations and strategies to multiply a whole number of up to four digits by a one-digit number, and a two-digit number by a two-digit number using strategies based on place value and the properties of operations. |
| **4.NBT.B.6** | Use various representations to 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. |

### 4.NF - Number & Operations - Fractions

#### 4.NF.A - Extend understanding of fraction equivalence and ordering.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **4.NF.A.1** | Use visual fraction representations to recognize, generate, and explain relationships between equivalent fractions. |
| **4.NF.A.2** | Compare two fractions with different numerators and different denominators, record the results with the symbols >, =, or <, and justify the conclusions. |

#### 4.NF.B - Build fractions from unit fractions.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **4.NF.B.3** | Understand a fraction (a/b) as the sum (a) of fractions of the same denominator (1/b). Solve word problems in authentic contexts involving addition and subtraction of fractions referring to the same whole and having like denominators. |
| **4.NF.B.4** | Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. Represent and solve word problems in authentic contexts involving multiplication of a fraction by a whole number. |

#### 4.NF.C - Understand decimal notation for fractions, and compare decimal fractions.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **4.NF.C.5** | Connect representations of equivalent fractions to fractions with denominators of 10 and 100, and use these representations to understand and use these representations to add two fractions with denominators of 10 and 100. |
| **4.NF.C.6** | Use and interpret decimal notation for fractions with denominators 10 or 100. |
| **4.NF.C.7** | Use decimal notation for fractions with denominators 10 or 100. Compare two decimals to hundredths place by reasoning about their size, and record the comparison using the symbols >, =, or <. |

### 4.MD - Measurement & Data

#### 4.MD.A - Solve problems involving measurement and conversion of measurements.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **4.MD.A.1** | Know relative sizes of measurement units and express measurements in a larger unit in terms of a smaller unit. |
| **4.MD.A.2** | Apply knowledge of relative size of measurement units, simple fractions or decimals, and the four operations to solve word problems in authentic contexts. |
| **4.MD.A.3** | Apply the area and perimeter formulas for rectangles in authentic contexts and mathematical problems |

#### 4.MD.B - Represent and interpret data.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **4.MD.B.4** | Build and investigate line plots that display data sets of fractional measurements with the same denominator. Use the data display to answer questions involving addition and subtraction of the fractional measurements. |

#### 4.MD.C - Geometric measurement: understand concepts of angle and measure angles.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **4.MD.C.5** | Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint. Understand and apply concepts of angle measurement. |
| **4.MD.C.6** | Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure. |
| **4.MD.C.7** | Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. |

### 4.G - Geometry

#### 4.G.A -Draw and identify lines and angles, and classify shapes by properties of their lines and angles.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **4.G.A.1** | Draw points, lines, line segments, rays, angles and perpendicular and parallel lines. Identify these in two-dimensional figures. |
| **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. |
| **4.G.A.3** | Recognize and draw a line of symmetry for a two dimensional figure. |

## 7C: Grade 4 Crosswalk with Clarifying Guidance

### CLUSTER: 4.OA.A - Use the four operations with whole numbers to solve problems.

#### STANDARD: 4.OA.A.1

##### DRAFT Standards Statement (JAN 2021):

Interpret a multiplication equation as a comparison of quantities. Represent verbal statements of multiplicative comparisons as equations.

##### DRAFT Clarifying Guidance (JAN 2021):

**Connection to MPs:**

MP6 - understand the statement 35 = 5 x 7 as 35 is the same value as 5 times as many as 7 and 7 times as many as 5.

MP2 - Represent verbal statements of multiplicative comparisons as multiplication equations.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 4.OA.A.2

##### DRAFT Standards Statement (JAN 2021):

Multiply or divide to solve word problems in authentic contexts involving multiplicative comparison, distinguishing multiplicative comparison from additive comparison.

##### DRAFT Clarifying Guidance (JAN 2021):

**Common Confusion:**

Students should recognize that additive comparison refers to the difference between two numbers and multiplicative comparison refers to how much or how many times larger the bigger number is from the smaller number as a comparison.

**Connection to MPs:**

MP6 - Use drawings and equations with a symbol for the unknown number to represent the problem.

##### Original CCSS Text (2010):

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.

#### STANDARD: 4.OA.A.3

##### DRAFT Standards Statement (JAN 2021):

Solve multistep word problems in authentic contexts using whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted.

##### DRAFT Clarifying Guidance (JAN 2021):

**Example:**

"How many busses are needed to transport 250 students, if each bus holds 36 students?" In which the remainder of 34 would be interpreted to include an additional bus.

**Connection to MPs:**

MP2 - Interpret and use remainders, and assess the reasonableness of answers using mental computation and estimation strategies.

MP4 - Represent these problems using equations with a letter standing for the unknown quantity.

MP6 - Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

##### *Original CCSS Text (2010):*

*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.*

### CLUSTER: 4.OA.B- Gain familiarity with factors and multiples.

#### STANDARD: 4.OA.B.4

##### DRAFT Standards Statement (JAN 2021):

Find all factor pairs for a whole number in the range 1-100. Determine whether a given whole number in the range of 1-100 is a multiple of a given one-digit number, and prime or composite.

##### DRAFT Clarifying Guidance (JAN 2021):

**Example:**

The factors of 24 are 1, 2, 3, 4, 6, 8, 12 and 24.

**Connection to MPs:**

MP8 - Recognize that a whole number is a multiple of each of its factors (e.g., 24 is a multiple of 1, 2, 3, 4, 6, 8, 12, and 24).

##### *Original CCSS Text (2010):*

*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.*

### CLUSTER: 4.OA.C- Generate and analyze patterns.

#### STANDARD: 4.OA.A.5

##### DRAFT Standards Statement (JAN 2021):

Analyze a number, visual, or contextual pattern that follows a given rule.

##### DRAFT Clarifying Guidance (JAN 2021):

**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.

**Connection to MPs:**

MP3 - Identify and describe features of the rule not explicit in the rule itself.

##### *Original CCSS Text (2010):*

*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.*

### CLUSTER: 4.NBT.A - Generalize place value understanding for multi-digit whole numbers.

#### STANDARD: 4.NBT.A.1

##### DRAFT Standards Statement (JAN 2021):

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.

##### DRAFT Clarifying Guidance (JAN 2021):

Example:

Recognize that 700 ÷ 70 = 10 by applying concepts of place value and division.

Boundary:

Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 4.NBT.A.2

##### DRAFT Standards Statement (JAN 2021):

Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Use understandings of place value within these forms to compare two multi-digit numbers using >, =, and < symbols.

##### DRAFT Clarifying Guidance (JAN 2021):

Connection to MPs:

MP2 - Make connections across representations of multi-digit whole numbers using base ten numerals, number names, and expanded form.

MP7 - Develop rules for comparing the multi-digit numbers.

Boundary:

Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 4.NBT.A.3

##### DRAFT Standards Statement (JAN 2021):

Use place value understanding to round multi-digit whole numbers to any place.

##### DRAFT Clarifying Guidance (JAN 2021):

**Common Confusion:**

Students rounding to 348 to the nearest hundred may mistakenly round initially to 350 and then 400 by applying rules such as if the digit is 0-4 then round down and 5-9 and round up. Models can help them see that 348 is closer to 300 than 400.

**Boundary:**

Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000.

##### Original CCSS Text (2010):

Use place value understanding to round multi-digit whole numbers to any place.

### CLUSTER: 4.NBT.B - Use place value understanding and properties of operations to perform multi-digit arithmetic.

#### STANDARD: 4.NBT.B.4

##### DRAFT Standards Statement (JAN 2021):

Demonstrate fluency with addition and subtraction of multi-digit whole numbers using accurate, efficient, and flexible strategies and algorithms based on place value and properties of operations.

##### DRAFT Clarifying Guidance (JAN 2021):

**Note:**

Students should use efficient algorithms that make sense for the given numbers and draw upon their understanding of multi-digit whole numbers, the properties of operations, and place value.

**Boundary:**

Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1, 000,000. A range of algorithms may be used.

##### *Original CCSS Text (2010):*

*Fluently add and subtract multi-digit whole numbers using the standard algorithm.*

#### STANDARD: 4.NBT.B.5

##### DRAFT Standards Statement (JAN 2021):

Use various representations and strategies to multiply a whole number of up to four digits by a one-digit number, and a two-digit number by a two-digit number using strategies based on place value and the properties of operations.

##### DRAFT Clarifying Guidance (JAN 2021):

Illustrate and explain calculations using rectangular arrays, area models, and/or equations, along with strategies based on place value and properties of operations.

**Example:**

Connect numeric and visual models such as those created by representing 285 with base 10 pieces and repeating three times. Use this area model with dimensions of 285 and 3 to find partial products.

**Connecting to MPs:**

MP3 - Illustrate and explain the calculation using equations, rectangular arrays and /or area models.

MP7 - Use expanded form of the whole number and the distributive property of multiplication to simplify calculations.

**Boundary:**

Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000. A range of algorithms may be used.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 4.NBT.B.6

##### DRAFT Standards Statement (JAN 2021):

Use various representations to 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.

##### DRAFT Clarifying Guidance (JAN 2021):

**Example:**

Apply knowledge of decomposing whole numbers into divisible parts. Such as, connect numeric and visual models such as those created by representing 136 with base 10 pieces and dividing into groups of 4 or 4 groups to determine either the size of the group or the number of groups; or building/sketching a rectangle with an area of 136 and one dimension of 4 and finding partial quotients.

**Connection to MPs:**

MP3 - Illustrate and explain the calculation using equations, rectangular arrays and /or area models.

**Boundary:**

Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000. A range of algorithms may be used.

##### *Original CCSS Text (2010):*

*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.*

### CLUSTER: 4.NF.A - Extend understanding of fraction equivalence and ordering.

#### STANDARD: 4.NF.A.1

##### DRAFT Standards Statement (JAN 2021):

Use visual fraction representations to recognize, generate, and explain relationships between equivalent fractions.

##### DRAFT Clarifying Guidance (JAN 2021):

**Connection to MPs:**

MP3 - Use visual models to justify why a fraction a/b is equivalent to a fraction (n × a)/(n × b) with attention to how the number and size of the parts differ even though the two fractions themselves are the same size.

**Boundary:**

Grade 4 expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, 100.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 4.NF.A.2

##### DRAFT Standards Statement (JAN 2021):

Compare two fractions with different numerators and different denominators, record the results with the symbols >, =, or <, and justify the conclusions.

##### DRAFT Clarifying Guidance (JAN 2021):

**Connection to MPs:**

MP2 - Recognize that comparisons are valid only when the two fractions refer to the same whole.

MP3 - Justify using conceptual and procedural strategies. Conceptual strategies should include using visual models; comparing benchmark fractions such as 0, ½, 1; and attending to the size of the piece for the like numerators or number of pieces for like denominators. Procedural strategies should include finding a common denominator to directly compare the number of pieces.

MP6 - Record with comparison symbols >, =, or <.

**Boundary:**

Grade 4 expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, 100.

##### *Original CCSS Text (2010):*

*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.*

### CLUSTER: 4.NF.B - Build fractions from unit fractions.

#### STANDARD: 4.NF.B.3

##### DRAFT Standards Statement (JAN 2021):

Understand a fraction (a/b) as the sum (a) of fractions of the same denominator (1/b). Solve word problems in authentic contexts involving addition and subtraction of fractions referring to the same whole and having like denominators.

##### DRAFT Clarifying Guidance (JAN 2021):

Extend understanding addition and subtraction to include fractions.

* Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.
* Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation.
* Add and subtract mixed numbers with like denominators.

**Connection to MPs:**

MP2 - Decompose and recompose 3/8 as 1/8 + 1/8 + 1/8 or 1/8 + 2/8 and 2 1/8 as 1 + 1 + 1/8 or 8/8 + 8/8 + 1/8.

MP4 - Use visual fraction models and equations to represent problems.

MP7 - Replace mixed numbers with equivalent fractions and/or use properties of operations and the relationship between addition and subtraction to solve problems.

**Boundary:**

Grade 4 expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, 100.

##### *Original CCSS Text (2010):*

*Understand a fraction a/b with a > 1 as a sum of fractions 1/b.*

*4.NF.B.3.A Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.*

*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.*

*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.*

*4.NF.B.3.D Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem.*

#### STANDARD: 4.NF.B.4

##### DRAFT Standards Statement (JAN 2021):

Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. Represent and solve word problems in authentic contexts involving multiplication of a fraction by a whole number.

##### DRAFT Clarifying Guidance (JAN 2021):

Extend understanding multiplication to include fractions.

* Understand a fraction a/b as a multiple of 1/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.

**Connection to MPs:**

MP2 - 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).

MP3 - Use a visual fraction model to demonstrate 3 × (2/5) is the same as 6 × (1/5), recognizing this product as 6/5. Justify the general idea n × (a/b) = (n × a)/b.

**Boundary:**

Grade 4 expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.

##### *Original CCSS Text (2010):*

*Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.*

*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).*

*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.)*

*4.NF.B.4.C Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. For example, if each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?*

### CLUSTER: 4.NF.C - Understand decimal notation for fractions, and compare decimal fractions.

#### STANDARD: 4.NF.C.5

##### DRAFT Standards Statement (JAN 2021):

Connect representations of equivalent fractions to fractions with denominators of 10 and 100, and use these representations to understand and use these representations to add two fractions with denominators of 10 and 100.

##### DRAFT Clarifying Guidance (JAN 2021):

**Connection to MPs:**

MP7 - Express 3/10 as 30/100 and add 3/10 + 4/100 = 34/100.

**Boundary:**

Grade 4 expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12 and 100.

**NOTE:**

Students who can generate equivalent fractions can develop strategies for adding fractions with unlike denominators in general. But addition and subtraction with unlike denominators in general is not a requirement at this grade.

##### *Original CCSS Text (2010):*

*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. (Students who can generate equivalent fractions can develop strategies for adding fractions with unlike denominators in general. But addition and subtraction with unlike denominators in general is not a requirement at this grade.) (Grade 4 expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.)*

#### STANDARD: 4.NF.C.6

##### DRAFT Standards Statement (JAN 2021):

Use and interpret decimal notation for fractions with denominators 10 or 100.

##### DRAFT Clarifying Guidance (JAN 2021):

**Example:**

Rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram.

**Boundary:**

Grade 4 expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, 100.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 4.NF.C.7

##### DRAFT Standards Statement (JAN 2021):

Use decimal notation for fractions with denominators 10 or 100. Compare two decimals to hundredths place by reasoning about their size, and record the comparison using the symbols >, =, or <.

##### DRAFT Clarifying Guidance (JAN 2021):

**Connection to MPs:**

MP2 - Recognize that comparisons are valid only when decimals refer to the same whole.

MP6 - Record with comparison symbols >, =, or <.

MP3 - Justify conclusions using visual models.

**Boundary:**

Grade 4 expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12 and 100.

##### *Original CCSS Text (2010):*

*Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model. (Grade 4 expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.)*

### CLUSTER: 4.MD.A - Describe and compare measurable attributes.

#### STANDARD: 4.MD.A.1

##### DRAFT Standards Statement (JAN 2021):

Know relative sizes of measurement units and express measurements in a larger unit in terms of a smaller unit.

##### DRAFT Clarifying Guidance (JAN 2021):

**Example:**

Know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft. snake as 48 inches. Generate a conversion table for feet and inches listed as number pairs (1, 12), (2, 24), (3, 36), ….

**Connection to MPs:**

MP3 - Justify conversions using understanding that larger units can be partitioned into smaller equal sized units.

**Boundary:**

Measurement units within one system a student should be familiar with include km, m, cm, kg, g, lb, oz, l, hr, min, sec.

##### *Original CCSS Text (2010):*

*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), ...*

#### STANDARD: 4.MD.A.2

##### DRAFT Standards Statement (JAN 2021):

Apply knowledge of relative size of measurement units, simple fractions or decimals, and the four operations to solve word problems in authentic contexts.

##### DRAFT Clarifying Guidance (JAN 2021):

Connections to MPs:

MP2 - Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.

Boundary:

Word problems should involve simple fractions or decimals and expressing measurements given in a larger unit in terms of a smaller unit. Contexts include distance, intervals of time, liquid volumes, mass and money.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 4.MD.A.3

##### DRAFT Standards Statement (JAN 2021):

Apply the area and perimeter formulas for rectangles in authentic contexts and mathematical problems.

##### DRAFT Clarifying Guidance (JAN 2021):

**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.

##### *Original CCSS Text (2010):*

*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.*

### CLUSTER: 4.MD.B - Use place value understanding and properties of operations to perform multi-digit arithmetic.

#### STANDARD: 4.MD.B.4

##### DRAFT Standards Statement (JAN 2021):

Build and investigate line plots that display data sets of fractional measurements with the same denominator. Use the data display to answer questions involving addition and subtraction of the fractional measurements.

##### DRAFT Clarifying Guidance (JAN 2021):

**Example:**

From a line plot find and interpret the difference in length between the longest and shortest specimens of an insect collection.

**Boundary:**

Fractions include 1/2, 1/4, 1/8.

##### *Original CCSS Text (2010):*

*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.*

### CLUSTER: 4.MD.C - Geometric measurement: understand concepts of angle and measure angles.

#### STANDARD: 4.MD.C.5

##### DRAFT Standards Statement (JAN 2021):

Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint. Understand and apply concepts of angle measurement.

##### DRAFT Clarifying Guidance (JAN 2021):

Understand concepts of angle measurement:

* An angle can be viewed as a wedge of a circle or a turn through a circular arc where 1/360 of the wedge or turn is one-degree.
* An angle that turns through *n* one-degree angles is said to have an angle measure of *n* degrees.

##### *Original CCSS Text (2010):*

*Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement:*

*4.MD.C.5.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.*

*4.MD.C.5.B An angle that turns through n one-degree angles is said to have an angle measure of n degrees.*

#### STANDARD: 4.MD.C.6

##### DRAFT Standards Statement (JAN 2021):

Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.

##### DRAFT Clarifying Guidance (JAN 2021):

[no additional clarifying guidance at this time]

##### *Original CCSS Text (2010):*

*Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.*

#### STANDARD: 4.MD.C.7

##### DRAFT Standards Statement (JAN 2021):

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.

##### DRAFT Clarifying Guidance (JAN 2021):

Expectation includes solving addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems such as by using an equation with a symbol for the unknown angle measure.

##### *Original CCSS Text (2010):*

*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.*

### CLUSTER: 4.G.A. - Draw and identify lines and angles, and classify shapes by properties of their lines and angles.

#### STANDARD: 4.G.A.1

##### DRAFT Standards Statement (JAN 2021):

Draw points, lines, line segments, rays, angles and perpendicular and parallel lines. Identify these in two-dimensional figures.

##### DRAFT Clarifying Guidance (JAN 2021):

**Notes:** Expectation that drawing and identifying right, acute, and obtuse angles are included in this standard.

##### *Original CCSS Text (2010):*

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

#### STANDARD: 4.G.A.2

##### DRAFT Standards Statement (JAN 2021):

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.

##### DRAFT Clarifying Guidance (JAN 2021):

**Connection to MPs:**

MP6 - Recognize and identify right triangles as a category.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 4.G.A.3

##### DRAFT Standards Statement (JAN 2021):

Recognize and draw a line of symmetry for a two dimensional figure.

##### DRAFT Clarifying Guidance (JAN 2021):

Note:

A line of symmetry is a line across the figure such that the figure can be folded along the line into matching parts.

Connection to MPs:

MP7 - Identify or create line-symmetric figures by drawing and testing proposed lines of symmetry and sketching the second half of a symmetrical figure.

##### *Original CCSS Text (2010):*

*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.*

# SECTION EIGHT: Draft 5th Grade Standards

## 8A: Introduction

### Critical Areas for Grade 5 Mathematics

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

1. Students apply their understanding of fractions and fraction models to represent the addition and subtraction of fractions with unlike denominators as equivalent calculations with like denominators. They develop fluency in calculating sums and differences of fractions, and make reasonable estimates of them. Students also use the meaning of fractions, of multiplication and division, and the relationship between multiplication and division to understand and explain why the procedures for multiplying and dividing fractions make sense. (Note: this is limited to the case of dividing unit fractions by whole numbers and whole numbers by unit fractions.)
2. Students develop understanding of why division procedures work based on the meaning of base-ten numerals and properties of operations. They finalize fluency with multi-digit addition, subtraction, multiplication, and division. They apply their understandings of models for decimals, decimal notation, and properties of operations to add and subtract decimals to hundredths. They develop fluency in these computations, and make reasonable estimates of their results. Students use the relationship between decimals and fractions, as well as the relationship between finite decimals and whole numbers (i.e., a finite decimal multiplied by an appropriate power of 10 is a whole number), to understand and explain why the procedures for multiplying and dividing finite decimals make sense. They compute products and quotients of decimals to hundredths efficiently and accurately.
3. Students recognize volume as an attribute of three-dimensional space. They understand that volume can be measured by finding the total number of same-size units of volume required to fill the space without gaps or overlaps. They understand that a 1-unit by 1-unit by 1-unit cube is the standard unit for measuring volume. They select appropriate units, strategies, and tools for solving problems that involve estimating and measuring volume. They decompose three-dimensional shapes and find volumes of right rectangular prisms by viewing them as decomposed into layers of arrays of cubes. They measure necessary attributes of shapes in order to determine volumes to solve real world and mathematical problems.

### Grade 5 Overview

#### Operations and Algebraic Thinking

* Write and interpret numerical expressions.
* Analyze patterns and relationships.

#### Number and Operations in Base Ten

* Understand the place value system.
* Perform operations with multi-digit whole numbers and with decimals to hundredths.

#### Number and Operations—Fractions

* Use equivalent fractions as a strategy to add and subtract fractions.
* Apply and extend previous understandings of multiplication and division to multiply and divide fractions.

#### Measurement and Data

* Convert like measurement units within a given measurement system.
* Represent and interpret data.
* Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.

#### Geometry

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

### Mathematical Practices

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

### Highlights of Major Work in Grades K-8

K-2: Addition and subtraction – concepts, skills, and problem solving; place value

3-5: Multiplication and division of whole numbers and fractions – concepts, skills, and problem solving

6: Ratios and proportional relationships; early expressions and equations

7: Ratios and proportional relationships; arithmetic of rational numbers

8: Linear algebra and linear functions

### Grade 5 Fluency Standard(s)

5.NBT.B.5 Multi-digit multiplication

## 8B: Draft Standards Statements – Grade 5

The standards listed in the tables below list both core standards statements and cluster prioritization for K-8 mathematics. Not all content in a given grade is emphasized equally in the Standards. Some clusters require greater emphasis than others based on the depth of the ideas, the time that they take to master, and/or their importance to future mathematics or the demands of college and career readiness. (Link to [Focus by Grade Level documents](https://achievethecore.org/category/774/mathematics-focus-by-grade-level))

Students should spend the large majority of their time on the major work of the grade ( ). Supporting work ( ) and, where appropriate, additional work () can engage students in the major work of the grade.

### 5.OA - Operations & Algebraic Thinking

#### 5.OA.A - Write and interpret numerical expressions.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **5.OA.A.1** | Write and evaluate simple numerical expressions that include parentheses. |
| **5.OA.A.2** | Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. |

#### 5.OA.B - Analyze patterns and relationships.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **5.OA.B.3** | Given rules for two numerical patterns, identify and analyze relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns and graph them on a coordinate plane. |

### 5.NBT - Number & Operations in Base Ten

#### 5.NBT.A - Understand the place value system.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **5.NBT.A.1** | Read and write decimals to thousandths using base-ten numerals, number names, and expanded form. Use representations of place value within these forms to compare two decimals to thousandths using >, =, and < symbols. |
| **5.NBT.A.2** | Use whole number exponents to denote powers of 10 and explain the patterns that occur when multiplying and/or dividing whole numbers and decimals by powers of 10. |
| **5.NBT.A.3** | Read, write, and compare decimals to thousandths. |
| **5.NBT.A.4** | Use place value understanding to round decimals to any place. |

#### 5.NBT.B - Perform operations with multi-digit whole numbers and with decimals to hundredths.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **5.NBT.B.5** | Demonstrate fluency with multiplication of multi-digit whole numbers using accurate, efficient, and flexible strategies and algorithms based on place value and properties of operations. |
| **5.NBT.B.6** | Use a variety of representations and strategies to reason about and find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors. |
| **5.NBT.B.7** | Use a variety of representations and strategies to add, subtract, multiply, and divide decimals to hundredths. Relate the strategy to a written method and explain the reasoning used. |

### 5.NF - Number & Operations - Fractions

#### 5.NF.A - Use equivalent fractions as a strategy to add and subtract fractions.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **5.NF.A.1** | Add and subtract fractions with unlike denominators, including common fractions larger than one and mixed numbers. |
| **5.NF.A.2** | Solve problems in authentic contexts involving addition and subtraction of fractions with unlike denominators, including common fractions larger than one and mixed numbers. |

#### 5.NF.B - Apply and extend previous understandings of multiplication and division.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **5.NF.B.3** | Interpret a fraction as division of the numerator by the denominator (a/b = a ÷ b). Solve problems in authentic contexts involving division of whole numbers that result in answers that are common fractions or mixed numbers. |
| **5.NF.B.4** | Apply and extend previous understanding and strategies of multiplication to multiply a fraction or whole number by a fraction. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas. |
| **5.NF.B.5** | Apply and extend previous understandings of multiplication and division to represent and calculate multiplication and division of fractions. Interpret multiplication as scaling (resizing) by comparing the size of products between two factors. |
| **5.NF.B.6** | Solve problems in authentic contexts involving multiplication of common fractions and mixed numbers. |
| **5.NF.B.7** | Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions, including solving problems in authentic contexts. |

### 5.MD - Measurement & Data

#### 5.MD.A - Convert like measurement units within a given measurement system.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **5.MD.A.1** | Convert between different-sized standard measurement units within a given measurement system. Use these conversions in solving multi-step problems in authentic contexts. |

#### 5.MD.B - Represent and interpret data.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **5.MD.B.2** | Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. |

#### 5.MD.C - Geometric measurement: understand concepts of volume.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **5.MD.C.3** | Recognize that volume is a measurable attribute of solid figures. |
| **5.MD.C.4** | Measure the volume of a rectangular prism by counting unit cubes using standard and improvised units. |
| **5.MD.C.5** | Relate volume to the operations of multiplication and addition. Solve problems in authentic contexts involving volume using a variety of strategies. |

### 5.G - Geometry

#### 5.G.A - Graph points on the coordinate plane to solve real-world and mathematical problems.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **5.G.A.1** | Graph and name coordinate points in the first quadrant using the standard x, y notation. Understand the coordinate points values represent the distance traveled along the horizontal x-axis and vertical y-axis. |
| **5.G.A.2** | Represent authentic contexts and mathematical problems by graphing points in the first quadrant of the coordinate plane. Interpret the meaning of the coordinate values based on the context of a given situation. |

#### 5.G.B - Classify two-dimensional figures into categories based on their properties.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **5.G.B.3** | *Note: propose combining with 5.G.B.4* |
| **5.G.B.4** | Classify two-dimensional figures within a hierarchy based on their geometrical properties, and explain the relationship across and within different categories of these figures. |

## 8C: Grade 5 Crosswalk with Clarifying Guidance

### CLUSTER: 5.OA.A - Write and interpret numerical expressions.

#### STANDARD: 5.OA.A.1

##### DRAFT Standards Statement (JAN 2021):

Write and evaluate simple numerical expressions that include parentheses.

##### DRAFT Clarifying Guidance (JAN 2021):

Use of nested parentheses should be used in favor of brackets or braces in numerical expressions.

**Example:**

Express the calculation “add 8 and 7, then multiply by 2” as 2 × (8 + 7).

If this expression were tripled, then it could represented as 3 x (2 × (8 + 7)), where the number of open parentheses is the same as the number of closed parentheses.

##### *Original CCSS Text (2010):*

*Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.*

#### STANDARD: 5.OA.A.2

##### DRAFT Standards Statement (JAN 2021):

Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them.

##### DRAFT Clarifying Guidance (JAN 2021):

Expressions included should contain numbers, operations, and grouping symbols.

**Example:**

Recognize that 3 × (18,932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.

##### Original CCSS Text (2010):

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.

### CLUSTER: 5.OA.B - Analyze patterns and relationships.

#### STANDARD: 5.OA.B.3

##### DRAFT Standards Statement (JAN 2021):

Given rules for two numerical patterns, identify and analyze relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns and graph them on a coordinate plane.

##### DRAFT Clarifying Guidance (JAN 2021):

**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. Identify and explain why the terms in one sequence are twice the value of the terms in the corresponding sequence.

**Boundary:**

Generating numerical patterns is a fourth grade standard, therefore is also an expectation for 5th grade.

##### *Original CCSS Text (2010):*

*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.*

### CLUSTER: 5.NBT.A - Understand the place value system.

#### STANDARD: 5.NBT.A.1

##### DRAFT Standards Statement (JAN 2021):

Read and write decimals to thousandths using base-ten numerals, number names, and expanded form. Use representations of place value within these forms to compare two decimals to thousandths using >, =, and < symbols.

##### DRAFT Clarifying Guidance (JAN 2021):

Read and write decimals to thousandths using base-ten numerals, number names, and expanded form.

For example, 347.392 = 3 × 100 + 4 × 10 + 7 × 1 + 3 × (1/10) + 9 × (1/100) + 2 × (1/1000).

700 is 10 times as much as 70, and 70 is 1/10 of 700.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 5.NBT.A.2

##### DRAFT Standards Statement (JAN 2021):

Use whole number exponents to denote powers of 10 and explain the patterns that occur when multiplying and/or dividing whole numbers and decimals by powers of 10.

##### DRAFT Clarifying Guidance (JAN 2021):

Observe and explain the patterns in the number of zeros of a product when multiplying a whole number by a power of 10, and the placement of the decimal point when a decimal is multiplied or divided by a power of 10.

**Boundary:**

Work with exponents at this grade is limited to powers of 10.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 5.NBT.A.3

##### DRAFT Standards Statement (JAN 2021):

Read, write, and compare decimals to thousandths.

##### DRAFT Clarifying Guidance (JAN 2021):

Read, write, and compare decimals to thousandths using base-ten numerals, number names, and expanded form.

Use >, =, and < symbols to record comparisons of two decimals.

**For example:**

347.392 =

= 3 × 100 + 4 × 10 + 7 × 1 + 3 × (1/10) + 9 × (1/100) + 2 × (1/1000).

=three hundred forty-seven and three hundred ninety-two thousandths

**Note:**

Students should be provided opportunities to simultaneously compare decimals and fractions, including equivalent fractions and decimals, on both single and double number lines.

##### *Original CCSS Text (2010):*

*Read, write, and compare decimals to thousandths.*

*5.NBT.A.3.A Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., 347.392 = 3 × 100 + 4 × 10 + 7 × 1 + 3 × (1/10) + 9 × (1/100) + 2 × (1/1000).*

*5.NBT.A.3.B Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.*

#### STANDARD: 5.NBT.A.4

##### DRAFT Standards Statement (JAN 2021):

Use place value understanding to round decimals to any place.

##### DRAFT Clarifying Guidance (JAN 2021):

Boundary:

Work with decimals at this grade is limited to decimals up to the thousandths.

##### *Original CCSS Text (2010):*

*Use place value understanding to round decimals to any place.*

### CLUSTER: 5.NBT.B - Perform operations with multi-digit whole numbers and with decimals to hundredths.

#### STANDARD: 5.NBT.B.5

##### DRAFT Standards Statement (JAN 2021):

Demonstrate fluency with multiplication of multi-digit whole numbers using accurate, efficient, and flexible strategies and algorithms based on place value and properties of operations.

##### DRAFT Clarifying Guidance (JAN 2021):

**Note:**

The National Council of Teachers of Mathematics provides the following definition of procedural fluency:

“Procedural fluency is the ability to apply procedures accurately, efficiently, and flexibly; to transfer procedures to different problems and contexts; to build or modify procedures from other procedures; and to recognize when one strategy or procedure is more appropriate to apply than another.

##### *Original CCSS Text (2010):*

*Fluently multiply multi-digit whole numbers using the standard algorithm.*

#### STANDARD: 5.NBT.B.6

##### DRAFT Standards Statement (JAN 2021):

Use a variety of representations and strategies to reason about and find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors.

##### DRAFT Clarifying Guidance (JAN 2021):

**Note:**

Illustrate and explain calculations using rectangular arrays, area models, and/or equations, along with strategies based on place value, properties of operations, and/or the relationship between multiplication and division.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 5.NBT.B.7

##### DRAFT Standards Statement (JAN 2021):

Use a variety of representations and strategies to add, subtract, multiply, and divide decimals to hundredths. Relate the strategy to a written method and explain the reasoning used.

##### DRAFT Clarifying Guidance (JAN 2021):

**Note:**

As part of this standard, students must be able to use concrete models, visual drawings and strategies based on place value, properties of operations, and the relationship between addition and subtraction.

**Boundary:**

Fluency with operations with decimals is part of the 6th grade standards.

##### *Original CCSS Text (2010):*

*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.*

### CLUSTER: 5.NF.A - Use equivalent fractions as a strategy to add and subtract fractions.

#### STANDARD: 5.NF.A.1

##### DRAFT Standards Statement (JAN 2021):

Add and subtract fractions with unlike denominators, including common fractions larger than one and mixed numbers.

##### DRAFT Clarifying Guidance (JAN 2021):

A common fraction is a fraction in which numerator and denominator are both integers, as opposed to fractions. Fractions such as 4/3, or 14/5 should be thought of as common fractions greater than one, which could also be written using mixed numbers as 1-1/3 and 2-4/5 respectively.

Use of the term "improper fraction" should be avoided.

**Note:** Include replacing given fractions with equivalent fractions to produce an equivalent sum or difference.

**Example:**

2/3 + 5/4 = 8/12 + 15/12 = 23/12 or 1 11/12.

**Boundary:**

Work with fractions at grade 5 should focus on fractions with denominators 2-10, 12, 16, 25, 100 and 1000.

##### *Original CCSS Text (2010):*

*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.)*

#### STANDARD: 5.NF.A.2

##### DRAFT Standards Statement (JAN 2021):

Solve problems in authentic contexts involving addition and subtraction of fractions with unlike denominators, including common fractions larger than one and mixed numbers.

##### DRAFT Clarifying Guidance (JAN 2021):

**Example:** Use visual fraction models or equations to represent the problem.

**Boundary:**

Work with fractions at grade 5 should focus on fractions with denominators 2-10, 12, 16, 25, 100 and 1000.

**Connections to MP 2 and MP6:**

Use benchmark fractions and number sense of fractions to estimate and assess the reasonableness of answers.

##### *Original CCSS Text (2010):*

*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.*

### CLUSTER: 5.NF.B - Apply and extend previous understandings of multiplication and division.

#### STANDARD: 5.NF.B.3

##### DRAFT Standards Statement (JAN 2021):

Interpret a fraction as division of the numerator by the denominator (a/b = a ÷ b). Solve problems in authentic contexts involving division of whole numbers that result in answers that are common fractions or mixed numbers.

##### DRAFT Clarifying Guidance (JAN 2021):

**Note:**

As part of this standard, students should have opportunities to use visual models or equations to represent and solve problems.

**Example:**

If 3 cookies are shared equally among 4 people each person receives ¾ of a cookie.

Sample Tasks:

* 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?

##### *Original CCSS Text (2010):*

*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?*

#### STANDARD: 5.NF.B.4

##### DRAFT Standards Statement (JAN 2021):

Apply and extend previous understanding and strategies of multiplication to multiply a fraction or whole number by a fraction. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.

##### DRAFT Clarifying Guidance (JAN 2021):

Interpret the product of the fraction a/b and a whole number (q) as

* partitioning the whole number into b parts and counting a parts
* Repeating the fraction a/b q number of times.

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

**Note:**

Understand that ⅔ x 4 can be seen as partitioning 4 into 3 equal parts as well as counting 2 of the 3 (4/3 x 2) parts or as iterating ⅔ four times [(2 x 4)/3]. In general, a/b x q = q/b x a = (a x q)/b.

**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.

##### *Original CCSS Text (2010):*

*Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.*

*5.NF.B.4.A Interpret the product (a/b) × q as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations a × q ÷ b. 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 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.*

#### STANDARD: 5.NF.B.5

##### DRAFT Standards Statement (JAN 2021):

Apply and extend previous understandings of multiplication and division to represent and calculate multiplication and division of fractions. Interpret multiplication as scaling (resizing) by comparing the size of products between two factors.

##### DRAFT Clarifying Guidance (JAN 2021):

Note:

As part of this standard, students must be able to

* 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.
* Explain that multiplying a given number by a fraction greater than 1 results in a product greater than the given number.
* Explain that multiplying a given number by a fraction equivalent to 1 (such as 4/4) results in the same product as multiplying by 1.
* Explain that multiplying a given number by a fraction less than 1 results in a product smaller than the given number.

##### *Original CCSS Text (2010):*

*Interpret multiplication as scaling (resizing), by:*

*5.NF.B.5.A Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.*

*5.NF.B.5.B Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence a/b = (n × a)/(n × b) to the effect of multiplying a/b by 1.*

#### STANDARD: 5.NF.B.6

##### DRAFT Standards Statement (JAN 2021):

Solve problems in authentic contexts involving multiplication of common fractions and mixed numbers.

##### DRAFT Clarifying Guidance (JAN 2021):

**Note:**

Students should be given opportunities to use both visual fraction models and equations to represent and solve problems.Students should be given opportunities to use both visual fraction models and equations to represent and solve problems.

##### *Original CCSS Text (2010):*

*Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.*

#### STANDARD: 5.NF.B.7

##### DRAFT Standards Statement (JAN 2021):

Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions, including solving problems in authentic contexts.

##### DRAFT Clarifying Guidance (JAN 2021):

Note: Students should be given opportunities to use both visual fraction models and equations to represent and solve problems.

**Examples:**

* 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.
* 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.
* How much chocolate will each person get if 3 people share ½ lb of chocolate equally?
* How many ⅓-cup servings are in 2 cups of raisins?

**Boundary:**

Division of a fraction by a fraction is not a requirement at this grade. However, students who are able to multiply fractions can develop strategies to divide a fraction by a fraction by reasoning about the relationship between multiplication and division.

##### *Original CCSS Text (2010):*

*Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.1*

*5.NF.B.7.A 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.7.B 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.7.C Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. 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?*

### CLUSTER: 5.MD.A - Convert like measurement units within a given measurement system.

#### STANDARD: 5.MD.A.1

##### DRAFT Standards Statement (JAN 2021):

Convert between different-sized standard measurement units within a given measurement system. Use these conversions in solving multi-step problems in authentic contexts.

##### DRAFT Clarifying Guidance (JAN 2021):

**Note:**

Students should be provided opportunities to convert within both metric and customary systems.

**Example:**

For example, convert 5 cm to 0.05 m.

**Boundary:**

Students do not need to convert between systems.

##### *Original CCSS Text (2010):*

*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.*

### CLUSTER: 5.MD.B – Represent and interpret data.

#### STANDARD: 5.MD.B.2

##### DRAFT Standards Statement (JAN 2021):

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.

##### DRAFT Clarifying Guidance (JAN 2021):

**Note:** Students should be provided opportunities to read and interpret information presented in line plots.

**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.

##### *Original CCSS Text (2010):*

*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.*

### CLUSTER: 5.MD.C - Geometric measurement: understand concepts of volume.

#### STANDARD: 5.MD.C.3

##### DRAFT Standards Statement (JAN 2021):

Recognize that volume is a measurable attribute of solid figures.

##### DRAFT Clarifying Guidance (JAN 2021):

**Note:**

* 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.
* 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.

##### *Original CCSS Text (2010):*

*Recognize volume as an attribute of solid figures and understand concepts of volume measurement.*

*5.MD.C.3.A A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume.*

*5.MD.C.3.B A solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units.*

#### STANDARD: 5.MD.C.4

##### DRAFT Standards Statement (JAN 2021):

Measure the volume of a rectangular prism by counting unit cubes using standard and improvised units.

##### DRAFT Clarifying Guidance (JAN 2021):

**Note:**

Students should have opportunities to use metric, customary and improvised units.

##### *Original CCSS Text (2010):*

*Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.*

#### STANDARD: 5.MD.C.5

##### DRAFT Standards Statement (JAN 2021):

Relate volume to the operations of multiplication and addition. Solve problems in authentic contexts involving volume using a variety of strategies.

##### DRAFT Clarifying Guidance (JAN 2021):

**Note:**

Students should be provided opportunities to use a variety of strategies including counting cubes, addition and multiplication, and applying the formula.

**Examples:**

* Find the volume of a rectangular prism with whole-number side lengths by packing it with unit cubes.

Show that the volume is the same as would be found by multiplying the edge lengths or by multiplying the height by the area of the base.

* Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping rectangular prisms by adding the volumes of the non-overlapping parts.
* Given the volume and 2 side lengths, determine the missing side length.

**Boundary:**

Work with volume at fifth grade is limited to whole number edge lengths.

##### *Original CCSS Text (2010):*

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

*5.MD.C.5.A Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication.*

*5.MD.C.5.B Apply the formulas V = l × w × h and V = b × h for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems.*

*5.MD.C.5.C Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.*

### CLUSTER: 5.G.A. - Graph points on the coordinate plane to solve real-world and mathematical problems.

#### STANDARD: 5.G.A.1

##### DRAFT Standards Statement (JAN 2021):

Graph and name coordinate points in the first quadrant using the standard x, y notation. Understand the coordinate points values represent the distance traveled along the horizontal x-axis and vertical y-axis.

##### DRAFT Clarifying Guidance (JAN 2021):

**Note:**

This is students first formalized introduction to the conventions of coordinate graphing:

* The first number indicates the distance from the origin on the x-axis.
* The second number indicates the distance from the origin on the y-axis.
* The names of the two axes and coordinates (or ordered pairs) correspond (x-axis and x-coordinate, y-axis and y-coordinate).

In addition to whole numbers, ordered pairs should include the decimal and fractional values of halves and fourths.

**Boundary:**

Graphing beyond the first quadrant is not a requirement at this grade.

##### *Original CCSS Text (2010):*

*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).*

#### STANDARD: 5.G.A.2

##### DRAFT Standards Statement (JAN 2021):

Represent authentic contexts and mathematical problems by graphing points in the first quadrant of the coordinate plane. Interpret the meaning of the coordinate values based on the context of a given situation.

##### DRAFT Clarifying Guidance (JAN 2021):

**Example:**

The coordinate (1,1.5) or (1,1½) means that in the first year, a person grew 1.5 or 1 ½ inches.

##### *Original CCSS Text (2010):*

*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.*

### CLUSTER: 5.G.B. - Classify two-dimensional figures into categories based on their properties.

#### STANDARD: 5.G.B.3

##### DRAFT Standards Statement (JAN 2021):

Note: propose combining with 5.G.B.4

##### DRAFT Clarifying Guidance (JAN 2021):

[no additional clarifying guidance at this time]

##### Original CCSS Text (2010):

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.

#### STANDARD: 5.G.B.4

##### DRAFT Standards Statement (JAN 2021):

Classify two-dimensional figures within a hierarchy based on their geometrical properties, and explain the relationship across and within different categories of these figures.

##### DRAFT Clarifying Guidance (JAN 2021):

**For example:**

Explain that since all rectangles have four right angles, and squares are rectangles, then all squares have four right angles. Explain that parallelograms and trapezoids are both quadrilaterals, and both have at least one set of parallel sides, but that they differ in that trapezoids have exactly one set and parallelograms have exactly two sets.

**Note:**

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.

##### Original CCSS Text (2010):

Classify two-dimensional figures in a hierarchy based on properties.

# SECTION NINE: Draft 6th Grade Standards

## 9A: Introduction

### Critical Areas for Grade 6 Mathematics

In Grade 6, instructional time should focus on four critical areas: (1) connecting ratio and rate to whole number multiplication and division and using concepts of ratio and rate to solve problems; (2) completing understanding of division of fractions and extending the notion of number to the system of rational numbers, which includes negative numbers; (3) writing, interpreting, and using expressions and equations; and (4) developing understanding of statistical thinking.

1. Students use reasoning about multiplication and division to solve ratio and rate problems about quantities. By viewing equivalent ratios and rates as deriving from, and extending, pairs of rows (or columns) in the multiplication table, and by analyzing simple drawings that indicate the relative size of quantities, students connect their understanding of multiplication and division with ratios and rates. Thus students expand the scope of problems for which they can use multiplication and division to solve problems, and they connect ratios and fractions. Students solve a wide variety of problems involving ratios and rates.
2. Students use the meaning of fractions, the meanings of multiplication and division, and the relationship between multiplication and division to understand and explain why the procedures for dividing fractions make sense. Students use these operations to solve problems. Students extend their previous understandings of number and the ordering of numbers to the full system of rational numbers, which includes negative rational numbers, and in particular negative integers. They reason about the order and absolute value of rational numbers and about the location of points in all four quadrants of the coordinate plane.
3. Students understand the use of variables in mathematical expressions. They write expressions and equations that correspond to given situations, evaluate expressions, and use expressions and formulas to solve problems. Students understand that expressions in different forms can be equivalent, and they use the properties of operations to rewrite expressions in equivalent forms. Students know that the solutions of an equation are the values of the variables that make the equation true. Students use properties of operations and the idea of maintaining the equality of both sides of an equation to solve simple one-step equations. Students construct and analyze tables, such as tables of quantities that are in equivalent ratios, and they use equations (such as 3x = y) to describe relationships between quantities.
4. Building on and reinforcing their understanding of number, students begin to develop their ability to think statistically. Students recognize that a data distribution may not have a definite center and that different ways to measure center yield different values. The median measures center in the sense that it is roughly the middle value. The mean measures center in the sense that it is the value that each data point would take on if the total of the data values were redistributed equally, and also in the sense that it is a balance point. Students recognize that a measure of variability (interquartile range or mean absolute deviation) can also be useful for summarizing data because two very different sets of data can have the same mean and median yet be distinguished by their variability.  
     
   Students learn to describe and summarize numerical data sets, identifying clusters, peaks, gaps, and symmetry, considering the context in which the data were collected. Students in Grade 6 also build on their work with area in elementary school by reasoning about relationships among shapes to determine area, surface area, and volume. They find areas of right triangles, other triangles, and special quadrilaterals by decomposing these shapes, rearranging or removing pieces, and relating the shapes to rectangles. Using these methods, students discuss, develop, and justify formulas for areas of triangles and parallelograms. Students find areas of polygons and surface areas of prisms and pyramids by decomposing them into pieces whose area they can determine. They reason about right rectangular prisms with fractional side lengths to extend formulas for the volume of a right rectangular prism to fractional side lengths. They prepare for work on scale drawings and constructions in Grade 7 by drawing polygons in the coordinate plane.

### Grade 6 Overview

#### Ratios and Proportional Relationships

* Understand ratio concepts and use ratio reasoning to solve problems.

#### The Number System

* Apply and extend previous understandings of multiplication and division to divide fractions by fractions.
* Multiply and divide multi-digit numbers and find common factors and multiples.
* Apply and extend previous understandings of numbers to the system of rational numbers.

#### Expressions and Equations

* Apply and extend previous understandings of arithmetic to algebraic expressions.
* Reason about and solve one-variable equations and inequalities.
* Represent and analyze quantitative relationships between dependent and independent variables.

#### Geometry

* Solve real-world and mathematical problems involving area, surface area, and volume.

#### Statistics and Probability

* Develop understanding of statistical variability.
* Summarize and describe distributions.

### Mathematical Practices

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

### Highlights of Major Work in Grades K-8

K-2: Addition and subtraction – concepts, skills, and problem solving; place value

3-5: Multiplication and division of whole numbers and fractions – concepts, skills, and problem solving

6: Ratios and proportional relationships; early expressions and equations

7: Ratios and proportional relationships; arithmetic of rational numbers

8: Linear algebra and linear functions

### Grade 6 Fluency Standard(s)

6.NS.B.2 Multi-digit division

6.NS.B.3 Positive rational number operations, including fractions and multi-digit decimals

## 9B: Draft Standards Statements – Grade 6

The standards listed in the tables below list both core standards statements and cluster prioritization for K-8 mathematics. Not all content in a given grade is emphasized equally in the Standards. Some clusters require greater emphasis than others based on the depth of the ideas, the time that they take to master, and/or their importance to future mathematics or the demands of college and career readiness. (Link to [Focus by Grade Level documents](https://achievethecore.org/category/774/mathematics-focus-by-grade-level))

Students should spend the large majority of their time on the major work of the grade ( ). Supporting work ( ) and, where appropriate, additional work () can engage students in the major work of the grade.

### 6.RP - Ratios & Proportional Relationships

#### 6.RP.A - Understand ratio concepts and use ratio reasoning to solve problems.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **6.RP.A.1** | Understand the concept of a ratio in authentic contexts, and use ratio language to describe a ratio relationship between two quantities. |
| **6.RP.A.2** | Understand the concept of a unit rate in authentic contexts and use rate language in the context of a ratio relationship. |
| **6.RP.A.3** | Use ratio and rate reasoning to solve problems in authentic contexts that use equivalent ratios, unit rates, percents, and measurement units. |

### 6.NS - The Number System

#### 6.NS.A - Apply and extend previous understandings of multiplication and division to divide fractions by fractions.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **6.NS.A.1** | Represent, interpret, and compute quotients of fractions to solve problems in authentic contexts involving division of fractions by fractions. |

#### 6.NS.B - Compute fluently with multi-digit numbers and find common factors and multiples.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **6.NS.B.2** | Demonstrate fluency with division of multi-digit numbers using accurate, efficient, and flexible strategies and algorithms based on place value and properties of operations. |
| **6.NS.B.3** | Fluently add, subtract, multiply and divide fractions and multi-digit decimals using a standard algorithm for each operation. |
| **6.NS.B.4** | Apply the greatest common factor to 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. |

#### 6.NS.C - Apply and extend previous understandings of numbers to the system of rational numbers.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **6.NS.C.5** | Understand that positive and negative numbers are used together to describe quantities having opposite directions or values. Use positive and negative numbers to represent quantities in authentic contexts, explaining the meaning of zero in each situation. |
| **6.NS.C.6** | Represent 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.7** | Understand ordering and absolute value of rational numbers. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. Write, interpret, and explain statements of order for rational numbers in authentic contexts. |
| **6.NS.C.8** | Graph points in all four quadrants of the coordinate plane to solve problems in authentic contexts. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate. |

### 6.EE - Expressions & Equations

#### 6.EE.A -Apply and extend previous understandings of arithmetic to algebraic expressions.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **6.EE.A.1** | Write and evaluate numerical expressions involving whole-number bases and exponents. |
| **6.EE.A.2** | Apply knowledge of common mathematical terms to move between the verbal and mathematical forms of an expression with numbers and letters standing for numbers. Include expressions that arise from authentic contexts. Evaluate these variable expressions at specific values for their variables. |
| **6.EE.A.3** | Apply the properties of operations to generate equivalent expressions and to determine when two expressions are equivalent. |
| **6.EE.A.4** | *[proposed merge with 6.EE.A.3 content]* |

#### 6.EE.B -Reason about and solve one-variable equations and inequalities.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **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 which number(s) in a given set make an equation or inequality true. |
| **6.EE.B.6** | Use variables to represent numbers and write expressions when solving problems in authentic contexts. |
| **6.EE.B.7** | Write and solve equations of the form x + p = q and px = q in problems that arise from authentic contexts for cases in which p, q and x are all nonnegative rational numbers. |
| **6.EE.B.8** | Write inequalities of the form x > c and x < c to represent constraints or conditions to solve problems in authentic contexts. Describe and graph the infinite solutions of inequalities of the form x > c and x < c. |

#### 6.EE.C - Represent and analyze quantitative relationships between dependent and independent variables.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **6.EE.C.9** | Use variables to represent and analyze two quantities to solve problems in authentic contexts. Including those that change in relationship to one another; write an equation to express one quantity in terms of the other quantity. |

### 6.G - Geometry

#### 6.G.A - Solve real-world and mathematical problems involving area, surface area, and volume.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **6.G.A.1** | Find the area of triangles, quadrilaterals, and other polygons by composing into rectangles or decomposing into triangles and other shapes. Apply these techniques to solve problems in authentic contexts. |
| **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. Connect and apply to the formulas V = l w h and V = b h to find volumes of right rectangular prisms with fractional edge lengths to solve problems in authentic contexts. |
| **6.G.A.3** | Draw polygons in the 4-quadrant coordinate plane given coordinates for the vertices and find the length of a side. Apply these techniques to solve problems in authentic contexts. |
| **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, including those from authentic contexts. |

### 6.SP - Statistics & Probability

#### 6.SP.A -Develop understanding of statistical variability.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **6.SP.A.1** | Generate and recognize statistical questions as those that anticipate variability in the data related to the question and account for it in the answers. |
| **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. |
| **6.SP.A.3** | Recognize that a measure of center for a numerical data set is a single number that summarizes all of the values in the data set, while a measure of variation is a single number that describes how the values in the data set vary from one another. |

#### 6.SP.B -Summarize and describe distributions.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **6.SP.B.4** | Display numerical data in plots on a number line, including dot plots, histograms, and box plots. |
| **6.SP.B.5** | Identify and describe the characteristics of numerical data sets using quantitative measures of center and variability. Additional descriptions include number of observations, measurement attributes, and shape of distribution. |

## 9C: Grade 6 Crosswalk with Clarifying Guidance

### CLUSTER: 6.RP.A - Understand ratio concepts and use ratio reasoning to solve problems.

#### STANDARD: 6.RP.A.1

##### DRAFT Standards Statement (JAN 2021):

Understand the concept of a ratio in authentic contexts, and use ratio language to describe a ratio relationship between two quantities.

##### DRAFT Clarifying Guidance (JAN 2021):

**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.

Describe a ratio as a multiplicative relationship between two quantities.

Model a ratio relationship using a variety of representations.

##### *Original CCSS Text (2010):*

*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."*

#### STANDARD: 6.RP.A.2

##### DRAFT Standards Statement (JAN 2021):

Understand the concept of a unit rate in authentic contexts and use rate language in the context of a ratio relationship.

##### DRAFT Clarifying Guidance (JAN 2021):

**For example:**

This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is ¾ cup of flour for each cup of sugar.

We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger.

##### *Original CCSS Text (2010):*

*Understand the concept of a unit rate a/b associated with a ratio a:b with b ≠ 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." (Expectations for unit rates in this grade are limited to non-complex fractions.)*

#### STANDARD: 6.RP.A.3

##### DRAFT Standards Statement (JAN 2021):

Use ratio and rate reasoning to solve problems in authentic contexts that use equivalent ratios, unit rates, percents, and measurement units.

##### DRAFT Clarifying Guidance (JAN 2021):

Create and use a table to compare ratios and plotting the pairs of values on the coordinate plane.

Find missing values in the tables.

Use unit rates to solve problems, including problems involving unit pricing and constant speed.

Convert and manipulate measurements using given ratios.

##### *Original CCSS Text (2010):*

*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.*

*6.RP.A.3.A 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.*

*6.RP.A.3.B 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?*

*6.RP.A.3.C 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.*

### CLUSTER: 6.NS.A - Apply and extend previous understandings of multiplication and division to divide fractions by fractions.

#### STANDARD: 6.NS.A.1

##### DRAFT Standards Statement (JAN 2021):

Represent, interpret, and compute quotients of fractions to solve problems in authentic contexts involving division of fractions by fractions.

##### DRAFT Clarifying Guidance (JAN 2021):

Reason and solve problems with quotients of fractions using both the measurement and partition models of division (based on what is most appropriate for the fractions in the quotient).

Describe a context for a given division problem with common fractions, including both measurement and partition contexts.

Use visual fraction models to represent and solve division problems with common fractions. For example, create a story context for (2/3) ÷ (3/4) and use a visual fraction model to show the quotient.

Use equations and the relationship between multiplication and division to represent and solve a given division problem with fractions.

For example, (2/3) ÷ (3/4) = 8/9 because 3/4 of 8/9 is 2/3. (In general, (a/b) ÷ (c/d) = ad/bc.)

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?

##### *Original CCSS Text (2010):*

*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?.*

### CLUSTER: 6.NS.B - Compute fluently with multi-digit numbers and find common factors and multiples.

#### STANDARD: 6.NS.B.2

##### DRAFT Standards Statement (JAN 2021):

Demonstrate fluency with division of multi-digit numbers using accurate, efficient, and flexible strategies and algorithms based on place value and properties of operations.

##### DRAFT Clarifying Guidance (JAN 2021):

[no additional clarifying guidance at this time]

##### *Original CCSS Text (2010):*

*Fluently divide multi-digit numbers using the standard algorithm.*

#### STANDARD: 6.NS.B.3

##### DRAFT Standards Statement (JAN 2021):

Demonstrate fluency with addition, subtraction, multiplication, and division of positive rational numbers, including fractions and multi-digit decimals, using accurate, efficient, and flexible strategies and algorithms.

##### DRAFT Clarifying Guidance (JAN 2021):

[no additional clarifying guidance at this time]

##### *Original CCSS Text (2010):*

*Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.*

#### STANDARD: 6.NS.B.4

##### DRAFT Standards Statement (JAN 2021):

Apply the greatest common factor to 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.

##### DRAFT Clarifying Guidance (JAN 2021):

**For example:**

Express 36 + 8 as 4 (9 + 2).

**Note:** GCF & LCM support use of distributive property.

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.

##### *Original CCSS Text (2010):*

*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)..*

### CLUSTER: 6.NS.C - Apply and extend previous understandings of numbers to the system of rational numbers.

#### STANDARD: 6.NS.C.5

##### DRAFT Standards Statement (JAN 2021):

Understand that positive and negative numbers are used together to describe quantities having opposite directions or values. Use positive and negative numbers to represent quantities in authentic contexts, explaining the meaning of zero in each situation.

##### DRAFT Clarifying Guidance (JAN 2021):

**For example:**

Temperature above/below zero;

Elevation above/below sea level, Debits/credit;

Positive/negative electric charge.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 6.NS.C.6

##### DRAFT Standards Statement (JAN 2021):

Represent 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.

##### DRAFT Clarifying Guidance (JAN 2021):

**Notes**

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.

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.

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.

##### *Original CCSS Text (2010):*

*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.6.A 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.6.B 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.6.C 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.*

#### STANDARD: 6.NS.C.7

##### DRAFT Standards Statement (JAN 2021):

Understand ordering and absolute value of rational numbers. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. Write, interpret, and explain statements of order for rational numbers in authentic contexts.

##### DRAFT Clarifying Guidance (JAN 2021):

**Note:**

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

Distinguish comparisons of absolute value from statements about order.

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.

Write –3°C > –7°C to express the fact that –3°C is warmer than –7°C.

For an account balance of –30 dollars, write |–30| = 30 to describe the size of the debt in dollars.

Recognize that an account balance less than –30 dollars represents a debt greater than 30 dollars.

##### *Original CCSS Text (2010):*

*Understand ordering and absolute value of rational numbers.*

*6.NS.C.7.A 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.7.B Write, interpret, and explain statements of order for rational numbers in real-world contexts. For example, write -3 oC > -7 oC to express the fact that -3 oC is warmer than -7 oC.*

*6.NS.C.7.C 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.7.D 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.*

#### STANDARD: 6.NS.C.8

##### DRAFT Standards Statement (JAN 2021):

Graph points in all four quadrants of the coordinate plane to solve problems in authentic contexts. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.

##### DRAFT Clarifying Guidance (JAN 2021):

Understand that the slope of these lines is undefined or 0.

**For example:**

Rectangle RSTU has vertices at (−4,3), 𝑆𝑆(−4, −2), 𝑇𝑇(5, −2) and 𝑈𝑈(5,3). Plot the rectangle on a coordinate plane and find the perimeter of the figure.

##### *Original CCSS Text (2010):*

*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.*

### CLUSTER: 6.EE.A - Apply and extend previous understandings of arithmetic to algebraic expressions.

#### STANDARD: 6.EE.A.1

##### DRAFT Standards Statement (JAN 2021):

Write and evaluate numerical expressions involving whole-number bases and exponents.

##### DRAFT Clarifying Guidance (JAN 2021):

Extend previous understanding by using brackets and parentheses and order of operations and exponents.

##### *Original CCSS Text (2010):*

*Write and evaluate numerical expressions involving whole-number exponents.*

#### STANDARD: 6.EE.A.2

##### DRAFT Standards Statement (JAN 2021):

Apply knowledge of common mathematical terms to move between the verbal and mathematical forms of an expression with numbers and letters standing for numbers. Include expressions that arise from authentic contexts. Evaluate these variable expressions at specific values for their variables.

##### DRAFT Clarifying Guidance (JAN 2021):

**Note:**

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.

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:

Express the calculation subtract y from 5 as 5 – y.

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.

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.

##### *Original CCSS Text (2010):*

*Write, read, and evaluate expressions in which letters stand for numbers.*

*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.*

*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.*

*6.EE.A.2.C 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 = s3 and A = 6 s2 to find the volume and surface area of a cube with sides of length s = 1/2.*

#### STANDARD: 6.EE.A.3

##### DRAFT Standards Statement (JAN 2021):

Apply the properties of operations to generate equivalent expressions and to determine when two expressions are equivalent.

##### DRAFT Clarifying Guidance (JAN 2021):

**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 operation to the expression y + y + y to produce the equivalent expression 3y and know they are equivalent because they name the same number regardless of which number y stands for.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 6.EE.A.4

##### DRAFT Standards Statement (JAN 2021):

See Standard EE.A.3 above as we moved this standard.

##### DRAFT Clarifying Guidance (JAN 2021):

[no clarifying guidance at this time]

##### *Original CCSS Text (2010):*

*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..*

### CLUSTER: 6.EE.B - Reason about and solve one-variable equations and inequalities.

#### STANDARD: 6.EE.B.5

##### DRAFT Standards Statement (JAN 2021):

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 which number(s) in a given set make an equation or inequality true.

##### DRAFT Clarifying Guidance (JAN 2021):

Use an inequality of the form x > c or x < c .

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 6.EE.B.6

##### DRAFT Standards Statement (JAN 2021):

Use variables to represent numbers and write expressions when solving problems in authentic contexts.

##### DRAFT Clarifying Guidance (JAN 2021):

Understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 6.EE.B.7

##### DRAFT Standards Statement (JAN 2021):

Write and solve equations of the form x + p = q and px = q in problems that arise from authentic contexts for cases in which p, q and x are all nonnegative rational numbers.

##### DRAFT Clarifying Guidance (JAN 2021):

**Notes:** p, x, and q include non-whole numbers. Students should be able to solve equations of this form using strategies such as related equations, fact families, inverse operations, and visual models.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 6.EE.B.8

##### DRAFT Standards Statement (JAN 2021):

Write inequalities of the form x > c and x < c to represent constraints or conditions to solve problems in authentic contexts. Describe and graph the infinite solutions of inequalities of the form x > c and x < c.

##### DRAFT Clarifying Guidance (JAN 2021):

Represent solutions of such inequalities on number line diagrams.

##### *Original CCSS Text (2010):*

*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.*

### CLUSTER: 6.EE.C - Represent and analyze quantitative relationships between dependent and independent variables.

#### STANDARD: 6.EE.C.9

##### DRAFT Standards Statement (JAN 2021):

Use variables to represent and analyze two quantities to solve problems in authentic contexts. Including those that change in relationship to one another; write an equation to express one quantity in terms of the other quantity.

##### DRAFT Clarifying Guidance (JAN 2021):

**Note:**

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.

##### *Original CCSS Text (2010):*

*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.*

### CLUSTER: 6.G.A - Solve real-world and mathematical problems involving area, surface area, and volume.

#### STANDARD: 6.G.A.1

##### DRAFT Standards Statement (JAN 2021):

Find the area of triangles, quadrilaterals, and other polygons by composing into rectangles or decomposing into triangles and other shapes. Apply these techniques to solve problems in authentic contexts.

##### DRAFT Clarifying Guidance (JAN 2021):

Apply these techniques in the context of solving real-world and mathematical problems.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 6.G.A.2

##### DRAFT Standards Statement (JAN 2021):

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. Connect and apply to the formulas V = l w h and V = b h to find volumes of right rectangular prisms with fractional edge lengths to solve problems in authentic contexts.

##### DRAFT Clarifying Guidance (JAN 2021):

**Note:**

Show that the volume is the same as would be found by multiplying the edge lengths of the prism.

Apply these techniques in the context of solving real-world and mathematical problems.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 6.G.A.3

##### DRAFT Standards Statement (JAN 2021):

Draw polygons in the 4-quadrant coordinate plane given coordinates for the vertices and find the length of a side. Apply these techniques to solve problems in authentic contexts.

##### DRAFT Clarifying Guidance (JAN 2021):

Use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 6.G.A.4

##### DRAFT Standards Statement (JAN 2021):

Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures, including those from authentic contexts.

##### DRAFT Clarifying Guidance (JAN 2021):

Apply these techniques in the context of solving real-world and mathematical problems.

##### *Original CCSS Text (2010):*

*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.*

### CLUSTER: 6.SP.A. - Develop understanding of statistical variability.

#### STANDARD: 6.SP.A.1

##### DRAFT Standards Statement (JAN 2021):

Generate and recognize statistical questions as those that anticipate variability in the data related to the question and account for it in the answers.

##### DRAFT Clarifying Guidance (JAN 2021):

Note:

Students should be able to generate their own statistical questions.

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.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 6.SP.A.2

##### DRAFT Standards Statement (JAN 2021):

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.

##### DRAFT Clarifying Guidance (JAN 2021):

[no additional guidance at this time]

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 6.SP.A.3

##### DRAFT Standards Statement (JAN 2021):

Recognize that a measure of center for a numerical data set is a single number that summarizes all of the values in the data set, while a measure of variation is a single number that describes how the values in the data set vary from one another.

##### DRAFT Clarifying Guidance (JAN 2021):

[no additional guidance at this time]

##### *Original CCSS Text (2010):*

*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.*

### CLUSTER: 6.SP.B. - Summarize and describe distributions.

#### STANDARD: 6.SP.B.4

##### DRAFT Standards Statement (JAN 2021):

Display numerical data in plots on a number line, including dot plots and histograms..

##### DRAFT Clarifying Guidance (JAN 2021):

[no additional guidance at this time]

##### *Original CCSS Text (2010):*

*Display numerical data in plots on a number line, including dot plots, histograms, and box plots.*

#### STANDARD: 6.SP.B.5

##### DRAFT Standards Statement (JAN 2021):

Identify and describe the characteristics of numerical data sets using quantitative measures of center and variability. Additional descriptions include number of observations, measurement attributes, and shape of distribution.

##### DRAFT Clarifying Guidance (JAN 2021):

Identification and description of data characteristics related to their context includes:

Reporting the number of observations.

Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.

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.

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.

##### *Original CCSS Text (2010):*

*Summarize numerical data sets in relation to their context, such as by:*

*6.SP.B.5.A Reporting the number of observations.*

*6.SP.B.5.B Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.*

*6.SP.B.5.C 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.*

*6.SP.B.5.D 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.*

# SECTION TEN: Draft 7th Grade Standards

## 10A: Introduction

**Critical Areas for Grade 7 Mathematics**

In Grade 7, instructional time should focus on four critical areas: (1) developing understanding of and applying proportional relationships; (2) developing understanding of operations with rational numbers and working with expressions and linear equations; (3) solving problems involving scale drawings and informal geometric constructions, and working with two- and three-dimensional shapes to solve problems involving area, surface area, and volume; and (4) drawing inferences about populations based on samples.

1. Students extend their understanding of ratios and develop understanding of proportionality to solve single- and multi-step problems. Students use their understanding of ratios and proportionality to solve a wide variety of percent problems, including those involving discounts, interest, taxes, tips, and percent increase or decrease. Students solve problems about scale drawings by relating corresponding lengths between the objects or by using the fact that relationships of lengths within an object are preserved in similar objects. Students graph proportional relationships and understand the unit rate informally as a measure of the steepness of the related line, called the slope. They distinguish proportional relationships from other relationships.
2. Students develop a unified understanding of number, recognizing fractions, decimals (that have a finite or a repeating decimal representation), and percents as different representations of rational numbers. Students extend addition, subtraction, multiplication, and division to all rational numbers, maintaining the properties of operations and the relationships between addition and subtraction, and multiplication and division. By applying these properties, and by viewing negative numbers in terms of everyday contexts (e.g., amounts owed or temperatures below zero), students explain and interpret the rules for adding, subtracting, multiplying, and dividing with negative numbers. They use the arithmetic of rational numbers as they formulate expressions and equations in one variable and use these equations to solve problems.
3. Students continue their work with area from Grade 6, solving problems involving the area and circumference of a circle and surface area of three-dimensional objects. In preparation for work on congruence and similarity in Grade 8 they reason about relationships among two-dimensional figures using scale drawings and informal geometric constructions, and they gain familiarity with the relationships between angles formed by intersecting lines. Students work with three-dimensional figures, relating them to two-dimensional figures by examining cross-sections. They solve real-world and mathematical problems involving area, surface area, and volume of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes and right prisms.
4. Students build on their previous work with single data distributions to compare two data distributions and address questions about differences between populations. They begin informal work with random sampling to generate data sets and learn about the importance of representative samples for drawing inferences.

### Grade 7 Overview

#### Ratios and Proportional Relationships

* Analyze proportional relationships and use them to solve real-world and mathematical problems.

#### The Number System

* Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

#### Expressions and Equations

* Use properties of operations to generate equivalent expressions.
* Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

#### Geometry

* Draw, construct and describe geometrical figures and describe the relationships between them.
* Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.

#### Statistics and Probability

* Use random sampling to draw inferences about a population.
* Draw informal comparative inferences about two populations.
* Investigate chance processes and develop, use, and evaluate probability models.

### Mathematical Practices

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

### Highlights of Major Work in Grades K-8

K-2: Addition and subtraction – concepts, skills, and problem solving; place value

3-5: Multiplication and division of whole numbers and fractions – concepts, skills, and problem solving

6: Ratios and proportional relationships; early expressions and equations

7: Ratios and proportional relationships; arithmetic of rational numbers

8: Linear algebra and linear functions

## 10B: Draft Standards Statements – Grade 6

The standards listed in the tables below list both core standards statements and cluster prioritization for K-8 mathematics. Not all content in a given grade is emphasized equally in the Standards. Some clusters require greater emphasis than others based on the depth of the ideas, the time that they take to master, and/or their importance to future mathematics or the demands of college and career readiness. (Link to [Focus by Grade Level documents](https://achievethecore.org/category/774/mathematics-focus-by-grade-level))

Students should spend the large majority of their time on the major work of the grade ( ). Supporting work ( ) and, where appropriate, additional work () can engage students in the major work of the grade.

### 7.RP - Ratios & Proportional Relationships

#### 7.RP.A - Analyze proportional relationships and use them to solve real-world and mathematical problems.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **7.RP.A.1** | Solve problems in authentic contexts involving unit rates associated with ratios of fractions. |
| **7.RP.A.2** | Recognize and represent proportional relationships between quantities in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. Identify the constant of proportionality (unit rate) within various representations. |
| **7.RP.A.3** | Use proportional relationships to solve ratio and percent problems in authentic contexts. |

### 7.NS - The Number System

#### 7.NS.A - Apply and extend previous understandings of operations with fractions.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **7.NS.A.1** | Apply and extend previous understandings of addition, subtraction and absolute value to add and subtract rational numbers in authentic contexts. Understand subtraction as adding the additive inverse, p – q = p + (–q). |
| **7.NS.A.2** | Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. Interpret operations of rational numbers solving problems in authentic contexts. |
| **7.NS.A.3** | Understand that equivalent rational numbers can be written as fractions, decimals and percents. |

### 7.EE - Expressions & Equations

#### 7.EE.A - Use properties of operations to generate equivalent expressions.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **7.EE.A.1** | Identify and write equivalent expressions with rational numbers by applying associative, commutative, and distributive properties. |
| **7.EE.A.2** | Understand that rewriting an expression in different forms in a contextual problem can show how quantities are related. |

#### 7.EE.B - Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **7.EE.B.3** | Write and solve problems in authentic contexts posed with positive and negative rational numbers in any form. Contexts can be limited to those that can be solved with one or two-step linear equations. |
| **7.EE.B.4** | Write and solve inequalities in the form px + q > r or px + q < r, for cases in which p, q, and r are specific non-negative rational numbers to solve problems in authentic contexts. |

### 7.G - Geometry

#### 7.G.A - Draw construct, and describe geometrical figures and describe the relationships between them.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **7.G.A.1** | Solve problems involving scale drawings of geometric figures. Reproduce a scale drawing at a different scale. Compute actual lengths and areas from a scale drawing. |
| **7.G.A.2** | Draw triangles from three measures of angles or sides. Understand the possible side lengths and angle measures which determine a unique triangle, more than one triangle, or no triangle. |
| **7.G.A.3** | *[Recommend Removal]* |

#### 7.G.B - Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **7.G.B.4** | Understand the relationship between area and circumference of circles. Choose and use the appropriate formula to solve problems with radius, diameter, circumference and area of circles. |
| **7.G.B.5** | Apply facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to determine an unknown angle in a figure. |
| **7.G.B.6** | Solve problems in authentic contexts involving two- and three-dimensional figures. Given formulas, calculate area, volume and surface area. |

### 7.SP - Statistics & Probability

#### 7.SP.A - Use random sampling to draw inferences about a population.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **7.SP.A.1** | Understand that statistics can be used to gain information about a population and that a sample is valid only if the sample is representative of that population. |
| **7.SP.A.2** | Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Gauge how far off the estimate or prediction might be. |

#### 7.SP.B - Draw informal comparative inferences about two populations.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **7.SP.B.3** | Assess two data distributions visually to compare multiple measures of center and variability. |
| **7.SP.B.4** | Use measures of center and measures of variability for numerical data from random samples to compare and make informal inferences between two populations. |

#### 7.SP.C - Investigate chance processes and develop, use, and evaluate probability models.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **7.SP.C.5** | Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Represent probabilities as fractions, decimals, and percents. |
| **7.SP.C.6** | Use experimental data and theoretical probability to make predictions. Understand the probability predictions may not be exact. |
| **7.SP.C.7** | Develop a probability model and use it to find probabilities of events. Compare theoretical and experimental probabilities and explain possible sources of discrepancy if any exists. |
| **7.SP.C.8** | Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. |

## 10C: Grade 7 Crosswalk with Clarifying Guidance

### CLUSTER: 7.RP.A - Analyze proportional relationships and use them to solve real-world and mathematical problems.

#### STANDARD: 7.RP.A.1

##### DRAFT Standards Statement (JAN 2021):

Solve problems in authentic contexts involving unit rates associated with ratios of fractions.

##### DRAFT Clarifying Guidance (JAN 2021):

**Notes**

This includes ratios of lengths, areas and other quantities measured in like or different units.

Students should have opportunities to create visual representations to solve complex ratio problems.

Students should build upon their understanding of fractions as a form of division.

Students should build upon their fluency in division of fractions.

**Examples**

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.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 7.RP.A.2

##### DRAFT Standards Statement (JAN 2021):

Recognize and represent proportional relationships between quantities in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. Identify the constant of proportionality (unit rate) within various representations.

##### DRAFT Clarifying Guidance (JAN 2021):

**Notes:**

Students should recognize equations in the form y = mx are proportional.

Students should know that a graph with a straight line through the origin is proportional.

Students should be able to explain what a point (x,y) on the graph or table of a proportional relationship means in context of the problem.

This standard builds on students' understanding of unit rates from 6th grade.

**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.

##### *Original CCSS Text (2010):*

*Recognize and represent proportional relationships between quantities.*

*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.*

*7.RP.A.2.B Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.*

*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.*

*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.*

#### STANDARD: 7.RP.A.3

##### DRAFT Standards Statement (JAN 2021):

Use proportional relationships to solve ratio and percent problems in authentic contexts.

##### DRAFT Clarifying Guidance (JAN 2021):

Notes:

This includes solving multi step problems involving simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, and percent error.

##### *Original CCSS Text (2010):*

*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.*

### CLUSTER: 7.NS.A - Apply and extend previous understandings of operations with fractions.

#### STANDARD: 7.NS.A.1

##### DRAFT Standards Statement (JAN 2021):

Apply and extend previous understandings of addition, subtraction and absolute value to add and subtract rational numbers in authentic contexts. Understand subtraction as adding the additive inverse, p – q = p + (–q).

##### DRAFT Clarifying Guidance (JAN 2021):

Notes:

Represent operations with rational numbers both visually and numerically, including number line diagrams.

Solve real-world and mathematical problems involving adding and subtracting rational numbers.

Interpret operations of rational numbers by describing real-world contexts.

Apply properties of operations such as identity, inverse, distributive, associative and commutative properties.

##### *Original CCSS Text (2010):*

*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.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.*

#### STANDARD: 7.NS.A.2

##### DRAFT Standards Statement (JAN 2021):

Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. Interpret operations of rational numbers solving problems in authentic contexts.

##### DRAFT Clarifying Guidance (JAN 2021):

**Notes:**

Represent operations with rational numbers both visually and numerically,

Students should build upon previous work with number lines for addition and subtraction.

Solve real-world and mathematical problems involving multiplying and dividing rational numbers.

Interpret operations of rational numbers by describing real-world contexts.

Apply properties of operations such as identity, inverse, distributive, associative and commutative properties.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 7.NS.A.3

##### DRAFT Standards Statement (JAN 2021):

Understand that equivalent rational numbers can be written as fractions, decimals and percents.

##### DRAFT Clarifying Guidance (JAN 2021):

**Notes:** Use long division to convert fractions to decimals.

Students should build upon their understanding of percents as a ratio comparison to 100.

Identify whether the decimal form of a rational number is a terminating or repeating decimal.

Convert terminating decimals to fractions.

##### *Original CCSS Text (2010):*

*Solve real-world and mathematical problems involving the four operations with rational numbers.*

### CLUSTER: 7.EE.A - Use properties of operations to generate equivalent expressions.

#### STANDARD: 7.EE.A.1

##### DRAFT Standards Statement (JAN 2021):

Understand that equivalent rational numbers can be written as fractions, decimals and percents.

##### DRAFT Clarifying Guidance (JAN 2021):

**NOTES:** Identify like terms and combine like terms to create equivalent expressions.

Apply the distributive property to factor and expand linear expressions.

Use numerical substitution to identify equivalent expressions.

##### *Original CCSS Text (2010):*

*Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.*

#### STANDARD: 7.EE.A.2

##### DRAFT Standards Statement (JAN 2021):

Identify and write equivalent expressions with rational numbers by applying associative, commutative, and distributive properties.

##### DRAFT Clarifying Guidance (JAN 2021):

**NOTES:** Identify like terms and combine like terms to create equivalent expressions.

Apply the distributive property to factor and expand linear expressions.

Use numerical substitution to identify equivalent expressions.

##### *Original CCSS Text (2010):*

*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."*

### CLUSTER: 7.EE.B - Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

#### STANDARD: 7.EE.B.3

##### DRAFT Standards Statement (JAN 2021):

Write and solve problems in authentic contexts posed with positive and negative rational numbers in any form. Contexts can be limited to those that can be solved with one or two-step linear equations.

##### DRAFT Clarifying Guidance (JAN 2021):

**NOTES**

Solve problems in authentic contexts leading to equations such as form px + q = r and p(x + q) = r, in which p, q, and r are specific rational numbers in any form (whole numbers, fractions, and decimals).

Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.

Apply properties of operations as strategies to calculate with numbers in any form; convert between forms as appropriate; Assess the reasonableness of answers using mental computation and estimation strategies.

**EXAMPLE**

For example, “The perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?” This can be solved with the equation 6x = 54.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 7.EE.B.4

##### DRAFT Standards Statement (JAN 2021):

Write and solve inequalities in the form px + q > r or px + q < r, for cases in which p, q, and r are specific non-negative rational numbers to solve problems in authentic contexts.

##### DRAFT Clarifying Guidance (JAN 2021):

**Example:**

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.

##### *Original CCSS Text (2010):*

*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.*

*7.EE.B.4.A 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?*

*7.EE.B.4.B 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.*

### CLUSTER: 7.G.A - Draw construct, and describe geometrical figures and describe the relationships between them.

#### STANDARD: 7.G.A.1

##### DRAFT Standards Statement (JAN 2021):

Solve problems involving scale drawings of geometric figures. Reproduce a scale drawing at a different scale. Compute actual lengths and areas from a scale drawing.

##### DRAFT Clarifying Guidance (JAN 2021):

NOTES

Students should be given opportunities to use technology and tools to reproduce scale drawings.

Students should understand scale factor as a rate comparison between similar figures and scale drawings.

Students should build upon their understanding of proportional relationships.

This can lead to recognizing patterns in perimeter and area of similar geometric figures.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 7.G.A.2

##### DRAFT Standards Statement (JAN 2021):

Draw triangles from three measures of angles or sides. Understand the possible side lengths and angle measures which determine a unique triangle, more than one triangle, or no triangle..

##### DRAFT Clarifying Guidance (JAN 2021):

**NOTES**

Know when 3 side lengths will form a triangle.

Know that the angle measures in a triangle have a sum of 180 degrees.

Students should be provided opportunities to draw triangles with ruler and protractor, and with technology.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 7.G.A.3

##### DRAFT Standards Statement (JAN 2021):

[Recommend Removal]

##### DRAFT Clarifying Guidance (JAN 2021):

[no additional guidance at this time]

##### *Original CCSS Text (2010):*

*Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.*

### CLUSTER: 7.G.B - Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.

#### STANDARD: 7.G.B.4

##### DRAFT Standards Statement (JAN 2021):

Understand the relationship between area and circumference of circles. Choose and use the appropriate formula to solve problems with radius, diameter, circumference and area of circles.

##### DRAFT Clarifying Guidance (JAN 2021):

NOTES

Students should know how to write responses in terms of pi.

Students should be given opportunities to calculate with estimations of pi.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 7.G.B.5

##### DRAFT Standards Statement (JAN 2021):

Apply facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to determine an unknown angle in a figure.

##### DRAFT Clarifying Guidance (JAN 2021):

**NOTES**

This includes writing and solving simple equations for an unknown angle in a figure.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 7.G.B.6

##### DRAFT Standards Statement (JAN 2021):

Solve problems in authentic contexts involving two- and three-dimensional figures. Given formulas, calculate area, volume and surface area.

##### DRAFT Clarifying Guidance (JAN 2021):

**BOUNDARY**

This includes two- and three-dimensional objects composed of polygons.

**NOTES**

Students should understand the formulas for prisms as the general statement of the area of the base times the height. Students may build upon this generalization for volumes of figures in 8th grade.

Students should relate the formulas for parallelograms, triangles and trapezoids to the formula for a rectangle.

##### *Original CCSS Text (2010):*

*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.*

### CLUSTER: 7.SP.A - Use random sampling to draw inferences about a population.

#### STANDARD: 7.SP.A.1

##### DRAFT Standards Statement (JAN 2021):

Understand that statistics can be used to gain information about a population and that a sample is valid only if the sample is representative of that population.

##### DRAFT Clarifying Guidance (JAN 2021):

NOTES

Understand that random sampling tends to produce representative samples and support valid inferences.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 7.SP.A.2

##### DRAFT Standards Statement (JAN 2021):

Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Gauge how far off the estimate or prediction might be.

##### DRAFT Clarifying Guidance (JAN 2021):

**NOTES**

Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions.

**EXAMPLES**

For example, estimate the mean word length in a book by randomly sampling words from the book.

For example, predict the winner of a school election based on randomly sampled survey data.

##### *Original CCSS Text (2010):*

*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.*

### CLUSTER: 7.SP.B - Draw informal comparative inferences about two populations.

#### STANDARD: 7.SP.B.3

##### DRAFT Standards Statement (JAN 2021):

Assess two data distributions visually to compare multiple measures of center and variability.

##### DRAFT Clarifying Guidance (JAN 2021):

**NOTES**

Given visual representations of data from dot plots, line graphs, histograms and box-plots, create statements that compare the measures of center and variability between two data sets.

**EXAMPLE**

For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.

##### *Original CCSS Text (2010):*

*Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.*

#### STANDARD: 7.SP.B.4

##### DRAFT Standards Statement (JAN 2021):

Use measures of center and measures of variability for numerical data from random samples to compare and make informal inferences between two populations.

##### DRAFT Clarifying Guidance (JAN 2021):

**EXAMPLES**

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.

##### *Original CCSS Text (2010):*

*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.*

### CLUSTER: 7.SP.C - Investigate chance processes and develop, use, and evaluate probability models.

#### STANDARD: 7.SP.C.5

##### DRAFT Standards Statement (JAN 2021):

Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Represent probabilities as fractions, decimals, and percents.

##### DRAFT Clarifying Guidance (JAN 2021):

NOTES

Know that a probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is equally likely, and a probability near 1 indicates a likely event.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 7.SP.C.6

##### DRAFT Standards Statement (JAN 2021):

Use experimental data and theoretical probability to make predictions. Understand the probability predictions may not be exact.

##### DRAFT Clarifying Guidance (JAN 2021):

**NOTES**

Students should draw upon understanding of proportional relationships to make predictions.

**EXAMPLES**

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.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 7.SP.C.7

##### DRAFT Standards Statement (JAN 2021):

Develop a probability model and use it to find probabilities of events. Compare theoretical and experimental probabilities and explain possible sources of discrepancy if any exists.

##### DRAFT Clarifying Guidance (JAN 2021):

**EXAMPLES**

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.

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?

##### *Original CCSS Text (2010):*

*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.7.A 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.7.B 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?*

#### STANDARD: 7.SP.C.8

##### DRAFT Standards Statement (JAN 2021):

Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.

##### DRAFT Clarifying Guidance (JAN 2021):

**NOTES**

Design and use simulations to generate experimental data for compound events.

**EXAMPLES**

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?

Determine the probability of “rolling double sixes”

##### *Original CCSS Text (2010):*

*Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.*

*7.SP.C.8.A 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.8.B 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.8.C 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?*

# SECTION ELEVEN: Draft 8th Grade Standards

## 11A: Introduction

**Critical Areas for Grade 8 Mathematics**

In Grade 8, instructional time should focus on three critical areas: (1) formulating and reasoning about expressions and equations, including modeling an association in bivariate data with a linear equation, and solving linear equations and systems of linear equations; (2) grasping the concept of a function and using functions to describe quantitative relationships; (3) analyzing two- and three-dimensional space and figures using distance, angle, similarity, and congruence, and understanding and applying the Pythagorean Theorem.

1. Students use linear equations and systems of linear equations to represent, analyze, and solve a variety of problems. Students recognize equations for proportions (y/x = m or y = mx) as special linear equations (y = mx + b), understanding that the constant of proportionality (m) is the slope, and the graphs are lines through the origin. They understand that the slope (m) of a line is a constant rate of change, so that if the input or x-coordinate changes by an amount A, the output or y-coordinate changes by the amount m·A. Students also use a linear equation to describe the association between two quantities in bivariate data (such as arm span vs. height for students in a classroom). At this grade, fitting the model, and assessing its fit to the data are done informally. Interpreting the model in the context of the data requires students to express a relationship between the two quantities in question and to interpret components of the relationship (such as slope and y-intercept) in terms of the situation.  
     
   Students strategically choose and efficiently implement procedures to solve linear equations in one variable, understanding that when they use the properties of equality and the concept of logical equivalence, they maintain the solutions of the original equation. Students solve systems of two linear equations in two variables and relate the systems to pairs of lines in the plane; these intersect, are parallel, or are the same line. Students use linear equations, systems of linear equations, linear functions, and their understanding of slope of a line to analyze situations and solve problems.
2. Students grasp the concept of a function as a rule that assigns to each input exactly one output. They understand that functions describe situations where one quantity determines another. They can translate among representations and partial representations of functions (noting that tabular and graphical representations may be partial representations), and they describe how aspects of the function are reflected in the different representations.
3. Students use ideas about distance and angles, how they behave under translations, rotations, reflections, and dilations, and ideas about congruence and similarity to describe and analyze two-dimensional figures and to solve problems. Students show that the sum of the angles in a triangle is the angle formed by a straight line, and that various configurations of lines give rise to similar triangles because of the angles created when a transversal cuts parallel lines. Students understand the statement of the Pythagorean Theorem and its converse, and can explain why the Pythagorean Theorem holds, for example, by decomposing a square in two different ways. They apply the Pythagorean Theorem to find distances between points on the coordinate plane, to find lengths, and to analyze polygons. Students complete their work on volume by solving problems involving cones, cylinders, and spheres.

### Grade 8 Overview

#### The Number System

* Know that there are numbers that are not rational, and approximate them by rational numbers.

#### Expressions and Equations

* Work with radicals and integer exponents.
* Understand the connections between proportional relationships, lines, and linear equations.
* Analyze and solve linear equations and pairs of simultaneous linear equations.

#### Functions

* Define, evaluate, and compare functions.
* Use functions to model relationships between quantities.

#### Geometry

* Understand congruence and similarity using physical models, transparencies, or geometry software.
* Understand and apply the Pythagorean Theorem.
* Solve real-world and mathematical problems involving volume of cylinders, cones and spheres.

#### Statistics and Probability

* Investigate patterns of association in bivariate data.

### Mathematical Practices

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

### Highlights of Major Work in Grades K-8

K-2: Addition and subtraction – concepts, skills, and problem solving; place value

3-5: Multiplication and division of whole numbers and fractions – concepts, skills, and problem solving

6: Ratios and proportional relationships; early expressions and equations

7: Ratios and proportional relationships; arithmetic of rational numbers

8: Linear algebra and linear functions

## 11B: Draft Standards Statements – Grade 8

The standards listed in the tables below list both core standards statements and cluster prioritization for K-8 mathematics. Not all content in a given grade is emphasized equally in the Standards. Some clusters require greater emphasis than others based on the depth of the ideas, the time that they take to master, and/or their importance to future mathematics or the demands of college and career readiness. (Link to [Focus by Grade Level documents](https://achievethecore.org/category/774/mathematics-focus-by-grade-level))

Students should spend the large majority of their time on the major work of the grade ( ). Supporting work ( ) and, where appropriate, additional work () can engage students in the major work of the grade.

### 8.NS - The Number System

#### 8.NS.A - Know that there are numbers that are not rational, and approximate them by rational numbers.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **8.NS.A.1** | Know that real numbers that are not rational are called irrational. |
| **8.NS.A.2** | Use rational approximations of irrational numbers to compare size and locate on a number line. |

### 8.EE - Expressions & Equations

#### 8.EE.A - Expressions and Equations Work with radicals and integer exponents.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **8.EE.A.1** | Apply the properties of integer exponents using powers of 10 to generate equivalent numerical expressions. |
| **8.EE.A.2** | Represent solutions to equations using square root and cube root symbols. |
| **8.EE.A.3** | Estimate very large or very small quantities using a single digit times an integer power of ten. |
| **8.EE.A.4** | Perform operations with numbers expressed in scientific notation. |

#### 8.EE.B - Understand the connections between proportional relationships, lines, and linear equations.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **8.EE.B.5** | Graph proportional relationships in authentic contexts and interpret the unit rate as the slope of the graph. |
| **8.EE.B.6** | Write the equation for a line in slope intercept form y = mx + b, where m and b are rational numbers, and explain in context why the slope m is the same between any two distinct points. |

#### 8.EE.C - Analyze and solve linear equations and pairs of simultaneous linear equations.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **8.EE.C.7** | Solve linear equations in one variable including equations with rational number coefficients, with the variable on both sides, or whose solutions require using the distributive property and/or combining like terms. |
| **8.EE.C.8** | Find, analyze, and interpret solutions to pairs of simultaneous linear equations using graphs or tables. |

### 8.F - Functions

#### 8.F.A -Define, evaluate, and compare functions.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **8.F.A.1** | Understand in authentic contexts, that the graph of a function is the set of ordered pairs consisting of an input and a corresponding output. |
| **8.F.A.2** | Compare the properties of two functions represented algebraically, graphically, numerically in tables, or verbally by description. |
| **8.F.A.3** | Understand and identify linear functions, whose graph is a straight line, and identify examples of functions that are not linear. |

#### 8.F.B - Use functions to model relationships between quantities.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **8.F.B.4** | Construct a function to model a linear relationship in authentic contexts between two quantities. |
| **8.F.B.5** | Describe qualitatively the functional relationship between two quantities in authentic contexts by analyzing a graph. |

### 8.G - Geometry

#### 8.G.A - Understand congruence and similarity using physical models, transparencies, or geometry software.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **8.G.A.1** | Verify experimentally the properties of rotations, reflections, and translations. |
| **8.G.A.2** | 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. |
| **8.G.A.3** | Describe the effect of dilations, translations, rotations and reflections on two-dimensional figures using coordinates. |
| **8.G.A.4** | 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. |
| **8.G.A.5** | Use informal arguments to establish facts about interior and exterior angles of triangles and angles formed by parallel lines cut with a transversal. |

#### 8.G.B - Understand and apply the Pythagorean Theorem.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **8.G.B.6** | Distinguish between the Pythagorean Theorem and its Converse. |
| **8.G.B.7** | Apply the Pythagorean Theorem to determine unknown side lengths in right triangles. |
| **8.G.B.8** | Apply the Pythagorean Theorem to find the distance between two points in a coordinate system. |

#### 8.G.C - Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **8.G.C.9** | Choose and use the appropriate formula for the volume of cones, cylinders, and spheres to solve problems in authentic contexts. |

### 8.SP - Statistics & Probability

#### 8.SP.A - Investigate patterns of association in bivariate data.

| Standard | Standards Statement (Jan 2021 Draft) |
| --- | --- |
| **8.SP.A.1** | Construct and interpret scatter plots for bivariate data to investigate patterns of association between two quantities. |
| **8.SP.A.2** | Know that straight lines are widely used to model relationships between two quantitative variables. |
| **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. |
| **8.SP.A.4** | Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. |

## 11C: Grade 8 Crosswalk with Clarifying Guidance

### CLUSTER: 8.NS.A - Know that there are numbers that are not rational, and approximate them by rational numbers.

#### STANDARD: 8.NS.A.1

##### DRAFT Standards Statement (JAN 2021):

Know that real numbers that are not rational are called irrational.

##### DRAFT Clarifying Guidance (JAN 2021):

Understand that every number has a decimal expansion. For rational numbers show that the decimal expansion repeats eventually. Convert a decimal expansion which repeats eventually into a rational number expressed as a fraction.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 8.NS.A.2

##### DRAFT Standards Statement (JAN 2021):

Use rational approximations of irrational numbers to compare size and locate on a number line.

##### DRAFT Clarifying Guidance (JAN 2021):

Compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of square roots. For example, start with locating the nearest perfect squares and obtain closer and closer successive decimal approximations.

##### *Original CCSS Text (2010):*

*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., π2). For example, by truncating the decimal expansion of √2, show that √2 is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.*

### CLUSTER: 8.EE.A - Expressions and Equations Work with radicals and integer exponents.

#### STANDARD: 8.EE.A.1

##### DRAFT Standards Statement (JAN 2021):

Apply the properties of integer exponents using powers of 10 to generate equivalent numerical expressions.

##### DRAFT Clarifying Guidance (JAN 2021):

Generate equivalent numerical expressions. For example, 10^2 × 10^(–5) = 10^(–3) = 1/(10^3) = 1/1000.

##### *Original CCSS Text (2010):*

*Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, 32 × 3-5 = 3-3 = 1/33 = 1/27.*

#### STANDARD: 8.EE.A.2

##### DRAFT Standards Statement (JAN 2021):

Represent solutions to equations using square root and cube root symbols.

##### DRAFT Clarifying Guidance (JAN 2021):

Equations are of the form x^2 = p and x^3 = p, where p is a positive rational number. In addition, evaluate square roots of small perfect squares up to 225 and cube roots of small perfect cubes up to 1000. Know that any square root that is not an integer is irrational.

##### *Original CCSS Text (2010):*

*Use square root and cube root symbols to represent solutions to equations of the form x2 = p and x3 = p, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational.*

#### STANDARD: 8.EE.A.3

##### DRAFT Standards Statement (JAN 2021):

Estimate very large or very small quantities using a single digit times an integer power of ten.

##### DRAFT Clarifying Guidance (JAN 2021):

Compare two quantities written in this format. 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.

##### *Original CCSS Text (2010):*

*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 times 108 and the population of the world as 7 times 109, and determine that the world population is more than 20 times larger.*

#### STANDARD: 8.EE.A.4

##### DRAFT Standards Statement (JAN 2021):

Perform operations with numbers expressed in scientific notation.

##### DRAFT Clarifying Guidance (JAN 2021):

Include real-world problems where both standard and scientific notation are used. Use scientific notation to choose units of appropriate size for measurements of very large or very small quantities. For example, use millimeters per year for seafloor spreading. Interpret scientific notation that has been generated by technology.

##### *Original CCSS Text (2010):*

*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*

### CLUSTER: 8.EE.B - Understand the connections between proportional relationships, lines, and linear equations.

#### STANDARD: 8.EE.B.5

##### DRAFT Standards Statement (JAN 2021):

Graph proportional relationships in authentic contexts and interpret the unit rate as the slope of the graph.

##### DRAFT Clarifying Guidance (JAN 2021):

Interpret the unit rate as the slope of the graph. Compare one or more 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.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 8.EE.B.6

##### DRAFT Standards Statement (JAN 2021):

Write the equation for a line in slope intercept form y = mx + b, where m and b are rational numbers, and explain in context why the slope m is the same between any two distinct points.

##### DRAFT Clarifying Guidance (JAN 2021):

Know that the slope m is the same between any two distinct points on a non-vertical line and be able to explain or demonstrate why.

##### *Original CCSS Text (2010):*

*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.*

### CLUSTER: 8.EE.C - Analyze and solve linear equations and pairs of simultaneous linear equations.

#### STANDARD: 8.EE.C.7

##### DRAFT Standards Statement (JAN 2021):

Solve linear equations in one variable including equations with rational number coefficients, with the variable on both sides, or whose solutions require using the distributive property and/or combining like terms.

##### DRAFT Clarifying Guidance (JAN 2021):

This standard also includes solving or giving examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions.

##### *Original CCSS Text (2010):*

*Solve linear equations in one variable.*

*8.EE.C.7.A 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).*

*8.EE.C.7.B Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.*

#### STANDARD: 8.EE.C.8

##### DRAFT Standards Statement (JAN 2021):

Find, analyze, and interpret solutions to pairs of simultaneous linear equations using graphs or tables.

##### DRAFT Clarifying Guidance (JAN 2021):

8A: Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs.

8B: Solve systems of equations graphically and using tables. Understand that the solution may be approximate.

8C: Include 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.

##### *Original CCSS Text (2010):*

*Analyze and solve pairs of simultaneous linear equations.*

*8.EE.C.8.A 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.*

*8.EE.C.8.B 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.*

*8.EE.C.8.C 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.*

### CLUSTER: 8.F.A - Define, evaluate, and compare functions.

#### STANDARD: 8.F.A.1

##### DRAFT Standards Statement (JAN 2021):

Understand in authentic contexts, that the graph of a function is the set of ordered pairs consisting of an input and a corresponding output.

##### DRAFT Clarifying Guidance (JAN 2021):

Understanding that a function is a rule that assigns exactly one output to each input and using function notation are not required in Grade 8.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 8.F.A.2

##### DRAFT Standards Statement (JAN 2021):

Compare the properties of two functions represented algebraically, graphically, numerically in tables, or verbally by description.

##### DRAFT Clarifying Guidance (JAN 2021):

For example, given a linear function represented by a table of values and a linear function represented by an algebraic equation, determine which function has the greater rate of change.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 8.F.A.3

##### DRAFT Standards Statement (JAN 2021):

Understand and identify linear functions, whose graph is a straight line, and identify examples of functions that are not linear.

##### DRAFT Clarifying Guidance (JAN 2021):

For example, A) determine if an equation represents a linear function and give examples of both linear and non-linear functions and B) show that the function A = s^2 is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.

##### *Original CCSS Text (2010):*

*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 = s2 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.*

### CLUSTER: 8.F.B - Use functions to model relationships between quantities.

#### STANDARD: 8.F.B.4

##### DRAFT Standards Statement (JAN 2021):

Construct a function to model a linear relationship in authentic contexts between two quantities.

##### DRAFT Clarifying Guidance (JAN 2021):

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.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 8.F.B.5

##### DRAFT Standards Statement (JAN 2021):

Describe qualitatively the functional relationship between two quantities in authentic contexts by analyzing a graph.

##### DRAFT Clarifying Guidance (JAN 2021):

For example, 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.

##### *Original CCSS Text (2010):*

*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.*

### CLUSTER: 8.G.A - Understand congruence and similarity using physical models, transparencies, or geometry software.

#### STANDARD: 8.G.A.1

##### DRAFT Standards Statement (JAN 2021):

Verify experimentally the properties of rotations, reflections, and translations.

##### DRAFT Clarifying Guidance (JAN 2021):

Understand that: 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.

For example, show these properties using physical models, transparencies, and/or geometry software.

##### *Original CCSS Text (2010):*

*Verify experimentally the properties of rotations, reflections, and translations:*

*8.G.A.1.A Lines are taken to lines, and line segments to line segments of the same length.*

*8.G.A.1.B Angles are taken to angles of the same measure.*

*8.G.A.1.C Parallel lines are taken to parallel lines.*

#### STANDARD: 8.G.A.2

##### DRAFT Standards Statement (JAN 2021):

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.

##### DRAFT Clarifying Guidance (JAN 2021):

For example, given two congruent figures, describe a sequence of transformations that demonstrates the congruence between them.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 8.G.A.3

##### DRAFT Standards Statement (JAN 2021):

Describe the effect of dilations, translations, rotations and reflections on two-dimensional figures using coordinates.

##### DRAFT Clarifying Guidance (JAN 2021):

For example, given a triangle with given coordinates, give the new coordinates after a prescribed transformation.

##### *Original CCSS Text (2010):*

*Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.*

#### STANDARD: 8.G.A.4

##### DRAFT Standards Statement (JAN 2021):

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.

##### DRAFT Clarifying Guidance (JAN 2021):

For example, given two similar two-dimensional figures, describe a sequence of transformations that demonstrates the similarity between them.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 8.G.A.5

##### DRAFT Standards Statement (JAN 2021):

Use informal arguments to establish facts about interior and exterior angles of triangles and angles formed by parallel lines cut with a transversal.

##### DRAFT Clarifying Guidance (JAN 2021):

This standard includes using the properties of the angle sum of the interior angles of a triangle, exterior angle of triangles, the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles to find missing angle measures.

##### *Original CCSS Text (2010):*

*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.*

### CLUSTER: 8.G.B - Understand and apply the Pythagorean Theorem.

#### STANDARD: 8.G.B.6

##### DRAFT Standards Statement (JAN 2021):

Distinguish between the Pythagorean Theorem and its Converse.

##### DRAFT Clarifying Guidance (JAN 2021):

Students should have the opportunity to explore one or more proofs of the Pythagorean Theorem.

##### *Original CCSS Text (2010):*

*Explain a proof of the Pythagorean Theorem and its converse.*

#### STANDARD: 8.G.B.7

##### DRAFT Standards Statement (JAN 2021):

Introduce applications of the Pythagorean Theorem in authentic contexts to determine unknown side lengths in right triangles.

##### DRAFT Clarifying Guidance (JAN 2021):

Include real-world and mathematical problems in two and three dimensions.

##### *Original CCSS Text (2010):*

*Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.*

#### STANDARD: 8.G.B.8

##### DRAFT Standards Statement (JAN 2021):

Introduce applications of the Pythagorean Theorem in authentic contexts to determine unknown side lengths in right triangles.

##### DRAFT Clarifying Guidance (JAN 2021):

The Distance Formula is NOT included in the 8th grade standard.

##### *Original CCSS Text (2010):*

*Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.*

### CLUSTER: 8.G.C - Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.

#### STANDARD: 8.G.C.9

##### DRAFT Standards Statement (JAN 2021):

Choose and use the appropriate formula for the volume of cones, cylinders, and spheres to solve problems in authentic contexts.

##### DRAFT Clarifying Guidance (JAN 2021):

Memorizing the formulas is NOT included in this standard.

##### *Original CCSS Text (2010):*

*Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.*

### CLUSTER: 8.SP.A - Investigate patterns of association in bivariate data.

#### STANDARD: 8.SP.A.1

##### DRAFT Standards Statement (JAN 2021):

Construct and interpret scatter plots for bivariate data to investigate patterns of association between two quantities.

##### DRAFT Clarifying Guidance (JAN 2021):

Bivariate data are data for two variables (usually two types of related data), such as height and weight.

Describe patterns such as clustering, outliers, positive/negative/no association, linear association, and nonlinear association.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 8.SP.A.2

##### DRAFT Standards Statement (JAN 2021):

Know that straight lines are widely used to model relationships between two quantitative variables.

##### DRAFT Clarifying Guidance (JAN 2021):

For example, create a scatter plot for bivariate data and, if appropriate, informally fit a straight line and use the line to predict values. Informally assess the model fit by judging the closeness of the data points to the line.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 8.SP.A.3

##### DRAFT Standards Statement (JAN 2021):

Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept.

##### DRAFT Clarifying Guidance (JAN 2021):

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.

##### *Original CCSS Text (2010):*

*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.*

#### STANDARD: 8.SP.A.4

##### DRAFT Standards Statement (JAN 2021):

Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table.

##### DRAFT Clarifying Guidance (JAN 2021):

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?

##### *Original CCSS Text (2010):*

*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?*