Grade 7 Major Work of the Grade

CCSS-Aligned 40-Week Pacing Guide with Coherence Connections & Curriculum Alignment

Aligned to Common Core State Standards for Mathematics | Achieve the Core Coherence Framework

For Math Instructional Leaders, Curriculum Coordinators, and Classroom Teachers

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Section 1 Purpose Statement

Purpose of This Document

This document provides a comprehensive, coherence-driven guide to the **Major Work of Grade 7** in mathematics, aligned to the Common Core State Standards for Mathematics (CCSS-M) and the Achieve the Core Coherence Framework. It is designed for use by math instructional leaders, curriculum coordinators, and classroom teachers who are responsible for planning, sequencing, and delivering Grade 7 mathematics instruction.

The guiding principle behind this document is **focus and coherence**. Achieve the Core emphasizes that the large majority of instructional time, approximately 65–75% at Grade 7, should be dedicated to the major work of the grade. Major work is not simply the most important content; it is the content that, when taught deeply and with coherence, opens the door to everything that follows in middle school and high school mathematics.

Achieve the Core: Grade 7 Focus Guidance

The major clusters in Grade 7: Ratios and Proportional Relationships (7.RP.A), The Number System (7.NS.A), and Expressions and Equations (7.EE.A–B) represent the instructional core of the year. Supporting and additional standards deepen and extend major work; they should never displace it.

Grade 7 Key Areas of Focus

1. **Proportional Relationships (7.RP.A)** - The gravitational center of the entire year. Grade 7 formalizes ratio reasoning from Grade 6 into the equation y = kx, connecting to linear functions in Grade 8. Proportionality is not merely one unit in Grade 7; it is the universal lens through which every other domain is viewed.
2. **Operations with Rational Numbers (7.NS.A)** - All four operations, all rational numbers including negatives. This is the arithmetic engine that powers every other standard in Grade 7. Students

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cannot access the full complexity of proportional relationships, expressions, or geometry without fluency with rational number operations.

3. **Expressions and Equations with Rational Number Coefficients (7.EE.A–B)** - Extending Grade 6's one-step equation work to multi-step situations. Students solve px + q = r and p(x + q) = r, write and solve inequalities, and apply algebraic reasoning to rich real-world problems.
4. **Inferences About Populations from Samples (7.SP.A–B)** - Statistical inference is introduced for the first time in Grade 7. Students use random samples to make claims about populations, building the foundation for high school statistics.

Grade 7 is the year proportionality becomes a universal lens across ALL domains. Geometry uses scale factors. Statistics uses proportional sampling. Expressions and equations formalize y = kx.
7.NS provides the arithmetic. 7.EE builds the algebra. 7.RP is the coherent center.

Required Fluency

7.NS.A - Adding, subtracting, multiplying, and dividing rational numbers is the culminating fluency of the entire Grades 4–7 number system progression. Students who do not achieve fluency with rational number operations in Grade 7 carry a computational deficit into every subsequent course. This is the single most consequential fluency target in the middle grades.

Section 2 Grade 7 CCSS Domain Overview

All Grade 7 Standards by Domain, Cluster, and Emphasis

The table below presents all Grade 7 CCSS-M domains, clusters, and individual standards with their designated emphasis level. Major work clusters are the instructional priority. Supporting clusters reinforce and extend major work. Additional clusters round out the grade-level content.

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Emphasis Key: ★ MAJOR ● SUPPORTING ○ ADDITIONAL

Domain	Cluster	Emphasis	Standards
Ratios & Proportional Relationships (7.RP)	**7.RP.A** - Analyze proportional relationships and use them to solve real-world and mathematical problems	★ MAJOR	**7.RP.A.1:** Compute unit rates associated with ratios of fractions (e.g., if a person walks ½ mile in each ¼ hour, the unit rate is 2 mph)
7.RP.A.2: Recognize and represent proportional relationships - (2a) decide if a relationship is proportional; (2b) identify constant of proportionality k in tables, graphs, equations, and diagrams; (2c) represent proportional relationships by equations of the form y = kx; (2d) explain what a point (x, y) on the graph means in context, including (0,0) and (1,k)			
7.RP.A.3: Use proportional relationships to solve multi-step ratio and percent problems - tax, tip, discount, percent increase, percent decrease, percent error, simple interest, commission			
The Number System (7.NS)	**7.NS.A** - Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers	★ MAJOR	**7.NS.A.1:** Add and subtract rational numbers - (1a) describe situations in which opposite quantities combine to make 0; additive inverse on number line; (1b) understand p + q as distance |q| from p, with direction indicated by sign; (1c) subtraction as adding the additive inverse; (1d) apply properties to add and subtract rational numbers; fluency
7.NS.A.2: Multiply and divide rational numbers - (2a) understand that products of negatives are positive; products of positives and negatives are negative; (2b) understand division with integers and the relationship to multiplication; (2c) extend to rational numbers; (2d) convert a rational number to a decimal using long division; know that rational numbers terminate or repeat			
7.NS.A.3: Solve real-world and mathematical problems involving the four operations with rational numbers			
(Fluency target for Grade 7)			
Expressions & Equations (7.EE)	**7.EE.A** Use properties of operations to generate	★ MAJOR	**7.EE.A.1:** Add, subtract, factor, and expand linear expressions with rational

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Domain	Cluster	Emphasis	Standards
	equivalent expressions		coefficients using properties of operations
7.EE.A.2: Rewrite an expression in different forms to shed light on the problem; understand that different forms reveal different information about a quantity			
7.EE.B Solve real-life and mathematical problems using numerical and algebraic expressions and equations	★ **MAJOR**	**7.EE.B.3:** Solve multi-step real-world and mathematical problems posed with positive and negative rational numbers; assess reasonableness using mental computation and estimation	
7.EE.B.4: Use variables to set up and solve word problems (4a) equations of the form px + q = r and p(x + q) = r; (4b) inequalities of the form px + q > r or px + q < r; graph and interpret solution sets			
Note: 7.EE connects proportional relationships (y = kx) to algebraic structure and extends to non-proportional linear equations.			
Geometry (7.G)	**7.G.A** - Draw, construct, and describe geometrical figures and relationships between them	● **SUPPORTING**	**7.G.A.1:** Solve problems involving scale drawings of geometric figures; reproduce scale drawings at a different scale; compute actual lengths and areas from a scale drawing
7.G.A.2: Draw geometric shapes with given conditions; focus on triangles from three measures of angles or sides - understand when conditions determine a unique triangle, more than one, or none			
7.G.A.3: Describe the two-dimensional figures that result from slicing three-dimensional figures (cross-sections of right rectangular prisms and right rectangular pyramids)			
7.G.B Solve real-world and mathematical problems involving angle measure, area, surface area, and volume	● **SUPPORTING**	**7.G.B.4:** Know the formulas for area and circumference of a circle; give an informal derivation of the relationship between circumference and area of a circle; $C = \pi d$; $A = \pi r^2$	
7.G.B.5: 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			
7.G.B.6: Solve real-world and mathematical problems involving area, volume, and surface area of two- and three-dimensional objects (triangles, quadrilaterals, polygons, cubes, and right prisms)			
Statistics & Probability (7.SP)	**7.SP.A** Use random sampling to draw inferences about a population	○ **ADDITIONAL**	**7.SP.A.1:** Understand that statistics can be used to gain information about a population by examining a sample; understand that random sampling tends to produce representative samples and support valid inferences

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Domain	Cluster	Emphasis	Standards
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 an estimate or prediction might be by generating multiple samples			
7.SP.B Draw informal comparative inferences about two populations	○ **ADDITIONAL**		**7.SP.B.3:** 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
7.SP.B.4: Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations			
7.SP.C Investigate chance processes and develop, use, and evaluate probability models	○ **ADDITIONAL**		**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; 0 = impossible; 1 = certain; closer to 1 = more likely
7.SP.C.6: Approximate the probability of a chance event by collecting data on the chance process and observing its long-run relative frequency; compare to theoretical probability			
7.SP.C.7: Develop probability models (7a) uniform probability model; assign equal probability to outcomes; (7b) non-uniform probability model; compare predicted vs. observed frequencies			
7.SP.C.8: Find probabilities of compound events (8a) understand the sample space; (8b) represent using organized lists, tables, tree diagrams, and simulation; (8c) design and use simulation to generate frequencies for compound events			

Section 3 - Achieve the Core Coherence Connections

Vertical and Horizontal Coherence Map - Grade 7

The table below maps each Grade 7 major, supporting, and additional cluster to its connections across prior grades, within Grade 7, and into future grades. This is the instructional blueprint for coherent teaching - understanding where students come from and where each standard leads.

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Standard / Cluster	Prior Grade Connections	Within Grade 7 Connections	Future Grade Connections
7.RP.A ★ MAJOR Proportional Relationships	**6.RP.A** Ratio concepts, unit rate, ratio tables, equivalent ratios, percent as rate per 100 **6.NS.A.1** Fraction division (essential for ratios of fractions in 7.RP.A.1) **5.NF.B** Fraction multiplication and division as foundation	**7.NS.A** Rational number arithmetic is the computational engine for fractional rates and negative contexts **7.EE.A–B** - y = kx is formalized into equations; solving proportional equations uses 7.EE tools **7.G.A.1** Scale drawings are proportional relationships; scale factor = k **7.SP.A** Sampling as proportional reasoning; sample proportion estimates population proportion	**8.EE.B** Proportional vs. non-proportional linear relationships; slope = unit rate **8.F.A** Functions; proportional relationships are a special case (y = kx) **8.SP.A** Bivariate data; lines of fit; slope as unit rate **HS Algebra** Linear functions; slope-intercept form; direct variation
7.NS.A ★ MAJOR Rational Number Operations	**6.NS.A.1** Fraction division **6.NS.B** Decimal fluency; multi-digit computation **6.NS.C** Rational numbers on number line, absolute value, ordering, comparing **4–6 NF** Fraction concepts and operations	**7.RP.A.1** Ratios of fractions require fraction division fluency **7.EE.A–B** Rational coefficients in expressions and equations require rational arithmetic **7.G.B.4, 7.G.B.6** Formulas with rational and irrational measurements **7.SP** Computing means, medians, MAD, and IQR from data sets	**8.NS.A** Irrational numbers extend the rational number system; 7.NS.A.2d previews this **8.EE.A** Scientific notation; properties of integer exponents **8.EE.C** Solving linear equations and systems with rational coefficients **HS:** Real number system; complex numbers
7.EE.A ★ MAJOR Equivalent Expressions	**6.EE.A.1–4** Write and evaluate algebraic expressions; identify equivalent expressions; apply distributive property; properties of operations **6.NS** Rational number fluency for evaluating expressions	**7.EE.B** Equivalent expressions are the tools used to simplify and solve equations **7.NS.A** Rational coefficients in expressions require rational arithmetic **7.RP.A.2c** - y = kx is a special linear expression; proportionality as equation form	**8.EE.A** Properties of integer exponents extend algebraic structure **8.EE.C** Systems of linear equations **HS Algebra** Polynomial operations; factoring; algebraic structure
7.EE.B ★ MAJOR Equations & Inequalities	**6.EE.B.5–8** One-step equations x + p = q and px = q; inequalities x > c; using variables for unknowns; substitution **6.EE.C.9** Dependent and independent	**7.NS.A** Provides rational number coefficients throughout equations and inequalities **7.RP.A.2c** y = kx as a proportional equation context **7.EE.A** Equivalent expressions used to simplify both sides before solving **7.G.B.5** Angle equations as a concrete context for px + q = r	**8.EE.C** Systems of two linear equations in two variables **8.F.A–B** Functions; linear equations; rate of change **HS Algebra I** Quadratic equations; systems; inequalities in two variables

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Standard / Cluster	Prior Grade Connections	Within Grade 7 Connections	Future Grade Connections
	variables; analyze relationships		
7.G.A ● SUPPORTING Geometric Figures & Scale	**6.G.A.1** Area of polygons on the coordinate plane **6.G.A.3** Coordinate plane; polygons from vertices **6.RP.A** Scale as a ratio; equivalent ratios for scale	**7.RP.A.2** Scale factor is the constant of proportionality; y = kx is the scale relationship **7.G.B.5** Angle conditions for triangles (7.G.A.2) connect to angle relationships **7.NS.A** Rational number arithmetic for side lengths and angle measures	**8.G.A** Similarity and congruence; dilations as proportional transformations **8.G.B** Pythagorean Theorem; right triangle geometry **HS Geometry** Triangle congruence and similarity proofs
7.G.B ● SUPPORTING Angle, Area, Volume	**6.G.A.1–4** Area of triangles, quadrilaterals, polygons; surface area; volume with whole and fractional dimensions **6.EE.A.2c** Evaluate formulas with variables **4.MD.C** Angle measurement; protractor use	**7.EE.B.4a** Angle equations (px + q = r) for supplementary, complementary, vertical angles **7.NS.A** Rational arithmetic required for all geometric formula computations **7.RP.A** Circumference as a ratio (C/d = π); area formulas as proportional relationships	**8.G.C** Volume of cones, cylinders, and spheres (extension of 7.G.B.6) **8.NS.A** Irrational numbers appear in geometry (√2, π) **HS Geometry** Circle theorems; 3D geometry; trigonometry
7.SP.A–B ○ ADDITIONAL Sampling & Inference	**6.SP.A** Statistical questions; understanding distributions; dot plots; histograms; box plots **6.SP.B** Measures of center (mean, median); measures of variability (range, IQR, MAD)	**7.RP.A** Sample proportion as a ratio; using sample proportions to estimate population proportions **7.NS.A** Arithmetic required to compute sample statistics **7.EE.B.3** Multi-step reasoning in comparing population statistics	**HS Stats** Margin of error; confidence intervals; surveys vs. experiments; observational studies **HS Algebra II** Normal distribution; standard deviation; z-scores
7.SP.C ○ ADDITIONAL Probability	**6.SP.A–B** Data distributions; frequency; relative frequency (precursor to probability) **6.RP.A** Ratios and rates; probability as a ratio of favorable to total outcomes	**7.RP.A** Probability values are ratios between 0 and 1; probability as a proportional relationship **7.NS.A** Rational number arithmetic for computing all probability values **7.EE.B** Setting up and solving probability equations	**HS Stats** Conditional probability; independence; binomial distributions; Bayes' theorem **HS Algebra II** Permutations; combinations; counting principles

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In no other grade band is a single mathematical concept as pervasive as proportional reasoning is in Grade 7. **7.RP.A is not one unit among many; it is the conceptual spine of the entire year.** The Number System (7.NS.A) provides the arithmetic necessary to work with proportional relationships that involve fractions and negative quantities. Without rational number fluency, students cannot access the full complexity of y = kx when k is a fraction or negative. Expressions and Equations (7.EE.A–B) formalize those proportional relationships into symbolic equations that can be solved, manipulated, and interpreted. Geometry (7.G.A.1) applies proportionality to scale, revealing that scale drawings are nothing more than the equation y = kx applied spatially. Statistics (7.SP.A–B) uses proportional sampling to draw inferences; the sample proportion is a ratio used to estimate a population proportion.

Instruction that treats these clusters as isolated units misses the coherent architecture of Grade 7. The most effective Grade 7 teachers make proportionality visible in every domain naming it explicitly when it appears in geometry, statistics, and equations, so that students experience Grade 7 as a unified mathematical story rather than a collection of disconnected topics.

Section 4 40-Week Pacing Guide by Quarter

40-Week Instructional Pacing Guide - Grade 7 Mathematics

Critical Sequencing Note

This pacing guide intentionally places **7.NS (Rational Number Operations) before 7.RP (Proportional Relationships)**. This differs from several commercial curricula. The rationale is pedagogically essential: students cannot compute unit rates with fractional quantities (7.RP.A.1), identify fractional constants of proportionality (7.RP.A.2b), or solve percent problems with decimal results (7.RP.A.3) without fluency in rational number arithmetic. Beginning proportional relationships before 7.NS fluency is established is the single most common pacing error in Grade 7.

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QUARTER 1 (Weeks 1–10) Rational Number Operations: Building the Arithmetic Engine

Rationale: 7.NS must come first because every other domain in Grade 7 depends on rational number arithmetic. This quarter establishes the computational foundation for the entire year.

Week	CCSS Standards	Unit / Topic Name	Days	Supporting Standards & Connections	Assessment / Notes
Week 1	6.NS.C (review)	Diagnostic Pre-Assessment; Number System Review - integers, absolute value, ordering and comparing rational numbers, the number line	5	6.NS.C.5–7 (integer contexts, absolute value, coordinate plane); 6.RP.A (ratio review)	**Pre-Assessment:** Administer Grade 7 Readiness Diagnostic; identify gaps in 6.NS and 6.RP
Weeks 2–3	7.NS.A.1a–d	Adding and Subtracting Rational Numbers - additive inverses; number line models; chip models; real-world contexts (temperature, elevation, finance, sea level)	10	6.NS.C.5–7 (absolute value, opposite numbers); 6.NS.B.3 (decimal operations)	Daily exit tickets; conceptual check: can students explain why a negative + negative = more negative?
Weeks 4–5	7.NS.A.2a–c	Multiplying and Dividing Rational Numbers - sign rules derived from patterns, not declarations; products of negatives as	10	6.NS.A.1 (fraction division); 6.NS.B.2–3 (long division, decimal operations)	Derive sign rules through multiplication table extensions before stating any rule; include mixed numbers and

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		positive; division as inverse of multiplication; extending to fractions			complex fractions
Week 6	7.NS.A.2d	Converting Fractions to Decimals - terminating vs. repeating decimals; long division interpretation; rational numbers either terminate or repeat (conceptual gateway to irrational numbers)	5	6.NS.B.2 (long division); 8.NS.A (irrational numbers - preview connection)	**Mid-Quarter Check:** 7.NS.A.1 and 7.NS.A.2 fluency check; address misconceptions before proceeding
Weeks 7–8	7.NS.A.3	Multi-Step Real-World Problems with Rational Numbers - all four operations; profit and loss; banking and budgeting; cooking and measurement; temperature change; elevation contexts	10	6.EE.B.7 (model and solve real-world problems); 7.EE.B.3 (preview - multi-step reasonableness)	Emphasis on choosing the correct operation; multi-step problem organization; reasonableness checks
Weeks 9–10	7.RP.A.1, 7.RP.A.2a–b	Introduction to Proportional Relationships - unit rates with fractions; deciding whether relationships are proportional	10	6.RP.A.1–3 (ratio concepts, unit rates, ratio tables, graphs); 7.NS.A (fractional rates require rational arithmetic)	**Q1 Assessment (Week 10):** 7.NS.A.1–3 fluency; all four operations with rational numbers including fractions and mixed numbers;

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		using tables and graphs; identifying constant of proportionality k			multi-step contexts

QUARTER 2 (Weeks 11–20) Proportional Relationships: The Core of Grade 7

Rationale: With rational number fluency established, students can now access the full complexity of proportional relationships - fractional rates, negative contexts, the formal equation y = kx, and all types of percent applications including percent change, error, and interest.

Week	CCSS Standards	Unit / Topic Name	Days	Supporting Standards & Connections	Assessment / Notes
Weeks 11–12	7.RP.A.2b–c	Constant of Proportionality - identify k in tables, graphs, equations, and verbal descriptions; write equations of the form y = kx; connect multiple representations of the same proportional relationship	10	6.RP.A.2–3 (unit rate as k); 6.EE.C.9 (equations relating variables); 7.NS.A (compute fractional k values)	Students should find k from a table BEFORE they see the equation y = kx; representations sequence: table → graph → equation
Weeks 13–14	7.RP.A.2d	Graphs of Proportional Relationships - graph y = kx; interpret what each point (x, y) means in context; explain why (0, 0) is on every proportional graph; identify (1, k) as the	10	6.RP.A.3a (graphing ratios); 6.EE.C.9 (independent/dependent variable); 8.EE.B.5 (preview - slope as rate of change)	Distinguish proportional graphs (through origin) from non-proportional linear graphs (y-intercept ≠ 0) - this distinction is critical for Grade 8

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		unit rate; compare steepness of graphs with different k values			
Week 15	7.RP.A.3 (Part 1)	Multi-Step Ratio and Percent Problems - tax, tip, and discount; single-step and two-step percent problems; always identify the whole (base) first; mental math strategies for common percents	5	6.RP.A.3c–d (percent, finding percent of a quantity); 7.NS.A (decimal multiplication for percent computations)	**Mid-Quarter Check (Week 15):** 7.RP.A.1, 7.RP.A.2a–d; tables, graphs, equations, and unit rates with fractions
Weeks 16–17	7.RP.A.3 (Part 2)	Percent Increase, Decrease, and Error - percent change formula; identifying the original value as the base (whole); percent error in measurement contexts; distinguishing percent of vs. percent change	10	6.RP.A.3c (percent of a quantity); 7.NS.A.2 (multiplying by decimals); 7.EE.B.3 (reasonableness of percent answers)	Common error: using the wrong base. Always: (amount of change ÷ original) × 100. Include problems where the final value is given and original is unknown
Week 18	7.RP.A.3 (Part 3)	Simple Interest and Commission - I = Prt; commission as a percent of sales; real-world financial contexts; multi-step problems combining	5	7.NS.A.2–3 (rational multiplication for I = Prt); 7.EE.B.4a (solving for unknown in I = Prt)	Connect I = Prt to proportional reasoning: interest is proportional to principal, time, and rate separately; multi-variable proportional contexts

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		percent types; consumer math applications			
Weeks 19–20	7.G.A.1	Scale Drawings - reproduce scale drawings at different scales; compute actual lengths and areas from a scale drawing; scale factor as a proportional relationship; create scale drawings from real measurements	10	7.RP.A.2 (scale factor = constant of proportionality k); 7.EE.B.4a (solving for actual or drawing length); 6.G.A.1 (area of polygons)	**Q2 Assessment (Week 20):** Proportional reasoning - identify proportional relationships; write and use y = kx; solve all types of percent problems including percent change and simple interest; scale drawings

QUARTER 3 (Weeks 21–30) Expressions, Equations & Inequalities

Rationale: With proportional relationships and rational number operations solidly established, Grade 7 can now formalize multi-step algebraic reasoning extending Grade 6's one-step equations to two-step and beyond, with rational coefficients, in rich real-world contexts.

Week	CCSS Standards	Unit / Topic Name	Days	Supporting Standards & Connections	Assessment / Notes
Weeks 21–22	7.EE.A.1	Equivalent Expressions with Rational Coefficients - add, subtract, factor, and expand linear expressions; distributive property with negative and fractional coefficients; combining like	10	6.EE.A.3–4 (equivalent expressions, distributive property, identify equivalent expressions); 7.NS.A (rational arithmetic throughout)	Prerequisite check: Can students identify like terms and apply the distributive property with integers? Address 6.EE gaps before extending to

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		terms; identifying when expressions are equivalent			rational coefficients
Week 23	7.EE.A.2	Rewriting Expressions in Different Forms - understand that rewriting a + 0.05a = 1.05a reveals that an increase of 5% is multiplication by 1.05; different forms reveal different information; strategic use of equivalent expressions	5	7.RP.A.3 (percent expressions); 7.EE.A.1 (equivalent expressions are the tool); 7.EE.B (preparation for equation solving)	Key insight: the form of an expression is a mathematical choice, not just simplification. Connect to percent: a 20% discount on p is 0.80p - not just p − 0.20p
Weeks 24–26	7.EE.B.4a	Solving Two-Step Equations - px + q = r and p(x + q) = r with rational number coefficients; setting up equations from real-world word problems; verifying solutions by substitution; justifying solution steps using properties of equality	15	6.EE.B.7 (one-step equations); 7.NS.A (rational arithmetic for solving); 7.RP.A.2c (y = kx as proportional equation context); 7.G.B.5 (angle equations as concrete context)	**Mid-Quarter Check (Week 26):** 7.EE.A.1–2; solving px + q = r and p(x + q) = r with rational coefficients; real-world contexts
Weeks 27–28	7.EE.B.4b	Solving and Graphing Two-Step Inequalities - px + q > r and px + q < r; the inequality-flipping rule for multiplying/dividing by negatives (derived from number line reasoning, not declared as a rule); graphing solution sets on number lines; interpreting	10	6.EE.B.8 (write and graph inequalities of the form x > c or x < c); 7.NS.A (signed number operations in solving); 7.EE.B.4a (extend equation-solving process)	Derive the sign-flip rule: if −2x > 6, show on a number line that x must be less than −3. Never declare "flip when you divide by a negative" as a disconnected rule

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		inequalities in real-world contexts			
Weeks 29–30	7.EE.B.3	Multi-Step Real-World Problem Solving - assess reasonableness; mental computation and estimation strategies; positive and negative rational numbers in expressions, equations, and inequalities; integrating all of 7.EE and 7.NS in complex real-world contexts	10	7.NS.A.3 (multi-step problems with rational numbers); 7.RP.A.3 (percent contexts); 7.EE.A–B (all equation and expression tools)	**Q3 Assessment (Week 30):** Expressions and equations - equivalent expressions with rational coefficients; solve px + q = r and p(x + q) = r; write and solve inequalities; graph solution sets; multi-step real-world contexts

QUARTER 4 (Weeks 31–40) Geometry, Statistics, Probability & Review

Rationale: Geometry connects explicitly to proportional and algebraic reasoning established in Q1–Q3. Statistics extends Grade 6 work into inference. Probability is new to Grade 7 and requires dedicated instructional time. The quarter concludes with cumulative review integrating all major clusters.

Week	CCSS Standards	Unit / Topic Name	Days	Supporting Standards & Connections	Assessment / Notes
Weeks 31–32	7.G.B.5, 7.G.B.4	Geometry: Angles and Circles - supplementary, complementary, vertical, and adjacent angles; write and solve equations for unknown angles (7.EE.B.4a in	10	7.EE.B.4a (angle equations as equation context); 7.NS.A (rational arithmetic with π); 4.MD.C (angle concepts); 8.NS.A (π as	Angle equations are 7.EE disguised as geometry. Derive: supplementary x + 127 = 180; vertical 3x = 75. Circle derivation: wrap string

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		geometric context); area and circumference of circles; informal derivation of π through measurement		irrational - preview)	around circles; measure C and d; discover π empirically before any formula
Week 33	7.G.B.6	Surface Area and Volume - area of composite figures; surface area of prisms and pyramids; volume V = Bh for right prisms; composite solid figures; rational dimensions throughout	5	6.G.A.1–4 (area, surface area, volume with whole and fractional dimensions); 7.NS.A (rational measurement arithmetic); 7.EE.B.3 (multi-step reasonableness)	**Mid-Quarter Check (Week 33):** 7.G.B.4–6; angle equations, circle formulas, surface area, volume; connect back to 7.EE.B.4a throughout
Week 34	7.G.A.2–3	Geometric Figures - draw triangles given three conditions (angles or sides); determine when conditions produce a unique triangle, more than one, or none; cross-sections of right rectangular prisms and pyramids	5	7.G.B.5 (angle sum in triangles = 180°); 7.NS.A (angle measures as rational numbers); 8.G.A (preview - similarity and congruence from conditions)	Cross-sections: connect to 8.G.C (cylinders, cones, spheres - cross-sections are circles); build spatial reasoning through physical or digital models
Weeks 35–36	7.SP.A.1–2, 7.SP.B.3–4	Statistical Inference - random sampling and representative samples; why random sampling allows valid inference; using sample data to	10	6.SP.A–B (distributions, center, variability, IQR, MAD); 7.RP.A (sample proportion as ratio); 7.NS.A (arithmetic for computing statistics)	Distinguish convenience, voluntary, and random samples explicitly. Simulate: draw 10 different random samples from the same

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		estimate population characteristics; comparing two populations using measures of center and variability; visual overlap of distributions; MAD as a measure of difference			population; compare estimates - illustrate sampling variability. Compare MAD, IQR between two groups
Weeks 37–38	7.SP.C.5–8	Probability - probability as a number between 0 and 1; experimental vs. theoretical probability; uniform and non-uniform models; Law of Large Numbers through simulation; compound events using organized lists, tables, tree diagrams, and simulation; sample space analysis	10	7.RP.A (probability as ratio -favorable to total); 7.NS.A (rational arithmetic for probability values); 6.RP.A.3b (ratio as part-to-whole)	Experimental probability BEFORE theoretical. Students run simulations (coins, dice, spinners, digital) before computing theoretical probability. Tree diagrams built by students, not pre-given. Connect to 7.RP: P(event) is always a ratio
Weeks 39–40	7.RP, 7.NS, 7.EE (Cumulative)	Cumulative Review and End-of-Year Assessment - revisit 7.RP, 7.NS, 7.EE through integrated performance tasks; include geometry (circles, angle equations) and basic probability; address	10	All major clusters; cross-domain integration; connect proportional reasoning across geometry, statistics, and algebra	**EOY Assessment (Week 40):** Performance task integrating 7.RP + 7.NS + 7.EE; include 7.G.B (circles, angle equations); basic probability (7.SP.C). Administer Grade 8

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		unfinished learning; celebrate mathematical growth			Readiness Screener

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Section 5 Standards Time Allocation Summary

Instructional Time Summary by Domain

Domain / Cluster	Emphasis Level	Total Weeks	% of Instructional Time	Quarter(s)	Notes
7.NS.A - The Number System (Rational Number Operations)	★ MAJOR	9 weeks	**~22.5%**	Q1	Culminating fluency for Grades 4–7 number system progression
7.RP.A - Ratios and Proportional Relationships	★ MAJOR	9 weeks	**~22.5%**	Q1–Q2	Proportionality continues across ALL quarters as a lens, not just these weeks
7.EE.A–B - Expressions, Equations, and Inequalities	★ MAJOR	10 weeks	**~25%**	Q3	Includes 7.EE.A.1–2 (expressions) and 7.EE.B.3–4 (equations and inequalities)
7.G.A–B - Geometry	● SUPPORTING	5 weeks	**~12.5%**	Q2 (scale), Q4 (measurement)	Scale drawings taught in Q2 as a proportional relationships application; measurement geometry in Q4
7.SP.A–C - Statistics and Probability	○ ADDITIONAL	6 weeks	**~15%**	Q4	Inference (7.SP.A–B) and Probability (7.SP.C) together; connect to 7.RP throughout
Review / Assessment / Diagnostic	-	5 weeks	**~12.5%**	Q1–Q4	Pre-assessment, quarterly assessments, mid-quarter checks, EOY performance task

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TOTAL MAJOR WORK (7.NS + 7.RP + 7.EE)	★ MAJOR	**28 weeks**	**~70%**	Q1–Q3	Meets Achieve the Core recommendation of 65–75% on major work for Grade 7
MAJOR + SUPPORTING (7.NS + 7.RP + 7.EE + 7.G)	Major + Supporting	**33 weeks**	**~82.5%**	Q1–Q4	Reflects Achieve the Core Grade 7 recommendation: major + supporting = ~85%

Achieve the Core Grade 7 Time Allocation Guidance

Achieve the Core's Grade 7 focus document recommends that the large majority of instruction be devoted to major work. This pacing guide allocates approximately **70% of instructional time to major work** (7.RP, 7.NS, 7.EE) and approximately **83% to major + supporting combined**. Additional clusters (7.SP) receive approximately 15% - sufficient to address all standards while preserving the primacy of proportional relationships, rational number operations, and algebraic reasoning.

Section 6 - Supporting & Additional Standards: Connections to Major Work

How Supporting and Additional Standards Reinforce Major Work

A common misunderstanding is that supporting and additional standards are lower priority or can be skipped. In fact, their power lies in how they *reinforce* and *contextualize* major work. Well-designed instruction uses supporting and additional clusters as application contexts for major cluster skills not as separate topics. Below are specific connections for each Grade 7 supporting and additional standard.

7.G.A.1 Scale Drawings

● SUPPORTING

Scale drawings are proportional relationships applied geometrically. The scale factor is the constant of proportionality k; the equation "actual length = scale factor × drawing length" is precisely y = kx (7.RP.A.2c). When students find an unknown actual length given a drawing length and scale, they are

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solving a proportional equation (7.EE.B.4a). Three major cluster standards, 7.RP.A.2, 7.EE.B.4a, and 7.NS.A, all serve 7.G.A.1. Teaching scale drawings in isolation, without naming these connections, squanders a rich proportional reasoning context.

7.G.A.2 Drawing Triangles

● SUPPORTING

Drawing triangles given three conditions (side-side-side, angle-side-angle, etc.) requires understanding the angle sum property (angles in a triangle sum to 180°) which directly connects to 7.G.B.5 (angle relationships). Angle measures are rational numbers, requiring 7.NS.A arithmetic throughout. This standard also builds the foundational geometric reasoning for 8.G.A (congruence and similarity).

7.G.A.3 Cross-Sections

● SUPPORTING

Cross-sections of prisms and pyramids develop the spatial reasoning that is prerequisite for understanding why volume formulas for cylinders, cones, and spheres in Grade 8 (8.G.C) are what they are. A cross-section of a cylinder is a circle, connecting to 7.G.B.4. A cross-section of a rectangular prism is a rectangle, connecting to 7.G.B.6 area formulas.

7.G.B.4 Circles (Area and Circumference)

● SUPPORTING

Circle formulas sit at the intersection of three major clusters. Computing area ($A = \pi r^2$) and circumference ($C = \pi d$) requires rational number arithmetic (7.NS.A) multiplying by π approximated as 3.14 or 22/7. Finding an unknown radius or diameter from a known area or circumference requires setting up and solving a two-step equation (7.EE.B.4a): if $C = 31.4$, then $\pi d = 31.4$, so $d = 31.4 \div \pi$. The ratio $C/d = \pi$ is itself a proportional relationship (7.RP.A). Furthermore, π as an irrational number provides the conceptual bridge to 8.NS.A a rational number either terminates or repeats (7.NS.A.2d), and since π does neither, it cannot be rational.

7.G.B.5 Angle Relationships

● SUPPORTING

Angle relationship problems are equation-solving problems in geometric disguise. Setting up and solving for unknown angles in supplementary, complementary, vertical, and adjacent angle situations directly applies 7.EE.B.4a (solving $px + q = r$). For example: supplementary angles $x + 127 = 180$ (solve for x);

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vertical angles 3x = 75 (solve for x); a three-angle combination x + 2x + 45 = 180 (collect like terms, solve). This is 7.EE with geometry as the compelling real-world context. Teachers who teach angle relationships after equation solving find that students' equation fluency transfers powerfully to this geometric setting.

7.G.B.6 Area, Surface Area, and Volume

● SUPPORTING

This standard extends Grade 6 geometry (6.G.A.1–4) into the rational dimension world of Grade 7. Every area, surface area, and volume computation with rational dimensions requires 7.NS.A fluency. Composite figure problems, find the area of an L-shaped region, for example, require multi-step problem solving (7.EE.B.3). Volume of composite prisms (find the volume of a figure made from two rectangular prisms) integrates formula use (7.EE.A.2) with rational arithmetic (7.NS.A).

7.SP.A.1–2 Random Sampling and Inference

○ ADDITIONAL

Statistical sampling is proportional reasoning applied to data. When students use a sample proportion to estimate a population proportion ("If 18 out of 50 sampled students prefer soccer, estimate how many out of 800 students prefer soccer"), they are setting up a proportion, 18/50 = x/800, and applying 7.RP.A.2 and 7.EE.B.4a. Computing sample statistics (sample mean, sample median, MAD) requires 7.NS.A arithmetic. Generating multiple samples to gauge the variability of estimates builds intuition for sampling distributions, which appears in high school statistics as margin of error.

7.SP.B.3–4 Comparing Two Populations

○ ADDITIONAL

Comparing the center and variability of two data distributions requires computing means, medians, IQRs, and MADs, all of which require 7.NS.A arithmetic when data include rational numbers. The conceptual framing of "how many MADs apart are the two centers?" introduces the idea of expressing a difference in units of spread, a precursor to the z-score concept in high school statistics. This standard directly extends 6.SP.B, making it one of the most coherent within-progression standards in all of middle school.

7.SP.C Probability

○ ADDITIONAL

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Every probability value is a rational number between 0 and 1 (7.NS.A); computing probabilities requires fraction and decimal arithmetic. Probability is defined as a ratio of favorable outcomes to total outcomes connecting directly to 7.RP.A. Relative frequency (experimental probability) is the ratio of observed occurrences to total trials, another direct application of ratios (6.RP.A.1). Compound event probabilities are computed by multiplying fractions and decimals (7.NS.A.2). All three major clusters (7.RP.A, 7.NS.A, 7.EE.B) serve the probability cluster.

Section 7 Curriculum Alignment: Commercial Programs

Commercial Curriculum Alignment for Grade 7

The table below maps four widely used Grade 7 mathematics curricula to CCSS standards and to this pacing guide's recommended sequence. Sequencing differences are noted; these differences have pedagogical implications and are explained in the notes for each program.

Eureka Math / Eureka Math² (Great Minds)

Module	CCSS Standards Addressed	Approx. Weeks	Alignment Notes
Module 1: Ratios and Proportional Relationships	7.RP.A.1, 7.RP.A.2a–d, 7.RP.A.3	~8 weeks	Begins the year with RP before NS - differs from this guide's recommended sequence
Module 2: Rational Numbers	7.NS.A.1a–d, 7.NS.A.2a–d, 7.NS.A.3	~6 weeks	Strong conceptual development of sign rules; multiple models used
Module 3: Expressions and Equations	7.EE.A.1–2, 7.EE.B.3–4a–b	~9 weeks	Deep treatment; connects to proportional relationships throughout
Module 4: Percent and Proportional Relationships	7.RP.A.3 (deep dive - percent increase/decrease, simple interest, commission)	~4 weeks	Revisits 7.RP.A.3 with full rational number fluency from Module 2 - effective design
Module 5: Statistics and Probability	7.SP.A.1–2, 7.SP.B.3–4, 7.SP.C.5–8	~6 weeks	Solid coverage; simulation activities strong in Eureka Math²

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Module	CCSS Standards Addressed	Approx. Weeks	Alignment Notes
Module 6: Geometry	7.G.A.1–3, 7.G.B.4–6	~5 weeks	Geometry placed at end of year; angle equations connect well to Module 3

Eureka Math - Sequencing Advisory

Eureka Math places Ratios and Proportional Relationships (Module 1) *before* Rational Numbers (Module 2). This differs from this pacing guide's recommended sequence. Teachers using Eureka Math should supplement Module 1 with targeted 7.NS.A.1–2 review of integer operations before introducing unit rates with fractions (7.RP.A.1), or be prepared to scaffold fractional ratio computations heavily in Module 1. Eureka Math² addresses this more effectively than the original Eureka Math.

i-Ready Classroom Mathematics / Ready Math (Curriculum Associates)

Unit	CCSS Standards Addressed	Approx. Weeks	Alignment Notes
Unit 1: Proportional Relationships	7.RP.A.1, 7.RP.A.2a–b	~5 weeks	Opens with proportional relationships; fractional rate computations may challenge students before 7.NS fluency
Unit 2: Rational Number Operations	7.NS.A.1a–d, 7.NS.A.2a–d, 7.NS.A.3	~6 weeks	Strong conceptual development; three models (number line, chip, context); builds fluency mid-year
Unit 3: Percent	7.RP.A.3 (tax, tip, discount, percent change, simple interest, commission)	~4 weeks	Unit 2 rational number fluency directly supports percent computations here - effective sequencing
Unit 4: Expressions and Equations	7.EE.A.1–2, 7.EE.B.3–4a–b	~8 weeks	Strong real-world problem contexts; inequalities well-developed; connects to 7.RP throughout
Unit 5: Geometry	7.G.A.1–3, 7.G.B.4–6	~5 weeks	Angle equations explicitly connected to 7.EE; circle derivation included
Unit 6: Statistics and Probability	7.SP.A.1–2, 7.SP.B.3–4, 7.SP.C.5–8	~6 weeks	Strong simulation activities; i-Ready Diagnostic integration supports differentiation

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i-Ready Classroom Mathematics - Sequencing Advisory

Like Eureka Math, i-Ready sequences Proportional Relationships before Rational Number Operations. Teachers should monitor whether Unit 1 introduces fractional unit rates (7.RP.A.1) before students have sufficient rational number fluency. Use i-Ready Diagnostic data to identify students who may need supplemental integer and fraction operation support before entering Unit 1.

enVision Mathematics 2.0 (Savvas/Pearson)

Topic	CCSS Standards Addressed	Approx. Weeks	Alignment Notes
Topic 1: Rational Number Operations	7.NS.A.1a–d, 7.NS.A.2a–d, 7.NS.A.3	~5 weeks	Sequences NS before RP - consistent with this pacing guide; strong digital interactives for sign rules
Topic 2: Analyze and Use Proportional Relationships	7.RP.A.1, 7.RP.A.2a–d	~5 weeks	Builds on Topic 1 rational arithmetic; multiple representations of proportional relationships
Topic 3: Analyze and Solve Percent Problems	7.RP.A.3 (tax, tip, discount, percent change, simple interest, commission)	~4 weeks	Deep treatment of percent with strong visual models; percent error well-developed
Topic 4: Generate Equivalent Expressions	7.EE.A.1–2	~4 weeks	Rational coefficients throughout; distributive property with negatives emphasized
Topic 5: Solve Problems Using Equations and Inequalities	7.EE.B.3–4a–b	~5 weeks	px + q = r and p(x+q) = r with real-world contexts; graphing inequalities on number lines
Topics 6–8: Geometry, Statistics, and Probability	7.G.A.1–3, 7.G.B.4–6, 7.SP.A–C	~10 weeks	Comprehensive geometry and statistics coverage; probability includes simulation activities

enVision Mathematics 2.0 - Alignment Note

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enVision sequences Rational Number Operations (Topic 1) before Proportional Relationships (Topic 2) **fully consistent with this pacing guide's recommended sequence**. The digital interactives in Topic 1 effectively support conceptual understanding of sign rules for multiplication and division of rational numbers. Of the four programs reviewed, enVision's sequencing most closely mirrors this guide's recommended order; however, the other programs have adequate coverage and may only require minor monitoring of student outcomes for instructional adjustments.

Open Up Resources 6–8 Math - Illustrative Mathematics (IM 7)

Unit	CCSS Standards Addressed	Approx. Weeks	Alignment Notes
Unit 1: Scale Drawings	7.G.A.1	~3 weeks	Distinctive opening - begins with geometry as a proportionality context; scale factor = constant of proportionality
Unit 2: Introducing Proportional Relationships	7.RP.A.2a–b	~3 weeks	Extends scale drawing proportionality into formal proportional relationship representation
Unit 3: Measuring Circles	7.G.B.4	~2.5 weeks	Uses circles as another proportional context ($C = \pi d$); strong informal derivation of π through measurement
Unit 4: Proportional Relationships and Percentages	7.RP.A.1, 7.RP.A.2c–d, 7.RP.A.3	~5 weeks	Completes proportional relationships including $y = kx$, graphs, and all percent applications
Unit 5: Rational Number Arithmetic	7.NS.A.1a–d, 7.NS.A.2a–d, 7.NS.A.3	~5 weeks	7.NS delayed until after 4 units of proportional reasoning - an intentional IM design choice
Unit 6: Expressions, Equations, and Inequalities	7.EE.A.1–2, 7.EE.B.3–4a–b	~7 weeks	Most time of any unit; deep treatment with rich contextual problems; strong connection to 7.NS from Unit 5
Unit 7: Angles, Triangles, and Prisms	7.G.A.2–3, 7.G.B.5–6	~4 weeks	Angle equations explicitly framed as equation-solving (7.EE.B.4a) in geometric context
Unit 8: Probability and Sampling	7.SP.A.1–2, 7.SP.B.3–4, 7.SP.C.5–8	~5 weeks	Thorough probability with simulation; sampling connected explicitly to proportional reasoning

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IM 7 - Distinctive Sequencing Advisory

IM 7 uses a highly distinctive sequencing: Scale Drawings → Proportional Relationships → Circles → Percent → then Rational Number Arithmetic (Unit 5). This is an intentional, research-grounded design choice; IM uses proportional geometry as an intuitive on-ramp to proportional arithmetic, before formalizing sign rules and rational number operations in Unit 5. However, this means that **7.NS fluency is developed later in the year than in any other major curriculum**. Teachers using IM 7 should monitor whether students have sufficient integer and fraction fluency to access Units 1–4 effectively, and should plan targeted interventions for students entering Grade 7 with weak rational number foundations. The design works best when incoming 7th graders have strong Grade 6 number system fluency.

Section 8 Instructional Notes & Pedagogical Recommendations

Key Instructional Strategies by Domain

7.NS - Rational Number Operations

- **Build sign rules from patterns, not declarations.** Have students extend a multiplication table continuing rows of positive multipliers, then 0, then −1, −2, −3 to discover that the pattern of positive × positive = positive continues as negative × negative = positive. Students who discover sign rules find them far more durable than students who are told them.
- **Use three models in deliberate sequence:** number line (for addition and subtraction - movement and direction), chip model (for multiplication - removing opposite pairs), and real-world contexts (profit/loss, temperature changes, elevation above/below sea level) for all four operations. Each model illuminates a different aspect of signed number arithmetic.

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- **The standard explicitly requires understanding the rules, not just applying them.** Assessment items should include explanation ("Why does −4 × −3 = +12? Explain using a pattern or model") alongside computation. Computation-only assessment of 7.NS.A misses the standard's intent.
- **Connect 7.NS.A.2d to rationality explicitly.** When students discover that 1/3 = 0.333... (repeating) and 3/8 = 0.375 (terminating), ask: what about π? Does it terminate? Does it repeat? This is the conceptual gateway to irrational numbers in Grade 8, and the connection should be made in Grade 7.

7.RP - Proportional Relationships

- **Distinguish proportional from non-proportional relationships continuously.** Use tables, graphs, and equations. Show a table where y/x is always equal (proportional) alongside one where it varies (non-proportional). Show a graph through the origin alongside one with a non-zero y-intercept. Make this distinction a recurring theme; it is the most important conceptual preparation for Grade 8's study of linear functions.
- **Teach the meaning of k before the equation form.** Students should find the constant of proportionality from a table, then recognize it as the steepness on a graph, then write the equation y = kx. This sequence honors the concept before the symbol.
- **Percent problems: always identify the whole (base) first.** The single most common source of systematic percent errors is using the wrong base. Before any calculation: "What is the whole? What is the part?" Tax and tip: the whole is the original price. Percent increase: the whole is the original value. Percent decrease: the whole is still the original value, not the final value. Make identifying the base a non-negotiable step in every percent problem.
- **Use double number lines and ratio tables alongside equations.** Multiple representations reinforce the concept and give students tools for checking their algebraic work against intuition.

7.EE - Expressions and Equations

- **Extend Grade 6's balance model to two-step situations.** Before solving px + q = r procedurally, have students use a balance (equality is maintained by doing the same thing to both sides) and

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verify solutions by substitution. Both practices build deep understanding of equation-solving as a meaning-making process.

- **Derive the inequality sign-flip rule from a number line.** Show that if $-2x > 6$, substituting $x = -4$ (a value less than -3) satisfies the inequality. Build the rule from examples and counter-examples before stating it; this dramatically reduces the rate at which students forget or misapply the rule.
- **Set up equations from real-world contexts before simplifying.** "A plumber charges $45 per hour plus a $75 call fee. The total bill was $210. How many hours did she work?" Students write $45h + 75 = 210$ before solving - giving every symbol in the equation a meaning. This prevents the "get the answer without understanding the equation" pattern.

7.G - Geometry

- **Angle relationship problems are equation-solving problems.** Name this connection explicitly - supplementary angle problems are a natural context for $px + q = r$ that students find highly motivating. Practice equation solving in this geometric context regularly.
- **Derive circle formulas before stating them.** Have students measure the circumference and diameter of multiple circular objects (cans, plates, coins); compute C/d for each; discover that the ratio is always approximately 3.14. Then name this ratio π. This empirical derivation makes the formula $C = \pi d$ far more memorable than any textbook statement.
- **Connect scale drawings explicitly to y = kx.** If the scale factor is 1:200, then actual length = 200 × drawing length. This is $y = 200x$ - a proportional relationship. Students who see this connection experience scale drawings as an application of proportional reasoning, not a new topic.

7.SP - Statistics and Probability

- **Distinguish types of sampling rigorously.** Convenience samples, voluntary response samples, and truly random samples produce very different results. Students should evaluate sampling methods and understand why only random samples support valid inference. This is a critical scientific reasoning skill that extends far beyond mathematics.

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- **Experimental probability must come before theoretical.** Run simulations first - coins, dice, spinners, or digital tools - and have students compute relative frequencies. Then ask: what should happen in theory? Compare. This sequence prevents students from memorizing formulas without understanding what probability means.
- **Tree diagrams should be built by students, not given to them.** The process of systematically listing all outcomes - branches for first event, sub-branches for second event - develops understanding of sample space and independence better than any pre-made diagram. Students who construct their own tree diagrams make far fewer errors in compound probability computations.

Common Misconceptions by Domain

Domain	Common Misconception	Instructional Response
7.NS	"Two negatives make a positive" - applied incorrectly to addition: $-3 + (-4) = +7$	The "two negatives" rule applies only to multiplication and division, never to addition. Use number lines and chip models for every addition problem before stating any rule about signs
7.NS	Absolute value as "drop the negative sign" - fails for $\|x - 3\|$ when $x < 3$	Build absolute value as distance from zero on a number line. Never define it as removing a negative sign
7.RP	Confusing percent increase with finding a percent of a number: "a 20% increase on $80" = "20% of $80"	Always compute percent change as original × (1 + rate). A 20% increase on $80 is $80 × 1.20 = $96, not $80 + $16 only - verify the two methods give the same answer and explain why
7.RP	Percent decrease: identifying the original (base) incorrectly when the discounted price is given and the original is unknown	Emphasize: "What was the starting value?" and always identify it before setting up any equation. The discounted price is NOT the base; it is the result of applying a percent to the base
7.EE	Distributing incorrectly with negatives: $3(x - 4) = 3x - 4$ (omitting the distribution to -4)	Use area models for the distributive property. Every term inside parentheses gets multiplied by every term outside. Practice extensively with negative coefficients outside and inside
7.EE	Forgetting to flip the inequality sign when multiplying or dividing by a negative value	Always connect back to number line reasoning. If $-2x > 6$, show that only x values less than -3 make the statement true. The sign flip is a logical consequence, not a memorized rule
7.SP	Equating experimental and theoretical probability: expecting	Run large-scale simulations (500 or 1000 trials) using digital tools. Graph relative frequency vs. number of

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Domain	Common Misconception	Instructional Response
	coin flips to yield exactly 50 heads in 100 trials	trials - students observe convergence toward theoretical probability, illustrating the Law of Large Numbers visually

Assessment Recommendations by Quarter

Assessment	Timing	Focus Standards and Format
Pre-Assessment / Readiness Diagnostic	Week 1	Grade 6 readiness: 6.NS.A.1, 6.NS.B–C, 6.RP.A, 6.EE.A–B. Identify gaps in fraction operations, ratio concepts, and integer understanding before instruction begins
Q1 Assessment	Week 10	7.NS.A.1–3 fluency - all four operations with rational numbers including fractions and mixed numbers; multi-step computation problems with real-world contexts; introduction to proportional relationships (7.RP.A.1, 7.RP.A.2a–b)
Q2 Assessment	Week 20	Proportional reasoning (7.RP.A) - identify proportional relationships in all representations; write and use y = kx; solve all types of percent problems including percent increase/decrease, simple interest, and commission; scale drawings (7.G.A.1)
Q3 Assessment	Week 30	Expressions and equations (7.EE.A–B) - generate equivalent expressions with rational coefficients; solve px + q = r and p(x + q) = r; write, solve, and graph two-step inequalities; multi-step real-world problem solving with reasonableness checks
End-of-Year Assessment	Week 40	Performance task integrating 7.RP + 7.NS + 7.EE in a multi-step real-world context; geometry (circles, angle equations); basic probability. Administer Grade 8 Readiness Screener to inform summer bridge and Algebra I placement decisions

Differentiation Notes

For Students Below Grade Level

Prioritize **7.NS.A** (rational number arithmetic fluency) and **7.EE.B.4a** (two-step equations) as the highest-leverage standards; these have the greatest impact on access to both Grade 7 content and Grade 8 readiness. Use i-Ready Diagnostic or similar tools to identify specific gaps in 6.NS (fraction operations) and 6.EE (one-step equations). Provide small-group instruction targeted at these prerequisite skills before or alongside Grade 7 content. Reduce cognitive load by using familiar integer contexts before extending to fractions in rational number operations.

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For Advanced Learners

Extend into 8.EE.B (proportional vs. non-proportional linear relationships; slope = unit rate) as a natural extension of 7.RP.A. Explore why irrational numbers cannot be expressed as ratios of integers - connecting 7.NS.A.2d (terminating/repeating decimals are rational) to 8.NS.A (irrational numbers). Provide open-ended performance tasks that require multi-step proportional reasoning, algebraic justification, and explanation - these develop the mathematical habits of mind needed for high school mathematics.

For English Learners

The vocabulary density of Grade 7 mathematics is significant. Pre-teach these high-priority terms with visual anchors *before* each unit: *proportional relationship, constant of proportionality, unit rate, percent increase/decrease, commission, simple interest* (7.RP); *rational number, additive inverse, absolute value* (7.NS); *coefficient, like terms, equivalent expressions, two-step equation, inequality* (7.EE). Use sentence frames for mathematical explanation tasks. Allow computation in students' home language while building English mathematical vocabulary. Double number lines and ratio tables are particularly accessible visual tools for multilingual learners engaging with proportional reasoning.

Section 9 Mathematical Practices Integration

Standards for Mathematical Practice - Grade 7 Integration

The Standards for Mathematical Practice (SMP) describe the processes and proficiencies that characterize mathematically proficient students. The table below identifies which practices are most prominently developed within each Grade 7 cluster and provides specific Grade 7 examples for each.

Cluster	Primary Mathematical Practices	Grade 7 Examples
7.NS.A Rational Number Operations ★ MAJOR	**SMP 2** - Reason abstractly and quantitatively **SMP 6** - Attend to precision **SMP 7** - Look for and make use	SMP 2: Decontextualize a temperature drop as a negative number; recontextualize the answer as degrees Fahrenheit lost SMP 6: Use precise notation for negative numbers; distinguish −(−4) from −4; precise use of absolute value symbols SMP 7: Recognize that properties

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Cluster	Primary Mathematical Practices	Grade 7 Examples
	of structure **SMP 8** - Look for and express regularity in repeated reasoning	of operations (commutative, associative, distributive) extend to rational numbers SMP 8: Discover sign rules for multiplication from patterns in multiplication tables; generalize to all rational numbers
7.RP.A Proportional Relationships ★ MAJOR	**SMP 1** - Make sense of problems and persevere **SMP 2** - Reason abstractly and quantitatively **SMP 4** - Model with mathematics **SMP 6** - Attend to precision	SMP 1: Multi-step ratio and percent problems require sustained problem-solving; persevere through identifying the base, computing the change, and interpreting the result SMP 2: Abstract - k as a unitless constant; quantitative - unit rate as miles per hour or dollars per item SMP 4: Model a real-world situation with y = kx; interpret slope in context SMP 6: Precisely identify the base (whole) in every percent problem; distinguish percent vs. percentage point
7.EE.A Equivalent Expressions ★ MAJOR	**SMP 3** - Construct viable arguments **SMP 6** - Attend to precision **SMP 7** - Look for and make use of structure	SMP 3: Justify why 3x − 3 + 2x + 5 = 5x + 2 using properties; critique a peer's factoring work SMP 6: Precise use of the distributive property with rational and negative coefficients; careful notation with parentheses SMP 7: Recognize that the distributive property has the same structure whether the coefficient is an integer, fraction, or negative number
7.EE.B Equations & Inequalities ★ MAJOR	**SMP 1** - Make sense of problems and persevere **SMP 2** - Reason abstractly and quantitatively **SMP 4** - Model with mathematics **SMP 6** - Attend to precision	SMP 1: Multi-step word problems require setting up equations, solving them, and interpreting solutions in context SMP 2: Write an equation from a word problem (abstract), solve it, then interpret the solution in context (quantitative) SMP 4: "A plumber charges $45/hour plus $75 flat fee..." → 45h + 75 = 210; interpret h as hours worked SMP 6: Check reasonableness of solutions; verify by substitution; precise graphing of inequality solution sets
7.G.A Geometric Figures & Scale ● SUPPORTING	**SMP 4** - Model with mathematics **SMP 5** - Use appropriate tools strategically **SMP 6** - Attend to precision	SMP 4: Use a scale drawing to model real architectural or geographic situations SMP 5: Use rulers, protractors, and compasses strategically to construct required geometric figures SMP 6: Precise measurement when creating or reproducing scale drawings; accurate use of protractors for given angle conditions
7.G.B Angle, Area, Volume ● SUPPORTING	**SMP 1** - Make sense of problems and persevere **SMP 4** - Model with mathematics **SMP 5** - Use appropriate tools strategically **SMP 7** - Look for and make use of structure	SMP 1: Multi-step composite figure area and volume problems require decomposition and sustained reasoning SMP 4: Model real packaging problems as surface area computations SMP 5: Use formulas as tools; choose the appropriate formula for each shape SMP 7: Recognize that angle relationships (supplementary, vertical) have a consistent structure that generates solvable equations

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Cluster	Primary Mathematical Practices	Grade 7 Examples
7.SP.A–B Sampling & Inference ○ ADDITIONAL	**SMP 2** - Reason abstractly and quantitatively **SMP 3** - Construct viable arguments **SMP 6** - Attend to precision	SMP 2: Abstract - sample proportion as a number; contextual - what does this proportion mean about the population? SMP 3: Justify an inference about a population from a sample; critique a peer's sampling method as biased or valid SMP 6: Precise language - distinguish "sample" from "population"; "estimate" from "fact"; "representative" from "large"
7.SP.C Probability ○ ADDITIONAL	**SMP 4** - Model with mathematics **SMP 5** - Use appropriate tools strategically **SMP 6** - Attend to precision	SMP 4: Model a real-world random process (spinning a game spinner, drawing from a bag) mathematically using probability SMP 5: Use simulation tools (coins, dice, digital spinners) strategically to estimate probabilities experimentally SMP 6: Precise notation - P(event) as a value between 0 and 1; distinguish theoretical from experimental probability; precise sample space enumeration

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Section 10 Glossary of Key Terms

Glossary of Grade 7 Mathematics Key Terms

Additive Inverse: The number that, when added to a given number, results in a sum of zero. For any rational number a, its additive inverse is −a. Example: the additive inverse of −7 is 7 because −7 + 7 = 0.

Circumference: The distance around a circle. Calculated using the formula $C = \pi d$ (where d is the diameter) or equivalently $C = 2\pi r$ (where r is the radius).

Coefficient: The numerical factor in a term that contains a variable. In the expression 3x + 7, the coefficient of x is 3. Coefficients may be rational numbers (fractions, decimals, or negatives) in Grade 7.

Complementary Angles: Two angles whose measures sum to 90°. If one angle measures a°, its complement measures (90 − a)°.

Compound Event: A combination of two or more simple events. The sample space of a compound event lists all possible combinations of outcomes. Example: rolling a number cube AND flipping a coin simultaneously.

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Constant of Proportionality (k): In a proportional relationship y = kx, k is the unit rate - the value of y when x = 1. It can be identified as the ratio y/x in any row of a proportional table, the slope of the line through the origin on a graph, or the coefficient in the equation y = kx.

Cross-Section: The two-dimensional figure formed when a plane intersects a three-dimensional figure. Example: slicing a right rectangular prism with a horizontal cut produces a rectangular cross-section.

Experimental Probability: The probability of an event estimated by running a probability experiment and recording observed frequencies. Calculated as: (number of times event occurred) ÷ (total number of trials). Experimental probability approaches theoretical probability as the number of trials increases.

Inference: A conclusion drawn about a population based on data from a sample. Statistical inference is valid only when the sample is randomly selected and representative of the population.

Inequality: A mathematical statement that compares two expressions using >, <, ≥, ≤, or ≠. In Grade 7, students write and solve two-step inequalities of the form px + q > r and graph their solution sets on number lines.

Like Terms: Terms in an expression that have the same variable(s) raised to the same power(s). Like terms can be combined by adding or subtracting their coefficients. Example: 3x and −7x are like terms; 3x and $3x^2$ are not.

Linear Expression: An algebraic expression in which the variable is raised to the first power only. Examples: 3x + 7; −½x − 4; 2(x + 5).

Multiplicative Inverse (Reciprocal): The number that, when multiplied by a given number, results in a product of 1. For any non-zero rational number a/b, its multiplicative inverse is b/a. Example: the multiplicative inverse of −3/4 is −4/3.

Percent Decrease: The percent by which a quantity decreases relative to its original value. Formula: percent decrease = [(original − new) ÷ original] × 100. The original (starting) value is always the base (denominator).

Percent Error: A measure of how far an estimated or measured value is from the actual (accepted) value. Formula: percent error = |estimated − actual| ÷ actual × 100. Used in scientific and engineering measurement contexts.

Percent Increase: The percent by which a quantity increases relative to its original value. Formula: percent increase = [(new − original) ÷ original] × 100. The original (starting) value is always the base (denominator).

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Pi (π): The ratio of the circumference of any circle to its diameter. π ≈ 3.14159... π is an irrational number - its decimal expansion never terminates and never repeats. In Grade 7, students use π ≈ 3.14 or π ≈ 22/7 as approximations. The exact value is irrational (8.NS.A).

Population: The entire group about which a statistical conclusion is drawn. In Grade 7, students use random samples to draw inferences about populations whose characteristics are not fully known.

Proportional Relationship: A relationship between two quantities x and y in which the ratio y/x is constant for all non-zero values of x. The constant ratio is the constant of proportionality k, and the relationship can be written as y = kx. Graphically, a proportional relationship is a straight line through the origin.

Random Sample: A sample in which every member of the population has an equal probability of being selected. Random sampling is the foundation for valid statistical inference about a population from sample data.

Rational Number: A number that can be expressed as the ratio p/q of two integers, where q ≠ 0. Equivalently, a number whose decimal representation either terminates (e.g., 0.75 = 3/4) or repeats (e.g., 0.333... = 1/3). Integers, fractions, mixed numbers, terminating decimals, and repeating decimals are all rational numbers.

Ratio of Fractions: A ratio in which one or both quantities are fractions. Example: ½ mile per ¼ hour. Computing this unit rate requires dividing fractions: (½) ÷ (¼) = 2 miles per hour (7.RP.A.1). Fraction division from Grade 6 (6.NS.A.1) is the prerequisite skill.

Repeating Decimal: A decimal in which one or more digits repeat indefinitely in a regular pattern. All repeating decimals are rational numbers. Example: 1/3 = 0.333... = $0.\overline{3}$; 1/7 = 0.142857142857... = $0.\overline{142857}$.

Sample Space: The set of all possible outcomes of a probability experiment. Example: the sample space for flipping two coins is {HH, HT, TH, TT}. Tree diagrams, organized lists, and tables are tools for constructing sample spaces for compound events.

Scale Drawing: A drawing that represents an actual object or space with all dimensions proportionally reduced or enlarged by the same scale factor. The relationship between drawing lengths and actual lengths is a proportional relationship y = kx, where k is the scale factor.

Scale Factor: The constant of proportionality in a scale drawing. If scale factor = 1/50, then every 1 unit in the drawing represents 50 units in reality. Scale factor is the same as the constant of proportionality k in y = kx for a proportional relationship between drawing lengths and actual lengths.

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Simple Interest: Interest calculated only on the original principal, not on previously earned interest. Formula: I = Prt, where I = interest earned, P = principal (original amount), r = annual interest rate (as a decimal), and t = time in years. Simple interest creates a proportional relationship between interest and time.

Supplementary Angles: Two angles whose measures sum to 180°. If one angle measures a°, its supplement measures (180 − a)°. Supplementary angle relationships create equations of the form x + a = 180 (7.EE.B.4a).

Terminating Decimal: A decimal that ends after a finite number of digits. All terminating decimals are rational numbers. Example: 3/4 = 0.75; 7/8 = 0.875. A fraction terminates as a decimal if and only if the denominator, in lowest terms, has no prime factors other than 2 and 5.

Theoretical Probability: The probability of an event calculated mathematically by analyzing the sample space, assuming all outcomes are equally likely. Formula (for uniform probability): P(event) = (number of favorable outcomes) ÷ (total number of possible outcomes).

Tree Diagram: A visual representation of all possible outcomes of a compound event, structured as branches representing each successive event. Tree diagrams make the sample space of compound events systematic and complete, reducing the likelihood of overlooked outcomes.

Two-Step Equation: An equation that requires two inverse operations to isolate the variable. In Grade 7, these take the forms px + q = r (apply subtraction, then division) and p(x + q) = r (apply division, then subtraction, or distribute first). Coefficients p, q, and r may be any rational numbers.

Unit Rate: A ratio with a denominator of 1, expressing the quantity of one unit per single unit of another. Examples: 60 miles per 1 hour; $3.50 per 1 pound; ¾ cup per 1 serving. The unit rate is the constant of proportionality k in y = kx and is represented on a graph as the value of y when x = 1, i.e., the point (1, k).

Vertical Angles: Two non-adjacent angles formed by two intersecting lines. Vertical angles are always congruent (equal in measure). The equation 3x = 75 (where two vertical angles measure 3x° and 75°) is an example of using 7.EE.B.4a in a geometric context.

Section 11 References

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Prior Connections to Previous Grade Levels

7.RP.A - Proportional Relationships (MAJOR)

Prior Grade Connections

- **6.RP.A (full cluster)** Students enter Grade 7 with ratio concepts, unit rates, percent as rate per 100, ratio tables, tape diagrams, double number lines, and graphs. Grade 6 emphasizes that *"Students develop a robust, flexible understanding of ratio concepts and apply ratio reasoning using multiple representations…"* These representations are the foundation for identifying the constant of proportionality $k$and writing $y = kx$.
- **6.NS.A.1 - Fraction division** Essential for 7.RP.A.1, which requires computing unit rates with fractional quantities. Grade 6 explicitly states: *"Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions…"*
- **6.NS.B.2–3 - Decimal fluency** Required for percent increase/decrease, percent error, and fractional constants of proportionality.
- **6.EE.C.9 - Dependent/independent variables** Students already analyze relationships in tables and graphs, preparing them to interpret proportional graphs and the meaning of points such as $(1, k)$.
- **5.NF - Fraction multiplication/division** Provides the computational foundation for fractional rates and proportional relationships involving rational values.

7.NS.A - Rational Number Operations (MAJOR)

Prior Grade Connections

- **6.NS.A.1 - Fraction division** Grade 6 builds the conceptual and procedural foundation for rational number operations: *"Divide fractions by fractions; solve word problems…"* This directly supports 7.NS.A.2 (multiplying/dividing rational numbers).
- **6.NS.B.2–3 - Multi-digit whole number & decimal fluency** Students must fluently add, subtract, multiply, and divide decimals before extending operations to all rational numbers.
- **6.NS.C.5–7 - Integers, absolute value, ordering** Grade 6 introduces negative numbers, the number line, and absolute value as distance from zero-critical for 7.NS.A.1a–d.
- **6.NS.C.8 - Coordinate plane** Reinforces rational number placement and distance, supporting additive inverses and rational arithmetic.
- **4–6 NF - Fraction concepts** Fraction equivalence, operations, and number line interpretation form the multi-year foundation for rational number operations.

7.EE.A - Equivalent Expressions (MAJOR)

Prior Grade Connections

- **6.EE.A.1–4 - Expressions, exponents, properties, equivalent expressions** Grade 6 explicitly teaches: *"Apply properties; identify equivalent expressions."* Students enter Grade 7 already able to write, read, and evaluate expressions, preparing them to manipulate expressions with rational coefficients.
- **6.NS - Rational number fluency** Required for evaluating expressions with fractional and negative coefficients.
- **5.OA.A–B - Numerical expressions & patterns** Students have experience interpreting expressions and analyzing patterns, supporting the transition to algebraic structure.

7.EE.B - Equations & Inequalities (MAJOR)

Prior Grade Connections

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- **6.EE.B.5–8 - One-variable equations & inequalities** Grade 6 builds the entire foundation for Grade 7 equation solving: *"Solve x + p = q and px = q; write equations for real-world problems."* Students also graph inequalities and interpret solution sets.
- **6.EE.C.9 - Quantitative relationships** Students already analyze dependent/independent variables, preparing them to interpret linear relationships and solve multi-step equations.
- **6.NS - Rational number placement & operations** Rational number fluency is required for solving equations with rational coefficients.
- **6.RP - Ratio equations** Students solve rate problems using equations, preparing them for proportional and non-proportional linear equations in Grade 7.

7.G.A - Geometric Figures & Scale (SUPPORTING)

Prior Grade Connections

- **6.G.A.1–4 - Area, volume, surface area, coordinate polygons, nets** Grade 6 provides geometric measurement foundations and coordinate plane fluency: *"Area of triangles, special quadrilaterals, and polygons… Polygons in coordinate plane; use coordinates to find side lengths."*
- **6.RP.A - Ratio reasoning** Scale factor is a ratio; students already use ratio tables and graphs, preparing them to interpret scale drawings as proportional relationships.
- **5.G.A - Coordinate plane (first quadrant)** Supports plotting and analyzing geometric figures.

7.G.B - Angle, Area, Surface Area & Volume (SUPPORTING)

Prior Grade Connections

- **6.G.A - Area, surface area, volume** Grade 6 provides the measurement foundation for 7.G.B.4–6: *"Solve real-world and mathematical problems involving area, surface area, and volume."*
- **6.EE.A.2c - Evaluate formulas with variables** Students already substitute values into formulas, preparing them for circle formulas and multi-step geometric equations.
- **4.MD.C - Angle measurement** Students have prior experience measuring angles and using protractors.

7.SP.A–B - Sampling & Inference (ADDITIONAL)

Prior Grade Connections

- **6.SP.A - Statistical questions & variability** Grade 6 introduces distributions, center, spread, and shape: *"Statistical questions; data distribution with center, spread, shape."*
- **6.SP.B - Dot plots, histograms, box plots; measures of center/variability** Students already compute mean, median, range, and IQR-critical for comparing populations.
- **6.RP - Ratio reasoning** Sampling proportions rely on ratio reasoning; students already compute unit rates and percents.

7.SP.C - Probability (ADDITIONAL)

Prior Grade Connections

- **6.SP - Data distributions & relative frequency** Students interpret frequencies and relative frequencies, preparing them for probability as long-run relative frequency.
- **6.RP.A - Ratios & rates** Probability is fundamentally a ratio: favorable outcomes ÷ total outcomes.
- **5.MD & 4.MD - Data representation** Students have experience organizing data in tables and plots, supporting sample space representations.

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Learning Progressions Coherence Across Grade Levels

7.RP.A Analyze proportional relationships and use them to solve real-world and mathematical problems

Major Cluster

Prior Grade Connections 5.NF. Multiply and divide fractions. 5.OA.B. Patterns and relationships in tables. 6.RP.A. Ratio concepts, unit rate, ratio tables, tape diagrams, double number lines, percent as rate per 100. 6.NS.A.1. Fraction division. 6.EE.C.9. Dependent and independent variables. Grade 6 states: "Students develop a robust, flexible understanding of ratio concepts and apply ratio reasoning using multiple representations." Grade 6 also states: "Percent as rate per 100; unit conversions."

Within Grade 7 Connections 7.NS.A. Rational number operations support fractional and negative rates. 7.EE.A and 7.EE.B. Proportional equations written as y = kx. 7.G.A.1. Scale factor as constant of proportionality. 7.SP.A. Sampling as proportional reasoning.

Future Grade Connections 8.EE.B. Slope as unit rate. 8.F. Functions. 8.SP. Lines of fit. High school algebra. Direct variation and linear functions.

7.NS.A Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers

Major Cluster

Prior Grade Connections 4.NF and 5.NF. Fraction equivalence and operations. 6.NS.A.1. Fraction division. 6.NS.B.2 and 6.NS.B.3. Multi-digit whole number and decimal fluency. 6.NS.C.5 to 6.NS.C.7. Integers, absolute value, ordering, comparing rational numbers. Grade 6 states: "Divide fractions by fractions; solve word problems." Grade 6 also states: "Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm."

Within Grade 7 Connections 7.RP.A. Fractional unit rates require rational arithmetic. 7.EE.A and 7.EE.B. Rational coefficients in expressions and equations. 7.G.B.4 and 7.G.B.6. Rational values in geometric formulas. 7.SP. Computing means, medians, and measures of variability.

Future Grade Connections 8.NS.A. Irrational numbers. 8.EE.A. Scientific notation. 8.EE.C. Solving linear equations and systems. High school real number system and complex numbers.

7.EE.A Use properties of operations to generate equivalent expressions

Major Cluster

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Prior Grade Connections 5.OA.A. Numerical expressions. 5.OA.B. Patterns. 6.EE.A.1 to 6.EE.A.4. Write, read, evaluate expressions; apply properties; identify equivalent expressions. Grade 6 states: “Apply properties; identify equivalent expressions.” 6.NS. Rational number fluency for evaluating expressions.
Within Grade 7 Connections 7.EE.B. Equivalent expressions used to simplify both sides of equations. 7.NS.A. Rational arithmetic throughout expression manipulation. 7.RP.A.2c. y = kx as a linear expression.
Future Grade Connections 8.EE.A. Integer exponents. 8.EE.C. Systems of equations. High school algebra. Polynomial operations and factoring.

7.EE.B Solve real-life and mathematical problems using numerical and algebraic expressions and equations

Major Cluster
Prior Grade Connections 4.OA.A. Multiplicative comparison problems. 5.MD.B. Volume problems as equations. 6.EE.B.5 to 6.EE.B.8. One-variable equations, inequalities, solution sets, graphing. Grade 6 states: “Solve x + p = q and px = q; write equations for real-world problems.” 6.EE.C.9. Analyze relationships between variables.
Within Grade 7 Connections 7.NS.A. Rational coefficients. 7.RP.A.2c. Proportional equations. 7.EE.A. Equivalent expressions for simplifying equations. 7.G.B.5. Angle equations.
Future Grade Connections 8.EE.C. Systems of linear equations. 8.F. Linear functions. High school algebra. Quadratic equations and inequalities.

7.G.A Draw, construct, and describe geometrical figures and relationships

Supporting Cluster
Prior Grade Connections 5.G.A. Coordinate plane. 6.G.A.1 to 6.G.A.4. Area of polygons, coordinate plane polygons, nets, surface area. Grade 6 states: “Polygons in coordinate plane; use coordinates to find side lengths.” 6.RP.A. Ratio reasoning for scale factor.
Within Grade 7 Connections 7.RP.A.2. Scale factor as constant of proportionality. 7.G.B.5. Angle relationships. 7.NS.A. Rational arithmetic for side lengths.
Future Grade Connections 8.G.A. Similarity and congruence. 8.G.B. Pythagorean theorem. High school geometry. Triangle congruence and similarity proofs.

7.G.B Solve real-world and mathematical problems involving angle measure, area, surface area, and volume

Supporting Cluster

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Prior Grade Connections 4.MD.C. Angle measurement. 6.G.A.1 to 6.G.A.4. Area, surface area, volume. 6.EE.A.2c. Evaluate formulas with variables. Grade 6 states: "Solve real-world and mathematical problems involving area, surface area, and volume."
Within Grade 7 Connections 7.EE.B.4a. Angle equations. 7.NS.A. Rational arithmetic for geometric formulas. 7.RP.A. Circumference as a ratio.
Future Grade Connections 8.G.C. Volume of cones, cylinders, spheres. 8.NS.A. Irrational numbers in geometry. High school geometry. Circle theorems and 3D geometry.

7.SP.A and 7.SP.B Sampling and inference

Additional Cluster
Prior Grade Connections 3.MD.B. Measurement data. 4.MD.B. Represent and interpret data. 5.MD.B. Line plots with fractions. 6.SP.A. Statistical questions, distributions, center, spread, shape. 6.SP.B. Measures of center and variability. Grade 6 states: "Measures of center and variability to summarize data sets."
Within Grade 7 Connections 7.RP.A. Sample proportion as ratio. 7.NS.A. Arithmetic for sample statistics. 7.EE.B. Multi-step reasoning.
Future Grade Connections High school statistics. Margin of error, confidence intervals, surveys, experiments. Algebra II. Normal distribution and standard deviation.

7.SP.C Probability

Additional Cluster
Prior Grade Connections 6.SP.A and 6.SP.B. Data distributions, frequency, relative frequency. 6.RP.A. Ratios and rates. Grade 6 states: "Display data on dot plots, histograms, box plots."
Within Grade 7 Connections 7.RP.A. Probability values as ratios. 7.NS.A. Rational arithmetic for probability. 7.EE.B. Probability equations.
Future Grade Connections High school statistics. Conditional probability, independence, binomial models, counting principles.

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