

# BENCHMARKS WITH EXAMPLES REPORT

## MATHEMATICS GRADE 7



**Key:** **Status** = Benchmarks designated as "Focus" are aligned to the Terra Nova, third edition. Benchmarks designated "Supporting" are not.  
**OCS Code** = The benchmark code. Consists of Grade (K-8), Domain (2-3 character alpha code), Strand (1-3 character alpha code), Standard (1-9), Benchmark Number (1 or 1-1 and up), and Complexity (a, b, c).  
**CCSS Code** = Common Core State Standards, developed by National Governors Association Center for Best Practices, Council of Chief State School Officers ([www.corestandards.org](http://www.corestandards.org)).  
**CRS Strand** = ACT College Readiness Standards developed by ACT, Inc. ([www.act.org](http://www.act.org)).  
**The CRS Strands are:** BOA = Basic Operations & Applications, PSD = Probability/Statistics/Data, NCP = Numbers/Concepts/Properties, XEI = Expression/Equation & Inequality,  
 GRE = Graphical Representations, PPF = Properties of Plane Figures, MEA = Measurement, FUN = Functions.

DOMAIN: Standards for Mathematical Content				
OCS Code:	Strand: <i>Ratios and Proportional Relationships (RP)</i>	Examples and Notes:	CCSS Code:	CRS Strand:
<b>7.SMC.RP.1</b>	<b>Analyze proportional relationships and use them to solve real-world and mathematical problems.</b>			
7.SMC.RP.1.1.a	Compute unit rates associated with ratios of fractions	Note: Include ratios of lengths, areas and other quantities measured in like or different units. e.g., If a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2/1/4 miles per hour, equivalently 2 miles per hour.	7.RP.A.1	BOA
7.SMC.RP.1.2-1.a	Determine the proportional relationship between two quantities	Note: Test for equivalent ratios in a table or graphing on a coordinate plane and observe whether the graph is a straight line through the origin.	7.RP.A.2a	BOA
7.SMC.RP.1.2-2.b	Identify the constant of proportionality or unit rate in a variety of contexts	e.g., In tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships	7.RP.A.2b	BOA
7.SMC.RP.1.2-3.b	Represent proportional relationships by writing an equation	e.g., If total cost $t$ is proportional to the number $n$ of items purchased at a constant price $p$ , the relationship between the total cost and the number of items can be expressed as $t = pn$	7.RP.A.2c	BOA
7.SMC.RP.1.2-4.c	Describe what a point $(x, y)$ on the graph of a proportional relationship means in terms of the context	Note: Pay special attention to the points $(0, 0)$ and $(1, r)$ where $r$ is the unit rate.	7.RP.A.2d	GRE
7.SMC.RP.1.3.c	Use proportional relationships to solve multistep ratio and percent problems	e.g., Simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error	7.RP.A.3	BOA
OCS Code:	Strand: <i>The Number System (NS)</i>	Examples and Notes:	CCSS Code:	CRS Strand:
<b>7.SMC.NS.1</b>	<b>Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.</b>			
7.SMC.NS.1.1-1.a	Describe situations in which opposite quantities combine to make 0	e.g., A hydrogen atom has 0 charge because its two constituents are oppositely charged	7.NS.A.1a	NCP
7.SMC.NS.1.1-2.b	Recognize $p + q$ as the number located a distance $ q $ from $p$	e.g., In the positive or negative direction depending on whether $q$ is positive or negative	7.NS.A.1b	NCP
7.SMC.NS.1.1-3.a	Show that a number and its opposite have a sum of zero	Note: The sum of a number and its opposite are called additive inverses.	7.NS.A.1b	NCP
7.SMC.NS.1.1-4.b	Interpret sums of rational numbers by describing real world contexts		7.NS.A.1b	NCP
7.SMC.NS.1.1-5.b	Recognize subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$		7.NS.A.1c	NCP
7.SMC.NS.1.1-6.b	Show that the distance between two rational numbers on a number line is the absolute value of their difference		7.NS.A.1c	GRE
7.SMC.NS.1.1-7.c	Apply the principle of absolute value difference in real world contexts		7.NS.A.1c	NCP
7.SMC.NS.1.1-8.c	Add and subtract rational numbers using properties of operations		7.NS.A.1d	NCP
7.SMC.NS.1.2-1.b	Show that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations	e.g., The distributive property, leading to products such as $(-1)(-1) = 1$ and the rules for multiplying signed numbers	7.NS.A.2a	BOA
7.SMC.NS.1.2-2.c	Interpret products of rational numbers in real world contexts		7.NS.A.2a	BOA
7.SMC.NS.1.2-3.b	Divide integers with non-zero divisors	Note: If $p$ and $q$ are integers, then $-(p/q) = (-p)/q = p/(-q)$ .	7.NS.A.2b	NCP

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7.SMC.NS.1.2-4.b	Recognize that every quotient of integers with a non-zero divisor is a rational number	Note: If $p$ and $q$ are integers, then $-(p/q) = (-p)/q = p/(-q)$ .	7.NS.A.2b	NCP
7.SMC.NS.1.2-5.c	Interpret quotients of rational numbers in real world contexts		7.NS.A.2b	NCP
7.SMC.NS.1.2-6.c	Multiply and divide rational numbers by applying properties of operations		7.NS.A.2c	BOA
7.SMC.NS.1.2-7.b	Convert a rational number to a decimal using long division		7.NS.A.2d	NCP
7.SMC.NS.1.2-8.b	Show that the decimal form of a rational number terminates in zeros or eventually repeats		7.NS.A.2d	NCP
7.SMC.NS.1.3.c	Solve real world and mathematical problems using the four operations with rational numbers		7.NS.A.3	BOA
<b>OCS Code:</b>	<b>Strand: Expressions and Equations (EE)</b>	<b>Examples and Notes:</b>	<b>CCSS Code:</b>	<b>CRS Strand:</b>
<b>7.SMC.EE.1</b>	<b>Use properties of operations to generate equivalent expressions.</b>			
7.SMC.EE.1.1-1.b	Add and subtract linear expressions with rational coefficients using properties of operations		7.EE.A.1	XEI
7.SMC.EE.1.1-2.b	Factor linear expressions with rational coefficients using properties of operations		7.EE.A.1	XEI
7.SMC.EE.1.1-3.b	Expand linear expressions with rational coefficients using properties of operations		7.EE.A.1	XEI
7.SMC.EE.1.2.b	Solve problems by rewriting an expression in different forms	Note: Rewriting an expression in a problem context can shed light on the problem and how the quantities in it are related. e.g., $a + 0.05a = 1.05a$ means that "increase by 5%" is the same as "multiply by 1.05."	7.EE.A.2	XEI
<b>7.SMC.EE.2</b>	<b>Solve real-life and mathematical problems using numerical and algebraic expressions and equations.</b>			
7.SMC.EE.2.1-1.c	Solve multi-step real-life and mathematical problems using positive and negative rational numbers in any form, including whole numbers, fractions, and decimals	e.g., 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	7.EE.B.3	BOA
7.SMC.EE.2.1-2.c	Calculate with positive and negative rational numbers in any form using properties of operations	e.g., 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.	7.EE.B.3	BOA
7.SMC.EE.2.1-3.c	Convert between numeric forms using properties of operations	e.g., 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	7.EE.B.3	BOA
7.SMC.EE.2.1-4.c	Assess the reasonableness of solutions by mentally computing and estimating with positive and negative rational numbers	e.g., 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	7.EE.B.3	BOA
7.SMC.EE.2.2-1.c	Solve word problems leading to equations of the form $px + q = r$ , where $p$ , $q$ , and $r$ are specific rational numbers	e.g., The perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?	7.EE.B.4a	XEI
7.SMC.EE.2.2-2.c	Solve word problems leading to equations of the form $p(x + q) = r$ , where $p$ , $q$ , and $r$ are specific rational numbers	e.g., The perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?	7.EE.B.4a	XEI
7.SMC.EE.2.2-3.c	Compare the algebraic and arithmetic solutions to word problems by showing the sequence of operations used in each approach	e.g., The perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?	7.EE.B.4a	XEI

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7.SMC.EE.2.2-4.c	Solve word problems leading to inequalities of the form $px + q > r$ , where $p$ , $q$ , and $r$ are specific rational numbers	e.g., 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	7.EE.B.4b	XEI
7.SMC.EE.2.2-5.c	Solve word problems leading to inequalities of the form $px + q < r$ , where $p$ , $q$ , and $r$ are specific rational numbers	e.g., 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	7.EE.B.4b	XEI
7.SMC.EE.2.2-6.c	Solve word problems by graphing the solution set of an algebraic inequality	e.g., 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	7.EE.B.4b	GRE
7.SMC.EE.2.2-7.c	Interpret a graph showing the solution set of an algebraic inequality in the context of a word problem	e.g., 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	7.EE.B.4b	GRE
<b>OCS Code:</b>	<b>Strand: <i>Geometry (G)</i></b>	<b>Examples and Notes:</b>	<b>CCSS Code:</b>	<b>CRS Strand:</b>
<b>7.SMC.G.1</b>	<b>Draw, construct, and describe geometrical figures and describe the relationships between them.</b>			
7.SMC.G.1.1-1.a	Solve problems involving scale drawings of geometric figures	e.g., Including computing actual lengths and areas from a scale drawing	7.G.A.1	MEA
7.SMC.G.1.1-2.a	Reproduce a scale drawing using a different scale		7.G.A.1	MEA
7.SMC.G.1.2.b	Draw geometric shapes with given conditions	e.g., Freehand, with ruler and protractor, and with technology. 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	7.G.A.2	MEA
7.SMC.G.1.3.c	Describe the two-dimensional figures that result from slicing three-dimensional figures	e.g., In plane sections of right rectangular prisms and right rectangular pyramids	7.G.A.3	MEA
<b>7.SMC.G.2</b>	<b>Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.</b>			
7.SMC.G.2.1-1.a	Memorize the formulas for the area and circumference of a circle	Note: Give an informal derivation of the relationship between the circumference and area of a circle.	7.G.B.4	MEA
7.SMC.G.2.1-2.a	Solve problems using the formulas for the area and circumference of a circle		7.G.B.4	MEA
7.SMC.G.2.2-1.b	Write equations for an unknown angle in a figure in a multi-step problem	Note: Students should know facts about supplementary, complementary, vertical, and adjacent angles.	7.G.B.5	PPF
7.SMC.G.2.2-2.b	Solve equations for an unknown angle in a figure using facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem	Note: Solve simple equations.	7.G.B.5	PPF
7.SMC.G.2.3-1.c	Solve real world and mathematical problems involving area of two- and three-dimensional objects	e.g., Of objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms	7.G.B.6	MEA
7.SMC.G.2.3-2.c	Solve real world and mathematical problems involving volume of two- and three-dimensional objects	e.g., Of objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms	7.G.B.6	MEA
7.SMC.G.2.3-3.c	Solve real world and mathematical problems involving surface area of two- and three-dimensional objects	e.g., Of objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms	7.G.B.6	MEA
<b>OCS Code:</b>	<b>Strand: <i>Statistics and Probability (SP)</i></b>	<b>Examples and Notes:</b>	<b>CCSS Code:</b>	<b>CRS Strand:</b>
<b>7.SMC.SP.1</b>	<b>Use random sampling to draw inferences about a population.</b>			
7.SMC.SP.1.1-1.a	Compare the characteristics of a sample to a statistical population		7.SP.A.1	PSD
7.SMC.SP.1.1-2.a	Determine under which conditions a sample is representative of a population		7.SP.A.1	PSD
7.SMC.SP.1.1-3.a	Determine under which conditions information obtained from a sample can support valid inferences		7.SP.A.1	PSD



7.SMC.SP.1.2-1.b	Use data from a random sample to draw inferences about a population	e.g., A population with an unknown characteristic of interest	7.SP.A.2	PSD
7.SMC.SP.1.2-2.b	Compare multiple or simulated samples of the same size to determine the variation in an estimate or prediction	e.g., 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	7.SP.A.2	PSD
<b>7.SMC.SP.2</b>	<b>Draw informal comparative inferences about two populations.</b>			
7.SMC.SP.2.1-1.b	Compare the visual overlap of two numerical data distributions with similar variabilities	e.g., 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	7.SP.B.3	PSD
7.SMC.SP.2.1-2.b	Measure the difference between the centers of two overlapping numerical data distributions by expressing the difference as a multiple of a measure of variability	e.g., 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	7.SP.B.3	PSD
7.SMC.SP.2.2-1.b	Use measures of center and variability for numerical data from random samples to draw informal comparative inferences about two populations	e.g., Decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book	7.SP.B.4	PSD
7.SMC.SP.2.2-2.b	Draw inferences from two populations by comparing measures of center and variability for numerical data from random samples	e.g., Decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book	7.SP.B.4	PSD
<b>7.SMC.SP.3</b>	<b>Investigate chance processes and develop, use, and evaluate probability models.</b>			
7.SMC.SP.3.1.a	Show that the likelihood or probability of a chance event occurring is a number between 0 and 1	Note: 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	7.SP.C.5	PSD
7.SMC.SP.3.2-1.b	Approximate the probability of a chance event occurring by collecting data on the chance process that produces it	e.g., When rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times	7.SP.C.6	PSD
7.SMC.SP.3.2-2.b	Approximate the probability of a chance event occurring by observing its long-run relative frequency		7.SP.C.6	PSD
7.SMC.SP.3.2-3.b	Predict the approximate relative frequency given the probability of a chance event	e.g., When rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times	7.SP.C.6	PSD
7.SMC.SP.3.3-1.b	Develop a uniform probability model by assigning equal probability to all outcomes of an event	e.g., 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.7a	PSD
7.SMC.SP.3.3-2.b	Use a uniform probability model to determine the probabilities of an event	e.g., 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.7a	PSD
7.SMC.SP.3.3-3.b	Develop a non-uniform probability model by observing frequencies in data generated from a chance process	e.g., 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?	7.SP.C.7b	PSD
7.SMC.SP.3.4-1.a	Show that the probability of a compound event is the fraction of outcomes in the sample space for which the event occurs		7.SP.C.8a	PSD
7.SMC.SP.3.4-2.b	Create a list, table, or tree diagram to represent sample spaces for compound events		7.SP.C.8b	PSD
7.SMC.SP.3.4-3.b	Describe the outcomes of a compound event in everyday language, by analyzing a sample space which composes an event	e.g., "Rolling double sixes"	7.SP.C.8b	PSD
7.SMC.SP.3.4-4.c	Design a simulation to generate frequencies for compound events	e.g., 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?	7.SP.C.8c	PSD



7.SMC.SP.3.4-5.c	Use a simulation to generate frequencies for compound events	e.g., 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?	7.SP.C.8c	PSD
<b>DOMAIN: Standards for Mathematical Practices</b>				
<b>OCS Code:</b>	<b>Strand: <i>Solve Problems (MP1)</i></b>	<b>Examples and Notes:</b>	<b>CCSS Code:</b>	<b>CRS Strand:</b>
<b>7.SMP.1</b>	<b>1. Make sense of problems and persevere in solving them.</b>			
7.SMP.1.c	Make sense of problems and persevere in solving them		MP1	
<b>OCS Code:</b>	<b>Strand: <i>Reason (MP2)</i></b>	<b>Examples and Notes:</b>	<b>CCSS Code:</b>	<b>CRS Strand:</b>
<b>7.SMP.2</b>	<b>2. Reason abstractly and quantitatively.</b>			
7.SMP.2.c	Reason abstractly and quantitatively		MP2	
<b>OCS Code:</b>	<b>Strand: <i>Construct Arguments (MP3)</i></b>	<b>Examples and Notes:</b>	<b>CCSS Code:</b>	<b>CRS Strand:</b>
<b>7.SMP.3</b>	<b>3. Construct viable arguments and critique the reasoning of others.</b>			
7.SMP.3.c	Construct viable arguments and critique the reasoning of others		MP3	
<b>OCS Code:</b>	<b>Strand: <i>Model (MP4)</i></b>	<b>Examples and Notes:</b>	<b>CCSS Code:</b>	<b>CRS Strand:</b>
<b>7.SMP.4</b>	<b>4. Model with mathematics.</b>			
7.SMP.4.c	Model with mathematics		MP4	
<b>OCS Code:</b>	<b>Strand: <i>Use Tools (MP5)</i></b>	<b>Examples and Notes:</b>	<b>CCSS Code:</b>	<b>CRS Strand:</b>
<b>7.SMP.5</b>	<b>5. Use appropriate tools strategically.</b>			
7.SMP.5.c	Use appropriate tools strategically		MP5	
<b>OCS Code:</b>	<b>Strand: <i>Attend to Precision (MP6)</i></b>	<b>Examples and Notes:</b>	<b>CCSS Code:</b>	<b>CRS Strand:</b>
<b>7.SMP.6</b>	<b>6. Attend to precision.</b>			
7.SMP.6.c	Attend to precision		MP6	
<b>OCS Code:</b>	<b>Strand: <i>Use Structure (MP7)</i></b>	<b>Examples and Notes:</b>	<b>CCSS Code:</b>	<b>CRS Strand:</b>
<b>7.SMP.7</b>	<b>7. Look for and make use of structure.</b>			
7.SMP.7.c	Look for and make use of structure		MP7	
<b>OCS Code:</b>	<b>Strand: <i>Express Regularity (MP8)</i></b>	<b>Examples and Notes:</b>	<b>CCSS Code:</b>	<b>CRS Strand:</b>
<b>7.SMP.8</b>	<b>8. Look for and express regularity in repeated reasoning.</b>			
7.SMP.8.c	Look for and express regularity in repeated reasoning		MP8	