



Common Core State Standards At-a-Glance Transition Documents Sixth Grade

S²TEM Centers SC are a statewide system of support for improving instruction and increasing student achievement in mathematics and science. S²TEM Centers SC, like S²MART Centers before them, are an initiative of South Carolina's Coalition for Mathematics and Science. The S²TEM Centers SC seek to work collaboratively with STEM-oriented partners in education, business and government.



Preface

The S²TEM Centers SC At-a-Glance Transition Documents were created in response to a request by district leaders for a quick overview of the magnitude of the changes as South Carolina moves from the 2007 SC Academic Standards for Mathematics to the Common Core State Standards for Mathematics (CCSSM). These documents do not provide a detailed analysis of the CCSSM or include all of the sub-skills that might need to be taught to ensure mastery of the standard, nor do they replace the current Support Documents for Mathematics that is available for Kindergarten through Algebra 1. More robust instructional resources will be created as SC gets closer to full implementation of the CCSSM.

In addition to the S²TEM Centers SC At-a-Glance Transition Documents, educators should have copies of the CCSSM from www.corestandards.org, as well as the appendices that accompany the standards. Specifically, K-8 educators will need access to the CCSSM glossary which includes tables 1, 2, and 3 to completely understand the intent of the standards.

The format of the documents is:

- Bulleted list of content that is new to the given grade level
- Bulleted list of content that is no longer included in the standards for the given grade level
- Four column table showing: Common Core State Standard, Understanding CCSS: Notes and Examples, 2007 SC Academic Standard, Major Changes

Throughout this document, the Common Core State Standards are identified by grade level, domain, and standard number. So, for example, 3.NBT.2 refers to the 3rd grade Number and Operations in Base Ten standard #2.

Please note: The CCSSM identifies a list of 8 Standards for Mathematical Practice in addition to the content standards for each grade. These mathematical practices are similar to NCTM's Process Standards. The Standards for Mathematical Practice identify the "habits of mind" used by proficient mathematics students. They are: (1) Make sense of problems and persevere in solving them, (2) Reason abstractly and quantitatively, (3) Construct viable arguments and critique the reasoning of others, (4) Model with mathematics, (5) Use appropriate tools strategically, (6) Attend to precision, (7) Look for and make use of structure, (8) Look for and express regularity in repeated reasoning.

As with any curriculum document, the S²TEM Center SC At-a-Glance Transition Documents are updated regularly to ensure accuracy of information. The date of the most recent edits is noted in the footer on each page of the documents. Please contact the S²TEM Centers SC CCSSM team at ccss.s2temsc@gmail.com with edits, refinements, and questions. Thank you.

During the period of July 1, 2009 to June 30, 2011, S2TEM Centers SC operated as S2MART Centers SC.

Acknowledgements

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Grade 6 Overview

In Grade 6, instructional time should focus on four critical areas: (1) connecting ratio and rate to whole number multiplication and division and using concepts of ratio and rate to solve problems; (2) completing understanding of division of fractions and extending the notion of number to the system of rational numbers, which includes negative numbers; (3) writing, interpreting, and using expressions and equations; and (4) developing understanding of statistical thinking.

Ratios and Proportional Relationships

- Understand ratio concepts and use ratio reasoning to solve problems.

The Number System

- Apply and extend previous understandings of multiplication and division to divide fractions by fractions.
- Compute fluently with multi-digit numbers and find common factors and multiples.
- Apply and extend previous understandings of numbers to the system of rational numbers.

Expressions and Equations

- Apply and extend previous understandings of arithmetic to algebraic expressions.
- Reason about and solve one-variable equations and inequalities.
- Represent and analyze quantitative relationships between dependent and independent variables.

Geometry

- Solve real-world and mathematical problems involving area, surface area, and volume.

Statistics and Probability

- Develop understanding of statistical variability.
- Summarize and describe distributions.

Common Core State Standards Initiative. (2010). Common Core State Standards for Mathematics. Washington, DC: National Governors Association Center for Best Practices and the Council of Chief State School Officers.

SIXTH GRADE CHANGES AT-A-GLANCE

What content is New to 6th Grade?

- Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions. (6.NS-1)
- Fluently divide multi-digit numbers using the standard algorithm. (6.NS-2)
- Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation. (6.NS-3)
- Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true. (6.EE-5)
- Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationships between the dependent and independent variables using graphs and tables, and relate these to the equation. (6.EE-9)
- Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V=lwh$ and $V=bh$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems. (6.G-2)
- Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. (6.SP-1)
- Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape. (6.SP-2)
- Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number. (6.SP-3)

Note: The Common Core State Standards are identified by grade level, domain, and standard number. So, for example, 6.NS.1 refers to the 6th grade Number System standard #1.

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SIXTH GRADE CHANGES AT-A-GLANCE

What content will no longer be included in the 6th Grade?*

- Apply an algorithm to add and subtract fractions. (6-2.4)
- Generate strategies to multiply and divide fractions and decimals. (6-2.5)
- Analyze numeric and algebraic patterns and pattern relationships. (6-3.1)
- Generalize the relationship between line symmetry and rotational symmetry for two-dimensional shapes. (6-4.3)
- Construct two-dimensional shapes with line or rotational symmetry. (6-4.4)
- Identify the transformation(s) used to move a polygon from one location to another in the coordinate plane. (5-4.5)
- Explain how transformations affect the location of the original polygon in the coordinate plane. (6-4.6)
- Compare the angles, side lengths, and perimeters of similar shapes. (6-4.7)
- Classify shapes as similar. (6-4.8)
- Classify pairs of angles as either complementary or supplementary. (6-4.9)
- Explain the relationships among the circumference, diameter, and radius of a circle. (6-5.1)
- Apply strategies and formulas with approximation of π to find the circumference and area of a circle. (6-5.2)
- Apply strategies and procedures to estimate the perimeters and areas of irregular shapes. (6-5.4)
- Use a scale to determine distance. (6-5.7)
- Predict the characteristics of one population based on the analysis of sample data. (6-6.1)
- Use theoretical probability to determine the sample space and probability for one- and two-stage events such as tree diagrams, models, lists, charts, and pictures. (6-6.4)
- Apply procedures to calculate the probability of complementary events. (6-6.5)

***Note: Common Core standards implementation will begin in 2010-2011, with full implementation and assessment in 2014-2015.**

SIXTH GRADE

RATIOS AND PROPORTIONAL RELATIONSHIPS (RP)

Common Core State Standards	Understanding CCSS: Notes and Examples	2007 S.C. Academic Standards for Mathematics	Major Changes
6.RP - Understand ratio concepts and use ration reasoning to solve problems.			
<p>1. Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.</p>	<p>For example:</p> <ul style="list-style-type: none"> • “The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak.” • “For every vote candidate A received, candidate C received nearly three votes.” 	<p>6-2.6 Understand the relationship between ratio/rate and multiplication/division.</p>	<p>Extend to include a focus on developing a conceptual understanding of <i>ratio</i>.</p>
<p>2. Understand the concept of a unit rate a/b associated with a ratio $a:b$ with $b \neq 0$, and use rate language in the context of a ratio relationship.</p>	<p>For example:</p> <ul style="list-style-type: none"> • “This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is $\frac{3}{4}$ cup of flour for each cup of sugar.” • “We paid \$75 for 15 hamburgers, which is a rate of \$5 per hamburger.” <p>Note: Expectations for unit rates in this grade are limited to non-complex fractions.</p>	<p>6-2.6 Understand the relationship between ratio/rate and multiplication/division.</p>	<p>Extend to include a focus on developing a conceptual understanding of <i>rate</i>.</p>

<p>3. Use ratio and rate reasoning to solve real-world and mathematical problems.</p> <ul style="list-style-type: none"> a. Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios. b. Solve unit rate problems including those involving unit pricing and constant speed. c. Find a percent of a quantity as a rate per 100; solve problems involving finding the whole, given a part and the percent. d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities. 	<p>For example:</p> <ul style="list-style-type: none"> b. If it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed? 	<p>6-2.6 Understand the relationship between ratio/rate and multiplication/division.</p> <p>6-5.6 Use proportions to determine unit rates.</p> <p>6-2.1 Understand whole-number percentages through 100.</p>	<ul style="list-style-type: none"> a. Extend to include analyzing ratios both numerically (in tables) and graphically (on the coordinate plane). b. Extend to include applications of ratios, rates and proportions such as unit pricing, constant speed and unit conversions. (See 2007 8-2.7 and 8-5.7 for reference) c. Extend 6-2.1 to include solving problems involving percent. (See 2007 7-2.5 for reference) – 6th grade is the first time students will be introduced to percentages.
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SIXTH GRADE

THE NUMBER SYSTEM (NS)

Common Core State Standards	Understanding CCSS: Notes and Examples	2007 S.C. Academic Standards for Mathematics	Major Changes
6.NS - Apply and extend previous understandings of multiplication and division to divide fractions by fractions.			
<p>1. Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions.</p>	<p>For example:</p> <ul style="list-style-type: none"> • Create a story context for $(2/3) \div (3/4)$ and use a visual fractions model to show the quotient. • Use the relationships between multiplications and division to explain that $(2/3) \div (3/4) = 8/9$ because $3/4$ of $8/9$ is $2/3$. • “How much chocolate will each person get if 3 people share $1/2$ lb of chocolate equally?” • “How many $3/4$-cup servings are in $2/3$ of a cup of yogurt?” • “How wide is a rectangular strip of land with length $3/4$ mi and area $1/2$ square mi?” 		<p>This standard is new to 6th grade. (See 2007 7-2.9 for reference)</p>
6.NS - Compute fluently with multi-digit numbers and find common factors and multiples.			
<p>2. Fluently divide multi-digit numbers using the standard algorithm.</p>			<p>This standard is new to 6th grade. (See 2007 5-2.2 for reference)</p>

<p>3. Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.</p>			<p>This standard is new to 6th grade. (See 2007 5-2.5 and 7-2.9 for reference)</p>
<p>4. Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1 – 100 with a common factor as a multiple of a sum of two whole numbers with no common factor.</p>	<p>For example, express $36 + 8$ as $4(9+2)$.</p>	<p>6-3.4 Use the commutative, associative, and distributive properties to show that two expressions are equivalent.</p>	<p>Students must now find the greatest common factor and the least common multiple of two whole numbers (See 2007 5-2.7 for reference). Extend to include using the distributive property to factor the GCF of a sum (this is new to 6th grade).</p>
<p>6.NS – Apply and extend previous understandings of numbers to the system of rational numbers.</p>			
<p>5. Understand that positive and negative numbers are used together to describe quantities having opposite directions or values; use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.</p>	<p>For example, temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge</p>	<p>6-2.2 Understand integers.</p>	<p>None noted.</p>

<p>6. Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.</p> <p>a. Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself.</p> <p>b. Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.</p> <p>c. Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.</p>	<p>For example:</p> <p>a. $-(-3) = 3$; 0 is its own opposite</p>	<p>6-2.2 Understand integers.</p> <p>6-4.1 Represent with ordered pairs of integers the location of points in a coordinate grid.</p>	<p>Extend to include placing positive and negative rational numbers on a number line and coordinate plane. (See 2007 7-2.2 for reference)</p> <p>Reference CCSS Glossary (rational numbers)</p>
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<p>7. Understand ordering and absolute value of rational numbers.</p> <p>a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram.</p> <p>b. Write, interpret, and explain statements of order for rational numbers in real-world contexts.</p> <p>c. Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation.</p> <p>d. Distinguish comparisons of absolute value from statements about order.</p>	<p>For example:</p> <p>a. Interpret $-3 > -7$ as a statement that -3 is located to the right of -7 on a number line oriented from left to right</p> <p>b. Write $-3^{\circ}\text{C} > -7^{\circ}\text{C}$ to express the fact that -3°C is warmer than -7°C</p> <p>c. For an account balance of -30 dollars, write $-30 = 30$ to describe the size of the debt in dollars.</p> <p>d. Recognize that an account balance less than -30 dollars represents a debt greater than 30 dollars.</p>	<p>6-2.3 Compare rational numbers and whole number percentages through 100 by using the symbols \leq, \geq, $<$, $>$, and $=$.</p>	<p>Extend to include representing rational numbers on a number line and understanding absolute value. (See 2007 7-2.2 and 7-2.4 for reference)</p>
<p>8. Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.</p>		<p>6-4.1 Represent with ordered pairs of integers the location of points in a coordinate grid.</p>	<p>Extend to include finding the distance between points with the same first coordinate or the same second coordinate.</p>

SIXTH GRADE

EXPRESSIONS AND EQUATIONS (EE)

Common Core State Standards	Understanding CCSS: Notes and Examples	2007 S.C. Academic Standards for Mathematics	Major Changes
6.EE – Apply and extend previous understandings of arithmetic to algebraic expressions.			
<p>1. Write and evaluate numerical expressions involving whole-number exponents.</p>		<p>6-2.7 Apply strategies and procedures to determine values of powers of 10, up to 10^6.</p> <p>6-2.8 Represent the prime factorization of numbers by using exponents.</p> <p>6-2.9 Represent whole numbers in exponential form.</p>	<p>Extend to include evaluating numerical expressions involving exponents in which the base is not 10.</p>
<p>2. Write, read, and evaluate expressions in which letters stand for numbers.</p> <p>a. Write expressions that record operations with numbers and with letters standing for numbers.</p> <p>b. Identify parts of an expression using mathematical terms; view one or more parts of an expression as a single entity.</p>	<p>For example:</p> <p>a. Express the calculation “Subtract y from 5” as $5 - y$</p> <p>b. Describe the expression $2(8+7)$ as a product of two factors; view $(8+7)$ as both a single entity and a sum of two terms</p>	<p>6-3.3 Represent algebraic relationships with variables in expressions, simple equations, and simple inequalities.</p> <p>6-3.2 Apply order of operations to simplify whole-number expressions.</p>	<p>Students are only expected to represent algebraic relationships with variables in expressions; do <i>not</i> include representing algebraic relationships with simple equations or simple inequalities.</p>

<p>c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order.</p>	<p>c. Use the formulas $V=s^3$ and $A=6s^2$ to find the volume and surface area of a cube with sides of lengths $s=1/2$</p>		
<p>3. Apply the properties of operations to generate equivalent expressions.</p>	<p>For example:</p> <ul style="list-style-type: none"> • Apply the distributive property to the expression $3(2+x)$ to produce the equivalent expression $6+3x$ • Apply the distributive property to the expression $24x+18y$ to produce the equivalent expression $6(4x+3y)$ • Apply properties of operations to $y+y+y$ to produce the equivalent expression $3y$ 	<p>6-3.4 Use the commutative, associative, and distributive properties to show that two expressions are equivalent.</p>	<p>Extend to include expressions with variables. (See 2007 8-3.3 for reference)</p>
<p>4. Identify when two expressions are equivalent.</p>	<p>For example, the expressions $y+y+y$ and $3y$ are equivalent because they name the same number regardless of which number y stands for.</p>	<p>6-3.4 Use the commutative, associative, and distributive properties to show that two expressions are equivalent.</p>	<p>Extend to include expressions with variables. (See 2007 8-3.3 for reference)</p>

6.EE – Reason about and solve one-variable equations and inequalities.			
<p>5. Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.</p>			<p>This standard is new to 6th grade.</p>
<p>6. Use variables to represent numbers and write expressions when solving a real-world or mathematical problems; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.</p>		<p>6-3.3 Represent algebraic relationships with variables in expressions, simple equations, and simple inequalities.</p>	<p>Students should not be expected to represent or write equations or inequalities.</p>
<p>7. Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p, q and x are all nonnegative rational numbers.</p>		<p>6-3.3 Represent algebraic relationships with variables in expressions, simple equations, and simple inequalities.</p> <p>6-3.5 Use inverse operations to solve one-step equations that have whole-number solutions and variables with whole-number coefficients.</p>	<p>Extend to include one-step equations with nonnegative rational number solutions and coefficients.</p>

<p>8. Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.</p>		<p>6-3.3 Represent algebraic relationships with variables in expressions, simple equations, and simple inequalities.</p>	<p>Extend to include representing inequality solutions on a number line and recognizing that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions.</p>
<p>6.EE – Represent an analyze quantitative relationships between dependent and independent variables.</p>			
<p>9. Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationships between the dependent and independent variables using graphs and tables, and relate these to the equation.</p>	<p>For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation $d=65t$ to represent the relationship between distance and time.</p>		<p>This standard is new to 6th grade. Students are now expected to write equations to represent relationships and analyze the relationships between independent and dependent variables using graphs and tables.</p>

SIXTH GRADE

GEOMETRY (G)

Common Core State Standards	Understanding CCSS: Notes and Examples	2007 S.C. Academic Standards for Mathematics	Major Changes
6.G – Solve real-world and mathematical problems involving area, surface area, and volume.			
<p>1. Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.</p>		<p>6-5.5 Apply strategies and procedures of combining and subdividing to find the perimeters and areas of irregular shapes.</p>	<p>Extend to include finding the areas of rectangles, triangles and special quadrilaterals. (See 2007 4-5.5, 5-5.4 and 8-5.5 for reference)</p>
<p>2. Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V=lwh$ and $V=bh$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.</p>			<p>This standard is new to 6th grade. (See 2007 5-5.5 for reference)</p>

<p>3. Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.</p>		<p>6-4.2 Apply strategies and procedures to find the coordinates of the missing vertex of a square, rectangle, or right triangle when given the coordinates of the polygon's other vertices.</p>	<p>Extend to include finding the length of a side joining points with the same first coordinate or the same second coordinate.</p>
<p>4. Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.</p>		<p>6-5.3 Generate strategies to determine the surface area of a rectangular prism and a cylinder.</p>	<p>Extend to include finding the surface area of triangular prisms and pyramids. (See 2007 7-5.2 for reference)</p>

SIXTH GRADE

STATISTICS AND PROBABILITY (SP)

Common Core State Standards	Understanding CCSS: Notes and Examples	2007 S.C. Academic Standards for Mathematics	Major Changes
6.SP – Develop understanding of statistical variability.			
1. Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers.	For example: “How old am I?” is not a statistical question, but “How old are the students in my school?” is a statistical question because one anticipates variability in students’ ages.		This standard is new to 6 th grade.
2. Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.			This standard is new to 6 th grade.
3. Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.			This standard is new to 6 th grade.
6.SP – Summarize and describe distributions.			
4. Display numerical data in plots on a number line, including dot plots, histograms, and box plots.		6-6.2 Organize data in frequency tables, histograms, or stem-and-leaf plots as appropriate.	Extend to include displaying data in dot plots and box plots. (See 2007 3-6.2 and 7-6.2 for reference)

<p>5. Summarize numerical data sets in relation to their context, such as by:</p> <ul style="list-style-type: none"> a. Reporting the number of observations. b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. c. Giving quantitative measures of center and variability, as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered. 		<p>6-6.3 Analyze which measure of central tendency (mean, median, or mode) is the most appropriate for a given purpose.</p>	<p>Extend to include reporting observations, describing the attribute, measures of variability, such as range, interquartile range and the mean absolute deviation. (See 2007 7-6.3 and 7-6.4 for reference)</p>
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