Prepared by the State Board of Education (SBOE) TEKS Review Committees

Final Recommendations, October 2011

In 2010-2011 the Commissioner's Mathematics Advisory Group was convened to offer recommendations regarding the next generation of mathematics standards in Texas. *The Commissioner's Draft of the Texas Mathematics Standards* reflects the recommendations of the Commissioner's Mathematics Advisory Group and a panel of national advisors in mathematics. The SBOE-appointed mathematics TEKS review committees used *The Commissioner's Draft of the Texas Mathematics Standards* as a starting point for their recommendations for revisions to the TEKS.

These proposed revisions reflect the recommended changes of the committees to the standards in *The Commissioner's Draft of the Texas Mathematics Standards.* Proposed additions are shown in green font with underlines (additions) and proposed deletions are shown in red font with strikethroughs (~~deletions~~). Changes recommended based on a vertical alignment review are shown in brown font (additions or ~~deletions~~).

Comments in the right-hand column provide explanations for the proposed changes. The following notations were used as part of the explanations:

BSG—information added, changed, or deleted based on broad-strokes guidance from the SBOE

CRS—information added or changed to align with the Texas College and Career Readiness Standards (CCRS)

ER—information added, changed, or deleted based on expert reviewer feedback

IF—information added, changed, or deleted based on informal feedback

MV—multiple viewpoints from within the committee

SBOE—information added, changed, or deleted based on SBOE feedback

VA—information added, changed, or deleted to increase vertical alignment

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Grade 6 Focal Areas		
Number and Operations	▲	Solving problems with multiplication and division of rational numbers
Proportionality	●	Understanding and applying ratios and rates
Expressions, Equations, and Relationships	■	Extending measurement to area of triangles and quadrilaterals

Supporting Topics for the Focal Areas in Grade 6 and Grade 7		
Number and Operations	+	Using integer operations
Proportionality	■	Understanding and using percents
Expressions, Equations, and Relationships	▲●■	Using multiple representations of Independent and dependent quantities
	▲●■	Writing and evaluating expressions
	▲●■	Solving one-step equations and inequalities
Measurement and Data	▲●■	Summarizing data using appropriate graphical representations
Color and symbol shows the connection between Focal Areas and Supporting Topics. + Indicates topic supports Focal Area in Grade 7		

Grade 6

Introduction

The desire to achieve education excellence is the driving force behind the Texas Essential Knowledge and Skills for mathematics, guided by the College and Career Readiness Standards. By embedding statistics, probability, finance, and focusing on fluency and deep understandings, Texas will lead the way in mathematics education and prepare all Texas students for the challenges they will face in the 21st century.

The process standards are integrated at every grade level and course. When possible, students will apply mathematics to problems arising in everyday life, society, and the workplace. Students will use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution. Students will select appropriate tools such as real objects, manipulatives, paper and pencil, and technology and techniques such as mental math, estimation, and number sense to solve problems. Students will effectively communicate mathematical ideas, reasoning, and their implications using multiple representations such as symbols, diagrams, graphs, and language. Students will analyze mathematical relationships to connect and communicate mathematical ideas. Students will display, explain, or justify mathematical ideas and arguments using precise mathematical language in written or oral communication.

The primary focal points at Grade 6 are number operations; proportionality; expressions, equations and relationships; and measurement and data. Students use concepts, algorithms, and properties of rational numbers to explore mathematical relationships and to describe increasingly complex situations. Students use concepts of proportionality to explore, develop, and communicate mathematical relationships. Students use algebraic thinking to describe how a change in one quantity in a relationship results in a change in the other; and they connect verbal, numeric, graphic, and symbolic representations of relationships including equations and inequalities. Students use geometric properties and relationships, as well as spatial reasoning, to model and analyze situations and solve problems. Students communicate information about geometric figures or situations by quantifying attributes, generalize procedures from measurement experiences, and use the procedures to solve problems. Students use appropriate statistics, representations of data, and reasoning to draw conclusions, evaluate arguments, and make recommendations. While the use of all types of technology is important, the emphasis on algebra readiness skills necessitates the implementation of graphing technology.

Mathematical Process Standards

Knowledge and Skills Statement. The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:

	apply mathematics to problems arising in everyday life, society, and the workplace	VA—Process Standards moved to knowledge and skills statements
	use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, ~~and~~ evaluating the problem-solving process and the reasonableness of the solution	

	select tools, including ~~such as~~ real objects, manipulatives, paper/pencil, ~~and~~ technology as appropriate, and ~~or~~ techniques, including ~~such as~~ mental math, estimation, and number sense as appropriate, to solve problems	
	communicate mathematical ideas, reasoning, and their implications using multiple representations, including ~~such as~~ symbols, diagrams, graphs, and language as appropriate	VA—Process Standards moved to knowledge and skills statements
	create and use representations to organize, record, and communicate mathematical ideas	
	analyze mathematical relationships to connect and communicate mathematical ideas	
	display, explain, and ~~or~~ justify mathematical ideas and arguments using precise mathematical language in written or oral communication~~s~~	

Number and Operations.		**6N**
Knowledge and Skills Statement. The student applies mathematical process standards to represent and use rational numbers in a variety of forms. The student is expected to:		
	classify whole numbers, integers, and rational numbers using a visual representation, such as a Venn diagram to describe relationships between sets of numbers	ER
	identify a number, its opposite, and its absolute value	VA, ER, IF
	locate, compare, and order integers using a number line	VA, ER, IF
6N01	locate, compare, and order rational numbers using a ~~extend previous understandings of~~ number line ~~to include placement and ordering rational numbers and absolute values of rational numbers~~	Language clarification, to highlight the connection of a number and its absolute value.
6N02	order a set of rational numbers arising from mathematical and ~~or~~ real-world contexts	ER
6N05	extend representations for division to include fraction notation such as ~~For example~~ ~~the fraction notation~~ a/b represents the same number as $a \div b$ where b≠0	Formatting IF
Knowledge and Skills Statement. The student applies mathematical process standards to represent addition, subtraction, multiplication, and division while solving problems and justifying solutions. The student is expected to:		
6N03	represent ~~multiplication and~~ division of ~~positive rational numbers~~ decimals to the hundredths place using models and connect to an algorithm ~~in mathematical and real-world problems with concrete, verbal, pictorial (including number line and area models), numerical, and algebraic representations~~	VA – Moved from 5th

6N04	use an area model to represent fraction multiplication and decimal multiplication ~~and division, including the multiplication or division of a fraction and a decimal For example , generate area models for 1.3 x 2.5, 1 3/10 x 2 ½, and 1.3 x 2 ½ explaining why these multiplications yield equivalent products~~	MV, ER – Separate multiplication and division for clarity Not intended to have fraction and decimal multiplication together within a single problem
	recognize that dividing by a rational number and multiplying by its reciprocal result in equivalent values	MV, ER – Separate multiplication and division for clarity
6N06	determine whether a quantity is increased or decreased when multiplied by a fraction, including values greater than or less than one ~~(proper or improper)~~ with and without computation	ER
6N07	represent integer operations with concrete ~~(such as counters), verbal, pictorial, tabular (such as patterns),and graphical (such as a number line) representations~~ models and connect the actions to algorithms	Several ER Developing Integers (by definition) include positive and negative whole numbers.
6N08	use previous understanding of all four operations to include whole numbers and positive decimals, fractions, and mixed numbers not having fractions and decimals within the same problem ~~multiply and divide positive rational numbers fluently~~	Developing ER
6N09	add, subtract, multiply, and divide integers ~~fluently~~	Moved integer fluency to 7th grade; rational number fluency moved to 8th grade. ER, IF
	add and subtract positive rational numbers fluently	VA

Proportionality.	**6P**
Number	
Knowledge and Skills Statement. The student applies mathematical process standards to develop an understanding of proportional relationships in problem situations. The student is expected to:	
6P01	compare two rules verbally, numerically, graphically, and symbolically in the form of $y = ax$ or $y = x + a$ in order to differentiate between additive and multiplicative relationships	ER clarity
6P05	apply qualitative and quantitative reasoning to solve prediction and comparison real-world problems involving ratios and rates	
6P02	give examples of ratios as multiplicative comparisons of two quantities describing the same attribute~~. For example the ratio of the length of worm A to worm B is 9 cm to 6 cm, so worm A is 1.5 times as long as worm B~~	Format Examples moved to PD

6P03	give examples of rates as the comparison by division of two quantities having different attributes, including rates as quotients~~, (e.g., 2 inches per 3 seconds is equivalent to 2/3 inches per second)~~	Format Examples moved to PD
	represent ratios and percents with concrete models, fractions, and decimals	Vertical alignment
6P08	represent benchmark fractions and percents ~~equivalents~~ such as ~~(~~1%, 10%, 25%, 33 1/3%, and multiples of these values~~)~~ using 10 x 10 grids, strip diagrams, number lines, and numbers	
6P09	generate ~~identify~~ equivalent forms of fractions, decimals, and percents using real world problems, including problems that involve money	SB 290
Knowledge and Skills Statement. The student applies mathematical process standards to solve problems involving proportional relationships. The student is expected to:		
6P04	represent mathematical and real world problems involving ratios and rates using scale factors, tables, graphs, and proportions	
~~6P06~~	~~solve mathematical and real-world problems involving ratios and rates using scale factors, unit rates, tables, graphs, and proportions~~	Covered in 7P04 ER – reduce 6th grade content
~~6P07~~	~~determine conversions within a measurement system, including the use of proportions and unit rates in mathematical and real-world problems~~	Moved to 7th grade
6P10	solve ~~determine solutions to~~ real-world problems~~, finding the whole, given a part and the percent;~~ finding the part~~,~~ given the whole and the percent ~~;~~ and finding the percent~~,~~ given the part and the whole using concrete and pictorial models	student need foundation before moving to abstract
	use equivalent fractions, decimals, and percents to show equal parts of the same whole	Readiness VA

Expressions, Equations and Relationships.	**6A**
Apply and Extend Arithmetic to Expressions and Equations	
Knowledge and Skills Statement. The student applies mathematical process standards to use multiple representations to describe algebraic relationships. The student is expected to:	
6A01	identify ~~represent~~ independent and dependent quantities from tables and graphs ~~within a mathematical or real-world problem using variables~~	VA
6A02	write an equation that represents the relationship between independent and dependent quantities from a table ~~within a mathematical or real-world problem~~	ER, IF, VA
~~6A03~~	~~represent mathematical and real-world problems with a rule equivalent to the form $y=kx$ or $y=x+b$~~	Combined 6A03 and 6A04

6A04	represent ~~key aspects of mathematical and real-world problems~~ a given situation using verbal descriptions, tables, graphs, and ~~or~~ equations in the form $y = kx$ or $y = x + b$	Combined 6A03 and 6A04 Clarity VA
~~6A06~~	~~represent expressions verbally, numerically, and algebraically~~	Combined with 6A07 ER
Knowledge and Skills Statement. The student applies mathematical process standards to develop concepts of expressions and equations. The student is expected to:		
6A05	generate equivalent ~~transform~~ numerical expressions using ~~the~~ order of operations, including positive exponents and prime factorization	Clarity VA Gap analysis result
6A07	distinguish between expressions and equations verbally, numerically, and algebraically	ER Combined with 6A05
6A09	determine if two expressions are equivalent using concrete models, pictorial models, and algebraic representations	
6A08	generate equivalent expressions using the properties of operations such as the inverse, identity, commutative, associative, and distributive properties	ER
Apply and Extend Arithmetic to Geometric Formulas		
Knowledge and Skills Statement. The student applies mathematical process standards to use geometry to represent relationships and solve problems. The student is expected to:		
	extend previous knowledge of triangles and their properties to include the sum of angles of a triangle, the relationship between the lengths of sides and measures of angles in a triangle, and determining when three lengths form a triangle	VA
6A10	model area formulas for ~~illustrate and explain the relationships for areas of~~ parallelograms, trapezoids, and triangles by decomposing and rearranging parts of these shapes ~~figures For example, parallelogram can be decomposed into a trapezoid and a right triangle with congruent heights; the triangle can be moved so that a rectangle is created having the same base length and height as the original parallelogram. (Figures include oblique triangles and parallelograms.)~~	example is not correct in general case. Clarification ER
6A11	write equations that represent ~~mathematical and real-world~~ problems related to the area of ~~(~~rectangles, parallelograms, trapezoids, and triangles~~)~~ and volume of right rectangular prisms where~~. (D~~dimensions ~~should include~~ are positive rational numbers~~.)~~	format
6A12	determine solutions for ~~mathematical and real-world~~ problems involving the area of ~~(~~rectangles, parallelograms, trapezoids, and triangles~~)~~ and volume of right rectangular prisms where~~. (D~~dimensions ~~should include~~ are positive rational numbers~~.)~~	format
Represent and Solve Equations and Inequalities		

Knowledge and Skills Statement. The student applies mathematical process standards to use equations and inequalities to represent situations. The student is expected to:		
6A13	write ~~a~~ one-variable, ~~(~~one-step~~)~~ equations and ~~or~~ inequalit~~y~~ies to represent constraints or conditions within ~~a mathematical (including number lines) or real-world~~ problems	clarity and formatting ensure both are addressed
6A14	represent solutions for ~~a~~ one-variable, ~~(~~one-step~~)~~ equations and inequalit~~y~~ies on ~~a~~ number lines	clarity ensure both are addressed
6A15	write ~~a~~ corresponding real-world problems given ~~a~~ one-variable, ~~(~~one-step~~)~~ equation or inequality	clarity ensure both are addressed
Knowledge and Skills Statement. The student applies mathematical process standards to use equations and inequalities to solve problems. The student is expected to:		
6A16	model and solve one-variable, ~~(~~one-step~~)~~ equations and inequalities that represent ~~real-world and mathematical~~ problems, including geometric concepts such as complementary and supplementary angles	consistency ensure both are addressed ER
6A17	determine if the given value(s) ~~that~~ make(s) ~~a~~ one-variable, ~~(~~one-step~~)~~ equations or inequalit~~y~~ies true	consistency ensure both are addressed

Measurement and Data.		**6M**
Knowledge and Skills Statement. The student applies mathematical process standards to use coordinate geometry to identify locations on a plane. The student is expected to:		
6M01	graph points in all four quadrants using ordered pairs of rational numbers~~, including points such as (½ , -½)~~	Clarity
Knowledge and Skills Statement. The student applies mathematical process standards to use numerical or graphical representations to analyze problems. The student is expected to:		
6M02	represent ~~summarize~~ numeric data ~~with~~ graphically ~~representations~~, including dot plots, stem-and-leaf plots, histograms, and box plots	
6M04	use the graphical representation of numeric data to describe the center, spread, and shape of the data distribution	
6M06	summarize numeric data with numerical summaries, including the mean and median (measures of center) and the range and interquartile range (IQR) (measures of spread), and use these summaries to describe the center, spread, and shape of the data distribution	Clarity
6M07	summarize categorical data with numerical and graphical summaries, including the mode ~~(most frequent)~~ and the percent of values in each category (relative frequency table) and the percent bar graph and use these summaries to describe the data distribution	

Knowledge and Skills Statement. The student applies mathematical process standards to use numerical or graphical representations to solve problems. The student is expected to:		
6M03	interpret ~~solve multistep mathematical and real-world problems using~~ numeric data summarized in dot plots, stem-and-leaf plots, histograms, and ~~or~~ box plots	
6M05	distinguish between situations ~~questions~~ that yield data with and without variability such as ~~. For example,~~ the question "How tall am I?" will be answered with a single height versus the question "How tall are the students in my class?" which would be answered based on heights that vary	Formatting, clarity

Grade 7

~~Mathematical Process Standards Grade 7~~		
~~I.~~	~~Apply mathematics to problems arising in everyday life, society and the workplace.~~	VA—Process Standards moved to knowledge and skills statements
~~II.~~	~~Use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution and evaluating the problem-solving process.~~	
~~III.~~	~~Select tools such as real objects, manipulatives, paper/pencil, and technology or techniques such as mental math, estimation, and number sense to solve problems.~~	
~~IV.~~	~~Communicate mathematical ideas, reasoning, and their implications using symbols, diagrams, graphs, and language.~~	
~~V.~~	~~Create and use representations to organize, record, and communicate mathematical ideas.~~	
~~VI.~~	~~Explain, display, or justify mathematical ideas and arguments using precise mathematical language in written or oral communications.~~	

Grade 7 Focal Areas		
Number and Operations	▲	Solving problems with addition, subtraction, multiplication, and division of rational numbers
Proportionality	●	Rates and their multiple representations
Proportionality	●	Understanding and applying the critical attributes of similarity
Expressions, Equations, and Relationships	■	Extending measurement to area of triangles and quadrilaterals

Supporting Topics for the Focal Areas in Grade 7 and Grade 8		
Proportionality	+ ▲	Using measures (pi and conversions) Determining probabilities
Expressions, Equations, and Relationships	▲● ▲●■	Using multiple representations of independent and dependent quantities Writing and evaluating expressions and solving equations
Measurement and Data	▲	Summarizing data using appropriate graphical representations
Color and symbol shows the connection between Focal Areas and Supporting Topics. + Indicates topic supports Focal Area in Grade 8		

Grade 7

Introduction

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The primary focal points at Grade 7 are number operations; proportionality; expressions, equations and relationships; and measurement and data. Students use concepts, algorithms, and properties of rational numbers to explore mathematical relationships and to describe increasingly complex situations. Students use concepts of proportionality to explore, develop, and communicate mathematical relationships, including number, geometry and measurement, and statistics and probability. Students use algebraic thinking to describe how a change in one quantity in a relationship results in a change in the other; and they connect verbal, numeric, graphic, and symbolic representations of relationships, including equations and inequalities. Students use geometric properties and relationships, as well as spatial reasoning, to model and analyze situations and solve problems. Students communicate information about geometric figures or situations by quantifying attributes, generalize procedures from measurement experiences, and use the procedures to solve problems. Students use appropriate statistics, representations of data, and reasoning to draw conclusions, evaluate arguments, and make recommendations. While the use of all types of technology is important, the emphasis on algebra readiness skills necessitates the implementation of graphing technology.

Mathematical Process Standards

Knowledge and Skills Statement. The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:

	Apply mathematics to problems arising in everyday life, society, and the workplace	VA—Process Standards moved to knowledge and skills statements
	Use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, ~~and~~ evaluating the problem-solving process and the reasonableness of the solution	

	select tools, including ~~such as~~ real objects, manipulatives, paper/pencil, ~~and~~ technology as appropriate, and ~~or~~ techniques, including ~~such as~~ mental math, estimation, and number sense as appropriate, to solve problems	
	communicate mathematical ideas, reasoning, and their implications using multiple representations, including ~~such as~~ symbols, diagrams, graphs, and language as appropriate	VA—Process Standards moved to knowledge and skills statements
	create and use representations to organize, record, and communicate mathematical ideas	
	analyze mathematical relationships to connect and communicate mathematical ideas	
	display, explain, and ~~or~~ justify mathematical ideas and arguments using precise mathematical language in written or oral communication~~s~~	

Number and Operations.		**7N**
Knowledge and Skills Statement. The student applies mathematical process standards to represent and use rational numbers in a variety of forms. The student is expected to:		
	extend previous knowledge of sets and subsets using a visual representation such as a Venn diagram to describe relationships between sets of rational numbers	foundation for high school vocabulary
Knowledge and Skills Statement. The student applies mathematical process standards to add, subtract, multiply, and divide while solving problems and justifying solutions. The student is expected to:		
	add, subtract, multiply, and divide integers fluently	developmental readiness
7N01	apply and extend previous understandings of operations to solve problems using addition, subtraction, multiplication, and division of ~~add, subtract, multiply, and divide~~ rational numbers	MV elimination of real world redundancy
~~7N02~~	~~determine solutions to mathematical and real-world problems containing rational numbers~~	MV elimination of real world redundancy Content moved to 7N01

Proportionality.		**7P**
Number		
Knowledge and Skills Statement. The student applies mathematical process standards to represent and solve problems involving proportional relationships. The student is expected to:		
7P01	represent constant rates of change in mathematical and real-world problems given ~~a~~ pictorial, tabular, verbal, numeric, graphical, and ~~or~~ algebraic representations, including $d = rt$	Clarity VA

7P02	calculate unit rates from rates in mathematical and real-world problems~~, including rates such as 1 ½ miles in each ¾ hour is the same as 6 miles in each 3 hours or 2 miles per hour~~	Example is not in a unit rate
7P03	determine the constant of proportionality ($k = y/x$) ~~to identify the invariant rate~~ within mathematical and real-world problems	ER—language
	solve real-world problems to find the whole given a part and the percent, the part given the whole and the percent, and the percent given the part and the whole	SBOE extending foundation set up in 6th grade.
7P04	solve ~~determine solutions to real-world and mathematical~~ problems involving ratios, rates, and percents, including multistep problems involving percent increase and percent decrease, including financial literacy problems such as tax, tip, discount, simple interest, and commission	SBOE feedback MV SB 290
	convert units within a measurement system, including the use of proportions and unit rates	Moved from 6th grade 6P07
7P08	convert ~~determine conversions~~ between measurement systems ~~mathematical and real-world problems~~, including the use of proportions and the use of unit rates	ER and clarity
Geometry and Measurement		
Knowledge and Skills Statement. The student applies mathematical process standards to use geometry to describe or solve problems involving proportional relationships. The student is expected to:		
7P05	generalize the critical attributes of similarity, including ratios within and between similar shapes ~~invariant and covariant relationships. (If a, a' and b, b' are side lengths of two pairs of corresponding sides, then a/a' = b/b' and a/b = a'/b'. Corresponding angles of similar figures are congruent.)~~	clarity and consistency of order ER
7P06	describe ~~represent~~ π as the ratio of the circumference of a circle to its diameter ~~and the area of a circle to the square of its radius~~	Clarity ER
7P07	solve ~~determine solutions to~~ mathematical and real-world problems involving similar shape ~~figures~~ and~~/or~~ scale drawings	ER & SBOE formatting
Statistics and Probability		
Knowledge and Skills Statement. The student applies mathematical process standards to develop concepts of probability for simple and compound events. The student is expected to:		
7P09	represent sample spaces for simple and compound events using lists and tree diagrams	
	select and use different simulations to represent simple and compound events with and without technology	necessary for concept development ER & IF
Knowledge and Skills Statement. The student applies mathematical process standards to make predictions and determine solutions for simple and compound events. The student is expected to:		

7P11	make predictions and determine solutions using ~~to mathematical and real-world problems involving~~ experimental data for simple and compound events ~~probabilistic events and make predictions with this data~~	concept development with clarity
	make predictions and determine solutions using theoretical probability for simple and compound events	concept development with clarity
Knowledge and Skills Statement. The student applies mathematical process standards to find solutions in probability and statistics. The student is expected to:		
	find the probabilities of a simple event and its complement and describe the relationship between the two	concept development CCRS
7P10	use data from a random sample to make inferences about a population ~~determine solutions to mathematical and real-world problems involving random sampling and application to the full population~~	clarity and intent
7P12	solve ~~determine solutions to mathematical and real-world~~ problems using data represented in bar graphs, dot plots, and circle graphs. Include ~~, including~~ part-to-whole and part-to-part comparisons and equivalents	
7P13	solve ~~determine solutions to mathematical and real-world~~ problems ~~involving~~ using qualitative and quantitative predictions and comparisons ~~data~~ from simple experiments ~~[Include qualitative prediction and qualitative comparison problems in addition to quantitative prediction and quantitative comparison problems based on the probabilities of simple events. P(E) = 0 vs. P(E) = 1/2 vs. P(E) = 1.]~~	MV
7P14	determine experimental and theoretical probabilities related to simple and compound events using data and sample spaces	
~~7P15~~	~~determine solutions to mathematical and real-world problems based on prediction using probabilities of simple events~~	included in previous expectation ER

Expressions, Equations, and Relationships.		**7A**
Apply and Extend Arithmetic to Expressions and Equations		
Knowledge and Skills Statement. The student applies mathematical process standards to represent linear relationships using multiple representations. The student is expected to:		
7A01	represent linear relationships ~~mathematical and real-world problems~~ using verbal descriptions, tables, graphs, and equations that simplify to the form $y = mx + b$	ER clarity and insertion of vocabulary
Apply and Extend Measurement to Geometric Formulas		
Knowledge and Skills Statement. The student applies mathematical process standards to develop geometric relationships with volume. The student is expected to:		

7A02	model ~~illustrate and explain~~ the relationship between the volume of a rectangular prism and a rectangular pyramid having both congruent bases and heights, and connect that relationship to the formulas ~~For example, the volume of a pyramid is 1/3 the volume of the prism that has the same base area and height~~	clarity and format
7A03	explain verbally and symbolically ~~illustrate and explain~~ the relationship between the volume of a triangular prism and a triangular pyramid having both congruent bases and heights and connect that relationship to the formulas	clarity and format
	use models to determine the approximate formulas for the circumference and area of a circle and connect the models to the actual formulas	
Knowledge and Skills Statement. The student applies mathematical process standards to solve geometric problems. The student is expected to:		
7A04	solve ~~determine solutions to mathematical and real-world~~ problems involving the volume of rectangular prisms, triangular prisms, rectangular pyramids, and ~~or~~ triangular pyramids	clarity and format
7A05	determine the circumference and area of circles ~~in mathematical and real-world problems~~	
7A06	determine the area of composite figures containing any combination ~~comprised~~ of rectangles, squares, parallelograms, trapezoids, triangles, semi-circles, and quarter-circles	clarification and consistency with reference chart
7G01	solve ~~mathematical and real-world~~ problems involving the lateral and total surface area of a rectangular prism, rectangular pyramid, triangular prism, and ~~or~~ triangular pyramid by determining the area of the ~~figure~~ shape's net	vertical alignment moved to cluster similar concepts
Represent and Solve Equations and Inequalities		
Knowledge and Skills Statement. The student applies mathematical process standards to use one-variable equations and inequalities to represent situations. The student is expected to:		
7A07	write ~~a~~ one-variable, ~~(~~two-step~~)~~ equations and ~~or~~ inequalit~~y~~ies to represent constraints or conditions within ~~a mathematical or real-world~~ problems	clarity and formatting ensure both are addressed
7A08	represent ~~the~~ solutions for ~~a~~ one-variable, ~~(~~two-step~~)~~ equations and inequalit~~y~~ies on ~~a~~ number lines	clarity ensure both are addressed
7A09	write a corresponding real-world problem given ~~a~~ one-variable, ~~(~~two-step~~)~~ equation or inequality	clarity ensure both are addressed
Knowledge and Skills Statement. The student applies mathematical process standards to solve one-variable equations and inequalities. The student is expected to:		
7A10	model and solve one-variable, ~~(~~two-step~~)~~ equations and inequalities ~~that represent mathematical and real-world problems~~	consistency ensure both are addressed

7A11	determine if the given value(s) ~~that~~ make(s) ~~a~~ one-variable, ~~(~~two-step~~)~~ equations and ~~or~~ inequalit~~y~~ies true	consistency ensure both are addressed
	write and solve equations using geometry concepts, including the sum of the angles in a triangle, and angle relationships	It appears that these concepts have been overlooked. MV, ER, IF

Measurement and Data ~~Two-Dimensional and Three-Dimensional Figures.~~		**7M ~~7G~~**
Knowledge and Skills Statement. The student applies mathematical process standards to use statistical representations to analyze data. The student is expected to:		
7M01	compare two groups of numeric data using comparative dot plots ~~(in the case of an equal number of data points in each group)~~ or box plots ~~(in the case of an unequal number of data points in each group)~~ by comparing their shapes, centers, and spreads	MV—no need to restrict use
7M02	use data from a random sample to make informal inferences about a population	
7M03	compare two populations based on data in random samples from these populations, including informal comparative inferences about differences between the two populations	

Grade 8

~~Mathematical Process Standards Grade 8~~		
~~I.~~	~~Apply mathematics to problems arising in everyday life, society and the workplace.~~	VA—Process Standards moved to knowledge and skills statements
~~II.~~	~~Use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution and evaluating the problem-solving process.~~	
~~III.~~	~~Select tools such as real objects, manipulatives, paper/pencil, and technology or techniques such as mental math, estimation, and number sense to solve problems.~~	
~~IV.~~	~~Communicate mathematical ideas, reasoning, and their implications using symbols, diagrams, graphs, and language.~~	
~~V.~~	~~Create and use representations to organize, record, and communicate mathematical ideas.~~	
~~VI.~~	~~Explain, display, or justify mathematical ideas and arguments using precise mathematical language in written or oral communications.~~	

Grade 8 Focal Areas		
Proportionality	▲	Understanding and applying rate of change and slope
Proportionality	▲	Understanding and applying foundations for linear functions
Expressions, Equations, and Relationships	●	Writing and solving equations

Supporting Topics for the Focal Areas in Grade 8 and Algebra I		
Number and Operation	▲●	Using irrational numbers
	●	Using scientific notation
Proportionality	▲●	Representing similarity and dilations on a coordinate plane
Foundations for Functions	▲●	Determining linear association within data
	▲●	Using multiple representations of linear functions ($y=kx$ and $y=mx+b$)
Expressions, Equations, and Relationships	●	Using integer exponents
	▲●	Extending measurement to volumes of pyramids, cylinders, cones and spheres
	▲	Understanding and applying Pythagorean theorem
Two-Dimensional and Three-Dimensional Figures	●	Understanding and representing transformations
Measurement and Data	▲●	Identifying trends in data to determining deviations in data
	▲●	Identifying trends in data to determine sample to sample variation
Color and symbol shows the connection between Focal Areas and Supporting Topics. + Indicates topic supports Focal Area in Algebra I		

Grade 8

Introduction

The desire to achieve educational excellence is the driving force behind the Texas Essential Knowledge and Skills for mathematics, guided by the College and Career Readiness Standards. By embedding statistics, probability, and finance, while focusing on fluency and solid understanding, Texas will lead the way in mathematics education and prepare all Texas students for the challenges they will face in the 21st century.

The process standards are integrated at every grade level and course. When possible, students will apply mathematics to problems arising in everyday life, society, and the workplace. Students will use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution. Students will select appropriate tools such as real objects, manipulatives, paper and pencil, and technology and techniques such as mental math, estimation, and number sense to solve problems. Students will effectively communicate mathematical ideas, reasoning, and their implications using multiple representations such as symbols, diagrams, graphs, and language. Students will use mathematical relationships to generate solutions and make connections and predictions. Students will analyze mathematical relationships to connect and communicate mathematical ideas. Students will display, explain, or justify mathematical ideas and arguments using precise mathematical language in written or oral communication.

The primary focal points at Grade 8 are proportionality; expressions, equations, relationships, and foundations of functions; and measurement and data. Students use concepts, algorithms, and properties of real numbers to explore mathematical relationships and to describe increasingly complex situations. Students use concepts of proportionality to explore, develop, and communicate mathematical relationships. Students use algebraic thinking to describe how a change in one quantity in a relationship results in a change in the other; and they connect verbal, numeric, graphic, and symbolic representations of relationships, including equations and inequalities. Students begin to develop an understanding of functional relationships. Students use geometric properties and relationships as well as spatial reasoning to model and analyze situations and solve problems. Students communicate information about geometric figures or situations by quantifying attributes, generalize procedures from measurement experiences, and use the procedures to solve problems. Students use appropriate statistics, representations of data, and reasoning to draw conclusions, evaluate arguments, and make recommendations. While the use of all types of technology is important, the emphasis on algebra readiness skills necessitates the implementation of graphing technology.

Mathematical Process Standards

Knowledge and Skills Statement. The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:

	apply mathematics to problems arising in everyday life, society, and the workplace	VA—Process Standards moved to knowledge and skills statements
	use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution	

	select tools, including ~~such as~~ real objects, manipulatives, paper/pencil, and technology as appropriate, and ~~or~~ techniques, including ~~such as~~ mental math, estimation, and number sense as appropriate, to solve problems	
	communicate mathematical ideas, reasoning, and their implications using multiple representations, including ~~such as~~ symbols, diagrams, graphs, and language as appropriate	VA—Process Standards moved to knowledge and skills statements
	create and use representations to organize, record, and communicate mathematical ideas	
	analyze mathematical relationships to connect and communicate mathematical ideas	
	display, explain, and ~~or~~ justify mathematical ideas and arguments using precise mathematical language in written or oral communication~~s~~	

Number and Operation.		**8N**
Knowledge and Skills Statement. The student applies mathematical process standards to represent and use real numbers in a variety of forms. The student is expected to:		
	extend previous knowledge of sets and subsets using a visual representation, such as a Venn diagram to describe relationships between sets of real numbers	Vertical alignment
	add, subtract, multiply, and divide rational numbers fluently	Moved from 7th grade for alignment and developmental appropriateness.
8N01	approximate the value ~~illustrate the rational approximation~~ of an irrational number and locate that ~~the~~ rational number approximation on a number line. Include π and ~~Numbers include~~ square roots of numbers less than 225~~, cube roots for numbers less than 225 with a whole number cube root, and π~~	ER – Clarity MV ER – deletion of cubed roots
8N02	convert between base-10 notation and scientific notation	MV – isolated topic Should be in Algebra 1 taught in context with properties of exponents.
~~8N03~~	~~extend previous understandings of number line to include ordering rational and irrational numbers~~	Redundancy
8N04	order a set of real ~~rational and irrational~~ numbers arising from mathematical and ~~or~~ real-world contexts	Clarity
8N05	~~approximate multiplicative comparisons between two numbers expressed in scientific notations based on real-world problems. (The average distance from the earth to the moon is 3.84 x 10^5 km. The average distance from the earth to Mars is 2.28 x 10^8 km. How many times greater is the distance from the earth to Mars than the distance from the earth to the moon?)~~	MV – not developmentally appropriate MV-isolated topic. Limited use in higher levels of math.

Proportionality.	**8P**

Dilations		
Knowledge and Skills Statement. The student applies mathematical process standards to use proportional relationships to describe dilations. The student is expected to:		
8P01	generalize that the ratio of corresponding sides of similar shapes are proportional, including a shape and it's dilation ~~the distance between any two points of a geometric figure G and the distance between two corresponding points of its dilation, D (G) are the same for all pairs of distinct points in G and that if two line segments AB and CD are given in G, then the ratio of the length of AB to the length of CD is equal to the ratio of the length of their dilations D (AB) and D (CD)~~	clarity ER
8P02	compare and contrast the attributes of a ~~explain the similarities and differences between a given figure~~ shape and its dilation(s) on a coordinate plane	ER
8P03	use an algebraic representation to explain the effect of a given positive rational scale factor~~s~~ applied to two-dimensional figures on a coordinate plane with the origin as the center of dilation ~~using an algebraic representation~~ such as ~~{For example, when a scale factor of 0.5 is applied to a graphed figure, the transformation can be described with~~ $(x, y) \rightarrow (0.5x, 0.5y)$~~}~~	ER
Slope		
Knowledge and Skills Statement. The student applies mathematical process standards to explain proportional and non-proportional relationships involving slope. The student is expected to:		
8P04	use ~~explain using~~ similar right triangles ~~to develop an understanding that why the~~ slope, m, given as the rate comparing the change in y-values to ~~divided by~~ the change in x-values, $(y_2 - y_1)/(x_2 - x_1)$, is the same for any two points (x_1, y_1) and (x_2, y_2) on the same line	clarity connecting rate to slope ER
8P05	graph proportional relationships, interpreting the unit rate as the slope of the line that models ~~modeling~~ the relationship	IF
	use data from a table or graph to determine the rate of change or slope and y-intercept in mathematical and real-world problems	Clarity IF
~~8P14~~	~~determine the slope (rate of change) and the y-intercept (initial value) of the data in a table or graph that models a given context~~	IF & ER
Foundations for Functions		
Knowledge and Skills Statement. The student applies mathematical process standards to use proportional and non-proportional relationships to develop foundational concepts of functions. The student is expected to:		
8P06	represent ~~key aspects of~~ linear proportional situations ~~and direct variation~~ with tables, graphs, and equations in the form of ~~($y = kx$)~~	Clarity and consistency ER

8P07	represent ~~key aspects of~~ linear, non-proportional situations with tables, graphs, and equations in the form of ~~(~~$y = mx + b$, $b \neq 0$~~)~~	Clarity and consistency ER
8P08	contrast bivariate sets of data that suggest a linear relationship ~~association~~ with bivariate sets of data that do not suggest a linear relationship ~~association~~ from a graphical representation	IF –consistency
8P09	use a trend line ~~graph a straight line~~ that approximates the linear relationship between bivariate sets of data to make predictions ~~that suggest a linear association~~	Clarity and vocabulary IF
	solve problems involving direct variation	VA
8P10	solve directly proportional ~~determine solutions to mathematical and real-world and real-world~~ problems ~~involving direct variation~~	Clarity VA
8P11	distinguish between proportional and non-proportional situations using tables, graphs, and ~~or~~ equations in the ~~of~~ form $y = kx$ or ~~and~~ $y = mx + b$, where $b \neq 0$	Clarity
	identify functions using sets of ordered pairs, tables, mappings, and graphs	Baseline needed for functions
8P12	identify ~~give~~ examples of proportional and non-proportional ~~non-examples of proportional~~ functions that arise from mathematical and real-world problems~~. Examples should reveal the understanding that each input has exactly one output~~	Clarity
8P13	write an equation ~~generate a linear function, written as~~ in the form $y = mx + b$ to model a linear relationship between two quantities using verbal, numerical, tabular, and graphical representations ~~represented verbally, numerically (two (x,y) values), tabularly or graphically~~	inconsistent words/notation verbal awkwardness

Expressions, Equations and Relationships.		**8A**
Apply and Extend Measurement to Geometric Formulas		
Knowledge and Skills Statement. The student applies mathematical process standards to develop mathematical relationships and make connections to geometric formulas. The student is expected to:		
8A01	~~apply the properties of integer exponents to generate equivalent numerical expressions.~~	VA; introduced in Algebra 1
8A02	describe the volume formula $V = Bh$ of a cylinder in terms of its base area and it's height ~~illustrate and explain the relationship between the base area, height, and volume of a cylinder verbally and symbolically~~	
8A03	~~illustrate and explain~~ model the relationship between the volume of a cylinder and a cone having both congruent bases and heights and connect that relationship to the formulas ~~For example, the volume of a cone is 1/3 the volume of the cylinder that has the same base area and height~~	Clarity

8A04	~~illustrate and explain the relationship between the formula for the volume of a sphere as it relates to the volume of a cone whose base radius and height are equal and are congruent to the radius of the sphere~~	ER
8A06	use models and diagrams to ~~represent, verify, and~~ explain the Pythagorean theorem ~~and its converse using models and diagrams~~	MV ER
Knowledge and Skills Statement. The student applies mathematical process standards to use geometry to solve problems. The student is expected to:		
8A05	solve ~~determine solutions to mathematical and real-world~~ problems involving the volume of cylinders, cones, and spheres	
	use previous knowledge of surface area to make connections to the formulas for lateral and total surface area and determine solutions for problems involving rectangular prisms, triangular prisms, and cylinders	necessary for vertical alignment
8A07	use the Pythagorean theorem and its converse to solve ~~mathematical and real-world~~ problems	
8A08	determine the distance between two points on a coordinate plane using the Pythagorean theorem	
Represent and Solve Equations ~~and Inequalities~~		
Knowledge and Skills Statement. The student applies mathematical process standards to use one-variable equations in problem situations. The student is expected to:		
8A09	write ~~a~~ one-variable equations ~~equation~~ with variables on both sides that represent ~~represents a or mathematical or real-world~~ problems ~~problem~~, using ~~. (The equations should include~~ rational number coefficients and constants~~)~~	clarity, consistency
8A11	write a corresponding real-world problem when given a one-variable equation with variables on both sides of the equal sign ~~including~~ using rational number coefficients and constants	
8A12	model and solve one-variable equations with variables on both sides of the equal sign that represent mathematical and real-world problems, using ~~. (The equations should include~~ rational number coefficients and constants~~)~~	clarity and consistency
	write and solve equations using geometry concepts, including the angle relationships when parallel lines are cut by a transversal	VA & ER
	write and solve equations using geometry concepts, including the properties of side lengths and angles in quadrilaterals	VA
Knowledge and Skills Statement. The student applies mathematical process standards to use multiple representations to develop foundational concepts of simultaneous linear equations. The student is expected to:		
8A10	identify and verify ~~match~~ the values of x and y that simultaneously satisfy two linear equations ~~(~~in the form $y = mx + b$~~)~~ from ~~with~~ the intersections of the graphed equations	ER

8A13	~~determine the solutions to mathematical and real-world problems involving pairs of simultaneous linear equations (in form *y=mx+b*) using tables, graphs and algebraic methods~~	ER Moved to Algebra 1

Two-Dimensional ~~and Three-Dimensional Figures~~ Shapes.		**8G**
Knowledge and Skills Statement. The student applies mathematical process standards to develop transformational geometry concepts. The student is expected to:		
8G01	generalize the properties of orientation and congruence of rotations, reflections, ~~and~~ translations, and dilations of two-dimensional ~~figures~~ shapes on a coordinate plane. ~~For example, rotations, reflections, and translations preserve congruence of two-dimensional figures~~	example only addressed one part of se ER
8G02	differentiate between transformations that preserve congruence and those that do not	
8G03	explain the effect of ~~given transformations~~ ~~(~~translations, reflections over the x- or y-axis, and rotations limited to 90°, 180°, 270°, and 360° as~~)~~ applied to two-dimensional ~~figures~~ shapes on a coordinate plane using an algebraic representation, such as ~~For example~~, $(x, y) \rightarrow (x+2, y+2)$ ~~describes a translation of the point two units up and two units to the right~~	Clarity
	model the effect on linear and area measurements of dilated two-dimensional shapes	VA & ER

Measurement and Data.		**8M**
Knowledge and Skills Statement. The student applies mathematical process standards to use statistical procedures to describe data. The student is expected to:		
8M01	construct a scatterplot and describe the observed trend such as positive trend, negative trend and no trend, ~~in the scatterplot (positive trend, negative trend, no trend, linear association, non-linear association, and/or no association .)~~ to address questions of association such as linear, non-linear, and no association between bivariate data	Clarity
8M02	~~determine deviations from the mean in order to describe the mean as a "balance point" (the sum of the deviations is 0)~~	ER Concepts in 8M02 are
8M03	determine the mean absolute deviation and use this quantity as a measure of the average distance data are from the mean using a data set of no more than ten data points ~~limiting the data set to ten or less data points~~	
8M04	simulate generating random samples of the same size from a population with known characteristics to ~~gauge the sample to sample variation in sample statistics and to~~ develop the notion of a random sample being representative of the population from which it was selected	Clarity