DRAFT Proposed Revisions
Texas Essential Knowledge and Skills (TEKS)
Mathematics, Grades 6-8

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

First Draft, July 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 draft 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~~).

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

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

MV—multiple viewpoints from within the committee

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

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Grade 6

~~Mathematical Process Standards Grade 6~~		
~~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 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. 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, evaluating the problem-solving problem process and reasonableness of the solution. They will select appropriate tools such as real objects, manipulatives, paper and pencil, and technology and techniques such as mental math, estimation, formulas, theorems, and number sense to solve problems efficiently. Effective communication of mathematical ideas, reasoning, and their implications using multiple representations, such as symbols, diagrams, graphs and language will be emphasized. They will use mathematical relationships to generate solutions and make connections and predictions. Students will analyze mathematical relationships to connect and communicate mathematical ideas. They will explain, display, or justify mathematical ideas and arguments using precise mathematical language in written or oral communications.

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:		VA—Process Standards moved to knowledge and skills statements
	Apply mathematics to problems arising in everyday life, society and the workplace.	
	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 as well as 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.	
	Create and use representations to organize, record, and communicate mathematical ideas.	
	Analyze mathematical relationships to connect and communicate mathematical ideas.	
	~~d~~Display, ~~E~~explain, ~~or~~ justify mathematical ideas and arguments using precise mathematical language in written or oral communications.	

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:		
6N01	extend previous understandings of number line to include placement and ordering of rational numbers and their 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 $a \div b$.	Formatting

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 in mathematical and real-world problems with concrete, verbal, pictorial (including number line and area models), numerical, and algebraic representations.	
6N04	use an area model to represent fraction and decimal multiplication ~~and division~~, including the multiplication ~~or division~~ of a fraction and a decimal and explain why the products are equivalent, such as ~~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
	use an area model to represent fraction and decimal division, including the division of a fraction and a decimal and explaining why the quotients are equivalent, such as generate area models for 2.5 / 0.5, 2 ½ ÷ ½, and 2 ½ ÷ 0.5	MV, ER – Separate multiplication and division for clarity
6N06	determine whether a quantity is increased or decreased when multiplied by a fraction (proper or improper) with and without computation.	
6N07	represent integer operations with concrete (such as counters), verbal, pictorial, tabular (such as patterns), and graphical (such as a number line) representations and connect the actions to algorithms.	Several ER
6N08	extend previous understanding of multiplying and dividing decimals, unit fractions, and whole numbers to include positive mixed numbers. ~~multiply and divide positive rational numbers fluently~~.	developing
6N09	add, subtract, multiply, and divide integers ~~fluently~~.	developing

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 differentiate between additive and multiplicative relationships in mathematical and real-world problems.	ER
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, such as ~~. 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
6P03	give examples of rates as the comparison by division of two quantities having different attributes, including rates as quotients, such as ~~(e.g.,~~ 2 inches per 3 seconds is equivalent to 2/3 inches per second~~)~~.	format
6P08	represent benchmark percents ~~equivalents~~, such as ~~(~~1%, 10%, 25%, 33 1/3% and multiples of these values~~)~~ using 10x10 grids, strip diagrams, number lines, and numbers.	
6P09	identify equivalent fractions, decimals, and percents including real-world problems involving 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.~~	combined with 6PO6
6P06	represent and solve mathematical and real-world problems involving ratios and rates using scale factors, unit rates, tables, graphs, and proportions.	
6P07	determine conversions within a measurement system, including the use of proportions and unit rates in mathematical and real-world problems	
6P10	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

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	represent independent and dependent quantities within a mathematical and ~~or~~ real-world problem using variables.	ensure both are addressed
6A02	write an equation that represents the relationship between independent and dependent quantities within a mathematical and ~~or~~ real-world problem.	ensure both are addressed

6A03	represent mathematical and real-world problems with a rule equivalent to the form $y=kx$ and ~~or~~ $y=x+b$.	ensure both are addressed
6A04	represent key aspects of mathematical and real-world problems using verbal descriptions, tables, graphs, and ~~or~~ equations.	ensure all are addressed
6A06	represent expressions verbally, numerically, and algebraically.	
Knowledge and Skills Statement. The student applies mathematical process standards to develop concepts of expressions and equations. The student is expected to:		
6A05	transform numerical expressions using the order of operations, including positive exponents.	
6A07	distinguish between expressions and equations.	
6A08	generate equivalent expressions using the properties of operations, such as the inverse, identity, commutative, associative, and distributive properties.	ER
6A09	determine if two expressions are equivalent using concrete models, pictorial models, and algebraic representations.	
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 sides and angles in a triangle, and determining when three lengths make a triangle.	VA
6A10	illustrate and explain the relationships for areas of parallelograms, trapezoids, and triangles by decomposing and rearranging parts of these 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.
6A11	write equations that represent mathematical and real-world problems related to area of ~~(~~rectangles, parallelograms, trapezoids, and triangles~~)~~ and volume of right rectangular prisms. ~~(~~Dimensions should include positive rational numbers.~~)~~	format

6A12	determine solutions for mathematical and real-world problems involving area of ~~(~~rectangles, parallelograms, trapezoids, and triangles~~)~~ and volume of right rectangular prisms. ~~(~~Dimensions should include 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 ~~(one-step) equation~~ and ~~or~~ inequalities ~~inequality~~ to represent constraints or conditions within ~~a~~ mathematical ~~(including number lines)~~ and ~~or~~ real-world problems ~~problem~~.	clarity and formatting ensure both are addressed
6A14	represent solutions for ~~a~~ one-variable, one-step ~~(one-step)~~ equations and inequalities ~~inequality~~ on ~~a~~ number lines ~~line~~.	clarity ensure both are addressed
6A15	write ~~a~~ corresponding real-world problems ~~problem~~ given ~~a~~ one-variable, one-step ~~(one-step)~~ equations ~~equation~~ and ~~or~~ inequalities ~~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	solve one-variable, one-step ~~(one-step)~~ equations and inequalities that represent mathematical and real-world ~~real-world and mathematical~~ problems.	consistency ensure both are addressed
6A17	determine if the given value(s) ~~that~~ make(s) ~~a~~ one-variable , one-step ~~(one-step)~~ equations ~~equation~~ and ~~or~~ inequalities ~~inequality~~ 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	summarize numeric data with graphical representations, including dot plots, stem-and-leaf plots, histograms and boxplots.	

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	solve multi-step mathematical and real-world problems using numeric data summarized in dot plots, stem-and-leaf plots, histograms, and ~~or~~ boxplots.	
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

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.

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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.	
	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 as well as 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.	VA—Process Standards moved to knowledge and skills statements
	Communicate mathematical ideas, reasoning, and their implications using multiple representations including ~~such as~~ symbols, diagrams, graphs, and language as appropriate.	
	Create and use representations to organize, record, and communicate mathematical ideas.	
	Analyze mathematical relationships to connect and communicate mathematical ideas.	
	~~d~~Display, ~~E~~explain, ~~or~~ justify mathematical ideas and arguments using precise mathematical language in written or oral communications.	

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, subsets, unions, and intersections using a visual representation, such as a Venn diagram to describe relationships between sets of 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:		
7N01	apply and extend previous understandings of operations to add, subtract, multiply, and divide rational numbers.	
	add, subtract, multiply, and divide rational numbers fluently.	developmental readiness

7N02	determine solutions to mathematical and real-world problems containing rational numbers.	7N02
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 in mathematical and real-world problems given ~~a~~ pictorial, tabular, verbal, numeric, graphical and ~~or~~ algebraic representations, including *d=rt*.	
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.	
7P03	determine the constant of proportionality (*k=y/x*) to identify the invariant rate within mathematical and real-world problems.	
	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.	extending foundation set up in 6th grade.
7P04	determine solutions to mathematical and real-world ~~and mathematical~~ problems involving ratios, rates, and percents, including multi-step problems involving percent increase and percent decrease. Include financial literacy problems such as tax, tip, discount, simple interest, and commission.	MV SB 290
7P08	convert ~~determine conversions~~ between measurement systems in 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 figures which are invariant and covariant relationships respectively. (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' and a/a' = b/b'. Also, corresponding ~~Corresponding~~	clarity and consistency of order
7P06	represent π as the ratio of the circumference of a circle to its diameter and as the area of a circle to the square of its radius.	clarity
7P07	determine solutions to mathematical and real-world problems involving similar figures and ~~/or~~ scale drawings.	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 models to simulate simple and compound events with and without technology	necessary for concept development ER
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 experimental data for simple and compound events in ~~determine solutions to~~ mathematical and real-world problems ~~involving experimental data for 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 in mathematical and real-world problems.	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 determine solutions about a population in mathematical and real world situations. ~~determine solutions to mathematical and real-world problems involving random sampling with and application to the full population.~~	clarity and intent
7P12	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	determine solutions to mathematical and real-world problems involving qualitative and quantitative predictions and comparisons 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 in 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	illustrate and explain the relationship between the volume of a rectangular prism and a rectangular pyramid having both congruent bases and heights, such as~~. 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	illustrate and explain the relationship between the volume of a triangular prism and a triangular pyramid having both congruent bases and heights.	clarity and format
Knowledge and Skills Statement. The student applies mathematical process standards to solve geometric problems. The student is expected to:		
7A04	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, rhombi, 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'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 ~~(two-step) equation~~ and ~~or~~ inequalities ~~inequality~~ to represent constraints or conditions within ~~a~~ mathematical and ~~or~~ real-world problems ~~problem~~.	clarity and formatting ensure both are addressed
7A08	represent ~~the~~ solutions for ~~a~~ one-variable, two-step ~~(two-step)~~ equations and inequalities ~~inequality~~ on ~~a~~ number lines ~~line~~.	clarity ensure both are addressed
7A09	write ~~a~~ corresponding real-world problems ~~problem~~ given ~~a~~ one-variable, two-step ~~(two-step)~~ equations ~~equation~~ and ~~or~~ inequalities ~~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	solve one-variable, two-step ~~(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 ~~(two-step)~~ equations ~~equation~~ and ~~or~~ inequalities ~~inequality~~ true.	consistency ensure both are addressed
	write and solve equations using geometry concepts, including sum of the angles in a triangle and angle relationships when parallel lines are cut by a transversal.	It appears that these concepts have been overlooked. MV

~~**Two-Dimensional and Three-Dimensional Figures.**~~		~~**7G**~~
Measurement and Data.		**7M**
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 boxplots ~~(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 academic ~~education~~ excellence is the driving force behind the Texas Essential Knowledge and Skills for mathematics, guided by the College and Career Readiness Standards. By including ~~embedding~~ statistics, probability, and personal finance, as well as, ~~and~~ focusing on building fluency and deep understandings of mathematical concepts, 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. 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, evaluating the problem-solving ~~problem~~ process and reasonableness of the solution. They will select appropriate tools such as real objects, manipulatives, paper and pencil, and technology and techniques such as mental math, estimation, formulas, theorems, and number sense to solve problems efficiently. Effective communication of mathematical ideas, reasoning, and their implications using multiple representations, such as symbols, diagrams, graphs and language will be emphasized. They will use mathematical relationships to generate solutions and make connections and predictions. Students will analyze mathematical relationships to connect and communicate mathematical ideas. They will explain, display, or justify mathematical ideas and arguments using precise mathematical language in written or oral communications.

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:		VA—Process Standards moved to knowledge and skills statements
	Apply mathematics to problems arising in everyday life, society and the workplace.	
	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 as well as 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.	
	Create and use representations to organize, record, and communicate mathematical ideas.	
	Analyze mathematical relationships to connect and communicate mathematical ideas.	
	~~d~~Display, ~~E~~explain, ~~or~~ justify mathematical ideas and arguments using precise mathematical language in written or oral communications.	

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:		
8N01	illustrate a ~~the~~ rational approximation of an irrational number and locate that ~~the~~ rational number approximation on a number line. Include π, ~~Numbers include~~ square roots of numbers less than 225, and cube roots for numbers less than 125 ~~225~~ with a whole number cube root~~, and π.~~	ER - Clarity
8N02	convert between base 10 notation and scientific notation.	
8N03	extend previous understandings of number line to include ordering real ~~rational and irrational~~ numbers.	Clarity
8N04	order a set of real ~~rational and irrational~~ numbers arising from mathematical and ~~or~~ real-world contexts.	Clarity

8N05	approximate multiplicative comparisons of ~~between~~ two numbers expressed in scientific notation~~s~~ based on real-world problems, such as ~~(The average distance from the earth to the moon is 3.84 x 105 km. The average distance from the earth to Mars is 2.28 x 108 km. How~~ finding how many times greater ~~is~~ the distance from the earth to Mars is than the distance from the earth to the moon?~~)~~	MV – Clarity, formatting
8A01	apply the properties of integer exponents to generate equivalent numerical expressions.	Moved from Expressions and equations Flows with scientific notation

Proportionality.		**8P**
Dilations		
Knowledge and Skills Statement. The student applies mathematical process standards to use proportional relationships to describe dilations.		
8P01	generalize that the ratio of 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	explain the similarities and differences between a given figure and its dilation(s) on a coordinate plane.	
8P03	use an algebraic representation to explain the effect of a given positive rational scale factor ~~factors~~ 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 explain 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 modeling the relationship.	
8P14	determine the slope (rate of change) and the y-intercept (initial value) of the data in a table and ~~or~~ graph that models a given context.	
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 proportional situations and direct variation with tables, graphs, and equations ($y=kx$).	
8P07	represent key aspects of linear non-proportional situations with tables, graphs, and equations ($y=mx+b, b\neq 0$).	
8P08	contrast bivariate sets of data that suggest a linear association with bivariate sets of data that do not suggest a linear association.	
8P09	draw a trend ~~graph a straight~~ line that approximates the relationship between bivariate sets of data that suggest a linear association.	clarity and vocabulary
8P10	determine solutions to mathematical and ~~real-world and~~ real-world problems involving direct variation.	
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 tables, mapping, and graphs	baseline needed for functions
8P12	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:	
8A02	illustrate and explain the relationship between the base area, height, and volume of a cylinder verbally and symbolically.

8A03	illustrate and explain the relationship between the volume of a cylinder and a cone having both congruent bases and heights. ~~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 to each other and are congruent to the radius of the sphere.	clarity
8A06	represent, verify, and explain the Pythagorean theorem and its converse using models and diagrams.	
Knowledge and Skills Statement. The student applies mathematical process standards to use geometry to solve problems. The student is expected to:		
8A05	determine solutions to mathematical and real-world problems involving the volume of cylinders, cones, and spheres.	
	extend previous knowledge of surface area to make connections to the formulas for lateral and total surface area and determine solutions for mathematical and real-world problems involving rectangular prisms, triangular prisms, and cylinder.	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 and ~~or~~ real-world problems ~~problem~~, including ~~. (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 rational number coefficients and constants.	
8A12	solve one-variable equations with variables on both sides of the equal sign that represent mathematical and real-world problems, including ~~. (The equations should include~~ rational number coefficients and constants~~.)~~	clarity and consistency
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~~,~~ and graphs.~~, and algebraic methods.~~	ER

Two-Dimensional and Three-Dimensional Figures.		**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 of two-dimensional figures on a coordinate plane. ~~For example, rotations, reflections, and translations preserve congruence of two-dimensional figures.~~	example only addressed one part of se
8G02	differentiate between transformations that preserve congruence and those that do not.	
8G03	explain the effect of given transformations (translations, reflections, and rotations limited to 90°, 180°, 270°, and 360°) applied to two-dimensional figures on a coordinate plane using an algebraic representation, such as ~~For example~~, (*x*, *y*)→(*x*+2, *y*+2) describes a translation of the point two units up and two units to the right.	

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 in the scatterplot including ~~(~~ positive trend, negative trend, no trend, linear association, non-linear association, and/or no association ~~.)~~ to address questions of association between bivariate data.	
8M02	determine deviations from the mean in order to describe the mean as a "balance point" where ~~(~~ the sum of the deviations is 0 ~~)~~ .	clarity-formatting
8M03	determine the mean absolute deviation and use this quantity as a measure of the average distance data are from the mean.	

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.~~	split for clarity
	simulate generating random samples of the same size from a population with known characteristics to develop the notion of a random sample being representative of the population from which it was selected.	