Instructional Focus Document
Grade 7 Mathematics

TITLE : Unit 05: Similarity
SUGGESTED DURATION : 12 days

UNIT OVERVIEW

Introduction
This unit bundles student expectations that address similarity, similar shapes, and scale drawings. According to the Texas Education Agency, mathematical process standards including application, a problem-solving model, tools and techniques, communication, representations, relationships, and justifications should be integrated (when applicable) with content knowledge and skills so that students are prepared to use mathematics in everyday life, society, and the workplace. The introduction to the grade level standards state, "While the use of all types of technology is important, the emphasis on algebra readiness skills necessitates the implementation of graphing technology."

Prior to this Unit
In Grade 6, students used scale factors involving ratios and rates to solve problems. In Grade 7 Unit 03, students used proportional reasoning with ratios and rates to solve problems involving ratios, rates, and percents.

During this Unit
Students extend concepts of proportionality to two-dimensional figures as they solve mathematical and real-world problems involving similar shapes and scale drawings. Students generalize the critical attributes of similarity, which include examining the multiplicative relationship within and between similar shapes.

Other considerations: Reference the Mathematics COVID-19 Gap Implementation Tool Grade 7

After this Unit
In Grade 8, students will generalize the ratio of corresponding sides of similar shapes are proportional, compare and contrast the attributes of a shape and its dilations on a coordinate plane, and use algebraic representations to explain the effect of a given scale factor applied to two-dimensional figures on a coordinate plane with the origin as the center of the dilation.

Additional Notes
In Grade 7, solving mathematical and real-world problems involving similar shape and scale drawings is identified as STAAR Readiness Standard 7.5C, and generalizing the critical attributes of similarity, including ratios within and between similar shapes is identified as STAAR Supporting Standard 7.5A. These two standards are listed under the Grade 7 STAAR Reporting Category: Geometry and Measurement and part of the Grade 7 *Texas Response to Curriculum Focal Points* (TxRCFP): Representing and applying proportional relationships. This unit is supporting the development of the *Texas College and Career Readiness Standards* (TxCCRS): I. Numeric Reasoning A2, B1; II. Algebraic Reasoning D1, D2; III. Geometric and Spatial Reasoning A2, B2, D3; V. Statistical Reasoning A1, C2; VII. Problem Solving and Reasoning A1, A2, A3, A4, A5, B1, C1, D1, D2; VIII. Communication and Representation A1, A2, A3, B1, B2, C1, C2, C3; IX. Connections A1, A2, B1, B2, B3.

Research
According to the National Council of Teachers of Mathematics (NCTM), *Navigating through Measurement in Grades 6 – 8* (2005), "The middle school years are a good time to introduce students to the use of proportional relationships to measure unusually large or small attributes…investigating relationships among measurements offers students excellent opportunities to practice multiplicative reasoning, which is necessary for solving problems related to the scaling of similar shapes in one, two, and three dimensions"

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(p. 45). Prior to the development of the concept of similarity, students must have had qualitative and quantitative experiences with ratios. "Similarity in the mathematical sense is a very complex idea and it takes some time for children to understand it…similarity is an elusive concept if the student has not learned to see quantitative relationships that are not explicit" (Lamon, 2006, p. 214)

Lamon, S. J. (2006). *Teaching fractions and ratios for understanding: Essential content knowledge and instructional strategies for teachers*. (2nd ed.). Mahwah, NJ: Lawrence Erlbaum Associates Inc.

National Council of Teachers of Mathematics. (2005). *Navigating through measurement in grades 6 – 8*. Reston, VA: National Council of Teachers of Mathematics, Inc.

Texas Education Agency & Texas Higher Education Coordinating Board. (2009). *Texas college and career readiness standards.* Retrieved from http://www.thecb.state.tx.us/institutional-resources-programs/public-community-technical-state-colleges/texas-college-and-career-readiness-standards/

Texas Education Agency. (2013). *Texas response to curriculum focal points for kindergarten through grade 8 mathematics.* Retrieved from https://www.texasgateway.org/resource/txrcfp-texas-response-curriculum-focal-points-k-8-mathematics-revised-2013

OVERARCHING UNDERSTANDINGS AND QUESTIONS

Quantitative relationships model problem situations efficiently and can be used to make generalizations, predictions, and critical judgements in everyday life.

- What patterns exist within different types of quantitative relationships and where are they found in everyday life?
- Why is the ability to model quantitative relationships in a variety of ways essential to solving problems in everyday life?

UNIT UNDERSTANDINGS AND QUESTIONS	OVERARCHING CONCEPTS AND UNIT CONCEPTS	PERFORMANCE ASSESSMENT(S)
Understanding how two quantities vary together (covariation) and can be reasoned up and down in situations involving invariant (constant) relationships builds flexible proportional reasoning in order to make predictions	Proportionality • Ratios and Rates • Scale factors • Relationships and Generalizations	**Mathematics Grade 7 Unit 05 PA 01** **Click on the PA title to view related rubric.** Analyze the problem situation(s) described below. Organize

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UNIT UNDERSTANDINGS AND QUESTIONS	OVERARCHING CONCEPTS AND UNIT CONCEPTS	PERFORMANCE ASSESSMENT(S)

and critical judgements about the relationship.
• Analyzing geometric relationships in models aids in representing the attributes and quantifiable measures to generalize proportional geometric relationships and solve problems.
  • What are the critical attributes of similarity?
  • How can ratios be used to generalize the attributes of similarity?
  • How is the between ratio of similar shapes different than the within ratio of similar shapes?
  • What is the relationship between corresponding side lengths of similar shapes and proportionality?
  • How does the scale factor affect the size of two similar shapes?
  • What is the relationship between the scale factor and linear measures of similar shapes?
  • What is the process for solving problems involving similar shapes and scale drawings?
	• Proportional
	• Geometric similarity
	• Scale drawings
	• Representations
	
	Associated Mathematical Processes
	• Application
	• Problem Solving Model
	• Tools and Techniques
	• Communication
	• Representations
	• Relationships
	• Justification
		and record your work for each of the following tasks. Using precise mathematical language, justify and explain each solution process.
		
		1. Jean is going to frame a picture. She plans to layer several rectangular mattes around the picture. The mattes need to be similar rectangles. She has the following mattes to choose from:
		
		      3" × 4.5"
		      4" × 6"
		      5" × 7"
		      6" × 8"
		      8" × 10"
		      12" × 14"
		      15" × 10"
		
		  a. Determine which mattes, if any, are similar. Justify your solutions using both within and between ratios for the similar figures.
		
		  b. Generalize the critical attributes of similarity.
		
		  c. Determine the scale factor that can be used to create a 6" × 8" rectangular matte from a 9" × 12" rectangular matte.
		
		  d. A new rectangular matte has dimensions that are 75% of all the dimensions of a 12" × 16" rectangular matte. What is the perimeter of the new rectangular matte?
		
		  e. Determine and describe if the measure of the perimeter of the new rectangular matte is

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UNIT UNDERSTANDINGS AND QUESTIONS	OVERARCHING CONCEPTS AND UNIT CONCEPTS	PERFORMANCE ASSESSMENT(S)
		proportional to the perimeter of the 12" × 16" rectangular matte when the scale factor of 75% is applied to all the original dimensions. Standard(s): **7.1A**, **7.1B**, **7.1C**, **7.1D**, **7.1E**, **7.1F**, **7.1G**, **7.5A**, **7.5C**, **ELPS.c.1A**, **ELPS.c.2C**, **ELPS.c.2D**, **ELPS.c.2E**, **ELPS.c.3C**, **ELPS.c.3D**, **ELPS.c.3H**, **ELPS.c.4C**, **ELPS.c.4H**, **ELPS.c.5B**, **ELPS.c.5F**, **ELPS.c.5G**

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⚠ MISCONCEPTIONS / UNDERDEVELOPED CONCEPTS

Misconceptions:

- Some students may think any scale factor applied to a similar shape will result in an enlargement or reduction rather than realizing that a scale factor of 1 produces a congruent shape.
- Some students may not use the name of the shape to help correctly match corresponding sides and angles of two similar shapes.
- Some students may not associate that sequence of vertices when naming similar shapes also names the corresponding sides and angles of the two shapes (e.g., If figure *ABCD* is similar to figure *QRST*, then $\overline{AB}$ corresponds to $\overline{QR}$ and ∠*A* corresponds to ∠*Q*, etc.)
- Some students may not be able to identify the original figure and its image, especially when dealing with similar shapes and drawings that transform from a larger figure to a smaller figure.
- Some students may not understand that a scale factor must be applied to all dimensions of a shape to maintain similarity.
- Some students may not interpret prime notation correctly when referring to similar shapes.
- Some students may think that all similar shapes are drawn to scale rather than using given measurements of the shapes.
- Students may think that the scale factor also applies to the angle measure rather than understanding that corresponding angles are congruent in similar shapes.

Underdeveloped Concepts:

- Some students may think proportionality is an additive relationship instead of a multiplicative relationship.

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UNIT VOCABULARY

- **Congruent** – of equal measure, having exactly the same size and same shape
- **Positive rational numbers** – the set of numbers that can be expressed as a fraction $\frac{a}{b}$, where a and b are counting (natural) numbers
- **Similar shapes** – shapes whose angles are congruent and side lengths are proportional (equal scale factor)

Related Vocabulary:

- Between ratio
- Corresponding
- Enlargement
- Prime notation

- Proportional
- Ratio
- Reduction
- Scale drawing

- Scale factor
- Within ratio

UNIT ASSESSMENT ITEMS	SYSTEM RESOURCES	OTHER RESOURCES
Unit Assessment Items that have been published by your district may be accessed through **Search All Components** in the District Resources tab. Assessment items may also be found using the Assessment Center if your district has granted access to that tool.	**Mathematics Concepts Charts** **Mathematics COVID-19 Gap Implementation Tool Grade 7** **Mathematics COVID-19 Gap Implementation Tool Instructions** **Mathematics Grade 7 Backward Design Document** **Mathematics Grade 7 Enhanced TEKS Clarification** **Mathematics Grade 7 Focal Points with Aligned Standards and TEKS Introduction**	Texas Higher Education Coordinating Board – **Texas College and Career Readiness Standards** Texas Education Agency – **Texas Response to Curriculum Focal Points for K-8 Mathematics Revised 2013** Texas Education Agency – **Mathematics Curriculum** Texas Education Agency – **STAAR Mathematics Resources** Texas Education Agency Texas Gateway – **Revised Mathematics TEKS: Vertical Alignment Charts**

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	Mathematics Grade 7 STAAR Analysis Resources	Texas Education Agency Texas Gateway – **Mathematics TEKS: Supporting Information**
	Mathematics Grade 7 STAAR Blueprint and Item Percentages	Texas Education Agency Texas Gateway – **Interactive Mathematics Glossary**
	Mathematics Grade 7 STAAR Enhanced Blueprint	Texas Education Agency Texas Gateway – **Resources Aligned to Grade 7 Mathematics TEKS**
	Mathematics Grade 7 Vertical Alignment	Texas Instruments – **Graphing Calculator Tutorials**
	Mathematics Grade 7_Unit 05_TEKS Resource System STAAR Analysis	
	Mathematics K-HS Overarching Understandings and Questions	
	Mathematics Long Term Transfer Goals	
	Mathematics Suggested Basic Manipulatives by Grade Level	
	Mathematics Suggested Engaging Literature	
	Mathematics Texas Education Agency Grade 7 TEKS Supporting Information (with TEKS Resource System Comments)	
	Mathematics Vertical Quick Guide	

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TAUGHT DIRECTLY TEKS
TEKS INTENDED TO BE EXPLICITLY TAUGHT IN THIS UNIT.

TEKS/SE Legend:

- ***Knowledge and Skills Statements (TEKS) identified by TEA are in italicized, bolded, black text.***
- **Student Expectations (TEKS) identified by TEA are in bolded, black text.**
- ***Student Expectations (TEKS) are labeled Readiness as identified by TEA of the assessed curriculum.***
- ***Student Expectations (TEKS) are labeled Supporting as identified by TEA of the assessed curriculum.***
- ***Student Expectations (TEKS) are labeled Process standards as identified by TEA of the assessed curriculum.***
- Portions of the Student Expectations (TEKS) that are not included in this unit but are taught in previous or future units are indicated by a ~~strike-through~~.

Specificity Legend:

- Supporting information / clarifications (specificity) written by TEKS Resource System are in blue text.
- *Unit-specific clarifications are in italicized, blue text.*
- Information from Texas Education Agency (TEA), Texas College and Career Readiness Standards (TxCCRS), Texas Response to Curriculum Focal Points (TxRCFP) is labeled.
- A Partial Specificity label indicates that a portion of the specificity not aligned to this unit has been removed.

TEKS# / SE#	TEKS	SPECIFICITY
7.1	***Mathematical process standards. The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:***	
7.1A	**Apply mathematics to problems arising in everyday life, society, and the workplace.** ***Process Standard***	Apply MATHEMATICS TO PROBLEMS ARISING IN EVERYDAY LIFE, SOCIETY, AND THE WORKPLACE

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		Including, but not limited to:
		
		• Mathematical problem situations within and between disciplines
		   ◦ Everyday life
		   ◦ Society
		   ◦ Workplace
		
		Note(s):
		
		• The mathematical process standards may be applied to all content standards as appropriate.
		• TxRCFP:
		   ◦ Developing fluency with rational numbers and operations to solve problems in a variety of contexts
		   ◦ Representing and applying proportional relationships
		   ◦ Using expressions and equations to describe relationships in a variety of contexts, including geometric problems
		   ◦ Comparing sets of data
		• TxCCRS:
		   ◦ VII.D. Problem Solving and Reasoning – Real-world problem solving
		      • VII.D.1. Interpret results of the mathematical problem in terms of the original real-world situation.
		   ◦ IX.A. Connections – Connections among the strands of mathematics
		      • IX.A.1. Connect and use multiple key concepts of mathematics in situations and problems.
		      • IX.A.2. Connect mathematics to the study of other disciplines.
		   ◦ IX.B. Connections – Connections of mathematics to nature, real-world situations, and everyday life
		      • IX.B.1. Use multiple representations to demonstrate links between mathematical and real-world situations.

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		• IX.B.2. Understand and use appropriate mathematical models in the natural, physical, and social sciences. • IX.B.3. Know and understand the use of mathematics in a variety of careers and professions.

7.1B	**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.**
	Process Standard
		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
		
		Including, but not limited to:
		
		• Problem-solving model
		  ◦ Analyze given information
		  ◦ Formulate a plan or strategy
		  ◦ Determine a solution
		  ◦ Justify the solution
		  ◦ Evaluate the problem-solving process and the reasonableness of the solution
		
		Note(s):
		
		• The mathematical process standards may be applied to all content standards as appropriate.
		• TxRCFP:
		  ◦ Developing fluency with rational numbers and operations to solve problems in a variety of contexts
		  ◦ Representing and applying proportional relationships
		  ◦ Using expressions and equations to describe relationships in a variety of contexts,

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		including geometric problems
		  ◦ Comparing sets of data
		• TxCCRS:
		  ◦ I.B. Numeric Reasoning – Number sense and number concepts
		    • I.B.1. Use estimation to check for errors and reasonableness of solutions.
		  ◦ V.A. Statistical Reasoning – Design a study
		    • V.A.1. Formulate a statistical question, plan an investigation, and collect data.
		  ◦ VII.A. Problem Solving and Reasoning – Mathematical problem solving
		    • VII.A.1. Analyze given information.
		    • VII.A.2. Formulate a plan or strategy.
		    • VII.A.3. Determine a solution.
		    • VII.A.4. Justify the solution.
		    • VII.A.5. Evaluate the problem-solving process.
		  ◦ VII.D. Problem Solving and Reasoning – Real-world problem solving
		    • VII.D.2. Evaluate the problem-solving process.

7.1C	**Select tools, including** ~~real objects, manipulatives,~~ **paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems.**
	
	Process Standard
		Partial Specificity
		
		Select
		
		TOOLS, INCLUDING PAPER AND PENCIL AND TECHNOLOGY AS APPROPRIATE, AND TECHNIQUES, INCLUDING MENTAL MATH, ESTIMATION, AND NUMBER SENSE AS APPROPRIATE, TO SOLVE PROBLEMS
		
		Including, but not limited to:
		
		• Appropriate selection of tool(s) and techniques to apply in order to solve problems
		  ◦ Tools
		    • Paper and pencil
		    • Technology
		  ◦ Techniques

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		• Mental math
		• Estimation
		• Number sense
		
		Note(s):
		
		• The mathematical process standards may be applied to all content standards as appropriate.
		• TxRCFP:
		  ○ Developing fluency with rational numbers and operations to solve problems in a variety of contexts
		  ○ Representing and applying proportional relationships
		  ○ Using expressions and equations to describe relationships in a variety of contexts, including geometric problems
		  ○ Comparing sets of data
		• TxCCRS:
		  ○ I.B. Numeric Reasoning – Number sense and number concepts
		    • I.B.1. Use estimation to check for errors and reasonableness of solutions.
		  ○ V.C. Statistical Reasoning – Analyze, interpret, and draw conclusions from data
		    • V.C.2. Analyze relationships between paired data using spreadsheets, graphing calculators, or statistical software.

7.1D	**Communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, ~~graphs,~~ and language as appropriate.** *Process Standard*	Partial Specificity Communicate MATHEMATICAL IDEAS, REASONING, AND THEIR IMPLICATIONS USING MULTIPLE REPRESENTATIONS, INCLUDING SYMBOLS, DIAGRAMS, AND LANGUAGE AS APPROPRIATE Including, but not limited to: • Mathematical ideas, reasoning, and their implications

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TEKS# / SE#	TEKS	SPECIFICITY
		◦ Multiple representations, as appropriate 　• Symbols 　• Diagrams 　• Language Note(s): • The mathematical process standards may be applied to all content standards as appropriate. • TxRCFP: 　◦ Developing fluency with rational numbers and operations to solve problems in a variety of contexts 　◦ Representing and applying proportional relationships 　◦ Using expressions and equations to describe relationships in a variety of contexts, including geometric problems 　◦ Comparing sets of data • TxCCRS: 　◦ II.D. Algebraic Reasoning – Representing relationships 　　• II.D.1. Interpret multiple representations of equations, inequalities, and relationships. 　　• II.D.2. Convert among multiple representations of equations, inequalities, and relationships. 　◦ VIII.A. Communication and Representation – Language, terms, and symbols of mathematics 　　• VIII.A.1. Use mathematical symbols, terminology, and notation to represent given and unknown information in a problem. 　　• VIII.A.2. Use mathematical language to represent and communicate the mathematical concepts in a problem. 　　• VIII.A.3. Use mathematical language for reasoning, problem solving, making connections, and generalizing. 　◦ VIII.B. Communication and Representation – Interpretation of mathematical work

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		• VIII.B.1. Model and interpret mathematical ideas and concepts using multiple representations. • VIII.B.2. Summarize and interpret mathematical information provided orally, visually, or in written form within the given context. ◦ VIII.C. Communication and Representation – Presentation and representation of mathematical work 　• VIII.C.1. Communicate mathematical ideas, reasoning, and their implications using symbols, diagrams, models, graphs, and words. 　• VIII.C.2. Create and use representations to organize, record, and communicate mathematical ideas. 　• VIII.C.3. Explain, display, or justify mathematical ideas and arguments using precise mathematical language in written or oral communications. ◦ IX.B. Connections – Connections of mathematics to nature, real-world situations, and everyday life 　• IX.B.1. Use multiple representations to demonstrate links between mathematical and real-world situations.
7.1E	**Create and use representations to organize, record, and communicate mathematical ideas.** ***Process Standard***	Create, Use REPRESENTATIONS TO ORGANIZE, RECORD, AND COMMUNICATE MATHEMATICAL IDEAS Including, but not limited to: • Representations of mathematical ideas 　◦ Organize 　◦ Record 　◦ Communicate • Evaluation of the effectiveness of representations to ensure clarity of mathematical ideas being communicated

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		• Appropriate mathematical vocabulary and phrasing when communicating mathematical ideas
		
		 Note(s):
		
		 • The mathematical process standards may be applied to all content standards as appropriate.
		 • TxRCFP:
		    ◦ Developing fluency with rational numbers and operations to solve problems in a variety of contexts
		    ◦ Representing and applying proportional relationships
		    ◦ Using expressions and equations to describe relationships in a variety of contexts, including geometric problems
		    ◦ Comparing sets of data
		 • TxCCRS:
		    ◦ VIII.B. Communication and Representation – Interpretation of mathematical work
		      ■ VIII.B.1. Model and interpret mathematical ideas and concepts using multiple representations.
		      ■ VIII.B.2. Summarize and interpret mathematical information provided orally, visually, or in written form within the given context.
		    ◦ VIII.C. Communication and Representation – Presentation and representation of mathematical work
		      ■ VIII.C.1. Communicate mathematical ideas, reasoning, and their implications using symbols, diagrams, models, graphs, and words.
		      ■ VIII.C.2. Create and use representations to organize, record, and communicate mathematical ideas.

7.1F	**Analyze mathematical relationships to connect and communicate mathematical ideas.** ***Process Standard***	Analyze MATHEMATICAL RELATIONSHIPS TO CONNECT AND COMMUNICATE MATHEMATICAL IDEAS

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		Including, but not limited to:
		
		• Mathematical relationships
		 ○ Connect and communicate mathematical ideas
		   ■ Conjectures and generalizations from sets of examples and non-examples, patterns, etc.
		   ■ Current knowledge to new learning
		
		Note(s):
		
		• The mathematical process standards may be applied to all content standards as appropriate.
		• TxRCFP:
		 ○ Developing fluency with rational numbers and operations to solve problems in a variety of contexts
		 ○ Representing and applying proportional relationships
		 ○ Using expressions and equations to describe relationships in a variety of contexts, including geometric problems
		 ○ Comparing sets of data
		• TxCCRS:
		 ○ VII.A. Problem Solving and Reasoning – Mathematical problem solving
		   ■ VII.A.1. Analyze given information.
		 ○ VIII.A. Communication and Representation – Language, terms, and symbols of mathematics
		   ■ VIII.A.1. Use mathematical symbols, terminology, and notation to represent given and unknown information in a problem.
		   ■ VIII.A.2. Use mathematical language to represent and communicate the mathematical concepts in a problem.
		   ■ VIII.A.3. Use mathematical language for reasoning, problem solving, making connections, and generalizing.
		 ○ VIII.B. Communication and Representation – Interpretation of mathematical work

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TEKS# / SE#	TEKS	SPECIFICITY
		- VIII.B.1. Model and interpret mathematical ideas and concepts using multiple representations. - VIII.C. Communication and Representation – Presentation and representation of mathematical work - VIII.C.1. Communicate mathematical ideas, reasoning, and their implications using symbols, diagrams, models, graphs, and words. - VIII.C.2. Create and use representations to organize, record, and communicate mathematical ideas. - VIII.C.3. Explain, display, or justify mathematical ideas and arguments using precise mathematical language in written or oral communications. - IX.A. Connections – Connections among the strands of mathematics - IX.A.1. Connect and use multiple key concepts of mathematics in situations and problems. - IX.A.2. Connect mathematics to the study of other disciplines.
7.1G	**Display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication.** *Process Standard*	Display, Explain, Justify MATHEMATICAL IDEAS AND ARGUMENTS USING PRECISE MATHEMATICAL LANGUAGE IN WRITTEN OR ORAL COMMUNICATION Including, but not limited to: - Mathematical ideas and arguments - Validation of conclusions - Displays to make work visible to others - Diagrams, visual aids, written work, etc. - Explanations and justifications - Precise mathematical language in written or oral communication

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		Note(s):
		
		 • The mathematical process standards may be applied to all content standards as appropriate.
		 • TxRCFP:
		   ◦ Developing fluency with rational numbers and operations to solve problems in a variety of contexts
		   ◦ Representing and applying proportional relationships
		   ◦ Using expressions and equations to describe relationships in a variety of contexts, including geometric problems
		   ◦ Comparing sets of data
		 • TxCCRS:
		   ◦ VII.A. Problem Solving and Reasoning – Mathematical problem solving
		     • VII.A.4. Justify the solution.
		   ◦ VII.B. Problem Solving and Reasoning – Proportional reasoning
		     • VII.B.1. Use proportional reasoning to solve problems that require fractions, ratios, percentages, decimals, and proportions in a variety of contexts using multiple representations.
		   ◦ VII.C. Problem Solving and Reasoning – Logical reasoning
		     • VII.C.1. Develop and evaluate convincing arguments.
		   ◦ VIII.A. Communication and Representation – Language, terms, and symbols of mathematics
		     • VIII. A.3. Use mathematical language for reasoning, problem solving, making connections, and generalizing.
		   ◦ VIII.B. Communication and Representation – Interpretation of mathematical work
		     • VIII.B.1. Model and interpret mathematical ideas and concepts using multiple representations.
		     • VIII.B.2. Summarize and interpret mathematical information provided orally, visually, or in written form within the given context.
		   ◦ VIII.C. Communication and Representation – Presentation and representation of mathematical work

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		• VIII. C.3. Explain, display, or justify mathematical ideas and arguments using precise mathematical language in written or oral communications.
7.5	*Proportionality. The student applies mathematical process standards to use geometry to describe or solve problems involving proportional relationships. The student is expected to:*	

7.5A	**Generalize the critical attributes of similarity, including ratios within and between similar shapes.** *Supporting Standard*	Generalize
		
		THE CRITICAL ATTRIBUTES OF SIMILARITY, INCLUDING RATIOS WITHIN AND BETWEEN SIMILAR SHAPES
		
		Including, but not limited to:
		
		• Congruent – of equal measure, having exactly the same size and same shape
		• Similar shapes – shapes whose angles are congruent and side lengths are proportional (equal scale factor)
		• Notation for similar shapes
		  ○ Symbol for similarity (~) read as "similar to"
		  ○ The order of the letters determines corresponding side lengths and angles
		• Attributes of similar shapes
		  ○ Corresponding sides are proportional.
		  ○ Corresponding angles are congruent.
		• Ratios within similar figures
		  ○ Compares two lengths within one figure to the corresponding two lengths within a second figure
		• Ratios between similar figures
		  ○ Compares two corresponding lengths between two similar figures

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		- If the figures are similar, all ratios comparing two corresponding lengths between the two figures will be the same. - Generalizations of similarity - A scale factor greater than 0 but <1 decreases the linear dimensions of the shape. - A scale factor >1 increases the linear dimensions of the shape. - Ratios comparing corresponding lengths within each shape or between shapes will determine if the shapes are similar. - Equivalent ratios for all pairs of corresponding lengths within or between figures should be tested to prove similarity. - Shapes that are "the same shape, but a different size" are not always similar shapes. - Corresponding sides are proportional, while corresponding angles are congruent. - There is a multiplicative relationship between the lengths of corresponding sides. Note(s): - Grade Level(s): - Grade 7 introduces generalizing the critical attributes of similarity, including ratios within and between similar shapes. - Various mathematical process standards will be applied to this student expectation as appropriate. - TxRCFP: - Representing and applying proportional relationships - TxCCRS: - III.A. Geometric and Spatial Reasoning – Figures and their properties - III.A.2. Form and validate conjectures about one-, two-, and three-dimensional figures and their properties. - III.B. Geometric and Spatial Reasoning – Transformations and symmetry - III.B.2. Use transformations to investigate congruence, similarity, and symmetries of figures. - III.D. Geometric and Spatial Reasoning – Measurements involving geometry and algebra

TITLE : Unit 05: Similarity   **SUGGESTED DURATION :** 12 days

TEKS# / SE#	TEKS	SPECIFICITY
		• III.D.3. Determine indirect measurements of geometric figures using a variety of methods. ○ VII.B. Problem Solving and Reasoning – Proportional reasoning • VII.B.1. Use proportional reasoning to solve problems that require fractions, ratios, percentages, decimals, and proportions in a variety of contexts using multiple representations.

7.5C	**Solve mathematical and real-world problems involving similar shape and scale drawings.**
	 Readiness Standard
		Solve
		
		 MATHEMATICAL AND REAL-WORLD PROBLEMS INVOLVING SIMILAR SHAPE AND SCALE DRAWINGS
		
		 Including, but not limited to:
		
		 • Positive rational numbers – the set of numbers that can be expressed as a fraction $\frac{a}{b}$, where a and b are counting (natural) numbers
		 • Various forms of positive rational numbers
		   ○ Counting (natural) numbers
		   ○ Decimals
		   ○ Fractions
		   ○ Percents converted to equivalent decimals or fractions for multiplying or dividing
		 • Mathematical and real-world problems
		 • Similar shapes – shapes whose angles are congruent and side lengths are proportional (equal scale factor)
		   ○ Similar shapes are proportional when a scale factor is applied to the linear measures, creating a dilated (enlarged or reduced) shape.
		 • Scale drawings
		   ○ Scale drawings are proportional when a scale factor is applied to the linear measures,

TITLE : Unit 05: Similarity　　　　　　　　　　　　　　　　**SUGGESTED DURATION :** 12 days

TEKS# / SE#	TEKS	SPECIFICITY
		creating a dilated (enlarged or reduced) scale drawing. Note(s): - Grade Level(s): 　- Grade 6 represented mathematical and real-world problems involving ratios and rates using scale factors, tables, graphs, and proportions. 　- Grade 7 introduces solving mathematical and real-world problems involving similar shape and scale drawings. 　- Grade 8 will generalize that the ratio of corresponding sides of similar shapes are proportional, including a shape and its dilation. 　- Grade 8 will compare and contrast the attributes of a shape and its dilation(s) on a coordinate plane. 　- Grade 8 will use an algebraic representation to explain the effect of a given positive rational scale factor applied to two-dimensional figures on a coordinate plane with the origin as the center of dilation. 　- Various mathematical process standards will be applied to this student expectation as appropriate. - TxRCFP: 　- Representing and applying proportional relationships - TxCCRS: 　- I.A. Numeric Reasoning – Number representations and operations 　　- I.A.2. Perform computations with rational and irrational numbers. 　- III.D. Geometric and Spatial Reasoning – Measurements involving geometry and algebra 　　- III.D.3. Determine indirect measurements of geometric figures using a variety of methods. 　- VII.B. Problem Solving and Reasoning – Proportional reasoning 　　- VII.B.1. Use proportional reasoning to solve problems that require fractions, ratios, percentages, decimals, and proportions in a variety of contexts using multiple representations.

TITLE : Unit 05: Similarity　　　　　　　　　　　　**SUGGESTED DURATION :** 12 days

TEKS# / SE#	TEKS	SPECIFICITY
		○ VII.D. Problem Solving and Reasoning – Real-world problem solving 　　• VII.D.1. Interpret results of the mathematical problem in terms of the original real-world situation. ○ IX.B. Connections – Connections of mathematics to nature, real-world situations, and everyday life 　　• IX.B.1. Use multiple representations to demonstrate links between mathematical and real-world situations.

ELPS#	SUBSECTION C: CROSS-CURRICULAR SECOND LANGUAGE ACQUISITION ESSENTIAL KNOWLEDGE AND SKILLS.

The English Language Proficiency Standards (ELPS), as required by 19 Texas Administrative Code, Chapter 74, Subchapter A, §74.4, outline English language proficiency level descriptors and student expectations for English language learners (ELLs). School districts are required to implement ELPS as an integral part of each subject in the required curriculum.

School districts shall provide instruction in the knowledge and skills of the foundation and enrichment curriculum in a manner that is linguistically accommodated commensurate with the student's levels of English language proficiency to ensure that the student learns the knowledge and skills in the required curriculum.

School districts shall provide content-based instruction including the cross-curricular second language acquisition essential knowledge and skills in subsection (c) of the ELPS in a manner that is linguistically accommodated to help the student acquire English language proficiency.
http://ritter.tea.state.tx.us/rules/tac/chapter074/ch074a.html#74.4

Choose appropriate ELPS to support instruction.

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