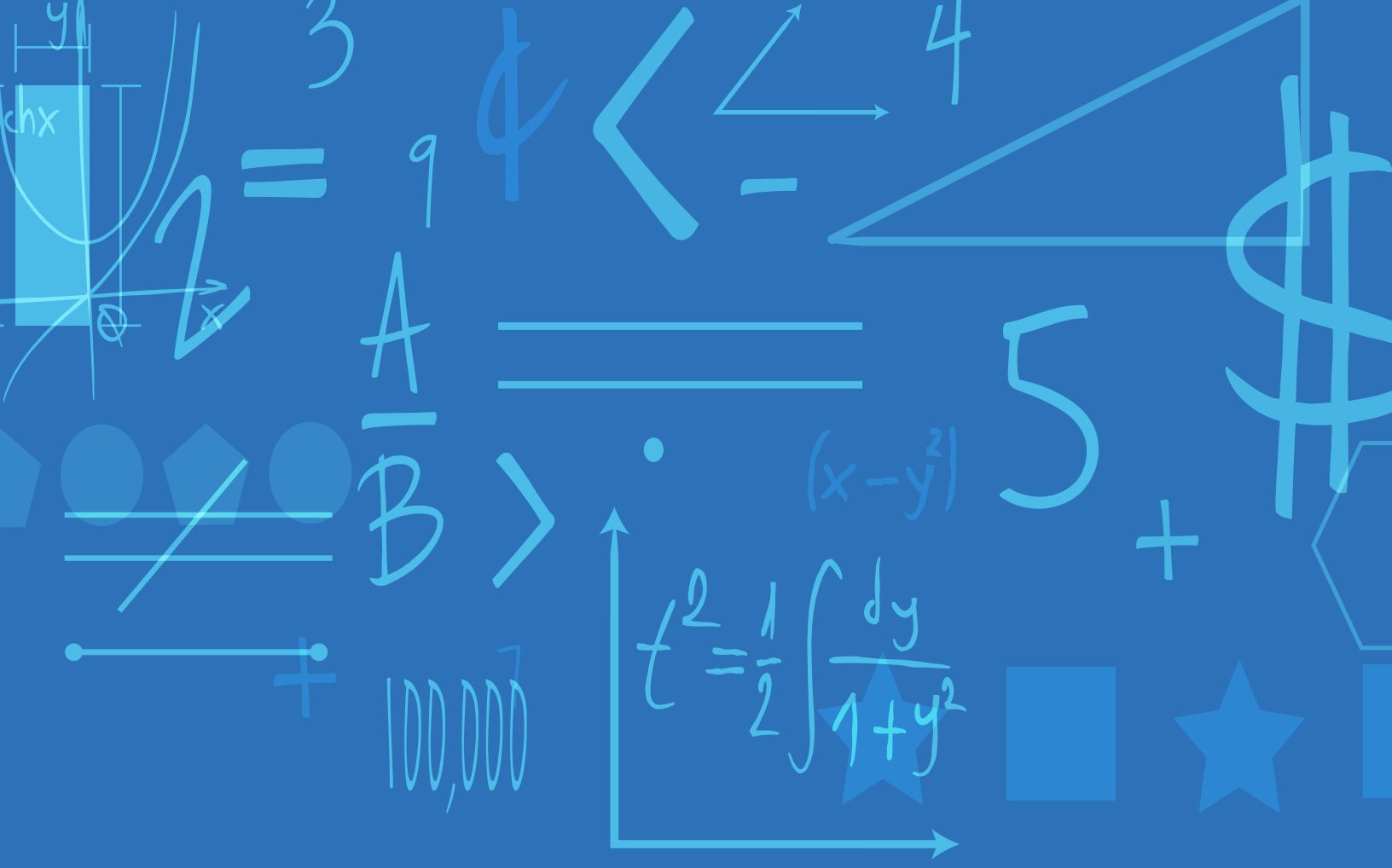
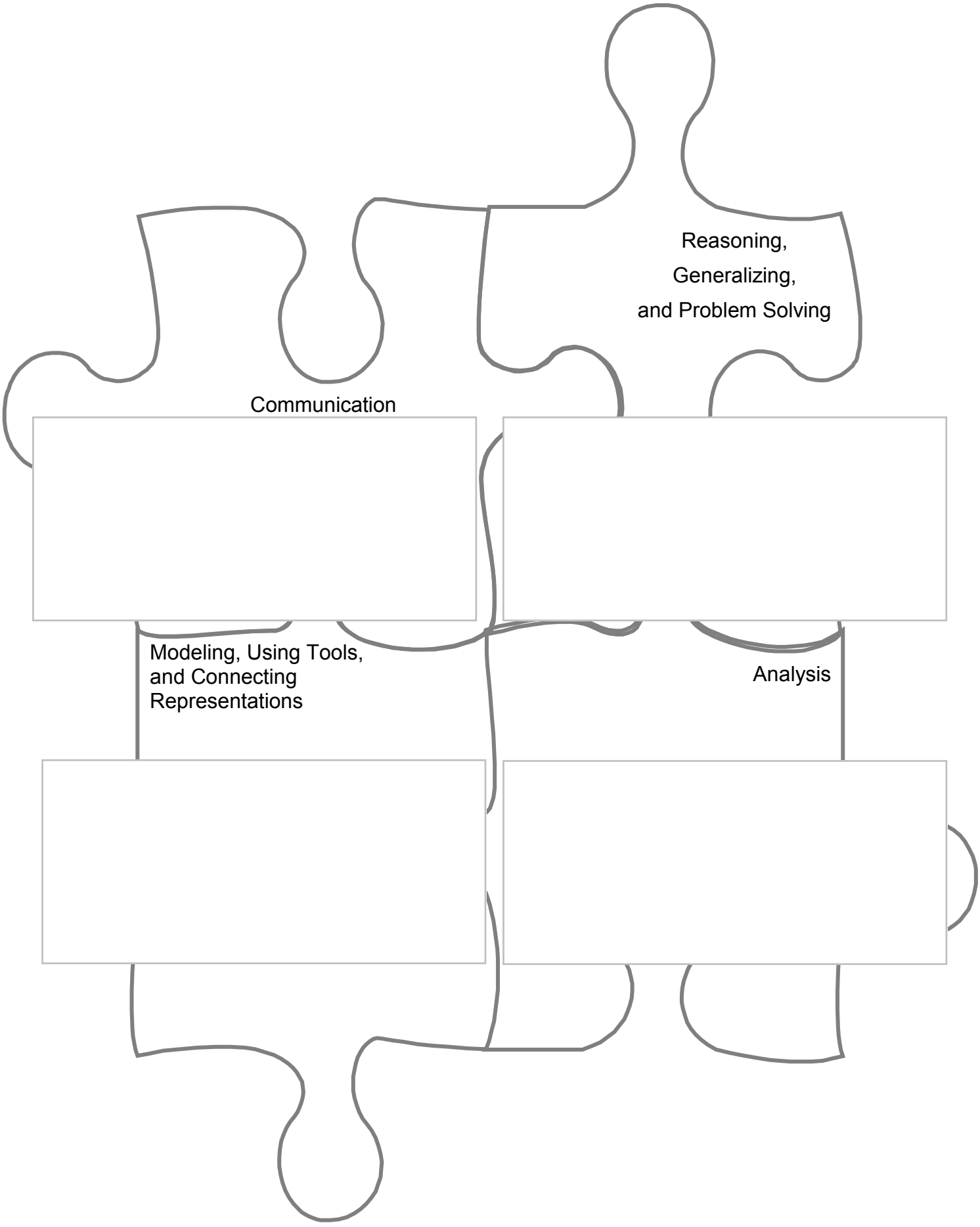


Introduction to the **Revised Mathematics TEKS**

MATHEMATICAL PROCESS STANDARDS JOURNAL GRADES 9-12

Texas Education Agency

Exploring The Mathematical Process Standards



Exploring The Mathematical Process Standards (continued)

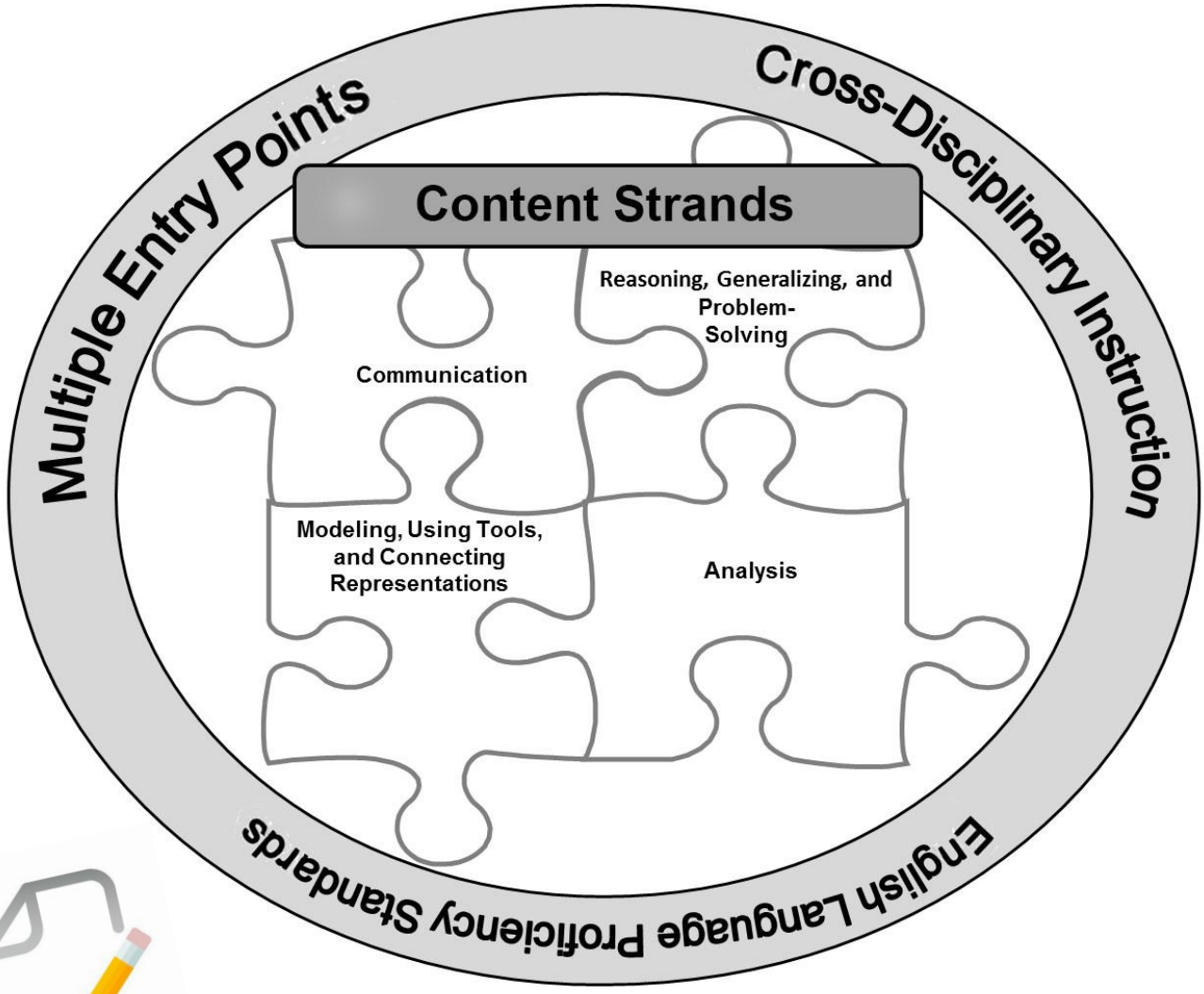
Mathematical Process Standard	Summarized
The student is expected to apply mathematics to problems arising in everyday life, society, and the workplace.	
The student is expected to use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution.	**1.**
The student is expected to 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.	
The student is expected to communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate.	**2.**
The student is expected to create and use representations to organize, record, and communicate mathematical ideas.	
The student is expected to analyze mathematical relationships to connect and communicate mathematical ideas.	**3.**
The student is expected to display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication.	

How might the new mathematical process standards support learning in your classroom?

Vocabulary Notes

ELPS	Cross-Disciplinary Instruction	Multiple Entry Points	Levels of Cognitive Demand
The English Language Proficiency Standards (ELPS) outline the instruction school districts must provide to English language learners in order for them to have full _____ to learn English and _____ academically. The ELPS are to be implemented as an integral part of the instruction in each _____ and _____ subject of the TEKS. Effective instruction and second language acquisition involves giving English language learners opportunities to listen, speak, read, or write at their _____ level of English language development in _____.	This term refers to skills and processes that cut across _____ disciplines (English/language arts, reading, math, science, and social studies). Related standards are found in the _____. **CCRS** The CCRS (College and Career Readiness Standards) includes the _____ and _____ Standards and is a resource designed to help students, parents, teachers, and counselors understand the specific _____ knowledge and _____ skills necessary for college and career readiness. The cross-disciplinary standards are organized into two major areas: Key _____ Skills and _____ Skills.	Tasks with _____ entry points are those which have varying degrees of _____ within the task, or provide students with varied _____, _____, and _____ to actively participate in the task.	Tasks that command engagement with the concepts and that encourage students to make connections leading to different opportunities for student thinking, such as _____ tasks, procedures _____ connections tasks, procedures _____ connections tasks, and _____ mathematics tasks.

The Mathematical Process Standards – My Understanding



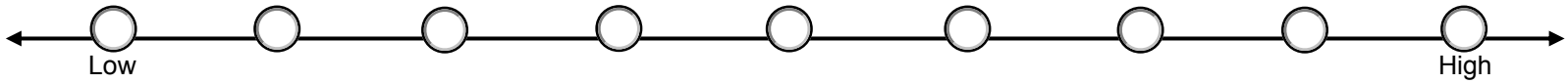
Since the process standards are mentioned in each Knowledge and Skills statement, how does that impact students' acquisition and demonstration of their mathematical understandings?

Examining Amplified Instructional Task 1

Task: _____

		Communication	Reasoning, Generalizing, and Problem Solving	Modeling, Using Tools, and Connecting Representations	Analysis
Instructional Strategies	English Language Proficiency Standards				
	Multiple Entry Points				
CCRS	Cross-Disciplinary				

Mark your perceived level of cognitive demand for this task on the continuum below:



Amplifying Instructional Tasks – Algebra I Example

		Considerations for Brainstorming		
	Consider the revised TEKS in the Original Task	**Consider the related SEs**	**Consider the Context**	**Consider the Student**
Guiding Questions	What main concepts and/or skills are involved in this task? What are related concepts and/or skills?	What else might be explored or applied? • Additional mathematical ideas from related student expectations • Process standards • Grade level connections	**Real-World Context** What else could be explored within this context? What related ideas could be added? Is there a real-world context for this idea? **Mathematical Context** Are there different starting points for the problem? How else could the material be presented?	What Tier I differentiation may be needed to reach the student who is • struggling, • learning English, and/or • advanced?
Brainstorming	**Main Concepts and/or Skills** *Identify key attributes of a quadratic function A(7)(A)* **Related Concepts and/or Skills** *Everyday life A(1)(A)*	**Process Standards** • *Process standards A(1)(A)-(G)* ***Content Standards*** • *Write quadratic functions using technology and make predictions A(8)(B)* • *Write quadratic functions given real solutions and graphs of related equations A(6)(C)* • *Write domain and range of quadratic functions using inequalities A(6)(A)*	**Context** • *How does the student thinking differ if the graph is presented first? Or the table?* • *What is the meaning of the points of a quadratic function when placed in a context?* • *What are the reasonable domain values when given a context?*	**Struggling** • *Model the use of additional tools (hands-on, pictures).* • *Model the use of a table to look for a pattern.* **Learning English** • *Provide sentence stems and frames.* • *Provide opportunities to speak.* • *Pre-teach vocabulary.* **Advanced** • *Explore how parameter changes would affect the profit.*

Amplifying Instructional Tasks – Geometry Example

	Considerations for Brainstorming			
	Consider the revised TEKS in the Original Task	**Consider the related SEs**	**Consider the Context**	**Consider the Student**
Guiding Questions	What main concepts and/or skills are involved in this task? What are related concepts and/or skills?	What else might be explored or applied? • Additional mathematical ideas from related student expectations • Process standards • Grade level connections	**Real-World Context** What else could be explored within this context? What related ideas could be added? Is there a real-world context for this idea? **Mathematical Context** Are there different starting points for the problem? How else could the material be presented?	What Tier I differentiation may be needed to reach the student who is • struggling, • learning English, and/or • advanced?
Brainstorming	**Main Concepts and/or Skills** *Find area of regular polygons G(11)(A)* **Related Concepts and/or Skills** *Everyday life G(1)(A)*	**Process Standards** • *Process standards G(1)(A)-(G)* ***Content Standards*** • *Apply the relationships in special right triangles 30°-60°-90° and 45°-45°-90° and the Pythagorean theorem, including Pythagorean triples, to solve problems. G(9)(B)* • *Determine the area of composite two-dimensional figures comprised of a combination of triangles, parallelograms, trapezoids, kites, regular polygons, or sectors of circles to solve problems using appropriate units of measure. G(11)(B)*	**Context** • *How can area be used to determine dimensions?* • *How could triangle properties be used to find lengths needed to calculate area?* • *How do you determine the amount of material needed for construction?*	**Struggling** • *Model the use of additional tools (hands-on, pictures).* • *Model the use of a table to look for a pattern.* **Learning English** • *Provide sentence stems and frames.* • *Provide opportunities to speak.* • *Pre-teach vocabulary.* **Advanced** • *Explore different pricing.* • *Explore how a change in amount of material affects the dimensions of the stage.*

Amplifying Instructional Tasks – Algebra II Example

	Consider the revised TEKS in the Original Task	Considerations for Brainstorming: Consider the related SEs	Consider the Context	Consider the Student
Guiding Questions	What main concepts and/or skills are involved in this task? What are related concepts and/or skills?	What else might be explored or applied? • Additional mathematical ideas from related student expectations • Process standards • Grade level connections	**Real-World Context** What else could be explored within this context? What related ideas could be added? Is there a real-world context for this idea? **Mathematical Context** Are there different starting points for the problem? How else could the material be presented?	What Tier I differentiation may be needed to reach the student who is • struggling, • learning English, and/or • advanced?
Brainstorming	**Main Concepts and/or Skills** *Graph and write the inverse of a function using notation such as $f^{-1}(x)$ 2A(2)(B)* **Related Concepts and/or Skills** *Multiple representations 2A(1)(D)*	**Process Standards** • *Process standards 2A(1)(A)-(G)* ***Content Standards*** • *Describe and analyze the relationship between a function and its inverse (quadratic and square root, logarithmic and exponential), including the restriction(s) on domain, which will restrict its range. 2A(2)(C)* • *Use the composition of two functions, including the necessary restrictions on the domain, to determine if the functions are inverses of each other. 2A(2)(D)* • *Write the quadratic function given three specified points in the plane. 2A(4)(A)* • *Determine the effect on the graph of $f(x) = \sqrt{x}$ when f(x) is replaced by af(x), f(x) + d, f(bx), and f(x - c) for specific positive and negative values of a, b, c, and d. 2A(4)(C)*	**Context** • *How does the student thinking differ if the graph is presented first? Or the table?* • *How do transformations of a function affect the inverse of that function?* • *What restricts the domain of the inverse of a function?*	**Struggling** • *Model the use of additional tools (hands-on, pictures).* • *Model the use of a graph and transformations to determine key attributes of a function.* **Learning English** • *Provide sentence stems and frames.* • *Provide opportunities to speak.* • *Pre-teach vocabulary.* **Advanced** • *What does it mean for $f(x)=f^{-1}(x)$?*

Exploring the Project Share Gateway

TEKS	Type of Activities	What evidence do you see of the mathematical process standards? Justify the connections that you noted.	Notes

My Reflections:

Amplifying Instructional Tasks Template - _____

		Considerations for Brainstorming		
	Consider the 2012 TEKS in the Original Task	**Consider the Content Strands**	**Consider the Context**	**Consider the Student**
Guiding Questions	What main concepts and/or skills are involved in this task? What are related concepts and/or skills?	What else might be explored or applied? • Additional mathematical ideas from related student expectations • Grade level connections • Process Standards	What else could be explored within this context? What related ideas could be added to this context? What connections could be made to other content areas?	What Tier I differentiation may be needed to reach the student who is • struggling, • learning English, • and/or advanced?
Brainstorming	**Main Concepts and/or Skills**	**Standards**	**Context**	**Struggling**
	Related Concepts and/or Skills			**Learning English**
				Advanced