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Revised Mathematics TEKS Scavenger Hunt

Review the Revised Mathematics TEKS for Algebra I, Algebra II, and Geometry. Use them to answer the following questions.

1. How many strands are in each content area? What are those strands?

Algebra I _____

Geometry _____

Algebra II _____

2. Examine the knowledge and skills statement for each of your strands. How are these statements similar?
3. What is the significance of the mathematical process standards for each content area?
4. Choose one content area. I am examining _____.
5. For the content area you identified, choose one strand. I am examining _____.
6. What similarities do you find among the student expectations in the strand you identified?
7. Why might the student expectations have been grouped in this way?



Mathematical Process Standards 3-Word Summary

- Read the 7 process standards.
- Use 1, 2, or 3 words to summarize the main idea of each process standard.
- Record your answers in your journal.

Mathematical Process Standards The student uses mathematical processes to acquire and demonstrate mathematical understanding.	1–2–3 Word Summary
(1)(A) The student is expected to apply mathematics to problems arising in everyday life, society, and the workplace.	
(1)(B) 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)(C) 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.	
(1)(D) The student is expected to communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate.	
(1)(E) The student is expected to create and use representations to organize, record, and communicate mathematical ideas.	
(1)(F) The student is expected to analyze mathematical relationships to connect and communicate mathematical ideas.	
(1)(G) The student is expected to display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication.	

Integrating Student Expectations with Mathematical Process Standards

Questions for Consideration

- What impact does the process standard have on the content student expectation?
- What impact does the process standard have on the way we expect students to respond to questions?



Content Area _____

Observations:

Reflection:

- What impact might integrating the mathematical process standards have on the way we expect students to demonstrate their understanding?

Algebra II and the Mathematical Process Standards

Student Expectation

2A(4)(A) The student is expected to write the quadratic function given three specified points in the plane.

Write a quadratic function in standard form given $f(3) = 0$, $f(-2) = 0$, and $f(0) = -6$.

Integrating the Student Expectation with a Mathematical Process Standard

2A(4)(A) The student is expected to write the quadratic function given three specified points in the plane.

2A(1)(B) 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.

A soccer ball is kicked off the ground and reached its maximum height of 30 feet in the air after 2.5 seconds had elapsed. It hit the ground 2.5 seconds after reaching its maximum height. Determine how much time elapsed while the ball was in the air 11 feet or more.

Amplifying an Instructional Task – Algebra II Example

Original Task

The student is expected to 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)

For each function $f(x)$, determine $f^{-1}(x)$ and state domain restrictions as necessary.

1. $f(x) = 2\sqrt{x+3}$

2. $f(x) = \frac{1}{2}(x-4)^2 + 3$, for $x \geq 4$

Amplifying Instructional Tasks – Algebra II 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 else might be explored or applied? <ul style="list-style-type: none"> 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?	What Tier I differentiation may be needed to reach the student who is <ul style="list-style-type: none"> struggling, learning English, and/or advanced?
	What are related concepts and/or skills?		Mathematical context Are there different starting points for the problem? How else could the material be presented?	
Brainstorming	Main Concepts and/or Skills <i>Graph and write the inverse of a function using notation such as $f^{-1}(x)$ 2A(2)(B)</i>	Process Standards <ul style="list-style-type: none"> Process standards 2A(1)(A-G) 	Context <ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> Model the use of additional tools (hands-on, pictures). Model the use of a graph and transformations to determine key attributes of a function.
	Related Concepts and/or Skills <i>Multiple representations 2A(1)(D)</i>	Content Standards <ul style="list-style-type: none"> 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) 		Learning English <ul style="list-style-type: none"> Provide sentence stems and frames. Provide opportunities to speak. Pre-teach vocabulary.
				Advanced <ul style="list-style-type: none"> What does it mean for $f(x)=f^{-1}(x)$?

Amplifying an Instructional Task – Algebra II Example

Amplified Task

Task A

For each function $f(x)$, determine $f^{-1}(x)$ and state domain restrictions as necessary. Use the composition of functions to verify the inverse function.

1. The quadratic function represented below with domain $x \geq 4$:

x	$f(x)$
5	3.5
7	7.5
8	11

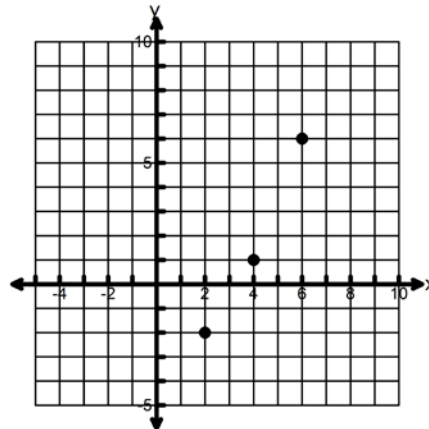
2. $f(x)$ is the function $g(x) = \sqrt{x}$ with the following transformations:
 - Vertically stretched by a factor of 2
 - Translated three units to the left

Task B (Scaffolded Task):

For each function $f(x)$, determine $f^{-1}(x)$ and state domain restrictions as necessary. Use the composition of functions to verify the inverse function.

1. The quadratic function represented below with domain $x \geq 0$:

x	$f(x)$
2	-2
4	1
6	6



$f(x) =$ _____

$f^{-1}(x) =$ _____

2. $f(x)$ is the function $g(x) = \sqrt{x}$ with the following transformations:

- Vertically stretched by a factor of 2
- Translated three units to the left

$f(x) =$ _____

$f^{-1}(x) =$ _____

Hint: Which of the following represents $f(x)$?
$f(x) = ag(x)$
$f(x) = g(bx)$
$f(x) = g(x - c)$
$f(x) = g(x) + d$

Task C (Scaffolded Task):

Determine which student in your pair will be partner A and which student will be partner B. Discuss the following questions. The indicated partner will begin the discussion:

- a. **Partner A:** What steps are needed to find the function to model a quadratic function given a table of values?
- b. **Partner B:** What are the steps to determine the inverse of a function?

Use the following conversation starters if needed.

Partner A	Partner B
<i>First, I would look for . . .</i> <i>Then, I would . . .</i>	<i>First, I would switch . . .</i> <i>Next, I would solve . . .</i>

For each function $f(x)$, determine $f^{-1}(x)$ and state domain restrictions as necessary. Use the composition of functions to verify the inverse function.

1. The quadratic function represented below:

x	$f(x)$
5	3.5
7	7.5
8	11

2. $f(x)$ is the function $g(x) = \sqrt{x}$ with the following transformations:
 - Vertically stretched by a factor of 2
 - Translated three units to the left

Task D (Enriched Task):

For each function $f(x)$, determine $f^{-1}(x)$ and state domain restrictions as necessary. Use the composition of functions to verify the inverse function.

1. The quadratic function represented below with domain $x \geq 0$:

x	$f(x)$
5	3.5
7	7.5
8	11

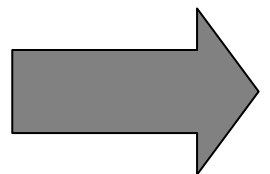
2. $f(x)$ is the function $g(x) = \sqrt{x}$ with the following transformations:
 - Vertically stretched by a factor of 2
 - Translated three units to the left
3. For the functions in 1 and 2, determine when $f(x) = f^{-1}(x)$.

A Vertical Look at Key Concepts and Procedures

Taking a Closer Look at Slope

What does the document tell us?

What doesn't the document tell us?



A Vertical Look – Potential Perks and Pitfalls

Role	Perks	Potential Pitfalls
Teacher	<ul style="list-style-type: none"> Helps teachers to stay in their lane Helps buy back time by eliminating those ideas that do not belong in the current grade level Helps to identify expected prerequisite knowledge and skills Helps identify the key concepts and procedures within the strands Helps to identify and anticipate gaps in students' prerequisite knowledge to better target interventions Helps identify the length of time students have been working with a concept or procedure 	<ul style="list-style-type: none"> This is <u>NOT</u> a curriculum guide. This does not provide the specificity that the TEKS provide. This does not provide the relative importance of each key concept or procedure. This does not tell how to teach the key concepts and procedures.
Evaluator	<ul style="list-style-type: none"> Helps to clarify if the instruction is on grade level for classroom observations and documentation 	
Curriculum Leader	<ul style="list-style-type: none"> Helps guide conversations within and between grade levels Helps facilitate movement and evaluation of curriculum materials Helps target future professional development needs for the district 	
Instructional Coach	<ul style="list-style-type: none"> Helps guide conversations within and between grade levels Helps facilitate movement and evaluation of curriculum materials Helps target future professional development needs for each teacher 	
Team Leader/ Department Chair	<ul style="list-style-type: none"> Helps guide conversations within and between grade levels Helps facilitate movement and evaluation of curriculum materials 	
Parent	<ul style="list-style-type: none"> Helps to clarify if the instruction is on grade level Provides a concise look at what is to be covered in a grade level 	



Side-by-Side Snap Shot Summary: Algebra II



Current Strand	Content that REMAINS or is CLARIFIED	Content that is NEW	Content that is MOVED or DELETED
1 Foundations for Functions			
2 Algebra and Geometry			
3 Quadratic and Square Root Functions			
4 Rational Functions			
5 Exponential and Logarithmic Functions			