

## Alignment of Texas Pre–Admission Content Test (PACT) Essential Academic Skills (701/702/703) Framework with Texas Essential Knowledge and Skills

This alignment study identifies the Texas Essential Knowledge and Skills that are addressed in whole or in part by each competency of the exam framework. An indication of alignment does not necessarily imply complete congruence of the content of an exam competency with the relevant standard. The information in this document is subject to change if revisions are made to the exam framework. Any changes will fully supersede the information contained in this document.

Competencies		Texas Essential Knowledge and Skills
<b>Field 701/702/703: TX PACT: Essential Academic Skills</b>		<b>Texas Essential Knowledge and Skills for English Language Arts and Reading and for Mathematics</b>
<u>Subtest I</u>		
<b>READING</b>		
001	Understand the meaning of words and phrases.	<p><b>Elementary:</b></p> <p><b>110.2 b 1; 110.3 b 1; 110.4 b 1; 110.5 b 1; 110.6 b 1; 110.7 b 1</b> Developing and sustaining foundational language skills: listening, speaking, discussion, and thinking--oral language. The student develops oral language through listening, speaking, and discussion.</p> <p><b>110.2 b 2; 110.3 b 2; 110.4 b 2; 110.5 b 2; 110.6 b 2; 110.7 b 2</b> Developing and sustaining foundational language skills: listening, speaking, reading, writing, and thinking--beginning reading and writing. The student develops word structure knowledge through phonological awareness, print concepts, phonics, and morphology to communicate, decode, and spell.</p> <p><b>110.2 b 3; 110.3 b 3; 110.4 b 3; 110.5 b 3; 110.6 b 3; 110.7 b 3</b> Developing and sustaining foundational language skills: listening, speaking, reading, writing, and thinking--vocabulary. The student uses newly acquired vocabulary expressively.</p> <p><b>110.2 b 4; 110.3 b 5; 110.4 b 5; 110.5 b 5; 110.6. b 5; 110.7 b 5</b> Developing and sustaining foundational language skills: listening, speaking, reading, writing, and thinking--self-sustained reading. The student reads grade appropriate texts independently. The student is expected to self-select text and interact independently with text for increasing periods of time.</p> <p><b>110.3 b 4; 110.4 b 4; 110.5 b 4; 110.6 b 4; 110.7 b 4</b> Developing and sustaining foundational language skills: listening, speaking, reading, writing, and thinking--fluency. The student reads grade level text with fluency and comprehension.</p>

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	<p><b>Middle School:</b></p> <p><b>110.22 b 1; 110.23 b 1; 110.24 b 1</b> Developing and sustaining foundational language skills: listening, speaking, discussion, and thinking--oral language. The student develops oral language through listening, speaking, and discussion.</p> <p><b>110.22 b 2; 110.23 b 2; 110.24 b 2</b> Developing and sustaining foundational language skills: listening, speaking, reading, writing, and thinking--vocabulary. The student uses newly acquired vocabulary expressively.</p> <p><b>110.22 b 3; 110.23 b 3; 110.24 b 3</b> Developing and sustaining foundational language skills: listening, speaking, reading, writing, and thinking--fluency. The student reads grade-level texts with fluency and comprehension.</p> <p><b>110.22 b 4; 110.23 b 4; 110.24 b 4</b> Developing and sustaining foundational language skills: listening, speaking, reading, writing, and thinking--self-sustained reading. The student reads grade-appropriate texts independently.</p> <p><b>High School:</b></p> <p><b>110.36 c 1; 110.37 c 1; 110.38 c 1; 110.39 c 1</b> Developing and sustaining foundational language skills: listening, speaking, discussion, and thinking--oral language. The student develops oral language through listening, speaking, and discussion.</p> <p><b>110.36 c 2; 110.37 c 2; 110.38 c 2; 110.39 c 2</b> Developing and sustaining foundational language skills: listening, speaking, reading, writing, and thinking--vocabulary. The student uses newly acquired vocabulary expressively.</p> <p><b>110.36 c 3; 110.37 c 3; 110.38 c 3; 110.39 c 3</b> Developing and sustaining foundational language skills: listening, speaking, reading, writing, and thinking--self-sustained reading. The student reads grade-appropriate texts independently.</p> <p><b>110.36 c 5; 110.37 c 5; 110.38 c 5; 110.39 c 5</b> Response skills: listening, speaking, reading, writing, and thinking using multiple texts. The student responds to an increasingly challenging variety of sources that are read, heard, or viewed.</p>

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002	Understand the main idea and supporting details in written material.	<p><b>Elementary:</b></p> <p><b>110.2 b 5; 110.3 b 6; 110.4 b 6; 110.5 b 6; 110.6 b 6; 110.7 b 6</b>  Comprehension skills: listening, speaking, reading, writing, and thinking using multiple texts. The student uses metacognitive skills to both develop and deepen comprehension of increasingly complex texts.</p> <p><b>110.2 b 6; 110.3 b 7; 110.4 b 7; 110.5 b 7; 110.6 b 7; 110.7 b 7</b> Response skills: listening, speaking, reading, writing, and thinking using multiple texts. The student responds to an increasingly challenging variety of sources that are read, heard, or viewed.</p> <p><b>110.2 b 7; 110.3 b 8; 110.4 b 8; 110.5 b 8; 110.6 b 8; 110.7 b 8</b> Multiple genres: listening, speaking, reading, writing, and thinking using multiple texts-- literary elements. The student recognizes and analyzes literary elements within and across increasingly complex traditional, contemporary, classical, and diverse literary texts.</p> <p><b>110.2 b 8; 110.3 b 9; 110.4 b 9; 110.5 b 9; 110.6 b 9; 110.7 b 9</b> Multiple genres: listening, speaking, reading, writing, and thinking using multiple texts-- genres. The student recognizes and analyzes genre-specific characteristics, structures, and purposes within and across increasingly complex traditional, contemporary, classical, and diverse texts.</p>

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	<p><b>Middle School:</b></p> <p><b>110.22 b 5; 110.23 b 5; 110.24 b 5</b> Comprehension skills: listening, speaking, reading, writing, and thinking using multiple texts. The student uses metacognitive skills to both develop and deepen comprehension of increasingly complex texts.</p> <p><b>110.22 b 6; 110.23 b 6; 110.24 b 6</b> Response skills: listening, speaking, reading, writing, and thinking using multiple texts. The student responds to an increasingly challenging variety of sources that are read, heard, or viewed.</p> <p><b>110.22 b 7; 110.23 c 7; 110.24 b 7</b> Multiple genres: listening, speaking, reading, writing, and thinking using multiple texts--literary elements. The student recognizes and analyzes literary elements within and across increasingly complex traditional, contemporary, classical, and diverse literary texts.</p> <p><b>110.22 b 8; 110.23 b 8; 110.24 b 8</b> Multiple genres: listening, speaking, reading, writing, and thinking using multiple texts--genres. The student recognizes and analyzes genre-specific characteristics, structures, and purposes within and across increasingly complex traditional, contemporary, classical, and diverse texts.</p>

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		<p><b>High School:</b></p> <p><b>110.36 c 4; 110.37 c 4; 110.38 c 4; 110.39 c 4</b> Comprehension skills: listening, speaking, reading, writing, and thinking using multiple texts. The student uses metacognitive skills to both develop and deepen comprehension of increasingly complex texts.</p> <p><b>110.36 c 5; 110.37 c 5; 110.38 c 5; 110.39 c 5</b> Response skills: listening, speaking, reading, writing, and thinking using multiple texts. The student responds to an increasingly challenging variety of sources that are read, heard, or viewed.</p> <p><b>110.36 c 6; 110.38 c 6; 110.38 c 6; 110.39 c 6</b> Multiple genres: listening, speaking, reading, writing, and thinking using multiple texts--literary elements. The student recognizes and analyzes literary elements within and across increasingly complex traditional, contemporary, classical, and diverse literary texts.</p> <p><b>110.36 c 7; 110.37 c 7; 110.38 c 7; 110.39 c 7</b> Multiple genres: listening, speaking, reading, writing, and thinking using multiple texts--genres. The student recognizes and analyzes genre-specific characteristics, structures, and purposes within and across increasingly complex traditional, contemporary, classical, and diverse texts.</p>
003	Understand a writer's purpose and audience, point of view, and intended meaning.	<p><b>Elementary:</b></p> <p><b>110.2 b 9; 110.3 b 10; 110.4 b 11; 110.5 b 11; 110.6 b 11; 110.7 b 11</b> Author's purpose and craft: listening, speaking, reading, writing, and thinking using multiple texts. The student uses critical inquiry to analyze the authors' choices and how they influence and communicate meaning within a variety of texts. The student analyzes and applies author's craft purposefully in order to develop his or her own products and performances.</p>

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		<p><b>Middle School:</b></p> <p><b>110.22 b 9; 110.23 b 9; 110.24 b 9</b> Author's purpose and craft: listening, speaking, reading, writing, and thinking using multiple texts. The student uses critical inquiry to analyze the authors' choices and how they influence and communicate meaning within a variety of texts. The student analyzes and applies author's craft purposefully in order to develop his or her own products and performances.</p> <p><b>High School:</b></p> <p><b>110.36 c 8; 110.37 c 8; 110.38 c 8; 110.39 c 8</b> Author's purpose and craft: listening, speaking, reading, writing, and thinking using multiple texts. The student uses critical inquiry to analyze the authors' choices and how they influence and communicate meaning within a variety of texts. The student analyzes and applies author's craft purposefully in order to develop his or her own products and performances.</p>
004	Use critical reasoning skills to evaluate written material.	<p><b>Elementary:</b></p> <p><b>110.2 b 6; 110.3 b 7; 110.4 b 7; 110.5 b 7; 110.6 b 7; 110.7 b 7</b> Response skills: listening, speaking, reading, writing, and thinking using multiple texts. The student responds to an increasingly challenging variety of sources that are read, heard, or viewed.</p> <p><b>110.2 b 7; 110.3 b 8; 110.4 b 8; 110.5 b 8; 110.6 b 8; 110.7 b 8</b> Multiple genres: listening, speaking, reading, writing, and thinking using multiple texts--literary elements. The student recognizes and analyzes literary elements within and across increasingly complex traditional, contemporary, classical, and diverse literary texts.</p> <p><b>110.2 b 8; 110.3 b 9; 110.4 b 9; 110.5 b 9; 110.6 b 9; 110.7 b 9</b> Multiple genres: listening, speaking, reading, writing, and thinking using multiple texts--genres. The student recognizes and analyzes genre-specific characteristics, structures, and purposes within and across increasingly complex traditional, contemporary, classical, and diverse texts.</p>

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	<p><b>Middle School:</b></p> <p><b>110.22 b 5; 110.23 b 5; 110.24 b 5</b> Comprehension skills: listening, speaking, reading, writing, and thinking using multiple texts. The student uses metacognitive skills to both develop and deepen comprehension of increasingly complex texts.</p> <p><b>110.22 b 6; 110.23 b 6; 110.24 b 6</b> Response skills: listening, speaking, reading, writing, and thinking using multiple texts. The student responds to an increasingly challenging variety of sources that are read, heard, or viewed.</p> <p><b>110.22 b 7; 110.23 b 7; 110.24 b 7</b> Multiple genres: listening, speaking, reading, writing, and thinking using multiple texts--literary elements. The student recognizes and analyzes literary elements within and across increasingly complex traditional, contemporary, classical, and diverse literary texts.</p> <p><b>110.22 b 8; 110.23 b 8; 110.24 b 8</b> Multiple genres: listening, speaking, reading, writing, and thinking using multiple texts--genres. The student recognizes and analyzes genre-specific characteristics, structures, and purposes within and across increasingly complex traditional, contemporary, classical, and diverse texts.</p>

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		<p><b>High School:</b></p> <p><b>110.36 c 4; 110.37 c 4; 110.38 c 4; 110.39 c 4</b> Comprehension skills: listening, speaking, reading, writing, and thinking using multiple texts. The student uses metacognitive skills to both develop and deepen comprehension of increasingly complex texts.</p> <p><b>110.36 c 5; 110.37 c 5; 110.38 c 5; 110.39 c 5</b> Response skills: listening, speaking, reading, writing, and thinking using multiple texts. The student responds to an increasingly challenging variety of sources that are read, heard, or viewed.</p> <p><b>110.36 c 6; 110.37 c 6; 110.38 c 6; 110.39 c 6</b> Multiple genres: listening, speaking, reading, writing, and thinking using multiple texts--literary elements. The student recognizes and analyzes literary elements within and across increasingly complex traditional, contemporary, classical, and diverse literary texts.</p> <p><b>110.36 c 7; 110.37 c 7; 110.38 c 7; 110.39 c 7</b> Multiple genres: listening, speaking, reading, writing, and thinking using multiple texts--genres. The student recognizes and analyzes genre-specific characteristics, structures, and purposes within and across increasingly complex traditional, contemporary, classical, and diverse texts.</p>
005	Understand the organization of information in written and graphic forms.	<p><b>Elementary:</b></p> <p><b>110.2 b 5; 110.3 b 6; 110.4 b 6; 110.5 b 6; 110.6 b 6; 110.7 b 6</b> Comprehension skills: listening, speaking, reading, writing, and thinking using multiple texts. The student uses metacognitive skills to both develop and deepen comprehension of increasingly complex texts.</p> <hr/> <p><b>Middle School:</b></p> <p><b>110.22 b 6; 110.23 b 6; 110.24 b 6</b> Response skills: listening, speaking, reading, writing, and thinking using multiple texts. The student responds to an increasingly challenging variety of sources that are read, heard, or viewed.</p>

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		<p><b>High School:</b></p> <p><b>110.36 c 5; 110.37 c 5; 110.38 c 5; 110.39 c 5</b> Response skills: listening, speaking, reading, writing, and thinking using multiple texts. The student responds to an increasingly challenging variety of sources that are read, heard, or viewed.</p> <p><b>110.36 c 8; 110.37 c 8; 110.38 c 8; 110.39 c 8</b> Author's purpose and craft: listening, speaking, reading, writing, and thinking using multiple texts. The student uses critical inquiry to analyze the authors' choices and how they influence and communicate meaning within a variety of texts. The student analyzes and applies author's craft purposefully in order to develop his or her own products and performances.</p>
<p><u>Subtest II</u></p> <p><b>WRITING</b></p>		
001	Understand purpose, audience, organization, and development in writing.	<p><b>Elementary:</b></p> <p><b>110.2 b 10; 110.3 b 11; 110.4 b 11; 110.5 b 11; 110.6 b 11; 110.7 c 11</b> Composition: listening, speaking, reading, writing, and thinking using multiple texts--writing process. The student uses the writing process recursively to compose multiple texts that are legible and uses appropriate conventions.</p> <p><b>110.2 b 11; 110.3 b 12; 110.4 b 12; 110.5 b 12; 110.6 b 12; 110.7 b 12</b> Composition: listening, speaking, reading, writing, and thinking using multiple texts--genres. The student uses genre characteristics and craft to compose multiple texts that are meaningful.</p>

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		<p><b>Middle School:</b></p> <p><b>110.22 b 10; 110.23 b 10; 110.24 b 10</b> Composition: listening, speaking, reading, writing, and thinking using multiple texts--writing process. The student uses the writing process recursively to compose multiple texts that are legible and uses appropriate conventions.</p> <p><b>110.22 b 11; 110.23 b 11; 110.24 b 11</b> Composition: listening, speaking, reading, writing, and thinking using multiple texts--genres. The student uses genre characteristics and craft to compose multiple texts that are meaningful.</p> <p><b>110.22 b 12; 110.23 b 12; 110. 24 b 12</b> Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts. The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.</p> <p><b>High School:</b></p> <p><b>110.36 c 9; 110.37 c 9; 110.38 c 9; 110.39 c 9</b> Composition: listening, speaking, reading, writing, and thinking using multiple texts--writing process. The student uses the writing process recursively to compose multiple texts that are legible and use appropriate conventions.</p> <p><b>110.36 c 10; 110.37 c 10; 110.38 c 10; 110.39 c 10</b> Composition: listening, speaking, reading, writing, and thinking using multiple texts--genres. The student uses genre characteristics and craft to compose multiple texts that are meaningful.</p> <p><b>110.36 c 11; 110.37 c 11; 110.38 c 11; 110.39 c 11</b> Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts. The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.</p>
002	Understand problems in sentence formation.	<p><b>Elementary:</b></p> <p><b>110.2 b 10; 110.3 b 11; 110.4 b 11; 110.5 b 11; 110.6 b 11; 110.7 b 11</b> Composition: listening, speaking, reading, writing, and thinking using multiple texts--writing process. The student uses the writing process recursively to compose multiple texts that are legible and uses appropriate conventions.</p>

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		<p><b>Middle School:</b>  <b>110.22 b 10; 110.23 b 10; 110.24 b 10</b> Composition: listening, speaking, reading, writing, and thinking using multiple texts--writing process. The student uses the writing process recursively to compose multiple texts that are legible and uses appropriate conventions.</p> <p><b>High School:</b>  <b>110.36 c 9; 110.37 c 9; 110.38 c 9; 110.39 c 9</b> Composition: listening, speaking, reading, writing, and thinking using multiple texts--writing process. The student uses the writing process recursively to compose multiple texts that are legible and use appropriate conventions.</p>
003	Understand conventions of Standard Written English grammar, usage, and mechanics.	<p><b>Elementary:</b>  <b>110.2 b 10; 110.3 b 11; 110.4 b 11; 110.5 b 11; 110.6 b 11; 110.7 b 11</b> Composition: listening, speaking, reading, writing, and thinking using multiple texts--writing process. The student uses the writing process recursively to compose multiple texts that are legible and uses appropriate conventions.</p> <p><b>Middle School:</b>  <b>110.22 b 10; 110.23 b 10; 110.24 b 10</b> Composition: listening, speaking, reading, writing, and thinking using multiple texts--writing process. The student uses the writing process recursively to compose multiple texts that are legible and uses appropriate conventions.</p> <p><b>High School:</b>  <b>110.36 c 9; 110.37 c 9; 110.38 c 9; 110.39 c 9</b> Composition: listening, speaking, reading, writing, and thinking using multiple texts--writing process. The student uses the writing process recursively to compose multiple texts that are legible and use appropriate conventions.</p>

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004	In response to an assignment, demonstrate the ability to compose a developed composition in Standard Written English on a given topic.	<p><b>Elementary:</b></p> <p><b>110.2 b 10; 110.3 b 11; 110.4 b 11; 110.5 b 11; 110.6 b 11; 110.7 b 11</b> Composition: listening, speaking, reading, writing, and thinking using multiple texts--writing process. The student uses the writing process recursively to compose multiple texts that are legible and uses appropriate conventions.</p> <p><b>110.2 b 11; 110.3 b 12; 110.4 b 12; 110.5 b 12; 110.6 b 12; 110.7 b 12</b> Composition: listening, speaking, reading, writing, and thinking using multiple texts--genres. The student uses genre characteristics and craft to compose multiple texts that are meaningful.</p> <p><b>Middle School:</b></p> <p><b>110.22 b 11; 110.23 b 11; 110.24 b 11</b> Composition: listening, speaking, reading, writing, and thinking using multiple texts--genres. The student uses genre characteristics and craft to compose multiple texts that are meaningful.</p> <p><b>110.22 b 12; 110.23 b 12; 110.24 b 12</b> Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts. The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.</p> <p><b>High School:</b></p> <p><b>110.36 c 9; 110.37 c 9; 110.38 c 9; 110.39 c 9</b> Composition: listening, speaking, reading, writing, and thinking using multiple texts--writing process. The student uses the writing process recursively to compose multiple texts that are legible and use appropriate conventions.</p> <p><b>110.36 c 10; 110.37 c 10; 110.38 c 10; 110.39 c 10</b> Composition: listening, speaking, reading, writing, and thinking using multiple texts--genres. The student uses genre characteristics and craft to compose multiple texts that are meaningful.</p> <p><b>110.36 c 11; 110.37 c 11; 110.38 c 11; 110.39 c 11</b> Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts. The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes.</p>

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<u>Subtest III</u> <b>MATHEMATICS</b>		
001	Understand number properties and number operations.	<p><b>Elementary:</b></p> <p><b>111.2 b 1; 111.3 b 1; 111.4 b 1; 111.5 b 1; 111.6 b 1; 111.7 b 1</b> Mathematical process standards. The student uses mathematical processes to acquire and demonstrate mathematical understanding.</p> <p><b>111.2 b 2</b> Number and operations. The student applies mathematical process standards to understand how to represent and compare whole numbers, the relative position and magnitude of whole numbers, and relationships within the numeration system.</p> <p><b>111.3 b 2; 111.4 b 2</b> Number and operations. The student applies mathematical process standards to represent and compare whole numbers, the relative position and magnitude of whole numbers, and relationships within the numeration system related to place value.</p> <p><b>111.5 b 2</b> Number and operations. The student applies mathematical process standards to represent, compare, and order whole numbers and decimals and understand relationships related to place value.</p> <p><b>111.6 b 2</b> Number and operations. The student applies mathematical process standards to represent, compare, and order whole numbers and decimals and understand relationships related to place value.</p> <p><b>111.2 b 3</b> Number and operations. The student applies mathematical process standards to develop an understanding of addition and subtraction situations in order to solve problems.</p> <p><b>111.3 b 3</b> Number and operations. The student applies mathematical process standards to develop and use strategies for whole number addition and subtraction computations in order to solve problems.</p> <p><b>111.4 b 3; 111.5 b 3</b> Number and operations. The student applies mathematical process standards to recognize and represent fractional units and communicates how they are used to name parts of a whole.</p>

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	<p><b>111.6 b 3</b> Number and operations. The student applies mathematical process standards to represent and generate fractions to solve problems.</p> <p><b>111.7 b 3</b> Number and operations. The student applies mathematical process standards to develop and use strategies and methods for positive rational number computations in order to solve problems with efficiency and accuracy.</p> <p><b>111.4 b 4</b> Number and operations. The student applies mathematical process standards to develop and use strategies and methods for whole number computations in order to solve addition and subtraction problems with efficiency and accuracy.</p> <p><b>111.5 b 4</b> Number and operations. The student applies mathematical process standards to develop and use strategies and methods for whole number computations in order to solve problems with efficiency and accuracy.</p> <p><b>111.6 b 4</b> Number and operations. The student applies mathematical process standards to develop and use strategies and methods for whole number computations and decimal sums and differences in order to solve problems with efficiency and accuracy.</p> <p><b>111.4 b 6</b> Number and operations. The student applies mathematical process standards to connect repeated addition and subtraction to multiplication and division situations that involve equal groupings and shares.</p> <hr/> <p><b>Middle School:</b></p> <p><b>111.26 b 1; 111.27 b 1; 111.28 b 1</b> Mathematical process standards. The student uses mathematical processes to acquire and demonstrate mathematical understanding.</p> <p><b>111.26 b 2; 111.27 b 2</b> Number and operations. The student applies mathematical process standards to represent and use rational numbers in a variety of forms.</p> <p><b>111.28 b 2</b> Number and operations. The student applies mathematical process standards to represent and use real numbers in a variety of forms.</p> <p><b>111.26 b 3; 111.27 b 3</b> Number and operations. The student applies mathematical process standards to represent addition, subtraction, multiplication, and division while solving problems and justifying solutions.</p>

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		<p><b>High School:</b></p> <p><b>111.39 c 1; 111.40 c 1; 111.41 c 1; 111.42 c 1; 111.43 c 1; 111.44 c 1; 111.45 c 1 111.46 c 1; 111.47 c 1; 111.48 c 1</b> Mathematical process standards. The student uses mathematical processes to acquire and demonstrate mathematical understanding.</p>
002	Understand fundamental principles of algebra.	<p><b>Elementary:</b></p> <p><b>111.2 b 5</b> Algebraic reasoning. The student applies mathematical process standards to identify the pattern in the number word list.</p> <p><b>111.3 b 5; 111.4 b 7</b> Algebraic reasoning. The student applies mathematical process standards to identify and apply number patterns within properties of numbers and operations in order to describe relationships.</p> <p><b>111.5 b 5</b> Algebraic reasoning. The student applies mathematical process standards to analyze and create patterns and relationships.</p> <p><b>111.6 b 5; 111.7 b 4</b> Algebraic reasoning. The student applies mathematical process standards to develop concepts of expressions and equations.</p> <p><b>Middle School:</b></p> <p><b>111.26 b 6</b> Expressions, equations, and relationships. The student applies mathematical process standards to use multiple representations to describe algebraic relationships.</p> <p><b>111.26 b 7</b> Expressions, equations, and relationships. The student applies mathematical process standards to develop concepts of expressions and equations.</p> <p><b>111.26 b 8</b> Expressions, equations, and relationships. The student applies mathematical process standards to use geometry to represent relationships and solve problems.</p> <p><b>111.26 b 9</b> Expressions, equations, and relationships. The student applies mathematical process standards to use equations and inequalities to represent situations.</p>

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	<p><b>111.27 b 7</b> Expressions, equations, and relationships. The student applies mathematical process standards to represent linear relationships using multiple representations.</p> <p><b>111.27 b 8</b> Expressions, equations, and relationships. The student applies mathematical process standards to develop geometric relationships with volume.</p> <p><b>111.27 b 10</b> Expressions, equations, and relationships. The student applies mathematical process standards to use one-variable equations and inequalities to represent situations.</p> <p><b>111.27 b 11</b> Expressions, equations, and relationships. The student applies mathematical process standards to solve one-variable equations and inequalities.</p> <p><b>111.28 b 2</b> Number and operations. The student applies mathematical process standards to represent and use real numbers in a variety of forms.</p> <p><b>111.28 b 3</b> Proportionality. The student applies mathematical process standards to use proportional relationships to describe dilations.</p> <p><b>111.28 b 4</b> Proportionality. The student applies mathematical process standards to explain proportional and non-proportional relationships involving slope.</p> <p><b>111.28 b 5</b> Proportionality. The student applies mathematical process standards to use proportional and non-proportional relationships to develop foundational concepts of functions.</p> <p><b>111.28 b 8</b> Expressions, equations, and relationships. The student applies mathematical process standards to use one-variable equations or inequalities in problem situations.</p> <p><b>111.28 b 9</b> Expressions, equations, and relationships. The student applies mathematical process standards to use multiple representations to develop foundational concepts of simultaneous linear equations.</p> <p><b>High School:</b></p> <p><b>111.39 c 2</b> Linear functions, equations, and inequalities. The student applies the mathematical process standards when using properties of linear functions</p>

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	<p>to write and represent in multiple ways, with and without technology, linear equations, inequalities, and systems of equations.</p> <p><b>111.39 c 3</b> Linear functions, equations, and inequalities. The student applies the mathematical process standards when using graphs of linear functions, key features, and related transformations to represent in multiple ways and solve, with and without technology, equations, inequalities, and systems of equations.</p> <p><b>111.39 c 4</b> Linear functions, equations, and inequalities. The student applies the mathematical process standards to formulate statistical relationships and evaluate their reasonableness based on real-world data.</p> <p><b>111.39 c 5</b> Linear functions, equations, and inequalities. The student applies the mathematical process standards to solve, with and without technology, linear equations and evaluate the reasonableness of their solutions.</p> <p><b>111.39 c 6</b> Quadratic functions and equations. The student applies the mathematical process standards when using properties of quadratic functions to write and represent in multiple ways, with and without technology, quadratic equations.</p> <p><b>111.39 c 7</b> Quadratic functions and equations. The student applies the mathematical process standards when using graphs of quadratic functions and their related transformations to represent in multiple ways and determine, with and without technology, the solutions to equations.</p> <p><b>111.39 c 8</b> Quadratic functions and equations. The student applies the mathematical process standards to solve, with and without technology, quadratic equations and evaluate the reasonableness of their solutions. The student formulates statistical relationships and evaluates their reasonableness based on real-world data.</p> <p><b>111.39 c 9</b> Exponential functions and equations. The student applies the mathematical process standards when using properties of exponential functions and their related transformations to write, graph, and represent in multiple ways exponential equations and evaluate, with and without technology, the reasonableness of their solutions. The student formulates statistical relationships and evaluates their reasonableness based on real-world data.</p>

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	<p><b>111.39 c 10</b> Number and algebraic methods. The student applies the mathematical process standards and algebraic methods to rewrite in equivalent forms and perform operations on polynomial expressions.</p> <p><b>111.39 c 11</b> Number and algebraic methods. The student applies the mathematical process standards and algebraic methods to rewrite algebraic expressions into equivalent forms.</p> <p><b>111.40 c 2</b> Attributes of functions and their inverses. The student applies mathematical processes to understand that functions have distinct key attributes and understand the relationship between a function and its inverse.</p> <p><b>111.40 c 3</b> Systems of equations and inequalities. The student applies mathematical processes to formulate systems of equations and inequalities, use a variety of methods to solve, and analyze reasonableness of solutions.</p> <p><b>111.40 c 4</b> Quadratic and square root functions, equations, and inequalities. The student applies mathematical processes to understand that quadratic and square root functions, equations, and quadratic inequalities can be used to model situations, solve problems, and make predictions.</p> <p><b>111.40 c 6</b> Cubic, cube root, absolute value and rational functions, equations, and inequalities. The student applies mathematical processes to understand that cubic, cube root, absolute value and rational functions, equations, and inequalities can be used to model situations, solve problems, and make predictions.</p> <p><b>111.40 c 7</b> Number and algebraic methods. The student applies mathematical processes to simplify and perform operations on expressions and to solve equations.</p> <p><b>111.41 c 2</b> Coordinate and transformational geometry. The student uses the process skills to understand the connections between algebra and geometry and uses the one- and two-dimensional coordinate systems to verify geometric conjectures.</p> <p><b>111.42 c 2</b> Functions. The student uses process standards in mathematics to explore, describe, and analyze the attributes of functions. The student makes connections between multiple representations of functions and algebraically constructs new functions. The student analyzes and uses functions to model real-world problems.</p>

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	<p><b>111.42 c 5</b> Algebraic reasoning. The student uses process standards in mathematics to evaluate expressions, describe patterns, formulate models, and solve equations and inequalities using properties, procedures, or algorithms.</p> <p><b>111.43 c 4</b> Mathematical modeling in personal finance. The student uses mathematical processes with algebraic formulas, numerical techniques, and graphs to solve problems related to financial planning.</p> <p><b>111.43 c 5</b> Mathematical modeling in science and engineering. The student applies mathematical processes with algebraic techniques to study patterns and analyze data as it applies to science.</p> <p><b>111.43 c 6</b> Mathematical modeling in science and engineering. The student applies mathematical processes with algebra and geometry to study patterns and analyze data as it applies to architecture and engineering.</p> <p><b>111.43 c 7</b> Mathematical modeling in fine arts. The student uses mathematical processes with algebra and geometry to study patterns and analyze data as it applies to fine arts.</p> <p><b>111.44 c 3</b> Algebraic reasoning (expressions, equations, and generalized relationships). The student applies the process standards in mathematics to create and analyze mathematical models of everyday situations to make informed decisions related to earning, investing, spending, and borrowing money by appropriate, proficient, and efficient use of tools, including technology. The student uses mathematical relationships to make connections and predictions. The student judges the validity of a prediction and uses mathematical models to represent, analyze, and solve dynamic real-world problems.</p> <p><b>111.48 c 2</b> Patterns and structure. The student applies mathematical processes to connect finite differences or common ratios to attributes of functions.</p> <p><b>111.48 c 3</b> Patterns and structure. The student applies mathematical processes to understand the connections among representations of functions and combinations of functions, including the constant function, <math>f(x) = x</math>, <math>f(x) = x^2</math>, <math>f(x) = \sqrt{x}</math>, <math>f(x) = 1/x</math>, <math>f(x) = x^3</math>, <math>f(x) = 3\sqrt{x}</math>, <math>f(x) = bx</math>, <math>f(x) =  x </math>, and <math>f(x) = \log_b(x)</math> where <math>b</math> is 10 or <math>e</math>; functions and their inverses; and key attributes of these functions.</p>

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		<p><b>111.48 c 4</b> Number and algebraic methods. The student applies mathematical processes to simplify and perform operations on functions represented in a variety of ways, including real-world situations.</p> <p><b>111.48 c 5</b> Number and algebraic methods. The student applies mathematical processes to represent, simplify, and perform operations on matrices and to solve systems of equations using matrices.</p> <p><b>111.48 c 6</b> Number and algebraic methods. The student applies mathematical processes to estimate and determine solutions to equations resulting from functions and real-world applications with fluency.</p>
003	Understand measurement principles and geometry concepts.	<p><b>Elementary:</b></p> <p><b>111.2 b 6; 111.3 b 6; 111.4 b 8; 111.5 b 6</b> Geometry and measurement. The student applies mathematical process standards to analyze attributes of two-dimensional shapes and three-dimensional solids to develop generalizations about their properties.</p> <p><b>111.2 b 7</b> Geometry and measurement. The student applies mathematical process standards to directly compare measurable attributes.</p> <p><b>111.3 b 7; 111.4 b 9</b> Geometry and measurement. The student applies mathematical process standards to select and use units to describe length and time.</p> <p><b>111.5 b 7</b> Geometry and measurement. The student applies mathematical process standards to select appropriate units, strategies, and tools to solve problems involving customary and metric measurement.</p> <p><b>111.6 b 6</b> Geometry and measurement. The student applies mathematical process standards to analyze geometric attributes in order to develop generalizations about their properties.</p> <p><b>111.6 b 7</b> Geometry and measurement. The student applies mathematical process standards to solve problems involving angles less than or equal to 180 degrees.</p> <p><b>111.7 b 5</b> Geometry and measurement. The student applies mathematical process standards to classify two-dimensional figures by attributes and properties.</p>

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	<p><b>111.7 b 6</b> Geometry and measurement. The student applies mathematical process standards to understand, recognize, and quantify volume.</p> <p><b>111.7 b 7</b> Geometry and measurement. The student applies mathematical process standards to select appropriate units, strategies, and tools to solve problems involving measurement.</p> <p><b>111.7 b 8</b> Geometry and measurement. The student applies mathematical process standards to identify locations on a coordinate plane.</p> <p><b>Middle School:</b></p> <p><b>111.26 b 8</b> Expressions, equations, and relationships. The student applies mathematical process standards to use geometry to represent relationships and solve problems.</p> <p><b>111.26 b 10</b> Expressions, equations, and relationships. The student applies mathematical process standards to use equations and inequalities to solve problems.</p> <p><b>111.26 b 11</b> Measurement and data. The student applies mathematical process standards to use coordinate geometry to identify locations on a plane.</p> <p><b>111.27 b 5</b> Proportionality. The student applies mathematical process standards to use geometry to describe or solve problems involving proportional relationships.</p> <p><b>111.27 b 8</b> Expressions, equations, and relationships. The student applies mathematical process standards to develop geometric relationships with volume.</p> <p><b>111.27 b 9</b> Expressions, equations, and relationships. The student applies mathematical process standards to solve geometric problems.</p> <p><b>111.28 b 6</b> Expressions, equations, and relationships. The student applies mathematical process standards to develop mathematical relationships and make connections to geometric formulas.</p> <p><b>111.28 b 7</b> Expressions, equations, and relationships. The student applies mathematical process standards to use geometry to solve problems.</p>

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	<p><b>High School:</b></p> <p><b>111.41 c 2</b> Coordinate and transformational geometry. The student uses the process skills to understand the connections between algebra and geometry and uses the one- and two-dimensional coordinate systems to verify geometric conjectures.</p> <p><b>111.41 c 3</b> Coordinate and transformational geometry. The student uses the process skills to generate and describe rigid transformations (translation, reflection, and rotation) and non-rigid transformations (dilations that preserve similarity and reductions and enlargements that do not preserve similarity).</p> <p><b>111.41 c 4</b> Logical argument and constructions. The student uses the process skills with deductive reasoning to understand geometric relationships.</p> <p><b>111.41 c 5</b> Logical argument and constructions. The student uses constructions to validate conjectures about geometric figures.</p> <p><b>111.41 c 6</b> Proof and congruence. The student uses the process skills with deductive reasoning to prove and apply theorems by using a variety of methods such as coordinate, transformational, and axiomatic and formats such as two-column, paragraph, and flow chart.</p> <p><b>111.41 c 7</b> Similarity, proof, and trigonometry. The student uses the process skills in applying similarity to solve problems.</p> <p><b>111.41 c 8</b> Similarity, proof, and trigonometry. The student uses the process skills with deductive reasoning to prove and apply theorems by using a variety of methods such as coordinate, transformational, and axiomatic and formats such as two-column, paragraph, and flow chart.</p> <p><b>111.41 c 9</b> Similarity, proof, and trigonometry. The student uses the process skills to understand and apply relationships in right triangles.</p> <p><b>111.41 c 10</b> Two-dimensional and three-dimensional figures. The student uses the process skills to recognize characteristics and dimensional changes of two- and three-dimensional figures.</p> <p><b>111.41 c 11</b> Two-dimensional and three-dimensional figures. The student uses the process skills in the application of formulas to determine measures of two- and three-dimensional figures.</p>

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		<p><b>111.41 c 12</b> Circles. The student uses the process skills to understand geometric relationships and apply theorems and equations about circles.</p> <p><b>111.43 c 6</b> Mathematical modeling in science and engineering. The student applies mathematical processes with algebra and geometry to study patterns and analyze data as it applies to architecture and engineering.</p> <p><b>111.43 c 7</b> Mathematical modeling in fine arts. The student applies mathematical processes with algebra and geometry to study patterns and analyze data as it applies to fine arts.</p>
004	Understand probability and statistics.	<p><b>Elementary:</b></p> <p><b>111.2 b 8</b> Data analysis. The student applies mathematical process standards to collect and organize data to make it useful for interpreting information.</p> <p><b>111.3 b 8; 111.4 c 10</b> Data analysis. The student applies mathematical process standards to organize data to make it useful for interpreting information and solving problems.</p> <p><b>111.5 b 8; 111.6 b 9; 111.7 b 9</b> Data analysis. The student applies mathematical process standards to solve problems by collecting, organizing, displaying, and interpreting data.</p> <p><b>Middle School:</b></p> <p><b>111.26 b 4</b> Proportionality. The student applies mathematical process standards to develop an understanding of proportional relationships in problem situations.</p> <p><b>111.26 b 5</b> Proportionality. The student applies mathematical process standards to solve problems involving proportional relationships.</p> <p><b>111.27 b 6</b> Proportionality. The student applies mathematical process standards to use probability and statistics to describe or solve problems involving proportional relationships.</p> <p><b>111.27 b 12</b> Measurement and data. The student applies mathematical process standards to use statistical representations to analyze data.</p>

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	<p><b>111.28 b 11</b> Measurement and data. The student applies mathematical process standards to use statistical procedures to describe data.</p> <p><b>High School:</b></p> <p><b>111.39 c 8</b> Quadratic functions and equations. The student applies the mathematical process standards to solve, with and without technology, quadratic equations and evaluate the reasonableness of their solutions. The student formulates statistical relationships and evaluates their reasonableness based on real-world data.</p> <p><b>111.41 c 13</b> Probability. The student uses the process skills to understand probability in real-world situations and how to apply independence and dependence of events.</p> <p><b>111.43 c 8</b> Mathematical modeling in social sciences. The student applies mathematical processes to determine the number of elements in a finite sample space and compute the probability of an event.</p> <p><b>111.43 c 9</b> Mathematical modeling in social sciences. The student applies mathematical processes and mathematical models to analyze data as it applies to social sciences.</p> <p><b>111.44 c 2</b> Numeric reasoning. The student applies the process standards in mathematics to generate new understandings by extending existing knowledge. The student generates new mathematical understandings through problems involving numerical data that arise in everyday life, society, and the workplace. The student extends existing knowledge and skills to analyze real-world situations.</p> <p><b>111.44 c 4</b> Probabilistic and statistical reasoning. The student uses the process standards in mathematics to generate new understandings of probability and statistics. The student analyzes statistical information and evaluates risk and return to connect mathematical ideas and make informed decisions. The student applies a problem-solving model and statistical methods to design and conduct a study that addresses one or more particular question(s). The student uses multiple representations to communicate effectively the results of student-generated statistical studies and the critical analysis of published statistical studies.</p>

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		<p><b>111.47 c 2</b> Statistical process sampling and experimentation. The student applies mathematical processes to apply understandings about statistical studies, surveys, and experiments to design and conduct a study and use graphical, numerical, and analytical techniques to communicate the results of the study.</p> <p><b>111.47 c 3</b> Variability. The student applies the mathematical process standards when describing and modeling variability.</p> <p><b>111.47 c 4</b> Categorical and quantitative data. The student applies the mathematical process standards to represent and analyze both categorical and quantitative data.</p> <p><b>111.47 c 5</b> Probability and random variables. The student applies the mathematical process standards to connect probability and statistics.</p> <p><b>111.47 c 6</b> Inference. The student applies the mathematical process standards to make inferences and justify conclusions from statistical studies.</p> <p><b>111.47 c 7</b> Bivariate data. The student applies the mathematical process standards to analyze relationships among bivariate quantitative data.</p>
005	Understand problem solving, reasoning, and mathematical communication.	<p><b>Elementary: 111.2 b 1; 111.3 b 1; 111.4 b 1; 111.5 b 1; 111.6 b 1; 111.7 b 1</b> Mathematical process standards. The student uses mathematical processes to acquire and demonstrate mathematical understanding.</p> <p><b>Middle School:</b></p> <p><b>111.26 b 1; 111.27 b 1; 111.28 b 1</b> Mathematical process standards. The student uses mathematical processes to acquire and demonstrate mathematical understanding.</p> <p><b>111.26 b 12</b> Measurement and data. The student applies mathematical process standards to use numerical or graphical representations to analyze problems.</p> <p><b>111.26 b 13</b> Measurement and data. The student applies mathematical process standards to use numerical or graphical representations to solve problems.</p> <p><b>111.27 b 12</b> Measurement and data. The student applies mathematical process standards to use statistical representations to analyze data.</p>

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	<p><b>111.28 b 11</b> Measurement and data. The student applies mathematical process standards to use statistical procedures to describe data.</p> <p><b>High School:</b></p> <p><b>111.39 c 1; 111.40 c 1; 111.41 c 1; 111.42 c 1; 111.43 c 1; 111.44 c 1; 111.45 c 1; 111.46 c 1; 111.47 c 1; 111.48 c 1</b> Mathematical process standards. The student uses mathematical processes to acquire and demonstrate mathematical understanding.</p> <p><b>111.39 c 12</b> Number and algebraic methods. The student applies the mathematical process standards and algebraic methods to write, solve, analyze, and evaluate equations, relations, and functions.</p> <p><b>111.40 c 5</b> Exponential and logarithmic functions and equations. The student applies mathematical processes to understand that exponential and logarithmic functions can be used to model situations and solve problems.</p> <p><b>111.41 c 4</b> Logical argument and constructions. The student uses the process skills with deductive reasoning to understand geometric relationships.</p> <p><b>111.41 c 5</b> Logical argument and constructions. The student uses constructions to validate conjectures about geometric figures.</p> <p><b>111.42 c 5</b> Algebraic reasoning. The student uses process standards in mathematics to evaluate expressions, describe patterns, formulate models, and solve equations and inequalities using properties, procedures, or algorithms.</p> <p><b>111.43 c 2</b> Mathematical modeling in personal finance. The student uses mathematical processes with graphical and numerical techniques to study patterns and analyze data related to personal finance.</p> <p><b>111.43 c 3</b> Mathematical modeling in personal finance. The student uses mathematical processes with algebraic formulas, graphs, and amortization modeling to solve problems involving credit.</p> <p><b>111.43 c 8</b> Mathematical modeling in social sciences. The student applies mathematical processes to determine the number of elements in a finite sample space and compute the probability of an event.</p>

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	<p><b>111.43 c 9</b> Mathematical modeling in social sciences. The student applies mathematical processes and mathematical models to analyze data as it applies to social sciences.</p> <p><b>111.43 c 10</b> Mathematical modeling in social sciences. The student applies mathematical processes to design a study and use graphical, numerical, and analytical techniques to communicate the results of the study.</p> <p><b>111.46 c 2</b> Graph theory. The student applies the concept of graphs to determine possible solutions to real-world problems.</p> <p><b>111.46 c 3</b> Planning and scheduling. The student uses heuristic algorithms to solve real-world problems.</p> <p><b>111.46 c 4</b> Group decision making. The student uses mathematical processes to apply decision-making schemes. The student analyzes the effects of multiple types of weighted voting and applies multiple voting concepts to real-world situations.</p> <p><b>111.46 c 5</b> Fair division. The student applies the adjusted winner procedure and Knaster inheritance procedure to real-world situations.</p> <p><b>111.46 c 6</b> Game (or competition) theory. The student uses knowledge of basic game theory concepts to calculate optimal strategies. The student analyzes situations and identifies the use of gaming strategies.</p> <p><b>111.46 c 7</b> Theory of moves. The student analyzes the theory of moves (TOM). The student uses the TOM and game theory to analyze conflicts.</p> <p><b>111.48 c 7</b> Modeling from data. The student applies mathematical processes to analyze and model data based on real-world situations with corresponding functions.</p>