# Proficiency Scales

Algebra I High School 2020



#### **PROFICIENCY SCALES**

**Proficiency scales serve as a starting point** for unit planning, creating assessments, delivering instruction, grading, and reporting progress, as well as making teaching visible to students and guiding their growth on the standards. Specifically, a proficiency scale is a continuum or learning progression that articulates distinct levels of knowledge and skills relative to specific standards. It shows teachers and students what proficiency looks like, what knowledge and skills students need to achieve proficiency, and how students might go beyond proficiency.

#### A proficiency scale is composed of a series of levels as follows:

- **Score 3.0**—Heart of the proficiency scale; it defines the target content that teachers expect all students to know and be able to do. I CAN statements are provided for this level.
- **Score 2.0**—Simpler content; it describes the foundational knowledge and skills that students will need to master before progressing to proficiency.
- **Score 4.0**—Challenging content; it provides students the opportunity to go above and beyond expectations by applying their knowledge in new situations or demonstrating understanding beyond what the teacher teaches in class. A generic statement is provided for this level.
- **Scores 1.0 and 0.0**—No specific content; 1.0 indicates that a student can demonstrate some knowledge or skill with help from the teacher, but not independently; 0.0 means that, even with help, a student cannot show any understanding. Generic statements are provided for these levels.
- **Half-point Scores**—More precise measurement of knowledge and skills that is between two levels. Generic statements are provided for these levels.

**Proficiency scales become** the centerpiece of communication and understanding in the classroom, as well as the common language for discussing learning between teacher and student.

**The proficiency scales are organized** according to the domains and strands in the NAD standards.

The cognitive rigor or complexity of the 3.0 learning targets has also been included, for it impacts the selection of instructional activities as well as assessment tasks. The Depth of Knowledge (DOK) model is generally used for this purpose, which is a taxonomy of four levels of cognitive demand. The levels are:

- Level 1—Recall
- Level 2—Skill/Concept
- Level 3—Strategic Thinking
- Level 4—Extended Thinking

## **Depth of Knowledge (DOK) Levels**



#### **Level One Activities**

Recall elements and details of story structure, such as sequence of events, character, plot and setting.

Conduct basic mathematical calculations.

Label locations on a map.

Represent in words or diagrams a scientific concept or relationship.

Perform routine procedures like measuring length or using punctuation marks correctly.

Describe the features of a place or people.

#### **Level Two Activities**

Identify and summarize the major events in a narrative.

Use context cues to identify the meaning of unfamiliar words.

Solve routine multiple-step problems.

Describe the cause/effect of a particular event.

Identify patterns in events or behavior.

Formulate a routine problem given data and conditions.

Organize, represent and interpret

#### **Level Three Activities**

Support ideas with details and examples.

Use voice appropriate to the purpose and audience.

Identify research questions and design investigations for a scientific problem.

Develop a scientific model for a complex situation.

Determine the author's purpose and describe how it affects the interpretation of a reading selection.

Apply a concept in other contexts.

#### **Level Four Activities**

Conduct a project that requires specifying a problem, designing and conducting an experiment, analyzing its data, and reporting results/ solutions.

Apply mathematical model to illuminate a problem or situation.

Analyze and synthesize information from multiple sources.

Describe and illustrate how common themes are found across texts from different cultures.

Design a mathematical model to inform and solve a practical or abstract situation.

# DISCIPLINARY TRANSFER GOALS (MATHEMATICAL PRACTICES)

There are a small number of overarching, long-term transfer goals in each subject area. They are meant to be integrated within and across grade-level instruction. Below are the transfer goals for math.

- 1. Make sense of problems and persevere in solving them.
- 2. Reason abstractly and quantitatively.
- 3. Construct viable arguments and critique the reasoning of others.
- 4. Model with mathematics.
- 5. Use appropriate tools strategically.
- 6. Attend to precision.
- 7. Look for and make use of structure.
- 8. Look for and express regularity in repeated reasoning.

### Southwestern Union Conference Secondary Math Committee

Steve Estrada — Houston Adventist Academy

Jon Dickerson — Chisholm Trail Academy

Robert Fetters — Ozark Adventist Academy

Brian Hack — South Texas Christian Academy

Stan Miller — Sandia View Academy

Todd Nelson — Burton Adventist Academy

Melonie Wolfe — North Dallas Adventist Academy



#### Algebra I Domains and Corresponding P-Scales

- 1. Graphs of Equations and Inequalities
- 2. Rational and Irrational Numbers
- 3. Arithmetic Operations on Polynomials
- 4. Creating Equations
- 5. Reasoning to Solve Equations
- 6. Equations and Inequalities
- 7. Structure of Expression
- 8. Solving Quadratic Equations
- 9. <u>Linear Models</u>
- 10. Functions
- 11. Exponents and Roots
- 12. Exponential Equations and Functions
- 13. Transformation of Functions
- 14. Systems of Equations
- 15. Graph Functions

		Graphs of Equations and Inequalities
Standards	: A.REI.10	, A.REI.11, A.REI.12
Score 4.0		ion to score 3.0 performance, the student demonstrates in-depth inferences olications that go beyond what was taught.
	Score 3.5	In addition to scoring 3.0 performance, partial success at score 4.0 content
Score 3.0	<ul> <li>The student will:         <ul> <li>graph the solution set of a system of linear inequalities in two variables as the intersect of the corresponding half-planes (A.REI.12)</li> <li>explain why the x-coordinates of the points where the graphs of the equations y = f(x) y = g(x) intersect are the solutions of the equations f(x) = g(x) (A.REI.11)</li> <li>find the approximate solutions of linear functions using technology, tables of values, o successive approximations (A.REI.11)</li> </ul> </li> <li>The student exhibits no major errors or omissions.</li> </ul>	
	Score 2.5	No major errors or omissions regarding score 2.0 content and partial success at score 3.0 content
Score 2.0	<ul> <li>Student will:         <ul> <li>understand that the graph of an equation in two variables is a set of all its solutions plotted in the coordinate plane, often forming a curve (which could be al line) (A.REI.10)</li> <li>graph the solution to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality) (A.REI.12)</li> <li>recognize or recall specific terminology: included (equal to), excluded (strictly less than, greater than)</li> </ul> </li> <li>There are no major errors or omissions regarding the simpler details and processes. However, the student exhibits major errors or omissions regarding the more complex ideas and processes.</li> </ul>	
	Score 1.5	Partial success at score 2.0 content and major errors or omissions regarding score 3.0 content
Score 1.0	With he	lp, partial success at score 2.0 content and score 3.0 content
	Score 0.5	with help, partial success at score 2.0 content but not at score 3.0 content
Score 0.0	Even wi	th help, no success

		Rational and Irrational Numbers
Standards	: N.RN.3	
Score 4.0	In addition to score 3.0 performance, the student demonstrates in-depth inference and applications that go beyond what was taught.	
	Score 3.5	In addition to scoring 3.0 performance, partial success at score 4.0 content
Score 3.0	The student will:  Explain why the sum or product of two rational numbers is rational (N.RN.3)  Explain why the sum of a rational and an irrational number is irrational  Explain why the product of a nonzero rational number and an irrational number is irrational	
	Score 2.5	ent exhibits no major errors or omissions.  No major errors or omissions regarding score 2.0 content and partial success at score 3.0 content
Score 2.0	The student will:  recognize or recall vocabulary such as irrational number, product, property, rational number, sum perform basic processes such as recognize or recall the properties of rational and irrational numbers  There are no major errors or omissions regarding the simpler details and processes. However, the student exhibits major errors or omissions regarding the more complex ideas and processes.	
	Score 1.5	Partial success at score 2.0 content and major errors or omissions regarding score 3.0 content
Score 1.0	With he	lp, partial success at score 2.0 content and score 3.0 content
	Score 0.5	with help, partial success at score 2.0 content but not at score 3.0 content
Score 0.0	Even with help, no success	

		Arithmetic Operations on Polynomials	
Standards	A.APR.1		
Score 4.0	In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught.		
	Score 3.5	In addition to scoring 3.0 performance, partial success at score 4.0 content	
Score 3.0	<ul> <li>multiply polynomials (A.APR.1)</li> <li>add and subtract polynomials (A.APR.1)</li> </ul>		
	Score 2.5	No major errors or omissions regarding score 2.0 content and partial success at score 3.0 content	
Score 2.0	<ul> <li>The student will:         <ul> <li>apply properties of exponents</li> <li>recognize or recall specific terminology: polynomial</li> <li>Understand that polynomials are closed under the operations of addition, subtraction, and multiplication (HSA-APR A.1)</li> </ul> </li> </ul>		
	There are no major errors or omissions regarding the simpler details and processes. However, the student exhibits major errors or omissions regarding the more complex ideas and processes.		
	Score 1.5	Partial success at score 2.0 content and major errors or omissions regarding score 3.0 content	
Score 1.0	With he	lp, partial success at score 2.0 content and score 3.0 content	
	Score 0.5	with help, partial success at score 2.0 content but not at score 3.0 content	
Score 0.0	Even with help, no success		

		Creating Equations	
Standards:			
Score 4.0		ion to score 3.0 performance, the student demonstrates in-depth inferences olications that go beyond what was taught.	
	Score 3.5	In addition to scoring 3.0 performance, partial success at score 4.0 content	
Score 3.0	The stud	ent will:	
	• g	create linear equations with two or more variables to represent relationships between quantities (A.CED.2) graph linear equations on coordinate axes with labels and scales (A.CED.2) epresent constraints by linear equations or inequalities and by systems of equations and/or inequalities (A.CED.3) interpret solutions as viable or non-viable options in a modeling context (A.CED.3)	
	The stud	lent exhibits no major errors or omissions.	
	Score 2.5	No major errors or omissions regarding score 2.0 content and partial success at score 3.0 content	
Score 2.0	• ri	lent will: earrange formulas to highlight a quantity of interest (A.CED.4) ecognize or recall specific terminology: independent and dependent variables, standard orm, slope-intercept form, point-slope form, factored form, vertex form, zeros/roots, growth, decay create linear equations and inequalities with one variable and use them to solve problems A.CED.1)	
	There are no major errors or omissions regarding the simpler details and processes. However, the student exhibits major errors or omissions regarding the more complex ideas and processes.		
	Score 1.5	Partial success at score 2.0 content and major errors or omissions regarding score 3.0 content	
Score 1.0	With he	lp, partial success at score 2.0 content and score 3.0 content	
	Score 0.5	with help, partial success at score 2.0 content but not at score 3.0 content	
Score 0.0	Even wi	th help, no success	

		Reasoning to Solve Equations
Standards	:	
Score 4.0		ion to score 3.0 performance, the student demonstrates in-depth inferences olications that go beyond what was taught.
	Score 3.5	In addition to scoring 3.0 performance, partial success at score 4.0 content
Score 3.0	The student will: <ul> <li>solve simple rational and radical equations in one variable (A.REI.2)</li> <li>identify extraneous solutions</li> <li>Construct a viable argument to justify a solution method.</li> </ul> The student exhibits no major errors or omissions.	
	Score 2.5	No major errors or omissions regarding score 2.0 content and partial success at score 3.0 content
		explain each step in solving an equation (A.REI.1) ecognize or recall specific terminology: argument, equation, extraneous solutions, listributive property, inverse operation, factor, quadratic formula, complete the square
		e no major errors or omissions regarding the simpler details and processes. However, the exhibits major errors or omissions regarding the more complex ideas and processes.
	Score 1.5	Partial success at score 2.0 content and major errors or omissions regarding score 3.0 content
Score 1.0	With he	lp, partial success at score 2.0 content and score 3.0 content
	Score 0.5	with help, partial success at score 2.0 content but not at score 3.0 content
Score 0.0	Even with help, no success	

		Equations and Inequalities
Standards:		
Score 4.0		ion to score 3.0 performance, the student demonstrates in-depth inferences olications that go beyond what was taught.
	Score 3.5	In addition to scoring 3.0 performance, partial success at score 4.0 content
Score 3.0	• s	ent will: solve simple linear equations in one variable with coefficients represented by letters A.REI.3) solve multi-step linear equations in one variable (A.REI.3) solve linear inequalities in one variable (A.REI.3)
	The stud	ent exhibits no major errors or omissions.
	Score 2.5	No major errors or omissions regarding score 2.0 content and partial success at score 3.0 content
Score 2.0	• r	ent will: colve simple linear equations in one variable (A.REI.3) ecognize or recall specific terminology: inequality, greater than (>), less than (<), greater han and equal to (≥), less than and equal to (≤), not equal to (≠),coefficient
		e no major errors or omissions regarding the simpler details and processes. However, the exhibits major errors or omissions regarding the more complex ideas and processes.
	Score 1.5	Partial success at score 2.0 content and major errors or omissions regarding score 3.0 content
Score 1.0	With he	lp, partial success at score 2.0 content and score 3.0 content
	Score 0.5	with help, partial success at score 2.0 content but not at score 3.0 content
Score 0.0	Even with help, no success	

		Structure of Expression		
Standards:				
Score 4.0		ion to score 3.0 performance, the student demonstrates in-depth inferences olications that go beyond what was taught.		
	Score 3.5	In addition to scoring 3.0 performance, partial success at score 4.0 content		
Score 3.0	()	ent will: Interpret complicated expressions by viewing one or more of their parts as a single entity A.SSE.1b)  understand a(b+c) as a product of two terms ewrite expressions based on the given structure (A.SSE.2)  use the distributive property with polynomials		
	The stud	The student exhibits no major errors or omissions.		
	Score 2.5	No major errors or omissions regarding score 2.0 content and partial success at score 3.0 content		
Score 2.0	<ul> <li>The student will:         <ul> <li>identify the parts of an expression (A.SSE.1a)</li> <li>add, subtract, and multiply polynomials</li> <li>recognize or recall specific terminology: binomial, trinomial</li> </ul> </li> <li>There are no major errors or omissions regarding the simpler details and processes. However, the student exhibits major errors or omissions regarding the more complex ideas and processes.</li> </ul>			
	Score 1.5	Partial success at score 2.0 content and major errors or omissions regarding score 3.0 content		
Score 1.0	With he	lp, partial success at score 2.0 content and score 3.0 content		
	Score 0.5	with help, partial success at score 2.0 content but not at score 3.0 content		
Score 0.0	Even wi	th help, no success		

Solving Quadratic Equations				
Standards:	A.REI.4c	, A.REI.4b		
Score 4.0		ion to score 3.0 performance, the student demonstrates in-depth inferences olications that go beyond what was taught.		
	Score 3.5	In addition to scoring 3.0 performance, partial success at score 4.0 content		
Score 3.0	<ul> <li>The student will:</li> <li>use the method of completing the square to transform any quadratic equation in x into an equation of the form (x - p)² = q that has the solutions (A.REI.4a)</li> <li>derive the quadratic formula using the method of completing the square (A.REI.4a)</li> <li>solve quadratic equations in one variable (e.g., inspection, taking square roots, the quadratic formula, and factoring) (A.REI.4b)</li> </ul>			
	The stud	ent exhibits no major errors or omissions.		
	Score 2.5	No major errors or omissions regarding score 2.0 content and partial success at score 3.0 content		
Score 2.0	The stud	lent will: ecognize or recall specific terminology: quadratic equation, quadratic formula, discriminant		
		e no major errors or omissions regarding the simpler details and processes. However, the exhibits major errors or omissions regarding the more complex ideas and processes.		
	Score 1.5	Partial success at score 2.0 content and major errors or omissions regarding score 3.0 content		
Score 1.0	With he	lp, partial success at score 2.0 content and score 3.0 content		
	Score 0.5	with help, partial success at score 2.0 content but not at score 3.0 content		
Score 0.0	Even wi	th help, no success		

		Linear Models
Standards:	S.ID.C.7,	S.ID.C.8, S.ID.C.9
Score 4.0		ion to score 3.0 performance, the student demonstrates in-depth inferences olications that go beyond what was taught.
	Score 3.5	In addition to scoring 3.0 performance, partial success at score 4.0 content
Score 3.0	<ul> <li>The student will:</li> <li>compute (using technology) and interpret the correlation coefficient of a linear fit (S.ID.C.8)</li> <li>distinguish between correlation and causation in a data set (S.ID.C.9)</li> <li>Interpret the slope (rate of change) and the intercept (constant term) of a linear mode in the context of the data (S.ID.C.7)</li> </ul>	
	The student exhibits no major errors or omissions.	
	Score 2.5	No major errors or omissions regarding score 2.0 content and partial success at score 3.0 content
Score 2.0	The student will:  • Calculate the slope and intercept.	
		e no major errors or omissions regarding the simpler details and processes. However, the exhibits major errors or omissions regarding the more complex ideas and processes.
	Score 1.5	Partial success at score 2.0 content and major errors or omissions regarding score 3.0 content
Score 1.0	With he	lp, partial success at score 2.0 content and score 3.0 content
	Score 0.5	with help, partial success at score 2.0 content but not at score 3.0 content
Score 0.0	Even with help, no success	

		Functions
Standards	:	
Score 4.0		ion to score 3.0 performance, the student demonstrates in-depth inferences blications that go beyond what was taught.
	Score 3.5	In addition to scoring 3.0 performance, partial success at score 4.0 content
Score 3.0	<ul> <li>The student will:         <ul> <li>understand that a linear function from one set to another set assigns to each element the domain exactly one element of the range (F.IF.1)</li> <li>use linear function notation to evaluate functions (F.IF.2)</li> </ul> </li> </ul>	
	The stud	ent exhibits no major errors or omissions.
	Score 2.5	No major errors or omissions regarding score 2.0 content and partial success at score 3.0 content
Score 2.0	• r r ·	ent will: letermine if a relation is a function given the graph, table or sets of ordered pairs ecognize or recall specific terminology: function notation, vertical line test, interpret, elation, function rule Understand that if f is a function and x is an element of its domain, then f(x) denotes the output of f corresponding to the input of x (F.IF.A.1) Understand that the graph of f is the graph of the equations y=f(x) (F.IF.A.1)  The no major errors or omissions regarding the simpler details and processes. However, the
	student e	exhibits major errors or omissions regarding the more complex ideas and processes.
	Score 1.5	Partial success at score 2.0 content and major errors or omissions regarding score 3.0 content
Score 1.0	With he	lp, partial success at score 2.0 content and score 3.0 content
	Score 0.5	with help, partial success at score 2.0 content but not at score 3.0 content
Score 0.0	Even with help, no success	

		Exponents and Roots
Standards	: N.RN.2	
Score 4.0	In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught.	
	Score 3.5	In addition to scoring 3.0 performance, partial success at score 4.0 content
Score 3.0	3.0 The student will:  • rewrite expressions involving integer exponents using the properties of exponents	
	The stud	ent exhibits no major errors or omissions.
	Score 2.5	No major errors or omissions regarding score 2.0 content and partial success at score 3.0 content
Score 2.0	The student will:  recall each of the rules of exponents understand the meaning of integer exponents	
		e no major errors or omissions regarding the simpler details and processes. However, the exhibits major errors or omissions regarding the more complex ideas and processes.
	Score 1.5	Partial success at score 2.0 content and major errors or omissions regarding score 3.0 content
Score 1.0	With he	lp, partial success at score 2.0 content and score 3.0 content
	Score 0.5	with help, partial success at score 2.0 content but not at score 3.0 content
Score 0.0	Even with help, no success	

		Exponential Equations and Functions
Standards:		
Score 4.0		ion to score 3.0 performance, the student demonstrates in-depth inferences olications that go beyond what was taught.
	Score 3.5	In addition to scoring 3.0 performance, partial success at score 4.0 content
Score 3.0	The student will:  • explain the meaning of each component and y-intercept of an exponential function real world relationship (F.LE.5)  • construct an exponential function to model a given situation (F.LE.5)	
	The stud	ent exhibits no major errors or omissions.
	Score 2.5	No major errors or omissions regarding score 2.0 content and partial success at score 3.0 content
Score 2.0	<ul> <li>The student will:         <ul> <li>distinguish between situations that can be modeled with linear functions and with exponential functions (F.LE.A.1)</li> <li>identify the names and definitions of each component of an exponential function (HSF.LE.A.1)</li> <li>recognize or recall specific terminology: asymptote, growth rate</li> </ul> </li> <li>There are no major errors or omissions regarding the simpler details and processes. However, the student exhibits major errors or omissions regarding the more complex ideas and processes.</li> </ul>	
	Score 1.5	Partial success at score 2.0 content and major errors or omissions regarding score 3.0 content
Score 1.0	With he	lp, partial success at score 2.0 content and score 3.0 content
	Score 0.5	with help, partial success at score 2.0 content but not at score 3.0 content
Score 0.0	Even with help, no success	

Transformation of Functions					
Standards	:				
Score 4.0	In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught.				
	Score 3.5	In addition to scoring 3.0 performance, partial success at score 4.0 content			
Score 3.0	The student will:  • compose two or more functions (F.BF.1c)				
	The student exhibits no major errors or omissions.				
	Score 2.5	No major errors or omissions regarding score 2.0 content and partial success at score 3.0 content			
Score 2.0	The student will: <ul> <li>combine different parent functions by adding, subtracting, multiplying and/or dividing to write a function (F.BF.1b)</li> <li>recognize or recall specific terminology: parent function, transformation, composition of functions</li> </ul>				
	There are no major errors or omissions regarding the simpler details and processes. However, the student exhibits major errors or omissions regarding the more complex ideas and processes.				
	Score 1.5	Partial success at score 2.0 content and major errors or omissions regarding score 3.0 content			
Score 1.0	With help, partial success at score 2.0 content and score 3.0 content				
	Score 0.5	with help, partial success at score 2.0 content but not at score 3.0 content			
Score 0.0	Even with help, no success				

Systems of Equations					
Standards:					
Score 4.0	In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught.				
	Score 3.5	In addition to scoring 3.0 performance, partial success at score 4.0 content			
Score 3.0	The student will:  • solve systems of linear equations (A.REI.6)  The student exhibits no major errors or omissions.				
	Score 2.5	No major errors or omissions regarding score 2.0 content and partial success at score 3.0 content			
Score 2.0	<ul> <li>The student will:         <ul> <li>solve systems of linear equations with technology (focusing on pairs of linear equations in two variables) exactly and approximately (e.g. with graphs) (A.REI.6)</li> <li>recognize or recall specific terminology: system of equations, elimination, substitution, solution, intersection</li> </ul> </li> <li>There are no major errors or omissions regarding the simpler details and processes. However, the student exhibits major errors or omissions regarding the more complex ideas and processes.</li> </ul>				
	Score 1.5	Partial success at score 2.0 content and major errors or omissions regarding score 3.0 content			
Score 1.0	With help, partial success at score 2.0 content and score 3.0 content				
	Score 0.5	with help, partial success at score 2.0 content but not at score 3.0 content			
Score 0.0	Even with help, no success				

Graph Functions					
Standards:					
Score 4.0	In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught.				
	Score 3.5	In addition to scoring 3.0 performance, partial success at score 4.0 content			
Score 3.0	• 6	The student will:  • graph linear, quadratic, absolute and exponential functions from equations and determine key features of the graph by hand and with technology (F.IF.7)			
	The student exhibits no major errors or omissions.				
	Score 2.5	No major errors or omissions regarding score 2.0 content and partial success at score 3.0 content			
Score 2.0	The student will:  • graph linear, quadratic functions from equations and determine key features of the graph by hand and with technology (F.IF.7)  • identify the key features of a function given the graph				
	There are no major errors or omissions regarding the simpler details and processes. However, student exhibits major errors or omissions regarding the more complex ideas and processes.				
	Score 1.5	Partial success at score 2.0 content and major errors or omissions regarding score 3.0 content			
Score 1.0	With help, partial success at score 2.0 content and score 3.0 content				
	Score 0.5	with help, partial success at score 2.0 content but not at score 3.0 content			
Score 0.0	Even with help, no success				