WHAT TO LOOK FOR

Math Advanced CCRSAE D and E

A Quick Guide for Observing Classroom Content and Practice Content

During an Adult Basic Education (ABE) advanced level Math class, you should observe the teacher integrating the corresponding level CCR Standards and students engaging in a variety of standards and practices:

Operations with Real Numbers (*NS, RP, N.RN, A.APR)	Algebra & Functions (*EE, RP, A.SSE, F.IF, A.REI)	Geometry (*G, G.GMD, G.MG)		
 Understand ratio concepts and proportional relationships to solve real world problems including probability. Fluency with the four operations of real numbers Use square roots and cube roots in numerical expressions Use numerical expressions with integer exponents, including numbers expressed in scientific notation 	 Solve problems involving rates, ratios, and percentages Represent a proportional relationship with an equation and use it to solve problems Rearrange formulas involving (linear), quadratic, exponential, polynomial, and simple rational expressions to highlight specific quantities Understand the concept of function and use function notation Solve equations and inequalities in one variable and a system of equations in two variables 	 Understand similarity and describe with a sequence of rotations, reflections, translations and dilations Solve real life and mathematical problems involving angle, measure, area, surface area, and volume of two- and three-dimensional figures Understand and apply the Pythagorean Theorem Use new vocabulary and facts about angles to solve problems (supplementary, complementary, vertical, adjacent) 		
Analysis and Modeling (As a tool for teaching and understanding functions, geometry and statistics; *G, *SP,*F.IF)				
 Interpret differences in shape, center, and spread when comparing data sets Construct scatter plots for bivariate data Interpret slope and intercept in terms of a data set in its context Use a linear or non-linear model to answer questions and solve problems related to data 	 Graph proportional relationships by hand, spreadsheet or Desmos, interpreting unit rate as slope and intercept as (0,0) For nonproportional relationships, understand the effects of slope and intercept Graph a linear function or inequality to model a situation—by hand, spreadsheet, or Desmos Analyze and solve linear and pairs of simultaneous equations to model real life situations Differentiate between and compare situations modeled by linear and exponential functions 	 Compare the relationship between the circumference and area of a circle Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions related to parallel and intersecting lines Apply geometric concepts in modeling situations 		

*NS = The Number System; RP = Ratio and Proportional Relationships; N.RN = The Real Number System; Algebra: Arithmetic with Polynomials and Rational Expressions; EE = Expressions and Equations, A.SSE = Algebra: Seeing Structure in Expressions; F.IF = Functions: Interpreting Functions; A.REI = Algebra: Reasoning with Equations and Inequalities G = Geometry; G.GMD Geometry: Geometric Measurement and Dimension; G.MG = Geometry: Modeling with Geometry

You should also observe all students engaging in **mathematical practices**, such as:

- Participating and persevering in solving problems that require deep thinking (DOK), have multiple ways they can be solved or multiple correct solutions, and/or are real-world (messy, require research and decision-making).
- Creating models and analyzing relationships between equations and graphs to draw conclusions.
- Using clear vocabulary and definitions in discussion; explaining their reasoning with correct units or graph labels.

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Practices

The examples below feature several Indicators from the <u>ABE Professional Standards</u>. These Indicators are just a sampling from the full set of the ABE Professional Standards and were chosen because they create a sequence: the teacher plans a lesson that sets clear and high expectations, the teacher then delivers high quality instruction, and finally the teacher uses a variety of assessments to see if students understand the material or if re-teaching is necessary. These examples highlight teacher and student behaviors aligned to these Indicators that you can expect to see in a rigorous ABE advanced level Math class. <u>Click this link</u> to see how these standards look in action before visiting a class.

PLANNING (Indicators P1.1, P1.2, C1.1)	The teacher plans and implements CCRSAE aligned, academically rigorous, differentiated lessons that include clear content and language objectives, set high expectations for all learners, cultivate a safe classroom environment, encourage productive struggle, and motivate all students to succeed.		
Virtual/Hands-On Tools: a problem to engage with at arrival; thinking tools (graphing calculator, <u>Desmos</u> , <u>GeoGebra</u>) and <u>materials</u> (graph paper, rulers, <u>spaghetti-lines</u>) accessible to students; <u>non-routine math problems and experiences</u> .			
What is the teacher doing?		What are adult learners doing?	
 <u>Demonstrating sophisticated mathematical models</u> (flow charts, formulas, spreadsheets) Creating or selecting <u>culturally responsive lessons</u> that <u>engage and sustain student attention</u> Establishing <u>classroom routines</u> that require students to defend their thinking using a logical progression <u>Focusing attention on mathematical language</u> 		 Using mathematical models (computer generated <u>Desmos</u> or GeoGebra), equations, graphs (hand drawn or <u>spreadsheet</u>) Engaging in <u>challenging learning tasks</u> regardless of learning needs (linguistic and cultural background) Justifying a solution method using a logical progression of arguments and critiquing the reasoning of others Using mathematical language precisely to convey meaning 	
INSTRUCTION (Indicators P1.3, P1.4)	The teacher delivers high quality, culturally responsive instruction that meets the diverse needs of all students and engages them with meaningful topics and tasks that develop students' critical thinking and problem-solving skills.		
Virtual/Hands-On Tools: <u>balance scale</u> , <u>algebra tiles</u> , spreadsheets, grid paper, <u>bar models</u> , <u>Desmos calculator</u> , <u>3-dimensional</u> <u>solid objects</u> .			
What is the teacher doing?		What are adult learners doing?	
 Creating a culture of being careful and precise when <u>communicating mathematical ideas</u> <u>Highlighting commonalities, differences, and patterns in students' ideas</u> Providing students with opportunities to <u>evaluate</u> different approaches to a problem 		 Negotiating with others in response to new ideas, preferences, or contributions <u>Referencing mathematical elements</u> in context while logically providing claims and counterclaims Actively incorporating others into discussions about mathematical ideas, incorporating a variety of approaches 	
ASSESSMENT (Indicators P2.1, P2.2, P2.3)	The teacher uses a variety of formative and summative assessments to measure student learning and understanding, evaluate the effectiveness of instruction, develop differentiated and advanced learning experiences, and inform future instruction.		
Virtual/ Hands-On Tools: exit tickets, journals or logs, My Favorite No, checklists for teacher observation of objectives being demonstrated, or completion of a project			
What is the teacher doing?		What are adult learners doing?	
 Prompting students' reasoning; listening to responses to gauge their understanding Conducting frequent checks for understanding and adjusting instruction accordingly Using multiple formative approaches to assess students (journals, analyzing group work, student explanation) 		 Demonstrating their thinking by drawing, <u>modeling with</u> <u>graphs or equations</u>, and discussing and sharing their work Incorporating feedback from the teacher and their peers to adjust their thinking Using <u>drawings</u>, <u>diagrams</u>, <u>graphs</u>, <u>equations</u>, and <u>computer-generated models</u> to show understanding and explain mathematical concepts 	