Session 1
Title: Ratio Concepts and Proportional Reasoning
Description: The primary focus of mathematics learning in the middle grades is ratio, proportion, and function. How can you help your students develop sound ratio concepts? Create strategies for establishing focused learning goals as well as for selecting tasks that foster understanding of ratio concepts through hands-on activities. You will learn to recognize and encourage solution methods that involve different approaches and representations, including unit rates and double number lines. We will also consider sixth-grade learning objectives within the Ratio and Proportional Relationships learning progression, pinpointing key fifth-grade goals and relevant links to seventh- and eighth-grade learning targets.

Session 2
Title: Data and Probability
Description: What does it mean to describe the variability of a data set or pick the most appropriate measure of center? Students are often expected to do their first serious work with statistics in sixth grade. We will investigate collecting and using data to explore measures of center and measures of the variability of data, and recognizing trends in data (as well as data points that do not fit a trend). Effective questioning strategies, techniques for encouraging student discourse, and ideas for eliciting evidence of student thinking will be important components of this session.

Session 3
Title: Expressions and Equations—Connecting Number to Algebra
Description: How do students’ previous understandings of arithmetic apply to algebraic expressions? Explore ways to elicit sixth-grade students’ current understandings of expressions and equations, helping them make connections among arithmetic, geometry, and algebra. Our work will model how teachers can pose purposeful questions that help students make connections among representations and build their capacity to create and analyze methods of reasoning about solving equations. We will also consider how to build students’ procedural fluency from a conceptual understanding of expressions and equations.

Session 4
Title: Numbers—Division of Fractions and Fluency
Description: What does computing with fluency mean? Explore ways to help students understand division of fractions through the use of manipulative materials and different approaches, such as measurement and partitive models. We will explore tasks that encourage students to extend their work to the use of reciprocals. By examining different problem contexts, we will learn strategies that help students develop a greater understanding of and procedural fluency with division of fractions.
**Grade 7**

**Session 1**
**Title:** Ratio and Proportion
**Description:** The primary focus of mathematics learning in the middle grades is the ratio, proportion, and function strand. In what ways can students solve problems by reasoning proportionally? Develop strategies for establishing learning goals as well as for selecting tasks that encourage students to reason about and solve proportions by using different methods and representations, including the constant of proportionality (unit rates), tape diagrams, tables, graphs, and double number lines. We will also consider seventh-grade learning goals within the Ratio and Proportional Relationships learning progression for grades 6 through 8.

**Session 2**
**Title:** Data and Probability
**Description:** How do we describe the likelihood of an event? This session will focus on investigating chance processes and using probability models. We will look at problems that facilitate students’ development understanding of theoretical and experimental probabilities; explore the use of organized lists, tables, tree diagrams, and simulation to find probabilities of compound events; and unpack vocabulary related to probability standards. You will also take away strategies and sample problems to engage students in productive struggle with common misconceptions as they learn to reason accurately about probability. Effective questioning strategies, techniques for encouraging student discourse, and ideas for eliciting evidence of student thinking will be important components of this session.

**Session 3**
**Title:** Expressions and Equations
**Description:** How are variables used to represent real-world quantities? Explore ways to pose purposeful questions that support students’ growing ability to simplify expressions, solve simple equations, and make connections among representations. We will also consider how to build students’ capacity to create and analyze methods of reasoning about solving equations, including how to develop understanding of the use of the distributive property as a structural tool. We will conclude by considering seventh-grade learning goals within the Expressions and Equations learning progression for grades 6 through 8.

**Session 4**
**Title:** Number—Key Ideas Related to Operations with Integers
**Description:** What strategies are effective in helping students understand operations with integers? Learn three key concepts about addition and subtraction with integers that will expand your students’ understanding of these operations (particularly subtraction) within this number system. By examining problems in different contexts and using samples of student work, you will discover strategies that will help your students develop a better understanding of operations with integers and build procedural fluency.
Session 1
Title: Function
Description: The primary focus of mathematics learning in the middle grades is ratio, proportion, and function. How do students’ experiences with ratio and proportional reasoning lay the groundwork for understanding linear functions? Develop strategies for establishing learning goals as well as for selecting tasks that encourage students to use tables to create graphs of proportional relationships, to differentiate and find similarities between direct proportional variations and all linear functions, and to apply expressions and equations to describe functions. We will also consider eighth-grade learning objectives within the Functions learning progression as support for the high school Functions domain as well as their links to goals within the seventh-grade Ratios and Proportional Relationships domain.

Session 2
Title: Data and Probability
Description: What are bivariate data and how does the study of data in eighth grade connect to the concept of functions? We will look at examples of sampling and create data displays to discover generalizations about data. You will take away strategies that help students engage in productive struggle with common misconceptions as they learn to reason accurately about the association between two quantities, to make predictions, and to consider the role of causation and correlation. Effective questioning strategies, techniques for encouraging student discourse, and ideas for eliciting evidence of student thinking will be important components of this session.

Session 3
Title: Connecting Geometry to Algebra and Number
Description: How can students learn the differences between rational and irrational numbers? Which expressions and area formulas can relate to geometry standards? By using contexts from geometry, we will look at how the expressions and equations standards and the number standards progress from previous grade levels. Explore ways to pose purposeful questions that support students’ ability to make connections among concepts.

Session 4
Title: Expressions and Equations
Description: What is the purpose of a system of equations, and how do we use them to solve problems? Explore ways to elicit eighth graders’ understanding of systems of linear functions. You will learn strategies to help students build conceptual understanding and procedural fluency when solving individual linear equations as well as systems of linear equations. We will also consider eighth-grade learning goals as part of the learning progression between seventh grade and the high school Algebra domain.
Grades 6, 7, 8

Session 5

Title: Pulling Our Work Together—Seeing the Mathematics Teaching Practices in Action

Description: How can teachers help students become better problem solvers who persevere even when they are not immediately successful? How do we elicit information to find out what students are learning so that we can adapt our instruction? We will consider these questions in a multistage process: (1) analyzing a video clip to identify specific teacher behaviors that support productive struggle, (2) examining student work and classroom strategies to determine what students know, and (3) exploring ways to help move students beyond their current understandings. Participants will conclude their work by reflecting on specific actions they can use in both the short and the long term to ensure mathematical success for all students.