The Progression from Understanding Patterns to Building Functions

Grade K

- ❏ Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations. CCSS.MATH.K.OA.A.1

Grade 1

- ❏ Apply properties of operations as strategies to add and subtract.2 *Examples: If 8 + 3 = 11 is known, then 3 + 8 = 11 is also known. (Commutative property of addition.) To add 2 + 6 + 4, the second two numbers can be added to make a ten, so 2 + 6 + 4 = 2 + 10 = 12. (Associative property of addition.)* CCSS.MATH.1.OA.B.3

Grade 2

- ❏ Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. CCSS.MATH.2.OA.A.1

Grade 3

- ❏ Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. CCSS.MATH.3.OA.D.9

Grade 4

- ❏ Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. CCSS.MATH.4.OA.C.5

Grade 5

- ❏ Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. CCSS.MATH.5.OA.B.3

Grade 6

- ❏ Apply and extend previous understandings of arithmetic to algebraic expressions. CCSS.MATH.6.EF.A

Grade 7

- ❏ Solve real-life and mathematical problems using numerical and algebraic expressions and equations. CCSS.MATH.7.EE.B

Grade 8

- ❑ Understand the connections between proportional relationships, lines, and linear equations. CCSS.MATH.8.EE.B
- ❑ Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output. CCSS.MATH.CONTENT.8.F.A.1
- ❑ Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change. CCSS.MATH.CONTENT.8.F.A.2
- ❑ Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. For example, the function A = s2giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line. CCSS.MATH.CONTENT.8.F.A.3

High School

- ❑ Understand the concept of a function and use function notation. CCSS.Math.HSF.IF.A
- ❑ Build a function that models a relationship between two quantities. CCSS.MATH.CONTENT.HSF.BF.A
- ❑ Construct and compare linear, quadratic, and exponential models and solve problems. CCSS.MATH.CONTENT.HSF.LE.A