MODULE 1 OVERVIEW

TEKS Addressed:
A.2A, **A.3C**, **A.6A**, **A.7A**, A.9A, **A.9D**, A.12A, A.12C, A.12D

*Bold TEKS = Readiness Standard

Searching for Patterns

Sessions: **24**

Why is this module named *Searching for Patterns*?

Students have searched for patterns in previous courses. They have recognized patterns in lists, learned to extend a pattern beyond a given list, and applied a rule to determine an arbitrary value well beyond the given list. This module extends students' understanding of functions to explore specific function families, including linear, exponential, and quadratic.

Throughout the module, students are searching for, recognizing, and defining patterns in relationships between quantities.

In the first topic, students explore various functions, presented as graphs and equations, and investigate their differentiating characteristics. Once they recognize patterns in the graphs and equations, they sort the functions into their corresponding function families.

In the second topic, students search for patterns in sequences of numbers. They recognize that while all sequences are functions, arithmetic sequences are linear functions, and some geometric sequences are exponential functions.

The Research Shows . . .

"Critical to algebraic thinking is the capacity to recognize patterns and organize data to represent situations in which input is related to output by well-defined functional rules."

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What is the mathematics of *Searching for Patterns*?

Searching for Patterns contains two topics: *Quantities and Relationships* and *Sequences*. Students recognize and identify the key characteristics of different function families. They write recursive and explicit formulas for arithmetic and geometric sequences. Students will revisit all of the function families, key characteristics and types of sequences again in later modules.

1 DAY PACING = 45-MINUTE SESSION

14 SESSIONS
13 LEARNING • 1 ASSESSMENT

TOPIC 1 *Quantities and Relationships*

Learning Together: 9 Sessions

TEKS: **A.2A**, **A.3C**, **A.6A**, **A.7A**, A.9A, **A.9D**, A.12A

Students analyze scenarios and graphs representing the functions they will study throughout the course.

- Students learn to write equations for functions in function notation.
- Students recognize that different function families have different key characteristics.
- Students use graphical behavior to classify functions according to their function families.

Learning Individually: 4 Sessions

Targeted Skills Practice for *Quantities and Relationships*

- Students identify independent and dependent quantities in situations.
- Students label the axes of graphs with the independent and dependent quantities.
- Students identify domain and range, sort graphs of functions by their characteristics, and determine whether a relation is a function.
- Students classify graphs by function type.
- Students create an equation and sketch a graph for a function.

10 SESSIONS
9 LEARNING • 1 ASSESSMENT

TOPIC 2 *Sequences*

Learning Together: 6 Sessions

TEKS: A.12A, A.12C, A.12D

Students explore sequences represented as lists of numbers, tables of values, equations, and graphs modeled on the coordinate plane.

- Students recognize that all sequences are functions.
- Students recognize the characteristics of arithmetic and geometric sequences and write recursive and explicit formulas for both.

Learning Individually: 3 Sessions

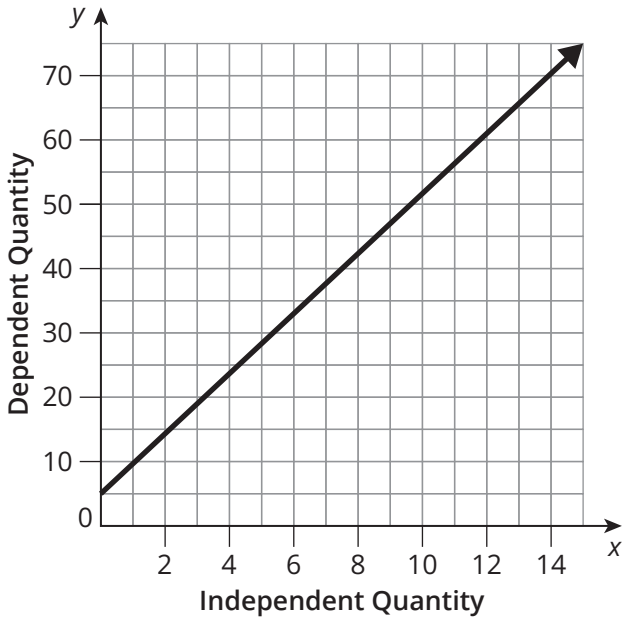
Targeted Skills Practice for *Sequences*

- Students describe patterns in sequences.
- Students determine the common difference in arithmetic sequences and the common ratio in geometric sequences and extend each type of sequence.
- Students identify sequences as arithmetic or geometric and use recursive and explicit formulas to determine unknown terms.

How is *Searching for Patterns* connected to prior learning?

Students have been reasoning with quantities in previous courses and are familiar with independent and dependent quantities. They have analyzed and interpreted linear relationships.

Independent Quantity	Dependent Quantity
0	5
1	10
2	15
3	20



You can represent this relationship with the equation $y = 5x + 5$.

When will students use knowledge from *Searching for Patterns* in future learning?

The concept of a function is the underpinning for the study of algebra. Students will explore three of the function families introduced in *Searching for Patterns*—linear, exponential, and quadratic—in more detail throughout the remainder of the course. They will use their understanding of arithmetic sequences to launch their study of linear functions.

Arithmetic Sequence	Linear Function	Mathematical Meaning
$a_n = a_1 + d(n - 1)$	$f(x) = ax + b$	
a_n	$f(x)$	output value
d	a	slope
n	x	input value
$a_1 - d$	b	y-intercept

1 Searching for Patterns

Module 1 Assessment Summary

Topic	Topic Title	Name	Administered	TEKS*
1	**Quantities and Relationships**	End of Topic Assessment	After Topic 1	**A.2A** **A.3C** **A.6A** **A.7A** A.9A **A.9D** A.12A
2	**Sequences**	End of Topic Assessment	After Topic 2	A.12A A.12C A.12D

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