

## Puzzle Patterns

ID: 9349

Time required  
30 minutes

## Topic: Patterns and Linear Functions

- *Model pattern growth in a table, then use various representations to investigate characteristics of linear functions*
- *Formulate an explicit rule for a growing pattern. Determine the number of tiles needed for the  $n$ th figure numerically, algebraically, and graphically.*
- *Determine a preferred representation for a given situation.*
- *Write the equation of a line*
- *Model the rate of change and make connections to how the rate shows up in the equation, the graph, and the table.*

## Activity Overview

*In this activity, students investigate the growth of a pattern from one figure to the next. As students use their own strategy for finding the number of tiles needed for the  $n$ th figure, they will use various representations to answer questions about the pattern. Students will find the explicit rule for the pattern, create a scatter plot from their data collected, and create a graph to make predictions. Students will analyze the slope in this situation and model how the slope shows up algebraically, graphically, and numerically..*

## Teacher Preparation

*This activity is appropriate for students in Algebra 1. It is assumed that students have recently been introduced to pattern growth, tables, and finding a general rule.*

## Classroom Management

- *This activity is designed to have students explore **individually and in pairs**. However, an alternate approach would be to use the activity in a whole-class format. By using the computer software and the questions found on the student worksheet, you can lead an interactive class discussion.*
- *The puzzle pattern .tns file and the student worksheet together guides students through the main ideas of the activity.*

## TI-Nspire™ Applications

*Graphs & Geometry, Lists & Spreadsheet, Notes*

**Problem 1 – Puzzle Patterns**

Students are given a warm up that launches a growing pattern conversation and how there are different ways to look at a pattern, and as a result, different methods may be used to find values. On the NSpire, an overview of the activity is on page 1.1, then on page 1.2 students are presented with a growing pattern and asked to find a method they would use to find the total number of tiles needed. They are prompted to write an expression to determine the number of tiles needed (page 1.3) for the third figure (**ctrl tab**) to change location in the window. On page 1.5, students complete a table for the figures 1, 2, 3, 5, and 10. They are also directed to write expressions to show how they got number of tiles. On page 1.6, students create a scatter plot (**MENU >3 graph type>3 scatter plot**), then write an equation to see if values match (graphically). On paper, students compare representations then find the number of tiles needed for the 20<sup>th</sup> figure. On page 1.8, students are asked to look at the various representations on page 1.9 and model how the slope (rate of change) shows up in each of the representations.