DAY 3: Growing Patterns

Materials

Copies: 3.1 Growing Patterns III
3.2 Growing Patterns Analysis
Ticket Out the Door Day 3

Supplies: Pattern Blocks (1 set per pair)
Graph Paper

Objective

Students will extend a linear pattern made with blocks. They will make a table comparing the figure number to the total number of blocks and then graph the resulting coordinates. The will analyze the blocks, table and graph to develop a basic understanding of rate of change or slope.

Student Talk Strategy

Report to a Partner for 3.1
Roundtable for 3.2

Academic Language Use

Origin- The center of the coordinate plane, represented by the point (0,0). This will be understood by the students as the "starting point" before graphing a point.
Coordinate Plane- The *xy*-coordinate plane has two coordinate axes, the *x*- and *y*-axis. They are perpendicular to each other. A point in the *xy*-plane is represented by two numbers, (*x*, *y*), where *x* and *y* are the coordinates of the *x*- and y-axes.
x-axis- The horizontal axis in the coordinate plane.
y-axis- The vertical axis in the coordinate plane.

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Activity Notes

10 minutes: Growing Patterns III

Put the students into groups of 2. Pass out activity sheet 3.1 and pattern blocks to each pair. Have the students BUILD the 1st three figures. Then give them 5 to minutes to study the pattern and build AND draw figures 4 and 5. When the 5 minutes are done, have students "Report to a Partner", take turns sharing what they drew and how they figured that out. Circulate to make sure students have built each figure correctly and ask them questions, such as, "How do you see this growing?" "How many blocks are in figure 1?" "What is different about figure 3?"

25 minutes: Make the Table and Graph

Pass out activity sheet 3.2. Make sure the class understands how to begin the table. Model for students how to complete the table for figure 1 and then also model how to graph this point. Give the students 20 minutes to complete the table, make the graph and answer the analysis questions. Circulate to assess students and question them to help them make connections. Once about half the class has figured out a method to

calculate the total blocks in figure 10, come together as a class and ask for students to share methods. Applaud all methods. Encourage them to think more generically to figure out figure 20 and 100. To do this, ask some questions such as, "In figure 3, how apartments made of 3 blocks are there? How many in figure 4? How many in figure 5? How many in figure 10?" Use this line of questioning to help them go from the basic pattern of adding 3 to get the next figure (the recursive formula) to the pattern of multiplying the figure number by 3 to get the total number of blocks in any figure (the function).

10 minutes: Group discussions
Put students into groups of 4 (2 pairs can join up). Explain to them that they will begin with a Roundtable for questions 1-3. To do this, the youngest person in the group will start by sharing 1 thing they wrote down for number 1, 2 OR 3. Then the person to their right will share next, sharing something DIFFERENT than the previous person shared. Have them continue this for about 5 minutes. Bring the class back together and give them give each group 5 more minutes to discuss the remaining questions.

10 minutes: Class discussion
Bring the class back together. Have a student bring up their pictures and explain how they see the pattern growing (question 1). Ask the students to listen to this student and then tell you, when the student is done, if they solved it or thought about it the same way or differently. Call on all students who saw it growing in a different (but still correct) way to share. Then have another student bring up their table and explain what they noticed (question 2). Repeat the same process for getting new ideas. Call on another volunteer to bring up their graph and share their thinking about question 3. Major ideas to bring out here are as follows:

- The pattern is "growing" in that the same amount is being added each time (in this case, 1 column of apartments or 2 squares and a triangle).
- The right column in the chart is growing by 3 each time.
- The graph is going up to the right.

If you have time left, have volunteers share their thinking for the remaining questions.

5 minutes: Ticket out the Door
Pass out the Ticket out the Door and have the students raise their hands when finished (so that you can check it and then dismiss them).

Note for today: If any students/pairs finish early, encourage them to build their own growing pattern OR have a new pattern ready for them to work on.