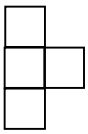
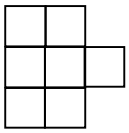
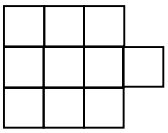
Tile Patterns

1. The first 3 figures in a pattern are shown below. Draw the 4th and 5th figures.

1st Figure	2nd Figure	3rd Figure	4th Figure	5th Figure
				

   a. Assuming your pattern continues, explain how you would build the 10th figure.

   b. Explain how you would build the 50th figure.

   c. Explain how you would build the nth figure.

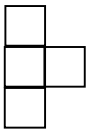
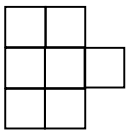
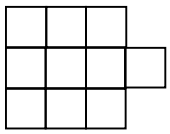
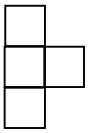
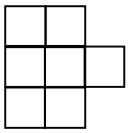
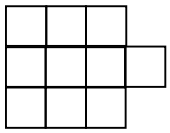
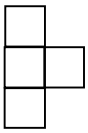
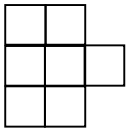
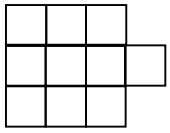
2 a. Tell how (other than building the figure and counting tiles) you would find the total number of tile in the 50th figure.

   b. Describe a different method (other than building and counting) you could use to find the total number of tile in the 50th figure.

   c. Describe a method to find the total number of tiles in any figure (the nth figure).

3. How many total tiles are in the 123rd figure? (Be sure to show how you find your answer.)

4. Jeremy needed 369 tiles to make a figure in the pattern. What figure number was it? (Show how you find your answer.)

1st Figure	2nd Figure	3rd Figure	4th Figure	5th Figure
				
				
				

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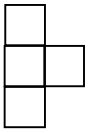	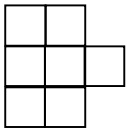	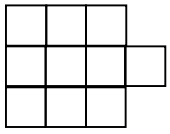		
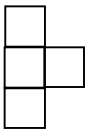	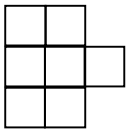	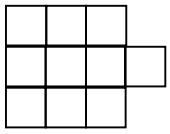		
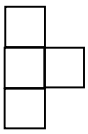	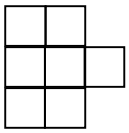	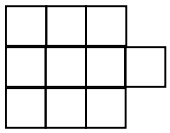		
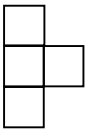	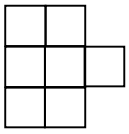	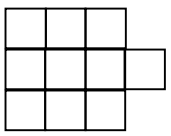		

Task

1. Draw the next 2 figures
2. Describe the 50th figure
3. Describe the nth figure
4. Write an expression that describes the number of tiles in the nth figure
5. Create an x-y table. x represents the figure number, y represents the number of tiles in the figure
6. Make a scatterplot representing the table
7. Describe the pattern that this table represents
8. Write an equation showing the relationship between x and y

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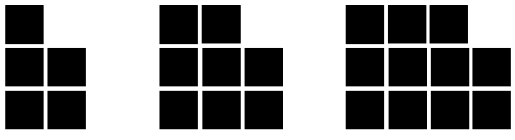
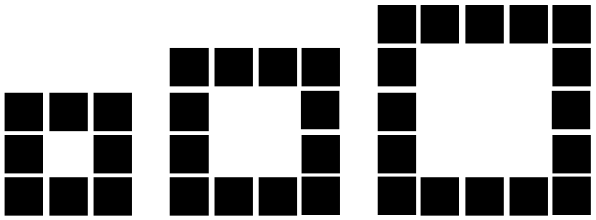
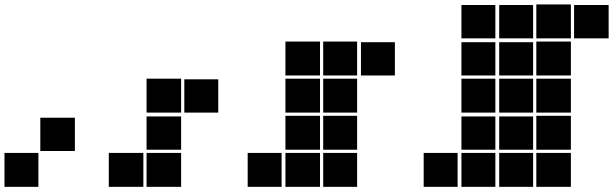
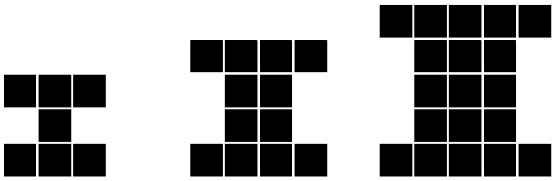
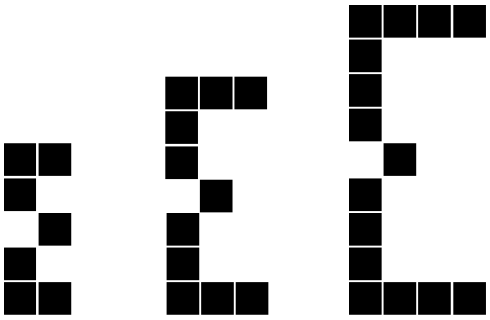
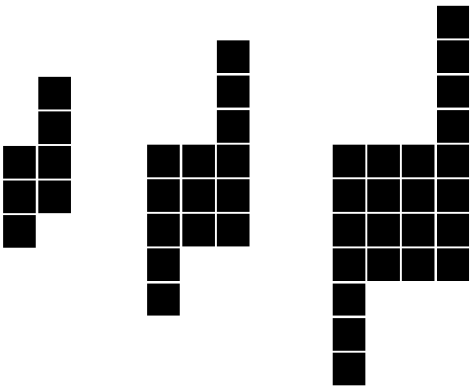


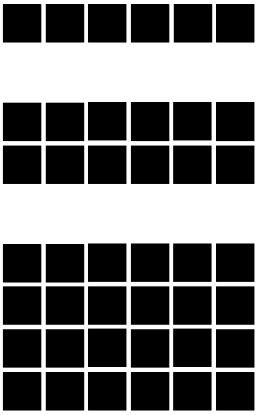


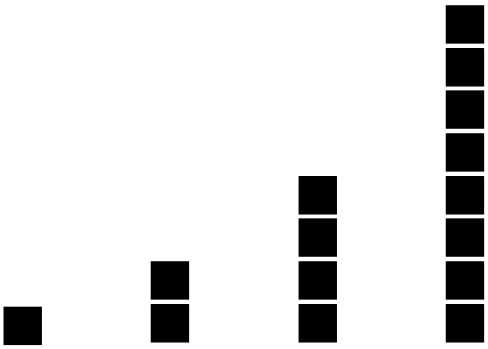






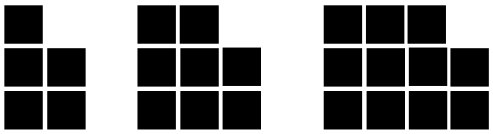




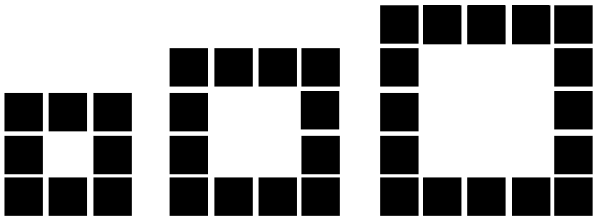


Type of pattern and nth term (note there are many ways students might see the nth term – this is only one.

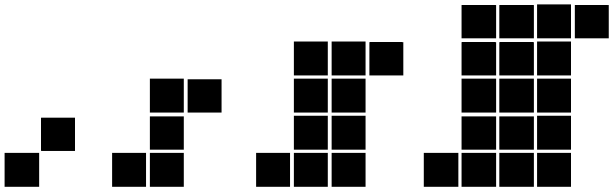
Linear - 3n + 2



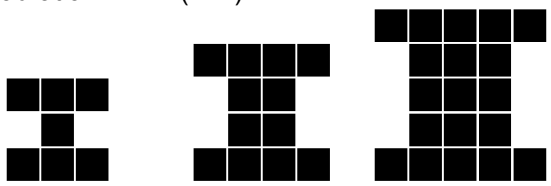
Linear - 4n + 4



quadratic – $(n-1)^2 + 2n$

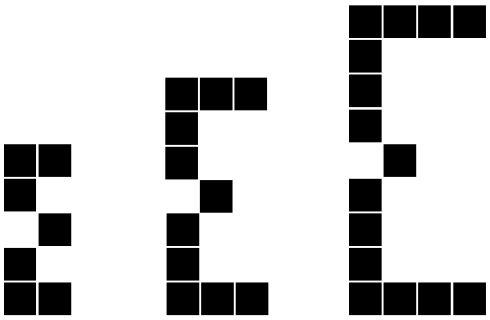


Quadratic – $n^2 + 2(n+2)$



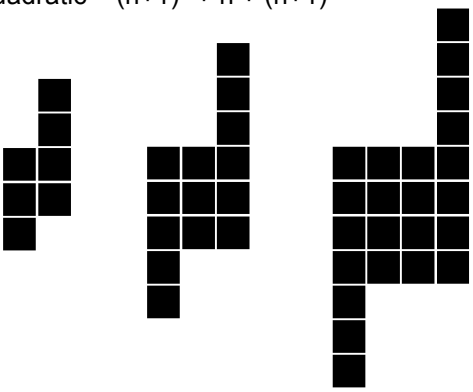
Quadratic – n(2n+1)

Linear – 2(n+1) + 2n + 1

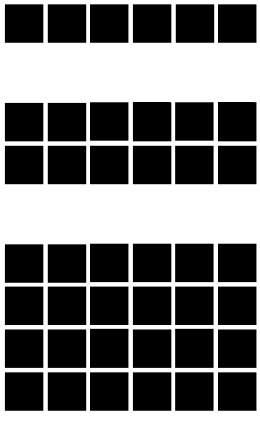


Linear – 3(n+1)

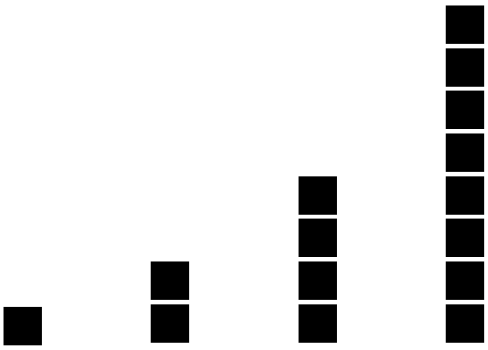
Quadratic – $(n+1)^2 + n + (n+1)$



Exponential – $6(2^{n-1})$



Exponential – 2^{n-1}



Standards for Mathematical Practice
How do mathematically proficient student approach problem solving and learning? Determine which practices are addressed in the activity. Describe how.

Standards for Mathematical Practice	Evidence
1. Make sense of problems and persevere in solving them • Explain meaning, looking for a way to start • Analyze givens and constraints and make a plan • Monitor progress and adapt • Use various mathematical representations/tools (equations, verbal descriptions, tables, graphs, diagrams); look for regularity or trends • Find a solution pathway – does this make sense • Persevere & stick to it, attempt different ways • Explain problem	
2. Reason abstractly and quantitatively • Decontextualize - abstract a situation and represent it mathematically – and contextualize – relate a problem to real-world situations • Make sense of quantities & their relationships • Use coherent & meaningful representations	
3. Construct viable arguments and critique the reasoning of others • Use assumptions, definitions & established results to construct arguments • Make conjectures & build a logical progression of statements to explore the truth of their conjectures • Communicate conclusions & respond to arguments of others • Use reasoning to compare the validity of arguments & explain the thinking of others	
4. Model with mathematics • Apply mathematics to everyday situations; express scenarios in mathematical language and symbols • Judiciously apply assumptions and approximations to simplify a situation • Use a variety of math tools (diagrams, two-way tables, graphs, flowcharts, formulas) to represent important relationships between quantities • Interpret results and possibly revise assumptions, approximations, and representations to make improvements • Recognize math applications in various situations	

Standards for Mathematical Practice	Evidence
5. Use appropriate tools strategically • Familiar with a wide variety of tools (e.g., pencil & paper, concrete models, ruler, protractor, calculator, spreadsheet, computer algebra system, statistical package, dynamic geometry software) to represent and solve problems; understand potential insight gained by the use of these tools as well as limitations • Strategically use estimation as a tool • Make deliberate choices of which mathematical tools to use and when • Aware of mathematical resources available • Use technological tools to explore & deepen understanding	
6. Attend to precision • Use clear definitions in communication • State the meaning of symbols • Specify units of measure • Include complete and appropriate labels on graphical representations • Use accurate terminology with a clear understanding of math symbols and meaning • Express numerical answers with a degree of precision appropriate for the problem context • Make explicit use of definitions	
7. Look for and make use of structure • Use patterns and structure to find similarities in mathematical representations and situations • Use numerical relationships to build understanding and flexibility with numbers • Use structure to help identify the parts of more complex expressions • Break complicated expressions down into simpler components or step back and see complicated expressions composed of several parts	
8. Look for and express regularity in repeated reasoning • Recognize & use repeated calculations to simplify computations & generalize methods • Focus on the details of problem solving while maintaining oversight of the process employed • Evaluate the reasonableness of intermediate results throughout problem solving	