



First Name: _____	Last Name: _____	Grade: _____
Teacher: _____	Parent's email: _____	

## Exploring Patterns

Welcome to the Math Challenge #9. Seeing pattern and structure in the world around us is a great mathematical habit of mind and one that we are developing from the first days of our life. We are naturally attuned to patterns because it allows us to predict what will come next and make sense of our world.

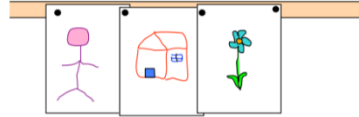
In this Math Challenge, you will be solving math problems by exploring patterns and predicting what's next. If you are stuck, don't hesitate to get your parents, older siblings, or classmates to help!

If you are new to any of the problem solving strategies, check out our complete overview of elementary problem solving strategies at <https://www.mathinaction.org/problem-solving-strategies.html>.

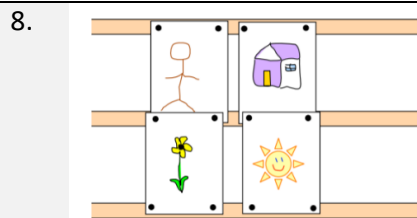
**Kinder & First Grade: solve at least 3 problems.**  
**Second & Third Grade: solve at least 7 problems.**  
**Fourth Grade and above: solve at least 12 problems.**

	<i>Answer</i>
<p>1. Jilian is making a border for her bedroom wall using the pattern below.</p> <div style="text-align: center;"> </div> <p>Draw or describe the next figure in her pattern.</p>	
<p>2. Anya made the pattern below by adding triangle-shaped pieces to each design.</p> <p>If she continues the pattern, what should be the total number of triangle-shaped pieces in Figure 5?</p> <div style="text-align: center;"> </div>	
<p>3. Jemma is making a pattern using her new stamping set she got for her birthday. She starts with     and repeats this pattern. What would be the 10<sup>th</sup> shape?</p> <div style="text-align: center;"> </div>	
<p>4. Joey writes a list of numbers in order between 10 and 30 in such a way that when Joey divides the number by 2, he gets an answer with remainder 1. What is the highest number that could be on his list?</p>	
<p>5. A second grade class at Redwood Elementary School stood in rows to have their picture taken. The photographer told 4 students to stand in the first row, 6 students to stand in the second row, and 8 students to stand in the third row. The pattern stops at the fourth row. How many second graders were having their picture taken?</p>	

6. During the art show, the second-grade art drawings are to be hung in a line as shown in the figure on the right. Pictures that are hung next to each other share a tack. How many tacks are needed to hang 18 pictures this way?

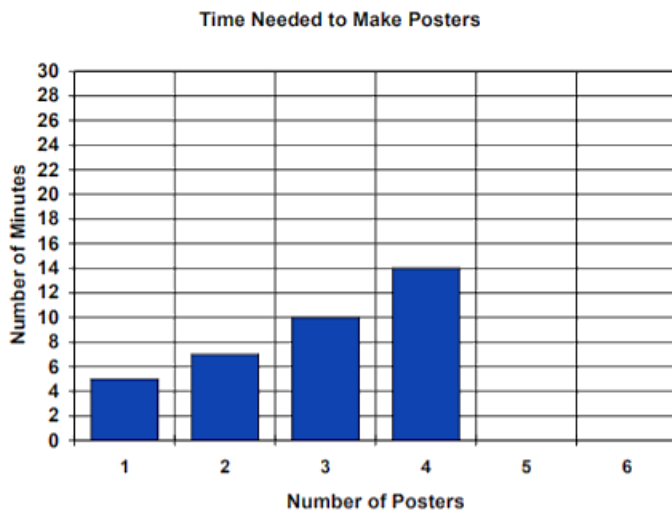


7. The math club at Redwood Elementary School stood in rows to have their picture taken. There are 35 students in the club. The photographer asked students to stand in rows so that each row increased by two people. There were three students standing in the first row. How many students were in the last row?



8. Mrs. Holmen has 20 art drawings to hang. She plans to hang them in two rows as shown on the left. The pictures share two tacks between the rows. How many tacks are needed to hang the 20 drawings?

9. The graph below shows how many minutes it takes Jamal to make different numbers of math posters. If this pattern continues, how many minutes will it take him to make 7 posters?



10. Miranda swims 1 hour each day after school and 2 hours each day on the weekend. How many hours does Miranda swim over 6 weeks?

11. Hank is planting pepper plants. In the first row, he plants 1 pepper. In the second row, he plants 2. In the third row, he plants 4. In the fourth row he plants 8, and he continues with this pattern. How many total pepper plants will have been planted by Hank when he completes planting the sixth row?

12. Nicholas practices lacrosse for 75 minutes a day during the week and 90 minutes a day on weekends. How many **hours** does he practice each week?

13. Look at each pattern of shapes and see if you can predict the following:



What will shape number 26 be?

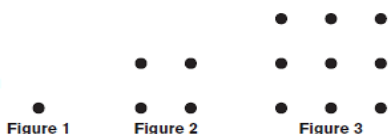


What will shape number 33 be?

a.

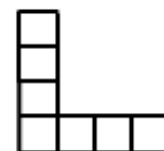
b.

14. Ross draws a pattern with dots as shown below. If this pattern continues, how many dots does he draw in Figure 13?



15. The following L shape has height 4 units and width 4 units. What would be the perimeter of the same shape with height 25 units and width 25 units?

Hint: *Make a table to notice the pattern.*

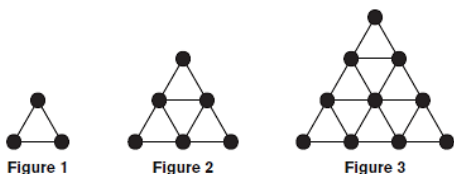


16. The following pattern of six squares is made from connecting 19 lines. How many lines would you need to make a pattern of 100 squares long?

Hint: *start with small numbers to notice the pattern.*



17. A sequence of figures is created by connecting lines from dots as shown below. If each segment from a dot to its nearest neighbors has length 1 unit, then how many triangles of perimeter 3 units will there be in Figure 10?



18. Look at the pattern below. If this pattern continues, in which column will 100 appear?

A	B	C	D	E	F	G
1		2		3		4
	7		6		5	
8		9		10		11
	14		13		12	
15		...		...		...