First Name: _____ **Last Name:** _____ **Grade:** _____

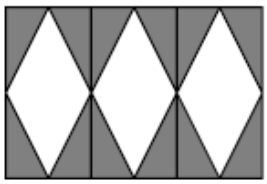
Teacher: _____ **Parent's email:** _____

Patterns

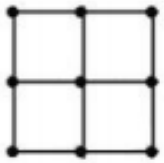
Kinder & First Grade: solve <u>at least</u> 3 problems.
Second & Third Grade: solve <u>at least</u> 7 problems.
Fourth Grade and above: solve <u>at least</u> 12 problems.

		Answer
1.	Meredith counts by two starting at 10. What is the 4th number she will say? Pattern: 10, 12, 14, **16**	*16*
2.	Norma counts backward by two starting with 20. What is the 4th number she will say? Pattern: 20, 18, 16, **14**	*14*
3.	Gary rakes leaves. The first day, he fills 5 bags. The second day, he fills 8 bags. The third day, he fills 11 bags of leaves. If this pattern continues, how many bags will he fill on the fifth day? Pattern: 5, 8, 11, 14, **17**	*17*
4.	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. If he plants a total of 5 rows, how many pepper plants are there in all? Pattern: 1, 2, 4, 8, 16. Total: 1+2+4+8+16 = 31.	*31*
5.	What is the total of: *one plus two plus three plus four plus five plus six plus* *one plus two plus three plus four plus five plus six plus* *one plus two plus three plus four plus five plus six plus* *one plus two plus three plus four plus five plus six plus* *one plus two plus three plus four plus five?* Hint: find a clever way to get to the correct answer. If each row has a total of 1+2+3+4+5+6 or 21 then we can calculate 21+21+21+21+ (1+2+3+4+5) = 84+15 = 99 Or we can also calculate this way: 21×4 + 15 = 99 Or (1+2+3+4+5) × 5 + (4×6) = 15×5 + 24 = 75 + 24 = 99	*99*
6.	A train can hold 78 passengers. The train starts out empty and picks up 1 passenger at the 1st stop, 2 new passengers at the 2nd stop, 3 new passengers at the 3rd stop and so forth. If no one gets off, after how many stops will the train be full? The train will be full at the 12th stop, with 78 passengers. Make an organized chart:	*12 [stops]*

1st stop	2nd stop	3rd stop	4th stop	5th stop	6th stop	7th stop	8th stop	9th stop	10th	11th	12th
1	1+2 = 3	3+3 = 6	6+4 = 10	10+5 = 15	15+6 = 21	21+7 = 28	28+8 = 36	36+9 = 45	45+10 = 55	55+11 =66	66+12 =78

7.	Andy is creating a design using colored shapes. He is starting with a triangle and ending with another triangle. In between the triangles, he has a circle to the left of a square. He continues with this pattern until he uses up 25 shapes. What is the 25th shape? Pattern: triangle, circle, square, triangle, triangle, circle, square, triangle, and so on. It loops every 4 shapes. 25÷4 = 6r1. The 24th shape must be a triangle (ending a loop), and the 25th shape is also a triangle (starting a new loop).	*triangle*
8.	Chelsea makes a display. He puts 1 photo in the first row, 4 photos in the second row, 7 in the third row, and 10 in the fourth row. If the pattern continues and he completes 10 rows of photos, how many total photos does Chelsea put in the display? 1, 4, 7, 10, 13, 16, 19, 22, 25, 28. Total photos: 1+4+7+10+13+16+19+22+25+28 = 145	*145 [photos]*
9.	Elizabeth collects seashells each day during her vacation at Whidbey Island. On the first day, she collects 3 seashells and each day the number of seashells she collects is double the number of seashells she collected the day before. On what day will Elizabeth collect exactly 96 seashells? Establish pattern (backward): 96, 48, 24, 12, 6, 3. Elizabeth will collect 96 seashells on the 6th day.	*6th day or day 6*
10.	The candy store has 4 separate large boxes, and inside each large box there are three separate small boxes, and inside each of these small boxes there are 2 separate smaller boxes filled with an assortmets of candies. How many boxes, counting all sizes, are there all together? You can draw it out for easier counting or 4 + (3×4) + 2(3×4) = 4 + 12 + 24 = 40 	*40 [boxes]*
11.	Tom uses 12 right triangles to make the following design: How many white rhombi will there be in all if he uses 64 small right triangles? Every white rhombus requires 4 small grey triangles. If he uses 64 small right triangles, there will be 64÷4 = 16 white rhombi. 	*16 [rhombi]*
12.	There are 8 marks evenly spaced from each other along a meter stick. The first mark is at 27 cm. The eight mark is at 62 cm. Where in centimeters, is the fifth mark?  1st 8th There are 7 spaces between the first mark and the eight mark and the length of it is 62 – 27 = 35 cm. Each space must be 35 ÷ 7 = 5 cm. Thus, the fifth mark is on 27 + 5×4 = 47 cm. or do skip counting 27, 32, 37, 42, **47**	*47 [cm]*
13.	Take a look at the growing pattern below. The first figure has 1 dime. In figure 2, some dimes have been added to make a triangle shape with two dimes on each side. The pattern continues and the figures keep getting larger in the same way, so the sides are growing by one more dime each time while the center is empty. How many dimes will be in Figure 100?  Figure 1 Figure 2 Figure 3 Figure 4 Figure 100 will have one side with 100 dimes. 100×3 = 300 dimes, but three dimes in the vertices belong to two sides at the same time, so the answer is 300 – 3 = **297 dimes**	*297 [dimes]*

14. Leisha is using popsicle sticks to build some grids for her city planning project. She needs 4 popsicle sticks to make a 1 by 1 grid, and 12 sticks to make a 2 by 2 grids as shown below. How many sticks does she need to make a 10 by 10 grids?



Analyze the 2 by 2 grid. To create it Leisha used 3 rows of 2 sticks each and 3 columns of 2 sticks each.
Similar to it, there would be 11 rows and there should be 10 sticks in each row.
So, there are 10 x 11 = 110 sticks (placed horizontally).
There would also be 11 columns and there should be 10 sticks in each.
Therefore, there are 10 x 11 = 110 sticks placed vertically.
Total = 110+110 = 220 popsicle sticks.

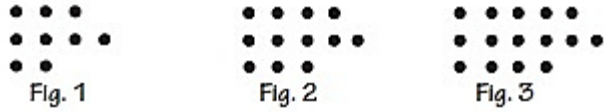
220 [sticks]

15. A wall clock strikes every hour. The number of strikes corresponds to the time. For example, at 9 am and 9 pm you will hear 9 strikes. In addition, the clock strikes once at the half-hour mark. How many strikes can be heard in one 24-hour period?

Each hour during the am period: 1+2+3+4+…+9+10+11+12 = 78
Each half hour during the am period: 12
Total strikes: (78 + 12) ×2 = 180

180 [strikes]

16. If the pattern continues, how many dots will be in the 100th figure of the sequence?



Analyze the given pattern. The first figure has 9 dots, in the next figure every line gets one more dot (or +3 in total). To get from figure 1 to figure 100 you will need to do 99 steps, each one is +3. So, the final number of dots is 9 + 99×3 = **306**
One way is to make a chart to notice the pattern:

Figure	1	2	3	4	…	100
Top row	3	4	5	6	…	100+2=102
Middle row	4	5	6	7	…	100+3=103
Bottom row	2	3	4	5		100+1=101
Total	9	12	15	18	…	306

306 [dots]

17. How many numbers between 1 and 99 are the product of any two even numbers?

If the number is the product of any two even numbers it means it has two factors, each one is even or divisible by 2. Then product must be divisible by 4. 100÷4 = 25, but we have the number up to 99, so there are 24 such numbers.
Pattern: 4, 8, 12, 16, 20
24, 28, 32, 36, 40
44, 48, 52, 56, 60
64, 68, 72, 76, 80
84, 88, 92, 96
Total numbers = 24

24 [numbers]

18. Desiree starts with 2 and count by 3s until she reaches 449. The pattern of numbers she says would be: 2, 5, 8, 11, …, 449. Her first number is 2, second number is 5, third number is 8, and so on. If 449 is the nth number, find the value of n.

To get to the nth number Desiree must do (n-1) skips counting by 3. And she started from 2. So, the number of skips is (449 - 2) ÷ 3 = 149. Thus, 449 is **150th number** in her list.
The other way is to make a chart to notice the pattern:

Order	1st	2nd	3rd	4th	…	nth
	2	5	8	11	…	449
Multiple of 3	3	6	9	12	…	450

150

Solution is available on March 19, 2021 at www.mathinaction.org