

Math Challenge #9



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


Patterns

Welcome to the Math Challenge #9. In this challenge, once again we look at problems involving Patterns. The ability to identify patterns and sequences is an important aspect of critical thinking and problem solving.


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.

Answer

1. Draw the shape that comes next in this sequence.



2. Complete this sock pattern.



3. Below are two sequences of letters. What letter will come next in each sequence?

a. X Y X Y Y X Y Y Y _

b. A A B C A A B C A _

a.

b.







4. Which shape comes next in the sequence?







i.  a.  b.  c.  *i.*







ii.  a.  b.  c.  *ii.*

iii.  a.  b.  c.  *iii.*

5. Complete the following patterns:

a.       *a.*

b.       *b.*

c.       *c.*

6. Tala cleans her hamster's house every 7 days. If she cleaned it on January 14, what are the dates in February when she will clean her hamster's house?

7. Fill in each blank with the correct number to continue each pattern.

a.

10	15	_____	25	30	_____	40	45
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b.

24	_____	20	18	16	_____	12	10
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c.

3	6	_____	15	21	28	_____	45
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a.
b.
c.

8. Fill in each blank to complete each pattern.

a.

	22		44	55				
--	----	--	----	----	--	--	--	--

b.

1	10	2	9	3					
---	----	---	---	---	--	--	--	--	--

c.

		75	70	65		55		
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a.
b.
c.

9. Mark bought 5 toy cars for \$4.50, 10 cars for \$9.00 and 15 cars for \$13.50. If the pattern continues, what would be the total cost for 21 toy cars?

10. Mia runs 3 miles every other day for the month of January. If Mia ran on January 1st, how many total miles would she have run in January?

11. A swimmer is gradually increasing the distance he swims each week. The chart below shows the distances he swims for the first 5 weeks of his program. If he continues the same pattern of increase, how far will he swim during the tenth week?

Swimming Distances (miles)				
Week 1	Week 2	Week 3	Week 4	Week 5
1.3	1.4	1.6	1.9	2.3

12. A sequence is called linear when the change from one number to the next is always the same. For example, 10, 16, 22, 28, 34, ... is linear because the increase from one number to the next is always 6. The following are linear sequences.

a. What is the 2nd term in the following linear sequence?

	?			76				108
1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th

b. What is the 11th term in the following linear sequence?

		51			84					?
1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th	10 th	11 th

c. What is the 6th term in the following linear sequence?

		62			?				167	
1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th	10 th	11 th

a.
b.
c.

13. If you know that $2^1 = 2$, $2^2 = 4$, $2^3 = 8$, $2^4 = 16$, $2^5 = 32$, what is the ones digit of 2^{25} ?

14. A **geometric sequence** is a **sequence** of numbers that follows a pattern where the next term is found by multiplying by a constant called the common ratio. Fill in each blank with the correct number to continue each geometric sequence.

a.

324	108	_____	_____	4	_____	$\frac{4}{9}$
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b.

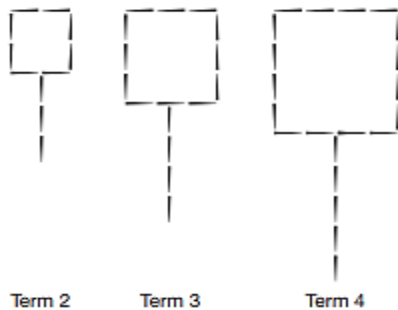
$\frac{3}{25}$	_____	3	15	_____	375	_____
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c.

_____	$\frac{3}{2}$	_____	6	_____	24	48
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a.
b.
c.

15. The terms of a pattern are made using toothpicks. Term 1 and Term 5 are not shown. Find the total number of toothpicks used in Term 1 to Term 5 of this pattern.

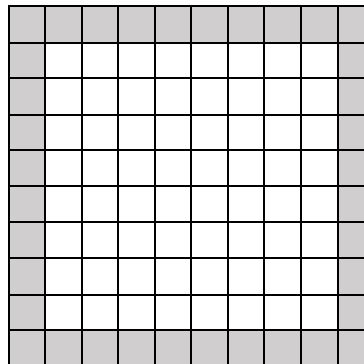


Term 2 Term 3 Term 4

16. If the 13th term in a linear sequence is 92 and the 28th term in the sequence is 152, what is the 6th term in the sequence?

17. Squares along the border of a 10 by 10 grid are shaded as shown in the picture.

- How many unit squares are shaded?
- If in a similar manner, squares are shaded along the border of a 50 by 50 grid, how many unit squares are shaded?



a.
b.

18. The Redmond International School auditorium has exactly 26 rows of seats. The rows are labeled, in order, from the front of the auditorium to the back from A through Z. There are 10 seats in row A. Each row after the first row has two more seats than the previous row. There are 12 seats in row B, 14 seats in row C and so on. What is the total number of seats in the school auditorium?