Math Challenge #7

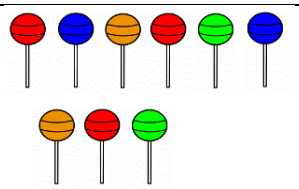
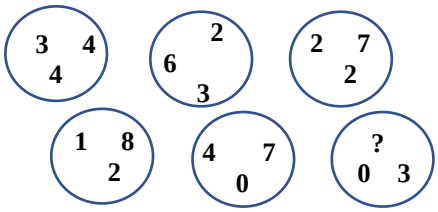
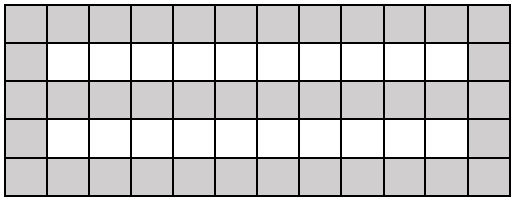
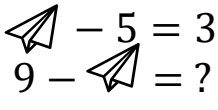
First Name: _____ **Last Name:** _____ **Grade:** _____

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

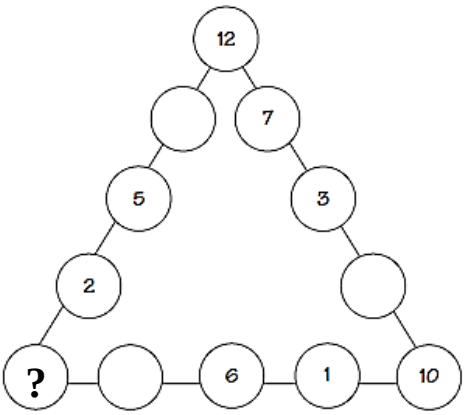
Numbers and Digits

Welcome to the Math Challenge #7. In this challenge, once again we look at problems involving numbers and digits. A **number** is a count or measurement that is really an idea in our minds. We write or talk about numbers using numerals such as "3" or three. A digit is a symbol in a numerical system. While a number can represent a number word or combination of digits, a digit is a symbol in a numeral representation of a number.

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.	What number is represented in the picture? 	*9*
2.	Tim wrote the numbers from 1 to 15 in order without spaces: 12345678910…. Which digit was the 13th that Tim wrote?	*1*
3.	The three numbers in each circle have a relationship that is the same in all six circles. Find the missing number where the question mark is.  The sum of the digits in each circle is 11. Thus, the missing number is 8. 0 + 8 + 3 = 11	*8*
4.	What number can represent the shaded squares in the picture? 	*40*
5.	Lana's secret number is between 9 and 15 and exactly in the middle of the two numbers mentioned here. Find Lana's secret number.	*12*
6.	Find the missing number that can replace the question mark. 	*1*

7. Place the numerals 1 – 12 in the twelve circles below so that the sum of each side of the triangle is 36. The numbers can only be used once. There are few numbers already placed to give you a head start. What would be the number replacing the question mark?



8

The final 3 missing number will be 8, 9, 11. The only possible solution for that can replace the question mark is 8 so it can make both sides add together equal to 36.

8. In the addition problem at the right, the letters AB represent a two-digit numeral. If you know that the letter B is not a zero (0), which digit represent A and B?

The only digits after addition of 3 identical digits to get the same units digit is 5: 5+5+5 = 15, B=5. It gives a carryover of 1. Thus, A is 6.

$$\begin{array}{r} AB \\ AB \\ +AB \\ \hline 19B \end{array}$$

A = 6

B = 5

9. How many **different** numbers are there in the picture?

×	1	2	3	4	5	6
1	1	2	3	4	5	6
2	2	4	6	8	10	12
3	3	6	9	12	15	18
4	4	8	12	16	20	24
5	5	10	15	20	25	30
6	6	12	18	24	30	36

18

The numbers are: 1, 2, 3, 4, 5, 6, 8, 9, 10 12, 15, 16, 18, 20, 24, 25, 30 and 36. Some numerals are repeated (there are three 1's, there are four 12's).

10. Find the missing digits in the following problem.

$$\begin{array}{r} 8\square\square \\ +\square 65 \\ \hline \square,295 \end{array} \qquad \begin{array}{r} 956 \\ +\square 7\square \\ \hline 1,6\square 5 \end{array}$$

$$\begin{array}{r} 8\boxed{3}\boxed{0} \\ +\boxed{4}65 \\ \hline \boxed{1},295 \end{array} \qquad \begin{array}{r} 956 \\ +\boxed{6}7\boxed{9} \\ \hline 1,6\boxed{3}5 \end{array}$$

11. Ursula uses the digits 1, 2, 3, 4, 5, and 6 to make two three-digit numerals. Each digit is used once. The numbers are then subtracted. What is the greatest possible difference? To get the greatest possible difference one needs to subtract the smallest number from the greatest number. Use the three greatest digits in the minuend and arrange them from greatest to least. Arrange the other three digits from least to greatest in the subtrahend. Then you will find 531 is the greatest possible difference. 654 – 123 = 531

531

12. In Clownland, they had a math operation called a "ClownIt" that look like this:

5  3 → 23

The clown between the 5 and the 3 meant that you had to add 5 + 3, then multiply 5 x 3, and then add the results together.

What does this ClownIt puzzle equal to? 4  2 + 3  6 = ?

41

[(4 + 2) + (4 x 2)] + [(3 + 6) 1 (3 x 6)] = (6 + 8) + (9 + 18) = 14 + 27 = 41

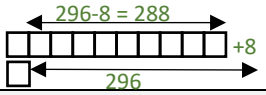
13. Find the missing digits in the following problem.

The only possible way to get the units digit 6 is to multiply 9 by 4. To find the next missing digit we may think, what number after multiplying by 4 will give 116? It's 29. Now we know what two number are being multiplied, therefore, we then can find their product.

$$\begin{array}{r} \square\,9 \\ \times\ 5\,\square \\ \hline 1\ 1\ 6 \\ +\ \square\,,\ \square\,5\,\square \\ \hline 1\,,\ 5\ 6\ 6 \end{array} \qquad \begin{array}{r} \boxed{2}\,9 \\ \times\ 5\,\boxed{4} \\ \hline 1\ 1\ 6 \\ +\ \boxed{1}\,,\ \boxed{4}\,5\,\boxed{0} \\ \hline 1\,,\ 5\ 6\ 6 \end{array}$$

14. The three-digit number NM8 is 296 more than the two-digit number NM. What is the value of the two-digit number NM? *32*

One way to see: NM8 – NM = 296 and N38 – N2 = 296
In the first case, M must be 2, and in the second case N must be 3
Another way to see: 296 +NM = NM8 and 296 + N2 = N28
In the first case, M must be 2, and in the second case N must be 3
Another way is to draw it out. Look at NM and NM0, it means NM0 is ten times greater than NM.



NM=288÷9 = 32

15. Use the clues below to find the value of **P.QR** *8.42*

- My hundredths digit is one half my tenths digit.
- My ones digit is twice my tenths digit.

P.QR

There is no digit 1 in any of the three letters.

You can't use digit greater than 4 for the tenths place, otherwise ones digit will get two-digit number, which is impossible. Tenth place digit must be even, because on the hundredth place we have half of it. Because 1 is not allowed in any of the places, the only choice for the tenths digit is 4. The number is 8.42

16. If the number 4 is placed at the right end of a two-digit number XY, the value of the three-digit number thus formed is 247 more than XY. What is the original two-digit number XY? *27*

The information given can also be expressed: the difference between XY4 and XY is 247.
Therefore, the solution for X is 2 and Y is 7.
Another way to see: if you add XY with 247, you will get XY4.

$$\begin{array}{r} XY \\ +247 \\ \hline XY4 \end{array}$$

17. The pages of a book are consecutively numbered from 1 through 384. How many times does the digit '8' appear in this numbering? *Hint:* make an organized list. *73*

One way: We can look at the ones and tens digits separately:
The ones digit of 8 from 1 through 384: since it occurs one time in every set of 10 consecutive numbers, there are 38 complete sets of 10 consecutive numbers. So, the digit '8' appears 38 times as a ones digit.
The tens digits of 8 from 1 through 384: since it occurs 10 times in every set of 100 consecutive numbers, there are 3 complete sets of 100 (1-100, 101-199, 200-299). The digit 8 appears 30 times as a tens digit. In addition, the numbers 380-384 contain 5 more tens digit of 8. In all, the digit '8 appears a total of 38 + 30 + 5 = 73 times.
Or if you are looking at the first hundred numbers there will be 20 digits 8 in them: 8, 18, 28, 38, 48, 58, 68, 78, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 98
Since we have 384 pages it means 20*3 + 13 = 73 times digit 8 will be happening in the page numeration 1-384

18. What digit is in the 45th decimal place in the decimal equivalent of 9/14? *2*

When you divide 9 by 14, you will get $0.\overline{6428571}$. There is 6 in the tenths place and then the six-digit pattern 428571 begins. The 45th digit in the decimal equivalent of will be the 44th digit in the repeating pattern. Since 6*7=42, there will be seven full sets of the pattern and the 44th digit will be the second digit of 428571 or digit '2'.

Solution is available on January 18, 2019 at www.mathinaction.org