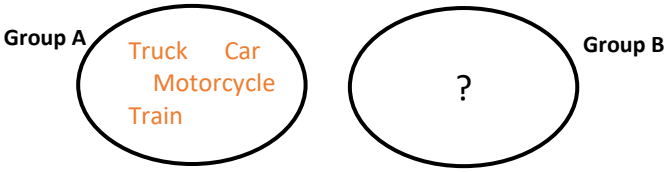
First Name: _____	**Last Name:** _____	**Grade:** _____
Teacher: _____	**Parent's email:** _____	

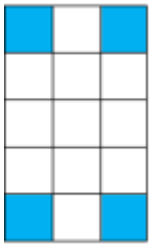
Guess and Check

Welcome to Math Challenge #2. This set of Math Challenge problems can all be solved using Guess and Check strategy or/and Logical Reasoning.

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 <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.	Tim had 8 coins. He lost some. Here are the coins that he has left:  How many coins did he lose? Since she has only 5 coins left, she lost 8 – 5 = 3 coins.	*3 [coins]*
2.	Roman has the following toys: a truck, a tugboat, a car, a submarine, a motorcycle, and a train. He sorts these items into two groups. He placed the truck, car, motorcycle and train in group A, and the rest in group B. Which toys are in group B?  Roman must have sorted the toys based on land or sea transportations. The toys that belong to the sea are the tugboat and the submarine.	*a tugboat and a submarine*
3.	Liana had 4 quarters, 3 dimes, and 3 pennies. She bought a candy bar using 8 coins. How many coins does she have left? Liana had a total of 10 coins. Since she used 8 coins, she is left with 10 – 8 = 2 coins.	*2 [coins]*
4.	Molly wrote three unique positive odd numbers on 3 cards. The sum of the numbers is 11. What did Molly write on the cards? Odd numbers are 1, 3, 5, 7, 9 and so on. 1 + 3 + 7 = 11 1, 3, and 7 are all different odd numbers.	*1, 3, and 7*
5.	Below is a number pattern. Find the missing number in the row below.  Notice that from 12 to 8, the difference is 4. From 8 to 4, the difference is 4 again. So, each number differs by 4. So, the missing number is 20 – 4 = 16.	*16*

6.	 Notice that there is a pattern where Kevin eats 1 dumpling, his dad eats 3 dumplings. When Kevin eats 2 dumplings, dad eats 3+3 or 6 dumplings. When Kevin eats 3 dumplings, dad eats 3+3+3 or 9 dumplings. When Kevin eats 4 dumplings, dad eats 3+3+3+3 or 12 dumplings.	*12 [dumplings]*
7.	2×3×7 = 42 or 1×6×7 =42 The largest number is 7.	*7*
8.	Two-digit numbers that can be divided evenly by 3: 12, 15, 18, 21, 24, 27, **30**, 33, … The number that can be divided evenly by 10: 10, 20, **30**, 40, … Since it has to be less than 40, the number must be 30.	*30*
9.	There are 15 squares, and 3/5 is equivalent to 9/15. Since 4 squares are colored already, she needs to color 9 – 4 = 5 squares. Or 3/5 of 15 squares is 9. So, Lily needs to color 9 – 4 = 5 more squares. 	*5 [squares]*
10.	Quarters Fifty cent coins  $6.00 $6 ÷ 3 = $2.00 per unit $2 in 50¢ coins = 4 fifty-cent coins $4 in quarters = 16 quarters	*four 50-cent coins and sixteen quarters*
11.	Do guess and check. There will be 6 two-door cars and 11 four-door cars. Check 6×3 + 11×5 = $18 + $55 = $73 Another way: Let's pretend that Mark washed 17 cars, all two-door. Then he would have gotten 17×3=$51, which is $73-$51 = $22 less then in actual story. The difference in price between the two-door car and four-door car is $5-$3 = $2. So, if he trades 1 two-door car for 1 four-door car he would raise $2 more dollars. $22÷$2 = 11 four-door cars, which means the rest 17-11 = 6 two door cars	*6 two-door cars and 11 four-door cars*
12.	10 8 7 6 4 Possible answers: 10/(6 + 4) + (8 - 7) = 2; 10 + 6 - (8/4 x 7) = 2; (10 - 7) x (8 - 6) - 4 = 2; (8 + 4 - 10) *x* (7 – 6) = 2; (8 + 4 - 10)÷(7 – 6) = 2	*Possible answers: 10/(6 + 4) + (8 - 7) = 2; 10 + 6 - (8/4 x 7) = 2; (10 - 7) x (8 - 6) - 4 = 2; (8 + 4 – 10)x(7 – 6) = 2; (8 + 4 - 10)÷(7 – 6) = 2. ((10+4)/7)*(8-6)=2*
13.	There are 5 gaps of two years between the oldest and the youngest. This means they are 10 years apart. You can then do some guess and check. Or you can think this way: when the oldest is 3 times as old as the youngest, this gap of 10 years will be equal to twice the age of the youngest, so the youngest will be 5 and the oldest will be 15. Or draw it out: 1st ☐ 2nd ☐ +2 3rd ☐ +4 4th ☐ +6 5th ☐ +8 6th ☐ +10 The oldest child is 3 times the youngest child's age Youngest ☐ Oldest ☐☐☐ (+10) This means that 1 unit is 5 years old	*5 [years old]*

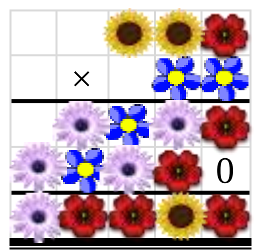
14. At least 64, at most 89 means we can have boxes of 64, 65, 66, …, 89 avocados. There are 89-63 = 26 possible boxes with different number of avocados that could be in the boxes. If we want to know the smallest number of boxes that is possible in the largest stack, we need to assume the number of avocados in the boxes allows them to be sorted in a way that they are as evenly spread out as possible. So, we can divide 185 by 26 = 7 r3. This means there are 23 stacks with 7 boxes and 3 stacks with 8 boxes. The smallest number of boxes possible in the largest stack would be 8.

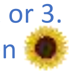
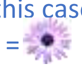
8 or x = 8

15. If we call the number of 3-point goals made G, then there were $(3 \cdot G)$ 2-point goals made, and the total score would be: $3points \cdot G + 2points \cdot 3 \cdot G = 9 \cdot G = 90\ points$.
So G = 10, and the total number of field goals made is $4 \cdot G$ = 40 (Ten 3-pointers and thirty 2-pointers).
Another way: use Ratio
2-points : 3-points : total = 3 : 1 : 4 → total 4 goals with 3x2 + 1x3 = 9 points total
90 ÷ 9 = 10 units. 4 x 10 = 40 total field goals

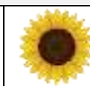
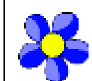
40 [field goals]

16. Notice that  must be 5, because it is the only number that multiplies with another number that makes a product that also end in a 5.



The  could either be 3 (3×5=15) or 7 (75=35).
The next thing to notice is that  +  = 5, so  and  must be 2 or 3. In this case, the  must be 3.
Since  is 3, then  ×3 = 
If  were 2, this would give 6, adding the regrouped 1 to make  = 7. But, in the hundreds column,  ×  = 2×3 = 6. This does not work.
Then,  must be 7 and  must be 2. Let's check:

		7	7	5
	×		3	3
	2	3	2	5
2	3	2	5	0
2	5	5	7	5

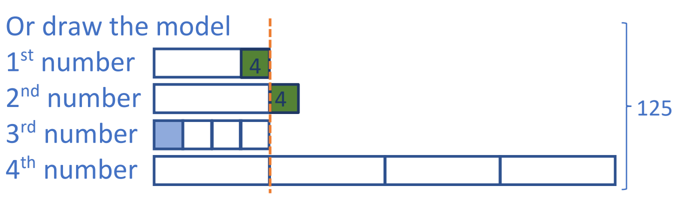
 = 7
 = 3
 = 5
 = 2

17. Caitlin circles 1011 numbers, Nicole circled 404 numbers. The only numbers which are circled by two colors are the multiples of 10; thus, there are 202 numbers circled both with red and yellow colors. There are 1011 – 202 = 809 numbers circled only with red, and 404 – 202 = 202 numbers circled only with yellow. In total there are 809 + 202 = 1011 numbers circled with only one color.

1011

18. Let's say the four numbers are a, b, c, and d. a + b + c + d = 125.
We also know: a + 4 = b – 4 = 4c = d/4. If we express b, c and d, in terms of a, we can substitute these expressions into the first equation and solve for a.
We would get b = a + 8, c = (a+4)/4, and d = 4a + 16.
Therefore, a + b + c + d = a + (a + 8) + (a + 4)/4 + (4a + 16) = 125.
We simplify and get: 6.25a + 25 = 125 → 6.25a = 100 → a = 16.
The value of b = 16 + 8 = 24, c = (16+4)/4 = 5, and d = 4×16 + 16 =80. The smallest of the original numbers is 5.

Or draw the model



As you see on the picture when you add the first and the second number at the end the 4 compensates. So, we have 6 and a quarter of identical units that stand for 125.
125÷6.25 = 20 per 1 unit. The smallest number is the third number ¼ of 20 = 5

5