

Math Challenge #15

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

Algebraic and Logical Reasonings


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>
1. + = 8 = ?	4
2. $\underline{\quad} - 2 = 7$ $? = 2 + 7$ $? = 9$	9
3. + = 6 + = 12 = ? One apple = 3 A banana + 3 = 12; a banana = 12 - 3 = 9	9
4. Start with finding out $55 + \underline{\quad} = 100$ and $25 + \underline{\quad} = 60$. <div style="text-align: right; margin-top: 10px;"> </div>	320
5. Clue 1: <i>Olga came in 3rd, Boris was not the first and Kyle was not the 4th.</i> Boris may be second or fourth. Clue 2: <i>Shin was not the winner, and he is faster than Boris.</i> Shin can be second, and Boris can be fourth. Then Kyle must be first. 	<i>Kyle, Shin, Olga, Boris</i>
6.	27 [people]
7. + + = 24 = ? - = 13 One pear = $24 \div 3 = 8$. One mango - 8 = 13, so one mango = $13 + 8 = 21$	21
8. Larger number } Smaller number } 100	2 units = $100 - 32 = 68$. 1 block or 1 unit = the smaller number = $68 \div 2 = 34$ The larger number = $34 + 32 = 66$. <i>Check: $34 + 66 = 100$ and $66 - 34 = 32$. Yes!</i>
9. Brother's age + sister's age = 12 All ages add up to 20. I must be $20 - 12 = 8$. Since the brother is older than the sister, the only age that could work for the brother is 7. Therefore, the sister is $20 - 8 - 7 = 5$ years old.	5 [years old]


10.

Menu


Sandwiches



Chicken




Tuna




Salami


Drinks



Cocoa



Soda



Tea

Possible combinations for sandwich and drinks:
Chicken and Cocoa, Chicken and Soda, Chicken and Tea
Tuna and Cocoa, Tuna and Soda, Tuna and Tea
Salami and Cocoa, Salami and Soda, Salami and Tea

Celia (given): salami and tea

Tasha: chicken (since Tuna has the same initial as her name) and possibly cocoa or soda as her drink.

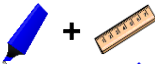
Sony: Tuna and cocoa, so Tasha must order **soda** for the drink.

We can also create a table of options and re-read the clues, marking the choices.


	Chicken	Tuna	Salami	Cocoa	Soda	Tea
Tasha	✓	✗	✗	✗	✓	✗
Celia	✗	✗	✓	✗	✗	✓
Sony	✗	✓	✗	✓	✗	✗

Chicken and soda


11.




= \$6.00



= \$10.50



= \$14.00



= ?

Looking at the third clue, we find that a compass = \$7.00

Highlighter = \$10.50 - \$7.00 = \$3.50

Ruler = \$6.00 - 3.50 = \$2.50

Ruler + compass = \$2.50 + \$7.00 = \$9.50




\$9.50

12. **One way** is to make guesses and checks. We can start with splitting the number of tables equally: 16 tables for four and 16 tables for six.
 $(16 \times 4) + (16 \times 6) = 64 + 96 = 160$ (too many)
 We can try higher number of tables for four for our next guesses.
 You can then find that 20 tables for 4 and 12 tables for 6 will seat 152 customers.

Another way is to assume that all 32 tables are table for four. Then there will be $32 \times 4 = 128$ customers, which is $152 - 128 = 24$ customers short. If we start trading a table for 4 for a table for 6, we will add 2 more customers. Thus, $24 \div 2 = 12$ tables for 6. Let's check $20 + 12 = 32$ tables. $20 \times 4 + 12 \times 6 = 152$ customers.

12 [tables for 6]

13.

From the first balance, 4 red triangles = 6 blue right-triangles. Then we also know that 2 red triangles = 3 blue right-triangles.
 Since 1 blue triangle = 24, then 2 red triangles = $3 \times 24 = 72$

72

14. Notice that the difference in their ages does not change over time. Her father is always 30 years older than her.

Sally's age $\times 2$:

Father's age (twice Sally's age): 30

Sally's age $\times 2$ must be 30, so Sally is $30 \div 2 = 15$ years old.

15 [years old]

15.  = \$5.00
 = \$25.00  = ?
 = \$0.95

$\text{Candy} + \text{Candy} = \$5.00 - \$0.95 = \4.05
 $\$4.05 + \$4.05 + \text{Muffin} + \text{Muffin} = \25.00
 $\text{Muffin} + \text{Muffin} = \$25.00 - (\$4.05 + 4.05) = \16.90
 $\text{Muffin} = \$16.90 / 2 = \8.45





\$8.45 [muffin]

16. **One way** is to make guesses and checks. We can start with splitting the number of tickets equally:
 50 adult and 50 children.
 $(50 \times 4.50) + (50 \times 3.00) = 225 + 150 = \375 (too much) \rightarrow we need more children.
 After few guesses and checks with a greater number of children, we find 60 children and 40 adults tickets will add up to \$360.
Another way is to assume all tickets were adult tickets. $\$4.50 \times 100 = \450 (too much by \$90). Since the difference in ticket price is \$1.50, we can divide \$90 by \$1.50 = 60 (which is the number of children tickets).
Let's check: $(40 \times 4.50) + (60 \times 3.00) = 180 + 180 = \360 . Yes!

60 [children]

17. Notice that 320 is an even number.
 The first time when every student who said a number that was a multiple of two sat down, there were $320 \div 2 = 160$ students left. This process was repeated 3 more times:
 $160 \div 2 = 80$,
 $80 \div 2 = 40$,
 $40 \div 2 = 20$
 $20 \div 2 = 10$
Another way to solve: the process of multiples of 2 sitting down was done 5 times.
 $320 \div 2^5 = 320 \div 32 = 10$ students left standing

10 [students]

18.    

One circle = $7/2 = 3.5$
 One diamond = $3.5 \times 3 = 10.5$
 $\text{Two triangles} = 30 - 2 \times 10.5 = 9$
 $\text{One triangle} = \frac{9}{3} = 3$ or $6 \frac{3}{4}$ or 6.75

$6 \frac{3}{4}$ or 6.75

Solution is available on May 20, 2022, at www.mathinaction.org