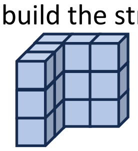
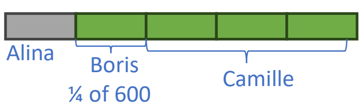
Math Challenge #8

First Name: ____________________	**Last Name:** ____________________ **Grade:** ________
Teacher: ____________________	**Parent's email:** ________________________________

Toys

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.	Olivia has 6 stuffed animals, and she wants to add 3 more to her collection. How many stuffed animals will Olivia have in total? 6 + 3 = **9**	*9 [stuffed animals]*
2.	Sarah has saved $12 to buy new toys. She finds a toy car for $6 and a puzzle for $5. How much money does she have left after buying both toys? Toy car and puzzle cost $6 + $5 = $11. Money leftover after buying the toy car and the puzzle: $12 - $11 = $1.	*[$]1 or one dollar*
3.	Tim is playing with cubes. He has 5 cubes already. How many more cubes does he need to build the structure shown in figure 1?  Figure 1 has 3+3+3+3+3 = 15 cubes. Since Tim has 5 cubes already, he needs 15 – 5 = **10 more cubes.** Figure 1	*10 [cubes]*
4.	Half of Evan's collection of stuffed animals are bears. If he has 7 bears, how many stuffed animals does he have? 7+7 = **14**	*14 [stuffed animals]*
5.	Since the free one is the cheapest toy, we can add up the prices of all toys except for the cheapest one: $35+$37+$42= **$114**	*$114 or $114.00*
6.	To maximize the number of different toy cars John can buy, he should start by selecting the cheapest ones. First, he can buy the $5 toy car. Then, he can add the $6 toy car, totaling $11. Next, he can buy the $7 toy car, making it a total of $18, but he would have only $2 left which is not enough to pay for any toy car. So, with $20, John can get **3 different toy cars.** Or the cost of all the cars in collection is $4 + $5 + $6 + $7 + $9 + $12 = $43. John has $20, so he doesn't have enough money to buy the whole collection, as he is $43 - $20 = $23 short. Three cars can fit precisely $23 ($4+$7+$12= $23 or $5 + $6 + $12 = $23). So, he can afford to buy three cars ($5, $6, $9, or $4, $7, $9), and there will be no change left. Thus, **John can buy at most 3 cars.**	*3 [toy cars]*
7.	The total number of toys is 12+6 = 18. If they want to have an equal number of toys, they need to split 18 toys equally: 18 ÷ 2 = 9. Sal should give 12 – 9 = **3** to Sarah so that each will have 9 action figures.	*3 [toys] or 3 [action figures]*

8.	1 toy robot: 20 + 5 = 25 minutes 6 toy robots: 25 + 25 + 25 + 25 + 25 + 25 or 6 × 25 = 150 minutes. 150 minutes = **2 hours and 30 minutes**	*2 hours and 30 minutes*
9.	The display has 3 shelves and can hold 12 toy soldiers in each shelf: 3 × 12 = 36 toy soldiers. 36 – 28 = **8 more toy soldiers.**	*8 [toy soldiers]*
10.	To calculate the profit for toy cars, we subtract the cost from the selling price: Profit per car = Selling price - Cost price = $8 - $5 = $3. Similarly, for toy trains: Profit per train = Selling price - Cost price = $10 - $7 = $3. Now, we calculate the total profit: Total profit = (Profit per car * Number of cars) + (Profit per train * Number of trains) Total profit = ($3 * 50) + ($3 * 30) = $150 + $90 = **$240.**	*[$]240 [profit]*
11.	Each machine will produce 120 ÷ 3 = 40 toy airplanes. If each machine takes 2 hours to produce 1 toy airplane, it will take 40×2 hours or **80 hours** to produce 40 toy airplanes or 120 airplanes for all three machines.	*80 [hours]*
12.	(60–3)+(26×2)+26+(14×2)+14+14+(14×2)+38 = 57+52+26+28+28+28+38 = **257 toys**.	*257 [toys]*
13.	There are 3 thirds in one whole. So, to complete the rest of the puzzle, they need 45 min × 2 = **90 minutes.**	*90 minutes*
14.	 Alina = 1/5 of 750 = 150 Boris = ¼ of (750 – 150) = ¼ of 600 = 150 Camille = 750 – 300 = 450 Another way to calculate: From the drawing, Boris completed the same number of pieces as Alina. So, Camille completed 750 – 150 – 150 = **450 pieces.** Another way to calculate: From the model, Alina completed 1/5 of the puzzle and Boris completed 1/5 of the puzzle. Thus, 3/5 of the puzzle was Camille's share. 3/5×750 = **450 pieces.**	*450 [pieces]*
15.	To minimize excess inventory, the store should aim to meet the demand exactly, when possible. To do this, you can calculate how many packs of each toy they need to order: • For action figures: 120 ÷ 25 = 4.8 packs. We round up to **5 packs of action figures** since we want to meet demand. • For building sets: 100 ÷ 15 = 6.67 packs. We round up to **7 packs of building sets** since we want to meet demand.	*5 [packs] of action figures* *7 [packs] of building sets*
16.	To ensure that 90% of the toys made are defect-free: 90% × the number of toys made = 475. So, 475 ÷ 90% = the number of toys need to be made. 475 ÷ 90/100 = 475 × 100/90 = 527.78 → we round up to **528** for a reasonable answer. • Check: 528 × 90% = 528 × 90/100 = 47520/100 = 475.20 → about 475 toys are defect-free.	*528 [toys]*
17.	In 2020, its value was $160×8 = $1,280. In 2021, its value was $1280×1.10 = $1408 In 2022, its value was $1408×1.10 = $1548.80 In 2023, its value was $1548.80×1.10 = $1703.68 In 2024, its value was $1703.68×1.10 = $1874.05	*[$]1874*

18.	3 workers assemble 1 toy in 8 hours it means 1 worker assembles $\frac{1}{3}$ toy in 8 hrs. Or 1 worker assembles $\frac{1}{24}$ toy in 1 hr. At first, 3 workers that worked for two hours, so, they assembled $3 \times \frac{1}{24} \times 2 = \frac{1}{4}$ toy. Then 1 worker left, and 2 of them working for 3 hours: $2 \times \frac{1}{24} \times 3 = \frac{1}{4}$ toy. Let's figure out what part of a toy is still left for assembling $1 - \frac{1}{4} - \frac{1}{4} = 1 - \frac{1}{2} = \frac{1}{2}$. Now 2 more workers join, so there are 4 people assembling the rest ½ of the toy. $4 \times \frac{1}{24} \times (?\ \boldsymbol{hrs.}) = \frac{1}{2} \Rightarrow \frac{1}{6} \times \mathbf{3} = \frac{1}{2}$, so, they needed 3 hours to complete assembling the toy. In total it took 2 hrs. + 3 hrs. + 3 hrs. = **8 hours** of assembling	*8 [hours]*

Solution is available on February 2, 2024

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