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

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

Working Backwards

Welcome to Math Challenge #1. We are starting the first Math Challenge with Working Backwards strategy. Many real-life problems, not just in mathematics, can be solved using this strategy. For example, if you lose a toy, you can retrace your steps. In the same manner, a police officer can figure out what happened at a traffic accident, or a criminal investigator can rebuild a crime scene and connect the evidence to the crime.
You may use the work-backwards strategy to solve the following simple math problems as well as the story problems in this Math Challenge. Start with the end result and undo each step or reverse the operation on each step. If you are new to the Math Challenge, feel free to learn about the different problem-solving strategies at http://www.mathinaction.org/problem-solving-strategies.html. Good luck!

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.	Lynn's mom gave Lynn some lunch money. After spending $3 on a sandwich and $1 on milk, she still has $2. How much was her lunch money?	*$6*
2.	After Connor gave 4 toy cars to Ben and 1 toy car to Melissa, he now has 3 toy cars. How many toy cars did he have at the beginning?	*8 [toy cars]*
3.	Gina lost half of her pencils. She now has only 4 pencils. How many pencils did she have before?	*8 [pencils]*
4.	Sam collects baseball cards. He gave 6 cards to his brother. He then got 4 new cards from his father. Sam now has 12 cards. How many baseball cards did he have before giving some to his brother?	*14 [cards]*
5.	? _____ → **add** 7 → **result** 16	*9*
6.	Sandra made some muffins yesterday. Today she made 6 more muffins than yesterday but ate 3 of them. She gave two muffins to her sister Anna. She now has 15 muffins left. How many muffins did she bake yesterday? Working backwards: 15 + 2 + 3 = 20 muffins (she had 20 muffins before she ate 3 of them and gave 2 away). Thus, (yesterday's muffins) + (yesterday's muffins + 6) = 20. The number of muffins she made yesterday is (20 – 6)/2 = 7.	*7 [muffins]*
7.	? _____ → **add** 10 → **subtract** 7 → **result** 16	*13*
8.	Caitlin had some money. After her shopping spree at Redmond Town Center, she had $5 left. She bought a new pair of shoes for $48, 2 pairs of jeans at $19 each, and 2 t-shirts at $13 each. How much did she have at the beginning? She spent $48 + (2 x $19) + (2 x $13) = $112. She then still had $5. At the beginning, she had $112 + $5 =$117.	*$117*

9. ? ______ → **double** it → **add** 2 → **result** 40

Reverse the operations: Start with 40, subtract 2, then divide by 2, or (40 – 2) ÷ 2 = 19.

19

10. ? ______ → **multiply by** 6 → **divide by** 2 → **divide by** 3 → **result** 8

Reverse the operations starting with the result: Start with 8, multiply by 3, then you get 24. Then you multiply 24 by 2 to get 48. Finally divide 48 by 6, which get you to 8, the starting number.

8

11. Paul is trying to set his alarm clock for tomorrow morning. He needs 30 minutes to get ready for school and it takes him 10 minutes to bike to school. If school starts at 8:40 a.m., and he would like to be 5 minutes early, what is the time he should set his alarm clock?

He needs a total of 40 minutes to get ready and bike to school. Since he needs to be 5 minutes early, he needs the additional 5 minutes time. Therefore, his alarm should be set at 45 minutes before 8:40 a.m., which is 7:55 a.m.

7:55 a.m.

12. Monica gave 10 cookies to both Sandy and Rony. She then gave 14 cookies to Emma and 6 cookies to Grace. She still had 91 cookies left. How many cookies did Monica have at the beginning?

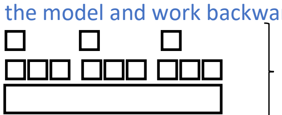
Reverse the operation: 91 + 6 + 14 + 10 + 10 = 131 cookies.

131 [cookies]

13. Three people went strawberry picking and picked 65 strawberries in total. At the first plant they each picked the same amount of strawberries. At the second plant they each collected three times the amount that they had collected at the first plant. After picking from the third plant they had five times the amount they had after picking strawberries from the first two plants. At the fourth plant they collected only five strawberries altogether. How many strawberries did each person collect at the first bush?

We'll draw the model and work backwards in this problem

1st plant
2nd plant
3rd plant

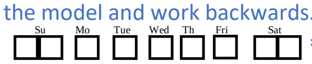


65 – 5 = 60 strawberries picked from the 1st, 2nd, 3rd plants
3rd plant is four times what was picked from the 1st and 2nd plant. Thus, there are 5 parts of strawberry in all. 60 ÷ 5 = 12 picked from the 1st and 2nd plant

65 – 5 = 60 strawberries picked from the 1st, 2nd, 3rd plant and 60 ÷ 5 = 12 picked from the 1st and 2nd plant.
12 equals to the total number of strawberries were picked off the first and second plants. To work out how many were picked from the first bush you must divide by four to get four equal parts, one part being what was picked off the first plant and three parts being what was picked off the second plant.
Therefore 12 ÷ 4 = 3. So, there were three strawberries picked off the first plant, one by each of the three people.

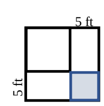
1

14. Sanika delivered a total of 126 papers last week. If she delivered twice as many papers on each day of the weekend as she does on each day of the week, how many papers does she deliver on Sunday?

Draw the model and work backwards. ☐ = number of papers during the weekday,
Then  =126. On weekday = 14 papers, on Sunday = 28 papers.

28

15. If two sides of a square field were increased by five feet, as seen in the diagram, the area of the field would increase by 245 square feet. Find the area of the original square.



The corner piece is 5 × 5 or 25 ft². 245 – 25 = 220 ft²
The rest of the new space is then 220 ft². Each small rectangle must be 110 ft², which must be 22 × 5.
The original square was 22 × 22 = 484 ft²

484 ft²