

# The 1st Annual West Windsor-Plainsboro Mathematics Expo

Saturday, October 26<sup>th</sup>, 2019

## Grade 3 Problem Set

### Directions:

Solve the following problems to the best of your ability. If you do not understand a problem or cannot solve it, skip it or ask for a hint. If you cannot solve a problem even after receiving all the hints for that problem, wait until the 30 minute mark and ask a proctor for further help or the solution. Some problems may not have hints.

Calculators are not allowed for these problems. You may, however, discuss with the people around you after 30 minutes have passed. That being said, do not ruin a problem for somebody by giving them a solution before they have a chance to attempt the problem themselves.

For this test, there will be 20 questions, and you will have a time limit of 60 minutes in total, which will be split into 30 minutes of individual work and 30 minutes of collaborative work. This test is very long and you are not expected to be able to do all of the problems. We recommend picking a range of 10-15 problems to work on.

Please note that this is not a competition, and your goal is to enjoy the problems and gain experience.

### ***HAVE FUN!***

By the way, if you finish this exceptionally early, you are most likely an exceptional student. Thus, here is a slightly harder problem that you may wish to solve:

**CHALLENGE:** Find all values of  $x$  less than 1000 that satisfy the following modular equations:

$$x \equiv 1 \pmod{2}$$

$$x \equiv 2 \pmod{3}$$

$$x \equiv 3 \pmod{5}$$

$$x \equiv 4 \pmod{7}$$

$$x \equiv 5 \pmod{11}$$

For those who do not understand the notation, this simply means that  $x$  leaves a remainder of 1 when divided by 2, a remainder of 2 when divided by 3, a remainder of 3 when divided by 5, a remainder of 4 when divided by 7, and a remainder of 5 when divided by 11.

1. What is  $2 + 2$ ?

- ○
- ○

2. 0 is this problem writer's second favorite number. What is  $0 + 0$ ?

3. What is  $2 + 0 + 2 + 2$ ?

4. Mickey Mouse has 6 marbles. Donald Duck has 8 marbles. Goofy has 53 mangoes. How many marbles do they have all together?



5. Thomas the Tank Engine has 3 years until he graduates Train School. If he has to be 18 to graduate, how old is he?

6. Andrew has 50 stars. Hurricane Jyotika destroyed 32 of them. How many stars does Andrew have left?

7. What is  $1 + 1 + 1 + 1 + 1 - 1 - 1 - 1 - 1 - 1$ ?

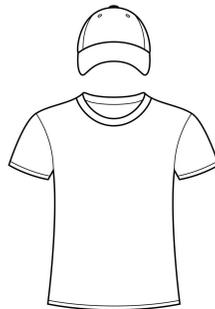
8. What is  $1 + (1 + 2) + (1 + 2 + 3) + (1 + 2 + 3 + 4)$ ?

9. Continue the pattern: 1, 4, 7, 10, ---.

10. What is the next number in this sequence of numbers, 1, 3, 6, 10, 15, 21, -- ?

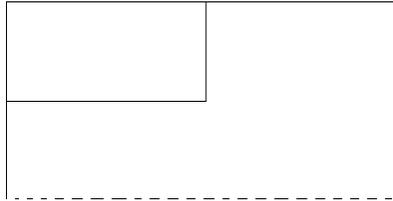
11. 2 is this problem writer's favorite number. What is  $2 \times 2$ ?

12. There are about 2000 kids in high school. If half of them wear blue shirts and 1024 of them have blue hats, what is the least number of people that both wear blue shirts and have blue hats?



13. Ayush has ten stickers. He dropped his orange juice over half of them and now those stickers cannot be used. How many stickers can be used?

14. 4 integers from a set of 5 are 5, 7, 2, 3. What is the maximum possible median of this set?



15. If the lengths of a rectangle are doubled, then how many times greater is the area of the new rectangle than the area of the original rectangle?
16. Bob goes to Costco and buys five 72-pound wheels of cheese (which Costco actually sells). How many pounds total?
17.  $a * b = 2a + 2b$ . What is  $5 * 3$ ?

18.

$$\triangle + \square = 4$$

$$\circ + \square = 6$$

$$\triangle + \circ = 8$$

Find  $\triangle + \square + \circ$ .

19. A right triangle has two legs of lengths 3 and 4. What is its area?
20. Solve for  $x$  using Algebra!

$$x \cdot x = x + x$$

Please note that  $\cdot$  is the same thing as  $\times$ .