

FALL 2014 McNABB GDCTM CONTEST
PRE-ALGEBRA

NO Calculators Allowed

1. Express 188 as the sum of two prime numbers.
2. Fiji apples cost \$4.68 for a half-dozen and 90 cents a piece. Gala apples cost \$5.39 for a half-dozen and 97 cents a piece. If Sarah buys 8 Fiji apples and 9 Gala apples with a \$20 bill, how much change should she receive?
3. Jack and Jill start walking toward each other. Initially they were 700 meters apart. Jack walks $\frac{4}{3}$ as fast as Jill. When they meet, how far is Jack from where Jill started?
4. A number of students pitch in to buy a gift for their teacher. If each pays 8 dollars, the total collected would be too great by 3 dollars. If each pays 7 dollars, the total collected would be too little by 4 dollars. How much does the gift cost?
5. If a ounces of tea leaves brews b cups of tea and c cups fill one thermos, how many ounces of tea leaves must be brewed to fill d thermos's? Answer in terms of a , b , c , and d .
6. Forty-one erasers are distributed to n students. If at least one student always receives at least 6 erasers no matter how the erasers are distributed, what is the largest possible value of n ?
7. A brigade of over a thousand men can line up in 13 rows of equal length with 4 soldiers left over and it can line up in 19 rows of equal length with 1 soldier left over. What is the smallest possible size of the brigade?
8. Suppose that m and n are positive integers satisfying

$$\frac{1}{77} = \frac{n}{7} - \frac{3}{m}$$

Find the value of $m + n$.

9. Find the smallest possible value of $ab + cd + ef$ if each letter stands for a distinct element of the set $\{1, 2, 3, 4, 5, 6\}$.
10. There are 5 yellow balls, 8 red balls, and 7 green balls in a bag. What is the minimum number of balls that must be drawn to guarantee that at least 6 of them are the same color?
11. The pages of the book *Science of Mechanics in the Middle Ages* are numbered from 1 to 711. Considering all the digits needed to print these page numbers starting from page 1, on what page number does the 241st '1' occur?
12. Write down in order from least to greatest (separate by commas) these irrational numbers:

$$1 + \sqrt{3}, \quad 2 - \sqrt{2}, \quad 2\sqrt{2}, \quad \frac{\sqrt{2}}{2}$$

13. Find the sum of the positive even factors of 10000.
14. In how many ways can 4 different rings be placed on the four fingers of the right hand?
Here the order of the rings on a given finger matters and each finger can accomodate all four rings.
15. Reading right to left, what is the first non-zero digit of $25!$?