Fall 2013 McNabb GDCTM Contest
Pre-Algebra

NO Calculators Allowed

1. How many positive factors does 24 have?

2. How many real numbers are equal to their own reciprocal?

3. The *Fibonacci* sequence is
$$1, 1, 2, 3, 5, 8, 13, 21, 34, ...$$
where each term past the second equals the sum of the two previous terms. Write down the first perfect square that appears in the Fibonacci sequence after the first two 1's.

4. Calculate $(17 + 62 + 83 + 38)^2$.

5. Hezy is a cashier and has more than 50 pennies and more than ten dimes in his cash register but only one quarter and no nickels or half-dollars. In how many different ways can he hand you 50 cents in change?

6. Find the smallest integer greater than $\sqrt[4]{4217}$.

7. Two positive integers have a product of 210 and a sum of 29. What is the result when the larger of the two integers is subtracted from the smaller of the two integers?

8. How many zeroes does $\dfrac{53!}{39!}$ end in?

9. What is the 2013th digit in the decimal expansion of 3/7?

10. A satellite passes over Dallas at 3:00pm on a Tuesday. If the satellite orbits the earth every 11 hours, what is the day of the week the very next time it passes over Dallas at 3:00pm?

11. How many six-digit integers of the form $79A4B1$, where A and B are digits, are divisible by eleven?

12. What is the largest prime p satisfying $\left(\dfrac{16}{p}\right)^2 > 2$?

13. With a, b, and c positive integers let lcm(a, b, c) stand for the least common multiple of a, b, and c. If $4\cdot\text{lcm}(ab, bc, ca) = abc$, what is least possible value of lcm(a, b, c)?

14. Which of these numbers is the largest?
$$2^{40} \qquad 3^{25} \qquad 5^{18} \qquad 7^{13}$$

15. When listing the permutations of the string of letters $ABCD$ we decide to put them in alphabetical order. So, for example, the string $CBAD$ will come after the string $CADB$. In which place does the string $CDAB$ occur? Answer like '45th'.