

SPRING 2013 McNABB GDCTM CONTEST  
PRE-ALGEBRA

NO Calculators Allowed

1. If 10% of  $a$  is  $b$  what is 10% of  $b$ ?

(A)  $100a$       (B)  $10a$       (C)  $a$       (D)  $.1a$       (E)  $.01a$

2. If 10 carpenters can build 10 cabinets in 10 days how many days does it take 20 carpenters to build 20 cabinets?

(A) 5      (B) 10      (C) 15      (D) 20      (E) 25

3. Express the fraction

$$\frac{1}{1 + \frac{1}{3 + \frac{1}{5}}}$$

in lowest terms.

(A)  $1/8$       (B)  $11/15$       (C)  $15/21$       (D)  $16/21$       (E)  $21/16$

4. The square root of 20000 lies between

(A) 130 and 131      (B) 140 and 141      (C) 141 and 142  
(D) 142 and 143      (E) 10,000 and 10,001

5. The last 6 digits of  $13^{426}$  are 000009. What is the sum of the last 6 digits of  $13^{1704}$ ?

(A) 18      (B) 19      (C) 20      (D) 21      (E) 22

6. In the repeating decimal  $0.\overline{71771}$ , in which decimal place does the 2013th 7 appear?

(A) 671st      (B) 2014th      (C) 2015th      (D) 3354th      (E) 3355th

7. How many positive factors does 2013 have?

(A) 6      (B) 8      (C) 10      (D) 12      (E) 14

8. If the integer  $\underline{4400b074}$  is divisible by 101, what must the digit  $b$  equal?
- (A) 0      (B) 2      (C) 3      (D) 5      (E) 8
9. The points  $A$ ,  $B$ ,  $C$ , and  $D$  are the vertices of a unit square. How many squares in the plane of these points (including  $ABCD$  itself) have two or more of them as vertices?
- (A) 4      (B) 6      (C) 9      (D) 12      (E) 13
10. The number of digits in the large number  $2^{50}$  is
- (A) between 6 and 10 inclusive  
(B) between 11 and 15 inclusive  
(C) between 16 and 20 inclusive  
(D) between 21 and 25 inclusive  
(E) 26 or more
11. Four indistinguishable roses and two indistinguishable tulips are to be arranged in a circle. Two such arrangements are considered to be the same if and only if each can be rotated into the other. How many distinct arrangements are possible?
- (A) 3      (B) 4      (C) 8      (D) 12      (E) 15
12. How many seconds are there in exactly six weeks?
- (A)  $7!$       (B)  $8!$       (C)  $9!$       (D)  $10!$       (E)  $12!$
13. The product of a certain integer and 180 is a perfect square. That certain integer must be divisible by
- (A) 2      (B) 3      (C) 4      (D) 5      (E) 6
14. A rectangle with area 125 has its sides in the ratio of 4 : 5. What is the perimeter of this rectangle?
- (A) 18      (B) 22.5      (C) 36      (D) 45      (E) 54

15. I have two numbers in mind. The first number leaves a remainder of 4159 when divided by 5153 while the second number leaves a remainder of 5149 when divided by 5153. What is the remainder when the sum of these numbers is divided by 5153?

(A) 3135      (B) 3455      (C) 4144      (D) 4155      (E) 4344

16. In the following triangular arrangement of the positive integers, in which column, counting from left to right, does 7021 appear?

$$\begin{array}{ccccccc}
 & & & & & & \cdot \\
 & & & & 5 & \cdots & \\
 & & 2 & 6 & \cdots & & \\
 & 1 & 3 & 7 & \cdots & & \\
 & & 4 & 8 & \cdots & & \\
 & & & 9 & \cdots & & \\
 & & & & & & \cdot
 \end{array}$$

(A) 43      (B) 51      (C) 52      (D) 84      (E) 99

17. Each face of a cube is numbered with a positive integer in such a way that the numbers on pairs of faces sharing an edge differ by at least two. What is the minimum possible sum of six such integers?

(A) 12      (B) 15      (C) 18      (D) 24      (E) 27

18. The value of

$$1 + 2 + 3 + 4 - 5 + 6 + 7 + 8 + 9 - 10 + \cdots + 46 + 47 + 48 + 49 - 50$$

is equal to

(A) 600      (B) 650      (C) 725      (D) 750      (E) 800