Fall 2011 McNabb GDCTM Contest
Pre-Algebra

NO Calculators Allowed

1. The sum
$$1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4}$$
   is equal to

   (A) 1/10   **(B)** 1/24   **(C)** 1/6   **(D)** 25/6   **(E)** 25/12

2. A certain number is doubled. The result is then increased by nine. This result is decreased by 3. If this last number is 28, what was the original number?

   (A) -4   **(B)** 0   **(C)** 7   **(D)** 11   **(E)** 28

3. A train travels 1 mile in 1 minute and 20 seconds. At this speed, how many miles will the train travel in 112 minutes?

   (A) 84   **(B)** 86   **(C)** 88   **(D)** 90   **(E)** 96

4. What is the number of square inches in a rectangle which measures $1\frac{1}{4}$ feet by $1\frac{1}{6}$ yards?

   (A) 35/24   **(B)** 35/2   **(C)** 70   **(D)** 120   **(E)** 630

5. Two sweaters, a pair of wool socks, and a coat cost $180. One sweater and the coat cost $ 130. How much does one sweater and a pair of wool socks cost?

   (A) $30   **(B)** $40   **(C)** $50   **(D)** $60   **(E)** $70

6. Five siblings, each a different age, split a gift of $200 in such a way that each child other than the youngest, gets ten dollars more than the next younger sibling. The youngest, of course, gets ten dollars less than the next to youngest. How much does the middle child receive?

   (A) $25   **(B)** $30   **(C)** $35   **(D)** $40   **(E)** $45

7. A given cone's dimensions are modified as described in the responses below. Which response does **not** change the volume?

   (A) double the height and halve the radius
   (B) halve the height and double the radius
   (C) quadruple the height and halve the radius
   (D) halve the height and quadruple the radius
   (E) quadruple the height and halve the radius twice

8. The sum of the first n positive integers is 210. What is the average of these first n positive integers?

   (A) 9   **(B)** 9.5   **(C)** 10   **(D)** 10.5   **(E)** 21

9. In a sequence of of matchstick diagrams the next diagram adds one more column of blocks built one block higher and attached to the right of the previous diagram. Shown are the first three diagrams in this sequence. What is the number of matchsticks in the 7th diagram of this sequence?

   (A) 70   **(B)** 72   **(C)** 74   **(D)** 76   **(E)** 78
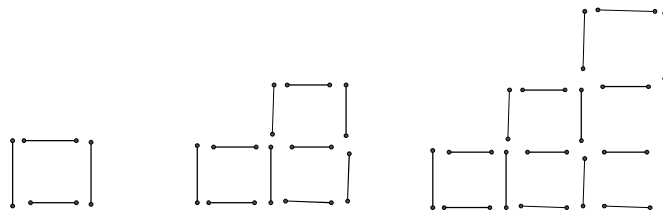
10. Amanda, Brice, and Carl all start working at SellMore with the same salary on the same day. They receive the following percent raises in their salary at the end of each of the first two years in order:

    Amanda: 5%, 3%

    Brice: 3%, 5%

    Carl: 4%, 4%,

    Which of them earns the most total over their first three years at SellMore?

    (A) Amanda   **(B)** Brice   **(C)** Carl
    (D) Amanda and Brice tied for the most   **(E)** All three tied for the most

11. From a regular deck of 52 cards three cards are dealt to you. What is the probability all three are red cards? Recall the red suites are hearts and diamonds.

    (A) 2/17   **(B)** 1/8   **(C)** 2/15   **(D)** 1/7   **(E)** 2/13

12. The value of
$$\frac{1^3 + 2^3 + 3^3 + 4^3 + \cdots + 17^3}{4^3 + 8^3 + 12^3 + 16^3 + \cdots + 68^3}$$
    is equal to

    (A) 1/4   **(B)** 1/16   **(C)** 1/64   **(D)** 1/68   **(E)** 1/192

13. In how many ways can 10 be written as a sum of one or more positive integers if order does not matter and no integer can be repeated in a given sum? Thus, for instance, $4 + 6$ is considered the same as $6 + 4$, and $5 + 5$ is not allowed.

    (A) 6   **(B)** 7   **(C)** 8   **(D)** 9   **(E)** 10

14. In square $ABCD$, square $WXYZ$ is inscribed in such a way that W is two-thirds of the way from A to B, X is two-thirds of the way from B to C, Y is two-thirds of the way from C to D, and Z is two-thirds of the way from D to A. If the area of $WXYZ$ is 100, what is the area of $ABCD$?

    (A) 150   **(B)** 160   **(C)** 170   **(D)** 180   **(E)** 200
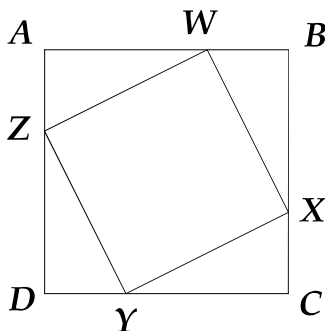
15. If a raindrop has a volume of 10 cubic millimeters, a certain school yard has dimensions 50 meters by 40 meters, and this yard receives 5 centimeters of rain, the number of raindrops that fell on the yard is

    (A) 10^9 **(B)** 10^{10} **(C)** 10^{11} **(D)** 10^{12} **(E)** 10^{13}

16. If $n^3 = 18 \cdot 96$, then n^2 is equal to

   (A) 36   (B) 81   (C) 121   (D) 144   (E) 196

17. Seven consecutive integers are written on a whiteboard. When one of them is erased, the sum of the remaining six integers is 857. What is the sum of the original seven integers?

   (A) 1001   (B) 1008   (C) 1015   (D) 1085   (E) 1092

18. How many factors of $51^5 \cdot 71^7 \cdot 91^9$ are perfect squares?

   (A) 1   (B) 60   (C) 180   (D) 192   (E) 900

19. Hezy and Zeke have a 6 hour drive to get to their grandparents house for Thanksgiving. Each will drive on their turn(s), if they have a turn, a positive whole number of hours. They can switch drivers or not as they wish, so long as they follow the rule of each driver driving a whole number of hours on their turn(s). They could even not switch at all. If Hezy starts the trip, in how many different ways of sharing (or not!) the driving, can they get to their grandparents?

   (A) 24   (B) 30   (C) 32   (D) 64   (E) 120

20. In how many ways can a group of ten students be split into two groups of five each?

   (A) 50   (B) 63   (C) 126   (D) 252   (E) $10 \cdot 9 \cdot 8 \cdot 7 \cdot 6$

21. The product of the repeating decimals $0.\overline{3}$ and $0.\overline{12}$ is

   (A) $0.\overline{03}$ (B) $0.\overline{04}$ (C) $0.\overline{36}$
   (D) $0.\overline{6}$ (E) not repeating

22. Blindfolded, Sue rolls two standard cubical dice. Her friend tells her that the sum of the two numbers rolled is less than six. What is the probability that Sue rolled snake-eyes, that is, two ones?

   (A) 1/36   (B) 1/18   (C) 1/12   (D) 1/11   (E) 1/10

23. Which of the following *cannot* be the number of zeros in which $n!$ ends?

   (A) 148   **(B)** 150   **(C)** 152   **(D)** 154   **(E)** 156

24. What is the smallest 4 digit prime number?

   (A) 1001   **(B)** 1003   **(C)** 1005   **(D)** 1007   **(E)** 1009

25. In how many ways can a 4×4 nailed down board be tiled by eight 1×2 dominoes? One way to tile the board is shown below.

   (A) 16   **(B)** 32   **(C)** 36   **(D)** 40   **(E)** 49