

FALL 2011 McNABB GDCTM CONTEST
ALGEBRA ONE

NO Calculators Allowed

1. 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
2. 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
3. The expression
$$3((a + 3b)4 + 2(5b + a))$$
is equivalent to the expression
(A) $18a + 22b$ (B) $15a + 22b$ (C) $42a + 42b$
(D) $15a + 66b$ (E) $18a + 66b$
4. How many subsets of $\{a, b, c, d, e\}$ have an odd number of elements?
(A) 0 (B) 2 (C) 4 (D) 8 (E) 16
5. 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) $2/13$
6. Xenia is three years older than Zyler. Eight years ago Zyler was half the age of Xenia. How many years from now will Xenia be $8/7$ ths the age of Zyler?
(A) 6 (B) 8 (C) 10 (D) 12 (E) 14

7. On the real number line, let point A have coordinate a and point B have coordinate b . What is the coordinate of the point between A and B which is four times closer to B than it is to A ?

- (A) $\frac{4a + b}{5}$ (B) $\frac{3a + b}{4}$ (C) $\frac{a + 4b}{5}$ (D) $\frac{a + 3b}{4}$ (E) $\frac{a + b}{2}$

8. The number of solutions of the equation

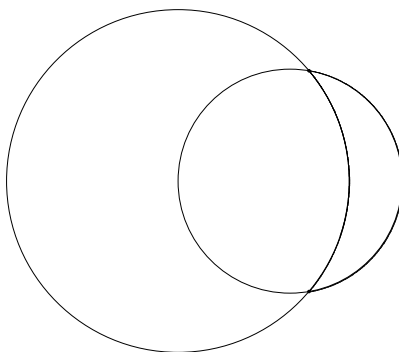
$$|x - 1| + |x - 2| = |x - 3|$$

is equal to

- (A) 0 (B) 1 (C) 2 (D) 3 (E) 4

9. The distance between the two centers of the two circles is 3, the center of the larger circle lies on the smaller circle, and the points of intersection of the two circles lie on the same diameter of the smaller circle. Find the area of that part of the smaller circle that lies outside of the larger circle.

- (A) 9 (B) $\pi/4$ (C) $9\pi/8 + 3\sqrt{2}/2$ (D) $3\pi - 3$ (E) 10



10. If $a < b < c < d < e$ which of the following must be true?

- (A) $ab < cd$
(B) $c - a < e - c$
(C) $a^2 < e^2$
(D) $ad + bc < ac + bd$
(E) $b + d < 2c$

11. 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}

12. Find the sum of all the factors of 280.

- (A) 440 (B) 540 (C) 600 (D) 640 (E) 720

13. The expression

$$a - (b + (c - (d + (e - f))))$$

is equivalent to

- (A) $a - b - c + d + e - f$
(B) $a - b - c + d - e - f$
(C) $a - b - c + d + e + f$
(D) $a - b + c - d + e - f$
(E) $a - b + c - d - e - f$

14. 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

15. 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

16. What is the smallest 4 digit prime number?
(A) 1001 (B) 1003 (C) 1005 (D) 1007 (E) 1009
17. If p people consume m pounds of mashed potato in h hours, then the pounds of mashed potato consumed by m people in p hours equals:
(A) mph (B) $\frac{m}{ph}$ (C) $\frac{m^2}{ph}$ (D) $\frac{m^2}{h}$ (E) $\frac{p^2}{m}$
18. If a positive integer n has exactly 12 factors, what is the difference between the greatest and least number of factors that n^2 could have?
(A) 22 (B) 23 (C) 24 (D) 25 (E) 27
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) 12 (B) 24 (C) 30 (D) 32 (E) 64
20. 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) $1/10$
21. How many of the numbers in this set below are irrational?
 $\{\sqrt{1.00}, \sqrt{1.01}, \sqrt{1.02}, \sqrt{1.03}, \dots, \sqrt{3.98}, \sqrt{3.99}\}$
(A) 299 (B) 294 (C) 290 (D) 286 (E) 150

22. Find the sum

$$1 \cdot 25 + 2 \cdot 24 + 3 \cdot 23 + 4 \cdot 22 + \cdots + 24 \cdot 2 + 25 \cdot 1$$

- (A) 2500 (B) 2725 (C) 2800 (D) 2825 (E) 2925

23. 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

24. If $a = \frac{1110}{1111}$, $b = \frac{2221}{2223}$, and $c = \frac{3331}{3334}$ which of the following is true?

- (A) $a > b > c$ (B) $b > a > c$ (C) $c > a > b$
(D) $c > b > a$ (E) $b > c > a$

25. In how many ways can the letters in the word *monsoon* be arranged so that the second *n* occurs before the third *o*?

- (A) 210 (B) 216 (C) 252 (D) 256 (E) 260