

## Number Sense I

### Example:

1 The positive integers  $A$ ,  $B$ ,  $A - B$ , and  $A + B$  are all prime numbers. The sum of these four primes is

(A) even (B) divisible by 3 (C) divisible by 5 (D) divisible by 7 (E) prime

2 A base-10 three-digit number  $n$  is selected at random. Which of the following is closest to the probability that the base-9 representation and the base-11 representation of  $n$  are both three-digit numerals?

(A) 0.3 (B) 0.4 (C) 0.5 (D) 0.6 (E) 0.7

3 Let  $n$  be a 5-digit number, and let  $q$  and  $r$  be the quotient and the remainder, respectively, when  $n$  is divided by 100. For how many values of  $n$  is  $q + r$  divisible by 11?

(A) 8180 (B) 8181 (C) 8182 (D) 9000 (E) 9090

4 What is the largest integer that is a divisor of  $(n+1)(n+3)(n+5)(n+7)(n+9)$  for all positive integer  $n$ ?

(A) 3 (B) 5 (C) 11 (D) 15 (E) 165

### Exercise:

1 In year  $N$ , the 300<sup>th</sup> day of the year is a Tuesday. In the year  $N + 1$ , the 200<sup>th</sup> day is also a Tuesday. On what day of the week did the 100<sup>th</sup> day of the year  $N - 1$  occur?

(A) Thursday (B) Friday (C) Saturday (D) Sunday (E) Monday

2 The digits 1, 2, 3, 4, 5, 6, 7, and 9 are used to form four two-digit prime numbers, with each digit used exactly once. What is the sum of these four primes?

(A) 150 (B) 160 (C) 170 (D) 180 (E) 190

3 For how many integers  $n$  is  $\frac{n}{20-n}$  the square of an integer?

(A) 1 (B) 2 (C) 3 (D) 4 (E) 10

4 There are 100 players in a singles tennis tournament. The tournament is single elimination, meaning that a player that loses a match is eliminated. In the first round, the strongest 28 players are given a bye, and the remaining 72 players are paired off to play. After each round, the remaining players play in the next round. The match continues until one player remains unbeaten. The total number of matches played is

(A) a prime number (B) divisible by 2 (C) divisible by 5 (D) divisible by 7 (E) divisible by 11

5 Patty has 20 coins consisting of nickels and dime. If her nickels were dimes and her dimes were nickels, she would have 70 cents more. How much are her coins worth?

(A) \$1.15 (B) \$1.20 (C) \$1.25 (D) \$1.30 (E) \$1.35

### Homework:

1 In the magic square shown, the sum of the numbers in each row, column, and diagonal are the same. Five of these numbers are represented by  $v$ ,  $w$ ,  $x$ ,  $y$ , and  $z$ . Find  $y + z$ .

$v$	24	$w$
18	$x$	$y$
25	$z$	21

(A) 43 (B) 44 (C) 45 (D) 46 (E) 47

2 A set of tiles numbered 1 through 100 is modified repeatedly by the following operation: remove all tiles numbered with a perfect square, and renumber the remaining tiles consecutively starting with 1. How many times must the operation be performed to reduce the number of tiles in the set to one?

(A) 10 (B) 11 (C) 18 (D) 19 (E) 20

3 The sum of the two 5-digit numbers  $AMC10$  and  $AMC12$  is 123422. What is  $A + M + C$ ?

(A) 10 (B) 11 (C) 12 (D) 13 (E) 14

4 A restaurant offers three desserts, and exactly twice as many appetizers as main courses. A dinner consists of an appetizer, a main course, and a dessert. What is the least number of main courses that the restaurant should offer so that a customer could have a different dinner each night in the year 2003?

(A) 4 (B) 5 (C) 6 (D) 7 (E) 8

5 The two digits in Jack's age are the same as Bill's age, but in reverse order. In five years Jack will be twice as old as Bill will be then. What is the difference in their current ages?

(A) 9 (B) 18 (C) 27 (D) 36 (E) 45