

1. If  $x$  is an integer, what is the value of  $x$ ?

- (1)  $|23x|$  is a prime number
- (2)  $2\sqrt{x^2}$  is a prime number.

2. If a positive integer  $n$  has exactly two positive factors what is the value of  $n$ ?

- (1)  $n/2$  is one of the factors of  $n$
- (2) The lowest common multiple of  $n$  and  $n + 10$  is an even number.

3. If  $0 < x < y$  and  $x$  and  $y$  are consecutive perfect squares, what is the remainder when  $y$  is divided by  $x$ ?

- (1) Both  $x$  and  $y$  have 3 positive factors.
- (2) Both  $\sqrt{x}$  and  $\sqrt{y}$  are prime numbers

4. Each digit of the three-digit integer  $N$  is a multiple of 4, what is the value of  $K$ ?

- (1) The units digit of  $K$  is the least common multiple of the tens and hundreds digit of  $K$
- (2)  $K$  is NOT a multiple of 3.

5. If  $a$ ,  $b$ , and  $c$  are integers and  $a < b < c$ , are  $a$ ,  $b$ , and  $c$  consecutive integers?

- (1) The median of  $\{a!, b!, c!\}$  is an odd number.
- (2)  $c!$  is a prime number

6. Set  $S$  consists of more than two integers. Are all the numbers in set  $S$  negative?

- (1) The product of any three integers in the list is negative
- (2) The product of the smallest and largest integers in the list is a prime number.

7. Is  $x$  the square of an integer?

- (1) When  $x$  is divided by 12 the remainder is 6
- (2) When  $x$  is divided by 14 the remainder is 2

8. Set  $A$  consist of 10 terms, each of which is a reciprocal of a prime number, is the median of the set less than  $1/5$ ?

- (1) Reciprocal of the median is a prime number
- (2) The product of any two terms of the set is a terminating decimal

9. If  $[x]$  denotes the greatest integer less than or equal to  $x$  for any number  $x$ , is  $[a] + [b] = 1$  ?

- (1)  $ab = 2$
- (2)  $0 < a < b < 2$

10. If  $N = 3^x \cdot 5^y$ , where  $x$  and  $y$  are positive integers, and  $N$  has 12 positive factors, what is the value of  $N$ ?

- (1) 9 is NOT a factor of  $N$
- (2) 125 is a factor of  $N$

BONUS QUESTION:

11. If  $x$  and  $y$  are positive integers, is  $x$  a prime number?

(1)  $|x - 2| < 2 - y$

(2)  $x + y - 3 = |1 - y|$