3. PROBLEMS

Problem 1. If k is a positive integer divisible by 9, and if $k < 200$, what is the greatest possible value of k?
(A) 99 (B) 189 (C) 197 (D) 198 (E) 199

Problem 2. which of the following numbers can be used to show that the statement below is FALSE?
All numbers that are divisible by both 6 and 9 are also divisible by 54.

(A) 162 (B) 108 (C) 9 (D) 72 (E) 54

Problem 3. On a rectangular gameboard that is divided into n rows of m squares each, k of these squares not lie along the boundary of the gameboard. Which of the following is a possible value for k?
(A) 15 (B) 25 (C) 35 (D) 49 (E) 52

Problem 4. When the positive integer s is divided 12, the remainder is 6. When the positive integer t is divided by 12, the remainder is 9. What is the remainder when the product st is divided by 9?
(A) 1 (B) 3 (C) 5 (D) 7 (E) 0

Problem 5. If x is an integer and $3x$ is divisible by 15, which of the following must be true?
I. x is divisible by 15.
II. x is divisible by 5.
III. x is an odd number.

(A) I only (B) II only (C) III only (D) I and II only (E) I, II, and III

Problem 6. If x is divisible by 7 and y is divisible by 8. Which of the following must be divisible by 56?
I. xy II. $7x + 8y$ III. $8x + 7y$

(A) I only (B) III only (C) I and II only (D) I and III only (E) I, II, and III

Problem 7. If a, b, c and d are different positive integers such that a is divisible by b, b is divisible by c, and c is divisible by d, which of the following statements must be true?
I. a is divisible by cd. II. a has at least 4 positive factors. III. $a = bcd$

(A) I only (B) II only (C) I and II (D) I and III only (E) I, II, and III

Problem 8. The four-digit number $\overline{6BB5}$ is divisible by 25. How many such four-digit numbers are there?
(A) 0 (B) 1 (C) 3 (D) 2 (E) 4

Problem 9. The five-digit number $\underline{31d26}$ is divisible by 3. Find the sum of all possible values of d.
(A) 18 (B) 16 (C) 15 (D) 14 (E) 8

Problem 10. The three-digit number $\underline{6x4}$ is divisible by 7. What is the value of x?
(A) 1 (B) 2 (C) 3 (D) 4 (E) 5

Problem 11. When Rachel divides her favorite number by 7, she gets a remainder of 5. What will the remainder be if she multiplies her favorite number by 5 and then divides by 7?
(A) 4 (B) 3 (C) 2 (D) 1 (E) 0

Problem 12. For what digit n is the five-digit number $3n85n$ divisible by 6?
(A) 0 (B) 1 (C) 2 (D) 3 (E) 4

Problem 13. What digit should replace the tens digit d so that the seven-digit number $5{,}376{,}5d4$ is divisible by 24?
(A) 4 (B) 3 (C) 2 (D) 1 (E) 0

Problem 14. How many 2-digit numbers are not divisible by 13?
(A) 90 (B) 83 (C) 13 (D) 7 (E) 84

Problem 15. How many numbers less than 100 and divisible by 3 are also divisible by 4?
(A) 96 (B) 42 (C) 8 (D) 25 (E) 33

Problem 16. There are 24 four-digit numbers which use each of the digits 1, 2, 3, 4. How many of these are divisible by 11?
(A) 10 (B) 6 (C) 5 (D) 4 (E) 8

Problem 17. Find a digit *d* that makes the three-digit number $\underline{2\ d\ 6}$ a multiple of 22.
(A) 1 (B) 4 (C) 5 (D) 8 (E) 2

Problem 18. A four-digit number uses each of the digits 1, 2, 3 and 4 exactly once. What is the probability that the number is a multiple of 4?
(A) 1/2 (B) 1/3 (C) 1/5 (D) 1/4 (E) 3/8

Problem 19. What is the greatest three-digit number that is divisible by 6?
(A) 999 (B) 998 (C) 997 (D) 996 (E) 993

Problem 20. If the four-digit number $\underline{5{,}7d\ 2}$ is divisible by 18, what is *d*?
(A) 4 (B) 3 (C) 2 (D) 1 (E) 0

Problem 21. What digit can replace *K* in the number $\underline{9K73K0}$ so that $\underline{9K73K0}$ will be divisible by 60?
(A) 4 (B) 3 (C) 2 (D) 1 (E) 0

Problem 22. How many different 4-digit numbers can be formed using the digits 2, 4, 5, 6, and 7 such that no digits repeat and the number is divisible by 4?
(A) 24 (B) 36 (C) 22 (D) 31 (E) 120

Problem 23. Given that *m* and *n* are digits, what is the sum of the values for *m* and *n* such that the five-digit number $m6{,}79n$ is divisible by 72?
(A) 4 (B) 3 (C) 7 (D) 10 (E) 5

☆**Problem 24.** (2011 AMC Problem 22) What is the tens digit of 7^{2011}?
(A) 0 (B) 1 (C) 3 (D) 4 (E) 7