

1. The smallest prime number that divides $5^{11} + 7^{13}$ is
 - a. 11
 - b. 7
 - c. 5
 - d. 2
 - e. not given

2. What is the 1995th digit in the decimal representation of the number $\frac{1}{13}$?
 - a. 3
 - b. 6
 - c. 7
 - d. 9
 - e. not given

3. At most how many different prime numbers must be tested to see if 2999 is a prime number?
 - a. 53
 - b. 27
 - c. 19
 - d. 16
 - e. not given

4. Determine the number of factors of 39039.
 - a. 8
 - b. 16
 - c. 24
 - d. 36
 - e. not given

5. What is the sum of all the odd three digit numbers that are divisible by 5?
 - a. 49,225
 - b. 98,450
 - c. 99,000
 - d. 10,000
 - e. not given

6. How many numbers between 131 and 259 are divisible by 3?
a. 41 b. 42 c. 43 d. 44 e. not given
7. Find the sum of 134_5 and 232_4 in base 9. All answers are stated in base 9.
a. 101 b. 110 c. 11 d. 1100 e. not given
8. How many consecutive counting numbers, starting with 8, must be added together to get at least a sum of 500?
a. 23 b. 24 c. 25 d. 26 e. not given
9. How many two-digit numbers are there that when each is subtracted from its reversal, the result is a perfect square.
a. 6 b. 14 c. 22 d. 30 e. not given
10. Find $3150_6 + 25_6$; All answers are given in base 6.
a. 126 b. 125 c. 115 d. 110 e. not given

11. A friend tells you that his house number has three digits. If you subtract 7 from it, the result is divisible by 7. If you subtract 8 from the original number, the result is divisible by 8 and if you subtract 9 from the original number, the result is divisible by 9. What is your friend's house number?

- a. 168 b. 252 c. 336 d. 504 e. not given

12. Which of the following properties of zero is the basis for excluding "division by zero"?

- a. $K + 0 = K$ for every integer K
b. $K + (-K) = 0$ for every integer K
c. 0 is its own additive inverse
d. $K \cdot 0 = 0$ for every integer K
e. not given

13. Find the sum of the natural numbers less than 30 that are relatively prime to 30?

- a. 119 b. 120 c. 129 d. 130 e. not given

14. Find the smallest positive integer with eighteen divisors.

- a. 768 b. 512 c. 324 d. 288 e. not given

15. If $(24_b)^2 = 554_b$, then $b =$

- a. 6 b. 7 c. 8 d. 9 e. not given

16. Given the decimal number $6x7y$. When $6x7y$ is divisible by 45. How many ordered pairs (x, y) of integral digits satisfy this statement.

- a. 4 b. 3 c. 2 d. 1 e. not given

17. Find the sum of the positive integral factors of 500?

- a. 591 b. 592 c. 1091 d. 1092 e. not given

18. Find the largest prime factor, in base seven, of 1163_7 . All answers are given in base seven.

- a. 23 b. 25 c. 32 d. 35 e. not given

19. Find the largest prime factor of $2^{20} - 1$

- a. 29 b. 31 c. 129 d. 257 e. not given

20. Find the largest number that leaves the same remainder when divided into the following four numbers: 887, 959, 1007, and 1187.

- a. 12 b. 19 c. 53 d. 137 e. not given

21. Find a in base five, which is the gcd of the three numbers b , c and d in the following.
 $a(b + c + d) = 223_5 + 314_5 + 33_5$. (a , b , c and d are also in base 5. and all answers are stated in base 5).

- a. 10 b. 12 c. 22 d. 23 e. not given

22. Once the following set of five numbers, $\{48, 72, 100, 120, 144\}$ are placed in order from the number with the least number of divisors to the number with the greatest number of divisors, which one of these five numbers would be third in this list?

- a. 48 b. 72 c. 100 d. 120 e. not given

23.. How many positive factors does $(10 \cdot 40)^5$ have

- a. 123 b. 200 c. 213 d. 321 e. not given

24. (a , b , c) are positive integers where $a < b, c$. The $\gcd(a, b, c) = 10$ and $\text{LCM}(a, b, c) = 1000$. Find the smallest possible integral value of b .

- a. 40 b. 50 c. 100 d. 200 e. not given

25. How many 3 digit numerals in base 4 are also 3 digit numerals when converted to base 6?

- a. 22 b. 28 c. 36 d. 42 e. not given

26. When a two digit positive integer is multiplied by the number which is two more than the units digit of the integer, the product has three digits, each of which is the tens digit of the original number. What is the 3-digit number?
- a. 111 b. 333 c. 555 d. 777 e. not given
27. The binary numeral 111.111_2 , written in base 10 notation equals
- a. 7.875 b. 14.875 c. 7.785 d. 78.75 e. not given
28. How many numbers of four different digits each can be formed using the digits 1, 2, 3, 4 so that each number is exactly divisible by 11?
- a. 8 b. 14 c. 17 d. 24 e. not given
29. Find the remainder when 2^{50} is divided by 7.
- a. 2 b. 3 c. 4 d. 5 e. not given
30. In how many zeros will $15!$ end when converted to base 12?
- a. 3 b. 4 c. 5 d. 6 e. not given