Scramble Round

Lexington High School

April 7, 2018

1. Calculate the number of primes between 1 and 300.
2. Calculate the number of numbers less than 2017^2.
3. Calculate the smallest multiple of 12345678910 that is greater than 111213141516171819.
4. Calculate 2^{40}.
5. Calculate the smallest integer n such that
$$\sum_{k=1}^{n} \frac{1}{k} > 10$$
6. Calculate the product of all composite numbers less than 30.
7. Calculate $10! \times 9! \times \cdots \times 1!$.
8. Calculate the smallest positive integers that is divisible by every integer from 1 to 30.
9. Calculate $1^3 + 2^3 + 3^3 + \cdots + 100^3 + 101^3$.
10. Calculate 3^{30}.
11. Calculate the last 2 digits of 42^{42}.
12. Calculate the 1000th digit in the number 12345678920222324...
13. Calculate the sum of all numbers less than 10^5 that do not contain a 0.
14. Calculate the number of positive integers less than 2018 that are relatively prime to 2018
15. Calculate the last 3 nonzero digits of 60!
16. Calculate the number of hours of anime had efang watched if he has watched $\frac{20}{18}$ of an hour every day from April 8th 2011 to April 7th 2018.
17. Calculate the value of $\binom{201}{8}$.
18. Calculate the number of ways are there to arrange 2 LMT teams of 6 people such that no one is next to a member of their team.
19. Calculate the number of times the minute and hour hand overlap in a leap year.
20. Calculate $\left\lfloor \sqrt[3]{987654321} \right\rfloor + \left\lceil \sqrt[3]{987654321} \right\rceil$.
21. Calculate $\frac{20}{18} + \frac{18}{20} + \frac{2018}{8102}$.
22. Calculate the sum of all 3 digit numbers that share at least 1 digit in the same place as 420.
23. Calculate $2 \uparrow\uparrow\uparrow 3$ if up arrow means repeated exponentiation, and each successive up means repeated of one less up arrow.
24. Calculate the largest integer n such that $n! < 10^{100}$.
25. Celsius the squirrel is guessing for HQ trivia. Calculate the number of years would one expect it to take him to guess all twelve 3-option multiple choice questions correctly if he plays once every hour.

26. Calculate 32!.
27. Set S has 25 elements. Calculate the number of subsets of S with a prime number of elements.
28. Calculate the smallest integer value of x such that $1.1^x > 3$
29. Calculate $1000^2 - 999^2 + 998^2 - ... - 1^2$
30. Calculate the number of zeroes at the end of $500! \times 499! \times 498! \times \cdots \times 1!$