Scramble Round

Lexington High School

March 23, 2019

1. Compute $\binom{20}{19}$.
2. Compute the remainder of $20! + 19!$ when divided by 23.
3. Compute 2019^2.
4. Compute
$$\sum_{n=1}^{2019} n^2(-1)^n.$$
5. Compute
$$\left\lfloor \sum_{k=1}^{2019} \frac{1}{k} \right\rfloor.$$
6. Compute 2019^3.
7. Compute $2019 + 2018 + \cdots + 2 + 1$.
8. Compute $1^1 + 2^2 + 3^3 + 4^4 + 5^5$.
9. Compute
$$\sum_{k=1}^{\infty} \frac{1}{2019^k}.$$
10. Compute $\lfloor 2019\pi \rfloor$.
11. Compute
$$2019^2 + 2018^2 + \cdots 2^2 + 1^2.$$
12. Compute $2019 + 20 + 19$.
13. Let $\triangle ABC$ be triangle such that $AB = 2018$, $BC = 2019$, $CA = 2020$. Find the length of altitude from A to BC.
14. Compute
$$20192019201920192019 + 2019201920192019 + 201920192019 + 20192019 + 2019.$$
15. Find the prime factorization of $2019^2 - 1$.
16. Let $\triangle ABC$ be a right triangle such that C is a right angle and $AC = 20, BC = 19$. Let D be the foot of altitude from C to AB. Find the length of BD.
17. Compute 2019^4.
18. Let γ be a circle such that its radius is 2019 and center at O. Let AB be the chord of circle and let point C be a point on AB such that $AC = 20$ and $BC = 19$. Find the length of CO.
19. Let $\sigma(n)$ be the sum of the positive divisors of n. Find $\sigma(2018) + \sigma(2019) + \sigma(2020)$.
20. Let $ABCD$ be a isosceles trapezoid such that $AB // CD$, $AB = 20, CD = 19, BC = AD = 2019$. Find the distance between AB and CD.
21. Compute $2018 \times 2019 \times 2020$.

22. Compute the greatest 4 digit prime number.
23. Compute
$$\sum_{n=1}^{2019} n^3.$$
24. Compute the value of
$$\sum_{n=0}^{2019} \left(1+\frac{n}{2}\right)^2$$
.
25. Compute the value of
$$\sum_{n=-2019}^{2019} n^2$$
26. Compute $\frac{1}{2019}$ to the nearest billionth.
27. Find the number of ordered pairs of integers (a,b) such that $a^2+b^2=1000$
28. Let $S(n)$ be the sum of the first n prime numbers. Find $S(20)+S(19)$.
29. Find the 20th smallest prime greater than 2019.
30. Find the number of trailing zeros in 2019!.