Scramble Round

Lexington High School

April 8, 2017

1. Compute
$$\frac{2+4+\cdots+2018}{1+3+\cdots+2017}+\frac{1+3+\cdots+2017}{2+4+\cdots+2018}.$$

2. Find the number of trailing zeros in
$$\prod_{i=1}^{2017} i!.$$

3. Compute the sum of the digits of 20^{17}.

4. Compute $1^2+2^2+\cdots+2017^2$.

5. Compute $\lfloor\sqrt{201700}\rfloor$.

6. Compute
$$\sum_{n=1}^{2017}\lfloor\sqrt{n}\rfloor.$$

7. Find the last three digits of $2017^{2016}-2016^{2015}+2015^{2014}-2014^{2013}$.

8. Compute
$$\sum_{a,b\in\mathbb{Z}_{\geq 0}}\frac{1}{20^a\cdot 17^b}.$$

9. Compute 2017^2.

10. Compute
$$\left(\sum_{n=1}^{20} n\right)\left(\sum_{n=1}^{17} n\right)=(1+2+3+\cdots+19+20)(1+2+3+\cdots+16+17).$$

11. Compute $1^2-2^2+3^2-4^2+5^2\cdots+2017^2$.

12. Compute the number of ordered pairs of nonnegative integers (m,n) which satisfy $20m+17n\leq 340$.

13. Compute 20^4-17^4.

14. Compute $\binom{20}{17}$.

15. For positive integers n, let $\sigma(n)$ denote the number of positive divisors of n. Find

$$\max_{1\leq n\leq 2017} \sigma(n).$$

16. Compute the number of positive integers less than 2017 which are relatively prime to 2016.

17. Compute $\frac{1}{20}+\frac{1}{17}+\frac{1}{2017}$.

18. Find the number of primes between 1 and 217, inclusive.

19. Find the last three digits of 17^{2017}.

20. Compute $20+17$.

21. Compute $20^2+19^2+18^2+17^2$.

22. Compute the number of four-digit positive integers with the same digit sum as 2017.

23. Find the last three digits of $2017^{2017!}-2017^{2017}$.

24. Compute

$$\sum_{n=1}^{2017} n = 1+2+3+\cdots+2016+2017.$$

25. Compute

$$\sum_{a,b\in\mathbb{Z}_{\geq 0}} \binom{20}{a}\binom{17}{b}.$$

26. Compute 20^2-17^2.

27. Compute

$$\sum_{n=1}^{2017} n\cdot(-1)^n = -1+2-3+4\cdots+2016-2017.$$

28. When all of the numbers from 1 to 2017 are written out, how many times does the digit 1 appear?

29. Find the sum of all four-digit positive integers that share at least one common digit with 2017.

30. Compute the number of positive integers less than 2017 which are relatively prime to 2017.