

- |           |  |           |  |
|-----------|--|-----------|--|
| _____ 1.  | Evaluate: $4.25^2$   | _____ 17. | The altitude of an equilateral triangle is 1. What is its area?  |
| _____ 2.  | Given that 2019 has exactly four factors, what is the largest prime factor of 2019?  | _____ 18. | The mean of $n$ numbers is 21. If we take a 27 out of the set, the mean is now 19. What is $n$ ?                 |
| _____ 3.  | A card is drawn from a standard 52 card deck and kept face down. If another card is drawn, what is the probability that the second card is an ace?   | _____ 19. | What is the maximum number of times a square and a circle may intersect?   |
| _____ 4.  | Find the sum of the factors of 24.   | _____ 20. | Evaluate: $\log_2(8192\sqrt{2})$   |
| _____ 5.  | Find the sum of the six smallest triangular numbers.   | _____ 21. | What is 2019% of 30?   |
| _____ 6.  | Write $>$ , $<$ , or $=$ :<br>$3^{\log 5}$ ( $>$ , $<$ , $=$ ) $5^{\log 3}$  | _____ 22. | Evaluate: $1111_3 + 1111_3 = x_{10}$   |
| _____ 7.  | Express $10110101_2$ in base 16.   | _____ 23. | Evaluate: $\sum_{i=1}^{10} \binom{10}{i}$  |
| _____ 8.  | Solve for $x$ : $3x - 1 = \frac{11}{9}x + \frac{7}{12}$  | _____ 24. | Evaluate: $\sum_{n=2}^{\infty} \frac{n}{2^n}$  |
| _____ 9.  | A region consists of two squares overlapping such that each has a vertex on the other's center. If a random point is chosen, what is the probability that it is in the overlapping region? | _____ 25. | Evaluate: $63 \times 32 - 45^2$  |
| _____ 10. | Given that the 9 <sup>th</sup> and 10 <sup>th</sup> Fibonacci numbers are 34 and 55, find the sum of the first ten Fibonacci numbers.  | _____ 26. | If $f(x) = 2 - x^2$ , at what values of $x$ does $f$ intersect its inverse?                                      |
| _____ 11. | Simplify: $\frac{12}{\sqrt{13}-2}$   | _____ 27. | What is $111 \times 111$ ?   |
| _____ 12. | What are the last two digits of $101^{101}$ ?  | _____ 28. | Evaluate: $41 \times 59 - 47 \times 53$  |
| _____ 13. | Find the product of the real zeros of $x^3 - 2019$ .   | _____ 29. | Evaluate: $36^2 + 48^2$  |
| _____ 14. | Simplify: $\sqrt{784}$   | _____ 30. | Compute: $\frac{1}{2} - \frac{3}{7} + \frac{1}{3}$   |
| _____ 15. | Jonathan rolls an 8-sided die (from 1-8) and then may roll a second time if he likes. If he plays optimally to obtain the greatest value, what is the expected value of his roll?          | _____ 31. | Solve for $x$ in the following:<br>$\log_2(x - 3) + \log_2(x - 5) = 3$   |
| _____ 16. | What is the 4 <sup>th</sup> natural number to have exactly three factors?  | _____ 32. | Find the sum of the distinct zeros of $x^3 - x^2 - x + 1$ .  |
|           |  | _____ 33. | Find the value of $5.2^2$ .  |
|           |  | _____ 34. | Given $x + \frac{1}{x} = 3$ , what is $(x + \frac{1}{x})^4$ ?  |
|           |  | _____ 35. | How many socks can you pull from 2019 pairs of socks until you are guaranteed a match?                           |
|           |  | _____ 36. | In a single-elimination tournament of 2019 players, what is the number of total games played to find the winner? |
|           |  | _____ 37. | Which is larger: $\frac{2019!}{2017!}$ or $\frac{2021!}{2019!}$ ?  |
|           |  | _____ 38. | Write $\frac{2}{101}$ as a repeating decimal.  |
|           |  | _____ 39. | What is the sum of the digits of $100000 - 98765$ ?  |
|           |  | _____ 40. | Find the sum of the squares of the first 8 Fibonacci numbers if the sequence begins 1,1,2,3,5...                 |