1. What is $10^{10} + 10^8 + 10^6 + 10^4 + 10^2 + 10^0$?
2. What is the probability that a randomly chosen word of this sentence has exactly four letters?
3. Alex the Katz is in the forest collecting flowers. Each flower has 7 petals, and in his final collection he sees 1001 petals. How many flowers does he have?
4. Banach and Tarski created a machine that can duplicate apples! If they put in an apple, it will clone it in 30 minutes. How long will it take to clone 36 apples, in hours?
5. Let $a\#b$ be defined as $ab - a - 3$. For example, $4\#5 = 20 - 4 - 3 = 13$. Compute $(2\#0)\#(1\#4)$.
6. A hedgehog has 4 friends on Day 1. If the number of friends he has increases by 5 every day, how many friends will he have on Day 2014?
7. If I add 21 to $\frac{1}{4}$ of a number, the result is $\frac{3}{5}$ of the number. What is this number?
8. Find the sum of the greatest common factor and the least common multiple of 12 and 18.
9. If 2 darps equals 4 derps, and 3 derps equals 5 dirps, then how many dirps equals 6 darps?
10. Let p_k be the k-th smallest positive prime number. Compute $p_1 + p_2 + \ldots + p_7$.
11. In a classroom there are girls, boys, and teachers. There are twice as many teachers as girls, there are 6 more boys than girls, and there are 38 people in the room in total. How many total children are in the room?
12. The length of Alex's rectangle is three times the length of Kelvin's rectangle, and the width of Alex's rectangle is three times the width of Kelvin's rectangle. If the area of Kelvin's rectangle is 12, what is the area of Alex's rectangle?
13. Let $P(x) = (x+1)(x+2)(x+3)\ldots(x+2013)(x+2014)$. What is $\frac{P(1)}{P(0)}$?
14. A cubic storage box has a surface area of 294 square feet. What is the length of each edge of the box?
15. Lev scores 91, 89, 88, 94, 87, 85 on his first 6 tests. After having his final exam, he (correctly) states that the average of all 7 of his test scores is equal to his final exam score. What was Levs final exam score?
16. A bank contains 70 coins consisting of nickels and dimes. The total value of the coins is \$5.55. What is the positive difference between the number of dimes and the number of nickels?
17. 11 consecutive integers sum to 1331. What is the largest of the 11 integers?
18. Find all values of x such that $\frac{x^2+1}{x-1} = \frac{x^2-1}{x+1}$.
19. In Asian cultures the number 4 is considered unlucky (much like 13 in Western culture). As such, in skyscrapers, floor numbers containing the number "4" are omitted. Jason sees that the top floor of a certain building is labeled "88". Jason knows that the building has no basement. How many floors does this building have?
20. Jala's garden is a circle with radius 6 units. The path around the garden is also circular, with a constant width of 3 units. In terms of π, what is the area of the path?
21. The sum of two integers is 8. The sum of the squares of those two integers is 34. What is the product of the two integers?
22. Young Guy walks at a speed of 3 feet per second. When he decides to chase someone, he runs at 7 feet per second. On Monday Young Guy went for a stroll, walking 42 feet away from his house. He then spotted Arjun, and decided to chase him back to his house, covering the same distance of 42 feet. What was Young Guys average speed over his entire journey?
23. The side length of a cube is increased by 20%. The surface area of the cube then increases by x% and the volume of the cube increases by y%. Find $5(y - x)$.
24. Abhi the Ram is trying to break down a door with his horns. The door is 4 inches thick, and the first time he runs into the door he breaks through 1.5 inches of wood. On each subsequent run, he breaks through $\frac{3}{4}$ times the amount he broke through the previous time. For example, his second run will break through 1.125 inches of wood. This continues until he has broken through the door completely. How many times will Abhi the Ram have to run into the door?

25. Kelvin the Frog and Alex the Kat play a game. They alternate rolling a standard 6-sided die, and win if they roll either an even number or a number that was previously rolled. If Kelvin the Frog goes first, what is the probability that Alex the Kat wins?

26. For how many positive integer values of x is $4^x - 1$ prime?

27. Alex the Kat has written x problems for a math contest. He observes that if he submits another x problems, he will have written half of the total number of problems. What fraction of the problems has he written now?

28. A cube has integer side length greater than one, and the numerical volume of the cube is equal to the numerical area of a square with integer side length. What is the minimum possible volume of the cube?

29. If a triangle has three altitudes of lengths 6, 6, and 6, what is its perimeter?

30. Points D, E, F, and G lie outside unit square $ABCD$ such that ADB, BEC, CFD, and DGA are all equilateral triangles. Find the area of square $DEFG$.

31. Sunay is training to make MOP. Currently he will score a 0 on the AMC, the AIME, and the USAMO. He can expend 3 units of effort to gain 6 points on the AMC, 7 units of effort to gain 10 points on the AIME, and 10 units of effort to gain 1 point on the USAMO. He will need to get at least 200 points on the AMC and AIME combined and get at least 21 points on the USAMO to make MOP. What is the minimum amount of effort he can expend to make MOP?

32. Young Guy likes to make friends with numbers, so he calls a number "friendly" if the sum of its digits is equal to the product of its digits. How many 3 digit friendly numbers are there?

33. Andy, Brittany, Christina, Daniel, and Evan are all in a line. How many ways can they stand so that the two girls are not next to each other?

34. If x is a positive integer such that $x^2 = 2^{64}$, y is a number such that $x^x = 2^y$, and z is a number such that $y = 2^z$, compute z.

35. An isosceles triangle has side lengths $x - 4, 2x - 9$, and $3x - 15$. Find the sum of all possible values of x.

36. There are 3 values of x such that the mean and median of the numbers 2, 4, 7, 11, and x are equal. Find the sum of these 3 values.

37. A regular polygon is inscribed in a circle. The circle has an area of 16π units and each side of the polygon has a length of 4 units. How many sides does the inscribed polygon have?

38. A bus can hold 60 passengers. One person is picked up at the first stop, 2 people are picked up at the second stop, 3 people are picked up at the third stop, and so on. Every three stops (i.e. at the third stop, the sixth stop, etc.), 2 people get off the bus. How many stops will it take for the bus to become full?

39. Compute $102^4 - 8 \cdot 102^3 + 24 \cdot 102^2 - 32 \cdot 102 + 16$.

40. What is the smallest positive integer with exactly 7 factors?

41. Find the product of all values of x satisfying $(x + 4)^{3x+1} = 1$.

42. Three unit circles are each externally tangent to each other. Find the area of the smallest equilateral triangle that contains each of these three circles.

43. The pages of a book are numbered in order starting with **zero**. If exactly 2014 digits were printed, how many pages are in the book?

44. Let $a_0 = 1$ and $a_n = \sqrt{(n+2)a_{n-1} + 1}$ for $n \geq 1$. Find a_{2014}.

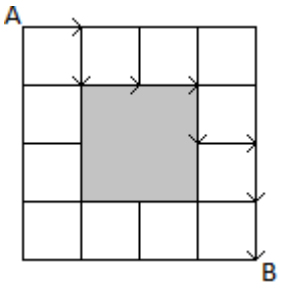
45. Kelvin the Frog and Zack the Orangutan stand on opposite corners of a square of side length 1. They both have poor vision and can only see things within 1 unit of themselves. AJ the Denace the Mennis randomly throws a stone into the square. What is the probability that both Kelvin and Zack can see the stone?

46. A right triangle has one side length of length 15, and one of the other two side lengths is twice the other. What is the product of all possible values for the smallest side length of the triangle?

47. Zack picks a positive integer k. Stier then adds all the numbers from 1 to k, including k. He then realizes that this sum is divisible by 24. What's the smallest value of k Zack could have chosen?

48. Four distinct positive integers a, b, c, d satisfy the equations $a + b + c + d = 11$ and $ab + cd = 11$. Compute the product of all four integers.

49. A figure consists of a 4x4 grid of unit squares with a 2x2 hole in the middle. Kelvin the Frog starts at corner A, and wishes to reach the opposite corner B through a series of hops, each of which are either 1 unit to the right or one unit down. In how many ways is this possible? One possible path is shown.



50. ABC is a right triangle with right angle $B, AB = 10$, and $BC = 24$. Let M be the midpoint of AC. Circle O_1 is inscribed in triangle ABM, and circle O_2 is inscribed in triangle BCM. Let r_1 be the radius of O_1, and let r_2 be the radius of O_2. Find the value of $r_1 r_2$.